

Annual Summary of Communicable Diseases Reported to the Minnesota Department of Health, 2007

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 control professional 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 and food-borne diseases.

Isolates for pathogens associated 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.

Table 2 summarizes cases of selected communicable diseases reported during 2007 by district of the patient's residence. Pertinent observations for some of these diseases are discussed 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 may be categorized as occurring within the seven-county Twin Cities metropolitan area (metropolitan area) or outside of it in Greater Minnesota.

Anaplasmosis

Human anaplasmosis (HA) (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). The same tick also transmits the agents of Lyme disease and babesiosis.

In 2007, a record number of 322 HA cases (6.2 per 100,000 population) were reported (Figure 1). This represents an 83% increase from the
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Table 1. Diseases Reportable to the Minnesota Department of Health

Report Immediately by Telephone

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

Report Within One Working Day

Amebiasis (<i>Entamoeba histolytica/dispar</i>)	Malaria (<i>Plasmodium</i> spp.)
Anaplasmosis (<i>Anaplasma phagocytophilum</i>)	Meningitis (caused by viral agents)
Arboviral disease (including but not limited to, LaCrosse encephalitis, eastern equine encephalitis, western equine encephalitis, St. Louis encephalitis, and West Nile virus)	Mumps
Babesiosis (<i>Babesia</i> spp.)	Neonatal sepsis, less than 7 days after birth (bacteria isolated from a sterile site, excluding coagulase-negative <i>Staphylococcus</i>) a, b
Blastomycosis (<i>Blastomyces dermatitidis</i>)	Pertussis (<i>Bordetella pertussis</i>) a
Campylobacteriosis (<i>Campylobacter</i> spp.) a	Psittacosis (<i>Chlamydophila psittaci</i>)
Cat scratch disease (infection caused by <i>Bartonella</i> spp.)	Retrovirus infection
Chancroid (<i>Haemophilus ducreyi</i>) c	Reye syndrome
<i>Chlamydia trachomatis</i> infection c	Rheumatic fever (cases meeting the Jones Criteria only)
Coccidioidomycosis	Rocky Mountain spotted fever (<i>Rickettsia rickettsii</i> , <i>R. canada</i>)
Cryptosporidiosis (<i>Cryptosporidium</i> spp.) a	Salmonellosis, including typhoid (<i>Salmonella</i> spp.) a
Cyclosporiasis (<i>Cyclospora</i> spp.) a	Shigellosis (<i>Shigella</i> spp.) a
Dengue virus infection	<i>Staphylococcus aureus</i> (vancomycin-intermediate <i>S. aureus</i> [VISA], vancomycin-resistant <i>S. aureus</i> [VRSA], and death or critical illness due to community-associated <i>S. aureus</i> in a previously healthy individual) a
<i>Diphyllobothrium latum</i> infection	Streptococcal disease (all invasive disease caused by Groups A and B streptococci and <i>S. pneumoniae</i>) a, b
Ehrlichiosis (<i>Ehrlichia</i> spp.)	Syphilis (<i>Treponema pallidum</i>) c
Encephalitis (caused by viral agents)	Tetanus (<i>Clostridium tetani</i>)
Enteric <i>E. coli</i> infection (<i>E. coli</i> O157:H7, other enterohemorrhagic [Shiga toxin-producing] <i>E. coli</i> , enteropathogenic <i>E. coli</i> , enteroinvasive <i>E. coli</i> , enterotoxigenic <i>E. coli</i>) a	Toxic shock syndrome a
<i>Enterobacter sakazakii</i> (infants under 1 year of age) a	Toxoplasmosis (<i>Toxoplasma gondii</i>)
Giardiasis (<i>Giardia lamblia</i>)	Transmissible spongiform encephalopathy
Gonorrhea (<i>Neisseria gonorrhoeae</i>) c	Trichinosis (<i>Trichinella spiralis</i>)
<i>Haemophilus influenzae</i> disease (all invasive disease) a,b	Tuberculosis (<i>Mycobacterium tuberculosis</i> complex) (Pulmonary or extrapulmonary sites of disease, including laboratory confirmed or clinically diagnosed disease, are reportable. Latent tuberculosis infection is not reportable.) a
Hantavirus infection	Typhus (<i>Rickettsia</i> spp.)
Hepatitis (all primary viral types including A, B, C, D, and E)	Unexplained deaths and unexplained critical illness (possibly due to infectious cause) a
Histoplasmosis (<i>Histoplasma capsulatum</i>)	Varicella-zoster disease
Human immunodeficiency virus (HIV) infection, including Acquired Immunodeficiency Syndrome (AIDS) a, d	(1. Primary [chickenpox]: unusual case incidence, critical illness, or laboratory-confirmed cases. 2. Recurrent [shingles]: unusual case incidence, or critical illness.) a
Influenza (unusual case incidence, critical illness, or laboratory confirmed cases) a, e	<i>Vibrio</i> spp. a
Kawasaki disease	Yellow fever
<i>Kingella</i> spp. (invasive only) a, b	Yersiniosis, enteric (<i>Yersinia</i> spp.) a
Legionellosis (<i>Legionella</i> spp.) a	
Leprosy (Hansen's disease) (<i>Mycobacterium leprae</i>)	
Leptospirosis (<i>Leptospira interrogans</i>)	
Listeriosis (<i>Listeria monocytogenes</i>) a	
Lyme disease (<i>Borrelia burgdorferi</i>)	

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

Methicillin-resistant *Staphylococcus aureus*

- | | |
|---|---|
| <p>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.</p> | <p>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.</p> <p>c Report on separate Sexually Transmitted Disease Report Card.</p> <p>d Report on separate HIV Report Card.</p> <p>e For criteria for reporting laboratory confirmed cases of influenza, see www.health.state.mn.us/divs/idepc/dtopics/reportable/index.html.</p> |
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Table 2. Cases of Selected Communicable Diseases Reported to the Minnesota Department of Health, by District of Residence, 2007

District*
(population per U.S. Census 2007 estimates)

Disease	Metropolitan (2,794,796)	Northwestern (153,381)	Northeastern (320,637)	Central (709,386)	West Central (228,559)	South Central (286,848)	Southeastern (484,905)	Southwestern (219,109)	Unknown Residence	Total (5,197,621)
Anaplasmosis	82	23	45	148	10	3	11	0	0	322
Arboviral disease										
LaCrosse	0	0	0	1	0	0	0	0	0	1
West Nile	19	17	4	6	32	3	2	18	0	101
Babesiosis	8	1	6	5	1	0	3	0	0	24
Campylobacteriosis	463	12	30	130	37	43	130	62	0	907
Cryptosporidiosis	67	4	20	37	29	42	68	35	0	302
<i>Escherichia coli</i> O157 infection	91	3	4	34	7	3	18	5	0	165
Hemolytic Uremic Syndrome	11	0	0	3	1	0	3	0	0	18
Giardiasis	561	7	46	72	23	43	62	16	74	904
<i>Haemophilus influenzae</i> invasive disease	41	7	6	10	2	2	12	2	0	82
HIV infection other than AIDS	200	2	5	10	3	2	7	0	0	229
AIDS (cases diagnosed in 2007)	134	1	6	7	1	4	3	3	0	159
Legionellosis	20	0	1	3	0	3	3	1	0	31
Listeriosis	3	0	0	1	0	2	0	0	0	6
Lyme disease	558	41	109	376	27	18	103	7	0	1,239
Meningococcal disease	11	1	0	4	2	0	4	0	0	22
Mumps	17	0	1	6	0	2	1	1	0	28
Pertussis	297	7	8	16	12	8	45	0	0	393
Salmonellosis	404	13	27	98	16	26	98	30	0	709
Sexually transmitted diseases	11,965	247	860	1,266	189	533	992	373	632	17,057
<i>Chlamydia trachomatis</i> - genital infections	9,028	221	715	1,102	171	491	845	337	502	13,412
Gonorrhea	2,772	26	145	158	16	42	143	34	123	3,459
Syphilis, total	165	0	0	6	2	0	4	2	7	186
Primary/secondary	55	0	0	1	1	0	1	0	1	59
Early latent**	53	0	0	0	0	0	0	0	2	55
Late latent***	57	0	0	5	1	0	3	2	4	72
Congenital	0	0	0	0	0	0	0	0	0	0
Other †	0	0	0	0	0	0	0	0	0	0
Chancroid	0	0	0	0	0	0	0	0	0	0
Shigellosis	171	22	6	17	6	3	6	7	0	238
<i>Streptococcus pneumoniae</i> invasive disease	318	34	54	100	29	48	60	21	0	664
Streptococcal invasive disease - Group A	94	6	18	23	2	8	13	9	0	173
Streptococcal invasive disease - Group B	187	18	24	36	11	13	31	11	0	331
Toxic Shock Syndrome	2	1	3	1	0	0	0	2	0	9
Tuberculosis	187	0	3	13	2	4	24	5	0	238
Viral hepatitis, type A	61	1	2	8	3	2	8	9	0	94
Viral hepatitis, type B (acute infections only, not perinatal)	12	2	1	2	0	3	3	2	0	25
Viral hepatitis, type C (acute infections only)	12	0	6	3	0	2	4	1	0	28
Yersiniosis	8	1	1	4	1	2	7	0	0	24

*Cases for which the patient's residence is unknown are assigned the geographic location of the reporting clinic

**Duration ≤1 year

***Duration >1 year

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

County Distribution within Districts

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

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

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

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

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

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

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

Southwestern - Big Stone, Chippewa, Cottonwood, Jackson, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Redwood,

Renville, Rock, Swift, Yellow Medicine

continued...

176 cases in 2006 (3.4 per 100,000) and a 73% increase from the previous record of 186 cases in 2005 (3.6 per 100,000). It is also markedly higher than the median number of cases reported annually from 1996 to 2004 (median, 76 cases; range, 14 to 139). Two hundred four (63%) case-patients reported in 2007 were male. The median age of case-patients was 58 years (range, 4 to 92 years), 17 years older than the median age of Lyme disease cases. Onsets of illness peaked in June (33% of cases), earlier in the season than Lyme disease. In 2007, 40% of HA case-patients were hospitalized for their infection, for a median duration of 4 days (range, 1 to 26 days). One case-patient died from complications of HA in 2007.

HA co-infections with Lyme disease and/or babesiosis can occur from the same tick bite. During 2007, 18 (6%) HA case-patients also had objective evidence of Lyme disease, and three (1%) had evidence of babesiosis. Because of under-detection, these numbers may underestimate the true frequency of co-infections.

The risk for HA is highest in many of the same Minnesota counties where the risk of Lyme disease is greatest. In 2007, 140 (59%) of 237 case-patients with a single known county of exposure in Minnesota were exposed in Aitkin, Cass, or Crow Wing counties. About half of anaplasmosis case-patients in 2007 (133 [51%] of 262 cases with a known activity) were most likely exposed to *I. scapularis* ticks at their home property.

Arboviral Disease

LaCrosse 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, 441 human cases (including 14 fatalities) were reported from 2002 to 2007. In 2007, WNV cases were reported from 43 states; nationwide, 3,623 human cases of WNV disease were reported, including 124 fatalities. The largest WNV case counts during 2007 occurred in Colorado (576 cases), California (380 cases), and North Dakota (369 cases). Most of the states with large case totals were Great Plains states, and WNV transmission to humans was especially

intense in the northern Great Plains and adjacent areas (2,318 [98.5%] of 2,353 western Canada's WNV cases in 2007 were residents of Manitoba, Saskatchewan, or Alberta).

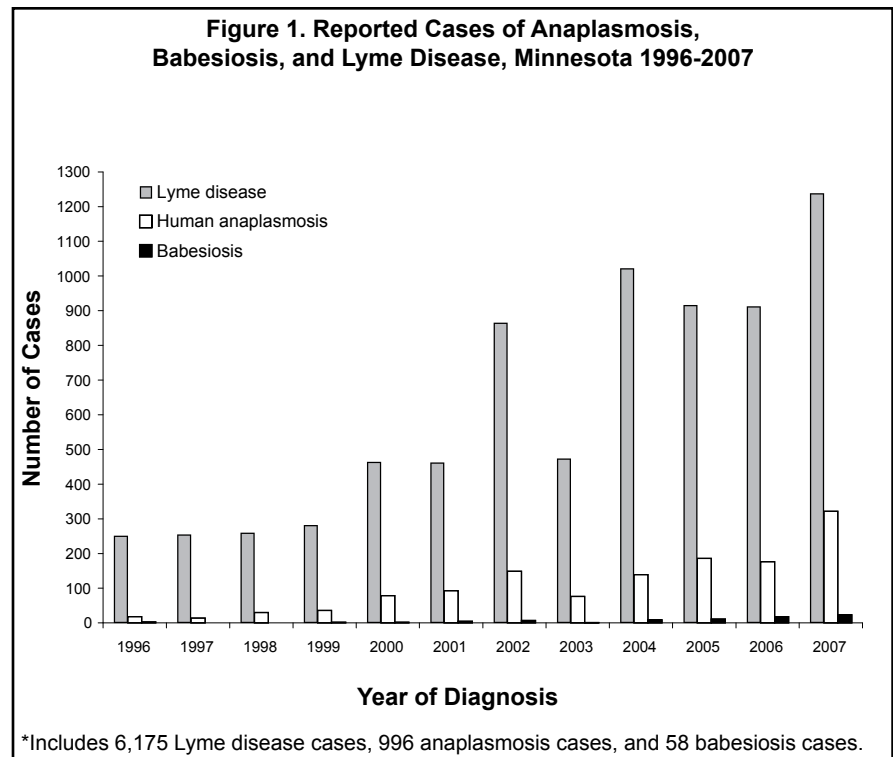
In Minnesota, 101 cases of WNV disease were reported in 2007 (the highest total since 148 cases were reported in 2003). Fifty-eight (57%) case-patients had West Nile (WN) fever; 23 (23%) had meningitis, and 20 (20%) had encephalitis. The median age of all WN case-patients was 52 years (range, 3 to 86 years); WN encephalitis patients were older (median, 70 years; range, 18 to 86 years). Two WN encephalitis patients (62 and 72 years old) died from their illness. Seventy-six cases (75%) occurred among residents of western and central Minnesota. Statewide WNV incidence was 1.9 cases per 100,000, but ranged up to 148.6, 104.7, and 66.6 cases per 100,000 in Big Stone, Norman, and Kittson counties, respectively. The 2007 WNV transmission season was the longest in Minnesota to date; the earliest case-patient had onset of symptoms on June 25; the latest on October 12. Similar to previous years, the peak in illness onsets was from July 15 through September 15 (85 [84%] cases).

The field ecology of WNV is complex. The virus 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. In 2007, warm spring and early summer weather lead to early and efficient amplification of WNV between birds and mosquitoes and an unusually large early season peak in vector numbers, likely contributing to the increased incidence of human cases. Interpreting the effect of weather on WNV transmission is 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. Until 2007, locally acquired cases of WNV disease were absent in the northeastern third of Minnesota, which corresponds to the region where *Cx. tarsalis* is rare or absent. However three cases with possible local exposure (St. Louis County [n=2] and Koochiching County) were reported during 2007.

During 2007, only one case of LaCrosse encephalitis was reported to MDH. The disease, which primarily affects children, is transmitted through the bite of infected *Aedes triseriatus* (Eastern

Figure 1. Reported Cases of Anaplasmosis, Babesiosis, and Lyme Disease, Minnesota 1996-2007



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 2007, 123 cases were reported from 21 southeastern Minnesota counties, with a median of five cases (range, 1 to 13 cases) reported annually. The median case-patient age was 6 years. Disease onsets have been reported from June through September, but most onsets have occurred from mid-July through mid-September.

Babesiosis

Babesiosis is a malaria-like illness caused by the protozoan *Babesia microti*. This parasite is transmitted to humans by bites from *Ixodes scapularis* (the blacklegged tick or deer tick), the same vector that transmits the agents of Lyme disease and human anaplasmosis (HA). *B. microti* can also be transmitted by blood transfusion.

In 2007, a record number of 24 babesiosis cases (0.5 per 100,000 population) were reported. This is a 22% increase from the previous record of 18 cases (0.4 per 100,000) in 2006. The frequency of babesiosis cases since 2006 is notably higher than the median number of cases reported annually from 1996 to 2005 (median, 2 cases; range, 0 to 10). Nineteen (79%) babesiosis case-patients reported in 2007 were male. The median age of case-patients was 63.5 years (range, 17 to 101 years). The peak in onsets of illness occurred in July and August (14 cases [61%]). In 2007, 74% of case-patients were hospitalized for their infection, for a median duration of 6 days (range, 2 to 15 days). One case-patient died from complications of babesiosis in 2007.

Babesiosis co-infections with Lyme disease or HA can occur from the same tick bite, although the majority of babesiosis infections are asymptomatic. During 2007, four (17%) babesiosis case-patients also had objective evidence of Lyme disease, and three (13%) had objective evidence of HA.

The risk for babesiosis is highest in many of the same Minnesota counties where the risk of Lyme disease and HA is greatest, especially in east-central

and north-central Minnesota and western Wisconsin.

Campylobacteriosis

Campylobacter continues to be the most commonly reported bacterial enteric pathogen in Minnesota (Figure 2). There were 907 cases of culture-confirmed *Campylobacter* infections reported in 2007 (17.5 per 100,000 population). This is similar to the 899 cases reported in 2006 and to the median annual number of cases reported from 2001 to 2006 (median, 918 cases; range, 843 to 953). In 2007, 51% of cases occurred in people who resided in the metropolitan area. Of the 868 *Campylobacter* isolates confirmed and identified to species by MDH, 90% were *C. jejuni* and 8% were *C. coli*.

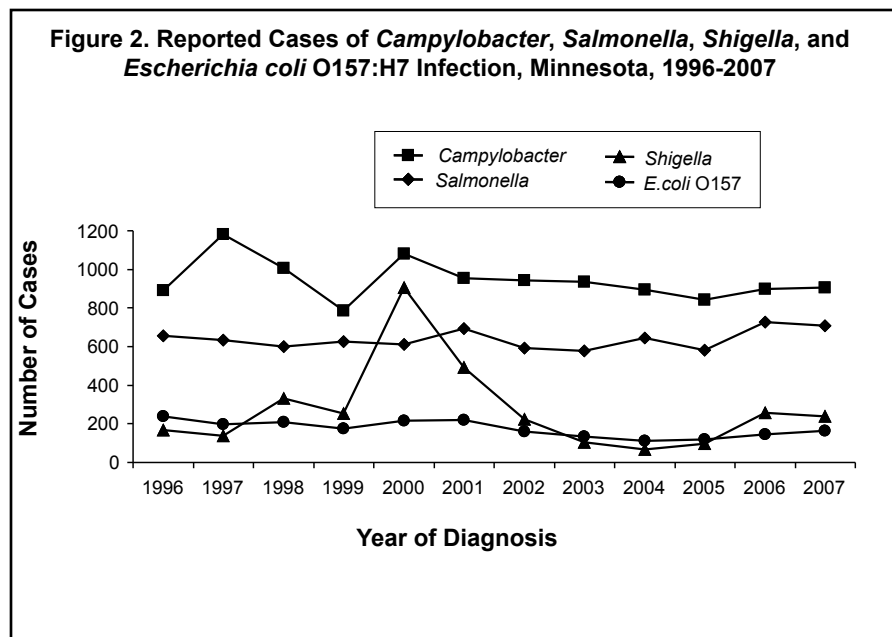
The median age of case-patients was 32 years (range, 1 month to 92 years). Forty-six percent of cases were between 20 and 49 years of age, and 14% were 5 years of age or younger. Fifty-seven percent of cases were male. Eleven percent of case-patients were hospitalized; the median length of hospitalization was 2 days. Forty-six percent of infections occurred during June through September. Of the 806 (89%) case-patients for whom data were available, 176 (22%) reported travel outside of the United States during the week prior to illness onset. The most common travel destinations were Central or South America or the Caribbean (n=44), Mexico (n=41), Europe (n=30), and Asia (n=22). There was one outbreak of campylobacteriosis

identified in Minnesota in 2007; this was an outbreak of *C. upsaliensis* infections associated with contact with cats from a local humane society.

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 2007, the overall proportion of quinolone resistance among *Campylobacter* isolates tested was 23% (a slight increase from 2006). However, 64% 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. Twelve percent of *Campylobacter* isolates from patients who acquired the infection domestically were resistant to fluoroquinolones.

Cryptosporidiosis

During 2007, 302 confirmed cases of cryptosporidiosis (5.8 per 100,000 population) were reported. This is the highest number of cases ever reported in Minnesota, and is 75% higher than the median number of cases reported annually from 1996 to 2006 (median, 173 cases; range, 81 to 242). The median age of case-patients in 2007 was 20 years (range, 1 month to 101 years). Children 10 years of age or younger accounted for 37% of cases. Sixty-seven percent of cases occurred during July through October. continued...



The incidence of cryptosporidiosis in the Southwestern, South Central, Southeastern, and West Central districts (16.0, 14.6, 14.0, and 10.1 cases per 100,000, respectively) was significantly higher than the statewide incidence. Only 67 (22%) reported cases occurred among residents of the metropolitan area (2.4 per 100,000). Forty-eight (16%) case-patients required hospitalization, for a median of 3 days (range, 1 to 20 days). Two cases were known to be HIV-infected. Three case-patients with cryptosporidiosis died; all had underlying health conditions.

Five outbreaks of cryptosporidiosis were identified in 2007, accounting for 21 laboratory-confirmed cases. An outbreak in a child daycare setting accounted for two laboratory-confirmed cases. Three recreational waterborne outbreaks occurred, including 20 cases (five laboratory-confirmed) associated with a membership club swimming pool, 60 cases (three laboratory-confirmed) associated with a hotel water park, and 33 cases (nine laboratory-confirmed) associated with a membership club swimming pool. One foodborne outbreak with two laboratory-confirmed cases was associated with an event at a private home.

***Escherichia coli* O157 Infection and Hemolytic Uremic Syndrome (HUS)**

During 2007, 165 culture-confirmed cases of *Escherichia coli* O157 infection (3.2 per 100,000 population) were reported. The number of reported cases is similar to the median number of cases reported annually from 1997 to 2006 (median, 168 cases; range, 110 to 219) but represents a 12% increase from the 147 cases reported in 2006 and the highest count since 2001. During 2007, 91 (55%) cases occurred in the metropolitan area. One hundred twenty-six (76%) cases occurred during May through October. The median age of case-patients was 20 years (range, 5 months to 85 years). Twenty-five percent of case-patients were 7 years of age or younger. Seventy (42%) case-patients were hospitalized; the median duration of hospitalization was 3 days (range, 1 to 28 days). None died.

In addition to the 165 culture-confirmed *E. coli* O157 cases, 67 cases of Shiga-toxin producing *E. coli* (STEC) infection were identified in 2007. Of those, culture-confirmation was not possible

in 24, and therefore it is unknown if those were O157 or another serogroup. Serogroups other than O157 accounted for the remaining 43 STEC cases. *E. coli* O111, O103 and O26 represented 70% of all non-O157 STEC, with 10 case-isolates of each.

Six *E. coli* O157 outbreaks were identified during 2007. Four of the outbreaks involved foodborne transmission. One outbreak involved contact with animals, and one involved person-to-person transmission.

From March through May, 10 cases with the same pulsed-field gel electrophoresis (PFGE) subtype of *E. coli* O157:H7 consumed ground beef purchased at grocery stores of the same chain in the Minneapolis/St. Paul metropolitan area. Seven cases were hospitalized, none developed hemolytic uremic syndrome (HUS). The beef trim used to make this ground beef originated from a processing plant in Cottonwood County.

In June and July, an outbreak of *E. coli* O157:H7 infections occurred at a home daycare in Ramsey County. Eight of the nine children in the daycare ultimately tested positive for *E. coli* O157. Two case-patients were hospitalized and one had HUS. The source of infection for the index case was not identified, but person-to-person transmission resulted in all of the additional cases. The index case was infectious when he returned to the daycare, and was most likely the source for the additional cases.

Three cases of *E. coli* O157:H7 infection in two households with illness onsets in July were associated with the consumption of sirloin ball tip steaks purchased from the same retailer. The source of the steaks was one of two beef processing companies in Kansas.

An outbreak of *E. coli* O157:H7 infections associated with a potluck dinner at a high school in Hennepin County occurred in July. An investigation was initiated when the MDH foodborne illness hotline received a report of illness among a group of people who attended the potluck. Nine laboratory-confirmed cases of *E. coli* O157:H7 and 17 probable cases were identified. Baked beans and fruit served at the event were significantly associated with illness. There were

reports of a lack of serving utensils at the event, and that utensils were used to serve multiple items. A 5-year-old child who had diarrhea prior to and during the potluck dinner and who had self-served fruit and chips was the most likely source of contamination.

Six Minnesota cases and one Wisconsin case with the same or closely-related PFGE subtype of *E. coli* O157:H7, and an additional Minnesota case of Shiga-toxin producing *E. coli* that was not culture-confirmed, attended the Minnesota State Fair in August. All but one of the cases showed cattle or visited the cattle barn.

A multi-state outbreak of *E. coli* O157:H7 infections associated with the consumption of premade, frozen ground beef patties purchased from the same retailer occurred from August to October. Eleven cases were identified in Minnesota, including four cases of HUS. Three of the 11 cases did not have culture confirmation of their infection. There were 36 additional *E. coli* O157:H7 isolates reported from 14 other states that had PFGE patterns indistinguishable from the outbreak subtype pattern, including two additional HUS cases. Leftover product collected from case households tested positive for the outbreak PFGE subtype. Packaging material obtained from cases revealed that the products were produced on the same day at approximately the same time. The investigation resulted in a recall of approximately 850,000 pounds of ground beef.

In 2007, 18 HUS cases were reported. There were no fatal cases. From 1997 to 2007, the median annual number of reported HUS cases in Minnesota was 17 (range, 9 to 25), and the overall case fatality rate was 6.6%. In 2007, the median age of HUS case-patients was 4.5 years (range, 1 to 66 years); 13 of the 18 cases occurred in children. All 18 case-patients were hospitalized, with a median hospital stay of 19 days (range, 6 to 122 days). All 18 HUS cases reported in 2007 were post-diarrheal. *E. coli* O157:H7 was cultured from the stool of 10 (55%) case-patients; there were no non-O157 STEC infections identified among the HUS cases in 2007.

Giardiasis

During 2007, 904 cases of *Giardia* infection (17.4 per 100,000) were reported. This represents an 18% decrease from the 1,105 cases reported in 2006 and an 18% decrease from the median number of cases reported annually from 1996 through 2006 (median, 1,105, cases; range, 851 to 1,556). Of the total number of *Giardia* cases for 2007, 40% represented positive tests during routine screenings of recent immigrants and refugees.

The median age for all case-patients reported in 2007 was 19 years (range, 1 month to 102 years). The median age among non-immigrant cases was 36 years (range, 1 month to 102 years). Twenty-two percent of cases were less than 5 years of age, and only 16% of cases were over 50 years of age. Overall, 5% of case-patients were hospitalized; 10% of case-patients over 50 years of age were hospitalized. No outbreaks of giardiasis were identified in Minnesota in 2007.

Haemophilus influenzae Invasive Disease

Eighty-two cases of invasive *Haemophilus influenzae* disease (1.6 per 100,000 population) were reported in 2007. Case-patients ranged in age from newborn to 103 years (median, 66 years). Thirty-seven (45%) case-patients had pneumonia, 36 (44%) had bacteremia without another focus of infection, five (6%) had meningitis, and four (5%) had other conditions. Nine (11%) deaths were reported among these case-patients.

Of 73 *H. influenzae* isolates for which typing was performed at MDH, eight (11%) were type f, four (5%) type e, four (5%) type a, two (3%) type d, one (1%) type b, one (1%) type c, and 53 (73%) were untypeable.

One case of type b (Hib) disease occurred in 2007, compared to four cases in 2006, one case in 2005, and two cases in 2004. The 2007 case occurred in a child <5 years of age that had received two Hib vaccinations. The child had meningitis and survived.

The nine deaths occurred in patients ranging in age from newborn to 103 years. Three case-patients presented with pneumonia and six with bacteremia without another focus of infection. Eight case-patients had *H. influenzae*

isolated from blood and one from pleural fluid. Seven had significant underlying medical conditions. Of the nine case-patients who died, seven case-isolates that were untypeable had one serotype f, and one case-isolate was not available from the hospital lab for typing.

HIV Infection and AIDS

Surveillance for AIDS has been conducted in Minnesota since 1982. In 1985, Minnesota became the first state to make HIV infection a name-based reportable condition; all states now require name-based HIV infection reporting.

The incidence of HIV/AIDS in Minnesota is moderately low. In 2006, state-specific AIDS rates ranged from 0.7 per 100,000 population in Montana to 29 per 100,000 in Maryland. Minnesota had the 11th lowest AIDS rate (4.1 cases per 100,000). Similar comparisons for HIV (non-AIDS) incidence rates are not possible, because some states only began HIV (non-AIDS) reporting recently.

As of December 31, 2007, a cumulative total of 8,504 cases of HIV infection, 5,151 AIDS cases and 3,353 HIV (non-AIDS) cases had been reported among Minnesota residents. Of the HIV/AIDS case-patients, 2,912 (35%) are known to have died.

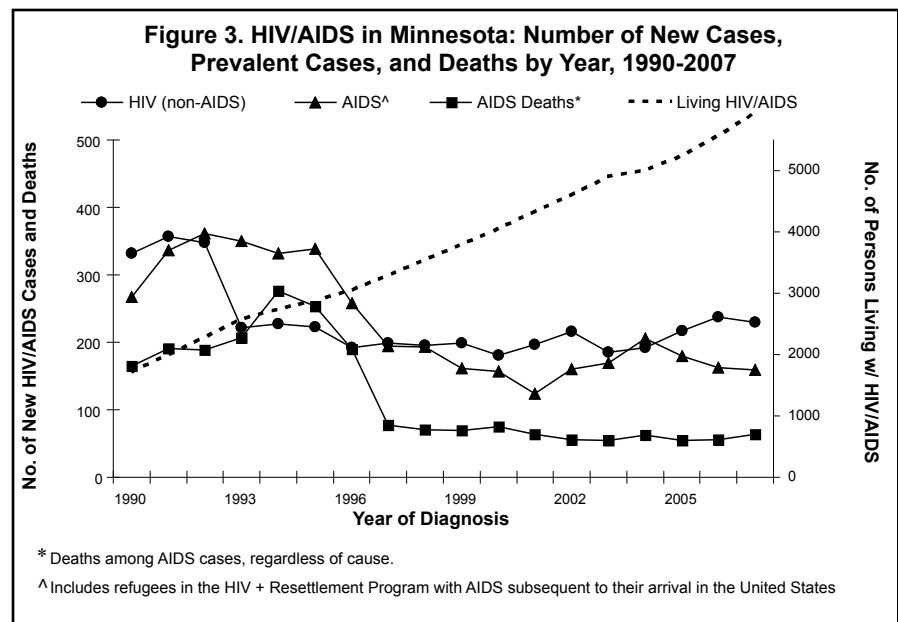
The annual number of AIDS cases reported in Minnesota increased steadily from the beginning of the

epidemic through the early 1990s, reaching a peak of 370 cases in 1992. Beginning in 1996, the annual number of new AIDS diagnoses, and deaths among AIDS case-patients, declined sharply, primarily due to new antiretroviral therapies, which delay the progression from HIV infection to AIDS and improve survival. In 2007, 159 new AIDS cases (Figure 3) and 54 deaths among AIDS patients were reported.

The annual number of newly diagnosed HIV (non-AIDS) cases reported in Minnesota has increased slightly from 185 in 2003 to 229 in 2007 (a 24% increase). This trend, coupled with improved survival, has led to an increasing number of persons in Minnesota living with HIV or AIDS. Approximately 6,000 persons with HIV/AIDS were residing in Minnesota at the end of 2007.

Historically, and in 2007, nearly 90% (285/325) 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 80% 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 **continued...**



males differ by race/ethnicity. New infections occurred primarily among white males in the 1980s and early 1990s. Although whites still comprise the largest proportion of new HIV infections among males, the number of new infections in this population has decreased since 1991. In contrast to declining numbers of new HIV infections among white males, the decline among U.S.-born black males has been more gradual, falling from a peak of 81 new infections in 1992 to 36 new infections in 2006. However in 2007 that number increased slightly to 54. The number of HIV infections diagnosed among Hispanic males increased substantially in 2006 from the previous year (37 versus 17) and that trend continued in 2007, with 33 new infections reported among Hispanic males. The number of new infections among African-born males increased in 2007 to 24 from 18 in 2006.

Females account for an increasing percentage of new HIV infections, from 10% of new infections in 1990 to 23% in 2007. Trends in HIV infections diagnosed annually among females also differ by race/ethnicity. Early in the epidemic, whites accounted for the majority of newly diagnosed infections in women. Since 1991, the number of new infections among women of color has exceeded that of white women. The annual number of new HIV infections diagnosed among U.S.-born black females had remained stable at 20 or fewer cases during 2001 to 2004, but increased to 28 new cases in both 2005 and 2006. In 2007 the number decreased again, with 17 infections reported. In contrast, the number of new infections among African-born females increased greatly from four cases in 1996 to 41 in 2002. However, since 2002 the number of new HIV infections in African-born females has decreased steadily, with 18 new cases diagnosed in 2006. In 2007, the number of new cases among African-born females increased again to 24. 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 2007, non-white men comprised approximately 12% of the male population in Minnesota

and 48% of new HIV infections among men. Similarly, persons of color comprised approximately 11% of the female population and 74% 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.

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, 69% (324/470) of new HIV infections were attributed to MSM (or MSM who also inject drugs); in 2007, this group accounted for 48% of new infections (158/325). However, current attitudes, beliefs, and unsafe sexual practices documented in surveys among MSM nationwide, and a current epidemic of syphilis among MSM documented in Minnesota and elsewhere, warrant concern. Similar to syphilis increases in other U.S. cities and abroad, over 40% of the recent syphilis cases in Minnesota among MSM were co-infected with HIV, some for many years. "Burn out" from adopting safer sexual practices and exaggerated confidence in the efficacy of HIV treatments may be contributors to resurging risky sexual behavior among MSM. CDC recommends annual screening for sexually transmitted diseases (including HIV and syphilis) for sexually active MSM and more frequent screening for MSM who report sex with anonymous partners or in conjunction with drug use.

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 17% (80/470) of cases in 1991 to 5% (16/325) in 2007. 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 percent of 250 new HIV diagnoses among women between 2005 and 2007 can be attributed to heterosexual exposure after re-distributing those 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, MDH began analyzing these groups separately, and a marked trend of increasing numbers of new HIV infections among African-born persons was observed. In 2007, there were 48 new HIV infections reported among Africans. While African-born persons comprise less than 1% of the state's population, they accounted for 15% of all HIV infections diagnosed in Minnesota in 2007. Until recently, culturally specific HIV prevention messages have not been directed to African communities in Minnesota. Taboos and other cultural barriers make it challenging to deliver such messages and to connect HIV-infected individuals with prevention and treatment services. However, in 2005, several African agencies were awarded HIV prevention funds to initiate and in some cases continue prevention programs in these communities. Additionally, collaborations between MDH, the Minnesota Department of Human Services, and community-based organizations serving African-born persons in Minnesota are continuing to address these complex issues.

One of the few success stories in the history of HIV infection is the use of medication to successfully reduce HIV perinatal transmission. Since the release of the U. S. Public Health Service guidelines in 1994, 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 10-fold between 1990 and 2007, the rate of perinatal transmission decreased six-fold, from 18% in 1990–1995 to 3% in 1996–2006. The overall rate of transmission for 2005–2007 was 1.3%; however, it was twice that among foreign-born mothers indicating the need for additional education and prevention.

Influenza

On November 2, 2007, the PHL isolated influenza virus from a Minnesota resident for the first time during the 2007-2008 influenza season. This date represented a slightly early start of influenza activity. Since 1990-1991, the first isolate typically has been between

mid-November and mid-December. Influenza activity peaked in late February/early March 2008. Nationally, a similar activity pattern was seen.

Influenza surveillance in Minnesota relies on reporting of selective individual cases from clinics, hospitals, and laboratories, as well as outbreak reporting from schools and long-term care facilities. The current system for reporting outbreaks has been in place since the 1995-1996 influenza season, and a Sentinel Provider Influenza Network was initiated in 1998-1999 to conduct active surveillance. Twenty-eight sentinel sites participated during the 2007-2008 season. While the program has surpassed its goal of 20 sentinel sites (i.e., one site per 250,000 population), MDH plans to expand the network to ensure sites represent all areas of the state. Clinics are particularly needed in southern region of the state, where coverage is sparse.

MDH requests reports of all suspected or confirmed cases of influenza-related encephalopathy or encephalitis in children <18 years of age, suspected or confirmed influenza-related deaths in children <18 years of age, suspected or confirmed cases of influenza and staphylococcal co-infection, suspected or confirmed influenza in hospitalized pregnant women, and suspected cases of novel influenza. Surveillance initiated in 2003 in the metropolitan area to monitor influenza-related pediatric hospitalizations was continued through the 2007-2008 season. Surveillance for influenza-related adult hospitalizations in the metropolitan area was added in 2005 and continued through the 2007-2008 season. From October 1, 2007 to April 26, 2008, 525 adult and pediatric hospitalizations with lab-confirmed influenza were reported to MDH from hospitals in the metropolitan area.

Three pediatric influenza-related deaths were identified during the 2007-2008 influenza season. Two cases were female and one was male. Cases ranged in age from 5 to 12 years. One case was white, non-Hispanic; one case was white, Hispanic; and one case's race and ethnicity were unknown. Onsets occurred between mid-February and early March 2008. Deaths occurred between late February and mid-March 2008. One case had an underlying health condition. The three cases were not vaccinated for influenza

for that season. Two cases resided in the metropolitan area and one resided in Greater Minnesota. During the 2006-2007 season, six pediatric influenza deaths were reported. Prior to 2006-2007, the last reported pediatric influenza death in Minnesota occurred during the 2004-2005 season.

A probable outbreak of influenza-like illness (ILI) in a school is defined as a doubled absence rate with all of the following primary influenza symptoms reported among students: rapid onset, fever of >101° F, 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 is 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. During the 2007-2008 season, MDH received reports of probable ILI outbreaks from 135 schools in 44 counties throughout Minnesota and possible outbreaks in 81 schools in 38 counties. A total of 216 schools in 54 counties reported suspected outbreaks in 2007-2008. Since 1988-1989, the number of schools reporting suspected influenza outbreaks has ranged from a low of 38 schools in 20 counties in 1996-1997 to 441 schools in 71 counties in 1991-1992.

An influenza outbreak is suspected in a long-term care facility when three or more residents in a single unit present with a cough and fever (>101° F) or chills during a 48- to 72-hour period. An influenza outbreak is confirmed when at least one resident has a positive culture or rapid antigen test for influenza. One hundred fifteen facilities in 48 counties reported confirmed influenza outbreaks in 2007-2008. In all facilities, influenza was laboratory-confirmed by rapid tests or culture. Since 1988-1989, the number of long-term care facilities reporting ILI outbreaks has ranged from a low of six in 1990-1991 to 140 in 2004-2005.

As of May 5, 2008, 189 (22%) of 869 influenza isolates in the PHL were well-matched to one of the three strains included in the vaccine for the 2007-2008 influenza season, compared to approximately 40% nationally. Of those, 55 (29%) were identified as influenza A/H1, 125 (66%) were identified as influenza A/H3, and 7 (4%) were

identified as influenza B/Malaysia-like. Four hundred twenty isolates (48%) were identified as influenza B/Shanghai-like, a different lineage than the vaccine reference strain. For 30% of isolates in the PHL, a vaccine match could not be determined; it is likely that many of these isolates were antigenically different from strains included in the 2007-2008 vaccine.

The PHL detected one case of influenza A (H1N1) swine influenza in a 26 year-old female. The case was black, non-Hispanic and lived in the metropolitan area. She had no underlying medical conditions and was not vaccinated for the 2007-2008 influenza season. The identification of this case demonstrates the capacity of the PHL to detect novel influenza viruses.

The highly pathogenic avian strain of influenza A (H5N1) continues to circulate in Southeast Asia, Europe, and Africa, causing illness in poultry and humans. The World Health Organization reported on April 8, 2008 that a total of 379 human cases including 239 deaths have been confirmed since January 2003, with an overall case-fatality rate of 63%. Fourteen countries in Asia and Africa have reported human cases of avian influenza. MDH utilizes guidelines developed by the CDC to assess ill patients returning from affected countries. Currently, no cases of H5N1 have been identified in the United States. Although person-to-person spread of H5N1 has likely occurred in situations of very close contact, sustained person-to-person spread has not been demonstrated.

Legionellosis

During 2007, 31 confirmed cases of legionellosis (Legionnaires' disease [LD]) were reported including 19 cases (61%) among residents of the metropolitan area and 12 cases (39%) among Greater Minnesota residents. One (3%) case-patient died. Older adults and elderly persons were more often affected, with 23 (74%) cases occurring among individuals 50 years and older (median age, 57 years; range, 37 to 72 years). Twenty-three (74%) cases had onset dates in June through September. Travel-associated legionellosis accounted for seven (23%) cases, defined as spending at least 1

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night away from the case's residence in the 10 days before onset of illness.

Confirmed LD case criteria includes X-ray confirmed pneumonia and positive results for one or more of the following tests: culture of *Legionella* spp., or detection of *L. pneumophila*, serogroup 1 infection by *Legionella* urinary antigen, direct fluorescent antigen, or by acute and convalescent antibody titers with a four-fold or greater rise to >1:128. A single antibody titer at any level is not of diagnostic value for LD. For detection of LD, the Infectious Diseases Society of America treatment guidelines for community-acquired pneumonia recommend urinary antigen assay and culture of respiratory secretions on selective media. Culture is particularly useful because environmental and clinical isolates can be compared by molecular typing in outbreaks and in investigations of healthcare-associated LD.

Starting in 2005, CDC recommended routine assessment of travel history among LD cases so that travel-associated LD clusters or outbreaks could be more readily and quickly detected.

Listeriosis

Six cases of listeriosis were reported during 2007. All case-patients were hospitalized, and two died. The median age of case-patients was 78 years (range, 68 to 95 years). Four had *Listeria monocytogenes* isolated from blood, one from cerebral spinal fluid, and one from a joint. None of the cases were part of a recognized outbreak. The six cases reported in 2007 is similar to the median annual number of cases reported from 1996 through 2006 (median, 8 cases; range, 4 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, Camem-

bert, 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 *Ixodes scapularis* (the blacklegged tick or deer tick). The same tick vector also transmits the agents of human anaplasmosis (HA) and babesiosis.

In 2007, 1,239 confirmed Lyme disease cases (23.8 per 100,000 population) were reported (Figure 1). This is a 36% increase from the 913 cases (17.7 per 100,000) in 2006. It is also substantially higher than the 918 cases in 2005 and the previous record number of 1,023 cases in 2004. The frequency of Lyme disease since 2004 has been considerably higher than the median number of cases reported annually from 1996 through 2003 (median, 374 cases; range, 252 to 866). Seven hundred seventy-one (62%) confirmed case-patients in 2007 were male. The median age of case-patients was 41 years (range, <1 to 88 years). Physician-diagnosed erythema migrans was present in 1,019 (82%) cases. Two hundred forty-four (20%) cases had one or more late manifestations of Lyme disease (including 203 with a history of objective joint swelling, 32 with cranial neuritis, four with lymphocytic meningitis, six with radiculoneuropathy, and six with acute onset of 2nd or 3rd degree atrioventricular conduction defects) and confirmation by a positive IgG antibody test or positive PCR. Onsets of illness peaked in July (37% of cases), corresponding to the peak activity of nymphal *I. scapularis* ticks in mid-May through mid-July.

Lyme disease co-infections with HA and babesiosis can occur from the same tick bite. During 2007, 18 (1%) Lyme disease case-patients also had objective evidence of HA, and four (<1%) had objective evidence of babesiosis. Because of under-detection, these numbers likely underestimate the true frequency of co-infections.

Most case-patients in 2007 either resided in or traveled to endemic counties in north-central, east-central, or southeast Minnesota or

western Wisconsin. As in 2006, Crow Wing County continued to have the highest number of Lyme disease case exposures (136 [21%] of 658 cases who reported a single county of exposure in Minnesota). Five hundred fifty-eight (45%) cases occurred among residents of the metropolitan area. However, only a minority of these residents (79 [22%] of 360 case-patients with known exposure) were likely exposed to infected *I. scapularis* ticks in the metropolitan area, primarily Anoka and Washington Counties. Over half of Lyme disease case-patients in 2007 (482 [60%] of 809 cases with a known activity) were most likely exposed to *I. scapularis* ticks while on vacation, visiting cabins, hunting, or during outdoor recreation.

Measles

One case of measles was reported during 2007. The case was confirmed by a positive measles IgM antibody test. The case-patient was a 16 month-old child residing in the metropolitan area. The child had returned from an extended stay in Japan 2 days prior to rash onset and was therefore considered an international importation. The child had a history of vaccination for measles at exactly 1 year of age. The child's mother was born in Japan and had measles at 2 years of age and subsequently received measles-containing vaccine in 2002. Maternal measles antibodies have been shown to persist longer in infants born to mothers with disease-induced immunity than mothers with vaccine-induced immunity. It is possible that circulating maternal antibody neutralized the vaccine virus, inhibiting a protective immune response in the case-patient.

No secondary cases were identified despite numerous exposures just prior to and during the child's measles prodrome. Exposure notification and follow-up were conducted for the child's primary care clinic and assistance with follow-up for passengers on three airplane flights was provided by the CDC.

This was the second consecutive year with a reported case of measles in Minnesota. In 2006, a case was reported in a 7-month-old infant adopted from Africa. The child had arrived in the United States 9 days prior to rash onset and was therefore considered an international importation.

Suspect measles cases should be reported to MDH immediately. Blood specimens for IgM serologic testing should be drawn at least 72 hours after rash onset. Testing for measles IgM antibody provides timely results; however, the positive predictive value is suboptimal when disease incidence is low (as it is currently). Multiple tests (including acute and convalescent measles IgG antibody and viral culture) are therefore strongly recommended. Testing for both measles and rubella is routinely recommended for individuals presenting with acute generalized rash and fever. Blood specimens for acute and convalescent IgG serology should be drawn within 4 days of rash onset and again 3 to 5 weeks later, and tested as paired sera. Specimens for viral culture (throat swabs, urine, or nasopharyngeal swabs) should be collected as soon as possible within 10 days of rash onset.

Meningococcal Disease

Twenty-two cases of *Neisseria meningitidis* invasive disease (0.4 per 100,000 population) were reported in 2007, compared to 15 cases in 2006. There were six (27%) serogroup B cases, nine (41%) serogroup C, six (27%) serogroup Y, and one (5%) ungroupable case. In addition, there were five culture-negative suspect cases that were positive by polymerase chain reaction (PCR) in the PHL.

Case-patients ranged in age from 1 to 82 years, with a median of 19 years. Fifty percent of the cases occurred in the metropolitan area. Six (27%) case-patients had bacteremia without another focus of infection and 16 (73%) had meningitis. One individual had two episodes of invasive meningococcal disease. All cases were sporadic, with no definite epidemiologic links. One death occurred; a 5-year-old male died of meningitis attributed to serogroup B.

In January 2005, a meningococcal polysaccharide-protein conjugate vaccine for serogroups A,C,Y, and W-135 (MCV4) was licensed for use in the United States for persons aged 11 to 55 years. In 2007, the license was approved to include 2 to 10 year olds. The Advisory Committee on Immunization Practices and American Academy of Pediatrics recommend immunization with the new vaccine at age 11-12 years, or at high school entry, 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 of the efficacy of MCV4. Eight cases occurred among 11-22 year-olds, including one college student with two episodes of disease and three high school students. One case had serogroup B disease and one had disease caused by an ungroupable isolate that would not have been prevented by the vaccine. There was also a culture-negative, PCR-positive suspected case of serogroup C disease in a high school student. The case-patients in this age group who had serogroup C or serogroup Y disease had not received meningococcal vaccine except for the case-patient with recurrent disease who had received vaccine prior to the second episode of illness.

Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Strains of *Staphylococcus aureus* that are resistant to methicillin and all available beta-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 1997, MDH began receiving reports of healthy young patients with MRSA infections. These patients had onset of their MRSA infections in the community and appeared to lack the established risk factors for MRSA. Although most of the reported infections were not severe, some resulted in serious illness or death. Strains of MRSA cultured from persons without HA risk factors for MRSA are now known as community-associated MRSA (CA-MRSA). CA-MRSA is defined as: a positive culture for MRSA from a specimen obtained <48 hours of admission to a hospital in a patient with no history of prior MRSA infection or colonization; no presence of indwelling percutaneous devices or catheters at the time of culture; and no history of hospitalization, surgery, residence in a long-term care facility, hemodialysis, or peritoneal dialysis in the year prior to the positive MRSA culture.

MDH initiated active surveillance for CA-MRSA at 12 sentinel hospital laboratories in January 2000. The laboratories (six in the metropolitan area and six in Greater Minnesota) were selected to represent various geographic regions of the state. Sentinel sites report all cases of MRSA identified at their facilities and for the first six years of surveillance submitted all CA-MRSA isolates to MDH. The purpose of this surveillance is to determine demographic and clinical characteristics of CA-MRSA infections in Minnesota, to identify possible risk factors for CA-MRSA, and to identify the antimicrobial susceptibility patterns and molecular subtypes of CA-MRSA isolates. A comparison of CA- and HA-MRSA using sentinel site surveillance data from 2000 demonstrated that CA- and HA-MRSA differ demographically and clinically, and that their respective isolates are microbiologically distinct.

In 2007, 3,495 cases of MRSA infection were reported by the 12 sentinel hospital laboratories. Fifty percent (1,761/3,495) of these cases were classified as CA-MRSA; 47% (1,644/3,495) were classified as HA-MRSA; and 3% (90/3,495) could not be classified. CA-MRSA infections increased from 131 cases (12% of all MRSA infections reported) in 2000 to 1,761 cases (50% of total MRSA infections reported) in 2007.

The CDC classifies MRSA isolates into pulsed-field types (PFTs) (currently USA100-1200) based on genetic relatedness. CA-MRSA isolates are most often classified as PFT USA300 or USA400. In Minnesota, the predominant CA-MRSA PFT has changed dramatically over time. In 2000, 63% of CA-MRSA isolates were USA400 and 4% were USA300. In 2006, only 10% of CA-MRSA isolates were USA400 and 78% were USA300. Because USA400 isolates are much more likely than USA300 isolates to demonstrate inducible clindamycin resistance (ICR) on disk diffusion testing, the change in the predominant CA-MRSA PFT has also been associated with a decrease in the proportion of erythromycin-resistant, clindamycin-sensitive CA-MRSA isolates demonstrating ICR, from 93% in 2000 to 10% in 2006.

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In 2005, as part of the CDC Active Bacterial Core surveillance (ABCs) system, MDH 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 population and was 19.4 and 18.5 in 2006 and 2007, respectively. In 2007, most MRSA was isolated from blood (82% in 2007), and 23% of the cases (21/93) died. Of the invasive isolates that underwent molecular subtyping, 79% (45/57) were of a known HA-MRSA PFT. Ramsey County had a somewhat lower invasive MRSA infection incidence rate than other participating surveillance sites (Klevens RM, et al. Invasive methicillin-resistant *Staphylococcus aureus* infections in the United States. *JAMA*. 2007;298(15):1763-71).

In 2007, MDH started collecting isolates from CA-MRSA and HA-MRSA invasive (isolated from a normally sterile body site) infections. Antimicrobial susceptibility and PFGE testing were performed on submitted isolates. Please refer to the MDH antibiogram for details. (see pp. 25-26).

Critical illnesses or deaths due to community-associated *S. aureus* infection (both methicillin-susceptible and-resistant) are now reportable in Minnesota, as is vancomycin-intermediate and vancomycin-resistant *S. aureus*.

Mumps

During 2007, 28 cases of mumps (0.54 per 100,000 population) were reported in Minnesota. Seven (25%) cases were laboratory confirmed, including one (14%) case confirmed by both positive mumps IgM serology and a demonstrated rise in mumps IgG between acute and convalescent serologic specimens, five (71%) cases confirmed by mumps IgM serology only, and one (14%) case confirmed by mumps virus isolation from a throat specimen. Four (14%) of the 28 total cases were epidemiologically linked to a laboratory confirmed case. Seventeen (61%) cases met the clinical case definition for mumps and were reported as probable cases. Nineteen (68%) cases were reported between January and April, following a multi-state resurgence of mumps in 2006. Minnesota reported 180 mumps cases

in 2006. By comparison, a total of 29 mumps cases had been reported in Minnesota in 2000-2005, all of which were laboratory-confirmed.

Thirteen (46%) case-patients had a documented history of two doses of mumps-containing vaccine. Five (18%) case-patients had a history of one dose of mumps-containing vaccine. One (4%) case-patient had not received mumps-containing vaccine because they were younger than the recommended minimum age for vaccination. The other nine (32%) case-patients had no documented history of vaccination for mumps; four (44%) reported a history of mumps and were born before 1957 and three (33%) self-reported a history of receiving mumps-containing vaccine which could not be verified.

Case-patients ranged in age from 7 months to 62 years. Seventeen (61%) cases occurred in persons younger than 21 years of age; five (18%) cases occurred in persons 22 through 33 years of age; two (7%) cases occurred in persons 34 through 49 years of age; and four (14%) cases occurred in persons 50 years and older. The multi-state mumps resurgence in 2006 demonstrated that birth before 1957 does not correlate with immunity to mumps, suggesting that natural immunity to mumps wanes in the absence of exposure to wild virus. This observation was supported in 2007 in Minnesota, as four case-patients were born before 1957.

Six (21%) cases occurred among family members residing in two households. No source of infection was identified for the index cases or for the remaining 22 (79%) cases, demonstrating that asymptomatic infections occur and suggesting that mumps is under-diagnosed.

Mumps surveillance is complicated by nonspecific clinical presentation, asymptomatic infections in an estimated 20% of cases, and suboptimal sensitivity and specificity of laboratory testing. False-positive serologic assays for mumps have been reported due to parainfluenza infections (viruses 1 and 3). Therefore, both IgM and IgG serologic testing as well as viral culture should be performed on all suspect mumps cases as soon as possible

after symptom onset. Specimens for viral culture include buccal and throat swabs, and should be collected during the first 5 days of illness. Occasionally, false-negative mumps IgM results occur when serum specimens are collected within 3 days after onset of parotitis. A second serum sample (collected 5-7 days after onset) is recommended in this situation.

Neonatal Sepsis

Neonatal sepsis was added to the Minnesota Rules Governing Communicable Diseases in September 2005, and surveillance and collection of isolates in addition to group B *Streptococcus* began in January 2006. This statewide effort includes reporting of all bacteria other than coagulase-negative *Staphylococcus* isolated from a sterile site in infants 7 days of age. The most prevalent sterile sites have been in blood and CSF.

The 2006 summary consisted of 75 organisms, whereas the 2007 summary for Minnesota neonatal sepsis organisms in infants <7 days of age is as follows:

23 Group B *Streptococcus*,
7 *Escherichia coli*,
8 *Streptococcus viridians*,
4 *Haemophilus influenzae*,
3 *Corynebacterium* spp.,
3 *Bacillus* spp.,
2 *Staphylococcus aureus*,
2 *Klebsiella* spp.,
2 *Streptococcus pneumoniae*,
1 each *Bacteroides* spp., *Enterococcus*,
Enterobacter cloacae, *Bacteroides fragilis*, Group A *Streptococcus*, Group G *Streptococcus*, *Neisseria* spp.,
Stomatococcus spp., *Acinetobacter*,
and *Actinomyces* spp.

Isolates were received for 54 of 64 identified neonatal sepsis organisms.

Pertussis

During 2007, 393 cases of pertussis (7.6 per 100,000 population) were reported in Minnesota, compared to 320 in 2006 and a peak of 1,571 cases reported in 2005. Laboratory confirmation was available for 248 (63%) cases, 32 (13%) of which were confirmed by culture and 216 (87%) of which were confirmed by PCR. In addition to the laboratory-confirmed cases, 58 (15%) cases were epidemiologically linked to laboratory-

confirmed cases, and 87 (22%) met the clinical case definition. Two hundred ninety-seven (76%) of the reported cases occurred in residents of the metropolitan area.

Paroxysmal coughing was the most commonly reported symptom. Three hundred seventy-one (94%) of the case-patients experienced paroxysmal coughing. Nearly one third (108, 27%) 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 158 (40%) of the cases. Infants and young children are at the highest risk for severe disease and complications. Pneumonia was diagnosed in four (1%) case-patients, two (50%) of whom were less than 18 months of age. Seventeen (4%) case-patients were hospitalized; 11 (65%) of the hospitalized patients were younger than 6 months of age.

Due to waning of immunity from either natural infection or vaccine, pertussis can affect persons of any age. The disease is increasingly recognized in older children and adults. During 2007, case-patients ranged in age from 1 week to 97 years. One hundred thirty-five (34%) cases occurred in adolescents 13 to 17 years of age; 110 (28%) cases occurred in adults 18 years of age and older; 93 (24%) occurred in children 5-12 years of age; 30 (8%) occurred in children 6 months through 4 years of age, and 25 (6%) occurred in infants less than 6 months of age.

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 2007, 30 pertussis cases were reported in infants less than 1 year of age. A likely source of exposure was identified for 14 (47%) cases; nine (30%) were infected by adults 18 years of age and older, two (7%) were infected by a child 13 years of age or older, and three (10%) were infected by a child less than 13 years of age. For the 16 cases with no identified source of infection, the source was likely from outside the household.

Although unvaccinated children are at highest risk for pertussis, fully

immunized children may also develop disease. 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 34 case-patients who were 7 months to 6 years of age, 22 (65%) were known to have received at least a primary series of three doses of DTP/DTaP vaccine prior to onset of illness, 12 (35%) received fewer than three doses and were considered preventable cases.

MDH reporting rules require that clinical isolates of *Bordetella pertussis* be submitted to the PHL. Of the 32 culture-confirmed cases, 27 (84%) of the isolates were received and sub-typed by PFGE and tested for antibiotic susceptibility to erythromycin, ampicillin, and trimethoprim-sulfamethoxazole. Nine distinct PFGE patterns were identified; five of these patterns occurred in only a single case isolate. The most common pattern identified accounted for 15 (56%) of the total isolates and they occurred throughout the year.

No cases of erythromycin-resistant *B. pertussis* have been identified in Minnesota since the first case was identified in 1999. Statewide, all 1,194 other isolates tested to date have had low minimum inhibitory concentrations, falling within the reference range for susceptibility to the antibiotics evaluated. Only eight other erythromycin-resistant *B. pertussis* cases have been identified to date in the United States.

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. Direct fluorescent antibody (DFA), provides a rapid presumptive diagnosis of pertussis; however, because both false-positive and false-negative results can occur, DFA tests should not be relied upon solely for laboratory confirmation. Serological tests are not standardized and are not acceptable for laboratory confirmation at this time.

Salmonellosis

During 2007, 709 culture-confirmed cases of *Salmonella* infection (13.6 per 100,000 population) were reported. This represents a 2% decrease from the 725 cases reported in 2006 but a 13% increase from the median annual number of cases reported from 1996 to 2006 (median, 626 cases; range, 576 to 725) (Figure 2). Of the 99 serotypes identified in 2007, five serotypes, *S. Typhimurium* (152 cases), *S. Enteritidis* (138 cases), *S. Montevideo* (39 cases), *S. Newport* (37 cases) and *S. I 4,5,12:i:-* (37 cases) accounted for 57% of cases. *Salmonella* was isolated from stool in 634 (89%), urine in 37 (5%), and blood in 34 (5%) case-patients. There were eight cases of *S. Typhi* infection. Five of the *S. Typhi* case-patients traveled internationally (India, Laos, Nigeria, and Pakistan) within approximately 3 weeks of their illness onset. Twenty-five percent of salmonellosis case-patients were 12 years of age or younger. Twenty-four percent of case-patients were hospitalized for their infection. Of the 635 case-patients who were interviewed, 107 (17%) traveled internationally during the week prior to their illness onset. A 58-year-old case-patient died; the cause of death was a pulmonary embolism, but *Salmonella* was isolated from a blood specimen 8 days prior to death.

Eighty-seven cases were part of 12 outbreaks of salmonellosis identified in 2007. Nine of the outbreaks involved foodborne transmission, including four outbreaks with cases in multiple states. Three outbreaks involved contact with animals, or food for animals; all three had cases in multiple states.

Ten *S. Tennessee* cases (seven cases in 2007 and three in 2006) with isolates of the same (PFGE) subtype that were part of a national outbreak associated with peanut butter were identified in
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Minnesota. This outbreak resulted in 714 cases in 48 states from August 2006 to July 2007.

An outbreak of *S. Typhimurium* infections resulted in 11 cases in March and April. Additional cases with the same PFGE pattern were identified in six other states. A case-control study found an association with eating leafy greens; however, the specific type of leafy green was not identified.

From May through August, nine cases with the same PFGE subtype of *S. Montevideo* were associated with contact with chickens or their environment. The cases reported purchasing chickens to raise for meat from a single hatchery in Iowa. Forty-two cases of the outbreak subtype of *S. Montevideo* were ultimately identified in 19 other states.

In June, one case of *S. Wandsworth* infection was part of a multi-state outbreak that resulted in 65 cases in 20 states. A snack of puffed rice and corn with a vegetable coating was implicated as the vehicle. The outbreak subtype of *S. Wandsworth* was isolated from sealed bags of the product and from one of the ingredients used in the seasoning mix. The investigation resulted in a recall of the implicated product and another product made by the same manufacturer.

One case of *S. Paratyphi B L(+)* tartrate+ (var Java) infection with onset of illness in June was part of a multi-state outbreak associated with contact with pet turtles. A total of 103 cases with isolates indistinguishable from the outbreak subtype were reported to CDC from 33 states.

In July, three cases of *S. Agona* infections that ate at a single Chinese buffet restaurant in Hennepin County were identified. Meal dates of the case-patrons occurred from mid-May through mid-June. Three restaurant employees tested positive for the same PFGE subtype of *S. Agona*. All three positive restaurant employees denied having a history of gastrointestinal symptoms. Inadequate utensil washing and disinfection, and cross-contamination were also identified as problems at the restaurant. The ultimate source of contamination was not identified.

Table 3. Number of Cases and Incidence Rates (per 100,000 population) of Chlamydia, Gonorrhea, Syphilis and Chancroid, Minnesota, 2003-2007

Disease	2003		2004		2005		2006		2007	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Chlamydia	10,802	220	11,647	237	12,359	251	12,977	264	13,412	273
Gonorrhea	3,235	66	2,974	60	3,505	71	3,317	67	3,459	70
Syphilis, Total	198	4.0	148	3.0	210	4.3	188	3.8	186	3.8
Primary/Secondary	49	1.0	27	0.5	71	1.4	47	1.0	59	1.2
Early Latent	45	0.9	22	0.4	48	1.0	58	1.2	55	1.1
Late Latent	103	2.1	97	2.0	88	1.8	81	1.6	72	1.5
Other*	1	0.0	1	0.0	1	0.0	0	0.0	0	0.0
Congenital**	0	0.0	1	1.4	2	2.8	2	2.8	0	0.0
Chancroid	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

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

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

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

Table 4. Number of Cases and Incidence Rates (per 100,000 population) of Chlamydia, Gonorrhea, and Primary/Secondary Syphilis by Residence, Age, Gender, and Race/Ethnicity, Minnesota, 2007

Demographic Group	Chlamydia		Gonorrhea		Syphilis	
	No.	Rate	No.	Rate	No.	Rate
Total	13,412	273	3,459	70	58	1.2
<i>Residence*</i>						
Minneapolis	2,943	769	1,245	325	35	9.1
St. Paul	1,893	659	700	244	5	1.7
Suburban**	4,192	213	827	42	15	0.8
Greater Minnesota	3,882	170	564	25	3	0.1
<i>Age</i>						
<15 years	141	13	34	3	0	0.0
15-19 years	4,010	1,071	859	229	2	0.5
20-24 years	5,134	1,592	1,073	333	5	1.6
25-29 years	2,289	716	657	205	9	2.8
30-34 years	985	279	363	103	13	3.7
35-44 years	649	79	320	39	19	2.3
≥45 years	204	12	153	9	11	0.7
<i>Gender</i>						
Male	3,570	153	1,528	63	58	2.4
Female	9,679	390	1,930	78	1	0.0
Transgender^^	3	----	1	----	0	0.0
<i>Race/Ethnicity</i>						
White	5,600	130	955	22	34	0.9
Black	3,797	1,871	1,728	851	7	5.4
American Indian	409	504	81	100	1	0.0
Asian	524	311	34	20	1	0.6
Other ^^	567	----	101	----	1	----
Unknown^^	2,515	----	560	----	3	----
Hispanic^^^	926	646	145	101	5	0.7

* Residence information missing for 502 chlamydia cases, 123 gonorrhea cases, and one P&S syphilis case.

** 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.

A *S. Schwarzengrund* case in July matched the outbreak PFGE subtype in a multi-state outbreak associated with contact with contaminated dry pet food made by a single manufacturer. The outbreak resulted in 62 cases in 18 states. It is unclear if the Minnesota case had contact with the contaminated pet food.

An outbreak of *S. Enteritidis* infections associated with eating at a Mexican restaurant in Hennepin County was identified in August. Sixteen culture-confirmed and three probable case-patrons ate at the restaurant from August 1 through August 8. Restaurant employees and environmental samples tested negative for *Salmonella*. Eating salsa was associated with illness, but the source of contamination was not identified.

Seven cases of *S. I 4,5,12:i:-* infection with onset of illness from August through October were part of a multi-state outbreak associated with consumption of frozen pot pies. Although not a ready-to-eat food, most cases cooked the products in the microwave. The cooking instructions were confusing and likely inadequate. The implicated pot pies were recalled. Between January and December, 2007, 401 isolates of *S. I 4,5,12:i:-* of the outbreak subtype were collected from ill persons in 35 states.

A *S. Typhimurium* outbreak associated with eating tomatoes at a sandwich restaurant in Olmsted County occurred in October. Eighteen culture-confirmed patron-cases and five probable cases with meal dates at the restaurant from October 1 through October 8 were identified. Two restaurant employees with onsets of illness during the same week in October as the patrons also tested positive for the outbreak subtype of *S. Typhimurium*. Cross-contamination of the tomatoes from foods of animal origin at the restaurant was ruled-out. The tomatoes were likely already contaminated when they entered the restaurant. The restaurant's practice of storing tomatoes at room temperature for ripening before being used may have contributed to amplification of the contamination.

In November, two cases of *S. Newport* infection associated with an office potluck were identified. The investigation identified an additional

nine probable cases that attended the potluck. A specific food vehicle was not identified.

Six *S. Montevideo* cases with isolates of the same PFGE subtype that were identified from September through December 2007, and an additional three cases that were identified from January through March 2008, were part of an outbreak associated with a grocery store deli in Wadena County. The outbreak subtype was the same as that from the earlier outbreak associated with contact with chickens discussed above. The chicken contact outbreak evidently resulted in infection of deli workers; leading to foodborne transmission to deli patrons. Two deli employees tested positive for the outbreak subtype of *S. Montevideo*, and one of the employees owned backyard chickens. Infected foodworkers were the source of contamination. This investigation is ongoing.

Sexually Transmitted Diseases (STDs)

Active surveillance for gonorrhea and chlamydia, initiated in 2002, involves cross-checking laboratory-reported cases against cases reported by clinicians. Although both laboratories and clinical facilities are required to report STDs independently of each other, an episode of STD is not considered a case for surveillance purposes until a corresponding case report is submitted by a 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, MDH mails a reminder letter and case report form to the corresponding clinical facility. Active surveillance for syphilis also began in 2002 and involves immediate follow-up with the clinician upon receipt of a positive laboratory report. Cases of chancroid are monitored through a mostly passive surveillance system. Herpes simplex virus and human papillomavirus infections are not reportable.

Although overall incidence rates for STDs in Minnesota are lower than those in many other areas of the United States, certain population subgroups in Minnesota have very high STD rates. Specifically, STDs disproportionately

affect adolescents, young adults, and persons of color.

Chlamydia

Chlamydia trachomatis infection is the most commonly reported STD in Minnesota. In 2007, 13,412 chlamydia cases (273 per 100,000 population) were reported, representing a 4% increase from 2006 (Table 3).

Adolescents and young adults are at highest risk for acquiring chlamydial infection (Table 4). The chlamydia rate is highest among 20 to 24-year-olds (1,592 per 100,000), with the next highest rate among 15 to 19-year-olds (1,071 per 100,000). The incidence of chlamydia among adults 25 to 29 years of age (716 per 100,000) is considerably lower but has increased in recent years. The chlamydia rate among females (390 per 100,000) is more than twice the rate among males (153 per 100,000). This difference is 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 (1,871 per 100,000) is over 14 times higher than the rate among whites (130 per 100,000). Although blacks comprise approximately 4% of Minnesota's population, they account for 28% of reported chlamydia cases. Rates among Asian/Pacific Islanders (311 per 100,000), American Indians (504 per 100,000), and Hispanics (646 per 100,000) are two to five times higher than the rate among whites.

Chlamydia infections occur throughout the state, with the highest reported rates in Minneapolis (769 per 100,000) and St. Paul (659 per 100,000). In 2007, the greatest increases for chlamydia were seen in the suburbs and Greater Minnesota with increases of 4% and 8%, respectively.

Gonorrhea

Gonorrhea, caused by *Neisseria gonorrhoeae*, is the second most commonly reported STD in Minnesota. In 2007, 3,459 cases (70 per 100,000 population) were reported, representing an increase of 5% from 2006 (Table 3).

Adolescents and young adults are at greatest risk for gonorrhea (Table 4), with incidence rates of 229 per 100,000
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among 15 to 19-year-olds, 333 per 100,000 among 20 to 24-year olds, and 205 per 100,000 among 25 to 29-year-olds. Gonorrhea rates for males (63 per 100,000) and females (78 per 100,000) are comparable. Communities of color are disproportionately affected by gonorrhea, with 50% of cases reported among blacks. The incidence of gonorrhea among blacks (851 per 100,000) is approximately 40 times higher than the rate among whites (22 per 100,000). Rates among American Indians (100 per 100,000) and Hispanics (101 per 100,000) are almost five times higher than among whites. The rate among Asian/Pacific Islanders (20 per 100,000) is slightly lower than among whites.

Gonorrhea rates are highest in the cities of Minneapolis and St. Paul (Table 4). The incidence in Minneapolis (325 per 100,000) is 1.3 times the rate in St. Paul (244 per 100,000), nearly eight times higher than the rate in the suburban metropolitan area (42 per 100,000), and 13 times higher than the rate in Greater Minnesota (25 per 100,000). However, the rate in Greater Minnesota is growing rapidly, with a 34% increase from 2006 to 2007.

Quinolone-resistant *N. gonorrhoeae*

The prevalence of quinolone-resistant *N. gonorrhoeae* (QRNG) has increased approximately six-fold from 1.5% in 2002 to 8.6% in 2007. Of concern

is the high prevalence among men who have sex with men (MSM), which increased sharply from 0% in 2002, to 8.9% in 2003, and to 27% in 2004. Since then the prevalence among MSM has remained stable but elevated (28% in 2007). As a result, fluoroquinolones (e.g., ciprofloxacin) are no longer recommended for treating gonorrhea in men with male sexual partners in Minnesota. In 2007, QRNG prevalence also reached a critical level in heterosexuals (4.5%), prompting the MDH to recommend non-quinolone therapy for that population as well.

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 was observed in 2002 among men who have sex with men (MSM). In 2007, 59 cases of primary/secondary syphilis (1.2 per 100,000 population)

were reported compared to 47 (1.0 per 100,000) cases in 2006.

Early Syphilis

In 2007, the number of early syphilis cases increased by 10%, with 114 cases occurring compared to 105 cases in 2006. The incidence is highest amongst MSM, where cases increased by 29% from 2006 to 2007 (80 to 103). Of the early syphilis cases in 2007, 111 (97%) occurred among men; 103 (93%) of these men reported having sex with other men; 44% of the MSM diagnosed with early syphilis were co-infected with HIV.

Congenital Syphilis

No cases of congenital syphilis were reported in Minnesota in 2007 (Table 3).

Chancroid

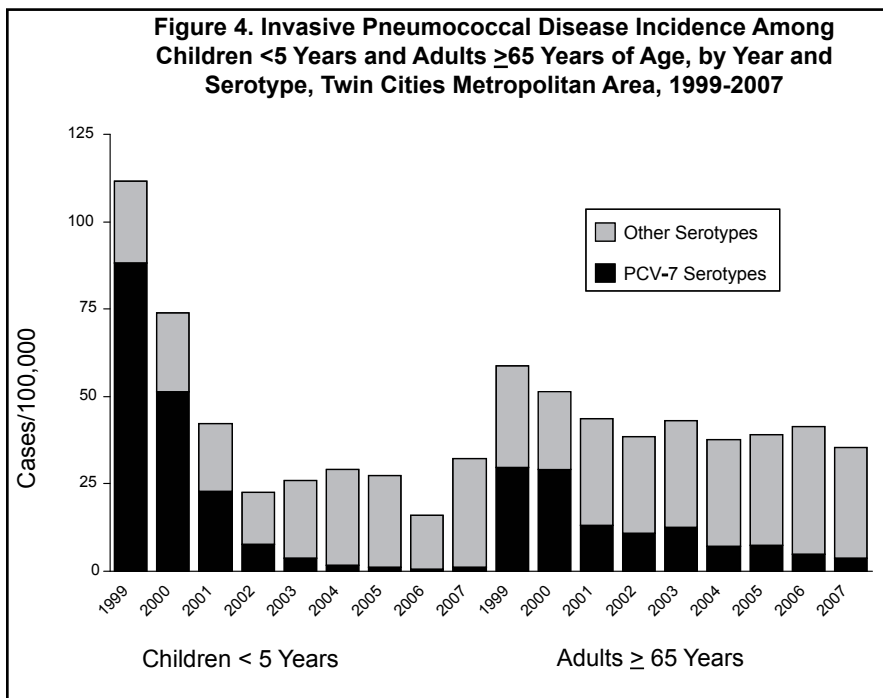
Chancroid continues to be very rare in Minnesota. No cases were reported in 2007.

Shigellosis

During 2007, 238 culture-confirmed cases of *Shigella* infection (5.0 per 100,000 population) were reported (Figure 2). This represents an 8% decrease from the 259 cases reported in 2006, and a 7% increase from the median number of cases reported annually from 1999 to 2006 (median, 222 cases; range, 68 to 904).

In 2007, *S. sonnei* accounted for 208 (88%) cases, *S. flexneri* for 27 (11%), and *S. dysenteriae* for one (<1%). Case-patients ranged in age from 1 month to 90 years (median, 9 years). Fifty-one percent of case-patients were less than 10 years of age; children less than 5 years of age accounted for 28% of cases. Forty-three (18%) case-patients were hospitalized. Seventy-nine percent of case-patients resided in the metropolitan area, including 35% in Hennepin County and 14% in Ramsey County.

Five outbreaks of shigellosis were identified in 2007; all five were caused by *S. sonnei*. These outbreaks resulted in 17 culture-confirmed cases (representing 7% of reported *Shigella* cases). Four person-to-person outbreaks occurred in child daycare facilities and one community associated person-to-person outbreak also occurred.



Every tenth *Shigella* isolate received at MDH is tested for antimicrobial resistance. Twenty-four isolates were tested in 2007; 71% were resistant to ampicillin, 21% were resistant to trimethoprim-sulfamethoxazole, and 13% were resistant to both ampicillin and trimethoprim-sulfamethoxazole. All isolates tested were susceptible to ceftriaxone.

***Streptococcus pneumoniae* Invasive Disease**

Statewide active surveillance for invasive *Streptococcus pneumoniae* (pneumococcal) disease began in 2002, expanded from the metropolitan area, where active surveillance has been ongoing since 1995. In 2007, 664 (12.9 per 100,000 population) cases of invasive pneumococcal disease were reported. By age group, annual incidence rates per 100,000 were 30.3 cases among children aged 0-4 years; 3.7 cases among children and adults aged 5-39 years, 12.9 cases among adults 40-64 years, and 40.0 cases among adults aged 65 years and older.

In 2007, pneumonia accounted for 381 (57%) cases of invasive pneumococcal disease among all cases (i.e., those infections accompanied by bacteremia or isolation of pneumococci from another sterile site such as pleural fluid). Bacteremia without another focus of infection accounted for 206 (31%) cases statewide. Pneumococcal meningitis accounted for 38 (6%) cases. Sixty-one (9%) patients with invasive pneumococcal disease died.

In 1999, the year before the pediatric pneumococcal conjugate vaccine (Prevnar, Wyeth-Lederle [PCV-7]) was licensed, the rate of invasive pneumococcal disease among children < 5 years in the metropolitan area was 111.7 cases/100,000. Over the years 2000-02 there was a major downward trend in incidence in this age group (Figure 4). Rates in each of the subsequent four years were somewhat higher, although there has not been a continuing upward trend (25.8 cases/100,000 in 2003; 29.0, 27.4, and 23.3, and 30 cases/100,000 in 2004, 2005, 2006, and 2007, respectively (Figure 4). 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 seven included in PCV-7) [Figure

4]. This small degree of replacement disease due to non-PCV-7 serotypes, similar to that seen in other parts of the country, has been far outweighed by the declines in disease caused by PCV-7 serotypes. This trend supports the need for ongoing monitoring, however, because further increases due to non-vaccine serotypes are possible. In Figure 4 rates of invasive pneumococcal disease among adults aged > 65 years are also shown by serotypes included and not included in PCV-7. Declines in incidence in this age group, particularly in disease due to PCV-7 serotypes, have been observed elsewhere in the United States and are likely attributable to herd immunity from use of PCV-7 among children. Among cases overall, a serotype not included in the PCV-7 vaccine, serotype 19A, is now most commonly associated with invasive pneumococcal disease in Minnesota.

Of the 615 isolates submitted for 2007 cases, one (<1%) isolate was resistant to penicillin and 40 (6%) exhibited intermediate-level resistance using nonmeningitis breakpoints (Note: CLSI penicillin breakpoints changed in 2008; refer to the MDH antibiogram on pp. 25-26); 96 isolates (16%) exhibited multi-drug resistance (i.e., high-level resistance to two or more antibiotic classes).

Streptococcal Invasive Disease - Group A

One hundred seventy-three cases of invasive group A streptococcal (GAS) disease (3.3 per 100,000 population), including 16 deaths, were reported in 2007, compared to 171 cases and 17 deaths in 2006. Ages of case-patients ranged from 6 days to 99 years (median, 50 years). Fifty-four percent of case-patients were residents of the metropolitan area. Fifty-nine (34%) case-patients had bacteremia without another focus of infection, and 31 (18%) case-patients had cellulitis with bacteremia. There were 22 (13%) cases of primary pneumonia and 14 (8%) cases of necrotizing fasciitis. Eighteen (10%) case-patients had septic arthritis and/or osteomyelitis, and three (2%) had streptococcal toxic shock syndrome (STSS) accompanied by another focus of infection. Thirteen (8%) case-patients were residents of long-term care facilities. Two facilities each had two case-patients.

The 16 deaths included eight cases of bacteremia without another focus of infection and three cases of pneumonia. The five remaining fatal cases had necrotizing fasciitis (2), peritonitis (1), and the type of infection was unknown for two deaths. The deaths occurred in persons ranging in age from 1 month to 95 years. For the 15 deaths in patients with known health histories, significant underlying medical conditions were reported for 13 of the case-patients.

Isolates were available for 160 (92%) cases, and 159 were subtyped using PFGE; 51 different molecular subtypes were identified. Twenty-five subtypes were represented by one isolate each; other subtypes were represented by two to 54 isolates each. No direct epidemiologic links were noted among cases with indistinguishable subtypes except for the two pairs of nursing home residents from the same facilities.

Isolates were available for 14 of the deaths and were distributed among six different PFGE subtypes. Eight deaths were attributed to the most common subtype, and two other deaths had indistinguishable subtypes.

Streptococcal Invasive Disease - Group B

Three hundred thirty-one cases of group B streptococcal invasive disease (6.3 per 100,000 population), including 12 deaths, were reported in 2007. These cases were those in which group B *Streptococcus* (GBS) was isolated from a normally sterile site; five cases of miscarriage or stillbirth in which GBS was cultured from the placenta were also reported.

Overall, 156 (47%) cases presented with bacteremia without another focus of infection. The other most common types of infection were cellulitis (16%), pneumonia (8%), osteomyelitis (8%), arthritis (6%), and meningitis (2%). The majority (79%) of cases had GBS isolated from blood only. Fifty-one percent of cases occurred among residents of the metropolitan area. Thirty-seven (11%) case-patients were infants less than 1 year of age, and 165 (50%) were 60 years of age or older.

Forty-six cases of infant (early-onset or late-onset) or maternal GBS disease were reported, compared to 59 cases in 2006. Twenty-three infants developed

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invasive disease within 6 days following birth (0.31 cases per 1,000 live births), and 13 infants became ill at 7 to 89 days of age. Five stillbirths or spontaneous abortions were associated with 10 maternal invasive GBS infections.

From 1997 to 2007, there were 278 early-onset disease cases reported, and 15 infants died. Sixty-one infants were born at less than 37 weeks gestation and accounted for 22% of early-onset cases. Bacteremia without another focus of infection (79%) was the most common type of infection in these early-onset cases, followed by pneumonia (11%) and meningitis (7%).

The *Prevention of Perinatal Group B Streptococcal Disease, Revised Guidelines* published by CDC in August 2002 included the following key changes: the recommendation for universal prenatal screening of all pregnant women at 35 to 37 weeks gestation and updated prophylaxis regimens for women with penicillin allergies. In light of these revised guidelines, MDH reviewed the maternal charts for all 23 early-onset cases reported during 2007. Overall, 12 (52%) of 23 women who delivered GBS-positive infants underwent prenatal screening for GBS. Of these, two (17%) women were positive and 10 (83%) were negative. Among the eight women who did not receive prenatal screening for GBS, two (25%) were screened upon admission to the hospital and prior to delivery of her infant. Among the 23 women of infants with invasive GBS disease, eight (32%) received intrapartum antimicrobial prophylaxis (IAP). Both of the women with a positive GBS screening result received IAP. MDH continues to follow the incidence of GBS disease among infants, screening for GBS among pregnant women, and the use of IAP for GBS-positive pregnant women during labor and delivery.

Tetanus

One case of tetanus was reported during 2007. The case occurred in a 10-year-old white, non-Hispanic male with no history of receiving tetanus and diphtheria toxoid (Td). He had sustained a deep laceration on his right foot when running on a farm without shoes. No immediate medical attention was sought and he was hospitalized 2

weeks later for symptoms consistent with generalized tetanus. He received tetanus immune globulin (TIG) 3 days after illness onset. The case-patient received mechanical ventilation for 18 days and was hospitalized for 28 days before recovering.

Toxic Shock Syndrome

In 2007, nine cases of suspect or probable staphylococcal toxic shock syndrome (TSS) were reported. Of the reported cases, most (78%) were female and the median age was 14 years (range, 10 to 19 years). Five of the nine (56%) were menstrual-associated, three were wound-associated, and one had no source identified.

Staphylococcal toxic shock syndrome with isolate submission (if isolated) is reportable to MDH within one working day. MDH follows the 1997 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; orthostatic drop in diastolic blood pressure greater than or equal to 15 mm Hg from lying to sitting, orthostatic syncope, or orthostatic dizziness), 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/mm³; disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent); negative results for blood, throat, or cerebrospinal fluid cultures (blood culture may be positive for *Staphylococcus aureus*) or rise in titer to Rocky Mountain spotted fever, leptospirosis, or measles.

Tuberculosis

While the number of cases of tuberculosis (TB) disease reported nationally has decreased each year since 1993, the incidence of TB in Minnesota increased throughout much of the 1990s and peaked at 239 TB cases (4.8 cases per 100,000 population) in 2001. After 3 consecutive years (2002-2004) of decreasing incidence followed by a plateau at 199 cases in 2005, the number of reported TB cases in Minnesota has steadily increased. A 9% increase in 2006 resulted in 217 cases, and a 10% increase in 2007 resulted in 238 cases (one case short of the 2001 peak). The increase in cases observed in 2006 primarily was due to a 62% increase in the number of U.S.-born cases, whereas the number of foreign-born cases counted in 2006 was essentially the same as the prior year. In 2007, the increase in cases was due to a 16% increase in the number of foreign-born cases (from 175 to 203), while the number of U.S.-born cases decreased by 17% (from 42 to 35). The 238 cases counted in 2007 represent an incidence rate of 4.6 cases per 100,000 population. The statewide incidence is slightly above that of the national rate (4.4 cases per 100,000 population in 2007); it also exceeds the U.S. Healthy People 2010 objective of 1.0 case per 100,000 population (Figure 5).

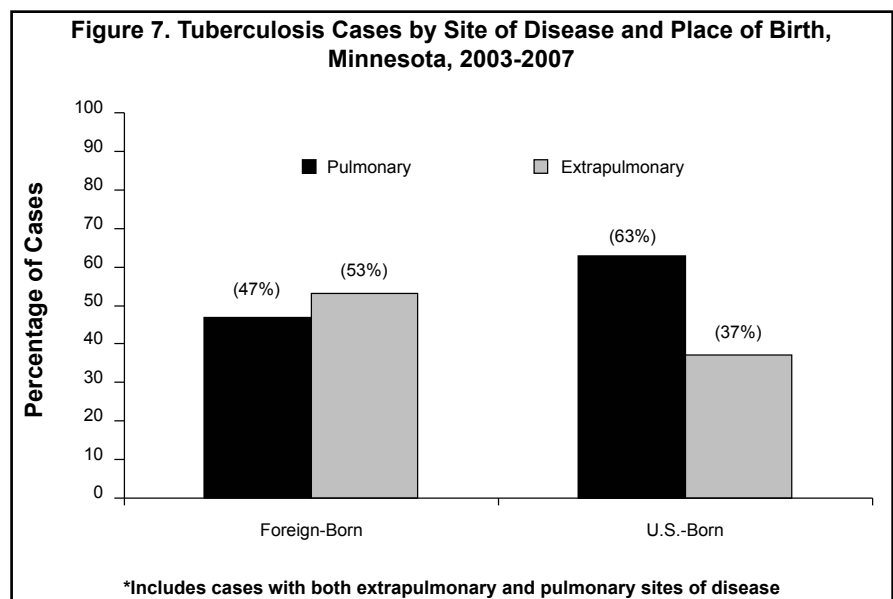
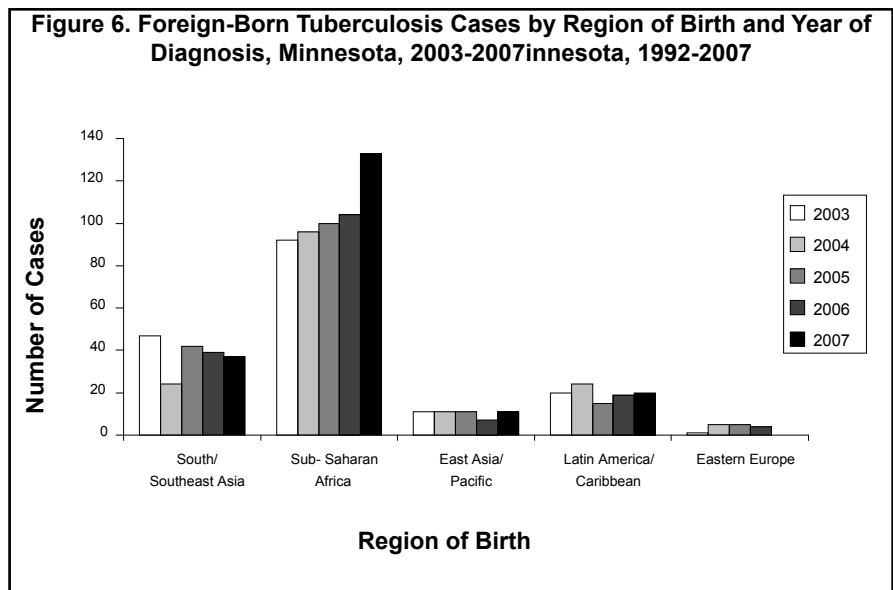
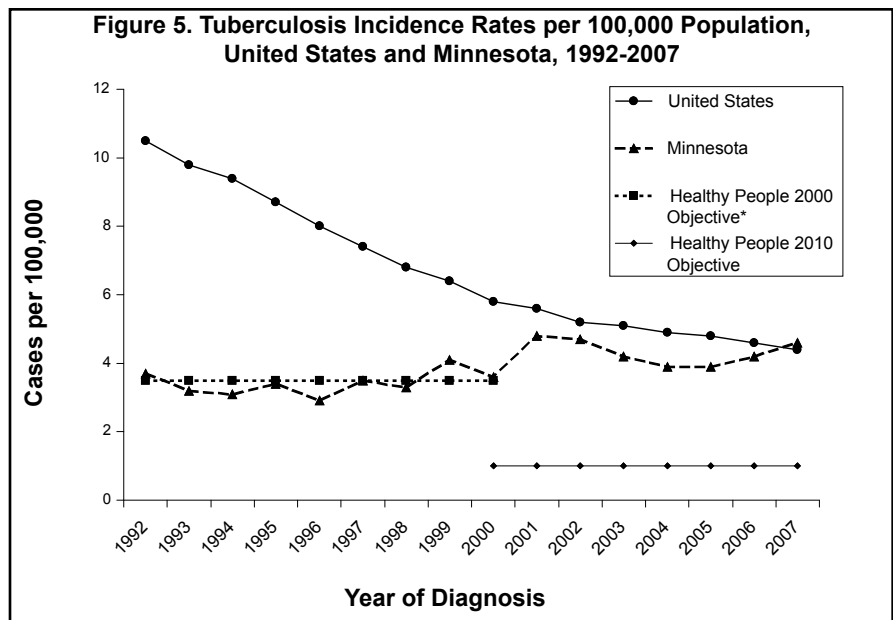
The most distinguishing characteristic of the epidemiology of TB disease in Minnesota continues to be the large proportion of TB cases reported among foreign-born persons. During the past decade, the percentage of foreign-born persons among TB cases reported in Minnesota increased from 71% in 1998, to 87% in 2005. In 2007, 85% of TB cases in Minnesota were foreign-born, which is consistent with the average percentage of foreign-born cases (83%) reported from 2003 through 2007. In contrast, 59% of TB cases reported nationwide in 2007 were foreign-born.

The 203 foreign-born 2007 TB case-patients represent 27 different countries of birth. The most common region of birth among foreign-born TB cases reported in 2007 was sub-Saharan Africa (66%), followed by South/Southeast Asia (18%) (Figure 6). The ethnic diversity among these foreign-born TB cases reflects the unique and constantly changing demographics of immigrant and other foreign-born

populations arriving in Minnesota. This diversity also poses significant challenges in providing culturally and linguistically appropriate TB prevention and control services for populations most affected by and at risk for TB in Minnesota.

Nearly one-fourth (24%) of the foreign-born TB case-patients reported in 2007 were diagnosed within 12 months after arriving in the United States. These cases likely represent persons who acquired TB infection outside the United States and began progressing to active TB disease prior to immigrating. Persons 15 years of age or older who arrive in the United States as immigrants or refugees receive a pre-immigration medical examination overseas that includes screening for pulmonary TB disease. Of 34 TB case-patients 15 years of age or older who were diagnosed in Minnesota during 2007 within 12 months of arriving in the United States and who arrived as immigrants or refugees, only nine (26%) had any TB-related condition noted in their pre-immigration medical exam results. 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. More than half (62%) of foreign-born TB case-patients reported in Minnesota during 2007 were diagnosed 2 or more years after arriving in the United States. These data suggest that at least half of foreign-born TB cases reported in Minnesota may be preventable by focusing on thorough domestic screening, evaluation, and treatment of latent TB infection among recently arrived refugees, immigrants, and other foreign-born persons.

The majority (68%) of foreign-born TB case-patients reported in Minnesota in 2007 were 15 to 44 years of age, whereas only 20% of U.S.-born TB cases occurred among persons in this age category. In contrast, 54% of U.S.-born TB case-patients were 45 years of age or older. The proportion of pediatric patients less than 5 years of age was considerably larger among U.S.-born TB cases than among foreign-born cases (11% versus 0%, respectively), although nearly all of these U.S.-born case-patients were children born in the U.S. to foreign-born parents. These first-generation U.S.-born...



born children appear to experience an increased risk of TB disease that more closely resembles that of foreign-born persons. Presumably, these children may be exposed to TB as a result of travel to their parents' country of origin and/or visiting or recently arrived family members who may be at increased risk for TB acquired overseas.

The majority (81%) of TB cases in 2007 in Minnesota were identified as a result of presenting for medical care. Other methods of case identification during this time period included TB contact investigations (6%), domestic refugee health examinations (6%), and follow-up evaluations following abnormal findings on pre-immigration exams performed overseas (3%). The remaining 4% of TB cases were identified through a variety of other means.

Aside from foreign-born persons, other high-risk population groups comprise much smaller proportions of the TB cases reported in Minnesota. Among cases reported in 2007, persons with certain medical conditions (excluding HIV infection) that increase the risk for progression from latent TB infection to active TB disease (e.g., silicosis, diabetes, prolonged corticosteroid therapy or other immunosuppressive therapy, end stage renal disease, etc.) were the most common of these other high-risk population groups, representing 16% of the cases. Substance abuse (including alcohol abuse and/or illicit drug use) was the second most common of these other risk factors, with approximately 7% of TB case-patients having a history of substance abuse during the 12 months prior to their TB diagnosis. Twelve (5%) of the 238 TB case-patients reported in Minnesota during 2007 were infected with HIV; all 12 of those HIV-infected TB case-patients were foreign-born, including four persons born in Mexico, two persons each from Ethiopia, Kenya, Liberia, and one person each from Cameroon and Sudan. The percentage of TB case-patients in Minnesota with HIV co-infection remains less than that among all TB cases reported nationwide. Other risk groups such as homeless persons, correctional facility inmates, and residents of nursing homes each represented only 1-3% of TB cases reported in Minnesota during 2007.

Twenty-seven (31%) of the state's 87 counties reported at least one case of TB disease in 2007, with the majority (79%) of cases occurring in the metropolitan area, particularly in Hennepin (48%) and Ramsey (20%) Counties, both of which have public TB clinics. Eleven percent of TB cases occurred in the five suburban metropolitan counties (i.e., Anoka, Dakota, Carver, Scott, and Washington). Olmsted County, which maintains a public TB clinic staffed jointly by the Olmsted County Health Department and Mayo Clinic, represented 8% of cases reported statewide in 2007. The remaining 13% of cases occurred in primarily rural areas of Greater Minnesota. MDH calculates county-specific annual TB incidence rates for Hennepin, Ramsey, and Olmsted counties, as well as for the five-county suburban metropolitan area and collectively for the remaining 79 counties in Greater Minnesota. In 2007, the highest TB incidence rate (14.3 cases per 100,000) was reported in Olmsted County, followed by Hennepin and Ramsey counties, respectively. The TB incidence rate in Hennepin County increased from 8.4 cases per 100,000 in 2006 to 10.0 cases per 100,000 in 2007, while the TB incidence rate in Ramsey County increased from 8.5 cases per 100,000 in 2006 to 9.4 cases per 100,000 in 2007. In 2007, the incidence rates in both the five-county suburban metropolitan area (2.2 cases per 100,000) and Greater Minnesota (1.4 cases per 100,000) were considerably lower than that in the state overall.

Drug-resistant TB is a critical concern in the prevention and control of TB in Minnesota, as well as nationally and globally. The prevalence of drug-resistant TB in Minnesota, particularly resistance to isoniazid (INH) and multi-drug resistance, exceeds comparable national figures. In 2007, 22 (13%) of 176 culture-confirmed TB cases were resistant to at least one first-line anti-TB drug (i.e., INH, rifampin, pyrazinamide, or ethambutol). In particular, 17 (10%) cases were resistant to INH, and three (2%) cases were multidrug-resistant (i.e., resistant to at least INH and rifampin). These data reflect the prevalence of MDR-TB in Minnesota during the past 5 years, which averaged approximately 2% of cases annually. Drug resistance is more common among foreign-born

TB cases than it is among U.S.-born cases in Minnesota. Of particular concern, six (32%) of 19 MDR-TB cases reported from 2003 through 2007 were resistant to all four first-line drugs. These six pan-resistant MDR-TB case-patients represented six different countries of birth (one each from China, Ethiopia, Laos, Thailand, Somalia, and the United States). The U.S.-born pan-resistant patient was a young child infected by a foreign-born family member. One of the MDR-TB cases (2006) also met the current World Health Organization definition of extensively drug-resistant (XDR) TB.

Another clinical characteristic of significance among TB cases in Minnesota is the preponderance of extrapulmonary disease among foreign-born TB patients. Just over half (53%) of foreign-born TB case-patients counted from 2003 through 2007 had an extrapulmonary site of disease; in contrast, only 37% of U.S.-born TB case-patients had extrapulmonary TB (.). The most common extrapulmonary sites of TB disease in Minnesota are lymphatic, pleural, peritoneal, bone/joint, and meningeal. The unusually high incidence of extrapulmonary TB disease in Minnesota exemplifies the need for clinicians to be aware of the epidemiology of TB in Minnesota and to have a high index of suspicion for TB, particularly among foreign-born patients and even when the patient does not present with a cough or other common symptoms of pulmonary TB.

The epidemiology of TB in Minnesota highlights the need to support global TB elimination strategies, as well as local TB prevention and control activities targeted to foreign-born persons. TB in Minnesota occurs primarily, although not exclusively, among foreign-born persons, with TB case-patients representing many countries of origin and varied cultural backgrounds. The prevalence of drug-resistant TB in Minnesota is high compared to that of the national rate, and extrapulmonary sites of disease are common, especially among foreign-born cases. The proportion of TB cases occurring in persons under 5 years of age in Minnesota exceeds the comparable figure nationally, with many of these children being born to foreign-born parents. These trends suggest that the incidence of TB in

Minnesota is not likely to decrease in the foreseeable future.

Unexplained Critical Illnesses and Deaths of Possible Infectious Etiology

Surveillance for unexplained critical illnesses and deaths of possible infectious etiology (UNEX) began in September 1995. Any case should be reported, regardless of the patient's age or underlying medical conditions. A subset of cases (persons up to 49 years of age with no underlying medical conditions who died of an apparent non-nosocomial infectious process) are eligible for testing performed at CDC as part a special project. For cases not eligible for the CDC project, some testing may be available at MDH or CDC, at the physician's request.

Sixty-four cases (39 deaths and 25 critical illnesses) were initially reported in 2007, compared to 45 cases in 2006. The cause(s) of illness subsequently were determined for 13 cases and were no longer considered unexplained. Among the remaining 51 cases, 15 presented with neurologic symptoms; 11 case-patients presented with respiratory symptoms; 10 presented with cardiac symptoms; seven presented with shock/sepsis; five presented with sudden unexpected death (SUD); one presented with gastrointestinal (GI) symptoms; one presented with a renal syndrome; and one had an illness that did not fit a defined syndrome. Case-patients with neurological symptoms were 1 to 76 years of age; those with respiratory symptoms ranged from 2 to 54 years of age; those with the cardiac case-patients were 8 days to 52 years of age; those with sepsis were 1 to 54 years of age; the case-patients with SUD were 1 to 53 years of age; the case-patient with GI symptoms was 16 years of age; the case-patient with renal symptoms was 39 years old, and the case-patient without a defined syndrome was 15 years of age. Nine patients with a cardiac syndrome, six patients with sepsis, five patients with respiratory symptoms, two patients with neurologic symptoms, and the patient with a GI syndrome died, as did the patient with a renal syndrome. Twenty-five patients resided in the metropolitan area, 14 case-patients resided in Greater Minnesota, and 12 case-patients were out-of-state residents hospitalized in Minnesota.

Nineteen cases were eligible for the CDC project (five cardiac, four respiratory, three sepsis, three neurologic, two SUD, the GI case, and the renal syndrome case). Specimens were obtained for testing at MDH or CDC for 14 cases. Probable etiologies were established for nine cases. Immunohistochemical (IHC) testing and a viral culture of the lungs were positive for influenza A from a 1 year-old who experienced sudden unexpected death. A viral culture and PCR test of a nasopharyngeal swab was also positive for influenza A. A 2-year-old had influenza A cultured from the lung and spleen and also had a culture and PCR test of the lung that were positive for group A streptococcus. A 10-month-old, a 4-year-old, and a 25 year-old male who died from myocarditis all had positive PCR tests for enterovirus from heart samples. A 44 year-old male who died with a respiratory syndrome had positive PCR tests of lung samples for *Streptococcus pneumoniae*. A 47 year-old male who died with a respiratory syndrome had IHC testing of a lung sample that was positive for *S. pneumoniae*. A 2 year-old who died with a respiratory syndrome had adenovirus type 2 isolated from a viral culture of a nasopharyngeal swab. A 3 year-old who died with shock/sepsis syndrome had a positive PCR test of blood for serogroup C *Neisseria meningitidis*.

Testing was also provided at MDH and/or CDC at the physician's request for 18 of the 32 cases that were not eligible for the CDC project. Positive results were found for four of these cases. All four (a 2 year-old, a 3 year-old, a 17 year-old female, and a 40 year-old female) were hospitalized with culture-negative meningitis and had positive PCR tests of cerebrospinal fluid for serogroup C *N. meningitidis*.

Medical Examiner Surveillance

MED-X is a population-based surveillance program aimed at identifying all infectious disease related deaths that are investigated by medical examiners (MEs). There are three mechanisms in place for case finding. First, as part of the unexplained deaths surveillance (UNEX), MDH reviews all death certificates for deaths due to infectious causes. Second, MDH reviews all death investigation reports at the Minnesota Regional Medical Examiner Office (MRMEO) in Hastings. This office cov-

ers seven counties, including Carver, Chisago, Dakota, Houston, Fillmore, Goodhue, and Scott, which together make up 14.3% of the state population. Lastly, the ME offices actively report cases that have infectious causes or are suspicious for infectious causes and MDH collaborates with them to determine the cause of death. In some instances, these become UNEX cases and may have additional testing done at CDC.

In 2007, MED-X was expanded to include the Hennepin County Medical Examiner's Office and the Midwest Regional Forensic Pathology Office in Anoka, in addition to the MRMEO. Additional counties covered by these two offices include Anoka, Crow Wing, Hennepin, Mille Lacs, Meeker, McLeod, Sibley, and Wright counties. The three ME offices together cover 48% of the state population.

MDH distributes specimen collection kits to the ME offices to help guide the number and type of specimens collected. These specimens are then tested at the facility laboratory or sent to MDH for testing. There were 15 kits distributed in 2007. Use of these kits has continued to improve the quality and number of specimens sent to MDH, which has increased our ability to determine a cause of death.

There were 104 MED-X cases in 2007, and 24 of these were also UNEX cases. Based on MRMEO data, the population-based rate of potential infectious disease related deaths as reported to medical examiners was 5,700 per 100,000 ME cases, which translates to 2,700 per 100,000 total deaths and 12 per 100,000 among the total population. The mean age of the case was 58 years, and 52% were female. The majority of cases were found through death investigation report review (78, [75%]). MEs reported 22 cases (21%), and four (4%) were found through death certificate review. The most common presenting symptom was pneumonia/upper respiratory infection, which was also the most common pathologic finding. In addition, there were 12 cases with myocarditis. Of the 104 cases, 35 (34%) were confirmed to be due to an infectious cause, 58 (56%) were possibly due to infectious cause, nine (9%) were determined to not

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be due to infectious cause, and two (2%) were unable to be determined. Pathogens that were identified as the cause of death included *Streptococcus pneumoniae*, *Staphylococcus aureus* and methicillin-resistant *S. aureus*, Group A *Streptococcus*, influenza A, enterovirus, *Haemophilus influenzae*, and prion disease. Other pathogens identified as possibly related to the cause of the death included Coxsackie virus, Group F *Streptococcus*, and adenovirus.

Varicella and Zoster

Varicella and zoster surveillance were implemented in Minnesota pursuant to their addition to the Minnesota Rules Governing Communicable Diseases, effective September 13, 2005. The reporting rules require that unusual case incidence, individual critical cases, and deaths due to varicella and zoster be reported. The reporting rules also allow for the use of a sentinel surveillance system to monitor varicella and zoster incidence until that system no longer provides adequate data for epidemiological purposes, at which time case-based surveillance will be implemented. This summary represents the second full year of these surveillance efforts. Over time, these data will be used to monitor trends in varicella and zoster disease in Minnesota, and will be used to extrapolate to the statewide disease burden.

No varicella-related deaths were identified in 2007. Five cases of critical varicella illness were reported. Four had underlying medical conditions and were being treated with immunosuppressive drugs. The other case-patient had no underlying conditions and was not known to be immunosuppressed. Three of the case-patients were male. Race was reported for four case-patients, all of whom were white. Ethnicity was reported for two, both of whom were not Hispanic. Two case-patients had a documented history of one dose of varicella-containing vaccine. Two case-patients had not received varicella-containing vaccine; one was born before 1980 and the other did not specify a reason for not being vaccinated. The other case-patient reported receiving varicella-containing vaccine but this was not verified. Each case-patient was hospitalized for a mean of 5.4 days. Dehydration was

the only complication reported in one case-patient. All five case-patients recovered.

Varicella surveillance in Minnesota includes reporting of outbreaks from all schools, and reporting of individual cases from selected sentinel schools and childcare centers. Eighty sentinel schools were selected and participated throughout the 2006-2007 school year and 77 participated in the 2007-2008 school year. One hundred nineteen sentinel childcare centers were selected and participated throughout 2007

An outbreak of varicella in a school is defined as five or more cases within a 2-month period in persons less than 13 years of age, or three or more cases within a 2-month period in persons 13 years of age and older. An outbreak is considered ended when no new cases occur within 2 months after the last case is no longer contagious. During the 2007-2008 school year, MDH received reports of outbreaks from 40 schools in 22 counties throughout Minnesota involving 487 students and no staff. By comparison, MDH received reports of outbreaks from 73 schools in 30 counties throughout Minnesota involving 1,230 students and no staff during the 2006-2007 school year. The number of cases per outbreak ranged from five to 37 (median, 9) during the 2007-2008 school year and five to 96 (median, 13) during the 2006-2007 school year.

A case of varicella is defined for sentinel school and childcare facility reporting as an illness with acute onset of diffuse (generalized) maculopapulovesicular rash without other apparent cause. During the 2007-2008 school year, MDH received 67 reports of varicella from 17 (22%) sentinel schools. Four sentinel schools reported clusters of cases that met the outbreak definition. Thirty-nine (58%) of 67 reported cases were included in these four outbreaks. Cases per outbreak ranged from five to 13 (median, 10.5). The 28 cases not associated with an outbreak represent sporadic varicella incidence in Minnesota schools.

Based on sentinel school data, an estimated 678 sporadic cases of varicella would have been expected

to occur during a school year among the 876,353 total school-aged children (in Minnesota schools with more than 99 students), representing 0.08% of this population, for an incidence rate of 77.4 per 100,000 population. Estimated grade level-specific annual incidence rates are 141.1 per 100,000 (585 of 414,616) for elementary school students; 52.1 per 100,000 (67 of 128,653) for middle school students; and 8.2 per 100,000 (26 of 315,706) for high school students.

In 2007, MDH received two reports of varicella cases from one (2.1%) of 47 sentinel childcare centers and no reports from 72 sentinel family childcares. Based on sentinel childcare data, an estimated 75 cases of varicella would have been expected to occur during the calendar year among the 95,110 children enrolled in Minnesota childcare centers, representing 0.08% of this population, for an incidence rate of 79.1 per 100,000. No cases of varicella would have been expected to occur during the calendar year among the 142,165 children enrolled in Minnesota family childcares.

MDH currently conducts zoster surveillance in all schools and selected sentinel childcare centers. During the 2007-2008 school year, MDH received 128 reports of zoster from schools in at least 43 counties throughout Minnesota, representing 0.01% of the total school population of 919,176 students for an incidence rate of 13.9 per 100,000. Ages ranged from 5 to 18 years. By comparison, MDH had received 144 reports of zoster in 37 counties throughout Minnesota during the 2006-2007 school year. Ages ranged from 5 to 18 years. As opposed to varicella, which is mainly diagnosed by school health personnel and parents, most zoster cases (93%) are physician-diagnosed.

In 2007, MDH received one report of zoster from one (2.1%) of 47 sentinel childcare centers and no reports from 72 sentinel family childcares. Based on sentinel childcare data, an estimated 38 cases of zoster would have been expected to occur during the calendar year among the children enrolled in Minnesota childcare centers, representing 0.04% of this

population, for an incidence rate of 39.5 per 100,000. No cases of zoster would have been expected to occur during the calendar year among the children enrolled in Minnesota family childcares.

Vaccine supply issues have caused major delays in getting the varicella vaccine to providers, resulting in children unable to receive the second dose of varicella vaccine. It is unclear when the vaccine supply will stabilize. Until it does, the two-dose requirement for kindergarteners and seventh graders enrolling in Minnesota schools has been postponed. However, a single dose of varicella vaccine is still required for students enrolling in these grades, and providers are encouraged to administer the second dose as recommended if varicella vaccine is available.

Viral Hepatitis A

In 2007, 94 cases of hepatitis A (1.8 per 100,000 population) were reported including one (1%) death. Sixty-one (65%) case-patients were residents of the metropolitan area, including 47 (50%) residents of Hennepin or Ramsey Counties. Forty-seven (50%) of the cases were male. Case-patients ranged in age from 1 to 89 years (median, 40 years). Seventy-two (77%) cases were white, four (4%) were black, three (3%) were American Indian, and one (1%) was Asian; race was unknown for 14 (15%) cases. The three cases in American Indians were the first reported in American Indians in Minnesota since 2002. The incidence rate of hepatitis A in American Indians declined steadily from 10.4 per 100,000 in 1999 to 6.0, 3.7, and 2.5 per 100,000, in 2000, 2001, and 2002 respectively, demonstrating the success of targeted immunization efforts initiated in 1999. Hispanic ethnicity was reported for nine cases (4.4 per 100,000).

A risk factor was identified for 74 (79%) of the 94 cases, 20 (27%) of whom had known exposure to a confirmed hepatitis A case. These persons became infected following exposure to a close contact, representing missed opportunities to administer immune globulin. Of the remaining 54 (73%) cases with a risk factor identified, 17 (31%) were

associated with travel. Of these 17, 13 (76%) traveled to Mexico, Central, or South America, four of whom reported consuming raw oysters.

In 2007, there were eight outbreaks of hepatitis A. Forty-two (45%) cases of hepatitis A were outbreak-associated. The number of cases per outbreak ranged from two to 15. Of the eight outbreaks, three were common-source food-borne outbreaks, three were community outbreaks, and two occurred among contacts of hepatitis A positive international adoptees. Post-exposure prophylaxis (immune globulin [IG] or hepatitis A vaccine) is recommended to prevent hepatitis A in persons exposed and to prevent or control outbreaks. One restaurant-associated outbreak in Hennepin County accounted for 15 (16%) cases. One restaurant-associated outbreak in Murray County accounted for eight (9%) cases, three (38%) of whom were restaurant employees. In response to the restaurant associated outbreak in Murray County, over 2,200 patrons received IG at a mass clinic conducted by the Lincoln, Lyon, Murray, and Pipestone Public Health Services. One foodborne outbreak accounted for four (4%) cases and was associated with consuming raw shellfish in Mexico. Seven (7%) cases, including three (3%) personal care attendants, were associated with an outbreak in a home in Hennepin County. The source case in this outbreak was travel-associated. Two (2%) cases were associated with an outbreak among group home residents. An outbreak in a daycare included two (2%) cases. One outbreak associated with international adoptee accounted for two (2%) cases including the source of infection in the group home outbreak. The other international adoptee associated outbreak accounted for two (2%) cases.

Hepatitis A vaccine is now recommended for post-exposure prophylaxis of certain groups. Hepatitis A vaccine used for post-exposure prophylaxis gives longer protection than IG, is often more readily available, and is easier to administer.

Viral Hepatitis B

In 2007, 25 cases of symptomatic acute hepatitis B virus (HBV) infection

(0.5 per 100,000 population) were reported, with no deaths. In addition to the 25 cases, six individuals with documented asymptomatic seroconversions were reported. Prior to 2006, both symptomatic cases and asymptomatic seroconvertors were counted as incident cases. This change in case counting criteria should be considered when examining case incidence trends. MDH also received 1,022 reports of newly identified cases of chronic HBV infection.

Acute cases ranged in age from 23 to 79 years (median, 47 years). Twelve (48%) of the 25 cases were residents of the metropolitan area, including five (20%) in Hennepin County and two (8%) in Ramsey County. Fourteen (56%) cases were male and 10 (40%) were adolescents or young adults between 13 and 39 years of age. Ten (40%) were white, two (8%) were black, and one (4%) was Asian; race was unknown for 12 (48%) cases. Two (8%) case-patients were of Hispanic ethnicity. Although the majority of cases were white, incidence rates were higher among blacks (0.9 per 100,000), Hispanics (0.9 per 100,000), and Asians (0.5 per 100,000) than among non-Hispanic whites (0.2 per 100,000).

MDH attempts to ascertain risk factor information and possible modes of transmission by collecting information reported by the case-patient to his/her health care provider, and by interviewing the case-patient directly, if possible. A case-patient may report more than one risk factor, and may report different information to his/her health care provider than to MDH. Five (20%) case-patients reported illicit drug use. Of these, two (40%) case-patients reported injection drug use. Ten (40%) case-patients reported having sexual contact with one or more partners within 6 months prior to onset of symptoms. Of these, three (30%) case-patients reported sexual contact with two or more partners, three (30%) case-patients were males who reported having at least one male sexual partner, and one (10%) case-patient reported having sexual contact with a known carrier of hepatitis B surface antigen (HBsAg). Two (8%) of the

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25 total case-patients reported having household contact with a known carrier of hepatitis B (HBsAg). No risk factor was identified for eight (32%) cases.

In addition to the 25 hepatitis B cases, one 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-patient was born in 2006. 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 infant was born in the United States and had received hepatitis B immune globulin and three doses of hepatitis B vaccine in accordance with the recommended schedule (i.e., was a treatment failure). Despite this treatment failure, the success of the public health prevention program is demonstrated by the fact that an additional 325 infants born to HBV-infected women during 2006 had post-serologic testing demonstrating no infection.

Viral Hepatitis C

In 2007, 28 cases of symptomatic acute hepatitis C virus (HCV) infection were reported. In addition to the 28 cases, nine individuals with asymptomatic, laboratory-confirmed acute HCV infection were reported. Prior to 2006, both symptomatic and asymptomatic acute infections were counted as incident cases. This

change in case counting criteria should be considered when examining case incidence trends.

Sixteen (57%) of the 28 case-patients resided in Greater Minnesota. The median age was 40 years (range, 19 to 61 years). Fifteen (54%) case-patients were female. Seventeen (61%) were white, three (11%) were American Indian, and three (11%) were black; race was unknown for five (18%) cases.

MDH attempts to ascertain risk factor information for the 6 months prior to onset of symptoms by collecting information reported by the case-patient to his/her health care provider and by interviewing the case-patient, if possible. A case-patient may report more than one risk factor, and may report different information to his/her health care provider than to MDH. Among the 28 case-patients, 11 (39%) used injection drugs; four (14%) had sexual contact with a known HCV-infected partner; two (7%) had multiple sexual partners; two (7%) had one sexual partner; one (4%) had sexual contact with an injection drug user; and one (4%) had an occupational exposure. No risk factor was identified for seven (25%) cases.

MDH received more than 2,000 reports of newly identified anti-HCV positive persons in 2007, the vast majority of whom are chronically infected. 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.

Emerging Infections Conference Program

Program Includes:

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| <ul style="list-style-type: none"> • Global Climate Change and the Impact on Emerging Infections - Jonathan D. Mayer, PhD, University of Washington | <ul style="list-style-type: none"> • The Future: Predictions for Emerging Infections - Michael T. Osterholm, PhD, University of Minnesota | <p>Case Presentations: Panel to Discuss Diagnoses - Moderator: Phillip K. Peterson, MD, University of Minnesota</p> |
| <ul style="list-style-type: none"> • Current Status of Vertical Transmission of HIV - Laura Hoyt, MD, Children's Hospitals and Clinics | <ul style="list-style-type: none"> • Vaccine Update - Priya Sampathkumar, MD - Mayo Clinic | <p>Panel:
- Richard Anderson, MD, Children's Hospitals,</p> |
| <ul style="list-style-type: none"> • Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)- A View from the Centers for Disease Control and Prevention - Scott K. Fridkin, MD, CDC | <ul style="list-style-type: none"> • Hot Topics from the Minnesota Department of Health - Richard Danila, PhD, Minnesota Department of Health | <p>- Mark R. Schleiss, MD, U of MN,

- James Johnson, MD, VA Medical Center-Minneapolis,</p> |
| <ul style="list-style-type: none"> • Travel Medicine Update - Abinash Virk MD, Mayo Clinic | <ul style="list-style-type: none"> • Dermatologic Manifestations of Epidemic and Endemic Diseases - Lisa A. Drage, MD, Mayo Clinic | <p>- Douglas R. Osmon, MD, Mayo Clinic,

- David Williams, MD, Hennepin County Medical Center</p> |

14th Annual Emerging Infections in Clinical Practice and Public Health Conference November 14, 2008 (See Program, p. 24)

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Antimicrobial Susceptibilities of Selected Pathogens, 2007

On the following pages is the *Anti-microbial Susceptibilities of Selected Pathogens, 2007*, a compilation of antimicrobial susceptibilities of selected pathogens submitted to MDH during 2007 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."

Please note the data on inducible clindamycin resistance for Group A and B *Streptococcus* and community associated methicillin-resistant *Staphylococcus aureus*.

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

Limited laminated copies can be ordered from: Antibigram, Minnesota Department of Health, Acute Disease Investigation and Control Section, PO Box 64975, St. Paul, MN 55164 or by calling (651) 201-5414.

Trends, Comments, and Other Pathogens	
1 <i>Campylobacter</i> spp.	Ciprofloxacin susceptibility was determined for all isolates (n=797). Only 37% of isolates from patients returning from foreign travel were susceptible to quinolones. Most susceptibilities were determined using 2008 CLSI breakpoints for <i>Campylobacter</i> . Susceptibilities for gentamicin and azithromycin were based on an MIC \leq 2 μ g/ml.
2 <i>Salmonella enterica</i> (non-typhoidal)	Antimicrobial treatment for enteric salmonellosis generally is not recommended.
3 <i>Neisseria gonorrhoeae</i>	In 2007, 361 <i>Neisseria gonorrhoeae</i> isolates were tested for antibiotic resistance. 251 (70%) were submitted by the Red Door Clinic in Minneapolis and 110 (31%) by Room 111 in Saint Paul. 288 isolates were associated with heterosexual transmission, of which 4.5% were resistant to ciprofloxacin. 64 isolates were from men who have sex with men; 28% of these were resistant to ciprofloxacin. In addition, 6 isolates (1.7%) demonstrated reduced susceptibility to azithromycin using provisional breakpoints (zone diameter \leq 30mm).
4 <i>Neisseria meningitidis</i>	According to CLSI, MICs \geq 8 μ g/ml for nalidixic acid may correlate with diminished fluoroquinolone susceptibility. In 2007, no isolates had an MIC $>$ 2 μ g/ml. However, in January 2008, 2 isolates from cases occurring in northwestern MN had nalidixic acid MICs $>$ 8 μ g/ml and ciprofloxacin MICs of 0.25 μ g/ml indicative of resistance. Azithromycin may be used as an alternative to ciprofloxacin for chemoprophylaxis against meningococcal disease in northwestern MN. (MMWR 2008; 57:173-5).
5 Group A <i>Streptococcus</i>	Among 15 erythromycin-resistant, clindamycin-susceptible isolates, 10 (67%) had inducible resistance to clindamycin by D-test.
6 Group B <i>Streptococcus</i>	96% (22/23) of early-onset infant, 92% (12/13) of late-onset infant, 50% (5/10) of maternal, and 88% (253/286) of other invasive GBS cases were tested. Among 49 erythromycin-resistant, clindamycin-susceptible isolates, 30 (61%) had inducible resistance to clindamycin by D-test. Overall, 67% were susceptible to clindamycin and were D-test negative (where applicable). 72% (28/39) of infant and maternal cases were susceptible to clindamycin and were D-test negative (where applicable).
7 <i>Streptococcus pneumoniae</i>	The 615 isolates tested represented 93% of 664 total cases. Reported above are the proportions of case-isolates susceptible by meningitis breakpoints for cefotaxime, ceftriaxone (intermediate = 1.0 μ g/ml, resistant \geq 2.0 μ g/ml) and penicillin (resistant \geq 0.12 μ g/ml). By nonmeningitis breakpoints (intermediate = 2.0 μ g/ml, resistant \geq 4.0 μ g/ml), 94% (579/615) and 94% (581/615) of isolates were susceptible to cefotaxime and ceftriaxone, respectively. By nonmeningitis breakpoints (intermediate = 4.0 μ g/ml, resistant \geq 8.0 μ g/ml), 93% (573/615) of isolates were susceptible to penicillin. Isolates were screened for high-level resistance to rifampin at a single MIC; all were \leq 2 μ g/ml. 16% (96/615) of isolates were resistant to two or more antibiotic classes and 12% (71/615) 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).
8 <i>Mycobacterium tuberculosis</i> (TB)	National guidelines recommend initial four-drug therapy for TB disease, at least until first-line drug susceptibility results are known. Of the 22 drug-resistant TB cases reported in 2007, 18 (82%) were in foreign-born persons, including two of three multidrug-resistant (MDR-TB) cases (i.e., resistant to at least isoniazid [INH] and rifampin). There were no cases of extensively drug-resistant TB (XDR-TB) (i.e., resistance to at least INH, rifampin, any fluoroquinolone, and at least one second-line injectable drug).
Invasive methicillin-resistant <i>Staphylococcus aureus</i>	3,517 cases of MRSA infection were reported in 2007 through 12 sentinel sites and Ramsey County population-based surveillance, of which 271 (8%) (sentinel: 151; Ramsey County: 41) were invasive (blood: 82%). 71% (192/271) had an isolate submitted and antimicrobial susceptibility conducted. Of invasive cases with an isolate, 81% were epidemiologically classified as healthcare-associated. Overall susceptibilities were as follows: 100% to linezolid, trimethoprim/sulfamethoxazole, vancomycin; 99% to gentamicin, tetracycline; 98% to rifampin; 96% to mupirocin; 14% to a fluoroquinolone (ciprofloxacin or levofloxacin); 3% to erythromycin. 51% (33/65) of erythromycin-resistant, clindamycin-susceptible isolates tested positive for inducible clindamycin resistance using the D-test. For the 32 (17%) classified as community-associated (CA) cases, susceptibilities were: 52% to ciprofloxacin; 97% to mupirocin and tetracycline. 39% of all invasive isolates and 60% of invasive, epidemiologically-defined CA-MRSA isolates were susceptible to clindamycin and D-test negative (where applicable).
<i>Bordetella pertussis</i>	Erythromycin susceptibility testing was performed on 36 <i>B. pertussis</i> isolates. All 36 were susceptible to erythromycin using provisional CDC breakpoints.
<i>Escherichia coli</i> O157:H7	Antimicrobial treatment for <i>E. coli</i> O157:H7 infection is not recommended.

Antimicrobial Susceptibilities
of Selected Pathogens, 2007



Sampling Methodology

- † all isolates tested
- ++ ~10% sample of statewide isolates received at MDH
- § isolates from a normally sterile site

	<i>Campylobacter</i> spp. 1†	<i>Salmonella</i> Typhimurium 2†	Other <i>Salmonella</i> serotypes (non-typhoidal) 2†	<i>Shigella</i> spp. †	<i>Neisseria gonorrhoeae</i> 3	<i>Neisseria meningitidis</i> 4†§	Group A <i>Streptococcus</i> 5†§	Group B <i>Streptococcus</i> 6†§	<i>Streptococcus pneumoniae</i> 7†§	<i>Mycobacterium tuberculosis</i> 8†
Number of Isolates Tested	79	147	51	24	361	22	160	292	615	176

% Susceptible

β-lactam antibiotics	amoxicillin									92
	ampicillin		56	98	29			100	100	
	penicillin					4	100	100	100	80
	cefixime					100				
	cefuroxime sodium									89
	cefotaxime							100	100	91
	ceftriaxone		95	98	100	100	100			91
	meropenem						100			90
Other antibiotics	ciprofloxacin	78 ¹	99	100	100	91	100			
	levofloxacin						100	99	99	99
	azithromycin	97				98	100			
	erythromycin	95						91	61	79
	clindamycin							100/94 ⁵	77/67 ⁶	90
	chloramphenicol		61	100	92		100			99
	gentamicin	84								
	spectinomycin					100				
	tetracycline	44				36		94		89
	trimethoprim/sulfamethoxazole		97	100	79		68			80
	vancomycin							100	100	100
TB antibiotics	ethambutol									98
	isoniazid									90
	pyrazinamide									97
	rifampin						100			98

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among health care providers.**

Sanne Magnan, M.D. Ph.D., Commissioner of Health

Division of Infectious Disease Epidemiology, Prevention and Control

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