

Annual Summary of Communicable Diseases Reported to the Minnesota Department of Health, 2002

Introduction

Assessment is a core public health function, and surveillance for communicable diseases is one type of ongoing assessment activity. Epidemiologic surveillance is the systematic collection, analysis, and dissemination of health data for the planning, implementation, and evaluation of public health programs. The Minnesota Department of Health (MDH) collects disease surveillance information on certain communicable diseases for the purposes of determining disease impact, assessing trends in disease occurrence, characterizing affected populations, prioritizing disease control efforts, and evaluating disease prevention strategies. In addition, prompt surveillance reports allow 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 a centralized system whereby reporting sources submit standardized report forms to MDH. These reports are monitored daily by disease-specific program staff. Cases of disease are reported pursuant to Minnesota Rules Governing Communicable Diseases (MN Rules 4605.7000 - 4605.7800). The Commissioner of Health has determined that the diseases listed in Table 1 (page 38) must be reported to MDH. As stated in these rules, physicians, health care facilities, medical laboratories, veterinarians, and veterinary medical laboratories 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 practitioner 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 communicable disease reporting without patient authorization. For further discussion on HIPAA see the May 2003 issue of the *Disease Control Newsletter* (vol. 31, no. 3).

Since April 1995, MDH has participated as one of the Emerging Infections Program (EIP) sites 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 performs state-of-the-art microbiologic evaluation of isolates, such as pulsed-field gel electrophoresis (PFGE), to determine whether isolates of selected pathogens (e.g., enteric pathogens such as *Salmonella* and *Escherichia coli* O157:H7 and invasive pathogens such as *Neisseria meningitidis*) are related and, therefore, may be associated with a common source. In addition, testing of submitted isolates allows detection and monitoring of antimicrobial resistance, which continues to be an important problem with many pathogens.

Table 2 summarizes the numbers of cases of selected communicable diseases reported to MDH during 2002 by district of the patient's residence. Pertinent observations for some of these diseases are discussed below. A summary of influenza surveillance data also is included. However, these data do not appear in Table 2 because the influenza surveillance system is based on reported outbreaks rather than on individual cases. Influenza data reported here pertain to the 2002-2003 influenza season.

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 and used by the MDH Infectious Disease Epidemiology, Prevention, and Control Division for the purpose of maximizing the comparability of disease-specific morbidity and mortality rates reported by programs throughout the Division.

Arboviral Encephalitis

LaCrosse encephalitis and Western equine encephalitis (WEE) historically have been the primary arboviral encephalitides found in Minnesota. During July 2002, however, West Nile Virus (WNV) was identified in Minnesota for the first time.

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Table 1. Diseases Reportable to the Minnesota Department of Health

(All reportable diseases must be reported within 1 working day, unless otherwise specified.)

Amebiasis (<i>Entamoeba histolytica</i>)	Leptospirosis (<i>Leptospira interrogans</i>)
Anthrax (<i>Bacillus anthracis</i>)*	Listeriosis (<i>Listeria monocytogenes</i>)*
Babesiosis (<i>Babesia</i> species)	Lyme disease (<i>Borrelia burgdorferi</i>)
Blastomycosis (<i>Blastomyces dermatitidis</i>)	Malaria (<i>Plasmodium</i> species)
Botulism (<i>Clostridium botulinum</i>)*	Measles (Rubeola)*
Brucellosis (<i>Brucella</i> species)	Meningitis (caused by <i>Haemophilus influenzae</i> *, <i>Neisseria meningitidis</i> *, <i>Streptococcus</i> <i>pneumoniae</i> *, or viral agents)
Campylobacteriosis (<i>Campylobacter</i> species)*	Meningococemia (<i>Neisseria meningitidis</i>)*
Cat Scratch disease (infection caused by <i>Bartonella</i> species)	Mumps*
Chancroid (<i>Haemophilus ducreyi</i>)*,**	Pertussis (<i>Bordetella pertussis</i>)*,*
<i>Chlamydia trachomatis</i> infection**	Plague (<i>Yersinia pestis</i>)
Cholera (<i>Vibrio cholerae</i>)*,*	Poliomyelitis*
Cryptosporidiosis (<i>Cryptosporidium parvum</i>)	Psittacosis (<i>Chlamydiaophila psittaci</i>)
Dengue virus infection	Q Fever (<i>Coxiella burnetii</i>)
Diphtheria (<i>Corynebacterium diphtheriae</i>)*	Rabies (animal and human cases and suspects)*
<i>Diphyllobothrium latum</i> infection	Retrovirus infections (other than HIV)
Ehrlichiosis (<i>Ehrlichia</i> and <i>Anaplasma</i> species)	Reye Syndrome
Encephalitis (caused by viral agents)	Rheumatic Fever (cases meeting the Jones Criteria only)
Enteric <i>Escherichia coli</i> infection (<i>E. coli</i> O157:H7 and other pathogenic <i>E. coli</i> from gastrointestinal infections)*	Rubella and Congenital Rubella Syndrome
Giardiasis (<i>Giardia lamblia</i>)	Rocky Mountain Spotted Fever (<i>Rickettsia</i> species)
Gonorrhea (<i>Neisseria gonorrhoeae</i>)**	Salmonellosis, including typhoid (<i>Salmonella</i> species)*
<i>Haemophilus influenzae</i> disease (all invasive disease)*	Shigellosis (<i>Shigella</i> species)*
Hantavirus infection	Streptococcal disease (all invasive disease caused by groups A or B streptococci and <i>S. pneumoniae</i>)*
Hemolytic Uremic Syndrome	Syphilis (<i>Treponema pallidum</i>)*,**
Hepatitis (all primary viral types including A, B, C, D, and E)	Tetanus (<i>Clostridium tetani</i>)
Histoplasmosis (<i>Histoplasma capsulatum</i>)	Toxic Shock Syndrome*
Human Immunodeficiency Virus (HIV) infection, including Acquired Immunodeficiency Syndrome (AIDS)***	Toxoplasmosis (<i>Toxoplasma gondii</i>)
Influenza (unusual case incidence or laboratory- confirmed cases)	Trichinosis (<i>Trichinella spiralis</i>)
Kawasaki Disease	Tuberculosis (<i>Mycobacterium tuberculosis</i> and <i>Mycobacterium bovis</i>)*
Legionellosis (<i>Legionella</i> species)	Tularemia (<i>Francisella tularensis</i>)
Leprosy (<i>Mycobacterium leprae</i>)	Typhus (<i>Rickettsia</i> species)
	Unexplained deaths possibly due to unidentified infectious causes
	Yellow Fever
	Yersiniosis (<i>Yersinia</i> species)*

*Report immediately by telephone at (612) 676-5414 or (877) 676-5414

**Report on separate Sexually Transmitted Disease Report Card

***Report on separate AIDS/HIV Report Card

*Submit isolates to the Minnesota Department of Health Public Health Laboratory

Confirmed cases of arboviral encephalitis are defined as those that are clinically and epidemiologically compatible with arboviral encephalitis and meet one or more of the following laboratory criteria: a four-fold or greater rise in antibody titer to the virus, isolation of virus from or detection of viral antigen in tissues or body fluids, or detection of specific IgM antibody in cerebrospinal fluid. Probable cases are defined as clinically compatible cases occurring during a period when arboviral transmission is likely, with an elevated and

stable (i.e., two-fold change or less) antibody titer to the virus. Medical providers' interest in WNV has led to the diagnosis and reporting of substantial numbers of less severe WNV infections (i.e., not classified as arboviral encephalitis cases). Consequently, a case definition for West Nile fever was developed, which includes a febrile illness with headache and the same laboratory confirmation criteria as for arboviral encephalitis cases.

WNV is maintained in a mosquito-to-bird transmission cycle. Several

mosquito and bird species may be involved in this cycle, and regional variation in vector and reservoir species is likely. Nationally during 2002, WNV was found in 44 states and the District of Columbia. During 2002, 4,156 human cases of WNV disease were reported in the U.S., including 284 fatalities. Forty-eight cases of WNV disease (no fatalities) were reported in Minnesota residents. Thirty-one (65%) Minnesota case-patients had West Nile fever; an additional 16 (33%) case-patients had **continued...**

Table 2. Cases of Selected Communicable Diseases Reported to the Minnesota Department of Health, by District of Residence, 2002

Disease	District*									Total (4,919,479)
	(population per U.S. Census 2000)									
	Metropolitan (2,642,056)	Northwestern (152,001)	Northeastern (248,425)	Central (683,787)	West Central (222,691)	South Central (280,332)	Southeastern (460,102)	Southwestern (230,085)	Unknown Residence	
Campylobacteriosis	480	22	37	127	52	50	104	69	0	941
Cryptosporidiosis	44	2	11	38	37	7	49	18	0	206
Ehrlichiosis	31	0	3	109	0	1	4	1	0	149
Encephalitis - viral										
LaCrosse	8	0	0	0	0	2	3	0	0	13
West Nile	13	4	0	4	10	4	5	8	0	48
<i>Escherichia coli</i> O157 infection	51	5	14	27	14	5	31	13	0	160
Hemolytic Uremic Syndrome	3	0	2	4	1	0	1	0	0	11
Giardiasis	533	13	32	133	23	59	125	64	0	982
<i>Haemophilus influenzae</i> invasive disease	24	3	4	6	4	2	7	2	0	52
HIV infection other than AIDS	189	1	4	8	1	2	5	0	1	211
AIDS (cases diagnosed in 2002)	135	1	2	7	1	1	3	0	1	151
Legionnaires' disease	12	0	5	0	0	0	1	0	0	18
Listeriosis	1	0	0	2	0	0	1	0	0	4
Lyme disease	401	11	22	358	5	14	52	4	0	867
Measles	2	0	0	0	0	0	0	0	0	2
Mumps	5	0	0	0	0	0	0	0	0	5
<i>Neisseria meningitidis</i> invasive disease	8	3	6	3	1	4	8	3	0	36
Pertussis	287	6	22	49	3	1	8	53	0	429
Rubella	0	0	0	0	0	0	0	0	0	0
Salmonellosis	349	14	31	61	27	26	54	31	0	593
Sexually transmitted diseases*	10,229	163	476	886	181	348	736	285	0	13,304
<i>Chlamydia trachomatis</i> - genital infections	7,402	152	423	755	158	314	640	263	0	10,107
Gonorrhea	2,697	10	53	123	22	34	91	19	0	3,049
Syphilis, total	130	1	0	8	1	0	5	3	0	148
primary/secondary	55	0	0	2	0	0	1	1	0	59
early latent**	23	0	0	0	0	0	0	0	0	23
late latent***	50	1	0	6	1	0	4	2	0	64
congenital	1	0	0	0	0	0	0	0	0	1
other	1	0	0	0	0	0	0	0	0	1
Chancroid	0	0	0	0	0	0	0	0	0	0
Shigellosis	169	10	1	13	14	5	6	4	0	222
<i>Streptococcus pneumoniae</i> invasive disease	300	22	38	88	31	38	56	25	0	598
Streptococcal invasive disease - Group A	82	4	10	14	4	5	23	5	0	147
Streptococcal invasive disease - Group B	187	7	26	31	10	10	31	9	0	311
Tuberculosis	184	0	5	10	5	7	20	6	0	237
Viral hepatitis, type A	39	0	3	2	2	1	6	0	0	53
Viral hepatitis, type B (acute infections only, not perinatal)	36	0	4	5	2	1	2	2	0	52
Viral hepatitis, type C (acute infections only)	2	0	6	5	1	0	0	0	0	14
Yersiniosis	7	1	1	5	1	1	2	1	0	19

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

**Duration ≤1 year

***Duration >1 year

County Distribution within Districts

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

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

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

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

West Central - Becker, Clay, Douglas, Grant, 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

either encephalitis or meningitis. Three case-patients (including two with encephalitis) were diagnosed with acute flaccid paralysis, an uncommon manifestation with a presentation similar to Guillain Barré syndrome.

A large epizootic among horses also was reported nationally; 14,539 equine cases were reported nationwide, including 992 cases in Minnesota. In

addition to the detection of human and equine WNV cases, MDH focused surveillance efforts on dead birds (especially American Crows and Blue Jays). In much of the country, dead bird surveillance has been the most sensitive indicator of the presence of WNV in an area. Evidence of WNV was detected in humans, horses, or birds in 85 of 87 Minnesota counties in 2002.

A more complete review of WNV can be found in the June 2003 issue of the *Disease Control Newsletter* (vol. 31, no. 4).

LaCrosse encephalitis was reported in several southeastern Minnesota counties in 2002. The disease, which primarily affects children, is transmitted through the bite of infected **continued...**

Ochlerotatus triseriatus (Eastern Tree Hole) mosquitoes. Persons are exposed to infected mosquitoes in wooded or shaded areas inhabited by this mosquito species, especially in areas where water-holding containers (e.g., waste tires, buckets, or cans) are abundant; these containers may be utilized as mosquito breeding habitats. During 2002, 13 cases of LaCrosse encephalitis were reported to MDH. From 1985 through 2002, 114 cases were reported from 19 southeastern Minnesota counties (Figure 1), with a median of five cases (range, three to 13 cases) reported yearly. Disease onsets have been reported from June through September; most onsets have occurred from mid-July through mid-September.

Campylobacteriosis

Campylobacter continues to be the most commonly reported bacterial enteric pathogen in Minnesota (Figure 2). There were 941 cases of culture-confirmed *Campylobacter* infection (19.1 per 100,000 population) reported in 2002. This is similar to the 953 cases reported in 2001 and represents a 7% decrease from the mean annual number of cases reported from 1997 to 2001 (mean, 1,011 cases; range, 786 to 1,181). The incidence of *Campylobacter* cases in the Southwestern district (30.0 cases per 100,000 population) was significantly higher than the statewide rate; the Northwestern district had the lowest incidence (14.5 cases per 100,000 population). Fifty-one percent of cases occurred in the seven-county Twin Cities metropolitan area. *C. jejuni* comprised 90% of the isolates confirmed by MDH, and *C. coli* comprised 10%.

Fifty percent of case-patients were 20 to 49 years of age, and 12% were 5 years of age or younger. Fifty-eight percent of case-patients were male. Fourteen percent of case-patients were hospitalized; the median length of hospitalization was 2 days. Fifty percent of infections occurred during June through September.

Four outbreaks of campylobacteriosis were detected in 2002, resulting in 12 culture-confirmed cases. One was a food-borne outbreak associated with a restaurant; the other three involved contact with farm animals, including an outbreak due to contact with dead

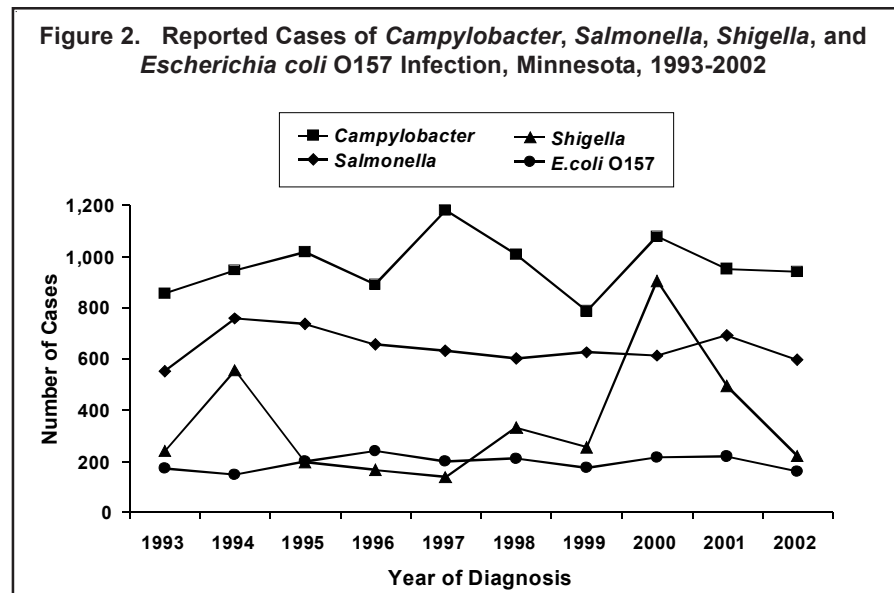
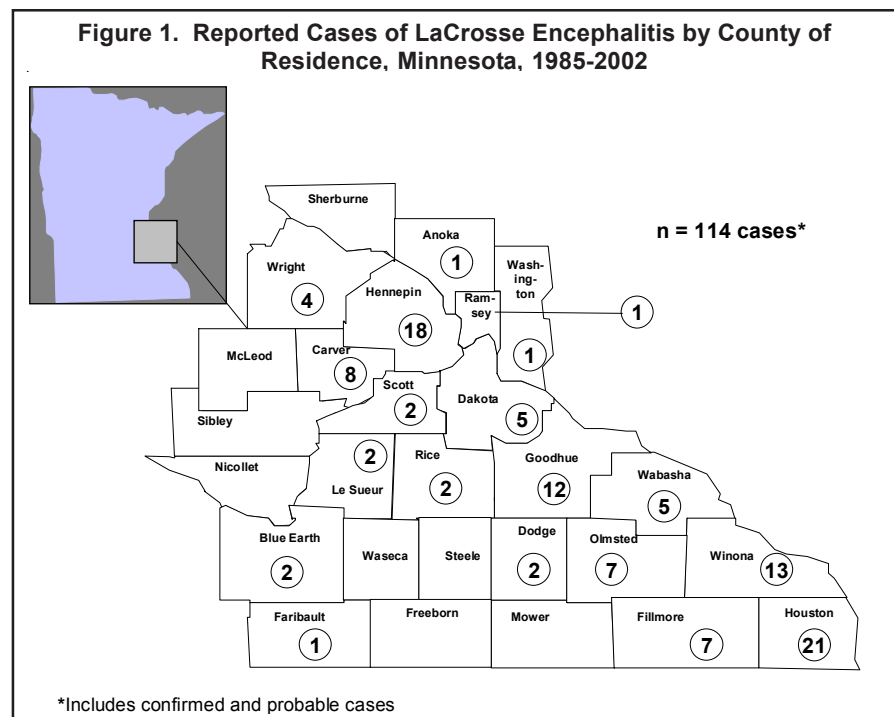
turkeys during flood clean-up activities in Roseau County.

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. From 1992 to 2002, the proportion of *C. jejuni* isolates from Minnesota residents that were resistant to quinolones increased from 1% to 18%. During 2002, approximately 50% of *C. jejuni* isolates from patients with a history of foreign travel (regardless of

destination) during the week before onset of illness were resistant to fluoroquinolones. Domestically acquired quinolone-resistant *C. jejuni* infections also have increased significantly since 1996. This increase likely is due largely to the use of fluoroquinolones in poultry (i.e., the primary source of *Campylobacter* for humans) in the U.S., which began late in 1995.

Cryptosporidiosis

During 2002, 206 confirmed cases of *Cryptosporidium parvum* infection (4.2 per 100,000 population) were reported. continued...



This is similar to the 198 cases reported in 2001 and represents an 8% increase from the median number of cases reported annually from 1997 to 2001 (median, 190 cases; range, 91 to 242). The median age among case-patients in 2002 was 10 years (range, 4 months to 81 years). Children 10 years of age or younger accounted for 52% of cases. Sixty percent of cases occurred during July through September. The incidence of cryptosporidiosis in the West Central, Southeastern, and Southwestern districts (16.6, 10.6, and 7.8 cases per 100,000 population, respectively) was significantly higher than the statewide incidence. Only 44 (21%) reported cases occurred among residents of the seven-county Twin Cities metropolitan area (1.6 per 100,000 population). Twenty-nine (14%) case-patients required hospitalization, for a median of 2 days (range, 1 to 9 days).

Six outbreaks of cryptosporidiosis were identified in 2002, including two outbreaks in child daycare settings (three and two cases, respectively) with person-to-person transmission. Three recreational water-borne outbreaks occurred, including 52 cases (16 laboratory-confirmed) associated with a community-based swimming pool, 41 cases (14 laboratory-confirmed) associated with a hotel swimming pool, and 16 cases (two laboratory-confirmed) associated with a resort swimming pool. One outbreak with two confirmed cases resulted from contact with calves from a dairy farm.

Ehrlichiosis

The agent of human granulocytic ehrlichiosis (HGE) recently has been classified in the genus *Anaplasma* and named *Anaplasma phagocytophilum*. HGE is transmitted to humans by *Ixodes scapularis* (deer tick or black-legged tick), the same tick that transmits Lyme disease.

During 2002, 149 confirmed or probable cases of HGE (3.0 per 100,000 population) were reported. This represents a 60% increase from the prior high of 93 cases reported in 2001 and a 314% increase from the 36 cases reported in 1999.

The national surveillance case definition for a confirmed case of HGE includes a compatible clinical illness with a four-fold increase in HGE antibody titer by IFA, a positive

polymerase chain reaction (PCR), or detection of intracytoplasmic morulae and an IFA antibody titer $\geq 1:64$ to HGE. Probable HGE cases have a compatible clinical illness and either an IFA serologic titer $\geq 1:64$ to HGE or detection of intracytoplasmic morulae.

Ninety-one (61%) case-patients reported in 2002 were male. The median age of case-patients was 56 years (range, 2 to 100 years). The peak in onsets of illness occurred in July (42% of cases). Co-infections with Lyme disease and HGE can occur from the same tick bite; during 2002, 20 (13%) HGE cases also met the case definition for early-stage Lyme disease with physician-diagnosed erythema migrans. People are at most risk of HGE in the same east-central Minnesota counties where the risk of Lyme disease is greatest, including Aitkin, Crow Wing, Cass, Pine, and Morrison Counties.

For more information on HGE and other tick-borne diseases in Minnesota, including a map of high-risk areas, see the May 2003 issue of the *Disease Control Newsletter* (vol. 31, no. 3).

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

During 2002, 160 culture-confirmed cases of *Escherichia coli* O157 infection (3.3 per 100,000 population) were reported. This represents a 27% decrease from the 219 cases reported in 2001 and a 23% decrease from the median number of cases reported annually from 1997 to 2001 (median, 209 cases; range, 175 to 219) (Figure 2). Fifty-one (32%) cases occurred in the seven-county Twin Cities metropolitan area. The largest numbers of cases in Greater Minnesota occurred in St. Louis (nine cases), Winona (nine), Stearns (eight), Beltrami (five), and Olmsted (five) Counties. One hundred twenty-five (78%) cases occurred during June through October. The median age of case-patients was 17 years (range, 8 months to 87 years). Fifty-eight (36%) case-patients were hospitalized; the median duration of hospitalization was 3 days (range, 1 to 23 days).

Two food-borne outbreaks of *E. coli* O157 were identified during 2002 in Minnesota; both outbreaks also involved other states. The first outbreak was caused by contaminated

retail ground beef; eight confirmed cases were identified among Minnesota residents. This outbreak led to a recall of 2.8 million pounds of ground beef. The second outbreak was associated with eating at a Mexican restaurant chain. This outbreak resulted in 23 confirmed cases in four states, including three cases in Minnesota. Lettuce was the suspected vehicle of transmission, but this was not confirmed.

In 2002, 11 cases of Hemolytic Uremic Syndrome (HUS) were reported. One death occurred in an 11-month-old male. From 1997 to 2002, the mean annual number of reported HUS cases was 15 (range, 11 to 22), and the overall case fatality rate was 11%. In 2002, the median age of HUS case-patients was 3 years (range, 11 months to 87 years). All 11 case-patients were hospitalized, with a median hospital stay of 13 days (range, 4 to 45 days). Eight (73%) HUS cases occurred during July through September. There were no outbreak-related cases of HUS. Two cases occurred among siblings. All cases reported in 2002 were post-diarrheal. Nine (82%) cases had *E. coli* O157 cultured from stool.

Giardiasis

During 2002, 982 cases of *Giardia* infection (20.0 per 100,000 population) were reported. This represents a 7% decrease from the 1,061 cases reported in 2001 and is near the low end of the range of the annual number of cases reported from 1996 through 2001 (median, 1,149 cases; range, 971 to 1,556).

The median age of case-patients reported in 2002 was 30 years. As in previous years, cases were clustered among children less than 5 years of age (21%); only 15% of cases were over 50 years of age. This age distribution suggests a higher risk for transmission among young children and the adults who care for them. Overall, 6% of case-patients were hospitalized; 17% of case-patients over 50 years of age were hospitalized. No food-borne or water-borne outbreaks of giardiasis were reported in 2002.

MDH began systematically interviewing cases of giardiasis in January 2002 in order to better characterize the illness and evaluate potential risk factors for **continued...**

infection. Fifty-eight percent of cases were interviewed. The symptoms most commonly reported by case-patients included diarrhea (97%), fatigue (84%), gas or bloating (79%), abdominal pain (77%), and nausea (61%); less commonly reported symptoms included vomiting (36%) and chills or fever (27%).

Forty-one percent of interviewed cases reported traveling in the 10 days prior to their illness onset. Among case-patients who reported travel, 28% reported travel outside the U.S. Twenty percent of case-patients reported camping or hiking in the 10 days prior to illness onset, and 41% reported having gone swimming or entered water before their onset. Fifty-eight percent of adult case-patients reported having children in their households; 59% of those case-patients had children in diapers. Thirty-eight percent of adults reported changing a diaper within the 10 days before their onset. Among giardiasis cases in children, 41% of interviewed parents reported that their child had contact with a childcare setting in the period before and/or during illness.

***Haemophilus influenzae* Invasive Disease**

Fifty-two cases of invasive *Haemophilus influenzae* disease (1.1 per 100,000 population) were reported in 2002. Case-patients ranged in age from newborn to 91 years (median, 54 years). Seventeen (33%) case-patients had pneumonia, 17 (33%) had bacteremia without another focus of infection, seven (13%) had meningitis, and 11 (21%) had other conditions. Three (6%) deaths were reported among these case-patients.

Of 43 *H. influenzae* isolates for which typing was performed at MDH, 11 (26%) were type f, four (9%) were type e, two (5%) were type d, two (5%) were type a, one (2%) was type b, one (2%) was type c, and 22 (51%) were untypeable. Isolates from nine (17%) cases were not available for typing.

The one case of type b (Hib) disease compares to one Hib case in 2001 and three cases in 2000. The Hib case reported in 2002 occurred in a 4-month-old who had received one dose of Hib vaccine and who had no underlying medical conditions. Meningitis was the type of infection, and the patient survived.

The three deaths occurred in patients ranging in age from 50 to 70 years.

Two case-patients presented with pneumonia, and one presented with bacteremia without another focus of infection. All three case-patients had *H. influenzae* isolated from blood and had underlying medical conditions. The isolate from one of the deceased case-patients was type e; the two other deceased case-patients had untypeable isolates.

HIV Infection and AIDS

AIDS is the advanced state of HIV infection. Surveillance for AIDS has been conducted in Minnesota since 1982. In 1985, AIDS became a reportable disease for all state and territorial health departments in the U.S. Also in 1985, when the U.S. Food and Drug Administration approved the first diagnostic test for HIV, Minnesota became the first state to make HIV infection a reportable condition; 34 states now require confidential reporting of HIV infection.

Compared to other states nationwide, the incidence of HIV/AIDS in Minnesota is moderately low. In 2001, state-specific AIDS incidence rates per 100,000 population ranged from 0.5 in North Dakota to 39.3 in New York, with 3.2 cases per 100,000 population reported in Minnesota. Similar comparisons for HIV (non-AIDS) incidence rates are not possible, because some states require only reporting of AIDS cases.

As of December 31, 2002, a cumulative total of 7,073 cases of HIV infection have been reported to MDH, including 4,008 AIDS cases and 3,065 HIV (non-AIDS) cases. Of these HIV/AIDS case-patients, 2,528 (36%) are known to have died.

The annual number of new 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 in Minnesota, primarily due to new antiretroviral therapies such as protease inhibitors, which delay the progression from HIV infection to AIDS and improve survival among AIDS patients. In 2002, 151 new AIDS cases and 46 deaths among AIDS

patients were reported in Minnesota (Figure 3).

The annual number of newly diagnosed HIV (non-AIDS) cases reported in Minnesota has remained fairly constant since the mid-1990s, with 211 reported in 2002. This trend, coupled with the improved survival of HIV-infected individuals who receive antiretroviral therapy, has led to an increasing number of persons in Minnesota living with HIV or AIDS (Figure 4). Approximately 4,600 persons with HIV/AIDS were residing in Minnesota at the end of 2002.

Historically and in 2002 (271/305), approximately 90% of new HIV infections (both HIV [non-AIDS] and AIDS at first diagnosis) reported in Minnesota occur in the seven-county Twin Cities 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 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 37 new infections in 2002. The number of HIV infections diagnosed among Hispanic and African-born males has increased annually, with 25 and 29 new infections, respectively, diagnosed in 2002.

Females account for an increasing percentage of new HIV infections, from 10% of new infections in 1990 to 29% in 2002. 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 among white

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women. The annual number of new HIV infections diagnosed among U.S.-born black females doubled from 1990 (12 cases) to 2002 (25 cases), whereas the number of new infections among African-born females has increased three-fold in the past 6 years to 36 cases in 2002. The annual number of new infections diagnosed among Hispanic, American Indian, and Asian females is small, with fewer than 10 cases annually in each group.

Despite relatively small numbers of cases, persons of color are disproportionately affected by HIV/AIDS in Minnesota. In 2002, non-white men comprised approximately 12% of the male population in Minnesota and 45% of new HIV infections among men. Similarly, persons of color comprised approximately 11% of the female population and 84% of new HIV infections among women. Although race is not considered a primary biological cause of disparities in the occurrence of HIV, race may be a marker for other risk factors, including 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) have declined since 1991. In 1991, 69% (324/470) of new HIV infections were attributed to MSM (or MSM who also inject drugs); by 2002, this percentage had decreased to 44% (135/305). Current attitudes, beliefs, and unsafe sexual practices documented in surveys among MSM nationwide and a recent outbreak of syphilis documented in Minnesota among MSM, however, warrant concern. Similar to increasing rates of syphilis among MSM in other U.S. cities and abroad, nearly 50% of the recent outbreak-associated syphilis cases in Minnesota 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 contributing to a resurgence in risky sexual behavior among MSM. Consistent with these findings, the 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

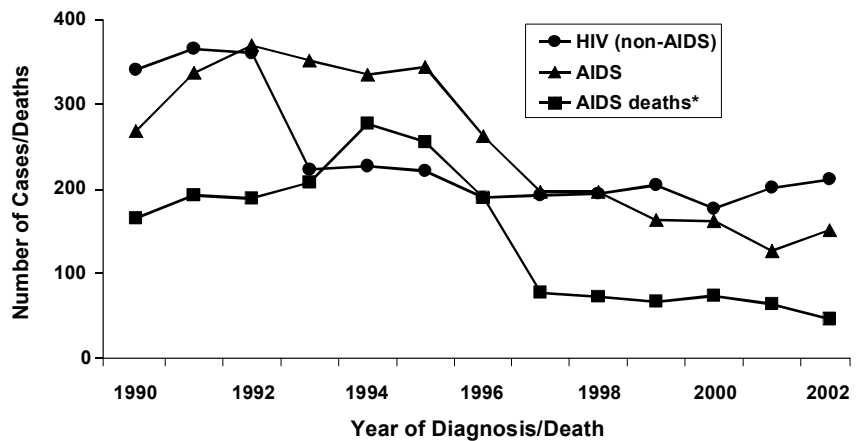
partners or in conjunction with drug use.

The number and percentage of HIV infections in Minnesota that are attributed to injection drug use have declined over the past decade for men and women, falling from 17% (80/470) of cases in 1991 to 5% (15/305) in 2002. 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. Eighty percent of 87 new HIV diagnoses among women in 2002 were attributable to heterosexual exposure.

Historically, race/ethnicity data for HIV/AIDS in Minnesota have grouped U.S.-

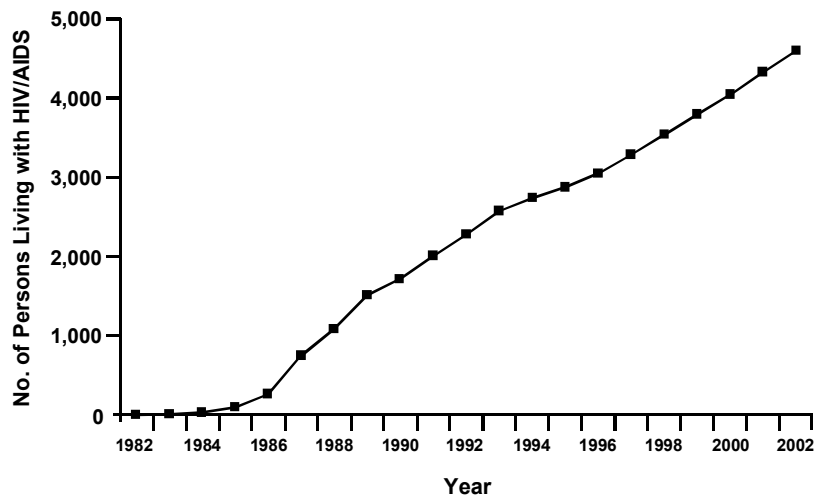
born blacks and African-born persons together as "black." In 2001, MDH began analyzing these groups separately, and a marked trend of increasing numbers of new HIV infections among African-born persons was observed. In 2002, the number of new HIV infections reported among Africans increased 41% (65 cases) compared to 46 cases in 2001. While African-born persons comprise less than 1% of the state's population, they accounted for 21% of all HIV infections diagnosed in Minnesota in 2002. Until recently, culturally specific HIV prevention messages have not been directed to African communities in Minnesota. Taboos and other cultural barriers **continued...**

Figure 3. HIV (non-AIDS) and AIDS Cases by Year of Diagnosis and AIDS Deaths by Year of Death, Minnesota, 1990-2002



*Deaths among AIDS cases, regardless of cause

Figure 4. Persons Living with HIV/AIDS at Year-End, Minnesota, 1982-2002



make it challenging to deliver such messages and to connect HIV-infected individuals with prevention and treatment services. Collaborations between MDH, the Minnesota Department of Human Services, and community based organizations serving African-born persons in Minnesota are underway to address these complex issues.

Influenza

The MDH Public Health Laboratory confirmed the first influenza isolate of the 2002-2003 influenza season in Minnesota on December 30, 2002, which represented a slight delay in the usual start of influenza activity. Since 1990-1991, the first influenza isolate typically has been identified between mid-November and mid-December. Influenza activity nationally and in states surrounding Minnesota peaked during the first week in February, whereas influenza activity in Minnesota began slowly and peaked during the first week in March. Deaths attributable to influenza and pneumonia in Minnesota did not exceed the epidemic threshold during the 2002-2003 influenza season.

Influenza surveillance in Minnesota relies on reporting of individual cases from clinics, hospitals, and laboratories, as well as outbreak reporting from schools and long-term care facilities. The current surveillance systems for reporting outbreaks in schools and long-term care facilities have been in place since the 1995-1996 influenza season, and a Sentinel Physician Influenza Network was initiated in 1998-1999 to conduct active surveillance. Twenty-two sentinel sites participated in the network during the 2002-2003 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 include active surveillance sites in all areas of the state. In order to establish baseline rates of influenza-like illness (ILI) and to monitor influenza year-round, MDH initiated a Summer Influenza Sentinel Surveillance program with 15 participating sites in May 2002.

The MDH Public Health Laboratory received 523 influenza isolates for viral confirmation and strain identification. Of these isolates, 279 (53%) were influenza type A/Panama-like (H3N2); 162 (31%) were A/New Caledonia

(H1N1); 72 (14%) were influenza B/Hong Kong; two (<1%) were B/Sichuan-like; four (1%) were influenza A (with unidentifiable strains); and four (1%) were influenza type B (with unidentifiable strains). Influenza type A/Panama, A/New Caledonia, and B/Hong Kong also were the predominant strains circulating nationally. The predominant influenza strains circulating in Minnesota during 2002-2003 were well matched to the strains in the influenza vaccine used in 2002-2003. Of the two influenza B stains identified in Minnesota, only B/Hong Kong was included in the vaccine, which includes only one influenza B strain each year.

A probable outbreak of 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 $\geq 101^{\circ}$ F, illness lasting 3 or more days, and at least one secondary influenza symptom (e.g., myalgia, headache, cough, coryza, sore throat, 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. In 2002-2003, MDH received reports of probable ILI outbreaks from 151 schools in 43 counties throughout Minnesota and possible outbreaks in 96 schools in 38 counties. Schools began reporting ILI outbreaks in mid-November; over half of the probable and possible ILI outbreaks were reported during February. Since 1988-1989, the number of schools reporting suspected influenza outbreaks has ranged from 38 schools in 20 counties in 1996-1997 to 441 schools in 71 counties in 1991-1992.

An ILI outbreak is suspected in a long-term care facility when three or more residents in a single unit present with a cough and fever ($\geq 101^{\circ}$ F) or chills during a period of 48 to 72 hours. An ILI outbreak is confirmed when at least one resident has a positive culture or rapid-antigen test for influenza. Thirty-three long-term care facilities reported confirmed or suspected ILI outbreaks in 2002-2003. In 26 (79%) of these facilities, influenza was laboratory-confirmed by rapid tests or culture. Fourteen (42%) facilities reported outbreaks between mid-February and mid-March. Since 1988-1989, the number of long-term care facilities

reporting ILI outbreaks has ranged from six in 1990-1991 to 79 in 1997-1998.

International influenza surveillance efforts identified two different avian strains of influenza in humans during 2002-2003. Two Hong Kong residents (a 33-year-old father and 9-year-old son) traveling in Fujian Province, China were infected with an influenza A (H5N1) strain in early February. The father died 9 days after onset of illness, while the son recovered. Other family members suffered from ILI, including an 8-year-old sibling who died; H5N1 was not isolated in this case. No additional spread of H5N1 was detected. At the end of February 2003, the Netherlands began reporting outbreaks of influenza A (H7N7) in poultry and swine on several farms. As of April 25, 2003, 83 confirmed cases of human H7N7 had been reported in the Netherlands. Conjunctivitis was the most common presenting symptom among these cases (79 cases, 95%); six cases with conjunctivitis also reported mild ILI, one case had ILI only, and two cases could not be classified. In addition to these cases, a 57-year-old veterinarian who visited an affected farm in April died in mid-April due to acute respiratory distress syndrome and related complications from an H7N7 infection. Evidence of person-to-person transmission from two poultry workers to three family members was documented.

Sustained person-to-person transmission is a precursor to a pandemic influenza event. The identification of these avian strains in humans further emphasizes the importance of collecting specimens for viral cultures as part of influenza surveillance and pandemic influenza preparedness.

Listeriosis

Four cases of listeriosis were reported during 2002; all cases occurred from September through December. All four case-patients were hospitalized, and one case was fatal. None of the cases was associated with a recognized outbreak. Ages of the case-patients were 47, 64, 70, and 73 years. All four had underlying medical conditions, including two with kidney transplants, one who required dialysis, and one with diabetes.

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The number of reported listeriosis cases has declined recently, from 19 cases in 1999 to four cases in 2002. The mean number of cases reported annually from 1996 to 2002 was 11 (range, four to 19 cases).

Elderly persons, pregnant women, neonates, and immunocompromised individuals are at highest risk for acquiring listeriosis. Listeriosis generally manifests as meningoen- cephalitis 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. *Listeria monocytogenes* can multiply in refrigerated foods. Persons at highest risk should: 1) avoid soft cheeses (e.g., feta, Brie, Camembert, blue-veined, and Mexican-style cheeses) and unpasteurized milk; 2) thoroughly heat/reheat deli meats, hot dogs, other meats, and leftovers; and 3) wash raw vegetables.

Lyme Disease

The national surveillance definition for a confirmed case of Lyme disease includes: 1) physician-diagnosed erythema migrans (EM) where a solitary lesion is ≥ 5 centimeters in diameter, or 2) at least one late manifestation of Lyme disease (neurologic, cardiac, or joint) and laboratory confirmation of infection. MDH has established the following criteria for laboratory confirmation of surveillance cases: 1) positive results of serologic testing conducted by CDC, or 2) a positive Western blot test from a clinical reference laboratory. A probable case of Lyme disease is defined as a person with at least one late manifestation of Lyme disease and laboratory evidence of infection but without a history of EM or appropriate laboratory confirmation.

During 2002, 867 confirmed cases of Lyme disease (17.6 per 100,000 population) were reported. This represents an 88% increase from the 461 cases reported in 2001 and a 206% increase from the 283 cases reported in 1999. During 2002, an additional 27 reports were classified as probable cases of Lyme disease. Also in 2002, 20 case-patients showed evidence of co-infection with human granulocytic ehrlichiosis, compared to only three in 2001.

Five hundred forty-six (63%) confirmed case-patients in 2002 were male. The median age of case-patients was 38 years (range, 1 to 89 years). Physi- cian-diagnosed EM was present in 766 (88%) cases. One hundred twenty- seven (15%) cases had at least one late manifestation of Lyme disease (86 had a history of objective joint swelling and 24 reported cranial neuritis) and confirmation by a positive Western blot test. Onsets of illness peaked in July and August (71% of cases), corre- sponding to the peak activity of nymphal *Ixodes scapularis* (deer tick, or black-legged tick) in June and July.

Four hundred one (46%) cases occurred among residents of the seven-county Twin Cities metropolitan area. However, only 70 (11%) of 666 case-patients with known exposure data likely were exposed to infected *I. scapularis* in metropolitan counties, primarily Anoka, Washington, and extreme northern Ramsey Counties. Most case-patients either resided in or travelled to endemic counties in east- central Minnesota or western Wiscon- sin. Of note, 187 (28%) Lyme disease cases had likely exposure in Crow Wing County. The counties with the highest incidence of Lyme disease in Minnesota were Crow Wing, Cass, Pine, Aitkin, and Morrison Counties, with incidence rates of 339, 206, 162, 105, and 98 cases per 100,000 population, respectively.

A more detailed discussion of tick- borne diseases in Minnesota, including a map of high-risk areas, is available in the May 2003 issue of the *Disease Control Newsletter* (vol. 31, no. 3).

Measles

Two confirmed cases of measles were reported to MDH during 2002. The cases were confirmed by positive IgM serologic tests for measles; viral culture for measles was not performed for either case. Both cases were considered international importations. The first case occurred in a 29-year- old female visitor to the U.S. She developed a measles-like rash 7 days after traveling from the Ukraine. The patient reported a history of measles vaccination as a child and no known exposure to measles in the Ukraine. Despite a thorough investigation of emergency room contacts by hospital infection control staff, no subsequent transmission was reported from this case. The second case occurred in an

8-month-old unvaccinated child. Eleven days after returning from a lengthy visit to the Philippines, the child developed a measles-like rash. No known exposure to measles oc- curred in the Philippines. All three of the child's siblings had been vacci- nated for measles, and no transmis- sion from this case was reported. International importation, a common source of measles in the U.S. and Minnesota, accounted for six (75%) of the eight measles cases reported in Minnesota during the past 5 years.

CDC recommends serologic testing for measles and rubella for patients with rash illnesses compatible with either disease. Blood specimens for IgM serology should be drawn at least 72 hours after rash onset. Blood speci- mens for acute and convalescent IgG serology should be drawn within 4 days of rash onset and again 3 to 5 weeks later. Acute and convalescent specimens should be tested as paired sera. Specimens for viral culture may be obtained from urine, nasopharyn- geal swabs, or throat swabs and are ideal for genotyping. Because measles viral load peaks prior to rash onset, specimens should be collected as early as possible. Specimens for viral culture should be collected at the same time as or prior to serologic specimens. Viral cultures and/or serologic specimens should be sent to MDH to be forwarded to CDC for genotypic strain identification, which provides important epidemiologic data for tracking patterns of measles importation and transmission. MDH strongly encourages submission of specimens for viral culture for all suspected measles cases.

Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Strains of *Staphylococcus aureus* that are resistant to methicillin and all beta- lactam antibiotics are referred to as methicillin-resistant *Staphylococcus aureus* (MRSA). Such strains first were recognized in the U.S. in the late 1960s. Risk factors for MRSA include recent hospitalization or surgery, residence in a long-term care facility, and renal dialysis.

In 1997, MDH began receiving reports from health care facilities in Minnesota describing increasing numbers of healthy young patients presenting with MRSA infections. These patients had **continued...**

onset of their MRSA infections in the community and appeared to have none of the established risk factors for MRSA. Although most of the reported infections were not severe, some resulted in serious illness or death.

In 1999, Minnesota Rules Governing Communicable Diseases were amended to require designated sentinel hospitals to report cases of MRSA to MDH. Cases of community-associated MRSA (CA-MRSA) that cause serious illness or death also were made reportable.

MDH initiated active surveillance for CA-MRSA at 12 sentinel hospital laboratories in January 2000. The laboratories (six in the seven-county Twin Cities 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 send all CA-MRSA isolates to MDH. The purpose of this surveillance system 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 antibiotic susceptibility patterns and molecular subtypes of CA-MRSA isolates.

Exclusion criteria for cases of CA-MRSA include: a positive culture for MRSA from a specimen obtained more than 48 hours after admission to a hospital (if admitted); prior MRSA infection or colonization; and hospitalization, surgery, residence in a long-term care facility, hemodialysis, peritoneal dialysis, or indwelling percutaneous devices or catheters within 1 year prior to the positive MRSA culture.

During 2002, 1,649 cases of MRSA infection were reported by sentinel sites. Thirteen percent of these cases were classified as CA-MRSA, 86% were classified as healthcare-associated MRSA (HA-MRSA), and 1% could not be classified. The MDH Public Health Laboratory received CA-MRSA isolates from 200 (90%) of the 223 CA-MRSA cases; to date, antimicrobial susceptibility testing and molecular subtyping by PFGE has been completed for 122 (61%) of these isolates. CA-MRSA patients were, on average, younger than patients with HA-MRSA (median age, 31 years vs. 64 years) and more likely to have MRSA isolated

from the skin (59% vs. 18%). Most CA-MRSA isolates belonged to one particular PFGE clonal group that is distinct from the clonal group most common among HA-MRSA isolates.

All CA-MRSA isolates submitted in 2002 were susceptible to rifampin and vancomycin. Most CA-MRSA isolates were susceptible to trimethoprim-sulfamethoxazole (99%), gentamicin (98%), tetracycline (89%), clindamycin (88%), and ciprofloxacin (80%). Conversely, only 39% of isolates were susceptible to erythromycin. Drug susceptibility data reported from retrospective studies (1996-1998) and sentinel surveillance (2000-2001) have demonstrated a significant decrease in the percentage of CA-MRSA isolates that are susceptible to ciprofloxacin, clindamycin, and erythromycin. Additionally, inducible clindamycin resistance has been demonstrated in 47 (85%) of 55 erythromycin-resistant/clindamycin-sensitive isolates from 2000-2001.

In 2002, MDH received reports of two cases of fatal necrotizing CA-MRSA pneumonia in young, previously healthy persons. MDH is interested in receiving reports of all serious illnesses or deaths due to *S. aureus* infection, regardless of susceptibility to methicillin.

Mumps

Five cases of mumps were reported in 2002; 39 cases have been reported during the last 5 years. Two of the case-patients reported in 2002 were children. One was a 5-year-old, white, non-Hispanic male with a history of one dose of MMR given at 11 months of age. The other was an 8-year-old, black, non-Hispanic female with a history of one dose of MMR given at 20 months of age. Of the three adult case-patients, two were Asian and one was white. Two of the adults had unknown histories of mumps disease or vaccination. The third adult reported receiving two doses of MMR vaccine administered outside the U.S. Adults represent an increasing percentage of mumps cases reported in Minnesota, highlighting the need to assess their mumps immunization status and to implement recommendations to vaccinate adults born in 1957 or later who have not received a second dose of MMR.

All five cases were laboratory confirmed by positive IgM serology; however, none had convalescent serum specimens collected to demonstrate a rise in serum IgG antibody. Both IgM and IgG serologic testing should be performed on suspected mumps cases, as false-positive indirect immunofluorescent antibody tests for mumps IgM have been reported. Serologic specimens for mumps IgM should be drawn on or after the third day of swelling. Specimens for acute and convalescent serum IgG should be drawn as soon as possible after onset of swelling and 3 to 5 weeks later; tests should be run as paired sera. Mumps also can be confirmed by viral culture on throat washings, urine, or spinal fluid specimens. Specimens for viral culture should be collected during the first 5 days of illness.

Neisseria meningitidis Invasive Disease

Thirty-six cases of *Neisseria meningitidis* invasive disease (0.7 per 100,000 population) were reported in 2002, compared to 27 cases in 2001. The distribution of serogroups among case isolates from 2002 was similar to 2001, with 17 (47%) serogroup C cases, eight (22%) serogroup B cases, nine (25%) serogroup Y cases, one (3%) serogroup W-135 case, and one (3%) serogroup X case.

Case-patients ranged in age from 2 months to 83 years, with a mean of 31 years. Seventy-eight percent of the cases occurred outside the seven-county Twin Cities metropolitan area. Sixteen (44%) case-patients had meningitis, 17 (47%) had bacteremia without another focus of infection, and three (8%) had bacteremia with pneumonia.

Two of the cases of meningococcal disease occurred in siblings living in the same household. An infant developed meningococemia and died. A few days later, after completing prophylaxis with rifampin, her school-aged sister was hospitalized with fever and lethargy; her blood culture grew *N. meningitidis*. The isolates from both children were serogroup C with indistinguishable PFGE patterns. While National Committee for Clinical Laboratory Standards cutoffs for *N. meningitidis* have not been established, the infant's isolate appeared **continued...**

susceptible to rifampin. However, the sibling's isolate appeared highly resistant, and an amino acid substitution was found in the *rpoB* gene. All other cases were sporadic, with no apparent epidemiologic links.

Five deaths occurred among cases reported in 2002. An 83-year-old female died of pneumonia and a 4-year-old male died of meningococemia; both were attributed to serogroup Y. A 2-month-old female died of meningococemia due to serogroup C. A 23-year-old female died of meningococemia due to serogroup W-135. And, a 73-year-old female died of meningococemia due to serogroup B.

Since the fall of 1998, MDH has collected additional information on college-aged students with *N. meningitidis* invasive disease as part of a nationwide effort to determine whether providing meningococcal vaccine to incoming college freshmen effectively prevents disease in this age group. In the fall of 1999, the CDC Advisory Committee on Immunization Practices recommended that health care providers inform college students about meningococcal disease and the availability of vaccine. Serogroups A, C, Y, and W-135 are covered by the quadrivalent vaccine. One serogroup C case and one serogroup W-135 case reported in Minnesota during 2002 occurred in college students.

In the spring of 2002, MDH in collaboration with CDC and other EIP sites nationwide, began a case-control study of risk factors for meningococcal disease among high school students in Minnesota. Two culture-confirmed serogroup C cases occurred among high school students in 2002. One culture-negative, PCR-positive, suspected case of meningococcal disease in a high school student also was included in the study.

Pertussis

During 2002, 429 cases of pertussis (8.7 per 100,000 population) were reported, compared to 308 cases in 2001 and 575 in 2000. Laboratory confirmation was available for 277 (65%) cases reported in 2002; 126 (45%) were culture-confirmed and 151 (55%) were confirmed by PCR. Among the remaining cases, 105 (24%) were epidemiologically linked to culture-confirmed cases, and 47 (11%) met the clinical case definition. Sixty-seven

percent of the reported cases occurred in the seven-county Twin Cities metropolitan area. No fatal cases were reported in 2002.

Pertussis commonly is called "whooping cough." However, very young children, older individuals, and previously immunized persons may not have the typical "whoop." Paroxysmal coughing is the most commonly reported symptom. In 2002, 396 (92%) case-patients experienced paroxysmal coughing, and nearly one-third experienced "whooping." Post-tussive vomiting was reported in 255 (59%) cases, and 144 (34%) case-patients reported apnea.

Due to waning immunity from natural infection or vaccination, pertussis can affect persons of any age. The disease increasingly is recognized in older children and adults; however, it is not known whether this represents a true increase or changes in surveillance and reporting procedures. Case-patients reported in 2002 ranged in age from 1 day to 86 years. Forty-seven (11%) cases occurred in infants less than 6 months of age, and 67 (16%) occurred in children 6 months to 4 years of age. The largest number of cases (120, [28%]) occurred in children 5 to 12 years of age, followed by 113 (26%) cases among persons 18 years of age or older. Persons 13 to 17 years of age accounted for 82 (19%) cases. Infants and young children are at highest risk for severe disease and complications. Pneumonia was diagnosed in 19 (4%) case-patients, nine (47%) of whom were less than 18 months of age. Twenty-six (6%) case-patients were hospitalized; 19 (73%) of the hospitalized patients were younger than 6 months of age.

In Minnesota, pertussis 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 2002, 54 cases of pertussis were reported in infants less than 1 year of age. A likely source of exposure was identified for nine (17%) cases. Of these nine cases, six (67%) were infected by adults 18 years of age or older, one (11%) was infected by an adolescent 13 to 17 years of age, and two (22%) were infected by a child less than 13 years of age. Forty-five (83%) pertussis cases in infants had no identified

source of infection, which likely was outside the household.

Although unvaccinated children are at highest risk for pertussis, fully immunized children also can develop disease. The efficacy of currently licensed vaccines in preventing serious pertussis disease is estimated to be 71 to 84%. Among 208 pertussis cases 2 months to 15 years of age with a known vaccination history, 174 (84%) had received age-appropriate immunization for pertussis. Of the 243 cases who were 7 months to 15 years of age, 186 (77%) had received at least a primary series of three doses; this is not surprising, since waning immunity begins approximately 3 years after the last dose of vaccine. Disease in previously immunized persons usually is mild. Of 97 cases in persons 7 months to 7 years of age, 15 (15%) had received fewer than three doses of DTP/DTaP vaccine before onset of illness and therefore were considered preventable cases.

Physicians should include pertussis in the differential diagnosis of cough illness in persons of all ages, regardless of immunization status. Until an approved booster vaccination for pertussis is available to protect older children and adults, prompt diagnosis and treatment of cases and prophylaxis of contacts are the only options for limiting transmission.

Laboratory tests should be performed on all suspected cases of pertussis. Culture of *Bordetella pertussis* requires inoculation of nasopharyngeal mucous on special media such as Regan-Lowe or Bordet-Gengou, and incubation for 7 to 10 days. However, *B. pertussis* rarely is 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; therefore, a positive PCR result does not necessarily indicate 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. Thus, whenever possible, culture should be done in conjunction with PCR testing. Direct fluorescent antibody (DFA) testing provides a rapid
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presumptive diagnosis of pertussis; however, because both false-positive and false-negative results can occur, DFA tests should not be relied upon as laboratory confirmation. Serologic tests for pertussis are not standardized and therefore do not indicate laboratory confirmation.

Minnesota Rules Governing Communicable Diseases require submission of all clinical *B. pertussis* isolates to MDH. Among 126 culture-confirmed cases, 112 (89%) had *B. pertussis* isolates submitted to MDH. These isolates were subtyped by PFGE and tested for antibiotic susceptibility to erythromycin, ampicillin, and trimethoprim/sulfamethoxazole. Twelve distinct PFGE patterns were identified; five of these patterns were represented by only a single case isolate. The two most common patterns accounted for 61% of the total isolates and occurred throughout the year.

The first case of erythromycin-resistant *B. pertussis* in Minnesota was identified in October 1999. All 910 other isolates tested to date have been susceptible to the antibiotics evaluated. Only eight other erythromycin-resistant *B. pertussis* cases have been identified in the U.S.

Salmonellosis

During 2002, 593 culture-confirmed cases of *Salmonella* infection (12.1 per 100,000 population) were reported. This represents a 14% decrease from the 693 cases reported in 2001 and a 6% decrease from the median annual number of cases reported from 1996 to 2001 (median, 629 cases; range, 601 to 693) (Figure 2). Four serotypes, *S. Typhimurium* (148 cases), *S. Enteritidis* (109 cases), *S. Newport* (56 cases), and *S. Heidelberg* (34 cases), accounted for 59% of cases reported in 2002. Twenty-five percent of case-patients were less than 10 years of age. Twenty-three percent of case-patients were hospitalized for their infection.

Six persons died 1 to 32 days after their specimen collection dates; isolates from these case-patients included one *S. Adelaide* and one *S. Tennessee* isolated from blood and two *S. Newport*, one *S. Typhimurium*, and one isolate of unknown serotype from stool. At least four case-patients who died had serious underlying medical

conditions (liver disease, colon cancer, thalassemia, and leukemia, respectively) prior to their *Salmonella* infection. One case-patient died of cardiac arrest 1 day after discharge from the hospital where he was being treated for *Salmonella* infection. One case-patient had a positive stool specimen collected during surgery for ruptured diverticula; she died from complications resulting from the surgery 20 days later.

Six outbreaks of salmonellosis were identified in 2002; five were food-borne, and one involved person-to-person transmission. Three food-borne outbreaks occurred in restaurants. In April, two patrons of a buffet-style Chinese restaurant became ill with *S. Enteritidis* infection; the vehicle was not confirmed, but chicken was suspected. In July, five patrons and five employees of a restaurant were culture-positive for *S. Newport*; ten additional patrons were identified as having symptoms compatible with salmonellosis. The investigation revealed several food preparation practices that could have resulted in cross-contamination from raw to ready-to-eat foods, and that employees worked while ill with gastrointestinal symptoms. The third outbreak of salmonellosis in a restaurant occurred in November. Fourteen patrons had confirmed *S. Typhimurium* infection, and five additional patrons had compatible symptoms. Ten employees also tested positive for *S. Typhimurium*, 40% of whom reported not having any recent gastrointestinal symptoms. Transmission to patrons occurred over a 2-week period. Multiple foods acted as vehicles. Numerous deficiencies in food-holding temperatures, food preparation, and sanitation procedures were identified; infected food workers also could have played an important role in transmission of *Salmonella* to patrons. The initial vehicle that introduced *Salmonella* into the kitchen was not identified.

Two food-borne outbreaks occurred in settings other than restaurants. In August and September, four cases of *S. Newport* associated with a multi-state outbreak were identified in Minnesota. Tomatoes were identified as the vehicle. A *S. Enteritidis* outbreak in October, which was associated with a gathering in a private home, resulted in five culture-con-

firmed cases and 13 additional cases of compatible illness. Consumption of fried rice containing eggs was associated with illness.

One person-to-person outbreak of *S. Oranienburg* infections was identified in a home child daycare setting. This outbreak resulted in three culture-confirmed cases among attendees and their family members.

Routine interviews of Minnesota residents with salmonellosis contributed to the detection of outbreaks in Texas and Florida. Eight *S. Enteritidis* cases reported in Minnesota from March through July were associated with a large outbreak at a conference hotel in Texas. One *S. Javiana* case was identified as part of an outbreak during the Transplant Olympics held in Florida in June.

Sexually Transmitted Diseases

Cases of chlamydia, gonorrhea, syphilis, and chancroid are monitored through a mostly passive surveillance system. Minnesota Rules Governing Communicable Diseases require physicians and laboratories to report all laboratory-confirmed cases of these four bacterial sexually transmitted diseases (STDs) to MDH. Other common STDs caused by viral pathogens, such as herpes simplex virus and human papillomavirus, are not reportable.

Active surveillance for gonorrhea and chlamydia was initiated in January 2002. This process involves cross-checking laboratory-reported cases against cases reported by clinicians. Although both laboratories and clinical facilities are required to report STDs, an episode of STD is not considered a case for surveillance purposes until a corresponding case report is submitted by a clinical facility. Additionally, clinical case reports contain critical demographic and clinical information that is not available from laboratory reports. When a laboratory report is received but no corresponding clinical case report is received within 45 days, MDH mails a reminder and case report form to the corresponding clinical facility.

Although overall incidence rates for STDs in Minnesota are lower than those in many other areas of the U.S., certain population subgroups in **continued...**

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 2002, 10,107 cases (205 per 100,000 population) were reported, representing a 21% increase from 2001 (Table 3). Approximately one-third of this increase is an artifact of changes in reporting associated with the implementation of active surveillance.

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 (1,193 per 100,000 population), with the next highest rate among 15 to 19-year-olds (873 per 100,000). The incidence of chlamydia among adults 25 to 29 years of age (502 per 100,000) is considerably lower but has increased in recent years. The chlamydia rate among females (296 per 100,000) is more than twice the rate among males (113 per 100,000); however, this difference probably is due to more frequent screening among women.

The incidence of chlamydia infection is highest in communities of color (Table 4). The rate among blacks (1,444 per 100,000 population) is approximately 15 times higher than the rate among whites (97 per 100,000). Although blacks comprise approximately 4% of Minnesota's population, they account for 29% of reported chlamydia cases. Rates among Asians (245 per 100,000), American Indians (375 per 100,000), and Hispanics (584 per 100,000) are three to six times higher than the rate among whites.

Chlamydia infections occur throughout the state, with the highest reported rates in Minneapolis (757 per 100,000 population) and St. Paul (637 per 100,000). The incidence in the suburban metropolitan area (136 per 100,000) is similar to that in Greater Minnesota (119 per 100,000).

Gonorrhea

Gonorrhea, caused by *Neisseria gonorrhoeae*, is the second most commonly reported STD in Minnesota. In 2002, 3,049 cases (62 per 100,000 population) were reported, represent-

ing an increase of 13% from 2001 (Table 3). Approximately one-third of the increase likely is due to improved surveillance.

Adolescents and young adults are at greatest risk for gonorrhea (Table 4), with incidence rates of 202 per continued...

Table 3. Number of Cases and Incidence Rates (per 100,000 population) of Chlamydia, Gonorrhea, and Syphilis, Minnesota, 1998-2002

Disease	1998		1999		2000		2001		2002	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Chlamydia	6,997	145.0	7,460	153.0	8,147	166.0	8,369	170.0	10,107	205.0
Gonorrhea	2,716	56.0	2,830	58.0	3,189	65.0	2,708	55.0	3,049	62.0
Syphilis, Total	78	1.6	72	1.5	81	1.6	135	2.7	148	3.0
Primary/										
Secondary	9	0.2	10	0.2	16	0.3	33	0.7	59	1.2
Early Latent**	8	0.2	9	0.2	18	0.4	16	0.3	23	0.5
Late Latent**	61	1.3	52	1.1	45	0.9	81	1.6	64	1.3
Congenital***	0	0.0	1	1.5	2	3.0	2	3.0	1	1.5
Other	0	0.0	0	0.0	0	0.0	3	0.1	1	0.0
Chancroid	0	0.0	1	0.0	0	0.0	1	0.0	0	0.0

*Duration ≤1 year
 **Duration >1 year
 ***Rate per 100,000 live births

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, 2002

Demographic Group	Chlamydia		Gonorrhea		Syphilis	
	No.	Rate	No.	Rate	No.	Rate
Total	10,107	205	3,049	62	59	1.2
<i>Residence</i>						
Minneapolis	2,897	757	1,390	363	36	9.4
St. Paul	1,829	637	593	207	5	1.7
Suburban*	2,676	136	714	36	14	0.7
Greater Minnesota	2,705	119	352	15	4	0.2
<i>Age</i>						
<10 years	8	1	1	0	0	0.0
10-14 years	144	38	47	13	0	0.0
15-19 years	3,269	873	758	202	0	0.0
20-24 years	3,846	1,193	930	288	4	1.2
25-29 years	1,606	502	522	163	4	1.3
30-34 years	625	177	309	87	11	3.1
35-44 years	502	61	368	45	24	2.9
≥45 years	107	6	114	7	16	1.0
<i>Gender</i>						
Male	2,755	113	1,361	56	55	2.3
Female	7,352	296	1,688	68	4	0.2
<i>Race</i>						
White	4,335	97	857	19	42	0.9
Black	2,931	1,444	1,512	745	9	4.4
American Indian	304	375	71	88	0	0.0
Asian	412	245	49	29	0	0.0
Other or Unknown**	2,125	---	560	---	8	---
<i>Ethnicity</i>						
Hispanic***	838	584	131	91	4	2.8

*Seven-county metropolitan area (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties), excluding cities of Minneapolis and St. Paul
 **No population data available to calculate rates
 ***Persons of Hispanic ethnicity may be of any race

100,000 population among 15 to 19-year-olds, 288 per 100,000 among 20 to 24-year-olds, and 163 per 100,000 among 25 to 29-year-olds. Gonorrhea rates for males (56 per 100,000) and females (68 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 (745 per 100,000) is approximately 40 times higher than the rate among whites (19 per 100,000). Rates among Asians (29 per 100,000), American Indians (88 per 100,000), and Hispanics (91 per 100,000) are two to five times higher than among whites.

Gonorrhea rates are highest in the cities of Minneapolis and St. Paul (Table 4). The incidence in Minneapolis (363 per 100,000 population) is nearly twice the rate in St. Paul (207 per 100,000), ten times higher than the rate in the suburban metropolitan area (36 per 100,000), and 24 times higher than the rate in Greater Minnesota (15 per 100,000).

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 4). Fifty-nine cases of primary/secondary syphilis (1.2 per 100,000 population) were reported in 2002, representing a 79% increase in incidence from 2001.

Early Syphilis

Trends in the occurrence of syphilis in Minnesota are difficult to assess due to the relatively low number of cases. However, the number of cases of early syphilis increased significantly in 2002, driven by an increase in syphilis cases among white men who have sex with men (MSM). Eighty-two cases of early syphilis (primary, secondary, and early latent stages) were reported in 2002, compared to 49 cases in 2001. Of the 82 early syphilis cases in 2002, 70

(85%) occurred among men; 56 (80%) of these men reported having sex with other men. Almost half (45%) of the MSM diagnosed with early syphilis were co-infected with HIV. Similar increases in syphilis among MSM have been observed in other parts of the U.S.

Congenital Syphilis

One case of congenital syphilis (1.5 per 100,000 live births) was reported in Minnesota in 2002 (Table 3).

Chancroid

Chancroid continues to be very rare in Minnesota. No cases were reported in 2002.

Shigellosis

During 2002, 222 culture-confirmed cases of *Shigella* infection (4.5 per 100,000 population) were reported (Figure 2). This represents a 55% decrease from the 493 cases reported in 2001, a 75% decrease from the 904 cases reported in 2000 (the largest annual number of cases ever reported in Minnesota), and a 33% decrease from the median number of cases reported annually from 1997 to 2001 (median, 331 cases; range, 138 to 904).

In 2002, *Shigella sonnei* accounted for 179 (81%) cases, *S. flexneri* for 32 (14%), *S. boydii* for two (1%), and *S. dysenteriae* for one (<1%); eight isolates were not serotyped. Case-patients ranged in age from 3 months to 77 years (median, 10 years). Forty-eight percent of case-patients were less than 10 years of age; children less than 5 years of age accounted for 26% of cases. Thirty-two (14%) case-patients were hospitalized. Seventy-six percent of case-patients resided in the seven-county Twin Cities metropolitan area, with 45% of all case-patients residing in Hennepin County.

Six outbreaks of shigellosis were identified in 2002; all were person-to-person outbreaks due to *S. sonnei*. These outbreaks resulted in at least 75 illnesses, including 36 culture-confirmed cases (representing 20% of all reported *S. sonnei* cases). Four of the outbreaks occurred in child daycare settings, and two occurred in elementary schools. In addition, two culture-confirmed *S. sonnei* cases reported in 2002 were part of a *S. sonnei* outbreak in an elementary school that began in December 2001.

Every tenth *Shigella* isolate received at MDH was tested for antimicrobial resistance, but only one isolate from each outbreak was included. Twenty isolates were tested in 2002; 90% of isolates were resistant to ampicillin, and 20% were resistant to trimethoprim-sulfamethoxazole. Twenty percent of isolates tested were resistant to both ampicillin and trimethoprim-sulfamethoxazole.

***Streptococcus pneumoniae* Invasive Disease**

In 2002, surveillance for invasive *Streptococcus pneumoniae* (pneumococcal) disease was expanded from the seven-county Twin Cities metropolitan area to include all counties statewide.

In 2002, 598 cases of invasive pneumococcal disease were reported in Minnesota, including 300 cases among residents of the Twin Cities metropolitan area and 298 cases in Greater Minnesota. Incidence rates of invasive pneumococcal disease were similar within each age group across geographic regions. For example, among infants less than 2 years of age, incidence rates per 100,000 population in the Twin Cities and Greater Minnesota were 32 and 36, respectively. Similarly, incidence rates in the Twin Cities and Greater Minnesota, respectively, were: 16 and 13 cases per 100,000 population among 2 to 4-year olds; 3 and 2 cases per 100,000 among 5 to 34-year-olds; 12 and 11 cases per 100,000 among 35 to 64-year-olds; and 40 and 44 cases per 100,000 among persons 65 years of age or older.

In 2002, pneumonia accounted for 333 (56%) cases of invasive pneumococcal disease (i.e., those infections accompanied by bacteremia or isolation of pneumococci from another sterile site such as pleural fluid). Pneumonia accounted for a somewhat higher proportion of cases in the Twin Cities (59%) than among cases in Greater Minnesota (52%). Bacteremia without another focus of infection accounted for 186 (31%) cases statewide, including 80 (27%) cases in Twin Cities area residents and 106 (36%) cases in Greater Minnesota. The proportions of cases attributed to pneumococcal meningitis (8%) and all other invasive infections (6%) were comparable in both geographic areas. Of the 598 **continued...**

cases of invasive pneumococcal disease, 69 (12%) patients died; fatality rates were similar in both residential groups.

Among 527 isolates submitted from cases reported in 2002, 64 (12%) were resistant to penicillin, and 38 (7%) exhibited intermediate susceptibility. The prevalence of penicillin resistance was identical in the Twin Cities and Greater Minnesota. Ninety (17%) isolates exhibited multidrug resistance (i.e., resistance to more than one drug class).

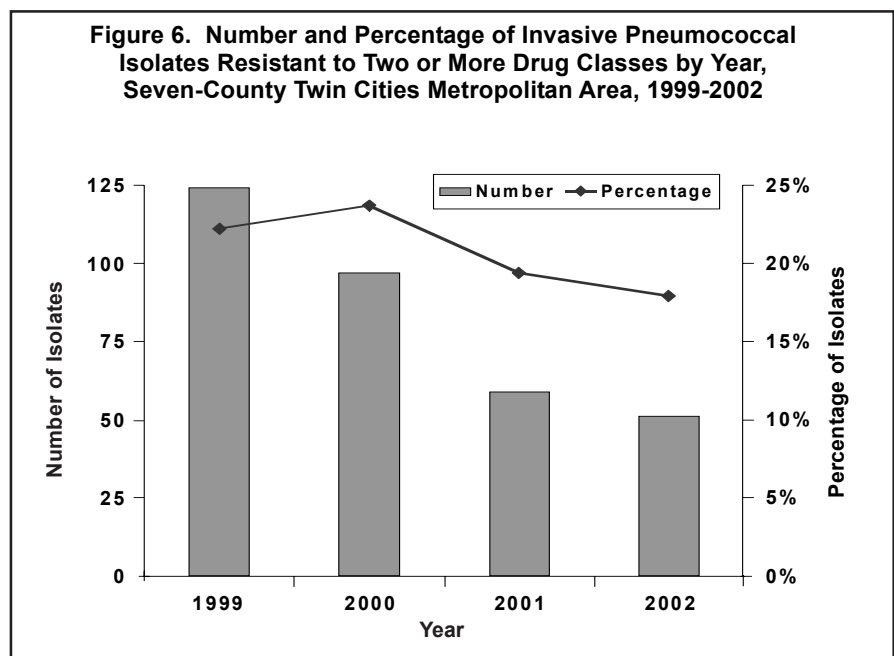
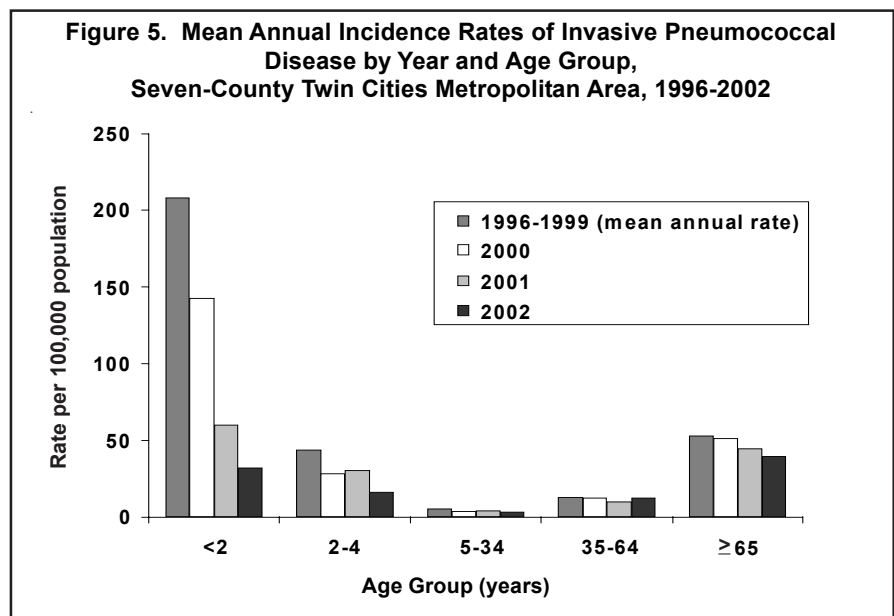
The 300 cases of invasive pneumococcal disease reported in the Twin Cities metropolitan area in 2002 represents a 12% decrease from the 340 cases reported in 2001. Incidence rates among infants less than 2 years of age declined most dramatically (Figure 5); this decrease is attributable to the use of the pediatric polysaccharide-protein conjugate vaccine (PCV-7) (Pneumovax, Wyeth-Lederle) licensed in 2000. This vaccine covers seven of the pneumococcal serotypes that caused most of the invasive pneumococcal disease in children before PCV-7 was licensed. During 2002, only six (26%) of 23 invasive infections among children less than 2 years of age in the Twin Cities area were caused by serotypes covered by PCV-7, compared to 81% of 150 cases in 1999.

Consistent with findings elsewhere in the U.S., rates of invasive pneumococcal disease among persons 65 years of age or older decreased in the Twin Cities area in 2002. This decline may be due in part to the use of PCV-7 in children. Because PCV-7 reduces pneumococcal colonization by the vaccine serotypes in vaccinees, the reservoir of circulating pneumococcal strains in the community may include fewer PCV-7 serotypes. Among case-patients 65 years of age or older in 2002, 28 (28%) of 99 isolates were serotypes included in PCV-7, compared to 72 (51%) of 142 isolates in 1999. Conversely, it is not likely that this decrease reflects increased use of 23-valent pneumococcal polysaccharide vaccines (PPV-23, Pneumovax, Merck, and Pnu-Immune 23, Wyeth-Ayerst Laboratories) recommended for adults over 64 years of age and for other individuals with certain chronic conditions. Sixteen serotypes included in PPV-23 are not included in PCV-7. In 2002, 45 (45%) of 99 isolates from

persons 65 years of age or older were among these 16 serotypes, compared with 42 (30%) of 142 isolates in 1999. Therefore, there was almost no change in the number of isolates with serotypes that were covered by PPV-23, except for those also covered by PCV-7. Relatively mild influenza seasons in 2001-2002 and 2002-2003 also may have influenced the recent decline in pneumococcal disease in the elderly.

A decline in the proportion of antibiotic-resistant pneumococcal strains among Twin Cities residents was observed in 2002, continuing a trend that began in 2001 (Figure 6). The prevalence of resistant pneumococcal strains has

usually been higher in children less than 5 years of age than in other age groups. In 2002, five (12%) of 41 invasive isolates from children less than 5 years of age were penicillin-resistant, and eight (20%) of 41 isolates were resistant to more than one drug class. In comparison, among 133 isolates from this age group in 2000, 33 (25%) were penicillin-resistant and 44 (33%) were multidrug-resistant. An insignificant reduction in resistance has occurred among isolates from individuals 5 years of age or older. In 2002, 29 (12%) of 244 isolates from this age group were penicillin-resistant, and 43 (18%) were



resistant to more than one drug class. In comparison, 35 (13%) of 277 isolates were penicillin-resistant, and 53 (19%) were multidrug-resistant in 2000. Due to declining invasive pneumococcal disease rates among young children, the absolute number of antibiotic-resistant isolates declined more quickly from 2000 through 2002 than did the proportion of resistant isolates (Figure 6). The seven serotypes included in PCV-7 represent the majority of antibiotic-resistant strains. Therefore, the decreased occurrence of resistant strains among invasive case isolates also may be attributed to increased use of PCV-7.

Additional information on antimicrobial susceptibility results for invasive pneumococcal isolates from 1996 through 2002 is available on the MDH website (<http://www.health.state.mn.us/divs/idepc/diseases/pneumococcal/sus9602.pdf>).

Streptococcal Invasive Disease - Group A

One hundred forty-seven cases of invasive group A streptococcal (GAS) disease (3.0 per 100,000 population), including 24 deaths, were reported in 2002, compared to 200 cases and 15 deaths in 2001. (The case definition for GAS changed in mid-2002 to exclude some less invasive cases in which GAS was isolated from surgical specimens.) Ages of case-patients ranged from 4 months to 96 years (mean, 52 years). Fifty-six percent of case-patients were residents of the seven-county Twin Cities metropolitan area. Thirty (20%) case-patients had bacteremia without another focus of infection. There were 13 (9%) cases each of primary pneumonia and necrotizing fasciitis. Ten (7%) case-patients had septic arthritis, and nine (6%) had streptococcal toxic shock syndrome (STSS).

The 24 deaths included four (17%) cases each of bacteremia without another focus of infection, pneumonia, and necrotizing fasciitis. Three (13%) cases had STSS, and two (8%) cases had both necrotizing fasciitis and STSS. The remaining fatal cases had bacteremia with another focus of infection, including four (17%) with cellulitis and one (4%) each with an abscess, puerperal sepsis, or septic arthritis. The deaths occurred in persons ranging in age from 20 to 92 years. For the 22 deaths in patients

with known health histories, significant underlying medical conditions were reported for all but four of the cases.

Isolates were available for 134 (91%) cases, of which 131 were subtyped using PFGE; 46 different molecular subtypes were identified. Thirty subtypes were represented by one isolate each; other subtypes were represented by two to 39 isolates each. No epidemiologic links were noted among cases with identical subtypes, except for two cases from one nursing home and three cases from another nursing home. All residents and most staff were cultured at the facility with three cases; two residents and five staff members had positive throat cultures. All except one staff member's isolate had PFGE patterns that were indistinguishable from the outbreak strain. Each resident and staff person with a positive culture was treated with antibiotics, and no further cases have been identified at that facility.

The deaths were distributed among 11 different PFGE subtypes, with seven (29%) deaths attributed to the most common PFGE subtype. No other subtype accounted for more than two deaths.

Streptococcal Invasive Disease - Group B

Three hundred eleven cases of Group B streptococcal invasive disease (6.3 per 100,000 population), including 24 deaths, were reported in 2002. These cases included those in which group B *Streptococcus* (GBS) was isolated from a normally sterile site, in addition to nine cases involving a miscarriage or stillbirth in which placenta was the site of disease.

Overall, 139 (45%) cases presented with bacteremia without another focus of infection. The other most common types of infection were cellulitis (16%), arthritis (9%), pneumonia (8%), osteomyelitis (4%), and meningitis (3%). The majority (78%) of cases had GBS isolated from blood only. Sixty percent of cases occurred among residents of the seven-county Twin Cities metropolitan area. Forty-seven (15%) case-patients were infants less than 1 year of age, and 153 (49%) were 60 years of age or older.

Forty-five cases of infant (early-onset or late-onset) or maternal GBS disease

were reported, compared to 53 cases in 2001. Twenty-seven infants developed invasive disease within 6 days following birth (i.e., early-onset disease), and 18 infants became ill at 7 to 89 days of age (i.e., late-onset disease). Nine stillbirths or spontaneous abortions were associated with 15 maternal invasive GBS infections.

From 1997 to 2002, 1,666 cases of GBS invasive disease were reported; 1,282 (77%) of these cases were adult non-maternal, 169 (10%) were early-onset, 114 (7%) were late-onset, 84 (5%) were maternal, and 17 (1%) were among children 90 days to 14 years of age. During this time period, 169 women had infants who developed early-onset GBS disease, and eight infants died. Thirty-one infants born at less than 37 weeks' gestation accounted for 18% of early-onset cases. Bacteremia without another focus of infection (83%) was the most common type of infection in these early-onset cases, followed by pneumonia (18%) and meningitis (7%).

In 1996, CDC, the American Academy of Pediatrics, and the American College of Obstetricians and Gynecologists released consensus guidelines urging prenatal care providers to use risk-based or screening-based approaches to prevent perinatal GBS disease. In light of these guidelines, MDH reviewed the maternal charts for 167 (99%) of 169 early-onset cases. Fifty (30%) women had prenatal screening for GBS; 16 (32%) were positive, 30 (60%) were negative, and four (8%) had an unknown result. Among those who were screened, 88% either did not receive screening for vaginal and rectal sites at greater than 34 weeks' gestation or did not have documentation of the site or date of screening. Overall, 15% of mothers of infants with invasive GBS disease received intrapartum antimicrobial prophylaxis (IAP). For women with risk factors and positive GBS cultures, regardless of site and date, 44% received IAP. Among women with risk factors and unknown or negative cultures, 32% received IAP; 56% of women with no risk factor and a GBS-positive culture received IAP. These data indicate that not all women with indications for IAP are receiving the appropriate preventive therapy.

In August 2002, the Perinatal GBS Disease Prevention guidelines were **continued...**

revised (http://www.cdc.gov/groupbstrep/gbs/gen_public_guidelines.htm). Key changes include the recommendation for universal prenatal screening of all pregnant women at 35 to 37 weeks' gestation, as well as updated prophylaxis regimens for women with penicillin allergies.

Tuberculosis

While the number of tuberculosis (TB) cases reported nationally has decreased each year since 1993, the incidence of TB in Minnesota has increased significantly during the same time period. In 2002, 237 new cases of TB disease (4.8 cases per 100,000 population) were reported statewide. This is comparable to the 239 cases (4.9 cases per 100,000) reported in 2001, the largest number of cases reported since the early 1970s.

The epidemiology of TB in Minnesota is distinct. The most significant factor is the very high percentage of TB cases that occur among foreign-born persons. In 2002, 181 (76%) cases occurred in persons born outside the U.S. For the first time since 1993, however, the percentage of foreign-born TB cases in Minnesota declined slightly in 2002, from 81% in 2001 and a high of 82% in 2000 (Figure 7). These data reflect the unique and changing demographics of immigrant populations arriving in the state, particularly persons from regions of the world where TB is prevalent. The most common regions of origin for foreign-born persons with TB disease reported in 2002 include sub-Saharan Africa (e.g., Somalia and Ethiopia) (56%) and South/Southeast Asia (e.g., Laos and Vietnam) (27%). The percentage of foreign-born TB case-patients who originated from sub-Saharan Africa decreased (from a peak of 61% in 2001) for the first time since 1993, when such data first were reported (Figure 8). (Similarly, data from the MDH Refugee Health Program indicate that the number and percentage of new refugees who arrived in Minnesota from sub-Saharan Africa during 2002 decreased to levels lower than any year since the mid-1990s.) The largest proportion of foreign-born TB cases were young adults 25 to 44 years of age; the proportion of pediatric cases (less than 15 years of age) was higher among U.S.-born cases than among foreign-born cases (23% versus 8%), although all U.S.-born pediatric cases

reported in 2002 occurred in households with foreign-born parents or other family members. The proportion of cases among persons 65 years of age or older was higher among U.S.-

born persons than among foreign-born persons (25% versus 7%).

Among 173 foreign-born persons diagnosed with TB disease in Minne-
continued...

Figure 7. Tuberculosis Cases by Country of Origin, Minnesota, 1993-2002

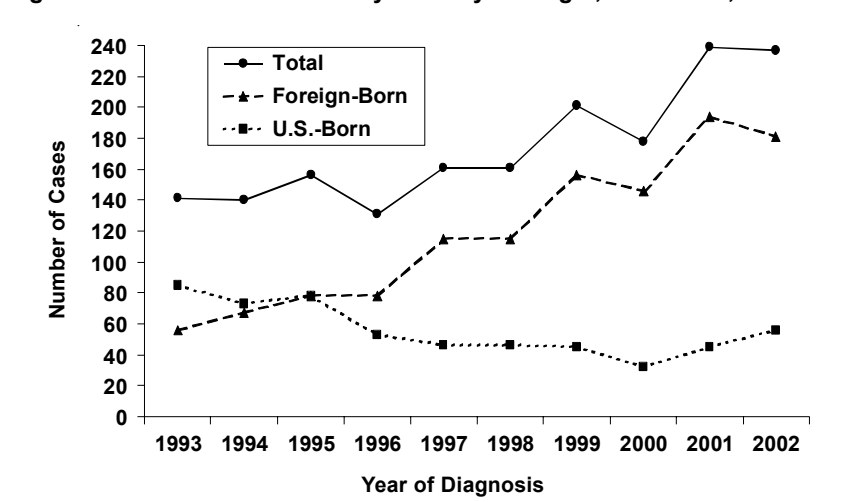


Figure 8. Foreign-Born Tuberculosis Cases by Region of Origin and Year of Diagnosis, Minnesota, 1998-2002

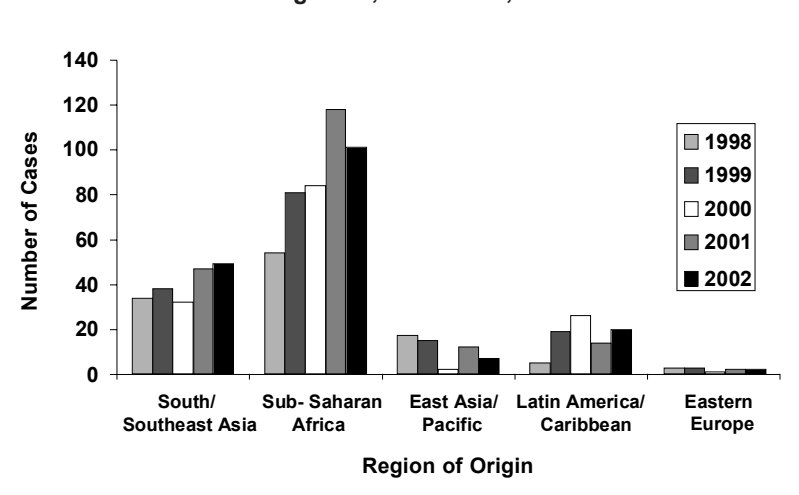


Table 5. Cases of Drug-Resistant Tuberculosis by Place of Birth and Year, Minnesota, 1998-2002

Year	Foreign-Born Cases		U.S.-Born Cases	
	Cases with Susceptibility Results*	Resistant No. (%)	Cases with Susceptibility Results*	Resistant No. (%)
1998	92	23 (25)	42	4 (10)
1999	131	29 (22)	35	1 (3)
2000	115	34 (30)	26	3 (12)
2001	156	46 (29)	39	10 (26)
2002	147	46 (31)	40	6 (15)
Total	641	178 (28)	182	24 (13)

*Culture-confirmed cases with drug susceptibility results available

sota during 2002 and whose date of arrival in the U.S. was known, 31 (18%) were diagnosed within 12 months of arrival in the U.S., and an additional 84 (49%) were diagnosed 2 to 5 years after arriving in this country. All individuals who arrive in the U.S. as either immigrants or refugees receive a medical evaluation overseas to identify conditions (such as infectious pulmonary TB disease) of public health concern. In 2002, only two (7%) of 27 immigrants/refugees diagnosed in Minnesota with TB disease within 12 months of their arrival in the U.S. had any TB-related condition noted in the results of their pre-immigration medical exams. These findings highlight the need for clinicians not to rely exclusively on the overseas exam to identify TB disease among newly arrived foreign-born persons; providers should thoroughly pursue screening, evaluation, and, if indicated, treatment of active TB disease or latent TB infection among patients who originate from areas where TB is endemic. Other less frequent risk factors among TB cases in Minnesota included homelessness (6%), HIV infection (4%), incarceration in a correctional facility (1%), and residence in a nursing home (1%). The percentage of homeless TB case-patients in 2002 was the highest since 1995.

Twenty-five (29%) of the state's 87 counties reported at least one case of TB disease in 2002, with the majority (78%) of TB cases in the seven-county Twin Cities metropolitan area, particularly among residents of Hennepin (54%) and Ramsey (16%) Counties. However, the percentage of cases reported from Greater Minnesota (22%) increased in 2002, while the percentage of cases from Hennepin County decreased to the smallest proportion in more than 5 years.

Drug-resistant TB is a critical public health and clinical concern, both globally and locally. The prevalence of drug resistance among TB cases reported in Minnesota exceeds comparable figures nationally. In 2002, 52 (28%) cases of drug-resistant TB were reported in Minnesota among 187 culture-confirmed cases for whom drug susceptibility results were available, including 25 (13%) cases resistant to isoniazid and six (3%) cases of multidrug-resistant TB (MDR-TB) (i.e., resistant to at least isoniazid and rifampin) (Table 5). This is the

highest prevalence of MDR-TB statewide since such data have been reported and considerably higher than the prevalence of MDR-TB nationally (1.2%) in 2001. The prevalence of drug-resistance among foreign-born cases (31%) increased slightly. The prevalence of drug resistance among U.S.-born cases (15%) decreased from 2001 yet was comparable to recent years. Forty-six (88%) of the 52 persons with drug-resistant TB disease reported in 2002 were born outside the U.S., including 23 (88%) of 26 isoniazid-resistant cases and five (83%) of six MDR-TB cases. The one U.S.-born MDR-TB case was resistant to all five first-line TB medications. This case was the first U.S.-born MDR-TB case ever reported in Minnesota. However, this patient had resided outside the U.S. for many years.

More detailed TB surveillance data and other TB-related resources (including patient education materials translated in nine languages) are available on the MDH TB Program's web site (www.health.state.mn.us/tb).

Unexplained Critical Illnesses and Deaths of Possible Infectious Etiology

Surveillance for unexplained critical illnesses and deaths of possible infectious etiology in Minnesota began in September 1995 as part of the EIP. MDH requests that any case of unexplained critical illness or death that appears to have a possibly infectious cause be reported, regardless of the patient's age or underlying medical conditions. A subset of reported cases (i.e., persons 6 months to 49 years of age with no serious underlying medical conditions who died of apparent non-nosocomial infectious processes) are eligible for testing performed at CDC as part of the core surveillance project. For cases who are not eligible for enrollment in the CDC project, some testing may be available at CDC and MDH, at the physician's request.

Forty possible cases were reported to MDH in 2002, compared to 35 cases in 2001. The cause(s) of illness subsequently were determined for 14 cases. One death remains unexplained, but there was no clear evidence to suggest an infectious cause. Among the remaining 25 cases, eight case-patients presented with respiratory symptoms, eight with neurologic

symptoms, five with shock/sepsis, and two each with cardiac symptoms and sudden unexpected death. The respiratory cases ranged from 2 to 51 years of age; the neurologic cases were 7 to 57 years of age; the sepsis cases were 8 to 53 years of age; the cardiac cases were 16 and 42 years of age; and the sudden unexpected deaths occurred in a 2-year-old and a 20-year-old. Four patients with respiratory symptoms and two patients with neurologic syndromes died. Four patients with sepsis and both cardiac case-patients died. Five each of the respiratory case-patients and neurologic case-patients, four sepsis case-patients, and both cardiac case-patients resided in the seven-county Twin Cities metropolitan area. The remaining case-patients resided in Greater Minnesota, except for two neurologic cases, who were out-of-state residents hospitalized in Minnesota.

Three sepsis cases, three respiratory cases, one neurologic case, one cardiac case, and both sudden unexpected deaths were eligible for inclusion in the CDC project. Specimens have been sent to CDC for testing for all cases, except for the cardiac case and one of the sudden unexpected deaths, which still are under investigation. An etiology was identified for all three respiratory cases and one sudden unexpected death based on the finding of *Streptococcus pneumoniae* in lung tissue from each of the case-patients by using immunohistochemical methods. Preliminary tests have not revealed an etiology for the remaining unexplained cases.

Viral Hepatitis A

In 2002, 53 cases of hepatitis A (1.1 per 100,000 population) were reported. Thirty-nine (74%) case-patients were residents of the seven-county Twin Cities metropolitan area, 30 (77%) of whom resided in Hennepin or Ramsey Counties. Thirty-five (66%) of the case-patients were male. Of 49 cases for whom race was reported, 37 (76%) were white, five (10%) were black, three (6%) were Asian, and two (4%) were American Indian. Although the greatest number of case-patients were white, incidence rates were higher among American Indians (2.5 per 100,000), blacks (2.5 per 100,000), and Asians (1.8 per 100,000) than among whites (0.8 per 100,000).

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Hispanic ethnicity was reported for two cases (1.4 per 100,000). Case-patients ranged in age from 1 to 89 years; 16 (30%) cases occurred among adults 25 to 44 years of age.

Two (4%) case-patients were employees of a food-service establishment in Goodhue County. Immune globulin prophylaxis and hepatitis A vaccine consequently were recommended for 23 exposed individuals, three of whom were fellow food-handlers.

Of the remaining 51 sporadic cases of hepatitis A reported in 2002, a risk factor for infection was identified for 41 (80%). Ten (20%) cases were associated with travel, five (50%) of which involved travel to South America or Mexico. Eight (16%) case-patients had known contact with another case, nine (18%) were men who had sex with men, and three (6%) had consumed raw shellfish. Overall, seven (14%) cases (all adults) were associated with childcare settings but were not related to any known outbreaks. Two of those seven cases had additional risk factors. Young children infected with hepatitis A virus often are asymptomatic or experience mild illness but remain efficient transmitters of disease. Persons who travel to countries where hepatitis A is endemic and men who have sex with men should be educated about their risk of hepatitis A and offered hepatitis A vaccine.

Viral Hepatitis B

In 2002, 52 cases of acute hepatitis B virus (HBV) infection (1.1 per 100,000 population) were reported, including one death. Forty-five (87%) of these cases had clinical symptoms; the remaining seven had documented asymptomatic seroconversions. Thirty-six (69%) case-patients were residents of the seven-county Twin Cities metropolitan area, including 17 (33%) in Hennepin County. Thirty-one (60%) case-patients were male, and 39 (75%) were adolescents or young adults between 16 and 39 years of age. Twenty-six (50%) case-patients were white, 16 (31%) were black, three (6%) were American Indian, and three (6%) were Asian; race was unknown for four (8%) cases (all were of Hispanic ethnicity). Although the majority of cases were white, incidence rates were higher among blacks (9.3 per

100,000), American Indians (5.5 per 100,000), Hispanics (2.8 per 100,000), and Asians (2.1 per 100,000) than among whites (0.6 per 100,000).

In addition to the 52 reported cases, six perinatal infections were identified in infants who tested positive for hepatitis B surface antigen (HBsAg) during post-vaccination screening. Three of the infants were born in 2000, and three were born in 2001. Four of these six infants were age-appropriately vaccinated with hepatitis B immune globulin (HBIG) and three doses of HBV vaccine. Two infants were delayed in the receipt of the third dose of vaccine.

Forty-four (85%) of the 52 cases were interviewed regarding possible modes of transmission. For 19 (43%) of those cases, the likely mode of transmission was sexual. Ten (23%) case-patients reported heterosexual contact with a known carrier of HBsAg, six (14%) reported heterosexual contact with multiple partners within 6 months prior to onset of symptoms, and three (7%) were men who reported having sex with men. One (2%) case-patient used needles to inject drugs and reported sexual contact with a known carrier of HBsAg. Three (7%) case-patients reported having had surgery within 6 months prior to onset of symptoms. Two (5%) cases involved non-sexual contact with HBsAg-infected persons. No cases were reported as a result of occupational exposure. Risk factors for acquiring HBV infection were not identified for the remaining 19 (43%) cases. These 19 cases and the eight who were unavailable for interviews were between 20 and 80 years of age (median, 34 years).

The Minnesota School Immunization Law requires HBV vaccination of students, unless they are legally exempt. HBV infections continue to occur in high-risk adolescents and adults who were beyond seventh grade when this law came into effect during the 2001-2002 school year. The majority of cases reported in 2002 with an identified risk factor indicated likely sexual transmission; therefore, health care providers should discuss the need for HBV testing and vaccination with at-risk patients, including patients seen for other sexually transmitted diseases.

Viral Hepatitis C

In 2002, 14 cases of acute hepatitis C virus (HCV) infection were reported to MDH. Ten (71%) of these cases had clinical symptoms, and four (29%) were asymptomatic seroconversions. Twelve (86%) case-patients resided in Greater Minnesota. The median age of case-patients was 32 years (range, 20 to 95 years). Eight (57%) case-patients were female. Eight (57%) case-patients were American Indian, and six (43%) were white. One (7%) case-patient was of Hispanic ethnicity. Incidence rates were higher among American Indians (9.9 per 100,000 population) than among whites (0.1 per 100,000).

Among the 14 case-patients, five (36%) reported using needles to inject drugs, two of whom also had HCV-positive sex partners. Two (14%) case-patients had sexual contact with a known anti-HCV-positive partner within 6 months prior to onset of symptoms. One (7%) case-patient had a history of intranasal cocaine use. No risk factor could be determined for the remaining six (43%) cases, three of whom were plasma donors with documented seroconversions and could not be located for an interview.

MDH received more than 2,293 reports of newly identified anti-HCV-positive persons in 2002, the vast majority of whom are chronically infected. The 14 acute cases represent less than 1% of those recently diagnosed. Since most cases are asymptomatic, medical providers are encouraged to review each patient's risk factor(s) for HCV infection to determine the need for testing. (Patients for whom testing is indicated include: persons with past or present injecting 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). Persons who test positive for HCV should be screened for susceptibility to hepatitis A and B virus infection and immunized appropriately.

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