

Annual Summary of Communicable Diseases Reported to the Minnesota Department of Health, 2004

Introduction

Assessment is a core public health function. Surveillance for communicable diseases is one type of assessment. Epidemiologic surveillance is the systematic collection, analysis, and dissemination of health data for the planning, implementation, and evaluation of health programs. The Minnesota Department of Health (MDH) collects information on certain communicable diseases for the purposes of determining disease impact, assessing trends in disease occurrence, characterizing affected populations, prioritizing control efforts, and evaluating prevention strategies. Prompt reporting allows outbreaks to be recognized in a timely fashion when control measures are most likely to be effective in preventing additional cases.

In Minnesota, communicable disease reporting is centralized, whereby reporting sources submit standardized report forms to MDH. Cases of disease are reported pursuant to Minnesota Rules Governing Communicable Diseases (MN Rules 4605.7000 - 4605.7800) which were recently updated (See "Revisions to the Communicable Disease Reporting Rule" in the May/June 2005 issue [vol 33, no. 3] of the *Disease Control Newsletter*). The diseases listed in Table 1 (page 38) must be reported to MDH. As stated in these rules, physicians, health care facilities, laboratories, and veterinarians 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.

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

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

Table 2 summarizes cases of selected communicable diseases reported during 2004 by district of the patient's residence. Pertinent observations for some of these diseases are discussed below.

Incidence rates in this report were calculated using disease-specific numerator data collected by MDH and a standardized set of denominator data derived from U.S. Census data. Disease incidence may be categorized as occurring within the seven-county Twin Cities metropolitan area or outside of it (Greater Minnesota).

Anaplasmosis

Human anaplasmosis (HA) is the new nomenclature for the disease formerly known as human granulocytic ehrlichiosis. HA (caused by the rickettsia *Anaplasma phagocytophilum*) is transmitted to humans by *Ixodes scapularis* (deer tick or black-legged tick), the same tick that transmits Lyme disease.

Similar to Lyme disease, HA case numbers also increased during 2004, from 78 cases in 2003 (1.6 per 100,000 population) to 139 cases (2.8 per 100,000). The record high occurred in 2002, with 149 cases (3.0 per 100,000 population). Eighty-one (58%) case-patients reported in 2004 were male. The median age of case-patients was 59 years (range, 1 to 89 years). The peak in onsets of illness occurred in June and July (77 cases [56%] of 137 cases with known onset). Co-infections with Lyme disease and HA

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Mark the Date: 11th Annual Emerging Infections in Clinical Practice and Emerging Health Threats Conference, Minneapolis, November 10-11 (half-day), 2005.....56

Table 1. Diseases Reportable to the Minnesota Department of Health

Report Immediately by Telephone

Anthrax (*Bacillus anthracis*) a
 Botulism (*Clostridium botulinum*)
 Brucellosis (*Brucella* spp.) a
 Cholera (*Vibrio cholerae*) a
 Diphtheria (*Corynebacterium diphtheriae*) a
 Hemolytic uremic syndrome a
 Measles (rubeola) a
 Meningococcal disease (*Neisseria meningitidis*)
 (all invasive disease) a, b
 Orthopox virus a
 Plague (*Yersinia pestis*) a
 Poliomyelitis a

Q fever (*Coxiella burnetii*) a
 Rabies
 (animal and human cases and suspected cases)
 Rubella and congenital rubella syndrome a
 Severe Acute Respiratory Syndrome (SARS) a
 Smallpox (variola) a
 Tularemia (*Francisella tularensis*) a
 Unusual or increased case incidence of any
 suspect infectious illness a

Report Within One Working Day

Amebiasis (*Entamoeba histolytica/dispar*)
 Anaplasmosis (*Anaplasma phagocytophilum*)
 Arboviral disease (including but not limited to,
 LaCrosse encephalitis, eastern equine encephalitis,
 western equine encephalitis, St. Louis encephalitis,
 and West Nile virus)
 Babesiosis (*Babesia* spp.)
 Blastomycosis (*Blastomyces dermatitidis*)
 Campylobacteriosis (*Campylobacter* spp.) a
 Cat scratch disease (infection caused by *Bartonella* spp.)
 Chancroid (*Haemophilus ducreyi*) c
 Chlamydia trachomatis infection c
 Coccidioidomycosis
 Cryptosporidiosis (*Cryptosporidium* spp.) a
 Cyclosporiasis (*Cyclospora* spp.) a
 Dengue virus infection
 Diphyllobothrium latum infection
 Ehrlichiosis (*Ehrlichia* spp.)
 Encephalitis (caused by viral agents)
 Enteric *E. coli* infection
 (*E. coli* O157:H7, other enterohemorrhagic [Shiga toxin-producing]
E. coli, enteropathogenic *E. coli*, enteroinvasive *E. coli*,
 enterotoxigenic *E. coli*) a
Enterobacter sakazakii (infants under 1 year of age) a
 Giardiasis (*Giardia lamblia*)
 Gonorrhea (*Neisseria gonorrhoeae*) c
Haemophilus influenzae disease
 (all invasive disease) a
 Hantavirus infection
 Hepatitis (all primary viral types including A, B, C, D, and E)
 Histoplasmosis (*Histoplasma capsulatum*)
 Human immunodeficiency virus (HIV) infection, including
 Acquired Immunodeficiency Syndrome (AIDS) a, d
 Influenza
 (unusual case incidence, critical illness, or laboratory
 confirmed cases) a, e
 Kawasaki disease
Kingella spp. (invasive only) a
 Legionellosis (*Legionella* spp.) a
 Leprosy (Hansen's disease) (*Mycobacterium leprae*)
 Leptospirosis (*Leptospira interrogans*)

Listeriosis (*Listeria monocytogenes*) a
 Lyme disease (*Borrelia burgdorferi*)
 Malaria (*Plasmodium* spp.)
 Meningitis (caused by viral agents)
 Mumps
 Neonatal sepsis, less than 7 days after birth (bacteria isolated from a
 sterile site, excluding coagulase-negative *Staphylococcus*) a, b
 Pertussis (*Bordetella pertussis*) a
 Psittacosis (*Chlamydia psittaci*)
 Retrovirus infection
 Reye syndrome
 Rheumatic fever (cases meeting the Jones Criteria only)
 Rocky Mountain spotted fever (*Rickettsia rickettsii*, *R. canada*)
 Salmonellosis, including typhoid (*Salmonella* spp.) a
 Shigellosis (*Shigella* spp.) a
Staphylococcus aureus (vancomycin-intermediate *S. aureus* [VISA],
 vancomycin-resistant *S. aureus* [VRSA], and death or critical illness
 due to community-associated *S. aureus* in a previously healthy
 individual) a
 Streptococcal disease (all invasive disease caused by Groups A and B
 streptococci and *S. pneumoniae*) a, b
 Syphilis (*Treponema pallidum*) c
 Tetanus (*Clostridium tetani*)
 Toxic shock syndrome a
 Toxoplasmosis (*Toxoplasma gondii*)
 Transmissible spongiform encephalopathy
 Trichinosis (*Trichinella spiralis*)
 Tuberculosis (*Mycobacterium tuberculosis* complex)
 (Pulmonary or extrapulmonary sites of disease, including laboratory
 confirmed or clinically diagnosed disease, are reportable. Latent
 tuberculosis infection is not reportable.) a
 Typhus (*Rickettsia* spp.)
 Unexplained deaths and unexplained critical illness
 (possibly due to infectious cause) a
 Varicella-zoster disease (1. Primary [chickenpox]: unusual case
 incidence, critical illness, or laboratory-confirmed cases. 2. Recurrent
 [shingles]: unusual case incidence, or critical illness.) a
Vibrio spp. a
 Yellow fever
 Yersiniosis, enteric (*Yersinia* spp.) a

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

Methicillin-resistant *Staphylococcus aureus*

a Submission of clinical materials required. If a rapid, non-culture assay is used for diagnosis, we request that positives be cultured, and isolates submitted. If this is not possible, send specimens, enrichment broth, or other appropriate material. Call the MDH Public Health Laboratory at 612-676-5396 for instructions.

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

c Report on separate Sexually Transmitted Disease Report Card.

d Report on separate HIV Report Card.

e For criteria for reporting laboratory confirmed cases of influenza, see www.health.state.mn.us/divs/idepc/dtopics/reportable/index.html.

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Table 2. Cases of Selected Communicable Diseases Reported to the Minnesota Department of Health, by District of Residence, 2004

Disease	District* (population per U.S. Census 2000)										Total (4,919,479)
	Metropolitan (2,642,056)	Northwestern (152,001)	Northeastern (322,073)	Central (610,139)	West Central (222,691)	South Central (280,332)	Southeastern (460,102)	Southwestern (230,085)	Unknown Residence		
Anaplasmosis	33	12	16	68	2	1	7	0	0	0	139
Campylobacteriosis	399	16	37	109	53	66	146	70	0	0	896
Cryptosporidiosis	21	1	18	30	11	16	29	21	0	0	147
Encephalitis - viral											
LaCrosse	0	0	0	0	0	1	1	0	0	0	2
West Nile	6	1	0	5	4	8	0	10	0	0	34
Escherichia coli O157 infection	45	2	4	13	2	12	18	14	0	0	110
Hemolytic Uremic Syndrome	4	0	0	2	1	0	0	2	0	0	9
Giardiasis	1,045	10	45	123	21	36	88	30	0	0	1,398
Haemophilus influenzae invasive disease	23	4	4	6	1	1	13	3	0	0	55
HIV infection other than AIDS	164	0	2	6	0	6	7	3	4	4	192
AIDS (cases diagnosed in 2004)	164	1	4	14	2	3	3	4	1	1	196
Legionnaires' disease	10	0	4	0	0	0	1	1	0	0	16
Listeriosis	2	0	0	0	0	1	1	1	0	0	5
Lyme disease	442	43	98	312	29	19	76	4	0	0	1,023
Mumps	1	0	0	0	0	1	2	0	0	0	4
Neisseria meningitidis invasive disease	17	1	1	2	1	0	1	1	0	0	24
Pertussis	859	41	58	149	53	27	130	51	0	0	1,368
Salmonellosis	344	9	27	79	26	28	66	64	0	0	643
Sexually transmitted diseases*	10,323	276	734	971	173	461	934	325	506	407	14,703
Chlamydia trachomatis - genital infections	7,805	248	613	866	161	395	807	299	407	407	11,601
Gonorrhea	2,394	28	121	102	11	64	118	23	96	96	2,957
Syphilis, total	124	0	0	3	1	2	9	3	3	3	145
primary/secondary	26	0	0	0	0	0	1	0	0	0	27
early latent**	19	0	0	0	0	0	1	0	1	1	21
late latent***	74	0	0	3	1	2	7	3	2	2	92
congenital	1	0	0	0	0	0	0	0	0	0	1
other	4	0	0	0	0	0	0	0	0	0	4
Chancroid	0	0	0	0	0	0	0	0	0	0	0
Shigellosis	47	0	4	6	2	0	4	5	0	0	68
Streptococcus pneumoniae invasive disease	286	14	48	72	20	36	49	15	0	0	540
Streptococcal invasive disease - Group A	84	6	5	16	3	7	16	9	0	0	146
Streptococcal invasive disease - Group B	189	14	21	38	15	19	34	11	0	0	341
Tuberculosis	157	2	3	3	3	2	22	7	0	0	199
Viral hepatitis, type A	45	2	0	0	0	1	11	0	0	0	59
Viral hepatitis, type B (acute infections only, not perinatal)	36	0	4	9	3	7	9	1	0	0	69
Viral hepatitis, type C (acute infections only)	9	3	8	1	1	0	1	0	0	0	23
Yersiniosis	13	0	0	3	2	1	3	0	0	0	22

*Cases for which the patient's residence is unknown are assigned the geographic location of the reporting clinic
 **Duration ≤1 year
 ***Duration >1 year; Includes neurosyphilis

County Distribution within Districts

Metropolitan - Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington
 Northwestern - Beltrami, Clearwater, Hubbard, Kittson, Lake of the Woods, Marshall, Pennington, Polk, Red Lake, Roseau
 Northeastern - Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, St. Louis
 Central - Benton, Cass, Chisago, Crow Wing, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Sherburne, Stearns, Todd, Wadena, Wright
 West Central - Becker, Clay, Douglas, Grant, Mahnomen, Norman, Otter Tail, Pope, Stevens, Traverse, Wilkin
 South Central - Blue Earth, Brown, Faribault, LeSueur, McLeod, Martin, Meeker, Nicollet, Sibley, Waseca, Watonwan
 Southeastern - Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Winona
 Southwestern - Big Stone, Chippewa, Cottonwood, Jackson, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Redwood, Renville, Rock, Swift, Yellow Medicine

can occur from the same tick bite; during 2004, two HA case-patients (1.4%) also had objective evidence of Lyme disease. The risk for HA is highest in many of the same Minnesota counties where the risk of Lyme disease is greatest, including Aitkin, Cass, Crow Wing, Hubbard, and Pine Counties.

For additional information, see "Dramatic Increase in Lyme Disease and Other Tick-borne Diseases, 2004"

in the May/June 2005 issue (vol. 33, no. 3) of the *Disease Control Newsletter*.

Arboviral Encephalitis

LaCrosse encephalitis and Western equine encephalitis historically have been the primary arboviral encephalitis found in Minnesota. During July 2002, West Nile virus (WNV) was identified in Minnesota for the first time. In 2004, WNV cases were reported from 47 states and the District

of Columbia; nationwide, 2,535 human cases of WNV disease were reported, including 98 fatalities. The largest WNV outbreaks during 2004 occurred in Arizona and California.

In Minnesota, 34 cases of WNV disease were reported in 2004 (down from 148 cases in 2003, and 48 in 2002). Twenty-one (62%) case-patients had West Nile (WN) fever; five (15%) had meningitis, and eight (24%) had **continued...**

encephalitis. The median age was 53 years (range, 3 to 83 years), but WN encephalitis patients tended to be older (median, 74 years; range, 51 to 83 years). Two WN encephalitis patients (51 and 66 years old) with pre-existing health problems died from their illness. Twenty-three cases (68%) occurred among residents of western and southcentral Minnesota. The earliest case-patient had onset of symptoms on July 12; the latest on October 8. Similar to previous years, the peak in illness onset was from August 1, 2004 through September 19, 2004 (24 of 34 [71%] cases).

The field ecology of WNV is complex. The virus 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. In 2004, cooler than normal weather in August kept mosquito numbers relatively low and likely contributed to the reduced incidence. Interpreting the effect of weather on WNV transmission demonstrates the difficulty of predicting how many people will become infected. WNV appears to be established throughout Minnesota; it will probably be present in the state to some extent every year. The disease risk to humans, however, will likely continue to be higher in central and western Minnesota where the primary vector, *Culex tarsalis*, is most abundant.

During 2004, two cases of LaCrosse encephalitis were reported. The

disease, which primarily affects children, is transmitted through the bite of infected *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) that provide mosquito breeding habitats are abundant. From 1985 through 2004, 119 cases were reported from 20 southeastern Minnesota counties, with a median of six cases (range, 2 to 13 cases) reported annually. 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 1). There were 896 cases of culture-confirmed *Campylobacter* infection reported in 2004 (18.2 per 100,000 population). This is similar to the 937 cases reported in 2003 and to the median annual number of cases reported from 1999 to 2003 (median, 941 cases; range, 786 to 1,079). Fifty-five percent of cases occurred in people who resided outside the Twin Cities metropolitan area. Of the 805 *Campylobacter* isolates confirmed and identified to species by MDH, 92% were *C. jejuni* and 7% were *C. coli*.

The median age of case-patients was 33 years (range, 3 months to 93

years). Forty-four percent of cases were between 20 and 49 years of age, and 16% were 5 years of age or younger. Fifty-eight percent of cases were male. Fifteen percent of case-patients were hospitalized; the median length of hospitalization was 2 days. Fifty-one percent of infections occurred during June through September. Of the 804 (90%) case-patients for whom data were available, 145 (18%) reported travel outside of the United States during the week prior to illness onset. The most common travel destinations were Mexico (n=40), Central or South America (n=41), western Europe (n=32), and Asia (n=25). There were no outbreaks of campylobacteriosis identified in 2004.

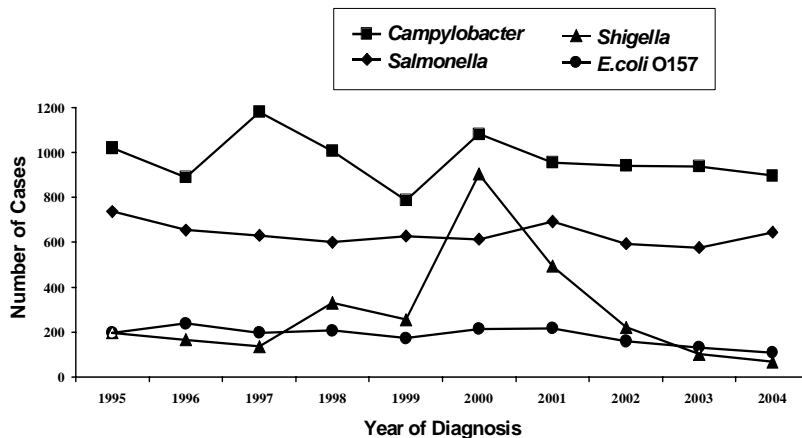
A primary feature of public health importance among *Campylobacter* cases was the continued presence of *Campylobacter* isolates resistant to fluoroquinolone antibiotics (e.g., ciprofloxacin), which are commonly used to treat campylobacteriosis. In 2004, the overall proportion of quinolone-resistant *Campylobacter* isolates was 15%. However, 67% of *C. jejuni* isolates from patients with a history of foreign travel (regardless of destination) during the week before illness onset were resistant to fluoroquinolones. Domestically acquired quinolone-resistant *C. jejuni* infections also have increased in recent years. This increase likely is due largely to the use of fluoroquinolones in poultry (the primary source of *Campylobacter* for humans) in the United States, which began late in 1995. In 2004, 5% of *C. jejuni* isolates from patients who acquired the infection domestically were resistant to fluoroquinolones.

Cryptosporidiosis

During 2004, 147 confirmed cases of cryptosporidiosis (3.0 per 100,000 population) were reported. This is similar to the 155 cases reported in 2003 but represents a 21% decrease from the median number of cases reported annually from 1996 to 2003 (median, 185 cases; range, 81 to 242). The median age of case-patients in 2004 was 24 years (range, 6 months to 87 years). Children 10 years of age or younger accounted for 30% of cases. Forty-five percent of cases occurred during July through October. The incidence of cryptosporidiosis in the Southwestern, Southeastern, and

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Figure 1. Reported Cases of *Campylobacter*, *Salmonella*, *Shigella*, and *Escherichia coli* O157:H7 Infection, Minnesota, 1995-2004



South Central districts (9.1, 6.3, and 5.7 cases per 100,000 population, respectively) was significantly higher than the statewide incidence. Only 21 (14%) reported cases occurred among residents of the Twin Cities metropolitan area (0.8 per 100,000 population). Thirty-six (24%) case-patients required hospitalization, for a median of 3 days (range, 1 to 34 days). Two case-patients were known to be HIV-infected. No outbreaks of cryptosporidiosis were identified in 2004.

***Escherichia coli* O157:H7 Infection and Hemolytic Uremic Syndrome (HUS)**

During 2004, 110 culture-confirmed cases of *Escherichia coli* O157:H7 infection (2.2 per 100,000 population) were reported. This represents a 17% decrease from the 133 cases reported in 2003 and a 41% decrease from the median number of cases reported annually from 1997 to 2003 (median, 187 cases; range, 133 to 219). Forty-five (41%) cases occurred in residents of the Twin Cities metropolitan area. The remaining 65 cases occurred throughout Greater Minnesota. Eighty-four (76%) cases occurred during May through October. The median age of case-patients was 17.5 years (range, 4 months to 80 years). Thirty-nine (35%) case-patients were hospitalized; the median duration of hospitalization was 3 days (range, 1 to 82 days).

Five *E. coli* O157:H7 outbreaks were identified during 2004. Of these, two outbreaks were foodborne. The first foodborne outbreak was associated with consumption of frozen ground sirloin patties purchased from a membership grocery warehouse club; this outbreak resulted in four confirmed *E. coli* O157:H7 cases in Minnesota and one confirmed case in Wisconsin. The second foodborne outbreak was associated with consumption of custom slaughter ground beef used at a church spaghetti dinner served during a charity bicycle tour in Minnesota. Approximately 980 people participated in this event. Of 244 participants interviewed, 19 cases (14 from Minnesota) met the clinical case definition and seven had culture-confirmed *E. coli* O157:H7 infections. Of the 50 bicycle tour participants interviewed who reported eating the spaghetti dinner, 14 (28%) met the case definition. By extrapolation, an estimated 70 (28% of 250 persons served the spaghetti dinner) *E. coli*

O157:H7 infections occurred as a result of this outbreak.

There were three daycare-associated outbreaks of *E. coli* O157:H7 in 2004, resulting in a total of 14 laboratory-confirmed cases (four to six cases per daycare). The route of transmission for all three outbreaks was likely person-to-person. There were no associated cases of hemolytic uremic syndrome (HUS).

In 2004, nine HUS cases were reported. There were no fatal cases. From 1997 to 2004, the median annual number of reported HUS cases was 14 (range, nine to 25), and the overall case fatality rate was 9%. In 2004, the median age of HUS case-patients was 7 years (range, 1 to 63 years). All cases occurred in either children (eight cases) or the elderly (one case). All nine case-patients were hospitalized, with a median hospital stay of 18 days (range, 1 to 82 days). All but one of the HUS cases reported in 2004 were post-diarrheal. *E. coli* O157:H7 was cultured from the stool of five case-patients. Non-O157 Shiga toxin-producing *E. coli* was isolated from two case-patients; the isolate from one was identified as *E. coli* O145:H28, the other serotype was not identified for the other case-isolate. *E. coli* O157:H7 serology was positive in one HUS patient with a negative stool culture. There were no outbreak-associated HUS cases in 2004.

Giardiasis

During 2004, 1,398 cases of *Giardia* infection (28.0 per 100,000 population) were reported. This represents a 64% increase from the 851 cases reported in 2003 and is greater than the median number of cases reported annually from 1996 through 2003 (median, 1,066 cases; range, 851 to 1,556). Of the total number of *Giardia* cases for 2004, 811 (58%) represented positive tests during routine screenings of recent immigrants and refugees.

The median age for all case-patients reported in 2004 was 10 years (range, 5 months to 89 years). The median age among non-immigrant cases was 33 years (range, 5 months to 89 years). As in previous years, cases were clustered among children less than 5 years of age (20%); only 19% of cases were over 50 years of age. Overall, 6% of case-patients were hospitalized; 16% of case-patients

over 50 years of age were hospitalized. There were no outbreaks of giardiasis in Minnesota in 2004.

MDH began systematically interviewing cases of giardiasis in January 2002 to better characterize the illness and evaluate potential risk factors for infection. In 2004, 67% of the non-immigrant cases were interviewed. The symptoms most commonly reported by case-patients included diarrhea (94%), gas or bloating (74%), abdominal pain (72%), weight loss (66%) and nausea (61%); less commonly reported symptoms included fatigue (41%), vomiting (37%), and fever (28%). The median duration of diarrhea was 17 days (range, 1 to 660 days).

Case-patients were interviewed about potential exposures during the 14 days prior to their illness onset. Thirty-seven percent of interviewed case-patients reported traveling prior to their onset. Among travelers, 30% reported travel outside the United States. Eleven percent of case-patients reported camping or hiking prior to onset, and 29% reported swimming or entering water. Forty-one percent of adult case-patients reported having children in their households; 48% of those case-patients had children in diapers. Twenty-eight percent of adults reported changing a diaper prior to onset. Among pediatric cases, 30% of interviewed parents reported that their child had contact with a childcare setting prior to and/or during illness.

***Haemophilus influenzae* Invasive Disease**

Fifty-five cases of invasive *Haemophilus influenzae* disease (1.1 per 100,000 population) were reported in 2004. Case-patients ranged in age from newborn to 96 years (median, 65 years). Twenty-five (45%) case-patients had pneumonia, 16 (29%) had bacteremia without another focus of infection, eight (15%) had meningitis, and 6 (11%) had other conditions. Nine (16%) deaths were reported among these case-patients.

Of 49 *H. influenzae* isolates for which typing was performed at MDH, 10 (20%) were type f, five (10%) type e, two (4%) type b, two (4%) type a, one (2%) type c, and 29 (59%) were untypeable. Isolates from six cases were not available for typing.

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Two cases of type b (Hib) disease occurred in 2004, compared to five cases in 2003, and one case in 2002. The Hib cases reported in 2004 occurred in a 5-month-old and an adult older than 40. The 5-month-old had not been vaccinated, and the other individual had underlying medical conditions. The adult had pneumonia and the infant had meningitis. Both patients survived.

The nine deaths occurred in patients ranging in age from 44 to 87 years. Six case-patients presented with pneumonia, two with bacteremia without another focus of infection, and one with peritonitis. Eight case-patients had *H. influenzae* isolated from blood and one from peritoneal fluid. Six had significant underlying medical conditions. Three of the isolates from the nine deceased case-patients were type c; five were untypeable isolates and one isolate was not available for typing.

HIV Infection and AIDS

Surveillance for AIDS has been conducted in Minnesota since 1982. In 1985, when the U.S. Food and Drug Administration (FDA) approved the first diagnostic test for HIV, Minnesota became the first state to make HIV infection a reportable condition; 39 states now require confidential reporting of HIV infection.

Compared to other states nationwide, the incidence of HIV/AIDS in Minnesota is moderately low. In 2003, state-specific AIDS incidence rates per 100,000 population ranged from 0.5 in North Dakota to 34.8 in New York, with 3.5 cases per 100,000 population reported in Minnesota. Similar comparisons for HIV (non-AIDS) incidence rates are not possible, because some states only began HIV (non-AIDS) reporting recently.

As of December 31, 2004, a cumulative total of 7,547 cases of HIV infection have been reported to MDH, including 4,334 AIDS cases and 3,213 HIV (non-AIDS) cases. Of these HIV/AIDS case-patients, 2,697 (36%) are known to have died.

The annual number of AIDS cases reported in Minnesota increased steadily from the beginning of the epidemic through the early 1990s, reaching a peak of 370 cases in 1992. Beginning in 1996, the annual number

of new AIDS diagnoses, and deaths among AIDS case-patients, declined sharply in Minnesota, primarily due to new antiretroviral therapies, which delay the progression from HIV infection to AIDS and improve survival. In 2004, 196 new AIDS cases and 58 deaths among AIDS patients were reported (Figure 2).

The annual number of newly diagnosed HIV (non-AIDS) cases reported in Minnesota has remained fairly constant since the mid-1990s, with 192 reported in 2004. This trend, coupled with improved survival, has led to an increasing number of persons in Minnesota living with HIV or AIDS. Approximately 5,000 persons with HIV/AIDS were residing in Minnesota at the end of 2004.

Historically, and in 2004, nearly 90% (272/307) of new HIV infections (both HIV [non-AIDS] and AIDS at first diagnosis) reported in Minnesota occur in the 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.

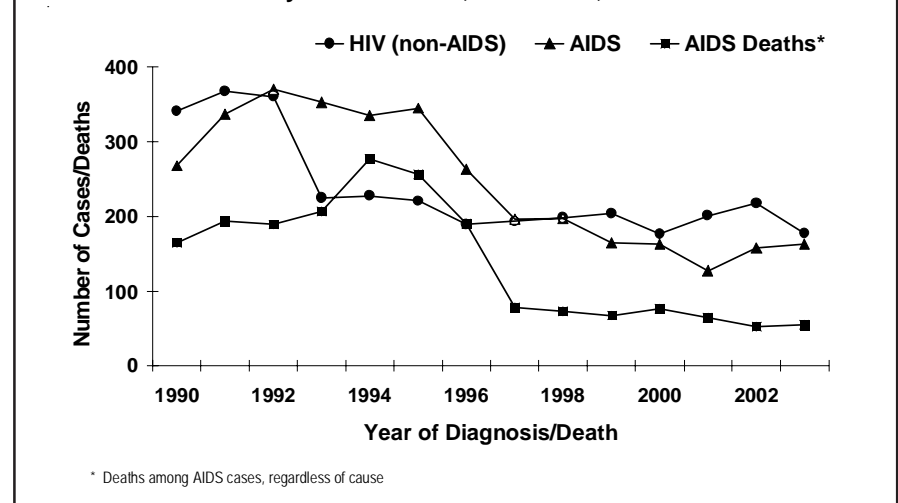
The majority of new HIV infections in Minnesota occur among males. Trends in the annual number of new HIV infections diagnosed among males differ by race/ethnicity. New infections occurred primarily among white males in the 1980s and early 1990s. Although whites still comprise the largest proportion 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 40 new infections in 2004. The number of HIV infections diagnosed among Hispanic and African-born males has increased annually, with 24 new infections, among each group, diagnosed in 2004.

Females account for an increasing percentage of new HIV infections, from 10% of new infections in 1990 to 29% in 2004. Trends in HIV infections diagnosed annually among females also differ by race/ethnicity. Early in the epidemic, whites accounted for the majority of newly diagnosed infections in women. Since 1991, the number of new infections among women of color has exceeded that of white women. The annual number of new HIV infections diagnosed among U.S.-born black females has remained near 20 cases the past 4 years. During that same time the number of new infections among African-born females increased 25% to 35 cases in 2004, continuing a dramatic increase from just three cases in 1996. The annual number of new infections diagnosed among Hispanic, American Indian, and Asian females is small, with 10 or fewer cases annually in each group.

Despite relatively small numbers of cases, persons of color are disproportionately affected by HIV/AIDS in Minnesota. In 2004, non-white men comprised approximately 12% of the **continued...**

Figure 2. HIV (non-AIDS) and AIDS Cases by Year of Diagnosis, and AIDS Deaths by Year of Death, Minnesota, 1990-2004



male population in Minnesota and 43% of new HIV infections among men. Similarly, persons of color comprised approximately 11% of the female population and 77% of new HIV infections among women. It bears noting that race is not considered a biological cause of disparities in the occurrence of HIV, but instead race is a marker for other risk factors, including lower socioeconomic status and education.

Since the beginning of the HIV epidemic, male-to-male sex has been the predominant mode of exposure to HIV reported in Minnesota, although the number and proportion of new HIV infections attributed to men who have sex with men (MSM) have declined since 1991. In 1991, 69% (324/470) of new HIV infections were attributed to MSM (or MSM who also inject drugs); by 2004, this percentage had decreased to 44% (134/307). However, current attitudes, beliefs, and unsafe sexual practices documented in surveys among MSM nationwide, and a current epidemic of syphilis among MSM, documented in Minnesota and elsewhere, warrant concern. Similar to syphilis increases in other U.S. cities and abroad, nearly 50% of the recent syphilis cases in Minnesota among MSM were co-infected with HIV, some for many years. "Burn out" from adopting safer sexual practices and exaggerated confidence in the efficacy of HIV treatments may be contributors to resurging risky sexual behavior among MSM. CDC recommends annual screening for sexually transmitted diseases (including HIV and syphilis) for sexually active MSM and more frequent screening for MSM who report sex with anonymous partners or in conjunction with drug use.

The number and percentage of HIV infections in Minnesota that are attributed to injection drug use have declined over the past decade for men and women, falling from 17% (80/470) of cases in 1991 to 4% (13/307) in 2004. 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 90 new HIV diagnoses among women in 2004 can be attributed to heterosexual exposure after re-distributing those with unspecified risk (Lansky A, et al. A method for classification of HIV exposure category

for women without HIV risk information. *MMWR* 2001; 50[RR-6]:29-40).

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 2004, there were 59 new HIV infections reported among Africans. While African-born persons comprise less than 1% of the state's population, they accounted for nearly 20% of all HIV infections diagnosed in Minnesota in 2004. Until recently, culturally specific HIV prevention messages have not been directed to African communities in Minnesota. Taboos and other cultural barriers make it challenging to deliver such messages and to connect HIV-infected individuals with prevention and treatment services. Collaborations between MDH, the Minnesota Department of Human Services, and community-based organizations serving African-born persons in Minnesota are underway addressing these complex issues.

Influenza

On October 5, 2004, MDH received notice that half of the influenza vaccine expected for the upcoming season would not be available. This prompted immediate public health action to determine the vaccine supply in Minnesota and redistribute it to reach groups most at risk for complications of influenza. As a result of public health efforts, as well as private providers, vaccine was made available to all Minnesota long-term care facility residents by early November 2004.

The Public Health Laboratory isolated influenza for the first time of the 2004-5 influenza season from a Minnesota resident on October 18, 2004, which represented an early start of activity. Since 1990-91, the first isolate typically has been between mid-November and mid-December. Despite the early isolation, influenza activity was sporadic in Minnesota until mid-December and didn't peak until the first week in February. Nationally, a similar activity pattern was seen.

Influenza surveillance in Minnesota relies on reporting of selective individual cases from clinics, hospitals,

and laboratories, as well as outbreak reporting from schools and long-term care facilities. The current system for reporting outbreaks has been in place since the 1995-96 influenza season, and a Sentinel Provider Influenza Network was initiated in 1998-99 to conduct active surveillance. Twenty-eight sentinel sites participated during the 2004-5 season. While the program has surpassed its goal of 20 sentinel sites (i.e., one site per 250,000 population), MDH plans to expand the network to ensure sites represent all areas of the state. Clinics are particularly needed in northern and southern areas of the state where coverage is sparse.

In response to increasing influenza-related encephalitis cases in children in Japan and reports of severe influenza in pregnant women in the United States, enhanced influenza surveillance was implemented during the 2003-4 influenza season and continued through the 2004-5 season. MDH requested reports of suspected or confirmed cases of influenza-related encephalopathy or encephalitis in children < 18 years of age, suspected or confirmed influenza-related deaths in children < 18 years of age, suspected or confirmed cases of influenza and staphylococcal co-infection, suspected or confirmed influenza in hospitalized pregnant women, and suspected cases of novel influenza. Surveillance initiated in 2003 in the metropolitan area to monitor influenza-related pediatric hospitalizations was also continued through the 2004-5 season.

Two cases of influenza-related encephalopathy and one pediatric, influenza-related death were identified in 2004-5. The encephalopathy cases presented in a 14-year-old and a 4-year-old. The 14-year-old had no pre-existing conditions, and the 4-year-old had a history of pneumonia, diabetes, and gastroesophageal reflux. Onsets of symptoms in the two were in mid-December and early January; both resulted in mild neurologic sequelae. The pediatric death occurred in a 6-year-old from Otter Tail County. The child had a co-infection of group A streptococcus and influenza B with no history of current influenza vaccination. The patient presented to a hospital emergency department in March in full

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respiratory arrest; resuscitation efforts were unsuccessful.

The Public Health Laboratory received 820 influenza specimens for viral confirmation and strain identification. Of these isolates, 535 (65%) were influenza type A/Wyoming like (H3); 273 (33%) were B/Sichuan-like; 9 (1%) were A; two (< 1%) were B/Hong Kong like, and one (< 1%) was B. Influenza A/California/7/2004-like (H3N2), which was not included in the 2004-5 vaccine, was the predominant strain circulating nationally, representing 72% of influenza A viruses typed at CDC. In Minnesota, there were no cases of influenza A/California/7/2004-like identified this past season, and all of the circulating strains were well matched to the vaccine components. Studies conducted during previous seasons with imperfect vaccine matches have shown that even a poorly matched vaccine is still moderately effective in preventing influenza-related hospitalizations and deaths.

A probable outbreak of influenza-like illness (ILI) in a school is defined as a doubled absence rate with all of the following primary influenza symptoms reported among students: rapid onset, fever of $\geq 101^{\circ}$ 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. During the 2004-5 season, MDH received reports of probable ILI outbreaks from 155 schools in 48 counties throughout Minnesota and possible outbreaks in 101 schools in 44 counties. Since 1988-89, the number of schools reporting suspected influenza outbreaks has ranged from 38 schools in 20 counties in 1996-97 to 441 schools in 71 counties in 1991-92.

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 48 to 72 hour period. An ILI outbreak is confirmed when at least one resident has a positive culture or rapid antigen test for influenza. The number of long-term care facilities reporting outbreaks this season was particularly high. One hundred forty

facilities in 54 counties reported confirmed or suspected ILI outbreaks in 2004-5. In all 140 facilities, influenza was laboratory-confirmed by rapid tests or culture. In comparison, 44 long-term care facilities reported outbreaks during the 2003-4 season. Since 1988-1989, the number of long-term care facilities reporting ILI outbreaks has ranged from six in 1990-91 to 79 in 1997-98.

The highly pathogenic avian strain of influenza A (H5N1) continues to circulate in Southeast Asia and cause illness in poultry and humans. The World Health Organization (WHO) reported on July 27, 2005 that a total of 109 human cases including 55 deaths have been confirmed since January 2004, with an overall case-fatality rate of 51%. These confirmed cases have been identified in Thailand, Vietnam, and Cambodia. Collective surveillance efforts from WHO, the CDC, as well as health authorities from Southeast Asia and around the world are in place to attempt to identify new cases and prevent spread. Minnesota utilizes guidelines developed by the CDC to assess ill patients returning from affected countries. Currently, no cases of H5N1 have been identified in Minnesota or the United States. H5N1 has not definitively demonstrated person-to-person spread, but in May 2005, WHO reported that the virus showed evidence of becoming more transmissible, though less virulent. It is possible that this change could make widespread global transmission of H5N1 more likely. Pandemic influenza planning has intensified at global, national, and state levels in the past year as the threat of H5N1 increases.

In April 2005, it was discovered that U.S. laboratories including some in Minnesota had inadvertently received proficiency samples containing the H2N2 influenza strain, which has not circulated in humans since 1969. H2N2 was the strain responsible for causing the 1957 pandemic. The CDC and agencies that sent out the samples provided instructions to immediately destroy any remaining samples. MDH followed up with all Minnesota laboratories to ensure that the samples had been destroyed.

The events of the 2004-5 influenza season highlight the need for coordinated efforts between public and private health care to manage influ-

enza. Vaccination of high-risk individuals for seasonal influenza, surveillance for novel virus strains, and planning efforts for an influenza pandemic are all important strategies to increase our capacity to effectively deal with influenza.

Listeriosis

Five cases of listeriosis were reported during 2004. Four case-patients were hospitalized, but none died. None of the cases were associated with a recognized outbreak. The median age was 53 years (range, 40 to 76 years). Two case-patients had *Listeria monocytogenes* isolated from joint fluid or tissue. One of these two case-patients had *L. monocytogenes* isolated from knee tissue and fluid. This case presented with knee pain and had a history of total knee replacement 5 years earlier. The other case presented with hip pain, had *L. monocytogenes* isolated from hip fluid, and had a history of total hip replacement 6 years earlier. A 46-year-old case-patient with a history of alcohol dependency and mental health problems had *L. monocytogenes* isolated from blood. One case-patient had several underlying conditions (congestive heart failure, anemia, arthritis, and history of acute gastrointestinal bleed) and had *L. monocytogenes* isolated from blood. One case-patient, a 53-year-old, did not have any underlying medical conditions, and had *L. monocytogenes* isolated from blood and cerebrospinal fluid.

The five cases reported in 2004 continue a recent trend of decreased listeriosis reports in Minnesota. Since 2000, the number of cases reported ranged from four to eight cases per year (median, 5 cases). This is a substantial decrease from 1997-1999, when 17 to 19 cases were reported per year. Only one of 27 cases reported in Minnesota since 2000 occurred in a pregnant woman.

Elderly persons, immunocompromised individuals, pregnant women, and neonates, 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, **continued...**

symptoms usually are mild or absent. *L. monocytogenes* can multiply in refrigerated foods. Persons at highest risk should: 1) avoid soft cheeses (e.g., feta, Brie, Camembert, blue-veined, and Mexican-style cheeses) and unpasteurized milk; 2) thoroughly heat/reheat deli meats, hot dogs, other meats, and leftovers; and 3) wash raw vegetables.

Lyme Disease

During 2004, reported Lyme disease cases increased to a record number of 1,023 (20.0 cases per 100,000 population). An additional 24 cases were classified as probable Lyme disease. Six hundred forty-four (63%) confirmed case-patients in 2004 were male. The median age of case-patients was 39 years (range, 1 to 94 years). Physician-diagnosed erythema migrans was present in 880 (86%) cases. Two hundred (20%) cases had at least one late manifestation of Lyme disease (including 132 with a history of objective joint swelling and 54 with cranial neuritis) and confirmation by a positive Western blot test. Onsets of illness peaked in July (35% of cases), corresponding to the peak activity of nymphal *Ixodes scapularis* (deer tick or black-legged tick) in mid-May through mid-July.

Four hundred forty-two (43%) cases occurred among residents of the Twin Cities metropolitan area. However, only 40 (5%) of 736 case-patients with known exposure likely were exposed to infected *I. scapularis* in metropolitan counties, primarily Anoka and Washington Counties. Most case-patients either resided in or traveled to endemic counties in east-central Minnesota or western Wisconsin. As in 2003, Crow Wing County continued to have the highest number of Lyme disease case exposures (153 [21%] of 736 cases). Lyme disease risk appears to be spreading north and west, indicated by an increasing number of exposures in counties with a history of sporadic Lyme disease case exposures (Becker, Hubbard and Itasca Counties).

For a more detailed discussion of Lyme disease and other tick-borne diseases in Minnesota, including a map of high-risk areas, see "Dramatic Increase in Lyme Disease and Other Tick-borne Diseases, 2004" in the May/June 2005 issue (vol. 33, no. 3) of the *Disease Control Newsletter*.

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). Risk factors for healthcare-associated (HA) MRSA include recent hospitalization or surgery, residence in a long-term care facility, and renal dialysis.

In 1997, MDH began receiving reports of healthy young patients with MRSA infections. These patients had onset of their MRSA infections in the community and appeared to lack the established risk factors for MRSA. Although most of the reported infections were not severe, some resulted in serious illness or death. Strains of MRSA cultured from persons without healthcare-associated risk factors for MRSA are now known as community-associated MRSA (CA-MRSA).

CA-MRSA is defined as: a positive culture for MRSA from a specimen obtained \leq 48 hours of admission to a hospital (if patient admitted); in a patient with no history of prior MRSA infection or colonization; no presence of indwelling percutaneous devices or catheters at the time of culture; and no history of hospitalization, surgery, residence in a long-term care facility, hemodialysis, or peritoneal dialysis in the year prior to the positive MRSA culture.

MDH initiated active surveillance for CA-MRSA at 12 sentinel hospital laboratories in January 2000. The laboratories (six in the 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 submit all CA-MRSA isolates to MDH. The purpose of this surveillance is to determine demographic and clinical characteristics of CA-MRSA infections in Minnesota, to identify possible risk factors for CA-MRSA, and to identify the antimicrobial susceptibility patterns and molecular subtypes of CA-MRSA isolates. A comparison of CA- and HA-MRSA using sentinel site surveillance data from 2000 demonstrated that CA- and HA-MRSA differ demographically and clinically, and that their respective isolates are microbiologically distinct (Naimi, T., et al. Community-onset and healthcare-associated methicillin-

resistant *Staphylococcus aureus* in Minnesota. *JAMA*. 2003;290(22):2976-84). In a recent study comparing the results from three different states conducting MRSA surveillance, 12% of all MRSA reported in Minnesota from 2001-2003 were CA-MRSA compared to 20% of cases in Atlanta, Georgia and 8% of all cases in Baltimore, Maryland. Additionally, this study found that in Atlanta and Baltimore, children less than 2 were overrepresented among CA-MRSA cases (population-based surveillance was not conducted in Minnesota). (Fridkin, S., et al. Methicillin-resistant *Staphylococcus aureus* disease in three communities. *N Engl J Med*. 2005;352(14):1436-44).

In 2004, 2,411 cases of MRSA infection were reported. Twenty-one percent of these cases were classified as CA-MRSA; 77% were classified as HA-MRSA, and <2% could not be classified. Isolates were received from 452 (89%) of the 508 CA-MRSA cases. To date, antimicrobial susceptibility testing has been completed on 155 (34%) and molecular subtyping by PFGE has been completed for 104 (23%) of these isolates. CA-MRSA patients continue to be younger than patients with HA-MRSA (median age, 33 years vs. 61 years) and more likely to have MRSA isolated from the skin (80% vs. 31%). Most CA-MRSA isolates belonged to one particular PFGE clonal group that is distinct from the most common HA-MRSA clonal group.

Clinicians should be aware that therapy with beta-lactam antimicrobials can no longer be relied upon as the sole empiric therapy for severely ill patients whose infections may be staphylococcal in origin. However, all 2004 CA-MRSA isolates tested to date have been susceptible to gentamicin, linezolid, synercid, trimethoprim-sulfamethoxazole, and vancomycin. Most CA-MRSA isolates (95%) were susceptible to tetracycline and rifampin (99%). Sixty-eight percent were susceptible to ciprofloxacin and 84% were susceptible to clindamycin. Conversely, only 24% of CA-MRSA isolates were susceptible to erythromycin. Eighteen percent (17/93) of erythromycin-resistant, clindamycin-susceptible isolates demonstrated inducible clindamycin resistance using the D test.

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MDH also has received reports of serious illness and death due to community-associated methicillin-susceptible *S. aureus* infection. Critical illnesses or deaths due to community-associated *S. aureus* infection, regardless of susceptibility to methicillin, is now reportable in Minnesota.

Mumps

Four cases of mumps were reported to MDH during 2004; a total of 23 mumps cases were reported between 2000-2004. Three of the case-patients were white, non-Hispanic males, ages 22, 44 and 50 years. The fourth case-patient was a 37-year-old white, non-Hispanic female. All four cases had an unknown history of vaccination for mumps. Between 2002 and 2004, eight of the 10 cases reported have occurred in adults, highlighting the need to assess the mumps immunization status of adults.

No source case was identified for two of the cases (ages 22 and 50 years). The 44-year-old reported a history of domestic travel that included meeting with persons from numerous other states and Canada. He and the female case-patient were epidemiologically linked. Transmission of mumps had not previously been identified in Minnesota since 1999.

All four cases were laboratory confirmed by positive IgM serology. Convalescent serum results were unavailable; therefore, a rise in serum IgG was not verified. Specimens for viral culture were not collected from any of the cases. Although IgG serologic tests and viral culture were not performed for the two epidemiologically linked cases, the clinical presentation (including orchitis in the male), negative laboratory test results for common differential diagnoses (e.g., mononucleosis and streptococcal infection), and the relative symptom onset dates supported the diagnosis of mumps. Neither case developed additional complications nor was hospitalized. Close contacts were notified of their exposure; no subsequent transmission was identified.

Both IgM and IgG serologic testing should be performed on suspect mumps cases, as false-positive indirect immunofluorescent antibody (IFA) tests for mumps IgM have been reported. Mumps can also be confirmed by viral culture of 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

Twenty-four cases of *Neisseria meningitidis* invasive disease (0.5 per 100,000 population) were reported in 2004, compared to 29 cases in 2003. The distribution of serogroups among case isolates from 2004 was similar to 2003, with 12 (50%) serogroup C cases, six (25%) serogroup B cases, four (17%) serogroup Y cases, one (4%) serogroup W-135 case, and one (4%) case whose isolate was not groupable.

Case-patients ranged in age from 2 months to 91 years, with a mean of 32 years. Seventy-one percent of the cases occurred in the Twin Cities metropolitan area. Twelve (50%) case-patients had meningitis, 10 (42%) had bacteremia without another focus of infection, and two (8%) had bacteremia with pneumonia. All cases were sporadic, with no definite epidemiologic links.

Three deaths occurred among cases reported in 2004. An 81-year-old female and a 91-year-old female died of bacteremia attributed to serogroup Y (one had bacteremia with pneumonia). An 83-year-old male died of bacteremia due to serogroup C.

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 Advisory Committee on Immunization Practices (ACIP) 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. No cases reported in Minnesota during 2004 were identified as 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. One culture-confirmed, serogroup undetermined case, and

one confirmed serogroup C case occurred among high school students in 2004. Two culture-negative suspected cases of meningococcal disease, positive by polymerase chain reaction (PCR) in the Public Health Laboratory, occurred in high school students also were included in the study in 2004.

In January 2005, a meningococcal polysaccharide-protein conjugate vaccine for serogroups A,C,Y, and W-135 was licensed for use in the United States for persons aged 11 to 55 years. The ACIP and American Academy of Pediatrics recommend immunization with the new vaccine at age 11-12 years or at high school entry as well as for college freshmen living in dormitories and other groups previously determined to be at high risk in the licensed age range. Complete recommendations are available in *MMWR* 2005; 54 (No. RR-7).

Pertussis

During 2004, 1,368 (27.8/100,000 population) cases of pertussis were reported in Minnesota. This number is more than six times the number reported in 2003 (207), more than twice the number reported during the most recent previous peak year of 2000 (575), and higher than the number reported during any year since 1950 (1,377). The increase in reported cases occurred nationally as well, and may be attributable to several factors including increased awareness of pertussis among health care providers and the general public, increased availability of more sensitive diagnostic testing using PCR, as well as a true increase in incidence. Laboratory confirmation was available for 935 (68%) cases; 92 (10%) were confirmed by culture and 843 (90%) by PCR. Among the remaining cases, 210 were epidemiologically linked to culture-confirmed cases, and 223 met the clinical case definition. Eight hundred sixty (63%) of the reported cases occurred in residents of the Twin Cities metropolitan area.

One death due to pertussis-related complications was reported in 2004. The case was a 1-month-old with no underlying medical conditions. Pertussis complications included pneumonia leading to respiratory failure.

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Paroxysmal coughing is the most commonly reported symptom. In 2004, 1,312 (96%) of the case-patients experienced paroxysmal coughing. Over one third (485, 35%) reported whooping. Although commonly referred to as "whooping cough," very young children, older individuals, and persons previously immunized may not have the typical "whoop" associated with pertussis. Post-tussive vomiting was reported in 631 (46%) of the cases. Four hundred eighty-five (35%) case-patients reported apnea. Infants and young children are at the highest risk for severe disease and complications. Pneumonia was diagnosed in 37 (3%) case-patients, four of whom were less than 18 months of age. Thirty-one (2%) case-patients were hospitalized; 20 (65%) of the hospitalized patients were younger than 6 months of age.

Due to waning immunity, either of natural infection or vaccine, pertussis can affect persons of any age. The disease is increasingly recognized in older children and adults; however, it is not clear whether it is a true increase or due to changes in surveillance and reporting. During 2004, case-patients ranged in age from 5 days to 82 years. Four hundred seventy-nine (35%) cases occurred in persons 13 to 17 years of age. Three hundred thirty-eight (25%) cases occurred in persons 18 years of age and older. Persons 5-12 years of age accounted for 28% (379) of all cases. Fifty (3%) of the total cases occurred in infants less than 6 months of age, and 120 (9%) occurred in children 6 months through 4 years of age. Age was unknown for one case.

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 2004, 71 cases of pertussis were reported in infants less than 1 year of age. A likely source of exposure was identified for 26 (37%) cases; 15 (21) were infected by adults 18 years of age and older, one (4%) was infected by an adolescent, and 10 (38%) were infected by a child less than 13 years of age. Forty-five (63%) cases had no identified source of infection. For these cases, the source of infection was likely outside the household.

Although unvaccinated children are at highest risk for pertussis, fully immu-

nized children may also develop disease. Disease in those previously immunized is usually mild. Efficacy for currently licensed vaccines is estimated to be 71% to 84% in preventing serious disease, but waning immunity begins approximately 3 years after the last dose of DTaP. Of the 766 case-patients who were 7 months to 15 years of age, 568 (74%) are known to have received at least a primary series of three doses. Of the 142 cases in persons 7 months through 6 years of age, 48 (34%) received fewer than three doses of DTP/DTaP vaccine before onset of illness, and were considered preventable cases.

MDH reporting rules require that clinical isolates of *Bordetella pertussis* be submitted to the Public Health Laboratory. Of the 92 culture-confirmed cases, 75 (82%) isolates were received and subtyped by PFGE and tested for antibiotic susceptibility to erythromycin, ampicillin, and trimethoprim-sulfamethoxazole. Fifteen distinct PFGE patterns were identified; four of these patterns occurred in only a single case isolate. The two most common patterns identified accounted for 38 (51%) of the total isolates and they occurred throughout the year.

No cases of erythromycin-resistant *B. pertussis* have been identified in Minnesota since the first case was identified in October 1999. Statewide, all 1,040 other isolates tested to date have had low minimum inhibitory concentrations, falling within the reference range for susceptibility to the antibiotics evaluated. Only eight other erythromycin-resistant *B. pertussis* cases have been identified to date in the United States.

Laboratory tests should be performed on all suspected cases of pertussis. Culture of *B. pertussis* requires inoculation of nasopharyngeal mucous on special media and incubation for 7 to 10 days. However, *B. pertussis* is rarely identified late in the illness; therefore, a negative culture does not rule out disease. A positive PCR result is considered confirmatory in patients with a 2-week history of cough illness. PCR can detect non-viable organisms. Consequently, a positive PCR result does not necessarily indicate current infectiousness. Patients with a 3-week or longer history of cough illness, regardless of PCR result, may not benefit from antibiotic therapy. Cultures

are necessary for molecular and epidemiologic studies and for drug susceptibility testing. Whenever possible, culture should be done in conjunction with PCR testing. Direct fluorescent antibody (DFA), provides a rapid presumptive diagnosis of pertussis; however, because both false-positive and false-negative results can occur, DFA tests should not be relied upon solely for laboratory confirmation. Serological tests are not standardized and are not acceptable for laboratory confirmation.

Pertussis booster vaccines for persons 7 years of age and older will help to decrease the incidence and transmission of pertussis in the community. Two new Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine, Adsorbed (Tdap) products were licensed by the FDA in 2005 as single dose booster vaccines to provide protection against tetanus, diphtheria, and pertussis. Boostrix,[®] developed by GlaxoSmithKline, is indicated for persons 10 to 18 years of age. Adacel,[®] developed by Sanofi Pasteur, is indicated for persons 11 to 64 years of age. On June 30, 2005 the ACIP voted to recommend the routine use of Tdap vaccines in adolescents aged 11-18 years in place of tetanus and diphtheria toxoids (Td) vaccines. Detailed information is published on the CDC website at: http://www.cdc.gov/nip/vaccine/tdap/tdap_acip_recs.pdf

Salmonellosis

During 2004, 643 culture-confirmed cases of *Salmonella* infection (13.1 per 100,000 population) were reported. This represents a 12% increase from the 576 cases reported in 2003 and a 4% increase from the median annual number of cases reported from 1996 to 2003 (median, 619 cases; range, 576 to 693) (Figure 1). Four serotypes, *S. Typhimurium* (164 cases), *S. Enteritidis* (111 cases), *S. Newport* (65 cases), and *S. Heidelberg* (33 cases) accounted for 58% of cases reported in 2004. There were seven cases of *S. Typhi* infection. Only one of the *S. Typhi* cases traveled internationally, two lived in the same household, and one was a group-home resident where an asymptomatic carrier was identified. Four percent of salmonellosis case-patients were less than 1 year of age, and 25% were 12 years of age or younger. Twenty-five percent of case-

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patients were hospitalized for their infection. Of 592 case-patients that were interviewed, 96 (16%) traveled internationally during the week prior to their illness onset.

Three case-patients died. Isolates from these case-patients included one *S. Subspecies I* isolated from blood, one *S. Newport* isolated from stool, and one *Salmonella* group C2 from stool. Two of the cases had serious underlying medical conditions; one had lung, stomach, and prostate cancer, and the other had complications following surgery for a chronic gastroesophageal condition. The third case was an 87-year-old person whose *Salmonella* infection was listed as the primary cause of death.

Eight outbreaks of salmonellosis were identified in 2004. Four outbreaks involved foodborne transmission. Person-to-person transmission resulted in one outbreak. The remaining three outbreaks involved infected pets.

Three cases of *S. Enteritidis* with illness onsets in May through July reported eating at the same restaurant before their illness. Several deficiencies in food holding and preparation, including inadequate refrigeration and potential for cross-contamination were found at the restaurant. Two environmental samples (underneath a sandwich cutting board and egg grill) tested positive for *S. Enteritidis*. An asymptomatic cook also tested positive for *S. Enteritidis*.

In June, six persons became ill with *S. Agona* after attending a graduation party. Eighteen additional cases of gastrointestinal illness were identified but were not tested for *Salmonella*. Samples of the turkey and turkey/soup mixture left over from the event tested positive for *S. Agona*.

From August through October, three cases of *S. Typhimurium* who had eaten ground beef purchased at a member-only warehouse were identified. One of the three cases reported tasting the raw ground beef after purchase and before storing it in the freezer. Cases of *S. Typhimurium* associated with ground beef from the same warehouse chain were identified in at least two other states.

In November, 20 *S. Newport* cases among employees of a medical clinic were identified. An additional 23 ill persons were identified but not tested. Gravy served at a catered lunch was the implicated vehicle. Undercooked turkey that was being prepared concurrently likely contaminated the gravy. In December, two cases of *S. Newport* were identified that reported eating at the restaurant that catered the medical clinic lunch. Three asymptomatic restaurant employees tested positive for *S. Newport*. The cases among restaurant patrons may have resulted from environmental contamination that occurred during the preparation of the turkey for the earlier catered lunch. It is possible that the infected foodworkers played a role in transmission.

A person-to-person outbreak occurred among residents of a nursing home. Two nursing home residents tested positive for *S. Newport* in August, and an additional resident tested positive in November.

In March, a cluster of four *S. Typhimurium* cases was identified. Two of the cases lived in a group home, and the other two cases were family members of one of the group home residents. These family members had adopted two puppies from the group home. The two adopted puppies tested positive for *S. Typhimurium*. Some of these cases likely occurred due to contact with feces of the infected dogs, but person-to-person transmission could have also played a role.

Two *S. Javiana* cases occurred in a 3-month-old and a 7-month-old infant in July. The family of one of the infants had a dog that was ill with diarrhea earlier in July. A stool specimen from the dog tested positive for *S. Javiana*. After the dog recovered, the two families and the dog spent time at a cabin. While at the cabin, one of the infants became ill with diarrhea; 2 days later the second infant became ill as well.

One *S. Typhimurium* case in a 5-year-old child was part of a multi-state outbreak associated with infected pet rodents. Cases in this outbreak were identified in 10 states.

Sexually Transmitted Diseases

Active surveillance for gonorrhea and chlamydia was initiated in January

2002. This involves cross-checking laboratory-reported cases against cases reported by clinicians. Although both laboratories and clinical facilities are required to report STDs independently of each other, an episode of STD is not considered a case for surveillance purposes until a corresponding case report is submitted by a clinical facility. Additionally, case reports contain critical demographic and clinical information that is not available from laboratory reports. When a laboratory report is received but no corresponding case report is received within 45 days, MDH mails a reminder letter and case report form to the corresponding clinical facility. Cases of syphilis and chancroid are monitored through a mostly passive surveillance system. Herpes simplex virus and human papillomavirus infections are not reportable.

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

Chlamydia

Chlamydia trachomatis infection is the most commonly reported STD in Minnesota. In 2004, 11,601 cases (236 per 100,000 population) were reported, representing a 8% increase from 2003 (Table 3).

Adolescents and young adults are at highest risk for acquiring chlamydial infection (Table 4). The chlamydia rate is highest among 20 to 24-year-olds (1,372 per 100,000 population), with the next highest rate among 15 to 19-year-olds (968 per 100,000). The incidence of chlamydia among adults 25 to 29 years of age (597 per 100,000) is considerably lower but has increased in recent years. The chlamydia rate among females (343 per 100,000) is more than twice the rate among males (126 per 100,000). This difference is likely due to more frequent screening among women.

The incidence of chlamydia infection is highest in communities of color (Table 4). The rate among blacks (1,456 per 100,000 population) is 13 times higher than the rate among whites (113 per 100,000). Although blacks comprise **continued...**

approximately 4% of Minnesota's population, they account for 25% of reported chlamydia cases. Rates among Asian/Pacific Islanders (260 per 100,000), American Indians (488 per 100,000), and Hispanics (594 per 100,000) are two to five times higher than the rate among whites.

Chlamydia infections occur throughout the state, with the highest reported rates in Minneapolis (694 per 100,000 population) and St. Paul (639 per 100,000). The incidence in the suburban metropolitan area (168 per 100,000) is similar to that in Greater Minnesota (149 per 100,000).

Gonorrhea

Gonorrhea, caused by *Neisseria gonorrhoeae*, is the second most commonly reported STD in Minnesota. In 2004, 2,957 cases (60 per 100,000 population) were reported, representing a decrease of 7% from 2003 (Table 3).

Adolescents and young adults are at greatest risk for gonorrhea (Table 4), with incidence rates of 198 per 100,000 population among 15 to 19-year-olds, 288 per 100,000 among 20 to 24-year-olds, and 157 per 100,000 among 25 to 29-year-olds. Gonorrhea rates for males (51 per 100,000) and females (69 per 100,000) are comparable. Communities of color are disproportionately affected by gonorrhea, with 41% of cases reported among blacks. The incidence of gonorrhea among blacks (592 per 100,000) is approximately 27 times higher than the rate among whites (22 per 100,000). Rates among American Indians (89 per 100,000) and Hispanics (97 per 100,000) are approximately five times higher than among whites. The rate among Asian/Pacific Islanders (36 per 100,000) is similar to that among whites.

Gonorrhea rates are highest in the cities of Minneapolis and St. Paul (Table 4). The incidence in Minneapolis (276 per 100,000 population) is nearly 1.5 times the rate in St. Paul (190 per 100,000), seven times higher than the rate in the suburban metropolitan area (40 per 100,000), and 13 times higher than the rate in Greater Minnesota (21 per 100,000).

continued...

Table 3. Number of Cases and Incidence Rates (per 100,000 population) of Chlamydia, Gonorrhea, and Syphilis, Minnesota, 2000-2004

Disease	2000		2001		2002		2003		2004	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Chlamydia	8,147	166.0	8,369	170.0	10,118	206.0	10,807	220.0	11,601	236.0
Gonorrhea	3,189	65.0	2,708	55.0	3,050	62.0	3,237	66.0	2,957	60.0
Syphilis, Total	80	1.6	135	2.7	149	3.0	198	4.0	145	2.9
Primary/										
Secondary	16	0.3	33	0.7	59	1.2	48	1.0	27	0.5
Early Latent	18	0.4	16	0.3	23	0.5	45	0.9	21	0.4
Late Latent*	44	0.9	81	1.6	65	1.3	105	2.1	95	1.9
Neurosyphilis	0	0.0	3	0.1	1	0.02	0	0.0	1	0.02
Congenital**	2	3.0	2	3.0	1	1.5	0	0.0	1	1.4
Chancroid	0	0.0	1	0.0	0	0.0	0	0.0	0	0.0

*Late latent syphilis includes neurosyphilis

**Congenital syphilis rate per 100,000 live births

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

Table 4. Number of Cases and Incidence Rates (per 100,000 population) of Chlamydia, Gonorrhea, and Primary/Secondary Syphilis by Residence, Age, Gender, and Race/Ethnicity, Minnesota, 2004

Demographic Group	Chlamydia		Gonorrhea		Syphilis	
	No.	Rate	No.	Rate	No.	Rate
Total	11,601	236	2,957	60	27	0.5
<i>Residence*</i>						
Minneapolis	2,655	694	1,055	276	16	4.2
St. Paul	1,835	639	545	190	3	1.0
Suburban**	3,315	168	794	40	7	0.4
Greater Minnesota	3,389	149	467	21	1	0.0
<i>Age</i>						
<10 years	3	0	1	0	0	0.0
10-14 years	119	32	34	9	0	0.0
15-19 years	3,623	968	740	198	1	0.3
20-24 years	4,426	1,372	929	288	3	0.9
25-29 years	1,910	597	503	157	4	1.3
30-34 years	840	238	293	83	3	0.8
35-44 years	539	65	334	41	9	1.1
≥45 years	141	8	123	7	7	0.4
<i>Gender</i>						
Male	3,081	126	1,244	51	24	1.0
Female	8,520	343	1,712	69	3	0.1
Transgender	---	---	1	---	---	---
<i>Race/Ethnicity</i>						
White	5,048	113	966	22	19	0.4
Black	2,956	1,456	1,202	592	7	3.4
American Indian	396	488	72	89	1	1.2
Asian	438	260	61	36	0	0.0
Other	465	522	86	97	0	0.0
Unknown^^	2,298	---	570	---	0	---
Hispanic^^^	852	594	139	97	0	0.0

*Residence information missing for 407 chlamydia cases and 96 gonorrhea cases.

**Suburban is defined as the seven-county metropolitan area (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties), excluding cities of Minneapolis and St. Paul

^Case counts include persons by race alone. Population counts used to calculate results include race alone or in combination.

^^No comparable population data available to calculate rates

^^^Persons of Hispanic ethnicity may be of any race

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

Quinolone-resistant *Neisseria gonorrhoeae*

While the overall rate of gonorrhea has stayed relatively constant over the past three years, the prevalence of quinolone-resistant *Neisseria gonorrhoeae* (QRNG) has increased five-fold from 1.5% in 2002 to 8.4% in 2004. Of concern is the high prevalence among men who have sex with men (MSM), which has increased from 0% in 2002, to 8.9% in 2003, and 26.9% in 2004. As a result, fluoroquinolones (e.g. ciprofloxacin) are no longer recommended for treating gonorrhea in men with male sexual partners in Minnesota.

Syphilis

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

Primary and Secondary Syphilis

The incidence of primary/secondary syphilis in Minnesota is lower than that of chlamydia or gonorrhea (Table 3). Twenty-seven cases of primary/secondary syphilis (0.5 per 100,000 population) were reported in 2004.

Early Syphilis

The number of cases of early syphilis decreased in 2004 compared to 2003, however the number of cases among men who have sex with men (MSM) remained high. Forty-eight cases of early syphilis were reported in 2004, compared to 93 cases in 2003. Of the 48 early syphilis cases in 2004, 42 (88%) occurred among men; 34 (81%) of these men reported having sex with other men. Almost a third (32%) of the MSM diagnosed with early syphilis were co-infected with HIV. However, preliminary data for early syphilis cases in 2005 shows a return to 2003 levels. Similar patterns in syphilis among MSM have been observed in other parts of the United States.

Congenital Syphilis

One case of congenital syphilis was reported in Minnesota in 2004 (Table 3).

Chancroid

Chancroid continues to be very rare in Minnesota. No cases were reported in 2004.

Shigellosis

During 2004, 68 culture-confirmed cases of *Shigella* infection (1.4 per 100,000 population) were reported (Figure 1). This represents a 34% decrease from the 103 cases reported in 2003, and a 73% decrease from the median number of cases reported annually from 1999 to 2003 (median, 254 cases; range, 103 to 904).

In 2004, *S. sonnei* accounted for 41 (60%) cases, *S. flexneri* for 22 (32%), *S. boydii* for four (6%), and *S. dysenteriae* for one (1%). Case-patients ranged in age from 1 to 75 years (median, 24 years). Thirty-two percent of case-patients were less than 10 years of age; children less than 5 years of age accounted for 21% of cases. Seventeen (25%) case-patients were hospitalized. Sixty-nine percent of case-patients resided in the Twin Cities metropolitan area, with 41% of all case-patients residing in Hennepin County.

Two foodborne outbreaks of shigellosis included Minnesota residents in 2004. One occurred among people who flew on commercial airline flights out of Honolulu, and one occurred at a Minnesota restaurant. In August, 44 confirmed *S. sonnei* cases were identified among people who traveled to four countries and 22 U.S. states on 12 flights, all served by the same caterer in Honolulu. Six of the 44 cases were Minnesota residents. Salad consumption was statistically associated with illness, and raw carrot was the only salad component common to all flights. The second outbreak took place during September at a restaurant. Two cases of *S. flexneri* had eaten at the same restaurant in Ramsey County. No food vehicle could be identified in this outbreak; the source was likely an unidentified infected food handler.

Every tenth *Shigella* isolate received at MDH was tested for antimicrobial resistance. Twelve isolates were tested in 2004; 66% were resistant to ampicillin, 50% were resistant to trimethoprim-sulfamethoxazole, and 42% were resistant to both ampicillin and trimethoprim-sulfamethoxazole.

Streptococcus pneumoniae Invasive Disease

Statewide active surveillance for invasive *Streptococcus pneumoniae* (pneumococcal) disease began in 2002, expanded from the Twin Cities metropolitan area, where active surveillance has been ongoing since 1995. In 2004, 540 cases of invasive pneumococcal disease were reported, including 286 cases among Twin Cities metropolitan area residents, and 254 cases among residents of Greater Minnesota. Incidence rates overall, and by age group were similar between these two geographic regions. For example, there were 10.5 cases of invasive pneumococcal disease per 100,000 Twin Cities metropolitan area residents, and 10.8 cases per 100,000 residents of Greater Minnesota. By age group, annual incidence rates per 100,000 Twin Cities area residents and Greater Minnesota residents were, respectively, 29.0 and 19.1 cases among children aged 0-4 years; 2.7 and 2.9 cases among children and adults aged 5-39 years, 10.6 and 8.9 cases among adults 40-64 years, and 37.7 and 37.8 cases among adults aged 65 years and older.

In 2004, pneumonia accounted for 286 (53%) cases of invasive pneumococcal disease among all cases (i.e., those infections accompanied by bacteremia or isolation of pneumococci from another sterile site such as pleural fluid). The 166 pneumonia cases among Twin Cities area residents accounted for a higher proportion of all invasive disease in that group (58%), than the 120 cases among residents of Greater Minnesota (47%). Bacteremia without another focus of infection accounted for 186 (34%) cases statewide, including 86 (30%) cases in Twin Cities area residents and 100 (39%) cases in Greater Minnesota residents. Pneumococcal meningitis accounted for 34 (6%) cases statewide, including 20 (7%) of cases in Twin Cities area residents and 14 (6%) cases in Greater Minnesota residents. Forty-nine patients with invasive pneumococcal disease died (9%); 9% (25) of case-patients who were Twin Cities area residents and 9% (24) of case-patients who were Greater Minnesota residents.

In 1999, the year before the pediatric pneumococcal conjugate vaccine (Pneumara[®], Wyeth-Lederle [PCV-7])
continued...

was licensed, the rate of invasive pneumococcal disease among children < 5 years in the Minneapolis-St. Paul Metropolitan Area was 111.7 cases/100,000. Over the years 2000-2002 there was a major downward trend in incidence in this age group (Figure 3). Compared with the lowest rate in 2002 (22.5 cases/100,000) the incidence rate in this age group increased slightly in 2003 (25.8 cases/100,000) and again in 2004 from 2002 (29.0 cases/100,000) (Figure 3). Based on the distribution of serotypes among isolates from these cases, this increase was limited to disease caused by non-vaccine serotypes (i.e. serotypes other than the seven included in PCV-7) (Figure 3). This small degree of replacement disease due to non-PCV-7 serotypes, similar to that seen in other parts of the country, has been far outweighed by the declines in disease caused by PCV-7 serotypes. This trend supports the need for ongoing monitoring, however, because further increases due to non-vaccine serotypes are possible. In Figure 3 rates of invasive pneumococcal disease among adults aged ≥ 65 years are also shown by serotypes included and not included in PCV-7. Declines in incidence in this age group, particularly in disease due to PCV-7 serotypes have been observed elsewhere in the United States and are likely attributable to herd immunity from use of PCV-7 among children.

Of the 480 isolates submitted for 2004 cases, 41 (9%) were highly resistant to

penicillin and 45 (9%) exhibited intermediate-level resistance; 62 isolates (13%) exhibited multi-drug resistance (i.e. high-level resistance to two or more drug classes). The proportion of isolates submitted from Greater Minnesota residents with high- or intermediate-level resistance to penicillin (29/205, 14.1%) was lower than the proportion from Twin Cities area residents (57/275, 21%, $p=.06$). *S. pneumoniae* is one of several pathogens included in the MDH Antibigram, which gives detailed antimicrobial susceptibility results of isolates tested at the Public Health Laboratory from 2004 cases, and is available on the MDH website: <http://www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance/antibiogram.html>.

Streptococcal Invasive Disease - Group A

One hundred forty-six cases of invasive group A streptococcal (GAS) disease (2.9 per 100,000 population), including 18 deaths, were reported in 2004, compared to 181 cases and 22 deaths in 2003. Ages of case-patients ranged from newborn to 100 years (mean, 50 years). Fifty-eight percent of case-patients were residents of the Twin Cities metropolitan area. Forty-seven (32%) case-patients had bacteremia without another focus of infection. There were 14 (10%) cases of primary pneumonia and 16 (11%) cases of necrotizing fasciitis. Thirteen (9%) case-patients had septic arthritis and/or osteomyelitis, and two (1%) had

streptococcal toxic shock syndrome (STSS). Fifteen (10%) case-patients were residents of 14 long-term care facilities. One facility had two case-patients with indistinguishable PFGE subtypes whose illness onsets were 4 days apart.

The 18 deaths included eight (44%) cases of bacteremia without another focus of infection, three (17%) cases of necrotizing fasciitis, and two (11%) cases of pneumonia. One case-patient had STSS and one case had puerperal sepsis. The remaining fatal cases had bacteremia with another focus of infection, including two (11%) with cellulitis, and one (6%) with both pneumonia and cellulitis. The deaths occurred in persons ranging in age from three to 92 years. For the 15 deaths in patients with known health histories, significant underlying medical conditions were reported for all but three of the cases.

Isolates were available for 133 (91%) cases, of which all were subtyped using PFGE; 56 different molecular subtypes were identified. Thirty-nine subtypes were represented by one isolate each; other subtypes were represented by two to 42 isolates each. No epidemiologic links were noted among cases with indistinguishable subtypes, except for the two cases from the same long-term care facility as described previously.

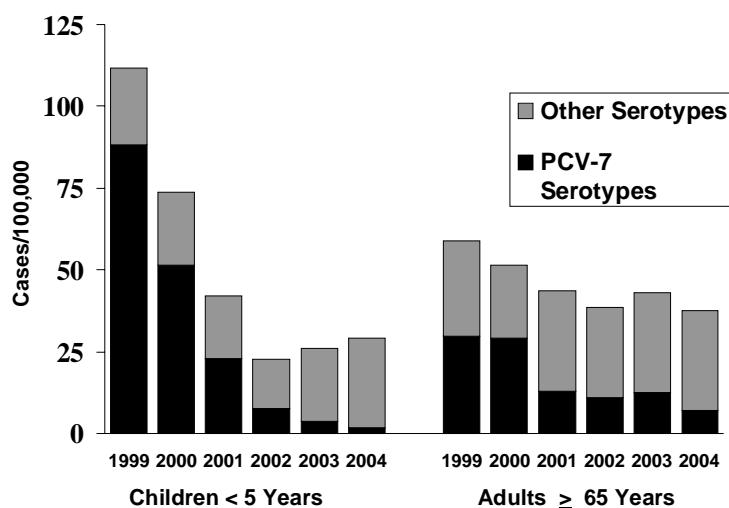
The deaths were distributed among 10 different PFGE subtypes, with seven (41%) deaths attributed to the most common PFGE subtype. No other subtype accounted for more than two deaths.

Streptococcal Invasive Disease - Group B

Three-hundred forty-one cases of group B streptococcal invasive disease (6.7 per 100,000 population), including 20 deaths, were reported in 2004. These cases were those in which group B *Streptococcus* (GBS) was isolated from a normally sterile site; 10 cases of miscarriage or stillbirth in which GBS was cultured from the placenta were also reported.

Overall, 158 (46%) cases presented with bacteremia without another focus of infection. The other most common types of infection were cellulitis (14%), pneumonia (9%), osteomyelitis (8%), continued...

Figure 3. Invasive Pneumococcal Disease Incidence Among Children <5 Years and Adults ≥ 65 Years by Year and Serotype, Seven County Twin Cities Metropolitan Area, 1999-2004



arthritis (6%), and meningitis (4%). The majority (72%) of cases had GBS isolated from blood only. Fifty-five percent of cases occurred among residents of the Twin Cities metropolitan area. Forty-five (13%) case-patients were infants less than 1 year of age, and 160 (47%) were 60 years of age or older.

Fifty-seven cases of infant (early-onset or late-onset) or maternal GBS disease were reported, compared to 40 cases in 2003. Twenty-six 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). Ten stillbirths or spontaneous abortions were associated with thirteen maternal invasive GBS infections.

From 1997 to 2004, there were 215 early-onset disease cases reported and 10 infants died. Forty infants were born at less than 37 weeks' gestation and accounted for 19% of early-onset cases. Bacteremia without another focus of infection (79%) was the most common type of infection in these early-onset cases, followed by pneumonia (13%) and meningitis (6%).

In August 2002, CDC published revised guidelines for the prevention of perinatal GBS disease (www.cdc.gov/groupbstrep/docs/RR5111.pdf). Key changes include the recommendation for universal prenatal screening of all pregnant women at 35 to 37 weeks' gestation and updated prophylaxis regimens for women with penicillin allergies. In light of these revised guidelines, MDH reviewed the maternal charts for all 26 early-onset cases reported during 2004. Overall, 18 (69%) of 26 women who delivered GBS-positive infants underwent prenatal screening for GBS. Of these, six (33%) women were positive and 12 (67%) women were negative. Among the eight women who did not receive prenatal screening for GBS, three (38%) were screened upon admission to the hospital and prior to delivery of her infant. Among the 26 women of infants with invasive GBS disease, seven (27%) received intrapartum antimicrobial prophylaxis (IAP). Two of the six women with a positive GBS screening result received IAP. MDH continues to monitor the incidence of GBS disease among infants, screening for GBS among pregnant women, and the use of IAP for GBS-positive

pregnant women during labor and delivery.

Tuberculosis

While the number of cases of tuberculosis (TB) disease reported nationally has decreased each year since 1993, the incidence of TB in Minnesota increased throughout much of the 1990s and peaked at 239 TB cases (4.8 cases per 100,000 population) in 2001. In 2004, 199 new cases of TB disease (3.9 cases per 100,000 population) were reported in Minnesota, representing a 7% decline from 2003 and the third consecutive year of decreasing incidence since 2001 (Figure 4). The incidence of TB disease in Minnesota, however, exceeds the U.S. Healthy People 2010 objective of 1.0 cases per 100,000 population.

In several ways, the epidemiology of TB in Minnesota is distinct from other states and has been a precursor of trends that now are emerging nationally. The most significant such factor is the very large proportion of TB cases reported among foreign-born persons in Minnesota, which has averaged 80% over the past 5 years. In 2004, 163 (82%) new TB cases in Minnesota occurred in persons born outside the United States. In contrast, 54% of TB cases reported nationwide in 2004 were foreign-born.

The 163 foreign-born TB case-patients reported in 2004 represent 33 different countries of birth. The most common region of birth among foreign-born TB cases reported in 2004 was sub-Saharan Africa (59%), followed by South/Southeast Asia (15%) and Latin America/Caribbean (15%) (Figure 5). The ethnic diversity among these foreign-born TB cases reflects the unique and constantly changing demographics of immigrant and other foreign-born populations arriving in Minnesota.

Persons 15 years of age or older who arrive in the United States as immigrants or refugees receive a medical evaluation overseas that includes screening for pulmonary TB disease. Among 161 foreign-born persons who were diagnosed with TB disease in Minnesota during 2004 and whose date of arrival in the United States was known, 96 (60%) were diagnosed less than 5 years after arriving in this country. Of 36 TB case-patients 15

years of age or older who were diagnosed within 12 months of their arrival in the United States and who arrived as immigrants or refugees, only six (17%) had any TB-related conditions noted in their pre-immigration medical exams performed overseas. These findings highlight the need for clinicians to have a high index of suspicion for TB among newly arrived foreign-born persons, regardless of the results of medical exams performed overseas. Health care providers should pursue thorough screening, evaluation, and, if indicated, treatment of active TB disease or latent TB infection among patients who originate from regions where TB is endemic.

Both demographic and clinical characteristics of TB cases reported in Minnesota differ between foreign-born and U.S.-born patients. For example, the majority (71%) of foreign-born TB case-patients reported in Minnesota in 2004 were 15 to 44 years of age, whereas the majority (58%) of U.S.-born TB cases occurred among persons 45 years of age or older. The proportions of pediatric cases (less than 15 years of age) and those 65 years of age or older were larger among U.S.-born TB cases than among foreign-born cases (22% versus 9% and 25% versus 9%, respectively). The relatively high proportion of U.S.-born pediatric cases can be attributed primarily to children born in the U.S. to foreign-born parents. Also, extrapulmonary TB disease is reported more frequently among foreign-born TB cases than among U.S.-born cases in Minnesota. In 2004, extrapulmonary TB was the most common (52%) form of TB disease among foreign-born TB cases, whereas 44% of U.S.-born TB cases had an extrapulmonary site of disease (Figure 6).

Aside from country of birth, other less common risk factors among TB cases reported in Minnesota during 2004 included HIV infection (7%), substance abuse (i.e., illicit drug use and/or alcohol abuse) (5%), homelessness (2%), and residence in a nursing home (1%). Notably, the prevalence of HIV infection among TB cases reported in 2004 was the highest since MDH began collecting this information in 1993. Ten (77%) of the 13 TB case-patients reported in 2004 with HIV coinfection were foreign-born persons, **continued...**

nine (90%) of whom were born in Africa. In 2004, no new TB cases were reported among inmates at correctional facilities in Minnesota.

Twenty-seven (31%) of the state's 87 counties reported at least one case of TB disease in 2004, with the majority (79%) of cases occurring in the seven-county Twin Cities metropolitan area, particularly in Hennepin (52%) and Ramsey (14%) Counties, both of which have public TB clinics. Thirteen percent of TB cases occurred in the five suburban Twin Cities metropolitan counties (i.e., Anoka, Dakota, Carver, Scott, and Washington). Olmsted County, which maintains a public TB clinic staffed jointly by the Olmsted County Health Department and Mayo Clinic, represented 7% of TB cases reported statewide in 2004. The remaining 15% of cases occurred in primarily rural areas of Greater Minnesota.

Drug-resistant TB is a critical and growing concern in the prevention and control of TB in Minnesota, as well as nationally and globally. The prevalence of drug-resistant TB in Minnesota, particularly resistance to isoniazid (INH) and multi-drug resistance, exceeds comparable national figures. In 2004, 22 (16%) of 138 culture-confirmed TB cases with drug susceptibility results available were resistant to at least one first-line anti-TB drug (i.e., INH, rifampin, pyrazinamide, or ethambutol). In particular, 17 (12%) cases were resistant to INH, and five (4%) cases were multidrug-resistant (i.e., resistant to at least INH and rifampin). As of 2004, MDH updated its definition of first-line TB drug resistance to exclude streptomycin resistance, in accordance with recently revised national recommendations for the treatment of TB disease, which no longer include streptomycin as a first-line anti-TB drug. Drug resistance is significantly more common among foreign-born TB cases in Minnesota than among U.S.-born cases. The prevalence of drug-resistance among foreign-born TB cases reported in 2004 was 18%, compared to 5% among U.S.-born cases. Of particular concern, eight (38%) of 21 multidrug-resistant TB (MDR-TB) cases reported during the past 5 years (2000-2004) were resistant to all four first-line drugs. These eight pan-resistant MDR-TB case-patients represented seven **continued...**

Figure 4. Tuberculosis Cases by Country of Origin, Minnesota, 1995-2004

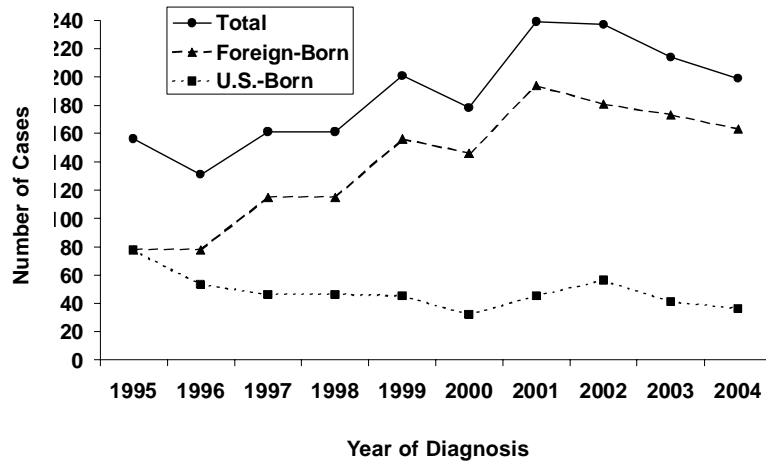


Figure 5. Foreign-Born Tuberculosis Cases by Region of Origin and Year of Diagnosis, Minnesota, 2000-2004

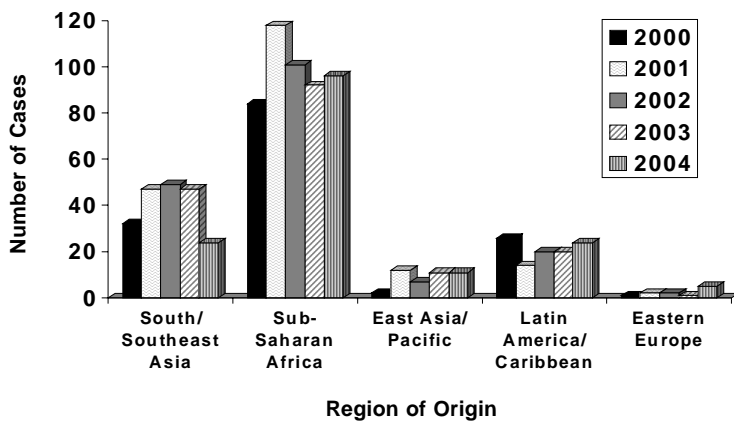
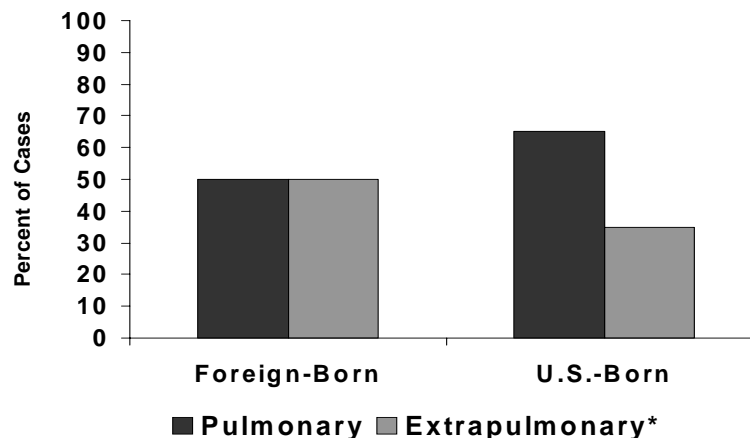


Figure 6. Tuberculosis Cases by Site of Disease and Place of Birth, Minnesota, 2000-2004



*Includes cases with both extrapulmonary and pulmonary sites of disease

different countries of birth (i.e., one each from Ethiopia, Laos, Moldova, Somalia, South Korea, Thailand, and two from the U.S.). One of the two U.S.-born pan-resistant patients had resided in Africa for several years; the other was a young child infected by a foreign-born family member.

The epidemiology of TB in Minnesota highlights the need to support global TB elimination strategies, as well as local TB prevention and control activities targeted to foreign-born persons. MDH is among 22 sites funded by the CDC to conduct a study designed to identify missed opportunities for preventing TB disease among foreign-born populations in the United States and Canada. This study, which includes conducting more than 50 1-hour interviews with foreign-born TB case-patients diagnosed in Minnesota, began in the summer of 2004 and will continue throughout 2005.

TB-related resources for patients and health care providers (including additional TB surveillance data and patient education materials translated in 12 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 began in September 1995. Any case should be reported, regardless of the patient's age or underlying medical conditions. A subset of cases (persons 6 months to 49 years of age with no underlying medical conditions who died of apparent non-nosocomial infectious processes) are eligible for testing performed at CDC as part a special project. For cases not eligible for the CDC project, some testing may be available at MDH or CDC, at the physician's request.

Fifty-two cases were investigated by MDH in 2004, compared to 38 cases in 2003. The cause(s) of illness subsequently were determined by the providers for 11 cases. Among the remaining 41 cases, 17 case-patients presented with respiratory symptoms; five presented with shock/sepsis; six presented with neurologic symptoms; two presented with cardiac symptoms, seven presented with sudden unex-

pected death (SUD), and four presented with gastrointestinal (GI) symptoms. Case-patients with respiratory symptoms ranged from 15 to 72 years of age; those with sepsis were 22 to 43 years of age; the neurologic case-patients were 10 to 76 years of age; the cardiac case-patients were 29 and 45 years of age; the sudden unexpected deaths were 2 months to 44 years of age; and the case-patients with GI symptoms were 30 to 83 years of age. Eleven patients with respiratory symptoms, four patients with sepsis, and one patient with neurologic symptoms died as did one patient with GI symptoms and one with a cardiac syndrome. Seven respiratory case-patients; two of the neurologic case-patients, three shock/sepsis case-patients; and both cardiac case-patients; and two case-patients with sudden unexpected death resided in the Twin Cities metropolitan area. The remaining case-patients resided in Greater Minnesota, except for two respiratory case-patients who were out-of-state residents hospitalized in Minnesota.

Eighteen cases were eligible for the CDC project (eight respiratory, three sepsis, one neurologic, one GI, one cardiac case(s); and four SUDs). Specimens were obtained for testing at MDH or CDC for all cases. Plausible etiologies were established for four cases. A 28-year-old female who died with respiratory symptoms had positive PCR tests for *S. pneumoniae* and picornavirus from two lung samples. The same samples had viral cultures positive for Echovirus 5. A 44-year-old male who died with a respiratory syndrome had a urine antigen and immunohistochemical testing of lung samples that were positive for *Legionella pneumophila* serogroup 1. The 48-year-old male who died of a neurologic syndrome had a 16s PCR test of a brain abscess that was positive for *Fusobacterium nucleatum*. Immunohistochemistry and PCR testing demonstrated the presence of *Clostridium perfringens* in necrotic bowel of a 30-year-old female who died with GI symptoms.

Viral Hepatitis A

In 2004, 59 cases of hepatitis A (1.2 per 100,000 population) were reported. Forty-five (76%) case-patients were residents of the Twin Cities metropolitan area, including 16 (36%) residents of Hennepin or Ramsey Counties. Thirty-

one (53%) of the cases were male. Although the greatest number of cases (34, 58%) were white, incidence rates were higher among Asians (11.2 per 100,000) than among whites (0.8 per 100,000) or blacks (0.49 per 100,000). No cases were reported in American Indians in 2003 or 2004. The incidence rate of hepatitis A in American Indians declined steadily from 10.4 per 100,000 population in 1999 to 6.0, 3.7, and 2.5 per 100,000, respectively, in 2000, 2001, and 2002 demonstrating the success of targeted immunization efforts initiated in 1999. Hispanic ethnicity was reported for four cases (2.8 per 100,000). Case-patients ranged in age from one to 87 years.

Two (4%) case-patients were employees of food-serving establishments. No community transmission of hepatitis A was identified.

Of the 59 cases, a risk factor was identified for 35 (59%). Twenty-one (60%) had known exposure to a confirmed hepatitis A case. Four of these persons, in three separate families, became infected following exposure to a family member, representing missed opportunities to administer immune globulin. Sixteen persons were related to an outbreak associated with Hmong arrivals from the Wat Tham Krabok refugee camp in Thailand; 14 of these cases acquired their infection abroad, and two case-patients acquired their infection in Minnesota through contact with these refugee cases. One other case-patient was a household contact of a confirmed hepatitis A case while visiting Turkey.

Of the remaining 14 (40%) cases with a risk factor identified, 13 (93%) were associated with travel. Of these 13, six (46%) traveled to Mexico or South America, and two reported consuming raw shellfish. One additional case was a man who reported having sex with men (MSM). Twenty-four cases did not report any known exposure or risk factors; however, one had contact with a household member enrolled in a childcare center. Young children infected with hepatitis A are often asymptomatic or have mild illness, but are efficient transmitters of disease.

Hepatitis A vaccine is licensed for persons 2 years of age and older. Although all persons could potentially benefit from receiving hepatitis A
continued...

vaccine, those who travel to hepatitis A endemic countries and MSM, in particular, should be educated about their increased risk of acquiring hepatitis A, and offered vaccine.

Viral Hepatitis B

In 2004, 69 cases of acute hepatitis B virus (HBV) infection (1.4 per 100,000) were reported, with no deaths. The age of case-patients ranged from 1 to 75 years (median, 35 years). Forty-two (61%) of these case-patients had clinical symptoms; the remaining 27 had documented asymptomatic seroconversions. Thirty-seven (54%) were residents of the Twin Cities metropolitan area, including 18 (26%) in Hennepin County and 13 (19%) in Ramsey County. Forty-eight (70%) cases were male, and 36 (52%) were adolescents or young adults between 13 and 39 years of age. Forty-one (59%) were white, 16 (23%) were black, and three (4%) were Asian; race was unknown for nine (13%). Two (3%) case-patients were of Hispanic ethnicity. Although the majority of cases were white, incidence rates were higher among blacks (9.3 per 100,000), Asians (2.1 per 100,000), and Hispanics (1.4 per 100,000) than among non-Hispanic whites (1 per 100,000).

Forty-three (62%) of the 69 case-patients were interviewed regarding possible modes of transmission. Thirty-five (81%) reported having sexual contact with one or more partners within 6 months prior to onset of symptoms; 17 (49%) of whom reported sexual contact with two or more partners. Of those reporting sexual activity, 27 (77%) reported their sexual preference as heterosexual, five (14%) reported their sexual preference as homosexual, and three (9%) reported their sexual preference as bisexual. Thirteen (30%) case-patients reported having contact with a known carrier of hepatitis B surface antigen (HbsAg); 10 (77%) of whom reported the contact as

sexual. Two (5%) case-patients reported using needles to inject drugs, four (9%) received a tattoo within 6 months prior to onset of symptoms, and one (2%) case-patient reported a recent history of blood transfusion.

Hepatitis B vaccine has been available since 1982, yet it continues to be underutilized in persons at greatest risk of infection. A large proportion of hepatitis B case-patients identified risk factors for sexual transmission; therefore, health care providers should discuss the need for HBV testing and vaccination with at-risk patients, including all unvaccinated adolescents, young adults, and patients seen for other sexually transmitted diseases.

In addition to the 69 hepatitis B cases, five perinatal infections were identified in infants who tested positive for HBsAg during post-vaccination screening performed at 9 to 15 months of age. Four perinatal case-patients were born in 2003 and one was born in 2002. All five perinatal infections occurred in infants identified through a public health program that works to ensure appropriate prophylactic treatment of infants born to HBV-infected mothers. The infants were born in the United States and had received hepatitis B immune globulin and three doses of hepatitis B vaccine in accordance with the recommended schedule (i.e., were treatment failures). Despite these treatment failures, the success of the public health prevention program is demonstrated by the fact that an additional 791 infants born to HBV-infected women during 2002-2003 had post-serologic testing demonstrating no infection.

Viral Hepatitis C

In 2004, 23 cases of acute hepatitis C virus (HCV) infection were reported. Sixteen (70%) of these case-patients had clinical symptoms, and seven (30%) were asymptomatic seroconversions. Fourteen (61%)

case-patients resided in Greater Minnesota. The median age was 24 years (range, 14 to 53 years). Twelve (52%) case-patients were female. Fourteen (61%) were white; six (26%) were American Indian; two (9%) were black, and one (4%) was of unknown race. Incidence rates were higher among American Indians (10.9 per 100,000 population) and blacks (1.2 per 100,000 population) than among whites (0.3 per 100,000 population).

Among the 23 case-patients, 17 (74%) reported using needles to inject drugs. Five (22%) case-patients had sexual contact with a known anti-HCV-positive partner within 6 months prior to onset of symptoms; two (9%) had a recent tattoo and one (4%) had recent surgery. (A case-patient may have >1 risk factor.)

MDH received more than 3,200 reports of newly identified anti-HCV-positive persons in 2004, the vast majority of whom are chronically infected. Because most cases are asymptomatic, medical providers are encouraged to consider each patient's risk for HCV infection to determine the need for testing. Patients for whom testing is indicated include: persons with past or present 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. Infants born to HCV-infected mothers should be tested at 12 to 18 months of age, as earlier testing tends to reflect maternal antibody status. Persons who test positive for HCV should be screened for susceptibility to hepatitis A and B virus infections and immunized appropriately.

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