Despite the recent arrival of West Nile virus in the state, Lyme disease and human granulocytic ehrlichiosis (HGE) continue to be the most commonly reported vector-borne diseases in Minnesota. A striking increase in the number of reported cases of both of these tick-borne diseases has occurred over the last 3 years. The purpose of this article is to provide an update on the epidemiology of these diseases and to review important diagnostic criteria for each disease.

Epidemiology of Lyme Disease
From 1983, when the Minnesota Department of Health (MDH) began surveillance for Lyme disease, through 2002, 4,337 cases of Lyme disease were reported in Minnesota residents. The 867 cases reported in 2002 represent an 86% increase over the prior record of 465 cases in 2000 (Figure 1). As recently as 1999, the incidence of Lyme disease among Minnesota residents was 6.0 cases per 100,000 person-years; the incidence increased to 9.5 in 2000 and to 17.6 in 2002. The increase likely is not an artifact of surveillance and awareness efforts, which have not changed in recent years, but rather may be the product of factors such as increased numbers of infected ticks and/or changes in human behavior (e.g., people spending more time in tick habitat).

Most Minnesota residents with Lyme disease have had likely exposure to infected Ixodes scapularis (deer tick or black-legged tick) in certain east-central Minnesota counties or western Wisconsin (Figure 2). In 2002, Crow Wing and Cass Counties had the greatest numbers of likely exposures, with 187 and 56 cases, respectively. In the seven-county Twin Cities metropolitan area, I. scapularis and human Lyme disease exposures occur primarily in certain rural or semi-rural areas north and east of the Mississippi River (i.e., Anoka and Washington Counties and the northern edge of Ramsey County).

In areas where Lyme disease is endemic, the risk of infection is not uniform. I. scapularis are found in wooded and brushy habitats where humidity at ground level is sufficient to prevent their desiccation. The ticks generally are not found in open grassy fields or lawns, but can be found at the border between open habitat and thick brush or woods. People who engage in activities in wooded or brushy areas are at most risk.

The risk of Lyme disease also varies during the year. Eighty percent of the Lyme disease cases reported to MDH during 1995 to 2002 had onset from June to August (Figure 3), which corresponds to the May through July peak feeding period of I. scapularis nymphs. These immature ticks are so small that many people do not detect and remove them prior to the 24 to 48 hour window when they can be most mobile.

Figure 1. Reported Cases of Lyme Disease in Minnesota by Location of Residence, 1983-2002 (n=4,337)

<table>
<thead>
<tr>
<th>Year</th>
<th>Residence in seven county Twin Cities metropolitan area</th>
<th>Residence in greater Minnesota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1984</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>1985</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>1986</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>1987</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>1988</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>1989</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>1990</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1991</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>1992</td>
<td>140</td>
<td>140</td>
</tr>
<tr>
<td>1993</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>1994</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>1995</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>1996</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>1997</td>
<td>240</td>
<td>240</td>
</tr>
<tr>
<td>1998</td>
<td>260</td>
<td>260</td>
</tr>
<tr>
<td>1999</td>
<td>280</td>
<td>280</td>
</tr>
<tr>
<td>2000</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>2001</td>
<td>320</td>
<td>320</td>
</tr>
<tr>
<td>2002</td>
<td>340</td>
<td>340</td>
</tr>
</tbody>
</table>
hours of attachment necessary for disease transmission. Adult I. scapularis are active primarily during the early spring and again during the fall (i.e., September and October). Adult I. scapularis are large enough that many people can see and remove them prior to disease transmission. Rates of *Borrelia burgdorferi* (the Lyme disease agent) infection in Minnesota I. scapularis populations have not been studied well but are thought to be less than in endemic areas on the East Coast, where up to 50% of ticks may be infected.

Despite the record level of Lyme disease cases, demographic characteristics among cases have not changed. Similar to previous years, the median age of case-patients in 2002 was 38 years (range, <1 year to 91 years). In 2002, 546 (63%) case-patients were male, similar to the 1995-2001 figure of 60%. This predominance of males likely is due to behavioral factors (e.g., males participating more frequently in activities in woods and brush).

**Epidemiology of HGE**

HGE is a bacterial disease transmitted to humans by the same I. scapularis ticks that transmit Lyme disease. HGE was first recognized during 1993 in several patients from Minnesota and western Wisconsin. The HGE agent has been named *Anaplasma phagocytophilum*. (Note the genus change from *Ehrlichia* to *Anaplasma*.) A monocytic form of ehrlichiosis caused by *Ehrlichia chaffeensis* is found throughout much of the southeastern and southcentral United States but rarely occurs in Minnesota.

Similar to Lyme disease, the number of HGE cases reported in Minnesota residents has increased recently. The 149 cases reported to MDH during 2002 represent a 60% increase over the prior high of 93 cases in 2001 and a 314% increase since 1999 (Figure 4). Some of this increase may be due to increasing recognition and testing by Minnesota physicians. However, the concurrent increase in Lyme disease cases suggests that at least part of the increase in HGE cases is “real.” Disease onsets peak in June (Figure 3), coinciding with the peak feeding period of *I. scapularis* nymphs. People are at greatest risk in the same counties where Lyme disease exposures are reported (Figure 2). In 2002, 55 HGE case-patients (50% of patients with known locations of exposure) likely had exposure to infected ticks in Crow Wing County.

Similar to Lyme disease, 61% of HGE case-patients during 1998-2002 were male. HGE case-patients ranged in age from <1 year to 95 years; the median age (59 years) has been older than that of Lyme disease case-patients (median age, 38 years in 2002).

In contrast to Lyme disease, a substantial majority (79%) of HGE case-patients in 1998-2002 were residents of greater Minnesota. This difference may be due in part to under-recognition of HGE among patients seeking health care in the Twin Cities metropolitan area after recreational exposures in other areas.

**Clinical Aspects of Lyme Disease and HGE**

The first sign of Lyme disease often is erythema migrans (EM): 87% of cases reported to MDH have EM. The rash occurs 3 to 30 days (median, 7 days) after exposure to an infected tick and typically is described as an erythematous annular border that gradually expands with partial central clearing. The EM usually expands to greater than 2 inches (5 cm) in diameter. This differs from smaller lesions (less than 1 inch in diameter) caused immediately by inflammation associated with the tick bite itself. Patients also may experience constitutional symptoms such as malaise, headache, fever, stiff neck, arthralgia, myalgia, and generalized lymphadenopathy. If untreated, the EM resolves within a median of 28 days (range, 1 day to 14 months); with treatment, EM diminishes within several days after initiating therapy.

Days or weeks following the onset of illness, *B. burgdorferi* disseminates through the bloodstream. Multiple skin lesions may occur but appear smaller than the primary EM. Constitutional symptoms and generalized lymphaden-
Serology is the most useful laboratory test available as an adjunct to the clinical diagnosis of Lyme disease. Specimens should be screened first using a sensitive enzyme-linked immunosorbent assay (ELISA), and all samples judged to be positive or equivocal (borderline) should be confirmed by Western blot. Negative serological results in infected patients are rare but can occur when specimens are obtained before the patient has developed a significant antibody response (days to several weeks).

Onset of HGE occurs within 1 to 3 weeks of exposure to an infected tick. Common signs and symptoms include rapid onset of fever (often >102°F), chills, headache, and myalgia. Nausea, vomiting, anorexia, cough, and diarrhea are reported less frequently. Highly suggestive laboratory findings include leukopenia (WBC <4,500/mm³), thrombocytopenia (platelets <150,000/mm³), and increased aminotransferase levels. The diagnosis of HGE is based on clinical signs, a history of potential exposure to deer ticks, and supportive laboratory tests. The indirect immunofluorescence assay (IFA) for *A. phagocytophilum* antibodies has the highest sensitivity and specificity for HGE, when paired acute and convalescent serum samples are tested. Testing of a single serum sample less than 7 days after onset of illness is not a sensitive diagnostic method; in one recent study, only 24% of patients tested in this time frame had developed sufficient antibodies to be IFA-positive. Intracellular inclusions (morulae) also may be visualized in neutrophils of Wright-stained blood smears in approximately 60% of cases. Polymerase chain reaction (PCR) assays also may be used to detect *A. phagocytophilum* DNA, but PCR tests are not widely available at clinical laboratories.

Co-Infections With Tick-Borne Pathogens

Co-infections of Lyme disease and HGE from the same tick bite are possible. In 2002, 20 (13%) HGE cases also had objective evidence of Lyme disease. Babesiosis, a third *I. scapularis*-transmitted disease caused by *Babesia microti*, also can be found in combination with Lyme disease or HGE. An average of one or two cases of babesiosis are reported each year in Minnesota; a record seven cases were reported in 2002. Most cases are mild and self-limited, but severe infections may occur in patients with a history of splenectomy or immunosuppression.

Prevention of Tick-Borne Disease

MDH continues to stress personal protective measures such as tick repellents, protective clothing, and frequent tick checks to prevent illness. There is no longer a Lyme disease vaccine on the market, and no large-scale tick control methods currently are available. Persons should take appropriate precautions when they spend substantial time in woods or brushy areas in deer tick endemic areas, particularly during mid-May through mid-July.

For additional information about tick-borne diseases contact the MDH Foodborne, Vectorborne and Zoonotic Diseases Unit at (612) 676-5414 or (877) 676-5414, or visit the MDH website (http://www.health.state.mn.us/divs/idepc/diseases/lyme/).

References

Communicable Disease Reporting and HIPAA

This article provides the Minnesota Department of Health (MDH)'s analysis of two issues related to the Health Insurance Portability and Accountability Act (HIPAA) and communicable disease reporting. (Disclaimer of Legal Advice: This is not legal advice and you should not rely on it as legal advice. Consult with a lawyer for legal advice.)

HIPAA's Interaction with the Minnesota Communicable Disease Reporting Rule and Minnesota Statutes §144.05 subd.1(a)

"Does HIPAA permit disclosure of specific patient medical information related to a communicable disease to MDH or other local public health authorities without patient authorization?"

Finding
HIPAA permits a provider and/or the provider's medical records department or staff to release a patient's medical information pertaining to a communicable disease in accordance with the Minnesota Communicable Disease Reporting Rule and M.S. §144.05, subd. 1(a) without the patient's authorization. This conclusion is based on review of HIPAA privacy rules and guidance from the U.S. Centers for Disease Control and Prevention (CDC) and U.S. Department of Health and Human Services (DHHS). ¹

The medical information being released must be related to a communicable disease report. This may include, but is not limited to, personally identifiable information on the patient or their contacts, the tests conducted, the results of those tests, treatments related to the disease, and other pertinent information.

Analysis
HIPAA governs the use and disclosure of protected health information (PHI). It applies to health plans, health care clearinghouses, and health care providers who transmit certain health claims information electronically. These entities are covered entities under the rule.

A covered entity must obtain a written authorization from the individual for the use and disclosure of PHI, unless the disclosure is to the individual for treatment, payment, or health care operations or the disclosure falls under one of the specified exceptions.

HIPAA privacy rules, specifically 45 Code of Federal Regulations §164.512, addresses the uses and disclosures of PHI for which an authorization or an opportunity to agree or object is not required. Specifically:

- Section 164.512(a) permits disclosures that are required by law, including statutes and rules, and
- Section 164.512(b) permits a covered entity to disclose PHI to:

  1. A public health authority that is authorized by law to collect or receive such information for the purpose of preventing or controlling disease, injury, or disability, including but not limited to, the reporting of disease, injury, vital events such as birth or death, and the conduct of public health surveillance, public health investigations, and public health interventions; ...

Under HIPAA, 45 CFR 164.501, public health authority is defined as "an agency or authority of … a State…or a political subdivision of a State…that is responsible for public health matters as part of its official mandate."

Therefore, to the extent that a public health authority is authorized by law to collect or receive information for public health purposes, covered entities may disclose PHI to such public health authority without the patient's authorization.

Summary
In summary, M.S. §144.05, subd. 1(a) and the Minnesota Communicable Disease Reporting Rules, Parts 4506.7000 to 4605.7900 allow MDH and local public health authorities to conduct studies and investigations on communicable diseases, such as hepatitis B, E. coli O157:H7, and sexually transmitted diseases to protect the public's health. Therefore, providers, their medical records departments, and their staff can share medical information pertaining to a communicable disease investigation or study without patient authorization.

Logging Public Health Disclosures Under HIPAA

"Does a provider or its medical records department have to keep a disclosure log when releasing specific patient medical information related to a communicable disease investigation to MDH or other local public health entities without the patient’s authorization?"

Finding
HIPAA permits a provider to account for these disclosures in a general, not patient-specific manner in instances of an ongoing, regular reporting or inspection requirement. For example, when disclosing individual PHI to a public health entity as part of a communicable disease investigation, a provider may keep a general log of disclosure rather than noting them in the individual patients' records. (See example at the end of this article). This finding is based on review of HIPAA privacy rules and guidance from CDC and DHHS.

Analysis
As discussed previously, HIPAA permits a provider and/or the provider's medical records department or staff to release a patient's medical information pertaining to a communicable disease in accordance with the Minnesota Communicable Disease Reporting Rule and M.S. §144.05, subd. 1(a) without the patient's authorization. HIPAA also requires that a covered entity, such as a provider, account for each disclosure of PHI to a public health authority without the patient's authorization. Specifically, the provider must maintain a disclosure log each time he or she discloses PHI without the patient's authorization (45 CFR 164.528).

The required accounting of disclosures may be accomplished in various ways. Typically, the covered entity must keep an accounting of each disclosure by date, the information disclosed, the identity of the recipient, and the purpose of the disclosure. However, 5 CFR 164.528(b)(3) does not require this type of log when a provider makes multiple disclosures for the same purpose. According to CDC and DHHS,

"Where the covered identity has, during the accounting period, made multiple disclosures to the same recipient for the same purpose, the Privacy Rule provides for a simplified means of accounting. In such cases, the covered entity need only identify the recipient of such repetitive disclosures, the purpose of the disclosure, and describe the PHI routinely disclosed. The date of each disclosure need not be tracked. Rather, the accounting may include the date of the first and last such disclosure during the accounting period, and a description of the frequency or periodicity of such disclosures. For example, the vast amount of data exchanged between
covered by HIPAA who routinely reports all cases of Hepatitis B or E. coli O157:H7 to MDH, does not need to annotate each patient’s medical record when these routine public health disclosures are made. Instead, the provider only needs to keep a general log of the following:

- Receiver of PHI: MDH
- PHI disclosed: Hepatitis B or E. coli O157:H7 case
- Purpose of disclosure: Required for communicable disease surveillance under Minnesota Communicable Disease Reporting Rules

For example,

A health care provider covered by HIPAA who routinely reports all cases of Hepatitis B or E. coli O157:H7 to MDH, does not need to annotate each patient’s medical record when these routine public health disclosures are made.

In 1984, three years after the first reports of a disease that was to become known as Acquired Immunodeficiency Syndrome (AIDS), researchers discovered the causative viral agent, human immunodeficiency virus type 1 (HIV-1). In 1986, a different type of HIV (HIV-2) was isolated from AIDS patients in west Africa. Although there are similarities between HIV-1 and HIV-2, there also are notable differences.

Both HIV-1 and HIV-2 have the same modes of transmission and are associated with similar opportunistic infections and conditions. However, in persons infected with HIV-2, immunodeficiency develops more slowly and is milder than that in persons infected with HIV-1. HIV-2 also appears to be less transmissible than HIV-1.

The geographic distributions of HIV-1 and HIV-2 differ markedly. HIV-1 is found in relative abundance throughout the world and is responsible for the worldwide pandemic. HIV-2 presently is considered rare in the U.S. The first U.S. case was diagnosed in 1987, followed by 79 more HIV-2 infections diagnosed by October 1998. Only one case of HIV-2 infection has been reported to the Minnesota Department of Health (MDH) to date, although recent migration and travel patterns suggest that additional cases are possible. Extensive immigration from African countries, including some where HIV-2 is endemic, has occurred during the past 8 years. From 35,000 to 50,000 African-born persons currently reside in Minnesota.

HIV-2 Testing

Although cross-reaction occurs between HIV-1 and HIV-2, HIV-2 infection may go undiagnosed when only HIV-1 screening tests are used. Depending on the test, 9-40% of persons infected with HIV-2 will test negative with HIV-1 enzyme immunoassays (EIAs). FDA-licensed HIV-1/HIV-2 EIAs are available. No licensed HIV-2 confirmatory test (e.g., HIV-2 Western blot) is currently available in the U.S., although tests are available for research purposes through several biotechnology companies. Confirmatory testing for HIV-2 also is available through MDH. For information on which HIV screening tests are licensed for detecting HIV-2 or to make arrangements for HIV-2 confirmatory testing through MDH, contact Tracy Sides at (612) 676-5461 or Donald Stiepan at (612) 676-5736.

Indications for HIV-2 Testing

Because epidemiologic data indicate that the prevalence of HIV-2 in the U.S. and Minnesota is very low, neither the U.S. Centers for Disease Control and Prevention nor MDH recommend routine testing for HIV-2 at counseling or testing sites or in settings other than blood centers.

However, when HIV testing is to be performed and demographic or behavioral risk factors suggest that HIV-2 might be present, a test that will detect both HIV-1 and HIV-2 antibodies should be used. Persons at increased risk for HIV-2 infection include:

- persons from or with extensive travel to Africa,
- sex partners of persons from or with extensive travel to Africa,
- sex partners of persons known to be infected with HIV-2,
- persons who received a blood transfusion or a nonsterile injection in Africa,
- persons who shared needles with a person from or with extensive travel to Africa, and
- children born to women who have risk factors for HIV-2 infection or who are infected with HIV-2.

Testing for HIV-2 also is indicated when there is clinical evidence or suspicion of HIV disease (such as an AIDS-associated opportunistic infection) in the absence of a positive test for HIV-1 antibodies or when an HIV-1 Western blot test result exhibits the unusual indeterminate pattern of gag (p24, p17) plus pol (p66, p51, or p32) bands in the absence of env (gp120, gp160, or gp41) bands.

For additional information on HIV-1 and HIV-2, contact the MDH HIV/AIDS Epidemiology and Surveillance Unit at (612) 676-5414 or (877) 676-5414.

References:
Cancer Surveillance in Minnesota, 1988-1999

As part of the Minnesota Department of Health (MDH)’s mission to protect and improve public health, the Minnesota Cancer Surveillance System (MCSS) evaluates changes in cancer rates over time, among racial groups, and by geographic area of the state. MCSS will release its seventh biennial report to the legislature in May 2003. Highlights from this report include:

- More than 22,000 Minnesotans were diagnosed with cancer in 1999. Nearly 50% of Minnesotans will be diagnosed with a potentially serious cancer during their lifetimes.

- Nearly 8,900 Minnesotans died of cancer in 1999, accounting for one of every four deaths. Despite important progress, cancer remains the second leading cause of death.

- The overall cancer rate in Minnesota is about 5% lower than the national rate, largely due to lower rates of cancers caused by tobacco use.

- The overall incidence rate of cancer among males in Minnesota decreased from 1988 to 1999, due to significant decreases in colorectal, stomach, and smoking-related cancers (Figure 5). The incidence of prostate cancer increased sharply during the early 1990s due to the introduction of a new screening test, which identified many cancers that otherwise would have been diagnosed much later. Prostate cancer mortality rates decreased steadily starting in 1994.

- The overall incidence rate of cancer among women in Minnesota increased by about 8% from 1988 to 1999, largely due to significant increases in breast and lung cancers (Figure 6). These increases were large enough to outweigh significant decreases in colorectal, stomach, and cervical cancers. Breast cancer mortality rates in Minnesota decreased 20% from 1988 to 1999, due to earlier diagnosis and improved treatment.

- Racial disparities in the burden of cancer are evident in Minnesota. Black men have the highest cancer rates, with incidence and mortality rates that are 30% and 60% higher, respectively, than those among white males. Also of special concern, the cancer mortality rate among American Indians in Minnesota is twice that of American Indians in the U.S.

- Although the overall cancer incidence rate in Minnesota did not increase significantly between 1988 and 1999, the number of Minnesotans diagnosed with cancer increased by more than 20%, because the population is growing and aging.

- The mesothelioma incidence rate in Minnesota increased by 70% among men between 1988 and 1999, but did not increase among women. The rate among men is 14% higher in Minnesota than in the U.S., but is the same for women. Rates are highest in northeastern Minnesota and are associated with occupational exposures to commercial asbestos products that were common until the early 1970s.

The full MCSS report, Cancer in Minnesota, 1988-1999, will be available at http://www.health.state.mn.us/divs/dpc/cdee/mcss.htm, or by contacting MCSS at (612) 676-5216 or at MCSS, P.O. Box 9441, Minneapolis, MN 55440-9441.

![Figure 5. Increasing prostate cancer incidence and decreasing lung and colorectal cancer incidence among Minnesota men, 1988-1999](image1)

![Figure 6. Increasing lung and breast cancer incidence and decreasing colorectal cancer incidence among Minnesota women, 1988-1999](image2)
### Antimicrobial Susceptibilities of Selected Pathogens, 2002

**Sampling Methodology**
- ~1 isolate tested per week at MDH
- all isolates tested
- ~10% sample of statewide isolates received at MDH
- isolates from a normally sterile site

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Isolates Tested</strong></td>
<td>55</td>
<td>128</td>
<td>47</td>
<td>20</td>
<td>51</td>
<td>36</td>
<td>133</td>
<td>264</td>
<td>527</td>
<td>187</td>
</tr>
<tr>
<td><strong>% Susceptible</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td>80</td>
<td>96</td>
<td>10</td>
<td></td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penicillin</td>
<td>88</td>
<td>100</td>
<td>100</td>
<td>81</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefuroxime sodium</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefotaxime</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceftiraxone</td>
<td>96</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meropenem</td>
<td></td>
<td></td>
<td>100</td>
<td>87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>82</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>96</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>84</td>
<td>96</td>
<td>90</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clindamycin</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td>99</td>
<td>84</td>
<td>96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gentamicin</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetracycline</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>98</td>
<td>100</td>
<td>80</td>
<td>64</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td></td>
<td></td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethambutol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>96</td>
</tr>
<tr>
<td>Isoniazid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>86</td>
</tr>
<tr>
<td>Pyrazinamide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>Rifampin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>96</td>
</tr>
<tr>
<td>Streptomycin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>81</td>
</tr>
</tbody>
</table>

**Trends, Comments and Other Pathogens**

1. **Campylobacter spp.**
   - Ciprofloxacin susceptibility was determined for all isolates (n=822). Only 36% of isolates from patients returning from foreign travel were susceptible to quinolones. Susceptibilities were determined using 2001 NCCLS breakpoints for Enterobacteriaceae. Susceptibility for erythromycin was based on an MIC ≤ 4 μg/ml.

2. **Salmonella spp.**
   - Antimicrobial treatment for enteric salmonellosis generally is not recommended.

3. **Neisseria gonorrhoeae**
   - 51 isolates comprise 2% of total cases reported in 2002. All were susceptible to cefixime, cefpodoxime, and spectinomycin. 3 were resistant to ciprofloxacin (MIC > 1 μg/ml). Among 217 MN isolates tested through another surveillance system (GISP), 1 was resistant to ciprofloxacin, penicillin, and tetracycline. No decreased susceptibility to azithromycin was detected in GISP isolates.

4. **Neisseria meningitidis**
   - Provisional CDC breakpoints: MIC ≤ 0.06 mcg/ml considered susceptible, MIC of 0.12 – 0.5 mcg/ml considered ‘less susceptible.’ In 2002, 3 isolates had MIC of 0.12 and 2 had MIC of 0.25 for penicillin. 1 isolate was highly resistant to rifampin with MIC ≥32 (by E-test).

5. **Group B Streptococcus (GBS)**
   - 89% (24/27) of early-onset infant, 94% (17/18) of late-onset infant, 71% (10/14) of maternal, and 84% (213/253) of other invasive GBS cases were tested. 84% (43/51) of infant and maternal case isolates were susceptible to clindamycin and 75% (38/51) were susceptible to erythromycin. All 264 isolates had an MIC of <0.5 μg/ml to cefazolin.

6. **Streptococcus pneumoniae**
   - 2002 is the first year of statewide testing. The 527 isolates tested were 88% of 597 total cases. 7% (38/527) had intermediate susceptibility and 12% (64/527) were resistant to penicillin. Reported above is the proportion of 2002 case isolates susceptible by meningitis breakpoints for cefotaxime (minimum inhibitory concentration 1.0 μg/ml) and for non-meningitis breakpoints (intermediate=2 μg/ml, resistant ≥ 4.0 μg/ml). 97% (512/527) of these isolates were susceptible. Isolates were screened for high-level resistance to rifampin at a single MIC; all were ≤ 2 μg/ml.

7. **Mycobacterium tuberculosis (TB)**
   - National guidelines recommend initial four-drug therapy for TB disease, at least until first-line drug susceptibility results are known. Forty-six (88%) of the 52 drug-resistant TB cases reported in 2002 were in persons born outside the U.S., including 23 (88%) of 26 isoniazid (INH)-resistant cases and five (83%) of six multi-drug resistant cases (i.e., resistant to at least INH and rifampin).

**Escherichia coli O157:H7**

- Antimicrobial treatment for E. coli O157:H7 infection is not recommended.

**Methicillin-resistant Staphylococcus aureus (MRSA)**

- Of 136 community-associated MRSA isolates tested in 2001 (2002 results pending), 75% were susceptible to ciprofloxacin, 82% susceptible to clindamycin, 42% susceptible to erythromycin, 99% susceptible to gentamicin, 100% susceptible to TMP-SMX, 100% susceptible to rifampin, 94% susceptible to tetracycline and 100% susceptible to vancomycin. 36/45 of erythromycin-resistant/clindamycin-susceptible isolates had inductive clindamycin resistance and contained the erm gene.
On the previous page is the Antimicrobial Susceptibilities of Selected Pathogens, 2002 - also known as the Minnesota Department of Health (MDH) Antibiogram, a compilation of antimicrobial susceptibilities of selected pathogens submitted to MDH during 2002 in accordance with Minnesota Rule 4605.7040. Because only a select group of isolates is submitted to MDH, it is important to read the notes entitled “Sampling Methodology” and “Trends, Comments, and Other Pathogens.”

We hope the MDH Antibiogram will serve as a useful “Thank You” for the work that laboratorians, infection control practitioners, and providers do to support public health in Minnesota.

We appreciate your feedback on this initiative.

The MDH Antibiogram is available on the MDH web site (http://www.health.state.mn.us). Laminated copies can be ordered from: Antibiogram, Minnesota Dept. of Health, Acute Disease Investigation and Control Section, 717 Delaware St. SE, Minneapolis, MN 55414.

Aggie Leitheiser, Acting Commissioner of Health
Division of Infectious Disease Epidemiology, Prevention and Control
Harry F. Hull, M.D. ...................... Division Director & State Epidemiologist
Richard N. Danila, Ph.D., M.P.H. ..................... ADIC Section Manager
Kirk Smith, D.V.M., Ph.D. .............................................. Editor
Wendy Mills, M.P.H. ...................................................... Assistant Editor
Valerie Solovjovs ........................................ Production Editor

CHANGING YOUR ADDRESS?
Please correct the address below and send it to:
DCN MAILING LIST
Minnesota Department of Health
717 Delaware Street SE
PO Box 9441
Minneapolis, MN 55440-9441

The Disease Control Newsletter is available on the MDH Acute Disease Investigation and Control (ADIC) Section web site (http://www.health.state.mn.us/divs/dpc/ades/pub.htm).
The Disease Control Newsletter toll-free telephone number is 1-800-366-2597.