The Epidemiology of Infectious Diseases in Illinois, 2005

April 2009
# The Epidemiology of Infectious Diseases in Illinois, 2005

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Reportable Communicable Diseases in Illinois
The following diseases must be reported to local health authorities in Illinois:

CLASS 1(a)- The following diseases are reportable by telephone immediately (within three hours):
1. Anthrax
2. Botulism, foodborne
3. Plague
4. Q-fever
5. Smallpox
6. Tularemia
7. Any suspected bioterrorist threat or event

CLASS 1(b)-The following diseases are reportable within 24 hours of diagnosis:
1. Botulism, infant, wound, and other
2. Cholera
3. Diarrhea of the newborn
4. Diphtheria
5. Foodborne or waterborne illness
6. Hemolytic uremic syndrome, post-diarrheal
7. Hepatitis A
8. Any unusual case or cluster of cases that may indicate a public health hazard
9. *Haemophilus influenzae*, meningitis and other invasive disease
10. *Neisseria meningitidis*. Meningitis and invasive disease
11. Streptococcal infections, Group A, invasive (Including toxic shock syndrome) and sequelae to group A streptococcal infections (rheumatic fever and acute glomerulonephritis)
12. Measles
13. Pertussis
14. Poliomyelitis
15. Rabies, human
16. Rabies, potential human exposure
17. Typhoid fever
18. Typhus
19. Enteric *Escherichia coli* infections (*E. coli*)0157:H7 and other enterohemorrhagic *E. coli*, enterotoxigenic *E. coli* enteropathogenic *E. coli*
20. *Staphylococcus aureus* infections with intermediate or high level resistance to vancomycin

(Continued on attached page)
The following diseases shall be reported as soon as possible during normal business hours, but within seven days (exceptions to the seven-day notification requirement are marked with an asterisk; see note below.)

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<td>Hantavirus pulmonary syndrome</td>
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<td>Legionnaires’ disease</td>
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<td>Leprosy</td>
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<td>Listeriosis</td>
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<td>26</td>
<td>Lyme disease</td>
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*Must be reported by mail or by telephone to the local health authority within five days

¹HIV is reported by patient code number, not by name in 2005.

The occurrence of any increase in incidence of disease of unknown or unusual etiology should be reported, with major signs and symptoms listed.

When an epidemic of a disease dangerous to the public health occurs and present rules are not adequate for its control or prevention, more stringent requirements shall be issued by the Illinois Department of Public Health.
2005 Summary of Selected Illinois Infectious Diseases

In Illinois, the communicable disease (CD) surveillance system relies on the passive reporting of cases required by state law. Diseases are made reportable because regular and timely information is necessary for prevention and control efforts. Lists of notifiable diseases are revised to include new pathogens or delete those with declining importance. The current reportable disease list mandates reporting, within specific time frames, of certain diseases and of selected positive laboratory tests. Surveillance of notifiable diseases provides public health workers the opportunity to ensure that ill persons receive appropriate treatment, provide contacts with needed vaccines or other preventive treatments and halt outbreaks. The effectiveness of the surveillance system relies heavily on the cooperation and support of health care providers, laboratories and local health departments in submitting information on reportable disease cases. In Illinois, regulations require reporting by physicians, nurses, nurses aides, dentists, health care practitioners, laboratory personnel, school personnel, long-term care personnel, day care personnel and university personnel. Notifiable disease data are submitted by the Illinois Department of Public Health on a weekly basis to be included with national data in the Morbidity and Mortality Weekly Report (MMWR). CD rules also include laboratory reporting. Some isolates are required to be forwarded to the Department. For selected agents and situations, pulse field gel electrophoresis may be performed to subtype isolates.

There are three diseases that are internationally quarantinable and notifiable (cholera, plague and yellow fever). There are 54 diseases or conditions listed as nationally reportable to the U.S. Centers for Disease Control and Prevention (CDC). The number reflects certain combinations; for example, HIV and AIDS are combined under one category (human immunodeficiency virus/acquired immune deficiency syndrome [HIV/AIDS]) as are invasive group A streptococcus (GAS) and toxic shock syndrome due to GAS. Diseases reportable to CDC but not reportable in Illinois in 2005 include animal rabies, severe acute respiratory syndrome (SARS), coccidioidomycosis, influenza associated pediatric mortality and yellow fever. Animal rabies testing is only performed by state laboratories so reporting is complete through state laboratory reporting. In 2005, the 10 most frequently reported notifiable infectious diseases in the United States were chlamydia, giardiasis, gonorrhea, AIDS, salmonellosis, shigellosis, varicella, Lyme disease, pertussis and syphilis.

In 2005, 65 different types of infectious diseases were reportable to the Department (see page 1 and 2). Many of the reportable diseases are included in this annual report along with some non-reportable diseases of importance in 2005. Case numbers for the various infectious diseases listed in this summary should be considered minimum estimates. There are several reasons why reported numbers are lower than the actual incidence of disease: Many individuals do not seek medical care and thus are not diagnosed; some cases are diagnosed on a clinical basis without confirmatory or supportive laboratory testing; and among diagnosed cases, some are not reported. These surveillance data are used to evaluate disease distribution trends over time rather than to identify precisely the total number of cases occurring in the state.

The five most frequently reported nationally notifiable infectious diseases in Illinois were chlamydia, gonorrhea, AIDS, Salmonella and pertussis. Diseases with increased
reporting in 2005 over the previous five-year median included amebiasis, blastomycosis, brucellosis, *Chlamydia*, cryptosporidiosis, acute hepatitis B, histoplasmosis, *Legionella*, *Listeria*, Lyme, malaria, pertussis, *Salmonella*, syphilis, invasive group A streptococcus, tuberculosis and West nile virus. The number of reported cases of California encephalitis, shiga toxin producing *E. coli*, giardia, gonorrhea, hepatitis A, *Haemophilus influenzae*, *N. meningitidis*, *Shigella* and varicella have been decreasing compared to the previous five-year median.

Highlights of 2005 in Illinois included cases of unusual or rarely reported illnesses including cases of hantavirus and leptospirosis and the appearance of terrestrial animal rabies in the north-central area of the state. Notable foodborne outbreaks included a large restaurant associated outbreak of *S. ser. Typhimurium* in Madison county and an ETEC outbreak in Dupage County. Two outbreaks suspected to be caused by high levels of yeast or yeast by products occurred in Cook County. Also, two outbreaks believed to be linked to excess calcium in tortilla, consumed by school children in Peoria County occurred in 2005.

Studies mentioned in the text of this report will be referred to in the selected readings sections. The reporting of infectious diseases by physicians, laboratory and hospital personnel, and local health departments is much appreciated. Without the support of the local health departments in following up on disease reports, it would not be possible to publish this annual report. The Department hopes you find this information useful and welcomes any suggestions on additional information that would be of use to you.

**Useful Contact/Surveillance Information**
Illinois Department of Public Health Web site [www.idph.state.il.us](http://www.idph.state.il.us)

To report cases: Contact your local health department.

To refer isolates to the Illinois Department of Public Health lab, ship to one of three locations:
Public Health Laboratory, 825 N. Rutledge St., Springfield, IL 62761
Public Health Laboratory, 1155 S. Oakland Ave., P.O. Box 2797, Carbondale, IL 62901
Public Health Laboratory, 2121 W. Taylor St., Chicago, IL 60612
Illinois Counties
Acquired Immune Deficiency Syndrome/Human Immunodeficiency Virus

Background
Since the first cases were reported in the summer of 1981, acquired immune deficiency syndrome (AIDS) has become one of the major health problems to emerge in the past 25 years. In 1984, the human immunodeficiency virus (HIV) was identified as the causative agent of AIDS. The disease is spread by the exchange of blood, semen or vaginal secretions between individuals. The most common routes of transmission are 1) having sex (anal, oral or vaginal) with an infected person, 2) sharing drug injection equipment with an infected person (including insulin or steroid needles), and 3) from mother to infant (perinatal) before or at the time of birth or through breastfeeding.

Within weeks to months after infection with HIV, some individuals develop a flu-like illness. After this initial illness, individuals with HIV may remain free of clinical signs for months to years. Since the progression of HIV to AIDS is as high as 50 percent among untreated infected adults monitored for 10 years, assessing the impact of the epidemic in Illinois has relied mainly on the reporting of cases that met the AIDS definition.

Clinical indicators of HIV infection may include lymphadenopathy, chronic diarrhea, weight loss, fever and fatigue followed by opportunistic infections. HIV may progress to AIDS, which includes a variety of late-term clinical manifestations including low T-cell counts. Opportunistic infections associated with AIDS include *Pneumocystis carinii* pneumonia, chronic cryptosporidiosis, central nervous system toxoplasmosis, candidiasis, disseminated cryptococcosis, tuberculosis, disseminated atypical mycobacteriosis and some forms of cytomegalovirus infection. Some cancers also may be associated with AIDS (e.g., Kaposi sarcoma, primary B-cell lymphoma of the brain, invasive cervical cancer and non-Hodgkin's lymphoma).

Increased knowledge of the disease and improved diagnostic and treatment methods have led to significant advances in the clinical management of HIV and resulted in a delay in the progression from HIV to AIDS and a reduction in AIDS morbidity and mortality. A number of antiretroviral agents are available for treatment of HIV/AIDS, and combination therapies have been shown to prolong and improve the quality of life for those who are infected.

At the end of 2005, 38 states had implemented confidential name-based HIV reporting. An estimated 437,982 persons in the United States were living with AIDS and 212,579 were living with HIV (not AIDS).

Case definition
In the state of Illinois, AIDS has always been reported by name, while HIV reporting was without patient identifiers until July 1, 1999. For HIV reporting, this meant that individuals with multiple positive test results for HIV were counted as new HIV cases each time they tested positive. On July 1, 1999, reporting of HIV by a patient code number (PCN) became mandatory in Illinois. The PCN is a coding system that permits duplicate reports to be identified but is not specific enough to permit identification of an individual person. Prevalent cases of HIV treated in Illinois also are reportable using the PCN system.

In January 1, 2006, named reporting of HIV began.
The case definition for AIDS has changed three times, which should be taken into account when reviewing trends over time. The changes can be referred to as pre-1987, the 1987 revision and the 1993 revision. To review the case definitions and how they have changed over time, the following *Morbidity and Mortality Weekly Reports* (MMWR) should be reviewed:

1) Review of the CDC surveillance case definition for acquired immunodeficiency syndrome. MMWR 1987;36 (Suppl):1-15s.
3) 1994 revised classification system for human immunodeficiency virus infection in children less than 13 years of age. MMWR 1994;43(RR-12): 1-19.
4) Case definitions for infectious conditions under public health surveillance. MMWR 1997;46(RR-10): 5-6.

Additional changes, including a revised case definition for HIV infection in adults and children, became effective January 1, 2000. For information about this latest revision, see “Guidelines for national human immunodeficiency virus case surveillance, including monitoring for human immunodeficiency virus infection and acquired immunodeficiency syndrome; MMWR 1999; 48 (No. RR-13).

**Descriptive epidemiology**

- Number of AIDS cases reported in calendar year 2005 as of December 31, 2005 – 1,321. The number of reported AIDS cases declined by 7 percent from 1,424 in 2004. The number of reported HIV cases was 2,526, a 1 percent increase over 2004.
- The majority of reported AIDS cases in 2005 were in males (1,070 cases or 81 percent). For all cases reported among males, men who have sex with men (MSM) accounted for the largest number of AIDS cases (603 cases or 56 percent), followed by injection drug use (IDU) with 108 cases or 10 percent (Figure 1).
- Reported cases of AIDS among females accounted for 251 cases or 19 percent of the total AIDS cases reported in 2005. Among females, heterosexual contact accounted for 106 cases or 42 percent of the total, with IDU accounting for 54 cases or 21 percent (Figure 2).
- African Americans, who represent 15 percent of the state’s population, accounted for 53 percent, or 696 of the AIDS cases reported in 2005. This represents a decrease since 2004 when 56 percent of cases reported were among African Americans (Figure 3).
- In 2005, Cook County and the collar counties (Dupage, Kane, Lake, McHenry and Will) comprised 87 percent of the total, with Chicago accounting for 61 percent of the total reported AIDS cases. Cook County and the collar counties comprised 90 percent of the total, with Chicago accounting for 71 percent of the total reported HIV cases.

**Summary**

The number of cases of AIDS reported in Illinois was 1,321 and the number of HIV cases was 2,558. Most reported AIDS cases were in males. The most common risk
factor for transmission for AIDS in males was MSM. Heterosexual contact was the most common risk factor for females for AIDS, followed by IDU.

Figure 1. Reported AIDS Cases in Illinois Males by Mode of Transmission, 2005

Figure 2. Reported AIDS Cases in Illinois in Females by Mode of Transmission, 2005

Figure 3. Reported AIDS Cases in Illinois by Race, 2001-2005
Amebiasis

Background
Entamoeba histolytica is a protozoan parasite that exists in two forms: the cyst and the trophozoite. It is an important health risk to travelers to the Indian subcontinent, southern and western Africa, the Far East, and areas of South and Central America. Intestinal disease can range from mild diarrhea to dysentery with fever, chills, weight loss and bloody or mucoid diarrhea. Extraintestinal amebiasis also can occur. Persons can develop amebic liver abscess which is more common in males than females. This may occur within two to four weeks of infection and include fever, cough and dull aching abdominal pain. Some persons are asymptomatic. Humans are the reservoir for Entamoeba histolytica. Infection occurs when a person ingests fecally contaminated food or water that contains the cyst or through oral-anal contact. The incubation period ranges from two to four weeks. In the United States, amebiasis is most commonly seen in immigrants and travelers to foreign countries.

When examination of stool for ova and parasites is often done, these tests cannot differentiate E. histolytica from nonpathogenic species like E. dispar and E. moshkovskii. There are now polymerase chain reaction (PCR) and antigen detection tests which can be used for differentiation.

Case definition
The CDC case definition used by the Illinois Department of Public Health for a confirmed intestinal amebiasis case is as follows: a clinically compatible illness that is laboratory confirmed (demonstration of cysts or trophozoites of E. histolytica in stool, or demonstration of trophozoites in tissue biopsy, or ulcer scraping by culture or histopathology). The definition for a case of extraintestinal amebiasis is a parasitologically confirmed infection of extraintestinal tissue; or, among symptomatic persons with clinical and/or radiographic findings consistent with extraintestinal infection, demonstration of specific antibody against E. histolytica as measured by indirect hemagglutination or enzyme-linked immunosorbent assay (ELISA). Cases were selected in INEDSS with the following criteria: disease=amebiasis, asymptomatic=unknown, no or null and year counted=2005.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 - 89 (five-year median=65). All cases were confirmed. From 2000 to 2005, the number of cases reported per year ranged from 49 to 89 (Figure 4). A total of 105 cases (both symptomatic and asymptomatic) were reported in 2005. Only symptomatic cases are used in the report below.
- Age - Cases ranged from 1 year to 77 years of age (mean=37 years) (Figure 5).
- Gender - Males accounted for 51 percent of cases.
- Race/ethnicity - Fifty percent of cases were white, 23 percent were African American, with 27 percent reporting some other racial identity; 42 percent of 26 cases for whom a response is known identified themselves as Hispanic, a significantly higher proportion than in the total Illinois population (12 percent).
- Seasonal variation – There was an increase in September and October (Figure 6).
- Geographic location – Seventy-four of 88 (84 percent) of cases lived in Cook County.
- Clinical outcome – Seven cases were admitted to the hospital and none were fatal.
Summary

The number of cases in 2005 was higher than the five-year median. Amebiasis was significantly more common in those reporting Hispanic ethnicity.

Figure 4. Amebiasis Cases in Illinois, 2000-2005

Figure 5. Age Distribution of Amebiasis Cases in Illinois, 2005

Figure 6. Amebiasis Cases in Illinois by Month, 2005
Blastomycosis

Background

*Blastomyces dermatitidis* is a dimorphic fungus found in both Canada and the United States. Blastomycosis is a zoonotic disease endemic in the midwestern United States. Occasionally, outbreaks occur in areas outside the endemic areas. The ideal area for the mycelial form of the organism is soil of warm, moist, wooded areas rich in organic debris. Recreational activities along waterways are considered to be a major risk factor for infection. Transmission is usually through inhalation of spore-laden dust. Blastomycosis most commonly presents as a subacute pulmonary disease but can range from asymptomatic to disseminated disease. For symptomatic infections, the incubation period ranges from 30 to 45 days.

Case definition

The case definition for confirmed blastomycosis in Illinois is culture confirmation of *Blastomyces dermatitidis*. If the diagnosis was based on a needle aspirate or other diagnostic specimen with demonstration of organism resembling *Blastomyces* or a presumptive *Blastomycosis* culture, it is considered a probable case.

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 – 102 (previous five-year median=87). All cases were confirmed. From 2000 to 2005, cases per year ranged from 47 to 102 (Figure 7). The 2005 incidence rate was 0.83 per 100,000 population in Illinois.
- Age - The mean age was 45 years (range 11 to 89) (Figure 8).
- Gender – Fifty-eight percent were male.
- Race/ethnicity - Sixty-four percent of the cases were white, 24 percent were African American and 11 percent were other; 20 percent were Hispanic.
- Geographic distribution – Sixty-nine percent of the cases had residential addresses in Cook, Kane or Lake counties (Figure 9).
- Reporting – The most common reporters were hospital personnel (62) and laboratory staff (34).
- Treatment – Eighty-five percent of cases were hospitalized; six cases were fatal with a mean age of 56.

Summary

A higher number of blastomycosis cases were reported in 2005 (102 cases) as compared to the five-year median of 87. This is the highest number of cases reported since at least 1996. Blastomycosis cases occur predominantly in adults. Sixty-nine percent of cases occurred in three counties: Cook, Kane or Lake counties.
Figure 7. Blastomycosis Cases in Illinois, 2000-2005

Figure 8. Blastomycosis Cases by Age in Illinois, 2005
Botulism

Background

There are three forms of botulism: foodborne, wound and intestinal (adult and infant). Foodborne botulism is caused by a neurotoxin produced by *Clostridium botulinum*. All forms of botulism produce the same distinct clinical syndrome which includes symmetrical cranial nerve palsies followed by descending flaccid paralysis which can progress to respiratory failure and death. *C. botulinum* is found in soil and aquatic sediments. Seven toxins (A-G) can be produced by *C. botulinum*. *C. baratii* and *C. butyricum* also can produce some botulinum toxins. Human cases are caused mainly by toxin types A, B, E and rarely F. Toxins cause neuromuscular blockage which results in flaccid paralysis. *C. botulinum* can form a spore that survives cooking and food processing measures. Spore germination can occur during anaerobic conditions, nonacidic pH and low salt and sugar content. Toxins are inactivated by heating. Foods causing foodborne botulism include home canned foods and traditional Alaska native dishes.

Wound botulism has increased in recent years due to an increase in injection drug users, especially those who use heroin. Infant botulism is the most common form of botulism and occurs in infants younger than 1 year of age. Infant botulism, a form of intestinal botulism, results when swallowed spores germinate and temporarily colonize the large intestine. It is believed to occur because competing organisms are not yet present in the digestive tract. Honey consumption probably only accounts for about 20 percent of infections. Botulism in infants younger than 12 months of age should be suspected when constipation, lethargy, poor feeding, weak cry, bulbar palsies and failure to thrive are present. Diagnosis of infant botulism involves detection of botulinum toxin in stool or serum by using a mouse neutralization assay or the isolation of toxigenic *C. botulinum* in the feces by enrichment culture techniques. Adult intestinal botulism is rare and occurs mainly in patients with an anatomical or functional bowel abnormality or those patients using antimicrobials which decreases the normal flora to compete with *Clostridium* species. Iatrogenic botulism is caused by injection of botulinum toxin for cosmetic or therapeutic purposes. The doses used for cosmetic treatment are too low to cause systemic disease.

The absence of cranial nerve palsies (blurry vision, diplopia, ptosis, facial paralysis, dysphagia, severe dry mouth) rules out a diagnosis of botulism. Flaccid descending paralysis follows and eventual constipation. The patient retains intellectual function.

Nineteen cases of foodborne botulism were reported in 2005 to CDC. There were also 85 cases of infant botulism and 31 cases of other types of botulism. Foodborne botulism results from ingestion of preformed toxin present in contaminated food. Diagnostic clues for foodborne botulism are primary neurologic symptoms including descending paralysis, normal body temperature, diplopia, blurred vision and ptosis with no altered mental status. Differential diagnoses include myasthenia gravis and Guillain-Barré syndrome. These can be differentiated using electromyography (EMG), the pattern of paralysis and reaction to Tensilon. The paralysis of botulism is flaccid, symmetrical and descending. Treatment for foodborne botulism is prompt administration of polyvalent equine source antitoxin which can decrease progression of paralysis but cannot reverse
existing paralysis. Equine botulinum antitoxin for types A, B and E can prevent progression of neurologic disease if administered early in the course of illness.

Wound botulism occurs after the causative organism contaminates a wound that is anaerobic.

If foodborne botulism is suspected, contact your local health department immediately. This will allow for rapid investigation to identify the source. If the source was a commercial product, it could be removed promptly from the market.

**Case definition**

**Botulism, infant**

Clinical illness may include poor feeding, constipation, failure to thrive, and respiratory failure. The case definition for infant botulism is a clinically compatible case that is laboratory confirmed, occurring in a child younger than 1 year of age. Laboratory confirmation is isolation of *C. botulinum* from stool or detection of botulinum toxin in stool or serum.

**Botulism, foodborne**

Clinical illness includes diplopia, blurred vision and bulbar weakness. Symmetric paralysis may progress quickly. Laboratory confirmation consists of detection of botulinum toxin in stool, serum or patient’s food or isolation of *C. botulinum* from stool. A probable case is a clinically compatible case with an epidemiologic link (ingestion of home-canned food within the previous 48 hours). A confirmed case is a clinically compatible case that is laboratory confirmed or that occurs among persons who ate the same food as persons who have laboratory-confirmed botulism.

**Botulism, wound**

Common symptoms include diplopia, blurred vision and bulbar weakness as well as symmetric paralysis. Laboratory confirmation is by detection of botulinum toxin in serum or isolation of *C. botulinum* from wound. A confirmed case is a clinically compatible illness that is laboratory confirmed in a patient who has no suspected exposure to contaminated food and who has a history of a fresh, contaminated wound during the two weeks before symptom onset.

**Descriptive epidemiology**

- There was one case of foodborne and one case of infant botulism in 2005.
- A case of foodborne botulism was reported in a Cook County resident in June. Type F toxin was found in stool and the CDC laboratory identified *C. baratii*. No food source could be linked as the source of illness. The patient had classic botulism symptoms and died.
- A case of infant botulism was reported in a Cook County resident in May. The child was floppy and had a drooping head. Toxin type A was identified in specimens at CDC. No source of infection could be identified for the child.

**Suggested readings**

Brucellosis

Background

Brucellosis is a systemic bacterial infection caused by *Brucella* species that can cause intermittent or continuous fever and headache, sweating and arthralgia. The incubation period varies from one to two months. Symptoms can last from days to years. *Brucella* species considered of importance in human disease include *B. abortus* (cattle are the primary reservoir), *B. melitensis* (sheep and goats are the primary reservoir) and *B. suis* (swine are the primary reservoir). Dogs are reservoirs of *B. canis* but are not considered to be an important public health concern in the United States. Transmission is by contact with animal tissues, such as blood, urine, vaginal discharges, aborted fetuses and placentas and by ingestion of raw milk or other dairy products. Investigation of *Brucella* cases could reveal foci of infection in United States livestock that should be investigated and eliminated. The disease is most common in residents or travelers to the Mediterranean, Middle East, Mexico, and Central and South America. The large majority of human *Brucella* cases are thought to be due to travel outside the country and consumption of contaminated products from those countries. *Brucella* is also a Class A bioterrorism agent. Biosafety level 3 is recommended for laboratory manipulation of isolates.

*Brucella* is the most commonly recognized cause of laboratory transmitted infection; about 2 percent of all *Brucella* cases may be laboratory acquired. The infecting dose for humans is low, and the organism can enter the body in many ways including respiratory, conjunctivae, gastrointestinal tract or abraded skin. The incubation period is usually two to four weeks. Symptoms include fever, headache, malaise, night sweats and arthralgia. Most cases of laboratory-acquired infection are from the more virulent *B. melitensis* species.

In a study of the epidemiology of brucellosis in Germany from 1962 to 2005, it was determined that brucellosis has changed from an occupational disease, mainly of persons associated with the cattle industry to a travel-associated foodborne zoonosis. In some developing countries the incidence of brucellosis may be as high as 200 per 100,000 but the disease is rare in the United States. In the United States in 2005, 120 human brucellosis cases were reported to CDC. Most were in international travelers or immigrants. Illinois was third in the nation in the number of *Brucella* cases reported.

Case definition

Illinois uses the CDC case definition for brucellosis. The case definition for a confirmed case of brucellosis is a clinically compatible illness with one of the following laboratory findings: isolation of *Brucella* from a clinical specimen, a four-fold or greater rise in *Brucella* agglutination titer between acute and convalescent phase serum specimens obtained greater than or equal to two weeks apart and studied at the same laboratory or demonstration of *Brucella* species in a clinical specimen by immunofluorescence. A probable case is defined as a clinically compatible case that is epidemiologically linked to a confirmed case or that has supportive serology (i.e., *Brucella* agglutination titer of $\geq 160$ in one or more serum specimens obtained after symptom onset).
Descriptive epidemiology

- Number of cases reported in Illinois in 2005 – 13 (Nine were confirmed and four were probable) (See Figure 9). The five-year median was seven cases per year.
- Age - Median age was 44 years (range 6 to 85 years).
- Gender - Four cases were male and nine were female.
- Race/ethnicity – Race was known for eight cases and all eight were white. Of 10 cases with ethnicity known, eight cases were Hispanic.
- Geographic distribution by residence – Cases resided in Cook (four cases), Boone (three cases), Lake (two cases), and one each in Knox, LaSalle, Peoria and Warren counties.
- Detailed case investigations were available on eight cases.
  - Case one – The patient was diagnosed with *B. melitensis* and had traveled to Mexico.
  - Case two – The patient was diagnosed with *B. melitensis* 2 and the case had traveled to Mexico previously but did not recall consuming unpasteurized milk.
  - Case three – The patient was diagnosed with *B. melitensis* 3 and drank unpasteurized milk in Mexico.
  - Case four – The case was infected with *Brucella melitensis* and had traveled to Mexico and consumed unpasteurized dairy products.
  - Case five – The case did not consume dairy products and was positive by serology.
  - Case six – The case was infected with *B. melitensis* 1 and had traveled to Mexico and consumed unpasteurized cheese.
  - Case seven – The patient traveled to Mexico and drank unpasteurized milk. *B. melitensis* 1 was isolated from the patient.
  - Case eight – *B. melitensis* 2 was isolated from the patient; the patient had consumed unpasteurized milk from overseas but the country was unknown.
- Diagnosis – Cultures were *Brucella* positive for nine cases. Results for speciation were identified for eight isolates; *B. melitensis* (1), *B. melitensis* 1 (2), *B. melitensis* 2 (3) and *B. melitensis* 3 (2). Three tested positive at a commercial lab and at the time of this report, the method of diagnosis for one case was unknown.
- Epidemiology – Six persons of eight with an epidemiologic history reported travel to Mexico. Five of the eight persons remembered consuming unpasteurized dairy products from other countries.
- Laboratory exposures – Nine laboratory workers in one hospital were placed on prophylactic antibiotics after exposure to a *Brucella* culture in June 2005. A culture plate was dropped. A second incident involving several laboratory workers at a Lake County hospital were exposed to *Brucella* and placed on prophylactic antibiotics in May 2005.

Summary

In Illinois, brucellosis is an uncommon disease and tends to occur primarily in individuals who have recently traveled to foreign countries and consumed unpasteurized dairy products or who have consumed unpasteurized dairy products imported from foreign countries. In 2005, there were 13 brucellosis cases reported in Illinois residents which was the third highest number among the states reporting cases (California and Texas reported higher numbers of cases).
Suggested readings


Figure 9. Brucellosis Cases in Illinois, 2000-2005
Campylobacteriosis

Background

Campylobacteriosis is a zoonotic bacterial enteric disease caused primarily by *Campylobacter jejuni* and occasionally by *Campylobacter coli*. *Campylobacter* organisms are motile, gram-negative bacilli with a curved shape. The infectious dose is large. The incubation period is two to five days. Symptoms, may last up to 10 days and include diarrhea, abdominal pain and fever; however, many infections are asymptomatic. Sequelae may include reactive arthritis, febrile convulsions, a typhoid-like syndrome, Guillain-Barré syndrome or meningitis. *C. jejuni* infection is the most frequently identified infection preceding Guillain-Barre syndrome. Reactive arthritis can occur seven to 10 days after diarrheal illness. Excretion of the organism can occur for two to seven weeks.

Approximately 1 percent of the population acquires *Campylobacter* each year in the United States. Among all 10 diseases under active surveillance in the federal FoodNet sites (*Campylobacter*, *Cryptosporidium*, *Cyclospora*, *E. coli* O157:H7, HUS, *Listeria monocytogenes*, *Salmonella*, *Shigella*, *Vibrio* and *Yersinia enterocolitica*), infection with *Campylobacter* comprised 34 percent of all of those reported in 2005. The preliminary overall incidence for this infection from the 10 FoodNet sites was 23 per 100,000 in 2005. The 2010 national health objective is for less than 12 cases per 100,000. *Campylobacter* decreased 30 percent from 1996-1998 to 2005 in data from the FoodNet sites.

The reservoir for *Campylobacter* is in animals, most commonly poultry and cattle. The most important mode of transmission to humans is the consumption and handling of raw poultry products. *Campylobacter* is found in approximately 80 percent of retail chicken meat. *Campylobacter* is also a cause of traveler’s diarrhea. In a study in Minneapolis, almost a quarter of 152 cats tested randomly in veterinary clinics were positive for *Campylobacter*. Fifteen of these cats had diarrhea. Younger cats were more likely to be positive. The main *Campylobacter* isolate was *C. upsaliensis*. This pathogen has been identified as a cause of human illness.

Prevention of campylobacteriosis includes cooking meat thoroughly, avoiding cross-contamination between foods and hand washing after animal handling.

Case definition

The case definition for a confirmed case of campylobacteriosis in Illinois is a clinically compatible illness with isolation of *Campylobacter* from any clinical specimen. A probable case is a clinically compatible illness that is epidemiologically linked to a confirmed case.

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 – 1,376 (previous five-year median = 1,235); incidence rate of 11 per 100,000 (Fig. 10). All but one were confirmed cases.
- Gender – Fifty-five percent of cases were male.
- Age - Mean age of reported cases was 48; highest incidence rate occurred in those younger than 5 years of age: 17 per 100,000 (Figure 11).
- Race/ethnicity - The majority of cases (88 percent) were in whites, with 4 percent in African Americans, 2 percent in Asians and 6 percent in other races. Those indicating Hispanic ethnicity accounted for 14 percent of the cases. There was a significantly
higher proportion of whites with campylobacteriosis and a lower proportion of African Americans with the disease than in the total Illinois population.

- **Seasonal variation** - Campylobacteriosis was reported more often in the warmer months of the year in Illinois (May through August) (Figure 12).
- **Geographic location** – Counties with the highest incidence per 100,000 in 2005 were Gallatin (62), Stephenson (43), Calhoun (39), Richland (37) and Carroll (36) (Figure 13).
- **Clinical** – Twenty-six percent of 963 reported cases with hospitalization information were hospitalized. One person with underlying health conditions was reported to have died as a result of illness.
- **Reporting** – The majority of cases were reported by hospital personnel (723 cases) and laboratory staff (231 cases).

**Summary**

The incidence of the disease increased between 2003 (10 per 100,000) and 2005 (11 per 100,000). This rate was slightly below the 2010 national objectives of 12 per 100,000. *Campylobacter* infections occur more commonly from May through August. The incidence was highest in 1 to 4-year-olds. Whites are more likely to be reported with campylobacteriosis than other races.

**Suggested readings**


Figure 11. Incidence of Campylobacteriosis Cases in Illinois by Age, 2005

Figure 12. Campylobacteriosis Cases in Illinois by Month, 2005
Figure 13. Incidence of *Campylobacter* by County in Illinois, 2005
Central Nervous System Infections

General
Both aseptic meningitis and acute encephalitis are reportable in Illinois. The purpose of this reporting is to identify arboviral infections. Control measures for arboviruses are possible and include public education and mosquito control activities.

Aseptic meningitis is usually a self-limiting illness characterized by sudden onset of fever, headache and stiff neck. A rash may be present along with vomiting, photophobia and nausea. In the United States, enteroviruses cause most cases with known etiology. Some arboviral infections may present as aseptic meningitis.

Acute infectious and post-infectious encephalitis are reportable in Illinois. Infections are characterized by headache, high fever, meningeal signs, stupor, disorientation, coma, tremors, convulsions or paralysis.

Aseptic meningitis and encephalitis are combined into an unknown etiology and known etiology category. Arbovirus infections were put in a third section. Cases of each type of CNS infection are shown in Table 1 and the number of reported CNS infections by year is shown in Figure 14.

Table 1. Number of reported CNS infections reported in Illinois, 2005

<table>
<thead>
<tr>
<th>Type of CNS Infection</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aseptic meningitis, unknown etiology</td>
<td>1,117</td>
</tr>
<tr>
<td>Aseptic meningitis, known virus, not arboviral</td>
<td>110</td>
</tr>
<tr>
<td>Encephalitis, acute, known virus, not arboviral</td>
<td>24</td>
</tr>
<tr>
<td>Encephalitis, acute, unknown etiology</td>
<td>127</td>
</tr>
<tr>
<td>WNV</td>
<td>252</td>
</tr>
<tr>
<td>California encephalitis</td>
<td>1</td>
</tr>
<tr>
<td>SLE</td>
<td>0</td>
</tr>
<tr>
<td>Dengue</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,632</td>
</tr>
</tbody>
</table>

Figure 14. Reported Non-bacterial CNS Infections by Year in Illinois, 2000-2005
Aseptic Meningitis or Encephalitis of Unknown Etiology

Background
Both aseptic meningitis and encephalitis are reportable in Illinois. One of the purposes of this reporting is to identify arboviruses. Although virus isolation and serologic testing for arboviruses (during the appropriate season) is offered for free to health care providers for all persons in the state with aseptic meningitis or encephalitis, the etiology of many cases of aseptic meningitis and encephalitis remains unknown.

Case definition
The case definition for aseptic meningitis in Illinois is a clinically compatible illness diagnosed by a physician as aseptic meningitis with elevated white blood cells in the CSF but no laboratory evidence of bacterial or fungal meningitis. For aseptic meningitis of unknown etiology, no virus could be isolated from the person and testing for arboviruses was negative or testing was not done.

The case definition for primary encephalitis is a clinically compatible illness diagnosed by a physician as primary encephalitis. For encephalitis of unknown etiology, no virus could be isolated from the patient and there were no positive tests for arboviruses.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 – 1,244 (1,117 meningitis cases and 127 encephalitis cases).
- Age - Annual incidence rate was highest in those younger than 1 year of age (115 per 100,000) (Figure 15). In all other age groups, the incidence rate was below 12 per 100,000. The mean age of reported cases was 28.
- Gender – Forty-nine percent were male.
- Race/ethnicity – Seventy-five percent white, 20 percent African American and 4 percent other races; 22 percent Hispanic.
- Seasonal variation - Most common June through October (Figure 16); Of the total cases, 847 had onsets between May 15 and October 31 (397 cases had onsets outside of this time frame).
- Geographic distribution - Highest annual incidence rates per 100,000 population for 2005 were in Cumberland (27), Tazewell (26), Douglas (25), Cass (22) and Kane (21) counties.

Summary
Cases of aseptic meningitis and acute encephalitis with no known cause occur with greater frequency in the summer months and in those younger than 1 year of age. However, reporting of these infections is required from May 15 through October 31 resulting in an increase in reporting during these months of the year.
Figure 15. Incidence of Aseptic Meningitis and Encephalitis, Unknown Etiology in Illinois by Age, 2005

Figure 16. Aseptic Meningitis and Encephalitis, Unknown Etiology by Month, 2005
Aseptic Meningitis or Encephalitis of Known Etiology, Excluding Arboviruses

Background
Both aseptic meningitis and encephalitis are reportable in Illinois. One of the purposes of this reporting is to identify arboviruses. Virus isolation is offered to all health care providers of persons in the state with aseptic meningitis or encephalitis, and this helps to identify the etiology of some cases.

Encephalitis can be caused by infectious, postinfectious and postimmunization causes. Pathogens causing infectious encephalitis include herpes simplex virus, arboviruses, lymphocytic choriomeningitis, mumps, cytomegalovirus, Epstein-Barr virus, human herpesvirus 6 and enteroviruses. Herpes simplex is a common cause of acute encephalitis that occurs most frequently in children and the elderly. Many encephalitis cases in the United States and Illinois are not identified as to the etiology.

Aseptic meningitis is an inflammation of the meninges that cover the brain and spinal cord. It is often caused by a virus, frequently an enterovirus. Enterovirus activity usually peaks during summer and early fall. Enterovirus illness is usually mild and only a small proportion result in aseptic meningitis. Children are at greater risk of severe manifestations with enteroviruses. Adults with enterovirus are more likely to experience upper respiratory symptoms. Enterovirus is shed in saliva and feces of infected persons. Persons should wash their hands thoroughly after using the bathroom and avoid sharing drinks and utensils during an outbreak.

Enterovirus infections are not nationally notifiable. Serotypes of human enteroviruses are classified into echoviruses, coxsackieviruses and polioviruses. From 1970 through 2005, the five enteroviruses most commonly reported to CDC through the national voluntary enterovirus typing included echoviruses 9,11,30 and 6 and coxsackie B5. Children younger than 1 year of age accounted for 44 percent of reports. Seventy-eight percent of reports were reported from June through October. CSF was the most common specimen type followed by respiratory and fecal submissions. They are reportable in Illinois as a part of the state aseptic meningitis reporting.

Case definition
The case definition for aseptic meningitis in Illinois is a clinically compatible illness diagnosed by a physician as aseptic meningitis with elevated white blood cells (greater than 4 cells) in the CSF but no laboratory evidence of bacterial or fungal meningitis. For aseptic meningitis of known etiology, a virus could be isolated from the person and no arbovirus testing was positive in specimens from the person.

The case definition for primary encephalitis is a clinically compatible illness diagnosed by a physician as primary encephalitis. For encephalitis of known etiology, a virus could be isolated from the patient and there was no positive test for arboviruses.

Descriptive epidemiology
- Number of cases – The number of cases reported was 134 (110 meningitis and 24 encephalitis).
- Age – The mean age was 24 years.
- Gender – Fifty percent of cases were male.
- Race/ethnicity – Seventy-three percent were white, 23 percent African American and 3 percent other races; 16 percent were Hispanic.
Seasonal variation - Aseptic meningitis or encephalitis of known etiology, excluding arboviruses were most commonly reported from August through October (Figure 17). Of the 134 cases, 105 cases (78 percent) had onsets during arbovirus season from May 15 through October 31.

Geographic – The four counties reporting the highest number of cases were Cook (53), Winnebago (12), DuPage (10) and Sangamon (nine).

Diagnosis – Viruses identified as the etiologic agent were enterovirus, not further specified (29), herpes simplex (27), coxsackie B5 (nine), coxsackie B3 (two), coxsackie virus, not further specified (three), echovirus 6 (12), echovirus, not further specified (four) and one each for coxsackie A9, enterovirus 70, echovirus 9, echovirus 11, echovirus 30 and cytomegalovirus. Post-infectious infections were due to post varicella zoster (three), post Epstein Barr virus (three) and post influenza (one). Other viruses were specified in 28 cases. Other types of organisms reported as etiologic agents included Cryptococcus (six) and Cryptosporidium (one).

Summary

In 388 of 1,632 (24 percent) of encephalitis and aseptic meningitis cases, an etiologic agent (including arboviruses) was identified as the cause of illness. Herpes simplex, coxsackie B5 and echovirus 6 were the most common specific viruses identified as the causative agents for aseptic meningitis and encephalitis cases. Arbovirus cases are described in a later section.

Suggested readings
Arboviral Infections

Background

Arboviruses that cause encephalitis are members of the Togaviridae, Flaviviridae or Bunyaviridae families. Humans and domestic animals, such as horses, can develop clinical disease but are usually dead-end hosts because they do not develop sufficient viremia to contribute to the transmission cycle. Arboviral infections that have ever been reported in Illinois residents due to exposure in Illinois include those due to West Nile virus infection (WNV), St. Louis encephalitis (SLE), California encephalitis (CE) encephalitis and Western equine encephalitis (WEE) viruses. WEE has not been seen in Illinois since the 1960s. The most likely mosquito-borne diseases to occur in people in Illinois as of 2005 are WNV and CE.

WNV is a flavivirus in the Japanese encephalitis antigenic complex. Birds become infected from mosquitoes. Infected ticks and bird-bird transmission also may occur. WNV is maintained in a bird-mosquito-bird cycle with passerine birds as the primary amplifiers. Mosquitoes from the Culex genus are the primary WNV vectors.

The incubation period for WNV is three to 14 days in people. WNV can cause a wide variety of clinical syndromes, including fever, meningitis, encephalitis and a flaccid paralysis characteristic of a poliomyelitis-like syndrome. About 80 percent of human infections are asymptomatic. Febrile illness (fever, headache, fatigue, backache, myalgia) is not uncommon. Gastrointestinal symptoms and a rash may also occur. The rash is usually maculopapular and appears between days five to 12 of illness. WNV produces a viremia that tends to disappear with the onset of clinical symptoms. IgM antibodies can persist for up to a year following infection.

Screening of blood donations began in June 2003 in the United States. In a study of blood donors in North Dakota in 2003, 256 infections were identified by blood donor testing per neuroinvasive case. The highest seroprevalence in North Dakota occurred in September and was 5 percent. CDC received data from blood donor centers and the seasonal incidence of WNV was 0.11 per 100,000. This would have meant the estimate of actual WNV infections in Illinois in 2003 would have been 14,399 WNV infections.

In the United States, total human cases reported to CDC by year are as follows: 2000 (21), 2001 (66), 2002 (4,156), 2003 (9,862), 2004 (1,604) and 2005 (3,000).

CE virus is the main cause of pediatric encephalitis in the United States. The illness occurs most commonly in children younger than 15 years of age (the elderly are at greatest risk of SLE). In Illinois, cases of CE virus infection are most often reported from Peoria, Tazewell and Woodford counties. The main vector is thought to be Ochlerotatus triseriatus (treehole mosquitoes). The primary vector of CE is a container-breeding mosquito. Therefore, human activities which can increase the numbers of containers such as tires or buckets, can increase the population of the treehole mosquito. On September 2, 2005, the Illinois Department of Public Health (IDPH) lab began testing only those less than 18 years of age for CE due to limitations on reagents for testing. Illinois was one of 13 states reporting cases. A total of 80 cases were reported in the United States.

SLE also can be identified in persons in Illinois. In 2005, 13 cases of SLE were reported from four states. In the United States, there were also 21 cases of Eastern equine encephalitis (EEE) reported, one case of Powassan and no cases of Western equine encephalitis (WEE). Arboviral encephalitis prevention includes limiting mosquito bites in humans and reducing mosquito habitat. Mosquito bites can be minimized by
using appropriate repellents, by avoiding the outdoors during peak mosquito feeding times and by repairing screens on windows and doors. The use of repellents provides the best protection against mosquitoes. Prevention involves personal protective behaviors and mosquito control activities. People can eliminate breeding areas for mosquitoes such as standing water in clogged rain gutters.

Dengue is an arbovirus caused by four serotypes (DEN-1, DEN-2, DEN-3 and DEN-4). It is present in most tropical and subtropical parts of the world. United States residents who travel to countries with endemic dengue are at risk for disease. The incubation period ranges from three to 14 days. Dengue infection can range from asymptomatic to mild to severe disease. Persons traveling to areas with dengue should wear repellents and protective clothing. Diagnosis is by acute and convalescent serum samples. Dengue is not nationally notifiable. There were 61 cases of Dengue reported in the United States.

During the period May 15 through October 31, physicians and laboratories in Illinois are encouraged to submit cerebrospinal fluid (CSF) from aseptic meningitis and encephalitis cases to the IDPH laboratory for further testing. In addition, serum samples are requested for testing for arboviral antibody from clinically compatible cases. The CSF is examined for antibodies to multiple arboviruses depending on the availability of laboratory testing reagents for that virus.

**Case definition**

The case definition for a confirmed case of arboviral encephalitis in Illinois is a clinically compatible illness that is laboratory confirmed at a public health laboratory. The laboratory criteria are a fourfold or greater rise in serum antibody titer; or isolation of virus from, or demonstration of viral antigen in, tissue, blood, CSF or other body fluid; or specific IgM antibody in CSF. A probable case of arboviral encephalitis is a clinically compatible illness occurring during the season when arbovirus transmission is likely to occur and with the following supportive serology: a stable (twofold or smaller change) elevated antibody titer to an arbovirus, e.g., > 320 by hemagglutination inhibition, > 128 by complement fixation (CF), > 256 by IF, > 160 by neutralization, or a positive serologic result by enzyme immunoassay (EIA).

**Descriptive epidemiology**

**California encephalitis surveillance**

A confirmed case of California encephalitis was identified in a 3-year-old resident of Jo Daviess County in August. There were several areas where the child may have been exposed: fairgrounds, home and dump sites. Near the home there were tires with standing water, open containers and tree holes. The owners were advised to fill the tree holes with sand and remove the tires and open containers. At the fairgrounds, there were tires present and some were on fences. They were advised the loose tires needed to be removed and the fence tires need to have a drainage hole placed in the bottom so water drains from the tires.

The past case numbers of CE in Illinois are as follows: 1993 (two), 1994 (six), 1995 (five), 1996 (13), 1997 (three), 1998 (four), 1999 (three), 2000 (three), 2001 (five), 2002 (eight), 2003 (11) and 2004 (eight) (Figure 18).
SLE Surveillance
Occurrence – No cases of SLE were reported in 2005.

Dengue
One case of dengue was reported in a 21-year-old female with onset in July. She had traveled to Costa Rica. Past case numbers are: 1993 (one), 1994 (two), 1995 (two), 1996 (none), 1997 (four), 1998 (one), 1999 (two), 2000 (two), 2001 (two), 2002 (none), 2003 (none) and 2004 (three).

West Nile virus surveillance

**Human**
- Number of cases reported in Illinois – 252 WNV cases were reported; 114 (45 percent) were confirmed and 138 (55 percent) were classified as probable (Figure 24). The incidence in Illinois was two cases per 100,000 population.
- Age – Ages ranged from 9 years to 92 years of age (mean = 55) (Figure 19).
- Gender – The number of male cases was 114 (45 percent).
- Race/ethnicity – The number of cases reporting white race were 195 (90 percent) with 12 (5 percent) reporting African American race and 10 (5 percent) report other race. Seven percent of 166 cases reported being of Hispanic ethnicity.
- Clinical Presentation – Cases were classified as: WNF (90), neuroinvasive disease (138) and other (24) (Figure 20). Of the neuroinvasive cases, 78 were classified as encephalitis, 57 were classified as meningitis and three were classified as flaccid paralysis. For individuals older than 59 years of age, 62 percent had neuroinvasive disease as compared to 50 percent of those less than 60 years of age. Cases exhibited the following symptoms: fever, 227 (90 percent), headache 178 (79 percent), stiff neck, 84 (45 percent), rash, 78 (39 percent) and change in consciousness, 71 (38 percent). Twenty-two persons were reported to have been on ventilators.
- Hospitalization – The number of cases reporting hospitalization were 186 of 238 (78 percent).
- Fatalities – Twelve cases were fatal. Due to age and underlying illness the direct cause of death may not have been WNV. All but one fatal case had neuroinvasive disease. Fatal cases ranged in age from 50 to 92 years of age (mean = 78 years).
- Diagnosis – The IDPH laboratory performed the MAC ELISA test on all submitted specimens. All cases were tested at public health laboratories before being counted as cases.
- Blood transfusion- Twelve cases were identified by blood donor testing.
- Seasonal Distribution – Onset of cases ranged from June 11 (Jackson County) through October 5 (Cook County). Figure 21 shows the number of WNV infections by week.
- Geographic Distribution – Twenty-one counties in Illinois had evidence of WNV activity in humans (Figure 22). The largest number of cases per county (133, 53 percent) occurred in Cook County (incidence 100,000 population = 2.5). Incidence rates in selected other counties were DuPage (5.2 per 100,000), Kane (4.2 per 100,000) and Peoria (3.8 per 100,000).
Reporting – Of the 131 with the reporting source listed, the most frequent reporters were infection control professionals (86) and laboratory staff (20).

**Bird testing**

A total of 413 suitable dead birds were submitted for WNV testing in 2005. To be considered suitable, birds had to be the correct species (blue jays, crows and robins) and could not be too decomposed for testing. Birds were necropsied at the Illinois Department of Agriculture (IDOA) laboratory in Galesburg, Illinois, and at the University of Illinois in Urbana. Birds were testing using immunohistochemistry testing (IHC). A total of 232 birds tested positive (56 percent) from 38 counties. The types of positive birds were 162 crows, 67 blue jays and three robins.

The first WNV positive bird collection was from May 19 in Woodford County. The last positive bird of the season was collected on October 5 from Livingston County. Birds were submitted from 64 of the 102 Illinois counties. No birds were collected from 38 counties. Thirty-eight counties of 64 submitting (59 percent) had positive birds identified.

**Mosquito Pool Testing**

In 2005, 2,523 (17 percent) mosquito pools tested positive. Thirty of 64 counties (47 percent) with testing had positive mosquito pools. Of the 2,512 mosquito pools with a known type of mosquito, the positive pools were *Culex* spp. (2,507), *Aedes* spp (one) and *Anopheles* (four). The first positive mosquito pool was collected on May 18 from DuPage County. The last positive mosquito pool was collected on November 2 from Cook County.

**WNV Horse testing**

In 2005, 16 horses and donkeys tested positive for WNV. Positives were identified in 16 counties. The first positive was identified on June 22 in Will County and the last positive on November 16 from Johnson County. Testing was by IgM ELISA.

**Other species**

There was one other mammal (llama) that was positive for WNV. That positive animal was in Morgan County.

**Summary**

A total of 254 arboviral infections were reported in the state. These included WNV (252), CE (one) and dengue (one). Because encephalitis cases are more commonly reported in the summer months in Illinois, the Department asks physicians to increase testing to establish the etiology and to report individuals with acute encephalitis from May 15 to October 31 each year. This was the fourth year for humans to test positive for WNV in Illinois. Dead crows, blue jays and robins tested positive for WNV in 38 counties in Illinois. Fifty-six percent of all submitted dead birds were positive for WNV. Positive dead birds were collected in Illinois between May 19 and Oct 5. Positive mosquito pools were collected between May 18 and November 1. All counties had WNV activity reported in mosquitoes, birds, humans or other mammals.

The first collection date for positive WNV results was in mosquito pools on May 18, followed by birds on May 19. Human cases followed with a first onset on June 11.
During 2005, 252 human WNV cases were reported from 21 counties in Illinois. In 2005, the majority of the cases were in the Chicago metropolitan area (Cook, DuPage, Will, Lake and Kane counties).

Illinois had the second highest number of reported cases in the United States. The top five states in number of cases during 2005 were California, Illinois, South Dakota, Texas and Nebraska. In the United States the following number of cases and deaths were reported per year from 2002 through 2005 (Table 2).

Table 2. Number of human WNV cases and deaths in the United States, 2002-2005.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total # WNV human cases in U.S.</th>
<th>Deaths</th>
<th># states with human cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>4,156</td>
<td>284</td>
<td>39</td>
</tr>
<tr>
<td>2003</td>
<td>9,862</td>
<td>264</td>
<td>45</td>
</tr>
<tr>
<td>2004</td>
<td>2,539</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>2005</td>
<td>3,000</td>
<td>99</td>
<td>43</td>
</tr>
</tbody>
</table>

Suggested readings
Figure 20. Clinical Syndrome for WNV Cases in Illinois, 2005

- WNV fever: 35%
- WNV encephalitis: 31%
- WNV aseptic meningitis: 23%
- Other: 11%

Figure 21. Epidemic Curve for Human WNV Cases in Illinois, 2005

Number of cases

Week of onset
Figure 22. Map of human WNV cases in Illinois
**Haemophilus influenzae (Invasive Disease)**

**Background**

*Haemophilus influenzae* can cause invasive disease such as meningitis, septic arthritis, pneumonia, epiglottitis and bacteremia. *H. influenzae* forms part of the normal flora of the human throat and is divided into six serotypes (a through f). The organism is transmitted by droplets and discharges from the nose and throat. The incubation period is probably short, from two to four days. Children younger than 5 years of age should be vaccinated against *H. influenzae*.

In 2005, 361 cases were reported in those less than 5 years of age in the United States. Six percent of these cases (with a known serotype) were *H. influenzae* type b but 60 percent had missing information as to serotype.

**Case definition**

The case definition for a confirmed case of invasive *H. influenzae* in Illinois is a clinically compatible illness with isolation of the organism from a normally sterile site. A probable case is a clinically compatible illness and detection of *H. influenzae* type b antigen in CSF.

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2005 - 124 (five-year median = 109). All cases were confirmed. From 2000 to 2005, the number of cases reported per year ranged from 62 to 135 (Figure 23).
- Age – Sixty-seven percent of the cases were older than 49 years of age (Figure 24). Two type b cases were in individuals younger than five years of age.
- Gender – Fifty-three percent of cases were female.
- Race/ethnicity - Thirteen percent were African Americans, 82 percent were white and 7 percent were other races; 14 percent were Hispanic.
- Seasonal distribution – *H. influenzae* occurs throughout the year. (Figure 25).
- Presentation – Eighty-five cases had information available at the time of this report for presentation type. The type of presentation was primary bacteremia (54 percent), pneumonia (29 percent), meningitis (5 percent), epiglottitis (3 percent), cellulitis (1 percent) and other type (8 percent).
- Treatment – Ninety-one percent of 114 reported cases for which information was available were hospitalized.
- Mortality – Ten of 75 (13 percent) cases where information was available died. Eight of the 10 fatal cases occurred in individuals older than 50 years of age.
- Diagnosis - All cases were culture confirmed. Ninety-three cases had information available at the time of this report on location of isolation. *H. influenzae* was isolated from blood (86 cases), CSF (two cases) and from other sites (five cases). Typing was attempted on specimens from 70 of 124 (56 percent) of reported cases; 13 percent of the isolates for which typing was attempted were type b, 11 percent were type f and 4 percent were type e. Sixty-seven percent of cases were typed as nontypable.
- Reporting – Reporters were listed for 101 cases. Reporters included infection control professionals (87), laboratory staff (13), and nurse (one).
Summary

The number of *H. influenzae* cases (124 cases) exceeded the five-year median (109 cases). Cases occur throughout the year with an increase from January to March. Eighteen cases were in children younger than 5 years of age for whom the vaccine is indicated. The percent of isolates serotyped as type b increased from the 5 percent seen in 2004 to 13 percent of cases in 2005. Sixty-five percent were untypable. Fifty six percent of isolates were sent to a public health laboratory as required by regulation. Sixty-seven percent of all cases occurred in people older than 49 years of age.
Listeriosis

Background
Listeriosis is caused by infection with *Listeria monocytogenes*, which is common in the environment. It is a foodborne illness that can cause sepsis in immunocompromised persons and meningoencephalitis and febrile gastroenteritis in immunocompetent persons. Febrile gastroenteritis is considered to be uncommon.

Patients receiving antineoplastic therapy are more susceptible to listeriosis. Bloodstream infection, sepsis and meningitis are typical clinical presentations. Listeriosis has the highest case fatality rate of any foodborne illness. Pregnant women whose gastrointestinal tracts become colonized with the bacteria after they eat contaminated foods can transmit the organism to the fetus or can contaminate the baby's skin or respiratory tract during childbirth.

The median incubation period is three weeks, which makes identifying a suspect food vehicle difficult. *L. monocytogenes* is found frequently in nature and can be cultured from foods and the environment, which makes typing of isolates from patients and suspected food items important. The majority of isolates from cases are 1/2 a, 1/2 b or 4b. Pulse field gel electrophoresis can be used to further discriminate between isolates. Contaminated food vehicles often identified in outbreaks of listeriosis in the United States include unpasteurized dairy products and ready-to-eat deli meat. However, other vehicles have been identified.

*L. monocytogenes* can resist salt, heat, nitrite and acidity better than many other organisms. It also can survive and multiply at cold temperatures. Refrigerators at 40° F or below are best for reducing the potential for listeriosis.

Of the 10 diseases/syndromes under active FoodNet surveillance (those caused by *Campylobacter*, *Cryptosporidium*, *Cyclospora*, *E. coli* O157:H7, HUS, *Listeria monocytogenes*, *Salmonella*, *Shigella*, *Vibrio* and *Yersinia enterocolitica*), listeriosis comprised 0.8 percent of the reported infections in preliminary data from 2005. In 2005, 896 cases of listeriosis were reported to CDC. Most cases were among persons older than 59 years of age.

Case definition
Illinois uses the CDC case definition for *Listeria* cases: a clinically compatible history (stillbirth, listeriosis of the newborn, meningitis, bacteremia or localized infection) and isolation of *L. monocytogenes* from a normally sterile site. In the setting of miscarriage or stillbirth, isolation of *L. monocytogenes* from placental or fetal tissue is adequate as laboratory confirmation. A maternal-child pair will only be counted as one maternal case.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 – 32 total (five were described as cases of meningitis). The five-year median is 24 (Figure 26). The 2005 incidence for all reported listeriosis was 0.25 per 100,000 population.
- Age - Cases ranged in age from 20 to 93 years of age; 69 percent of cases were older than 59 years of age.
- Gender – Fifty-nine percent of cases were female.
- Race/ethnicity – Seventy-six percent were white, 14 percent were African
American and 7 percent were Asian; 9 percent reported Hispanic ethnicity.

- **Geographic Location** – Nineteen of the 32 cases were reported from Cook County.
- **Diagnosis** - The site of *Listeria* isolation was identified as follows: blood (26), fetus or placenta (two), cerebrospinal fluid (one), blood and CSF (one), pleural fluid (one) and unknown sites (one).
- **Species/type** – The species of *Listeria* was indicated for 19 isolates. *L. monocytogenes* was identified in 18 cases and *L. seeligeri* in one case. The CDC laboratory typed three cases as 4 b, two as 1 / 2 a and two cases as 1 / 2 b.
- **Underlying conditions** – Nineteen of 25 cases with information available on immunosuppressive conditions reported an immunosuppressive condition. These included cancer, diabetes mellitus, pregnancy, renal disease/dialysis or steroid therapy. Four cases were pregnant. One fetus was stillborn, one was born alive, one patient had a miscarriage and the outcome for one pregnancy was unknown.
- **Clinical** – Thirty-one of 32 cases were hospitalized. One case died among 21 cases with information on mortality.
- **Epidemiology** – Two cases resided in a residential facility prior to illness.
- **Reporting** – Twenty-seven cases were reported by infection control professionals and one by laboratory staff.
- **There were no outbreaks of reported listeriosis in Illinois in 2005.**

**Summary**

In 2005, Illinois recorded 32 listeriosis cases; 69 percent of the cases were older than 59 years of age. The incidence rate (0.25) which is similar to that described by CDC’s FoodNet sites in 2005 (0.3).
Invasive Neisseria meningitidis

Background

*N. meningitidis* is an important cause of bacterial meningitis and septicemia in the world. The bacteria that causes meningococcal disease, *N. meningitidis*, is carried in the pharynx by about 5 percent to 10 percent of the population. The organism is transmitted by direct contact with large respiratory droplets from the nose and throat of an infected person. Most patients acquire infection from an asymptomatic carrier during face-to-face contact including coughing, sneezing and kissing and the sharing of drinks, foods and cigarettes. The incubation period ranges from two to 10 days and is usually three to four days. Meningococcal disease is an acute bacterial disease that may be characterized by fever, headache, stiff neck, delirium and, often, a rash and vomiting. It presents as meningitis in 80 percent to 85 percent of cases. Septicemia also can result from infection with *N. meningitidis*. Approximately 11 percent to 19 percent of survivors experience sequelae including limb loss, hearing loss and neurologic disability. Rates of disease are highest among children younger than 2 years of age with a second peak at 18 years of age. However, 62 percent of meningococcal disease occurs among persons aged greater than 11 years. The majority of cases in infants are caused by serogroup B.

In the United States, the rate of meningococcal disease is 0.5-1.1 per 100,000 population each year. The overall case fatality rate is between 10 percent and 14 percent. Carriage of the meningococcus organism is transient and the level of carriage does not predict the course of an outbreak. Less than 1 percent of exposed persons who become infected develop invasive disease. Risk factors for *N. meningitidis* carriage were examined in British teenagers. Risk factors for carriage included attendance at bars and clubs, intimate kissing and cigarette smoking. Passive smoking was also linked to carriage.

The following groups are at increased risk for meningococcal disease: college freshman in dormitories, microbiologists who regularly handle isolates, military recruits, persons who travel to countries where *N. meningitidis* is epidemic, person who have terminal complement component deficiencies and persons who have anatomic or functional asplenia.

From July 1994 to June 2002, a total of 76 outbreaks were identified in the United States. Outbreaks were caused by serogroup C (63 percent), serogroup B (25 percent) and serogroup Y (12 percent). Of the 50 (65 percent) outbreaks that were organization based, 13 (26 percent) occurred in colleges, 19 (38 percent) occurred in primary and secondary schools and nine (18 percent) in nursing homes. Of the 76 outbreaks, 26 (34 percent) were community-based outbreaks. Vaccination campaigns were conducted in 34 outbreaks (30 serogroup C and four serogroup Y).

Antimicrobial chemoprophylaxis is used for close contacts of cases. Close contacts to cases include household members, child-care contacts, and persons directly exposed to the patient's oral secretions (e.g., by kissing, endotracheal intubation or management and mouth-to-mouth resuscitation). Only close contacts should be given chemoprophylaxis due to concerns about antimicrobial resistance.

Vaccination can be used as an adjunct measure to protect against A, C, Y and W135 serogroups. A meningococcal vaccine which protects against these serogroups was licensed in the United States in 1982. It is given routinely to military recruits and to certain travelers. The first meningococcal conjugate vaccine containing A,C,W-135 and Y was licensed in the United States in January 2005 for persons aged 11-55 years.
conjugate vaccine against serogroup B has been used successfully in some settings overseas. It has not been approved for use in the United States. Vaccination campaigns are used in highly selected situations. In January 2005, a tetravalent meningococcal polysaccharide protein conjugate vaccine, Menactra TM, was licensed for use among persons aged 11-55 years. This vaccine protects against types A, C, Y and W-135. ACIP recommends that children be vaccinated at their preadolescent health care visit at 11-12 years of age. If a child does not receive the vaccine at this age, it is recommended that they should receive the vaccine before high school, at 15 years of age. Students in college dormitories had higher rates of meningococcal disease than those not living in dormitories. As of November 2004, 31 states, including Illinois, had adopted legislation to require colleges to provide information to students about meningococcal disease.

In 2005, 1,245 cases were reported in the United States.

Case definition
The case definition for a confirmed case of meningococcal disease is a clinically compatible case with *N. meningitidis* isolated from a normally sterile site. The case definition for a probable case is a compatible illness with positive results on latex agglutination or gram-negative diplococci in CSF. A person without laboratory confirmation of *N. meningitidis* but with a clinical diagnosis of rash illness consistent with meningococcemia will be counted as a probable case in Illinois.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 - 34 (incidence of 0.27 per 100,000) (five-year median = 88) (Figure 27). Thirty-three cases were confirmed and one was probable. Five attended a school. Two cases were reported to be college students. No clusters required a vaccination campaign in 2005.
- Age - The age distribution of reported meningococcal disease is shown in Figure 28. Mean age of cases was 36 (range: 0 to 85 years of age).
- Gender – Fifty-six percent of cases with gender information were female.
- Race/ethnicity - Nineteen percent were African American and 69 percent were white; 18 percent were Hispanic.
- Seasonal distribution - Meningococcal disease occurred throughout 2005 with increases in the winter (Figure 29).
- Presentation - Case reports indicated that 76 percent of reported cases had meningococcemia and 24 percent had meningitis. Five cases had an unknown presentation at the time of this report.
- Diagnosis - The organism was isolated from blood only (23 cases), CSF only (five), blood and CSF (one) and other (one). Two cases had isolation from an unknown source at the time of this report and two were not culture positive. Serogrouping was performed on isolates from 18 (53 percent) of cases. In cases where typing was done, the serogroups identified were Y, nine (50 percent); C, three (17 percent); B, two (11 percent); W-135, none (0 percent) and nontypable, four (22 percent) (Figure 30).
- Treatment – Thirty-one of 34 (91 percent) of individuals with information available were hospitalized.
- Mortality - The case fatality rate was 13 percent for 23 patients where the outcome of infection was known. Ages of the three fatal cases were 41, 50 and 85
years of age.

- Reporting – Nineteen cases were reported by infection control professionals.
- Clusters – None reported.

**Summary**

The number of *N. meningitidis* cases reported in Illinois in 2004 (34) was lower than the five-year median (73 cases). Fifty-three percent of isolates were serogrouped. Serogroup Y was the most common serogroup reported. Serogroup Y isolates have increased from 25 percent of isolates in 1992 to 50 percent in 2005.

**Suggested readings**


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</tr>
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**Figure 27. Meningococcal Disease in Illinois, 2000-2005**
Invasive Group B *Streptococcus*

**Background**

Group B streptococcus (GBS) and *E. coli* cause most cases of sepsis in infants. Around 10 percent to 35 percent of pregnant women may be colonized with GBS at the time of labor placing them at risk for transmitting the disease to their infants.

GBS infections are due to *Streptococcus agalactiae* and cause disease and death in newborns and morbidity in peripartum women and nonpregnant adults with chronic medical conditions. Early-onset disease of neonates (<7 days) may consist of sepsis, respiratory distress, apnea, shock, pneumonia and meningitis. The infection is acquired during delivery or in utero. Early-onset disease is caused by maternal GBS carriage. Risk factors for early-onset GBS sepsis (that occur within 72 hours of life) include fever in the mother during labor, preterm delivery, membrane rupture greater than 18 hours before delivery and a mother with a previous infant with GBS. Infants acquire infection through aspiration of contaminated amniotic fluid or during passage through the birth canal. Late-onset disease (seven days to several months) is characterized by sepsis and meningitis and is acquired by person-to-person contact. Only about 50 percent of late-onset disease cases have been shown to be of maternal origin.

In a study of early onset GBS disease in CDC’s Active Bacterial Core Surveillance, cases decreased 33 percent from 2002-2001 to 2003-2005. Rates increased in black infants (0.33 per 1000 live births). In 2002, universal screening of pregnant women was recommended.

**Case definition**

A confirmed case of invasive GBS disease is defined as isolation of GBS from a normally sterile site (e.g., blood or cerebrospinal fluid). A probable case is defined as a person who is latex agglutination positive for GBS from a sterile site. Only cases less than 3 months of age are required to be reported in Illinois in 2005.

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2005 – 77; 63 cases were less than 3 months of age.
- Age – Sixty-five of 77 cases (76 percent) occurred in those younger than 1 year of age.
- Gender – Forty-three percent of all cases were female.
- Race/ethnicity – Forty-nine percent of all cases were white and 44 percent were African American; 24 percent were Hispanic. Forty-six percent of cases 3 months of age or younger were African American. There was a significantly higher proportion of African Americans with GBS as compared to their representation in the Illinois population.
- Seasonal variation - Cases occurred throughout the year.
- Diagnosis – All cases were confirmed by a positive culture. The organism was isolated from blood (56 cases), CSF (seven cases), blood and CSF (two cases) and other or unknown sites (two cases). Ten cases had an unknown site of isolation at the time of this report.
- Case outcome – Seventy-five of 76 cases with information available were hospitalized; four of 44 cases were known to be fatal. For those less than 3
months of age, 61 of 62 cases were hospitalized and two fatalities were among this age group.

- Reporter – Sixty cases were reported by infection control professionals

Summary

Cases of GBS disease in newborns can be prevented if the appropriate guidelines are followed by health care providers. Seventy-seven cases of GBS disease were reported in Illinois, the majority in those less than 3 months of age. Although only GBS disease in those less than 3 months of age is reportable, voluntary reporting of invasive GBS disease in persons older than 3 months of age occurs.

Suggested Readings

Cholera

Background
Cholera is a bacterial enteric disease that causes sudden onset of severe watery diarrhea and also may cause vomiting. Rapid dehydration and renal failure can occur. *Vibrio cholerae* serogroups 01 and 0139 are associated with cholera. Serogroup 01 has two biotypes: classical and El Tor. *V. cholerae* O139 is present in South East Asia. Cholera is transmitted by ingestion of contaminated food or water. The incubation period is usually two to three days.

Epidemics of cholera are associated with consumption of contaminated water, poor hygiene, poor sanitation and crowded living conditions. Cholera is one of three diseases requiring international notification to the World Health Organization. Eleven cases were reported to CDC in 2005 and all were caused by toxigenic *Vibrio cholerae* 01. The largest number of toxigenic *V. cholerae* 01 infections were reported in the United States since 1998. Approximately 36 percent were acquired outside the United States, 36 percent were in persons consuming domestic seafood and in 27 percent of persons no source was identified. Foreign travel and consumption of undercooked seafood are the primary sources of illness. Crabs harvested from the United States Gulf Coast can be a source of cholera. The average annual incidence from 2001 through 2005 in the United States was five cases per 100,000 population. Vaccines are available and are used in travelers to countries with cholera.

Case definition
A confirmed case of cholera in Illinois is a clinically compatible case (diarrhea and/or vomiting) that is laboratory confirmed. Laboratory confirmation is through isolation of toxigenic *V. cholerae* 01 or 0139 from stool or vomitus or serologic evidence of cholera.

Descriptive Epidemiology
No cases were reported in Illinois in 2005.

Summary
A case of cholera in Illinois was reported in 2004 but none were reported in 2005. Cholera is infrequently reported and is usually associated with travel overseas.
Cryptosporidiosis

Background
Cryptosporidiosis is primarily a gastrointestinal disease that affects humans and 45 other species. Disease results from infection with Cryptosporidium species oocysts. There are 12 species recognized. Two species, C. hominis (previously known as C. parvum genotype 1) and C. parvum (previously known as C. parvum, genotype 2) are the most important human pathogens. C. hominis is largely restricted to humans and C. parvum to a range of species including sheep, cattle and humans. The organism is shed in the feces in the form of an oocyst, which has a hard shell to protect it from the environment. Oocysts are immediately infective upon excretion by an infected host and can be shed for up to two weeks or longer in immunocompetent humans. Infection is spread through person-to-person transmission, from direct contact with animals and by swimming in contaminated water. Approximately 1 percent to 3 percent of the general population may be excreting oocysts. The incubation period is an average of seven days (range is one to 12 days). Predominant symptoms include profuse and watery diarrhea accompanied by abdominal cramping. Infection in immunocompetent people lasts one to two weeks. Persons at risk for more severe infection include young children, pregnant women or persons with weakened immune systems.

Oocysts of cryptosporidia can be found in many types of water including untreated surface water, filtered swimming pool water and even from chlorine-treated or filtered drinking water. The minimum level of detectable oocysts that pose a public health threat in domestic water supplies is not known. Outbreaks have occurred due to person-to-person and waterborne spread. Cryptosporidium is the leading cause of reported outbreaks of gastroenteritis linked to treated swimming venues.

Of the 10 diseases under active surveillance in FoodNet sites (illnesses caused by Campylobacter, Cryptosporidium, Cyclospora, E. coli O157:H7, HUS, Listeria monocytogenes, Salmonella, Shigella, Vibrio and Yersinia enterocolitica), Cryptosporidium comprised 8 percent of the reported infections in 2005 preliminary FoodNet data. This was a preliminary incidence rate of three per 100,000 for Cryptosporidium and ranged from 0.6 to 16 at the 10 FoodNet sites in 2005. In 2005, 5,659 cryptosporidiosis cases were reported to CDC through NETSS. The incidence ranged by state from 0.1 per 100,000 to 18 per 100,000.

Important features of cryptosporidiosis include: 1) waterborne outbreaks are typical, 2) oocysts are resistant to commonly used disinfectants 3) transmission can occur by direct fecal-oral contact, 4) as few as 10 to 100 oocysts can cause infection, 5) oocysts are infectious upon excretion and 6) asymptomatic infections occur.

Prevention of outbreaks includes advising ill persons to wash hands with soap and water after using the toilet and before eating or preparing food, to avoid swimming in recreational water during illness and for at least two weeks after diarrhea stops and to avoid fecal exposure during sexual activity. Environmental control measures, such as hyperchlorination may be needed when outbreaks in recreational water facilities are discovered.

Case definition
A confirmed symptomatic case of cryptosporidiosis in Illinois is laboratory confirmed (demonstration of Cryptosporidium oocysts in stool by microscopic examination, or demonstration of Cryptosporidium in intestinal fluid or small bowel biopsy specimens, or demonstration of Cryptosporidium oocyte or sporozoite by a specific
immunodiagnostic test such as ELISA or by PCR techniques or demonstration of reproductive stages in tissue preparations) associated with one of the following symptoms: diarrhea, abdominal cramps, loss of appetite, low-grade fever, nausea or vomiting. A confirmed asymptomatic case is a laboratory confirmed case associated with none of the symptoms described above.

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 – 160 cases (five-year median = 126; see Figure 31). All but two cases were confirmed. Three were reported to be asymptomatic. The incidence rate was 1.3 per 100,000.
- Age - Mean age for all 2005 cases was 33 years. Age distribution of cases is shown in Figure 32.
- Gender - Fifty-four percent were male.
- Race/ethnicity – Eighty-five percent were white, 12 percent were African American and 4 percent were other races; 8 percent were Hispanic
- Seasonal variation - Cases peaked in July through September (Figure 33).
- Clinical – Symptoms included diarrhea (97 percent), fever (48 percent) and vomiting (57 percent); 37 percent were hospitalized, One case was reported as having died from infection.
- Geographic location – The four counties with the highest number of cases were: Cook (42 cases), DeKalb (10), Stephenson (15) and Winnebago (18).
- Risk factors – Eighty persons reported contact with animals, including 16 who had contact with cattle. Sixteen persons reported travel outside the United States including travel to Mexico (five), the Bahamas (two), India (two) and Pakistan (two). Thirty-four cases traveled out-of-state including nine traveling to Wisconsin. Thirty-seventeen of 126 (29 percent) cases reported swimming in chlorinated water. Eighteen of 127 (14 percent) reported swimming in non chlorinated water.
- Outbreaks: In 2005, no recreational water outbreaks due to cryptosporidiosis occurred in Illinois. In INEDSS, 17 were listed as having been linked to an outbreak, with 13 of these involved in a Rockford day care. Cases occurred in August and September and were residents of Winnebago, Ogle and Stephenson counties. For an additional four persons the outbreak setting was not listed and no outbreak was reported to the state.
- Reporting – Fifty-six cases were reported by infection control professionals and 21 by laboratory staff.

Summary

The number of reported cases of cryptosporidiosis in 2005 was similar to the number reported in 2004. A large outbreak in 2001 increased the numbers in that year. Most cases in 2005 occurred in the late summer and early fall. The incidence of reported cryptosporidiosis in Illinois (1.3 per 100,000) was lower than the preliminary incidence reported by FoodNet (3 per 100,000).

Suggested readings

Cyclosporiasis

Background
Cyclosporiasis is caused by a protozoal organism, *Cyclospora cayatensis*. Clinical illness consists of watery diarrhea and abdominal cramping. Diarrhea is usually self-limiting but may be prolonged. The median incubation period is seven days. Transmission to persons is usually through drinking or swimming in contaminated water. Several international outbreaks have involved consumption of raspberries from Guatemala. Basil and lettuce have also been implicated in transmission.

In 2005, 543 confirmed cyclosporiasis cases were reported to CDC through NETSS. Illinois was sixth in the nation in the number of cases reported. Of the 10 diseases under active surveillance in FoodNet sites (illnesses caused by *Campylobacter, Cryptosporidium, Cyclospora, E. coli O157:H7, HUS, Listeria monocytogenes, Salmonella, Shigella, Vibrio* and *Yersinia enterocolitica*), *Cyclospora* comprised 0.39 percent of the reported infections in preliminary data from 2005. Data from 2005 showed the incidence rate was 0.15 per 100,000 for *Cyclospora* and ranged from 0 to 1 at the ten FoodNet sites with preliminary data.

Case definition
Laboratory confirmation is the finding of *C. cayatensis* oocysts in stool by microscopic examination or in intestinal fluid or small bowel biopsy specimens; or demonstration of sporulation or PCR positive in stool, duodenal/jejunal aspirates or small bowel biopsy specimens. CDC has two case classifications: Confirmed, symptomatic - laboratory confirmed with clinically compatible illness. Confirmed, asymptomatic - laboratory confirmed with no symptoms.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 – Nine cases; all were confirmed.
- Age – Ages ranged from 43 to 74 years (mean = 56).
- Gender – Eight cases were female and one was male.
- Race/ethnicity – Eight case were white and one was unknown race. No cases were reported as Hispanic.
- Seasonal variation – Cases had onsets in February (one), April (five), June (two) and November (one).
- Clinical – All eight reported diarrhea. Twelve percent reported vomiting and 57 percent reported fever. One of seven cases were hospitalized. No deaths were reported.
- Geographic location – Cases were from Cook (six cases), Lake (two) and Winnebago (one).
- Risk factors – Six of eight cases with travel history available reported travel to another country. Countries visited included Panama (three), Mexico (one) and Jamaica (one). Four did not list country visited.
- Outbreaks – No cases were linked to an outbreak.

Summary
Only nine cases of *Cyclospora* were reported in the state in 2005. Most cases reported travel to other countries. No outbreaks were reported. Illinois was sixth in the nation in the number of cases.
Suggested Readings
Ehrlichiosis

Background

*Ehrlichia* are bacteria that infect a wide variety of animals and are transmitted by tick bites. Four *Ehrlichia* pathogens have been identified in the United States: *E. chaffeensis* (causing human monocytic ehrlichiosis (HME)), *Anaplasma phagocytophilum* (formerly *Ehrlichia phagocytophila*) causing human granulocytic anaplasmosis (HGA), *E. canis* and *E. ewingii*. Only one person with *E. canis* has been reported and the person was not clinically ill. *E. chaffeensis* and *E. canis* mainly invade the monocyte and the disease caused by these organisms is termed HME. *A. phagocytophilum* and *E. ewingii* invade mainly the granulocytes and the disease is referred to as granulocytic ehrlichiosis. Both HGA and HME are zoonotic diseases requiring an arthropod vector and a mammalian reservoir.

*E. chaffeensis*, which causes HME, is transmitted to humans primarily by the lone star tick, *A. americanum*. The white-tailed deer is a major host for this tick and acts as a natural reservoir for *E. chaffeensis*. Cases of HME are most commonly reported from Missouri, Oklahoma, Tennessee, Arkansas, and Maryland.

The blacklegged tick (*Ixodes scapularis*) is the vector of *A. phagocytophilum* which causes HGA in New England and the North Central United States. HGA is more frequently reported than HME with an average incidence of 1.6 cases per million from 2001 to 2002. States with the highest incidence were Rhode Island, Minnesota, Connecticut, New York and Maryland.

*E. ewingii* can be carried by *Amblyomma americanum*. Cases of human granulocytic ehrlichiosis caused by *E. ewingii* have been reported primarily in immunocompromised patients from Missouri, Oklahoma and Tennessee. Infection may also occur in dogs.

Both HME and HGA result in similar symptoms: fever, headache and myalgia. Cases also may have low platelets, low white blood cells and increased liver enzymes. Rash occurs in approximately one-third of HME patients and is rare in patients with HGA or *E. ewingii*. In 25 percent of HME cases, respiratory tract involvement occurs and in 20 percent of cases central nervous system disease occurs. More than 40 percent of HME cases require hospitalization and severe complications can include meningoencephalitis, acute respiratory distress syndrome, toxic shock like syndrome, renal failure, coagulopathy and multiorgan failure. These *Ehrlichia* organisms can form clusters of organisms called morulae, in the white blood cells. The case fatality rate has been reported as 5 percent in HME and 10 percent in HGE. A specific history of a tick bite can be elicited in about 68 percent of ehrlichiosis cases.

In 2005, 786 HGA, 506 HME and 112 other or unspecified ehrlichia cases were reported to CDC.

Case definitions

**HME**

A clinically compatible illness with demonstration of a four-fold change in antibody titer to *E. chaffeensis* antigen by IFA in paired serum or positive PCR and confirmation of *E. chaffeensis* DNA, or identification of morulae in leukocytes and a positive IFA titer to *E. chaffeensis* antigen, or immunostaining of *E. chaffeensis* antigen in a biopsy or autopsy specimen or positive culture for *E. chaffeensis* in a clinical specimen.

**HGE**

A clinically compatible illness with demonstration of demonstration of a four-fold rise in antibody titer to *A. phagocytophilum* antigen by IFA in paired serum or positive PCR
and confirmation of *E. phagocytophila* DNA, or identification of morulae in leukocytes and a positive IFA titer to *E. phagocytophila* antigen, or immunostaining of *E. phagocytophila* antigen in a biopsy or autopsy specimen or positive culture for *E. phagocytophila* in a clinical specimen.

**Ehrlichiosis, human, other or unspecified agent**
A clinically compatible illness with demonstration of a four-fold change in antibody titer to more than one *Ehrlichia* species by IFA in paired serum samples, in which a dominant reactivity cannot be established, or identification of *Ehrlichia* species other than *E. chaffeensis* or *E. phagocytophila* by PCR, immunostaining or culture.

**Descriptive epidemiology**
- Number of cases reported in Illinois in 2005 - seven; five were HME, two were HGA and one was of unknown type. One case of HGA was confirmed and one was probable. All HME cases were probable.
- Age - Cases ranged in age from 30 to 86 years of age (median = 60 years).
- Gender - Six cases were male and one was female.
- Race/ethnicity – All cases were white; none were Hispanic.
- Exposure sites – The exposure sites for the two HGA cases were Carroll County (one) and unknown (one). The exposure sites for the five HME cases were Jackson County (four) and Saline County (one).
- Seasonal variation - Onsets of all cases occurred between June and December.
- Outcomes – Four cases were hospitalized and one died from the disease.

**Summary**
Seven ehrlichiosis cases were reported in Illinois in 2005. HME cases had exposure sites in southern Illinois and HGA cases had exposure sites in northern Illinois. More cases were male than female.

**Suggested readings**
Shiga-toxin Producing *E. coli*, Enterotoxigenic *E. coli*, Enteropathogenic *E. coli*)

**Background**

Strains of *Escherichia coli* that cause diarrhea are classified into pathotypes. Enterohemorrhagic *E. coli* (EHEC) may cause bloody diarrhea and hemolytic uremic syndrome because they produce Shiga toxins. Another term frequently used is shiga toxin producing *E. coli* (STEC). STEC will be used in this document. Enteropathogenic *E. coli* (EPEC) lack Shiga toxins and cause nonspecific diarrhea in infants in less-developed countries.

*E. coli* O157:H7 was first recognized as a cause of human illness and associated with ground beef in 1982. *E. coli* O157:H7 causes primarily a diarrheal illness. The infectious dose is thought to be low due to evidence of person-to-person transmission and recreational water exposure transmission. The incubation period is from three to eight days with an average of three to four days. Occasionally, longer incubation periods have been reported. Infection with *E. coli* O157:H7 produces symptoms that range from mild to bloody diarrhea and that may progress to hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenic purpura (TTP); 3 percent to 5 percent of HUS cases are fatal. HUS is used to describe acute renal failure accompanied by non-immune hemolytic anemia and thrombocytopenia. It occurs most frequently in children younger than 5 years of age after infection by an agent producing shiga toxin. The illness can involve the central nervous system (CNS), pancreas, heart and other organs. HUS can be caused by *Shigella dysenteriae* type 1 and STEC. The most common cause of HUS in the United States is *E. coli* O157:H7.

*Escherichia coli* O157:H7 is transmitted through consumption of contaminated food or beverage, person-to-person contact or swimming in contaminated recreational water.

In 2001, STEC became notifiable. There are three categories: *E. coli* O157:H7, STEC, non O157 and STEC, not serogrouped.

During 2005, STEC cases were reported from all states. Of these, 74 percent were classified as *E. coli* O157:H7, 14 percent as STEC, non-O157 and 12 percent as STEC, not serogrouped. Most cases were reported from July to October. *E. coli* O157:H7 declined 29 percent over the period 1998 to 2005.

Of the 10 diseases under active surveillance in the FoodNet sites (illnesses caused by *Campylobacter*, *Cryptosporidium*, *Cyclospora*, *E. coli* O157:H7, HUS, *Listeria monocytogenes*, *Salmonella*, *Shigella*, *Vibrio* and *Yersinia enterocolitica*), *E. coli* O157:H7 was responsible for 2.8 percent and STEC, non O157 was responsible for 0.9 percent of the reported infections in preliminary 2005 data. The preliminary incidence rate for STEC O157:H7 was one per 100,000 and ranged from 0.4 to two per 100,000 at the ten FoodNet sites. The preliminary incidence rate for STEC non-O157 was 0.33. For 145 STEC non-O157, the following O antigens were identified: O26 (32 percent), O103 (31 percent), O111 (20 percent).

CDC recommends that all bloody diarrheal stools be routinely cultured for *E. coli* O157:H7. Rapid tests also are available to directly detect shiga toxin in stool specimens. Specimens testing positive should be cultured to identify which organism (*E. coli* or *Shigella*) produced the shiga toxin. No selective agar medium is available for isolation of non-O157 STEC because these organisms ferment sorbitol. STEC due to O157 can be isolated on selective media because strains of this serotype do not ferment sorbitol. Non-O157 STEC can be diagnosed through the use of EIA or PCR for detection of shiga toxin in stool or enrichment broths. EIA testing of broth cultures is the method of choice. False
positive EIA results can occur. Bacterial culture should be run with positive specimens. Broth culture media or specimens in which shiga toxin has been detected should be cultured for *E. coli* or submitted to the state public health laboratory for *E. coli* isolation. Non-O157 STEC can be tested by commercial antisera for the most common non-O157 STEC serogroups (O26, O45, O103, O111, O121 and O145).

Pulsed-field gel electrophoresis (PFGE) is done routinely in Illinois on *E. coli* O157:H7 isolates that are submitted to the state laboratory. Epidemiologic investigation into a cluster of cases should occur after finding a match by two enzyme PFGE. Single enzyme analysis is insufficient to determine whether isolates and cases are truly related.

Enterotoxigenic *E. coli* is believed to be a common cause of traveler’s diarrhea. United States residents who travel overseas may return to the United States with ETEC. Enterotoxigenic *E. coli* is not identified by routine stool culture methods.

Prevention measures for enteric *E. coli* infections include cooking food thoroughly, prompt refrigeration of foods and separation of cooked and raw foods. Antibiotics are contraindicated for treatment of *E. coli* O157:H7 infections; this treatment leads to release of toxin as bacteria die and increased risk for development of HUS.

Food safety practices that can decrease risk of *E. coli* O157:H7 from ground beef include thawing frozen ground beef in the refrigerator, not at room temperature and cooking to a temperature of 160 F. Kitchen items in contact with raw ground beef should be washed thoroughly before reusing.

**Case definition**

The case definition for a confirmed case of *E. coli* O157:H7 used in Illinois is a clinically compatible illness with isolation of *E. coli* O157:H7 from a stool specimen or *E. coli* O157 organisms that are laboratory confirmed as producing shiga toxin. *E. coli* isolated in stool from a person with clinically compatible illness that produce shiga toxin but are not identified as O157 is also reportable as enterohemorrhagic *E. coli*, non-O157. A confirmed case of ETEC is a clinically compatible illness with laboratory confirmation of enterotoxigenic *E. coli* from stool. A confirmed case of enteropathogenic *E. coli* is a clinically compatible illness with laboratory confirmation of enteropathogenic *E. coli* from stool. A probable case of ETEC or enteropathogenic *E. coli*, or enterohemorrhagic is a clinically compatible case which is epidemiologically linked to cases but has not been laboratory confirmed. In 2005, IDPH laboratories did not identify to serotype any STEC non-O157.

**Descriptive epidemiology**

Shiga-toxin producing *E. coli*, including *E. coli* O157:H7

- Number of cases reported in Illinois in 2005 – 142 (five-year median = 194) (see Figure 34). The incidence in 2005 was 0.98 cases per 100,000 population. Of these 142 cases, 102 were identified as *E. coli* O157:H7 and were all confirmed cases. In 2005, nine cases were classified as STEC, non-O157 and 31 as STEC, not further specified.
- Note: the information below is for *E. coli* O157:H7 cases only.
- Age - Cases occurred in all age groups. (median = 19 years of age) (Figure 35).
- Gender – 58 percent were female.
- Race/ethnicity – 89 percent were white, 9 percent were African American and 2 percent were other; 5 percent of 77 cases with ethnicity information were Hispanic.
Seasonal variation - The largest number of cases occurred in the months from July to September (52 percent of cases) (Figure 36).

Geographic location – The counties with the most cases were Cook (20) and Winnebago (14).

Symptoms - Among those with culture-confirmed *E. coli* O157:H7 for which symptom information was available, 99 percent reported diarrhea, 40 percent reported bloody diarrhea and 33 percent reported fever; Five cases (7 percent of patients for whom information was available) had hemolytic uremic syndrome (HUS) and one case (1 percent had thrombotic thrombocytopenic purpura (TTP). Three cases were reportedly put on dialysis.

Treatment – Eighty-eight (50 percent) were hospitalized.

Mortality - No cases were reported to be fatal.

Reporter – The most common reporters included infection control professionals (45) and laboratories (13).

Outbreaks – No foodborne outbreaks were reported in 2005.

**Risk factors for ECO157:H7**

The results of investigation of exposure to risk factors are presented in Table 3. The following percentages of patients reported consuming foods that have been associated with this infection in the seven days before symptom onset: ground beef (50, 67 percent), other beef products (68 percent), well water at home (10 percent), undercooked ground beef (19 percent) and other undercooked beef products (35 percent); Twenty-seven of 75 cases reported having contact with animals and of these, two reported contact with cattle. These risk factors were not confirmed as the source of illness in all of these cases.

**ETEC**

- Number of cases reported in Illinois in 2005 – Twenty-four cases of ETEC were reported; all related to one outbreak. All but three cases were probable.
- Age – Ages ranged from 11 to 55 (mean = 34 years).
- Gender – Forty-five percent were male.
- Seasonal – All cases were reported in late May.
- Clinical – All cases reported diarrhea, 86 percent reported abdominal cramps and 14 percent reported vomiting.
- Geographic location – Cases had residences in three counties: Cook, DuPage and Will.

**Other types of reportable enteric *E. coli***

There were no other types of *E. coli* infections reported in 2005.

**Summary**

The incidence of infection with *E. coli* O157:H7 in 2005 was 1 case per 100,000 population, which is similar to what was found in CDC’s FoodNet sites.

Most cases (52 percent) of *E. coli* O157:H7 occur in the months of July through September. Bloody diarrhea was reported by 40 percent of individuals; 7 percent of patients reportedly had HUS. No Illinois cases were fatal. Sixty-seven percent of cases reported consuming ground beef.
Suggested readings


Table 3. Reported characteristics of E. coli O157:H7 cases in Illinois, 2005

<table>
<thead>
<tr>
<th>Factor</th>
<th># cases with factor</th>
<th># cases with information</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with residential facility</td>
<td>8</td>
<td>83</td>
<td>10</td>
</tr>
<tr>
<td>Contact with a day care</td>
<td>8</td>
<td>84</td>
<td>9</td>
</tr>
<tr>
<td>Employed in a residential facility</td>
<td>2</td>
<td>102</td>
<td>2</td>
</tr>
<tr>
<td>Employed as a food handler</td>
<td>1</td>
<td>102</td>
<td>1</td>
</tr>
<tr>
<td>Employed in other sensitive occupation</td>
<td>1</td>
<td>102</td>
<td>1</td>
</tr>
<tr>
<td>Food/water history in prior seven days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground beef</td>
<td>50</td>
<td>74</td>
<td>67</td>
</tr>
<tr>
<td>Undercooked ground beef</td>
<td>7</td>
<td>36</td>
<td>19</td>
</tr>
<tr>
<td>Other beef</td>
<td>52</td>
<td>76</td>
<td>68</td>
</tr>
<tr>
<td>Undercooked other beef</td>
<td>6</td>
<td>17</td>
<td>35</td>
</tr>
<tr>
<td>Home drinking water is well water</td>
<td>8</td>
<td>83</td>
<td>10</td>
</tr>
<tr>
<td>Other factors in prior seven days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel out of the country</td>
<td>0</td>
<td>85</td>
<td>0</td>
</tr>
<tr>
<td>Swim in non chlorinated water</td>
<td>8</td>
<td>82</td>
<td>10</td>
</tr>
<tr>
<td>Contact with cattle</td>
<td>2</td>
<td>75</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Illinois Department of Public Health
Food and Waterborne outbreaks

Background

Food can act as a vehicle for transmission of pathogens or their by products. Although many foodborne illnesses result in a few days of diarrhea, with additional symptoms such as fever, vomiting or muscle aches, others can have serious health effects such as hemolytic uremic syndrome, reactive arthritis, sepsis or Guillain Barré syndrome. The primary forms of foodborne illness are intoxications, which are caused by toxins produced by organisms in the food, and infections, where the organism must multiply in the person before causing illness.

Four in 10 Americans eat in restaurants each day in the United States and one in six persons eat more than five meals per week in restaurants. From 1998 to 2004, about 1,290 foodborne outbreaks were reported each year to CDC. Fifty-two percent were associated with restaurants or delis.

Foodborne illness can be caused by microorganisms and their toxins, marine organisms and their toxins, fungi and chemical contaminants. There are four categories of organisms to consider in discussing the causes of foodborne illness: viruses, bacteria, parasites and fungi. For some viruses, such as hepatitis A or Noroviruses, also known as small round-structured viruses, humans are the only reservoir. Food can be contaminated with viruses if food handlers do not practice good hygiene before preparing food that is not later cooked, or if sewage contaminates the food. Rotaviruses can occasionally cause foodborne outbreaks. Shellfish have been associated with hepatitis A virus, calicivirus and Vibrio spp. outbreaks. Outbreaks of Y. pseudotuberculosis have been reported from carrots, pickled products, lettuce and other vegetables.

Bacteria make up the largest category of foodborne agents. These include E. coli O157:H7, Salmonella and Listeria monocytogenes. Parasites like Trichinella in pork, Anasakis in raw fish or Cyclospora in raspberries also can cause foodborne illness. Some enteric pathogens, such as Campylobacter, Giardia and Shigella, rarely cause foodborne outbreaks.

CDC’s Foodborne Disease Active Surveillance Network (FoodNet) is a system to collect information on 13 percent of the United States population on 10 enteric pathogens and on hemolytic uremic syndrome. At FoodNet sites, preliminary data on the pathogens responsible for most cases of enteric disease in 2005 include Salmonella (14 per 100,000), Campylobacter (13 per 100,000), Shigella (5 per 100,000), E. coli O157:H7 (1 per 100,000), and Cryptosporidium (3 per 100,000), Yersinia (0.4 per 100,000), Listeria (0.3 per 100,000), Vibrio (0.3 per 100,000) and Cyclospora (0.15 per 100,000).

Case definition

A foodborne outbreak is a cluster of illnesses in which two or more persons (usually residing in separate households) experience the onset of a similar, acute illness (usually gastrointestinal) following ingestion of common food or drink. CDC has established case definitions for confirmed outbreaks and these are listed under the specific organisms in this outbreak section.
For foodborne outbreaks, the number ill reflects those who meet a clinical case
definition. For outbreaks where the etiologic agent was suspected and not confirmed,
and the clinical syndrome matched the suspect etiologic agent but no laboratory
confirmation was obtained, the suspect cause is ascribed to this etiologic agent.

The Illinois Department of Public Health receives reports of potential foodborne
outbreaks from many sources. Outbreak investigations, which are conducted by local
health departments, may not result in a confirmed foodborne outbreak designation and
will not be counted in the state totals. There are a number of reasons for this: lack of
information, classification as person-person transmission or because the symptoms and
incubation period do not clearly indicate a known foodborne pathogen.

Descriptive epidemiology
The number of possible food or waterborne outbreaks reported to the
Department by local health departments (LHDs) was 83 during 2005. Of these, 23 were
determined by the local or state health department to not meet the criteria for a food or
waterborne outbreak. The total for the year was 60 outbreaks that met the definition of
an outbreak and were submitted to the Centers for Disease Control and Prevention
(CDC). No recreational water outbreaks were reported. Of the 60 foodborne outbreaks,
the etiology was confirmed in 17 outbreaks, suspected in 21 outbreaks and determined
to be unknown in 22 outbreaks.

In the year 2005, a total of 978 people were reported to have become ill as the
result of the 60 foodborne outbreaks. The median number ill per foodborne outbreak
was 8 (range: 1,162). There were no fatalities reported due to foodborne outbreaks
during the year 2005. Counties reporting outbreaks during the year 2005 were: Cook,
excluding Chicago (18), city of Chicago (11), Madison (seven), DuPage (four), Peoria
(three), Lake (two), Will (two), Champaign (two) and Kane (two), and one each was
reported from Effingham, Jo Daviess, Ogle, Pike, Richland, St Clair, Tazewell, Vermilion
and one multi-county outbreak.

The 60 reported foodborne outbreaks occurred in the following months: January,
two (3 percent); February, four (7 percent); March, five (8 percent); April, two (3
percent); May, 13 (22 percent); June, three (5 percent); July, three (5 percent); August,
six (10 percent); September, four (7 percent); October, four (7 percent); November, five
(8 percent); and December, nine (15 percent).

In the 60 foodborne outbreaks reported to CDC, the etiologic agent was
determined to be bacterial, either suspect or confirmed, in 14 (23 percent) (Table 4).
The bacterial pathogens were as follows: Salmonella sp., seven (50 percent),
Clostridium perfringens/Bacillus cereus, three (21 percent); Staphylococcus aureus, one
(7 percent), B. cereus, one (7 percent), Campylobacter, one (7 percent) and
enterotoxigenic Escherichia coli, one (7 percent).

The etiologic agent in 19 (32 percent) of the foodborne outbreaks was suspected
or confirmed to be caused by noroviruses. The Department laboratories were able to
confirm eight (42 percent) of these viral outbreaks. The remaining 11 (72 percent)
outbreaks were classed as suspicious norovirus outbreaks, largely based on symptoms,
incubation and duration in the people who were affected or where only one specimen
tested positive for norovirus.
One outbreak was caused by ciguatera toxin in fish. Two outbreaks were believed to be due to excess yeast or yeast by products and two due to tortillas that may have had an excess calcium content.

No foodborne outbreaks were caused by parasitic agents.

Although thorough investigations were conducted, there was inconclusive evidence to classify either suspect or confirm etiologic agents in 22 (37 percent) of the foodborne outbreaks and they were thus classified as etiology unknown.

In 32 food or waterborne outbreaks ill persons were tested for at least one pathogen. In 24 of the outbreaks, where ill persons were tested, at least one person tested positive for the pathogen implicated in the outbreak. These outbreaks were norovirus (15), Salmonella (seven), Campylobacter (one) and ETEC (one).

Food handlers were laboratory tested in six of the outbreaks. In five of the outbreaks, food handlers were found to be positive for the etiologic agent implicated in the outbreak. Food handlers tested positive for the following pathogens: Salmonella (two outbreaks), norovirus (two) and ETEC (one).

Environmental samples were not taken in any outbreaks.

A food could not be implicated by either epidemiologic analysis, food testing or strong supportive evidence in 45 outbreaks (75 percent). In 15 outbreaks a food was linked to illness by either epidemiologic analysis or food testing. The food items linked to illness were fruit or fruit juice (four), Mexican foods (four), dressings/sauces (two), fish (one), beef (one), other salad (one) and multiple types of foods (two). In two outbreaks involving Mexican foods, taco shells from the same company were implicated by strong supportive evidence (similar previous outbreaks associated with these taco shells). In one of these outbreaks, taco shells tested positive for high calcium levels. Another outbreak involved a Salmonella outbreak with fajitas epidemiologically implicated as a source of illness. Taco salad was implicated by epidemiology as the food causing illness in a norovirus outbreak. In the fifth outbreak, nacho cheese was implicated by strong supportive evidence (mishandling by leaving nacho cheese out without refrigeration). For fish, meat and poultry products, fish was implicated in one outbreak of ciguatera toxicity. In three outbreaks, produce was implicated; in one outbreak, fruit salad was implicated in a norovirus outbreak by epidemiologic analysis. In a second outbreak, seven-layer salad was implicated in an outbreak of norovirus. In a third outbreak, a pineapple fruit cup had high levels of yeast detected. In two outbreaks, juice was implicated as a cause of illness. In one Salmonella outbreak, another state identified orange juice as a source of illness. In another outbreak suspected to be caused by high levels of yeast and yeast by products, fruit juice was implicated by both epidemiology and by laboratory testing identifying high levels of yeast. In one Salmonella outbreak, a pre-packaged food was implicated by another state as the source of illness. In one norovirus outbreak, multiple foods (salad and chicken) were implicated by epidemiology.

Food was tested for pathogens in 10 (17 percent) of the outbreaks. Positive foods were found in three (30 percent) of the outbreaks where samples were tested. The responsible etiologic agents were found to be high yeast (two) and excess calcium (one).

The site of food preparation in these 60 foodborne outbreaks was: restaurant, 35 (58 percent); school, eight (13 percent); caterer, three (5 percent); home, two (3
percent); work, two (3 percent); multiple, three (5 percent); unknown, one (2 percent) and other, four (7 percent). The other sites included a dinner playhouse, prepackaged meals, fair and grocery.

The site where the food was consumed in 60 foodborne outbreaks was: restaurant, 25 (42 percent); home, seven (12 percent); workplace, nine (15 percent); school, eight (13 percent); banquet hall, six (10 percent); unknown, one (2 percent); multiple, one (2 percent) or other, three (5 percent). Other sites included a dinner playhouse, fair and homeless shelter.

In 39 (65 percent) of the 60 foodborne outbreaks, contributing factors were listed as unknown. Factors that were identified as contributing to 21 outbreaks were: bare-handed contact by food handler, six (28 percent of outbreaks with a contributing factor listed); handling by an infected person or carrier of a pathogen, five (24 percent); contaminated product, two (9 percent); gloved contact with ready to eat food by food handler, two (9 percent), cross contamination, two (9 percent), excess ingredient, two (9 percent), storage in contaminated environment, one (5 percent), sewage contamination, one (5 percent), handling by ill food handler, one (5 percent), temperature abuse, seven (33 percent), preparing foods ahead, two (9 percent), inadequate reheating, one (5 percent) and improper thawing, one (5 percent). Some outbreaks had more than one contributing factor listed. Proliferation factors and survival factors that may have led to an outbreak only apply to outbreaks where bacterial pathogens are involved.

Summary
In 2005, Illinois recorded 60 foodborne and nine waterborne outbreaks compared to a five-year median of 87 outbreaks. The most common site of food preparation in the reported outbreaks was restaurants. Food handlers who had bare-hand contact with food or gloved contact with food and infected food handlers were the most commonly reported contributing factors to outbreaks. Both bacterial and viral agents were important causes of foodborne outbreaks.

Suggested readings
Table 4. Etiologic Agent involved in 2005 Outbreaks

<table>
<thead>
<tr>
<th>Agent</th>
<th>Confirmed</th>
<th>Suspect</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>B. cereus</em></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><em>B. cereus/C. perfringens</em></td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ETEC</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><em>Salmonella</em></td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td><em>Campylobacter</em></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><em>S. aureus</em></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ciguatera</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Excess calcium</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Excess yeast and yeast by products</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Norovirus</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td><strong>UNKNOWN (22)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specific types of foodborne outbreaks

**Bacillus cereus**

*B. cereus* causes foodborne illness through intoxication. There are two types of illness caused by *B. cereus*, depending on the enterotoxin elaborated by the organism. In one type, the incubation period is from one to six hours and symptoms last 12 hours or less. Almost all individuals experience vomiting and about one-third experience diarrhea. The illness is caused by a preformed enterotoxin. Rice has been associated with this type of *B. cereus* in past outbreaks. In the other type, the incubation period ranges from eight to 16 hours and symptoms last less than 24 hours. Diarrhea is a prominent feature but vomiting is absent. Foods associated with previous outbreaks include custards, cereals, and meat or vegetable dishes. The organism multiplies rapidly at room temperature and the spores can survive boiling.

**Case definition**

Laboratory confirmation for *B. cereus* includes isolation of greater than $10^5$ organisms per gram in properly handled food or isolation of the organism from two or more ill people and not from controls.

**Descriptive epidemiology**

- Number of outbreaks reported in Illinois in 2005 – One suspected. There were three outbreaks in which the clinical picture suggested either *B. cereus* or *C. perfringens*.

**Campylobacter**

*Campylobacter* is an uncommon cause of foodborne outbreaks.
Case definition
Laboratory confirmation of a *Campylobacter* outbreak is when two or more ill persons test positive for *Campylobacter* or from implicated food or water.

Descriptive Epidemiology
- Number of outbreaks reported in Illinois in 2005 - One confirmed outbreak.
  - An outbreak of *Campylobacter* occurred in eight individuals after eating at a restaurant. Seven cases were laboratory confirmed. The food vehicle could not be identified. The median incubation period was 24 hours.

*Clostridium perfringens*
Another foodborne intoxication is caused by *C. perfringens* enterotoxin. Diarrhea is common but vomiting and fever are usually absent. The incubation period is eight to 16 hours (usually 12 hours). The illness lasts one day or less. Almost all outbreaks are associated with the inadequate heating or reheating of meats or gravies, which allows the organism to multiply. The enterotoxin is heat-resistant.

Case definition
There are three ways to establish laboratory confirmation of a *C. perfringens* outbreak:
1) isolation of greater than $10^5$ organisms per gram of food that has been properly handled for testing, 2) demonstration of enterotoxin in the stool of two or more ills, or 3) isolation of greater than $10^6$ organisms per gram in the stool of two or more ill persons.

Descriptive epidemiology
- Number of outbreaks reported in Illinois in 2005 – None. There were three suspected to be due to either *C. perfringens* or *B. cereus* but laboratory confirmation did not occur.

*Shiga toxin producing E. coli (STEC)*
Foodborne outbreaks of *E. coli* O157:H7 have been linked to undercooked ground beef, apple cider, sprouts and lettuce. Other types of *E. coli* also can be pathogenic in humans and cause outbreaks.

Case definition
Laboratory confirmation of an outbreak occurs when shiga toxin producing *E. coli* is isolated from stool of two or more ills or from the implicated food or water.

Descriptive epidemiology
- Number of outbreaks reported in Illinois in 2005 – None.
**Enterotoxigenic E. coli**

In 2005, an outbreak of ETEC occurred among patrons of two family-owned restaurants in Nevada. Butterfly shrimp were implicated as a source and food handlers shared between the two restaurants tested positive. Multiple serotypes were identified.

**Descriptive epidemiology**

- Number of outbreaks reported in Illinois in 2005 – One outbreak.
- Enterotoxigenic *E. coli* (ETEC) O169:H41 was identified in a restaurant outbreak in DuPage County in May. Twenty-one persons became ill and three ill individuals were laboratory confirmed. Diarrhea and abdominal cramps were the primary symptoms. The median incubation period was 31 hours. The food vehicle for illness was not determined.

**Suggested readings**


**Salmonella**

*Salmonella* is the most common causative agent associated with bacterial foodborne outbreaks. The incubation period for *Salmonella* is six to 72 hours. Symptoms may include diarrhea, vomiting, fever and headache.

**Case definition**

A laboratory-confirmed outbreak of *Salmonella* occurs when bacteria are either cultured from implicated food or *Salmonella* of the same serotype is cultured from clinical specimens from two or more ill individuals.

**Descriptive epidemiology**

- Number of outbreaks reported in Illinois in 2005 – Seven confirmed outbreaks occurred with 191 people ill (mean of 27 persons ill per outbreak). Outbreaks occurred in Ogle (one), Cook excluding Chicago (one), Madison (one), Will (one), DuPage (one), Champaign (one) and multi-county (one). The *Salmonella enterica* serotypes involved in the outbreaks were Enteritidis (two), Typhimurium (two), Thompson (one), Braenderup (one), monophasic 4,5,12i (one). Illinois also had residents who were matches to a *S. ser. Newport* and *S. ser. Braenderup* national outbreak linked to tomatoes.
  - The first *Salmonella* outbreak of 2005 occurred in April in 14 persons who worked at a meat packing plant in Ogle County. Eight cases were laboratory confirmed with *Salmonella enterica* ser. Enteritidis. Two food handlers tested positive; one was asymptomatic. *Salmonella* isolates were identified in patient and food worker specimens. Of those ill, none were hospitalized. The food vehicle or source of illness could not be determined. Phage type 13a was identified at CDC.
  - In May, five laboratory confirmed cases occurred among students at a school
in Cook County. Patient specimens indicated *Salmonella* enterica ser. Enteritidis. No source or food vehicle could be determined. No cases were hospitalized. Diarrhea, vomiting, abdominal cramps and fever were the most commonly reported symptoms.

- In Madison County, 162 patrons of a restaurant became ill after eating at the restaurant from May 18 through June 3. Laboratory testing confirmed *Salmonella* ser. Typhimurium. Ninety-three percent of cases reported diarrhea. Fajitas with lettuce, tomatoes, bell peppers, pico de gallo sauce, guacamole and sour cream were implicated by epidemiology. Four food handlers tested positive.
- Four cases of *S.* ser. Thompson that matched by PFGE occurred in Will County between May 28 and May 30. Due to the close association in time and space this was considered to be an outbreak although a source could not be identified.
- Three Illinois residents became ill as a result of packaged diet meals sold commercially. Illness onsets were between May 25 and May 27. This cluster of illnesses was part of a national outbreak. Cases were residents of Lake, Cook and McHenry counties. All cases were laboratory confirmed with *Salmonella* monophasic 4,5,12i that matched by PFGE.
- An outbreak of *S.* ser. Braenderup in two persons in DuPage County occurred in June. Both cases attended a fair but did not eat food from the same vendor. Both were laboratory confirmed with isolates that matched by PFGE. No other cases were identified in persons who attend the fair.
- The last outbreak of *S.* ser. Typhimurium was a national outbreak with one Illinois resident of Champaign County identified as a case. The cases were linked to consumption of a commercially available juice.

**Suggested readings**


**Shigella**

The *Shigella* organism is not a common cause of foodborne outbreaks. Instead, it causes a gastrointestinal illness often transmitted from person to person. However, outbreaks have been associated with bean dip, lettuce, parsley and contaminated water. Outbreaks of shigellosis also have been associated with swimming in contaminated water.

**Case definition**

The case definition for an outbreak of *Shigella* is identification of the same serotype of the bacteria in two or more ill persons.
Descriptive epidemiology
- Number of outbreaks reported in Illinois in 2005 - None.

Staphylococcal food poisoning
One type of foodborne illness, classified as an intoxication, is caused by enterotoxin-producing strains of *Staphylococcus aureus*. Within 30 minutes to eight hours (usually two to four hours) after eating contaminated food, a person may experience explosive vomiting and diarrhea. The duration of illness is usually short - less than 24 hours. Humans are considered to be the primary source of the organism in foodborne outbreaks. *S. aureus* can be found in nasal passages, throat and hair and on the skin of healthy people; bacteria are present in high numbers in cuts, pustules and abscesses. The enterotoxins produced by *S. aureus* are heat stable. The organism may produce toxin in foods and then die so cultures of foods may be negative and yet the foods contained the staphylococcal enterotoxin that made people ill. Foodborne outbreaks caused by *S. aureus* and those caused by the *B. cereus* type where vomiting predominates have similar incubation periods and clinical syndromes.

Case definition
Laboratory confirmation of an outbreak attributable to *S. aureus* requires detection of enterotoxin in food or organisms with the same phage type in stools or vomitus of two or more cases or isolation of greater than $10^5$ organisms per gram in properly handled food.

Descriptive epidemiology
- Number of outbreaks reported in Illinois in 2005 – One suspect outbreak.

Chemical agents
This category includes toxins such as ciguatera and scombrototoxin which are associated with fish consumption. Ciguatera fish poisoning is caused by eating contaminated fish. The incubation period ranges from two to 30 hours after ingestion of contaminated fish, but symptoms most commonly begin within two to six hours. Ciguatoxins in fish are acquired by consumption of toxins produced by dinoflagellates. Herbivorous fish accumulate the toxins after ingesting dinoflagellates. Carnivorous fish then eat contaminated fish and concentrate the toxins. More than 425 species of fish have been linked to ciguatera toxin poisoning. The most common fish implicated are barracuda, red snapper, grouper, amberjack, sea bass, shark, surgeonfish and moray. Ciguatera fish poisoning causes vomiting, diarrhea and neurologic symptoms such as weakness, tingling and pruritis. Reversal of temperature sensation is characteristic of ciguatera poisoning. Other symptoms may include cardiovascular dysfunction like hypotension, bradycardia or arrhythmia. There is a test to detect the toxin in fish. However, the toxic fish have a normal taste and appearance. The toxin cannot be destroyed by cooking or freezing. There is no diagnostic test or treatment available for humans.
Scombrotoxin poisoning occurs when a person consumes fish with a high level of histamine that can be produced in the muscle of fish after harvest. Some fish, such as tuna, mackerel, bluefish, dolphin, bonito and saury, are more likely to have high levels of histamines in their tissue. When there is temperature abuse of fish after harvesting, the potential for outbreaks associated with scombrotoxin increases. The clinical signs of toxicity in people include lip swelling, itching, a peppery taste in the mouth, nausea, vomiting, facial flushing, headache and stomach pain. Symptoms usually only last a few hours and there are no lasting effects.

Case definition
The case definition for ciguatera toxin outbreaks is the demonstration of ciguatoxin in epidemiologically implicated fish or a clinical syndrome among persons who have eaten a type of fish previously associated with ciguatera fish poisoning. The outbreak must involved two or more ill persons.

The case definition for scombroid toxin outbreaks is demonstration of histamine in epidemiologically implicated fish or a clinical syndrome among persons who have eaten a type of fish previously associated with histamine fish poisoning. The outbreak must involved two or more ill persons.

Descriptive epidemiology
- Number of outbreaks reported in Illinois in 2005 – One outbreak due to ciguatera toxin.
  - In June, six persons became ill after consumption of grouper at a restaurant in Kane County. Symptoms included diarrhea, abdominal cramps, itching, myalgia, temperature reversal and numbness. One case was hospitalized.

Suggested readings

Parasitic agents
There are a variety of parasitic agents that can cause foodborne or waterborne outbreaks, for example, Cryptosporidia, Cyclospora and Giardia. The incubation periods for parasitic agents can be up to 25 days.

Descriptive epidemiology
- Number of outbreaks reported in Illinois in 2005 - None confirmed.

Viral gastroenteritis
Noroviruses cause almost all of the outbreaks of acute non-bacterial gastroenteritis in the United States. Estimates are that 23 million people are affected by Noroviruses in the United States each year. The most common cause of viral
gastroenteritis are small round-structured viruses (SRSV), commonly called Norovirus. SRSV are caliciviruses and can be classified into two genogroups: genogroup 1 (Norwalk virus, Southampton virus and Desert shield virus) and genogroup 2 (Toronota virus, Mexico virus, Hawaii virus, Bristol virus, Lordsdale virus, camberwall virus, Snow Mountain agent and Melksham virus). G1 and G2 genogroups affect humans and include five to 10 genetic clusters. Noroviruses are transmitted through consumption of contaminated food or water, directly from person to person and from airborne droplets produced during vomiting. The most common method of spread is via the fecal-oral route. The virus is excreted in stool and vomitus for up to 10 days. The incubation period and duration of illness ranges from 24 to 48 hours. Virus shedding peaks 25 to 72 hours after exposure to the virus but can continue for three weeks. Within 48 to 72 hours after symptom onset, virus concentration in the stool declines below levels detectable by electron microscopy. Short-term immunity occurs after infection. Vomiting, diarrhea, headache and body aches are commonly reported. A common feature of Norovirus outbreaks is secondary transmission to household members not exposed to the implicated food or water. Norovirus infection can be asymptomatic in approximately 30 percent of persons.

Humans are the only known reservoir for these viruses. These viruses cannot replicate outside the human body and therefore will not multiply in food items. Characteristics of the virus that facilitate spread include low infectious dose, high concentration of virus in stool, strain diversity, environmental stability and prolonged shedding. Failure of an ill food handler to perform proper handwashing may result in fecal contamination of food. Illness caused by SRSV can be suspected based on incubation period, duration of illness, symptoms and the absence of bacterial or parasitic pathogens in stool samples. Noroviruses can survive freezing and temperatures of up to 60 C and can survive chlorine levels up to 10 ppm, which is in excess of what is normally present in public water systems.

Foodborne outbreaks are frequently linked to food handled by food handlers with norovirus. Foods also can be contaminated at processing plants. One outbreak in Arizona in 2005 was linked to consumption of deli meat contaminated at the processing plant prior to packaging. Norovirus was detected in deli meats. A worker at the plant had returned to work after gastrointestinal illness and handled product with bare hands.

The virus cannot be grown in cell culture; a polymerase chain reaction (PCR) test is used to diagnose Norovirus. Testing for viral gastroenteritis in humans is not useful for screening individual samples but is useful when multiple samples are available in an outbreak. Norovirus can be present in stools for up to a week after illness onset. Immunity is short-lived and appears to be strain specific. Since there are so many strains, individuals can be repeatedly infected by Noroviruses during their lifetime.

Case definition
Several laboratory tests may help to confirm an outbreak related to Norovirus. These include positive results on RT-PCR, visualization of SRSV in electron microscopy of stool from ill individuals, or a four-fold rise in antibody titer to Norovirus seen in acute and convalescent sera in most serum pairs. Multiple samples are needed from each outbreak to provide sufficient specimens to verify the causative agent as Norovirus. An
outbreak is considered confirmed when at least two ill persons have positive PCR results.

**Descriptive epidemiology**

- Number of outbreaks reported in Illinois in 2005 - Eight confirmed outbreaks of norovirus occurred involving 203 ill persons (mean = 18 ill persons per outbreak). Six were confirmed as the G2 genogroup, and two as G1. The median incubation period for the confirmed outbreaks was 35 hours. Thirty-seven persons tested positive in the eight outbreaks. Two ill persons were hospitalized. Eleven suspected outbreaks of viral gastroenteritis, based on clinical syndrome, incubation period and duration of illness also were reported.

The eight confirmed outbreaks occurred in DuPage (two), Effingham (one), Will (one), Tazewell (one), Cook, outside Chicago (one), Chicago (one) and Vermilion (one).

- The first confirmed norovirus outbreak occurred in Effingham County in March. Ten persons became ill after a large family meal at a banquet hall. Four persons were laboratory confirmed with norovirus, genotype 2. One food handler tested positive for norovirus, genotype 2. The median incubation period was 31 hours. No food vehicle could be implicated.

- The second confirmed outbreak occurred in Will County in March. Twenty-three persons were ill and two were laboratory confirmed with norovirus. Genotype G2. A seven-layer salad was implicated by epidemiologic analysis. No food handlers reported illness. The outbreak took place in a power plant workplace cafeteria.

- In May, an outbreak occurred in Tazewell County in 20 individuals after eating at a restaurant. Norovirus, genotype G1 was identified in five persons. Gravy was implicated by epidemiologic analysis. Illness status of food handlers is unknown.

- An outbreak occurred in May in DuPage County linked to consumption of food at a country club during a wedding reception. Twenty-four persons became ill and five were confirmed with norovirus, genotype G2. No food item was implicated. Two persons at the event became ill within five hours of attendance. The median incubation period was 36 hours. No food handlers reported illness.

- In August, an outbreak of norovirus, genotype G1 was reported in DuPage County. Thirty-one persons at a school reported illness after eating a special breakfast served as a part of the beginning of the new school year. Six persons tested positive. The food vehicle could not be determined. The median incubation period was 40 hours. One food handler became ill after the event as well and also tested positive.

- An outbreak of norovirus, genotype G2 occurred in 43 persons at a religious school holiday celebration in October. Foods were prepared at homes and at the school. Six persons were laboratory confirmed. The median incubation period was 34 hours. No food handlers reported illness.
An outbreak of norovirus, genotype G2 was reported in Chicago in November after a wedding reception. Forty-eight persons were ill and seven tested positive. The food vehicle was not identified. The median incubation period was 24 hours.

The final confirmed outbreak was in Vermilion County. Four cases were reported in December after eating at a restaurant. Two persons were laboratory confirmed as norovirus G2. The restaurant had plumbing problems which were corrected after they were identified.

Suggested readings

Foodborne, other
Descriptive epidemiology
Four outbreaks were reported in 2005.

- High numbers of yeast or yeast by products - Two outbreaks
  - The first outbreak occurred in early October in a Cook County school. Twenty-one persons became ill after drinking fruit juice at lunch. Epidemiologic analysis implicated fruit juice and laboratory testing identified high levels of yeast in the product. Sixty-two percent of cases experienced vomiting within one-half hour of consuming lunch.
  - The second outbreak occurred in October in a Cook County school. Twenty-five persons became ill after consumption of a pineapple fruit cup at lunch. The fruit cup was implicated by epidemiology and by high levels of yeast in the product. Although yeast are not believed to be major foodborne pathogens, their presence in food may render it “unfit for food” Sixty percent of cases reported vomiting within one-half hour of lunch consumption. This same school had a previous outbreak in October.

- Tortilla shells - Two outbreaks
  - The first outbreak occurred in December at a single school in Peoria. Ten students became ill with vomiting within one-half hour of eating lunch on December 5. Although soft tortilla shells could not be implicated by epidemiology in this outbreak, soft tortilla shells from this same manufacturer were implicated in several similar outbreaks in this state and other states. One possible contributing factor to the outbreak was excess calcium in the soft tortilla shells.
  - The second outbreak occurred in three schools in Peoria County in December. Forty-six students reported illness after eating lunch on December 7. Fifty-nine percent reported vomiting within 40 minutes of eating the meal. Soft tortilla shells were implicated by epidemiology. One possible contributing factor to the outbreak was excess calcium in the soft tortilla shells. The manufacturer was the same one as described in the first outbreak.
## Table 5. Foodborne and waterborne outbreaks in Illinois in 2005.

<table>
<thead>
<tr>
<th>IDPH Log #</th>
<th>Onset Date</th>
<th>City of exposure</th>
<th>County</th>
<th># ill/# exposed</th>
<th>Symptoms¹</th>
<th>Incub (hrs)</th>
<th>Foods implicated</th>
<th>Agent</th>
<th>Status²</th>
<th>Contributory causes³</th>
<th>Place of prep/ Place eaten⁴</th>
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<td>Onset Date</td>
<td>City of exposure</td>
<td>County</td>
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<td>Status²</td>
<td>Contributory causes³</td>
<td>Place of prep/ Place eaten⁴</td>
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<td>Barrington</td>
<td>Lake</td>
<td>25/29</td>
<td>V,D</td>
<td>32</td>
<td>Unknown</td>
<td>Norovirus</td>
<td>S</td>
<td>U</td>
<td>caterer and home and commercial product/home</td>
</tr>
<tr>
<td>2005-79</td>
<td>12/21</td>
<td>Chicago</td>
<td>Cook</td>
<td>2/9</td>
<td>V,D</td>
<td>4</td>
<td>Unknown</td>
<td>Unknown</td>
<td>U</td>
<td>U</td>
<td>restaurant/restaurant</td>
</tr>
<tr>
<td>2005-77</td>
<td>12/24</td>
<td>Mt Prospect</td>
<td>Cook caterer; McHenry meal</td>
<td>4/15</td>
<td>D,AC</td>
<td>16</td>
<td>Unknown</td>
<td>Unknown</td>
<td>U</td>
<td>U</td>
<td>restaurant and home/home</td>
</tr>
<tr>
<td>2005-76</td>
<td>12/25</td>
<td>Tinley Park</td>
<td>Cook</td>
<td>11/19</td>
<td>V,D</td>
<td>33</td>
<td>Unknown</td>
<td>Norovirus</td>
<td>S</td>
<td>U</td>
<td>restaurant/office</td>
</tr>
<tr>
<td>2005-78</td>
<td>12/25</td>
<td>Belleville</td>
<td>St. Clair</td>
<td>6/7</td>
<td>V,D,AC</td>
<td>3</td>
<td>Unknown</td>
<td>S. aureus</td>
<td>S</td>
<td>U</td>
<td>restaurant/home</td>
</tr>
</tbody>
</table>

¹BA=body ache, BD=bloody diarrhea, D=diarrhea, F=fever, H=headache, N=nausea, V=vomiting, AC=cramps; > 40% ills reporting symptoms
²S=suspect, C=confirmed, U=unknown; ³C=contaminated surfaces, CC=cross contamination, H=inadequate food handler hygiene, I=improper thawing, IF=ill food handlers, IC= inadequate cooking, P=preparing food ahead, PF=laboratory positive food handler, T=improper holding temperatures, F=unsafe foods, ICL=inadequate cleaning, CE=storage in contaminated environment, R=insufficient reheating, U=unknown; ⁴rest=restaurant
Giardiasis

Background

*Giardia* is the most commonly diagnosed intestinal parasite in public health laboratories. A common intestinal parasite of children, especially those attending day care, it is spread from person to person through fecal-oral transmission and has a median incubation period of seven to 10 days. Many infections are asymptomatic and repeated infections can occur in the same person. There are three species of giardia: *G. lamblia*, *G. agilis* and *G. muris*. The main human pathogen is *G. lamblia*. Cysts are infective immediately upon excretion and can remain viable for months. The infectious dose is low, as few as 10 cysts can cause infection and excretion can continue for months. Giardiasis also affects domestic and wild mammals including cats, dogs, cattle, deer and beavers.

Persons at greatest risk are children in day care facilities, close contacts of these children, men who have sex with men, backpackers, persons in contact with infected animals, campers and persons drinking from shallow wells contaminated by run-off with the organism. The most commonly identified intestinal parasite in international travelers is *G. lamblia*. Giardiasis peaks in late summer and early fall. Metronidazole is the most frequent treatment in the United States.

Approximately 85 percent of infections can be diagnosed with a single stool specimen. Diagnosis is made by identification of the parasite in wet mount staining with trichrome or iron hematoxylin, by direct fluorescent antibody detection, or by enzyme immunosorbent assay.

Because of its long period of communicability, low infectious dose and environmental resistance, giardiasis is easily transmitted. Preventive measures should include practicing good hygiene, avoiding water or food that might be contaminated and avoiding fecal exposure during sex with infected persons.

Giardiasis became nationally notifiable in 2002. In 2005, the CDC received reports on 19,733 cases. Nationally, the incidence rate for states in 2005 ranged from one to three per 100,000.

Case definition

The case definition for giardiasis in Illinois is the presence of diarrhea and the identification of *Giardia* trophozoites or cysts in stool, or detection of antigen by the ELISA antigen test. Carriers are those persons identified with *Giardia* trophozoites or cysts in the stool but who have no symptoms of disease.

Descriptive epidemiology

- Number of cases (confirmed and probable) reported in Illinois in 2005 – 772 (five-year median = 871); the incidence rate was six per 100,000 population. All but one of the cases was confirmed. Reported cases have declined since 2001 (see Figure 37). Of the 772 cases, 124 were known to be asymptomatic carriers (*Giardia* identified in stool but no clinical disease). The following information is derived from 466 reports on known symptomatic *Giardia* cases, not carriers.
- Age - Mean age of cases was 40 years. The age group with the highest incidence
was 1 to 4 years of age, which included 83 cases (12 per 100,000) (see Figure 38).

- Gender – Fifty-six percent were male.
- Race/ethnicity – Eighty-eight percent were white, 6 percent were African American and 2 percent were other races; 8 percent were Hispanic. There was a significantly higher proportion of whites with giardiasis and a lower proportion of African Americans compared to the Illinois population.
- Seasonal variation - More cases occurred in August (Figure 39).
- Geographic variation - Highest incidence rates per 100,000 for giardiasis occurred in central Illinois. Average annual incidence rates for 2005 ranged from 0 to 36 per 100,000 population by county. Counties with the highest average annual giardiasis incidence rates per 100,000 population over this period were Cumberland (36), Stark (32), Piatt (24) and Calhoun (20).
- Clinical - Symptoms were diarrhea (92 percent), vomiting (33 percent) and fever (22 percent). Sixteen percent were hospitalized. No fatalities were associated with cases.
- Reporters – Cases were most frequently reported by infection control professionals (181) and laboratory staff (247).
- Employment – Cases reported working in the following occupations: day care center (two cases), food service (two), health care worker (seven), residential facility (one) and other sensitive occupation (six).
- Risk Factors – Sixty-two cases reported travel to another country. The two countries most frequently visited included Mexico (13 cases) and India (11). Eleven of 383 (3 percent) reported drinking well water. Thirty-eight of 371 (10 percent) of cases reported swimming in non-chlorinated water while 43 of 356 (12 percent) reported swimming in chlorinated water. Cases attended or resided in day care centers (13) and residential facility (one). Forty-one of 378 cases (11 percent) had contact with a residential facility.
- Outbreaks – One foodborne outbreak due to *Campylobacter* was reported in 2005 (See foodborne outbreak section for detailed description).

**Summary**

Giardiasis cases decreased in 2005 compared to the previous five-year median (871). Whites were overrepresented in the case population for giardiasis (88 percent) compared to their representation in the Illinois population (73 percent); African Americans were underrepresented among giardiasis cases (6 percent) compared to their representation in the Illinois population (15 percent). The mean age of cases was 40 years, and more cases occurred in the warmest months of the year.

**Suggested Readings**

Figure 37. Giardiasis Cases and Carriers in Illinois, 2000-2005

Number of cases

- 873 in 2000
- 904 in 2001
- 871 in 2002
- 961 in 2003
- 907 in 2004
- 772 in 2005

Year

Figure 38. Incidence by Age of Giardiasis Cases in Illinois, 2005

Incidence per 100,000

- <1 yr
- 1-4 yr
- 5-9 yr
- 10-19 yr
- 20-29 yr
- 30-39 yr
- 40-49 yr
- 50-59 yr
- >59 yr

Age in years

Figure 39. Giardiasis Cases in Illinois by Month, 2005

Number of cases

- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec

Month of onset
Hantavirus
Background

Hantavirus was first recognized in the United States in 1993. Hantaviruses are rodent-borne. There are two groups of hantaviruses. The Old World hantaviruses are associated with renal syndrome, and the New World hantaviruses are associated with cardiopulmonary disease. In the United States it causes hantavirus cardiopulmonary syndrome. Sin nombre virus causes the majority of cases in the United States. Transmission is from inhalation of aerosolized virus from infected rodent droppings, urine or saliva. The incubation period may range from nine to 33 days. Most exposures are peridomestic. In Illinois, deer mice are the reservoir. Symptoms include fever, headache, vomiting and coughing followed by shortness of breath. The case fatality rate for hantavirus pulmonary syndrome in the United States is 30 percent to 40 percent. Through mid-2002, 318 cases had been identified in 31 states. Although this disease is a serious problem in North and Central America, more cases occur in South America.

The first case in Illinois occurred in a Carroll County resident in 1996. The house was infested with deer mice and 13 percent of trapped mice tested positive for the organism.

Prevention involves rodent control around homes and work areas, avoiding contact with rodent excreta and wearing appropriate equipment when working in heavily contaminated areas.

Case definition
A confirmed case is a clinically compatible case that is laboratory confirmed. Laboratory confirmation can be detection of hantavirus-specific immunoglobulin M or rising titers of hantavirus specific immunoglobulin G, or detection of hantavirus-specific ribonucleic acid sequence by PCR in clinical specimens or detection of hantavirus antigen by immunohistochemistry.

Descriptive epidemiology
One hantavirus case was reported in an Illinois resident in 2005. A 22-year-old from Kankakee County was confirmed as a case of Sin Nombre virus by CDC. This is only the second case ever of hantavirus reported in the state. This patient had no travel outside the state and worked and lived at a landscaping business. At the time of the environmental investigation there was minimal evidence of mouse droppings but the business had done a spring cleanup prior to the patient’s illness. Onset of illness was May 1 and the initial symptoms were vomiting, diarrhea, nasal discharge and cough. Symptoms progressed to chest pain, difficulty breathing, bleeding from the nose and he was described as having acute respiratory distress syndrome. The patient also had thrombocytopenia and leukocytosis. The patient recovered and was discharged from the hospital.

Suggested readings

Hemolytic Uremic Syndrome (HUS)

Background

Hemolytic uremic syndrome (HUS) is a triad of acute hemolytic anemia, thrombocytopenia, and renal insufficiency. Many microbes including *Shigella dysenteriae*, *Salmonella* ser. Typhi, *Campylobacter jejuni* and *E. coli* O157:H7 have been linked to HUS. Bacteria, such as *E. coli* O157:H7 produce a toxin that can cause vascular cell damage. The most serious sequelae from infection with Shiga toxin-producing *E. coli* in people is HUS. Approximately 8 percent of persons with *E. coli* O157:H7 develop HUS.

HUS occurs primarily in children younger than 5 years of age after infection by an organism producing shiga toxin and causing diarrhea. HUS usually occurs within two to 14 days after onset of diarrhea. Almost half of children with HUS require dialysis. The illness can involve the central nervous system (CNS), pancreas, heart and other organs. During 2005, 221 cases of post-diarrheal HUS were reported to CDC from 33 states. Most cases are in those younger than five years of age.

Antibiotic therapy has been identified as a risk factor for HUS development; therefore, if antibiotic therapy is being considered, it should be withheld for treatment of patients with diarrhea until (at least) a culture confirms that *E. coli* O157:H7 is not present in a stool specimen.

Case definition

Laboratory criteria are both acute anemia with microangiopathic changes (i.e. schistocytes, burr cells or helmet cells) on peripheral blood smear and acute renal injury evidenced by either hematuria, proteinuria, or elevated creatinine level (i.e. greater than or equal to 1.0 mg/dL in a child younger than 13 years or greater than or equal to 1.5 mg/dL in a person aged greater than or equal to 13 years, or greater than or equal to 50 percent increase over baseline).

A probable case is an acute illness diagnosed as HUS or TTP that meets the laboratory criteria in a patient who does not have a clear history of acute or bloody diarrhea in the preceding three weeks, or an acute illness diagnosed as HUS or TTP that a) has onset within three weeks after onset of an acute or bloody diarrhea and b) meets the laboratory criteria except that microangiopathic changes are not confirmed.

A confirmed case is an acute illness diagnosed as HUS or TTP that both meets the laboratory criteria and began within three weeks after onset of an episode of acute or bloody diarrhea

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 – Four cases were reported to CDC. Three additional cases were reported as STEC and HUS was listed as a complication but they were not reported to CDC as HUS cases. All three were probable cases.
- Of the four cases, one also was listed as an *E. coli* O157:H7 case.
- Age - The four HUS cases reported to CDC were 1, 2, 4 and 13 years of age.
- Race/ethnicity – All four cases were white; none were reported as Hispanic.
Seasonal - Onsets occurred in September (two cases) and December (two).

Geographic location - Counties in which cases occurred were Effingham (two), Kane (one) and Lake (one).

Clinical – All four cases had bloody diarrhea. One had fever. All cases were admitted to the hospital. No cases were fatal.

Summary
Only four cases of HUS were reported by Illinois to CDC in 2005. The three not reported were due to confirmed infection with *E. coli* O157:H7. Two cases of HUS were reportedly linked to outbreaks.
Hepatitis A

Background

Hepatitis A virus (HAV) is transmitted through the fecal-oral route by person to person contact and by contaminated food, water or fomites. HAV infection can spread in household members, through day care centers, among persons who consume contaminated or uncooked food handled by infected workers and among men who have sex with men (MSM). It is one of the most frequently reported vaccine preventable diseases. There is only one serotype and immunity after infection is life long. The hepatitis A rate in the United States in 2005 was 1.5 per 100,000 and 4,488 cases were reported. Rates were similar across all age groups. Rates among Hispanics were higher. The most frequently identified risk factor for acute hepatitis A in 2005 in the United States was international travel. International travel was reported for 15 percent of hepatitis A cases. The majority of cases with travel went to Mexico and Central or South America (81 percent). Sexual and household contact to a confirmed case of hepatitis A was reported for 12 percent of cases. In 2005, 3 percent reported being men who have sex with men and 5 percent reported intravenous drug use. In 2005 in the United States, 76 percent had jaundice, 33 percent were hospitalized and 0.6 percent died. Young children who are frequently asymptomatic when infected may play an important role in HAV transmission in communities. The incubation period is 15 to 50 days. Onset of illness with HAV can be abrupt with fever, anorexia, nausea and abdominal discomfort, followed by jaundice. The disease can vary from one to two weeks of mild symptoms to a severe illness lasting months. More than 70 percent of infections among young children are asymptomatic. In adults the majority (about 70 percent) are symptomatic. Severity generally increases with age and many infections are asymptomatic, especially in young children. Peak levels of the virus appear in the feces one to two weeks before symptom onset and diminish rapidly after symptoms appear. Serologic testing for IgM anti-HAV is required for laboratory confirmation of hepatitis A infection. IgM anti-HAV becomes detectable five to 10 days after exposure and can persist for up to six months.

Hepatitis A virus infection can be prevented by good personal hygiene, particularly handwashing, pre-exposure or postexposure immunization with immune globulin (IG), and pre-exposure immunization with HAV vaccine. The administration of IG for persons exposed to HAV is 85 percent effective in preventing symptomatic HAV infection if given within two weeks of exposure and may prevent infection entirely if given soon after exposure. The effect of IG starts within hours of administration and provides from three to six months of protection.

In 1995, a hepatitis A vaccine was licensed for individuals older than 2 years of age. The vaccine was recommended for individuals traveling to areas where there is a higher endemicity rate. In 1996, the recommendations expanded to include children in communities with high rates of hepatitis A, men who have sex with men, drug users and individuals who are occupationally at risk, have clotting factor disorders or who have chronic liver disease. In 1999, recommendations for hepatitis A vaccination were expanded to 11 states where the average annual hepatitis A incidence during 1987-1997 was at least 20 per 100,000 (twice the national average) and to consider routine
vaccination for children (24 to 35 months) in six states where average annual incidence was 10 to 20 per 100,000. Illinois did not fall into either of these categories. In August 2005, hepatitis A vaccine was licensed by FDA for use in children aged less than 12 months. In 2005, recommendations for hepatitis A vaccine were expanded. Hepatitis A vaccination is now recommended for children aged 1 year and persons at increased risk for infection. The national immunization survey provides annual estimates of vaccine coverage in states. Nationally in a random survey, 21 percent of children from 24 to 35 months were vaccinated with at least one dose of hepatitis A vaccine. In Illinois, 8 percent of children aged 24 to 35 months were vaccinated with at least one dose of hepatitis A vaccine.

Hepatitis A is typically transmitted from person to person through the fecal-oral route. Occasionally, foodborne transmission occurs when an HAV-infected food handler contaminates food which is not later cooked. Food handler associated outbreak characteristics include the presence of an HAV infected food handler who worked while infectious and had contact with uncooked food or food after it had been cooked, secondary cases among other food handlers who ate food contaminated by the index case and low attack rates in patrons.

Case definition
The CDC case definition for a case of hepatitis A is used in Illinois: an illness with a discrete onset of symptoms and jaundice or elevated serum aminotransferase levels, and IgM anti-HAV positive serology.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 – 130 (five-year median=262) (see Figure 40).
- Age - Incidence was highest in those younger than 10 years of age (two per 100,000) (mean age = 29) followed by the 10-19 year olds (1.4 per 100,000) and 50 to 59 year olds (1.1 per 100,000) (see Figure 41). The overall incidence rate for hepatitis A was one per 100,000.
- Gender – Forty-nine percent were female.
- Race-ethnicity – Sixty-three percent were white, 11 percent were Asian, 6 percent African American and 20 percent other races; 55 percent were Hispanic. Asians were overrepresented in the case population and African Americans were underrepresented in the case population as compared to the Illinois population. Hispanics were overrepresented in the case population as compared to the Illinois population.
- Employment – Two persons reported being food handlers, one a health care worker and one a day care worker.
- Seasonal variation - Cases increased from January through March and in August and September (see Figure 42).
- Geographic variation - The three counties with the most cases included Cook (71), Dupage (nine) and Will (eight).
- Risk factors – Household contact with a hepatitis A case, 19 of 77 (25 percent); travel outside the United States or Canada, 45 of 80 (56 percent); and
consumption of raw shellfish 11 of 69 (16 percent). The most common country visited was Mexico (30 cases).

- Symptoms/outcomes – Seventy-nine percent of reported cases were jaundiced. Forty-four percent of cases were hospitalized. One death was linked to acute hepatitis A.

**Summary**

Hepatitis A is the most commonly reported acute infectious hepatitis in Illinois. The incidence rate (1 per 100,000) was lower than the national incidence (1.5 per 100,000). The number of cases has been decreasing dramatically in the last five years. This may be due to the greater availability of HAV vaccine. The percent of cases reporting international travel has increased since 2004. The mean age of cases was 29 years, although the highest incidence (2 per 100,000) in 2005 occurred in those younger than 10 years of age. Hispanics were overrepresented in hepatitis A cases.

**Suggested readings**


Figure 42. Hepatitis A Cases in Illinois by Month, 2005

Year

Number of cases

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hepatitis B

Background
Hepatitis B virus is a bloodborne and sexually transmitted virus. It is acquired by percutaneous and mucosal exposure to blood or body fluids from an infected person. Men who have sex with men (MSM) are at increased risk for hepatitis B. Approximately 35 percent of cases of acute hepatitis B occur in people who report no recognized risk factor. The most commonly reported risk factors for transmission in the United States are high-risk sexual activity and injection drug use. A high proportion of cases occur among persons in risk groups such as injection drug user, men who have sex with men and persons with multiple sex partners. The incubation period is 45 to 180 days (average 60 to 90 days). Positivity for HBeAg is linked to an increased risk of hepatocellular carcinoma.

Fewer than half of acute hepatitis B cases will have jaundice (<10 percent of children, and 30 percent to 50 percent of adults). The onset is usually insidious with anorexia, nausea, vomiting, abdominal discomfort, jaundice, occasional arthralgias and rash. Chronic HBV infection is found in about 0.5 percent of adults in North America. Chronic infection is more likely to occur in persons infected as infants or young children. An estimated 15 percent to 25 percent of persons with chronic hepatitis B will progress to cirrhosis or hepatocellular carcinoma.

The most effective measure to decrease HBV infection is vaccination. From 1990 to 2004, the incidence of acute HBV infection declined 75 percent in the United States. The greatest decline, 94 percent, occurred in children and adolescents. As of 2004, more than 92 percent of children aged 19-35 months had been fully vaccinated with three doses of hepatitis B vaccine.

In Illinois, hepatitis B vaccination in children was mandated in 1997. CDC also recommends vaccination for MSM, certain travelers, injection drug users, heterosexuals with multiple sex partners or with sexually transmitted diseases, clients or staff in developmentally disabled institutions, health care workers with blood contact, some immigrants, hemodialysis patients, household contacts and sexual partners of hepatitis B virus carriers and male prisoners. During 2005, 5,494 acute hepatitis B cases were reported to CDC from across the United States, an incidence rate of 1.8 per 100,000.

In the United States, there has been more than a 79 percent decrease in hepatitis B since 1990. The rate of hepatitis B in the United States was the lowest recorded since 1990 (1.8 per 100,000). Declines were greatest in children younger than 15 years of age. The rates was highest in those 25 to 44 years of age (3.6 per 100,000) and the lowest rate in those younger than 15 years (0.03 per 100,000). Males have higher rates. Rates were highest in African Americans. At least one-third reported at least one sexual risk factors (MSM, multiple sex partners or sexual contact with a known hepatitis B case). Injection drug use was reported by 15 percent in the United States cases in 2005. Seventy-seven percent had jaundice, 40 percent were hospitalized and 1 percent of cases were fatal in the United States. In 2005, the rate among children younger than 14 years of age (the cohort born since routine infant vaccination was instituted) was 0.02 per 100,0000 representing a 98 percent decline as compared to 1990. The decline in hepatitis B has coincided with a national strategy of
1) screening of pregnant women for hepatitis B, 2) routine vaccination of persons younger than 19 years of age and 3) vaccination of high risk persons.

Case definition
The CDC case definition is used as the surveillance case definition for hepatitis B in Illinois: a clinical illness with a discrete onset of symptoms and jaundice or elevated serum aminotransferase levels, and laboratory confirmation. Laboratory confirmation consists of IgM anti-HBc-positive (if done), or HbsAg-positive, and IgM anti-HAV-negative (if done).

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 - 157 confirmed acute cases (five-year median = 170) (see Figure 43). The overall one-year incidence rate of reported acute hepatitis B in Illinois was 1.3 cases per 100,000 population.
- Age - Incidence rate was highest in the 20 to 49-year-old age groups (mean age = 39 years) (Figure 44).
- Gender – Sixty-two percent were male. The incidence in males was higher than in females.
- Race/ethnicity – Forty-six percent of cases were African American, 43 percent were white, 3 percent were Asian and 7 percent were other races; 13 percent were Hispanic. African Americans were overrepresented in the case population and whites were underrepresented.
- Symptoms/outcomes – Forty-six percent were hospitalized. Four cases were reported to have died as a result of their infection.
- Reporter – The most common reporters were hospital personnel excluding hospital laboratories (100) and laboratory personnel (47).

Summary
There were 147 confirmed hepatitis B cases reported in Illinois in 2005. Almost half of the cases were hospitalized.

Suggested readings
Hepatitis C, acute and chronic or resolved

Background

Hepatitis C virus (HCV), an RNA virus, is the most common chronic bloodborne infection in the United States. There are at least six distinct genotypes of HCV; types 1a and 1b are most common in the United States. It is estimated that 1.8 percent of United States residents have been infected with HCV. The incubation period for HCV ranges from two weeks to six months, most commonly six to nine weeks. Many individuals are asymptomatic and only a small proportion become jaundiced. Forty percent of infected adults are symptomatic, and 85 percent of adults with acute hepatitis C develop persistent infection. Acute hepatitis C is uncommon.

The most efficient route of transmission is by direct percutaneous exposure (e.g., blood or blood product transfusion, organ or tissue transplants, and sharing of contaminated needles between injection drug users [IDUs]). Low efficiencies of transmission occur from sexual and household exposure to an infected contact. Transmission of HCV has been reported from patient to health care worker. The majority of HCV cases are in IDUs. The virus has been shown to be transmitted by the use of shared drug preparation equipment such as drug cookers and filtration cotton. In the United States, injection drug use accounts for 60 percent of HCV infection, sexual contact (20 percent) and other exposures (household, perinatal and occupational) for 10 percent. Ten percent of cases have no identified risk factor. The rate of transmission after needle-stick injury from a known infected person is less than 10 percent. A study in New York City showed that hepatitis C virus was present in nasal secretions of HCV positive drug sniffers and on the straws used.

Hepatitis C is the most common indication for liver transplantation in adults and accounts for about 40 percent of all transplants in the United States. About 50 percent to 80 percent of patients with pretransplantation viremia develop hepatitis in the liver graft.

The hepatitis C virus can cause chronic hepatitis, cirrhosis and hepatocellular carcinoma. Among adults who had acute hepatitis C, 26 percent to 50 percent developed chronic active hepatitis and 3 percent to 26 percent developed cirrhosis.

Hepatitis C is more prevalent among African Americans than amongst persons of other races. Compared to whites, African Americans have a higher rate of chronic hepatitis C. In the United States, HCV infection is estimated to cause more than 10,000 deaths per year. African Americans represent only 12 percent of the United States population but 22 percent of the estimated Americans with chronic HCV infection. The most common mode of transmission for African Americans and whites is injection drug use. There is a higher prevalence of genotype 1 among African Americans than among other racial groups.

In the United States, 671 cases of acute hepatitis C were reported in 2005 (0.2 per 100,000). The rate of hepatitis C was higher for males. Rates of hepatitis C were similar in racial and ethnic groups. In the United States, 60 percent of cases had jaundice, 42 percent were hospitalized and 1 percent died in 2005. The incidence of acute hepatitis C has declined probably due to decreases in needle sharing behavior. Many persons reporting multiple sex partners as a risk factor were also intravenous
drug users. It is estimated that 3 million people in the United States are affected by chronic hepatitis C, especially those persons aged 40 to 49 years of age.

Routine screening for HCV infection is recommended only for persons who have a history of ever injecting drugs, recipients of clotting factor concentrates prior to 1987, recipients of blood transfusions or solid-organ transplants prior to July 1992, and chronic hemodialysis patients. Screening also is recommended for sex partners of HCV-infected persons, infants 12 months or older who were born to HCV-infected women, and health care workers after accidental needle-sticks or mucosal exposure to anti-HCV-positive blood. There is no vaccine or effective post-exposure prophylaxis to prevent HCV infection.

Diagnostic tests for HCV infection include serologic assays for antibodies and molecular tests for viral particles. Screening tests for HCV include enzyme immunoassays (EIAs) to measure anti-HCV antibody. While these tests are highly sensitive, they do not distinguish between acute, chronic or resolved infections. False-positive results are common, resulting in the need for supplementary testing. Diagnostic testing for HCV should include use of both an enzyme immunoassay (EIA) and supplemental or confirmatory testing with a more specific assay such as the recombinant immunoblot (RIBA, Chiron Corporation). RIBA results are reported as positive, indeterminate or negative. It is not as sensitive as the EIA and should not be used for screening.

Persons with chronic hepatitis C should not drink alcohol and should be vaccinated for hepatitis A and hepatitis B. HCV-positive persons should not donate blood, organs, tissues or semen. There is insufficient data to recommend that infected persons change sexual practices with steady partners. HCV-positive household members should not share toothbrushes or razors.

Treatment for hepatitis C may be recommended for persons with elevated serum alanine aminotransferase (ALT) and tests that indicate the presence of circulating HCV RNA. HCV RNA levels do not correlate with grade or stage of disease. HCV is divided into six genotypes. Genotype is a predictor of response to therapy. Genotype 1a and 1b HCV infection, the most common types in the United States, has a poorer response to therapy than other types. Response to therapy is higher in those with genotypes 2 and 3.

Case definition

The CDC case definition for acute hepatitis C is a discrete onset of symptoms with either jaundice or liver enzymes (ALT or AST) >2.5 x upper limit of normal and negative serology for acute hepatitis A and hepatitis B and positive for HCV antibody confirmed by a supplemental test (or simply positive for HCV by the supplemental test).

The CDC case definition for a confirmed case of hepatitis C virus infection, chronic or resolved is a person not meeting the acute hepatitis C definition and having at least one of the following laboratory results: HCV RIBA positive, nucleic acid test for HCV RNA positive, report of HCV genotype, anti-HCV positive (repeatedly reactive) by EIA, verified by a more specific assay like RIBA or nucleic acid, or antic-HCV screening test positive with a signal to cut off ratio of a true positive.

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Descriptive Epidemiology
Hepatitis, C acute

- Number of cases in Illinois in 2005 – Three cases of acute hepatitis C.
- Age – Acute hepatitis C cases ranged from 40 to 46 years (mean age = 43).
- Gender – Thirty-three percent of acute hepatitis C cases were male.
- Race/ethnicity - For acute hepatitis C cases, all cases were white.
- Risk factors - For acute hepatitis C, two of two (100 percent) cases with a documented history, reported a history of injection drug use.
- Symptoms/outcomes – Thirty-three percent of the acute hepatitis C cases with histories were hospitalized and no cases were fatal.

Hepatitis C, chronic or resolved

- Number of cases in Illinois in 2005 - 4,329 cases of chronic or resolved hepatitis C were reported. This does not mean the cases were acquired or diagnosed in 2005, this is just the first year they were reported to us and entered in the INEDSS system.
- Age – The majority of cases reported were in the 40 to 59 year age group (see Figure 45).
- Gender – Sixty-four percent of cases were male.
- Race/ethnicity – Sixty-nine percent of cases were white, 26 percent were African American, 2 percent were Asian and 2 percent were other races. For 3,050 cases where Hispanic status was known, 6 percent reported being Hispanic.
- Clinical – The number hospitalized was 350 of 2,324 (15 percent). Fourteen of the cases were reported to have died from their infection.

Summary

In 2005, there were three reported cases of acute hepatitis C. More than 4,000 cases of chronic or resolved hepatitis C were reported in this year. These cases may have been acquired in previous years and reported this year.

Suggested readings


Pearlman, B.L. Hepatitis C infection in African Americans. CID 2006;42:82-91.
Histoplasmosis

Background
Histoplasmosis is a systemic fungal disease caused by *Histoplasma capsulatum*. Transmission occurs through inhalation of the organism. The incubation period ranges from three to 17 days. Signs and symptoms of histoplasmosis include fever, headache, muscle aches, cough and chest pain. Patients who have underlying lung disease may develop chronic lung disease after *H. capsulatum* infection. Bird and bat droppings are beneficial to the growth of the organism. Diagnosis of infection can be through culture or serology. The M precipitin alone indicates active or past infection. The H precipitin indicates active disease or recent infection.

Histoplasmosis can be a severe infection in persons with HIV or other immunocompromising conditions. Approximately 5 percent of persons with AIDS who live in endemic areas may develop histoplasmosis, which frequently disseminates.

Case definition
Histoplasmosis is not a nationally notifiable disease. The case definition for histoplasmosis in Illinois is either:

1) Isolation of the organism from a clinical specimen in patients with acute onset of flu-like symptoms, or

2) In patients with flu-like symptoms, hilar adenopathy and/or patchy infiltrates found on chest radiograph, if done, and at least one of the following
   a. M or H precipitin bands positive by immunodiffusion
   b. A four-fold rise between acute and convalescent complement fixation (CF) titers
   c. A single CF titer of >1:32
   d. Demonstration of histoplasma polysaccharide antigen by radioimmunoassay (RIA) in blood or urine, or demonstration of organisms by silver staining blood specimens or biopsy material

3) Probable case: clinically compatible illness and epidemiologic link to known outbreak

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 - 71 (five-year median = 60) (see Figure 46). At least six (8 percent) of these cases were in immunocompromised persons; therefore, it is not possible to determine whether they represent new infections or reactivation of previous infections.
- Age - Mean age was 41 years (range: 4 years to 78 years) (Figure 48).
- Race/ethnicity – Sixty-six percent were white, 18 percent were African Americans and 3 percent were Asian; 8 percent were Hispanic.
- Disease type – Eleven cases had disseminated histoplasmosis. Forty-three of 44 cases with information available had chest imaging and 37 of the 43 had abnormalities on imaging.
Symptoms – cough, 34 of 51 (67 percent), fever, 37 of 49 (75 percent); difficulty breathing, 29 of 45 (64 percent); night sweats, 16 of 41 (39 percent) and chest pain, 19 of 43 (44 percent). Thirteen of 46 (28 percent) reported being current smokers.

Diagnosis - Seventy cases were reported as confirmed (one was classified as “probable”); 20 cases (32 percent) were confirmed by culture. Cultures were positive from blood (six), respiratory tract (six), bone marrow (two), other (three), unknown (two). One person had positive cultures from multiple sites. Nineteen of 63 (30 percent) were positive by serology along. Of these 19, eight were positive by complement fixation, six were M band positive by immunodiffusion, and five by both complement fixation and M band methods. For five cases, urine antigen tests alone were positive. For 19 cases, more than one diagnostic method was positive. For eight individuals the type of diagnostic testing was not available at the time of this report.

Seasonal variation - No seasonal trend (See Figure 49).

Geographic variation - The three counties reporting the most cases were Cook (15), Sangamon (seven) and Macon (seven).

Outcomes – Thirty-five (55 percent) were hospitalized; three cases were fatal.

Outbreaks - No outbreaks were reported in 2005.

Summary
Fewer cases were reported in 2005 as compared to the number reported in 2004. No outbreaks were reported.
Legionellosis

Background

Legionella spp. are a group of intracellular pathogens that often inhabit aquatic environments where they can survive well. There are 48 species of Legionella and several serotypes. L. pneumophila serotype 1 is responsible for most lower respiratory tract infections. However, 19 other Legionella species have been documented as human pathogens based on isolation from clinical material. The two major clinical manifestations of infection with Legionella bacteria are Legionnaires’ disease (legionellosis) and Pontiac fever. Legionellosis may be epidemic or sporadic, nosocomial or community acquired. The incubation period is two to 10 days (average five to six days). For Pontiac fever, it is five to 66 hours (average 24-48 hours). Initial symptoms of both are anorexia, myalgia and headache often followed by a nonproductive cough and diarrhea. Patients with legionellosis clinically have pneumonia and abnormal chest radiographs.

Legionellosis most often occurs in those who are immunocompromised due to disease or aging. Risk factors are underlying medical conditions such as human immunodeficiency virus, organ transplantation, renal dialysis, diabetes, chronic obstructive pulmonary disease, cancer, immunosuppressive medication or smoking. Pontiac fever is an acute, febrile illness with a high attack rate, short incubation period and rapid recovery. Most cases are sporadic (not associated with a known outbreak). Outbreaks have been associated with aerosol producing devices such as whirlpool spas, showers, humidifiers, respiratory care equipment, evaporative condensers, air conditioners, grocery store mist machines and cooling towers, and have occurred in industrial settings. Approximately 20 percent of all Legionnaires disease cases are associated with recent travel. Travel-associated cases can be hard to detect because travelers disperse and health departments may be unaware that multiple cases are associated to a common destination. Many are thought to be associated with potable water systems in hotels or whirlpool spas in hotels or on board cruise ships. Growth of Legionella species is supported in warm water and biofilms. Disease caused by L. longbeachae can be associated with potting soil and gardening activities.

Legionella urine antigen testing and culture of respiratory secretions are useful for diagnostic testing. The urine antigen test provides rapid diagnosis for L. pneumophila serogroup 1 but will not provide an isolate to compare to clinical and environmental isolates gathered during outbreak investigations. Testing for Legionella species is not performed by the Department’s laboratory. Most test results among reported cases are from hospital or commercial laboratories.

In 2005, 2,301 cases of legionellosis were reported to CDC from state health departments. Illinois was ninth in the nation for the number of Legionella cases reported. In a study of case reported to CDC from 1990 to 2005, incidence rates in males exceeded females and most cases were reported in the summer or fall. Most cases were reported in persons aged 45 to 64 years from 2000 to 2005. The number of Legionella cases reported increased from 1990 through 2005.
Case definition

A confirmed case in Illinois is one that meets the CDC case definition, i.e., a clinically compatible illness with laboratory confirmation of disease by 1) isolation of Legionella from lung tissue, respiratory secretions, pleural fluid, blood or other normally sterile sites; or 2) demonstration of a fourfold or greater rise in the reciprocal indirect fluorescence (IF) antibody titer to \( \geq 128 \) against L. pneumophila serogroup 1 between paired acute and convalescent phase serum specimens; or 3) demonstration of L. pneumophila serogroup 1 in lung tissue, respiratory secretions, or pleural fluid by direct fluorescent antibody (FA); or 4) demonstration of L. pneumophila serogroup 1 antigens in urine by radioimmunoassay (RIA) or enzyme-linked immunoassay (ELISA).

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 - 66 (five-year median = 33) (Figure 49). All were confirmed.
- Age - Seventy-four percent were greater than 50 years of age (see Figure 50).
- Forty-two (64 percent) cases were male.
- Race/ethnicity – Nine percent reported Hispanic ethnicity.
- Seasonal - An increase in cases occurred in August (See Figure 51).
- Geographic distribution – Twenty-three counties reported cases with 25 cases (39 percent) from Cook County and eight (12 percent) from Lake County.
- Risk factors - Four cases (10 percent) had been hospitalized continuously for three or more days before onset; one (2 percent) was discharged from the hospital within 10 days before onset; 35 (85 percent) had no hospital visits in the 10 days before symptoms, one (2 percent) had other types of health care exposure and 25 cases had no information on hospital visits immediately prior to onset. Eight of 43 cases (19 percent) traveled overnight in the two weeks prior to onset. At least one underlying health problem was reported among 34 of 39 cases with information available. Some cases had multiple underlying conditions. The underlying conditions included diabetes (12), cancer (nine), transplant (four), renal dialysis (one), corticosteroid therapy (seven), other immunosuppressive condition (10) or smoking (14); five cases reported no underlying health problems. Four were reported as residing in a residential facility.
- Diagnosis – Cases were diagnosed through urine antigen alone (45), culture of respiratory secretions alone (five), culture of blood (one), direct fluorescent antibody of lung biopsy alone (three), urine antigen plus one other test (two) or unknown (10).
- Outcomes - Hospitalization was required for 95 of 65 cases with information available; 48 cases with information available had X-ray confirmed pneumonia; 10 fatalities occurred among cases.
- Reporting – Forty-four of 47 cases with information available were reported by infection control professionals.
- Outbreaks – No outbreaks were reported in 2005.
Summary

In 2005, there were 66 cases of legionellosis reported in Illinois. Eighty-seven percent of cases had pre-existing medical conditions. There were no outbreaks of legionellosis in 2005.

Suggested readings


Figure 51. Legionellosis Cases in Illinois by Month, 2005

![Bar graph showing the number of Legionellosis cases in Illinois by month in 2005. The highest number of cases occurred in August, with lower numbers in other months.](image-url)
Lyme disease

Background

Lyme disease is a tickborne zoonotic disease caused by the bacterium *Borrelia burgdorferi* sensu lato. The reservoir is the black-legged tick (*Ixodes scapularis*), commonly called the deer tick. Human disease is thought to be primarily caused by nymphal tick bites, usually in late spring or summer. Babesiosis and ehrlichiosis also are transmitted by the same tick. In the Midwest, wild rodents and other animals maintain the transmission cycle. Deer are the preferred host of the adult tick.

Laboratory studies indicate ticks must be attached for > 24 hours for transmission to humans to occur. Experiments in animals have shown that most often the tick must feed at least 48 hours before the risk of transmission becomes substantial.

Lyme disease is characterized by a rash-like skin lesion called erythema migrans (EM) that may be followed by cardiac, neurologic and/or rheumatologic involvement if left untreated. The incubation period for EM ranges from three to 32 days (mean: seven to 10 days) after tick exposure; it is present in 80 percent to 90 percent of case patients. Erythema migrans may be characterized by a homogenous rash rather than a target appearance because of early presentation for treatment. Early manifestations include fever, headache, fatigue, migratory arthralgias and possibly lymphadenopathy. It can take approximately two to four weeks or longer for antibodies to be detected by blood tests so these tests are not required for patients diagnosed with EM in the public health surveillance case definition.

There were 23,305 cases of Lyme disease reported in 2005 in the United States, mainly from the Northeast, mid-Atlantic and north-central regions of the country. Ten states - Connecticut, Delaware, Maryland, Massachusetts, Minnesota, New Jersey, New York, Pennsylvania, Rhode Island and Wisconsin - accounted for 93 percent of all cases reported from 2003 through 2005. The incidence rate of cases in these states was 29 per 100,000. In the 10 states from 2003-2005, the median age of cases was 41 years. Sixty-one percent of cases in those 5 to 14 years of age were male. Cases were more likely to have onsets in June and July. A history of EM was found for 70 percent of patients, arthritis for 30 percent, facial palsy for 8 percent, radiculopathy for 3 percent, meningitis or encephalitis for 2 percent and heart block for less than 1 percent. The incidence rate for Illinois increased from 0.56 to 0.99 per 100,000 in this time frame.

During 2003 and 2004, two ticks submitted from DuPage County were identified as blacklegged ticks. Two human cases were reported during this same time frame with reported exposure of DuPage County. Environmental tick surveillance identified the blacklegged tick in two small areas along the east branch of the DuPage River.

From 1990 through 2004, more than 500 cases of Lyme disease were reported in Illinois residents. Annual spring mailings of tick awareness posters to campgrounds, state parks, local health departments and licensed youth camps are done by the Department.

Effective prevention measures include personal protective measures (tick checks, repellents) and decreasing tick exposure. Removing ticks within 24 hours of
attachment reduces transmission of Lyme disease. Removing brush and leaf litter or creating buffer zones of wood chips or gravel between forest and lawn or recreational areas can reduce tick populations. A study in Connecticut showed that use of protective clothing and tick repellents was effective in preventing Lyme infection.

Case definition
The surveillance case definition for Lyme disease in Illinois is the CDC definition:
1) erythema migrans of at least 5 cm, or 2) at least one late manifestation (musculoskeletal system, nervous system or cardiovascular system) and supportive laboratory evidence of infection or laboratory confirmation, i.e., isolation of \( B. \) burgdorferi from a clinical specimen, or demonstration of diagnostic immunoglobulin M or immunoglobulin G antibodies to \( B. \) burgdorferi in serum or cerebrospinal fluid (CSF).
A two-test approach using a sensitive enzyme immunoassay or immunofluorescence antibody followed by Western blot is required by IDPH for confirmation of non-EM cases.

Descriptive epidemiology
• Number of cases reported in Illinois in 2005 - 127 (five-year median = 47) (See Figure 52). All cases were confirmed. The incidence was one per 100,000.
• Age - Cases ranged in age from 2 to 73 years of age (mean=36).
• Gender – Sixty-two percent were male.
• Race/ethnicity – Of the cases for whom race is known, 115 cases (99 percent) were white. No cases identified themselves as Hispanic.
• Seasonal distribution – Lyme disease case onsets were most common in the months of June and July (Figure 53).
• Geographic distribution - The Illinois exposure locations for the 2005 cases are shown in Figure 54. Sixty-four (51 percent) reported exposure within Illinois. Fifty-nine cases reported a single Illinois county as an exposure locale. The majority of these exposures were in northern Illinois. Five cases reported multiple Illinois counties as exposure sites. Sixty-two cases (49 percent) reported non-Illinois exposure locations including Wisconsin (35), Indiana (five), Massachusetts (three), Michigan (two), Delaware (one), Minnesota (four), New Jersey (two), North Carolina (one), multiple states (seven), Canada (one) and Sweden (one). For one case, no exposure location could be identified. Twenty-six counties reported residents with Lyme disease. The top three counties reporting residents with Lyme disease included Cook County (42 cases), Jo Daviess (15) and DuPage (12).
• Tick Distribution – A map of Illinois with the distribution of known \( Ixodes \) scapularis (the vector for Lyme disease) is provided (Figure 55).
• Symptoms - Qualifying manifestations were EM (102, 82 percent), rheumatologic signs (14, 11 percent), neurologic signs such as Bell's palsy (four, 3 percent) and multiple late manifestations (four, 3 percent). For three cases, information on qualifying manifestations were not available at the time this report was written. Thirteen percent of cases were hospitalized; no deaths were reported in cases.
• Reporting – The four top reporters of Lyme disease cases were infection control
professionals (23), laboratory staff (21), physicians (16) and nurses (14).


Summary

For the 127 cases reported in Illinois residents during 2005, EM was the most common qualifying manifestation for Lyme disease. In the United States, EM was the qualifying manifestation for 69 percent of cases, in Illinois it was the qualifying manifestation for 82 percent of cases. The number of cases peaked in the summer months. The number of reported cases of Lyme disease has increased every year in Illinois since 1996. The tickborne disease module was implemented in INEDSS in late 2005.

Suggested readings


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Figure 52. Lyme Disease Cases in Illinois, 2000-2005

![Figure 52](image1)

Figure 53. Lyme Disease Cases in Illinois by Month, 2005

![Figure 53](image2)
Figure 54. Illinois Map of Reported Exposure Location of Lyme disease Cases by County
Figure 55. Tick distribution map

Known Geographic Distribution of Ixodes scapularis by county in Illinois 2005

*Ixodes scapularis* is also known as the "deer tick" and the "black-legged tick.
*Amblyomma americanum*, the lone star tick, and *Dermacentor variabilis*, the American dog tick, should be presumed present throughout the state.

Shaded counties denote where the "deer tick" has been found repeatedly in the environment and is believed established. CDC criteria for "established" ticks are at least 6 ticks or 2 life stages (larvae, nymphs, adults) identified.

Cross-hatched counties denote where additional reports suggest the "deer tick" is present and may be established.

The "deer tick" was found, late in 2005, in a limited area of southwestern Cook County.

Additional tick and host surveillance activities not depicted on this map may have been conducted by other agencies/organizations in Illinois - findings reflected on this map are those reported to the Illinois Department of Public Health (IDPH).

IDPH does not perform testing for disease pathogens in ticks but identification for genus and species is performed at IDPH when the tick is intact and sent in a crush-proof container to:

Illinois Department of Public Health
Entomologist, Division of Environmental Health
525 West Jefferson - 3rd Floor
Springfield, IL 62701
(217) 782-3890

13 January 2006
Malaria

Background
Malaria is a very important global parasitic disease. It is endemic in more than 100 countries. The incubation period may range from seven days to 10 months. Symptoms of malaria include fever, headache, muscle aches, fatigue, diarrhea and vomiting. Four species of *Plasmodium* (*P. vivax, P. falciparum, P. malariae* and *P. ovale*) cause disease in people. *P. vivax* malaria is the most common form. *P. falciparum* is the most common species in tropical areas and causes the most malaria deaths. The majority of malaria-endemic countries are in sub-Saharan Africa, Southeast Asia and Latin America. More than 90 percent of the incidence of malaria in the world occurs in sub-Saharan Africa and two-thirds of the remaining cases occur in India, Myanmar, Afghanistan, Vietnam and Colombia. The highest risk of malaria is for travelers to sub-Saharan Africa, Papua New Guinea and the Solomon Islands. About 90 percent of *P. falciparum* infections are acquired in Africa. More than 70 percent of *P. vivax* infections are due to exposures in Asia or Latin America.

Immunity lasts less than two years once a person leaves an endemic area. Many persons who travel back to their home country assume they are immune. Identification of the species is important because treatment can differ. For example, disease caused by *P. falciparum* has a more serious prognosis and must be treated differently. Untreated *P. falciparum* can progress to coma, renal failure, pulmonary edema and death. The majority of fatal cases in the United States are due to not using correct chemoprophylaxis, incorrect initial chemotherapy and delays in malarial diagnosis. One of the most important diagnoses to consider in recent travelers with fever is malaria. Imported malaria cases occur in Illinois when someone with the disease immigrates to the United States or when someone who travels overseas uses inadequate chemoprophylaxis. Persons traveling to malarious areas should take recommended chemoprophylaxis regimens and use appropriate personal protective measures against mosquito bites (using mosquito nets at night when accommodations do not protect against mosquitoes and repellents). The risk of malaria depends on geographic location of travel, urban versus rural stay, type of accommodations, duration of stay, time of the year, activities, elevation and compliance with preventive measures. In the United States, malaria is transmitted predominantly by the bite of an infective female anopheline mosquito in travelers while overseas. Other less common methods would include infected blood products, congenital transmission or local mosquito borne transmission. Malarial infection or relapse during pregnancy results in risk to the mother and fetus including maternal anemia, spontaneous abortion, perinatal mortality, low birth weight and prematurity. Symptoms in newborns included fever, poor appetite, irritability and lethargy and can mimic sepsis.

Malaria should be considered in the differential diagnosis of illness in persons with 1) fever and a history of travel to areas where malaria is endemic, including immigrants, 2) fever of unknown origin, regardless of travel history, or in 3) ill neonates and young infants with fever and mothers who have immigrated or traveled to areas where malaria is endemic.
The majority of malaria infections in Illinois are caused by travel to areas with ongoing transmission. In 2005, 1,494 malaria cases were reported in the United States including seven fatal cases. The species of malaria identified in these cases was *falciparum* (49 percent), *vivax* (22 percent), *malariae* (3 percent) and *ovale* (2 percent). In 23 percent of cases the species was unknown. Malaria is transmitted in parts of Africa, Asia, the Middle East, Central and South America, the island of Hispaniola and Oceania. All but two cases were imported. These two cases were congenital. The majority of infections in the United States were acquired in Africa (67 percent), followed by Asia and the Middle East (15 percent) and the Americas (16 percent). Sixty-eight percent had not taken any malarial chemoprophylaxis. Of the 160 patients who contracted malaria after taking a recommended antimalarial drug for chemoprophylaxis, 38 percent reported compliance with the regimen, 43 percent reported noncompliance and 19 percent had missing compliance information. For *P. vivax* or *P. ovale*, if onset develops 45 days after arriving in the United States this is consistent with relapsing infections and does not indicate primary prophylaxis failure. Of the United States civilians with malaria, 56 percent of cases had visited friends or relatives in malarious areas. The second leading reason for travel was missionary work (9 percent) followed by tourism (7 percent).

**Case definition**

Illinois uses the CDC case definition. A confirmed case is a person (symptomatic or asymptomatic) with an episode of microscopically confirmed malaria parasitemia diagnosed in the United States, regardless of whether the person experienced previous episodes of malaria while outside the country.

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2005 – 74. Travel history was unknown for eight cases; all other cases reported a travel destination outside the United States during their incubation period (five-year median = 61) (see Figure 56). All were confirmed cases.
- Age – An increase in cases occurred in the 50 to 59 year age group; the mean age was 37 (Figure 57).
- Sex – Sixty-six percent were male.
- Race/ethnicity – Fifty-one percent were African American, 24 percent were white, 11 percent were Asian and 13 percent were other races; 3 percent were Hispanic. There were significantly higher proportions of African Americans with malaria compared to their presence in the Illinois population and significantly lower proportions of whites and Hispanics with malaria compared to the Illinois population.
- Geographic Location – Malaria cases were reported from 13 counties. The majority were reported from Cook County (65 percent).
- Seasonal variation - Cases of malaria were reported in greater numbers in the summer (Figure 58).
Speciation - The malaria species identified in the reported cases were *P. falciparum* (41 cases, 62 percent of cases with known species), *P. vivax* (16 cases, 24 percent), *P. malariae* (five cases, 8 percent), *P. ovale* (four cases, 6 percent) and unknown (eight cases, 11 percent).

Treatment/outcomes – Forty-two of 69 (61 percent) were hospitalized. No cases are known to have been fatal. The *P. falciparum* cases were treated with the following medications: malarone (four cases); chloroquine (three); quinine (two); mefloquin (two), primaquin (one); doxycycline (one); doxycycline, quinine and primaquin (one); quinine and cleocin (one); doxycycline and quinine (five); doxycycline and malarone (one) and unknown (20). Two cases of cerebral malaria were reported.

- The *P. vivax* cases were treated with the following medications: quinine (one), chloroquin (one); malarone (one); doxycycline and quinine (four); primaquin and mefloquin (one); primaquine, chloroquin and levaquin (one); primaquin, quinine and doxycycline (one). Treatment type for six cases was unknown.

- The *P. ovale* cases were treated with the following medications: doxycycline, primaquin and quinine (three cases); primaquin and malarone (one); and chloroquin, quinine and clinamycin (one).

- The *P. malariae* were treated with the following medications: chloroquin (two cases); quinine (one), chloroquin and doxycycline (one) and unknown (one).

Risk factors - The major risk factor is travel outside the United States. Specific information was available for 66 of the 2005 cases. The only Asian country reported by cases as a travel destination was India (eight cases). In Africa, the following travel destinations were reported for 47 cases: Nigeria (23 cases), Ghana (11 cases), Uganda (two), West Africa (two), Tanzania (one), Ivory Coast (one), Republic of Congo (one), Zambia (one), unspecified Africa (four) and multiple African countries (one). Nine cases reported a travel destination of Central America, South America or the Caribbean. Destinations included Honduras (four cases), Haiti (one) and Belize and multiple countries in the area (three). Two cases reported travel destination in multiple continents.

- Of the 23 cases reporting travel to Nigeria, 17 were infected with *P. falciparum*, two with *P. malariae* and one case with *P. ovale*. Three cases were not speciated. Nine of the 11 cases who visited Ghana had *P. falciparum* and two had unknown species. The eight cases reporting travel to India were infected with *P. vivax* (seven) and *P. falciparum* (one).
Cases provided the following reasons for travel overseas: visiting friends or relatives (17), missionary work (six), business (four), tourism (five), immigrant or refugee (six), other (five) and unknown (31).

Malaria prophylaxis was reported by only 16 of 42 cases providing information (38 percent). Cases indicated taking the following medications for the prevention of malaria: chloroquin (six cases), mefloquin (three), doxycycline (two), pyrimethamine (one), Nevaquin (one), malarone (one) and unknown medication (two).

Reporting – Thirty-five of 48 cases were reported by infection control professionals.

Past infection – Nineteen cases reported no previous history of malaria, 11 cases reported a previous history with three cases documented to be within the last 12 months. Information on past history of malaria was not completed for 44 cases.

Summary
There were 74 reported cases of imported malaria identified in Illinois in 2005, the sixth highest number of cases among the states. This was higher than the median (61 cases) for the previous five years.

African Americans and Asians made up a higher proportion of persons with malaria than in the Illinois population. Laboratories should forward blood smears to the Department’s laboratory for verification of species. Laboratories should be thorough in identifying the species of this parasite because treatment differs by species (e.g., *P. vivax* and *P. ovale* require additional treatment with primaquine to prevent relapses) and simultaneous infection with more than one species does occur.

**Figure 56. Malaria Cases in Illinois, 2000-2005**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
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<td>2004</td>
<td>47</td>
</tr>
<tr>
<td>2005</td>
<td>74</td>
</tr>
</tbody>
</table>
Figure 57. Age Distribution of Malaria Cases in Illinois, 2005

Age Group: <1 yr, 1-4 yr, 5-9 yr, 10-19 yr, 20-29 yr, 30-39 yr, 40-49 yr, 50-59 yr, >59 yr
Number of cases: 0, 5, 10, 15, 20

Figure 58. Malaria Cases in Illinois by Month, 2005

Month of Onset: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
Number of cases: 0, 5, 10, 15
Measles

Background
Measles is a highly communicable viral disease with humans as the only natural host for the infection. Transmission most commonly occurs through airborne spread or through direct contact with nasal or throat secretions of infected people. The incubation period is about 10 days, but varies from seven to 18 days. Infected individuals show fever, conjunctivitis, coryza, cough and Koplik’s spots on the buccal mucosa, along with a rash that appears on the third to seventh day. The disease can be prevented by proper immunizations. A two-dose vaccination schedule is recommended in the United States, one at 12 to 15 months and one at school entry (4 to 6 years) or by 11 to 12 years. Sustaining high levels of vaccination is important to limit indigenous spread of measles from cases imported into the United States.

Nationally, there were 66 cases reported to CDC; 24 were internationally imported. Half of all cases occurred among children 5 to 19 years of age. Measles morbidity increased 79 percent from 2004. This was mainly due to an outbreak associated with a group of Indiana residents who were not vaccinated for measles due to religious reasons.

Case definition
A confirmed case in Illinois is one that meets the CDC definition, i.e., a case that is laboratory confirmed, or that meets the clinical case definition and is epidemiologically linked to a confirmed case. Laboratory confirmation consists of 1) isolation of measles virus from a clinical specimen, or 2) significant rise in measles antibody level by any standard serologic assay, or 3) positive serologic test for measles IgM antibody. The clinical case definition is an illness characterized by a generalized rash lasting > three days, and a temperature of ≥ 101 F, and a cough or coryza or conjunctivitis.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 – Two cases reported (See Figure 59).
- Age – Ages were 8 and 12 years.
- Gender – One was male and one was female.
- Race/ethnicity – One case was Asian and one did not report race. Neither case reported Hispanic ethnicity.
- Geographic distribution – One case resided in Chicago and one in Grundy County.
- Seasonal variation – Case onsets occurred in May and the two cases were unrelated to each other.
- Fatalities – No fatalities were reported.
- Immunization status – One case had received a single MMWR vaccination in May 1998. The other had not been vaccinated due to a religious exemption.
- Individual case description
- Case One – The first case, a Chicago resident, experienced fever, rash and cough and was positive by IgM testing with a titer of 1:60. The case had traveled to Pakistan and acquired infection while there.
- Case Two – The second case was a Grundy County resident with fever, rash and cough and a positive IgM titer of 1:640. He was not vaccinated for measles and acquired infection while in contact with a measles case who had traveled to Romania. Infection was acquired in a church setting.
- Outbreaks – No outbreaks based in Illinois were reported. An outbreak in Indiana resulted in one Illinois resident diagnosed with measles.

**Summary**

Two cases were reported. Both had either traveled overseas or had been in contact with someone who had traveled overseas.
Mumps

Background

Mumps is transmitted by droplet spread and by direct contact with the saliva of an infected person. The incubation period is 12 to 25 days. This viral disease is characterized by fever and swelling and tenderness of salivary glands. Orchitis may occur in males and oophoritis in females. Winter and spring are the times of increased occurrence. Vaccination can prevent mumps. In 2005, 314 mumps cases were reported to CDC.

Case definition

A confirmed case in Illinois is one that meets the CDC case definition: a clinically compatible illness that is laboratory confirmed, or that meets the clinical case definition and is epidemiologically linked to a confirmed or probable case. A laboratory-confirmed case does not need to meet the clinical case definition. The laboratory confirmation may consist of 1) isolation of mumps virus from a clinical specimen, or 2) a significant rise in mumps antibody level by a standard serologic assay, or 3) a positive serologic test for mumps IgM antibody. The clinical case definition is an illness with acute onset of unilateral or bilateral tender, self-limiting swelling of the parotid or other salivary gland, lasting greater than 2 days, and without other apparent cause.

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 - 10 (Figure 60). Four were confirmed and six were probable.
- Age - Median age was 10 years (range was 10 months to 32 years).
- Gender - Seventy percent were male.
- Race/ethnicity - Forty percent were white (four cases), 60 percent were other races (six cases). Forty percent reported Hispanic ethnicity.
- Geographic distribution - Cases resided in five jurisdictions (Champaign, Cook, Kane, Massac and Will).
- Seasonal variation - Cases occurred from January through October.
- Fatalities – No fatalities were reported.
- Immunization status – Eighty percent of cases were age-appropriately vaccinated; two cases had unknown vaccination status.
- Outbreaks – No outbreaks were reported in Illinois.

Summary

The median age of the 10 reported mumps cases in 2005 was 10 years. Most reported being appropriately immunized.
Figure 60: Mumps Cases in Illinois, 2000-2005

<table>
<thead>
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<th>Year</th>
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<tr>
<td>2004</td>
<td>10</td>
</tr>
<tr>
<td>2005</td>
<td>10</td>
</tr>
</tbody>
</table>
Pertussis

Background

Pertussis is an acute bacterial infection caused by *Bordetella pertussis*. It is transmitted primarily through aerosolized droplets of respiratory secretions or by direct contact with respiratory secretions from an infected person. The disease is endemic in the United States and epidemic cycles occur every three to four years.

Pertussis is characterized by a paroxysmal cough that can last several weeks. Pertussis should be considered in adolescents and adults especially if the cough is associated with vomiting or gagging or persists more than two weeks. Pertussis in adults may be missed because symptoms may be atypical, and nasopharyngeal cultures are rarely positive if taken during the first seven days of illness. Pertussis is transmitted from person to person via aerosolized droplets from cough or sneeze or by direct contact with secretions from the respiratory tract of infectious persons. Pertussis can be highly infectious during the three weeks after onset of illness. The incubation period is usually seven to 10 days although it can range from six to 20 days. A resurgence of cases has been reported in the last decade in the United States. A total of 25,616 pertussis cases (8.7 per 100,000) were reported to CDC from states in 2005. Of these cases, the incidence was highest (161 per 100,000 population) in infants younger than 6 months of age (too young to have received three doses of vaccine). Adolescents and adults account for the majority of cases (60 percent). Vaccine-induced immunity wanes about five to 10 years after pertussis vaccination.

For the first week, mild fever, coryza and cough are common. From week 1 through six, a paroxysmal cough, inspiratory whoop, and post-tussive vomiting may occur. From six to 12 weeks the intensity of cough decreases. Infants younger than 12 months with pertussis are more likely than older age groups to have complications of pertussis. Outbreaks are managed through prompt treatment of patients and antimicrobial prophylaxis of close contacts. Acellular pertussis vaccines are used in children from 6 weeks to 6 years of age.

Among the diseases for which universal childhood vaccination is recommended in the United States only pertussis has increased in incidence in the past 20 years. During the spring of 2005, two tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine (Tdap) products for use in adolescents were licensed in the United States. The ACIP recommended that adolescents aged 11 to 18 years should receive a single dose of Tdap rather than Td for booster immunization. Immunity to pertussis wanes approximately five to 10 years after completion of childhood pertussis vaccination. Active immunization with five doses of vaccine at 2, 4, and 6 months, at 12 to 15 months and at school entry can prevent this disease.

To confirm the diagnosis of pertussis in symptomatic adults, physicians should obtain a nasopharyngeal aspirate or swab for *B. pertussis* culture within two weeks of cough onset. After two weeks of cough, polymerase chain reaction (PCR) is two to three times more likely than culture to detect *B. pertussis*. PCR should be used in diagnosis of persons who also meet the clinical case definition of more than two weeks of cough with paroxysms, inspiratory whoop or posttussive vomiting.
Case definition

The case definition for pertussis in Illinois is a clinically compatible illness that is laboratory confirmed or epidemiologically linked to a laboratory-confirmed case. Laboratory confirmation is through culture of \emph{B. pertussis} from a clinical specimen. A clinically compatible illness is a cough lasting at least two weeks with one of the following: paroxysms of coughing, inspiratory whoop or post-tussive vomiting (without other apparent causes) or greater than two weeks of cough in a person in an outbreak setting. A confirmed case is defined as a cough illness of any duration in any person with isolation of \emph{B. pertussis} or a case that meets the clinical case definition and is confirmed by polymerase chain reaction or by epidemiologic linkage to a laboratory-confirmed case. A probable case meets the clinical case definition but is not laboratory confirmed or epidemiologically linked to a laboratory-confirmed case.

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 - 922 (five-year median = 231) (Figure 61). The one-year incidence rate for pertussis was 7.4 per 100,000.
- Age – Twenty-five percent occurred in those younger than five years of age (Figure 62). In 2005, 249 of 916 reported cases (27 percent) occurred in those older than 19 years of age.
- Gender - Females comprised 55 percent of cases.
- Race/ethnicity - Eighty percent were white, 4 percent were African American, 0.7 percent were Asian; 10 percent reported Hispanic ethnicity as compared to percent in 2004.
- Geographic Location – Cases were reported from 63 counties. Counties reporting the most cases were Cook (186), Lake (121), Kane (54), Jo Daviess (53) and Madison (49).
- Seasonal variation - Cases increased in October (Figure 63).
- Vaccination status – Fifty-two percent of 476 cases with a vaccination history were vaccinated for pertussis.
- Clinical Outcome – No cases were fatal.
- Outbreaks – Seventeen outbreaks from 11 Illinois counties were reported. In INEDSS, 172 cases were reported to be linked to a specific outbreak.

Summary

The number of yearly reported pertussis cases decreased from 2004 to 2005 in Illinois but the total was much higher than the five-year median for pertussis. The highest incidence occurred in those younger than one year of age.

There were 922 pertussis cases reported in Illinois in 2005 including those associated with 17 outbreaks. The incidence in Illinois was 7.2 per 100,000 as compared to the national incidence of 8.7 in 2005.

Suggested readings

ACIP. Preventing tetanus, diphtheria, and pertussis among adolescents: Use of

Q fever

Background

Q fever is an acute rickettsial disease. *Coxiella burnetti* is the causative agent. Q fever is a worldwide zoonosis. Phase I is found in nature and phase II after multiple laboratory passages in the laboratory. The infective dose can be very low, as low as one organism. The diagnosis of Q fever relies on serologic testing. In 60 percent of cases, acute Q fever can be asymptomatic. In patients with symptoms, it is usually mild and sometimes complicated by febrile illness, pneumonia or hepatitis infection. Chronic Q fever may appear as endocarditis. Persons at higher risk of Q fever infection include animal workers. The animal reservoirs include sheep, cattle, goats, cats, dogs and some wild animals. The organism can be shed in high quantities in placental fluids at parturition. Ticks can be a rare source of infection in the United States. Q fever is most commonly transmitted through airborne dissemination of the organism in dust from premises contaminated with placental tissues and excreta of infected animals, in necropsy rooms or in animal processing establishments. Rarely, it can be transmitted from consumption of unpasteurized milk or cheese. The incubation period is from two to three weeks. Q fever is also a Category B bioterrorism agent. Outbreaks have been linked to aerosol transmission in heavy winds.

In 2005, 136 cases of Q fever were reported to CDC.

Case Definition

A confirmed case of Q fever is a clinically compatible illness with either isolation of *C. burnetti* from a clinical specimen, demonstration of *C. burnetti* in a clinical specimen by detection of antigen or nucleic acid, or a fourfold or greater change in serum antibody titer to *C. burnetti* antigen. A probable case is defined as a clinically compatible or epidemiologically linked case with an elevated serum antibody titer to *C. burnetti*.

Descriptive Epidemiology

- Number of cases **reported** in Illinois in 2005 – 11.
- Age - Cases ranged in age from 19 to 75 (median=55)
- Gender - Females comprised 64 percent of cases.
- Race/ethnicity – Seventy-three percent were white, 18 percent were African American and 9 percent were in other races; no cases reported Hispanic ethnicity.
- Seasonal variation - Cases reported onsets from February to November.
- Geographic Location – Cases were reported from nine Illinois counties.
- Risk factors – Four cases had known exposures to livestock. Of the four, one case had exposure to goats including at parturition. One case had exposure to sheep including at parturition. Two cases had exposure to cattle. Seven cases had no known risk factors for infection.
Summary
Eleven cases of Q fever were reported in Illinois. States reporting the highest number of cases were Colorado (25), California (16), Missouri (13) and Illinois (11).

Suggested readings
Rabies

Background

In the United States, rabies is a disease that affects primarily wildlife populations. It is a neurologic illness that follows infection with a rhabdovirus. It produces encephalitis and typically progresses to death. Transmission of rabies to humans results from the bite of a rabid animal or from contact between the saliva of a rabid animal and a mucous membrane or wound. The rabies virus is inactivated by sunlight, heat and desiccation.

The incubation period is usually three to eight weeks. Symptoms may include fever, anxiety, malaise, and tingling and pruritus at the bite site. Neurologic signs, beginning two to 10 days later, may include hyperactivity, paralysis, agitation, confusion, hypersalivation and convulsions. The paralytic form of rabies must be differentiated from Guillain Barré syndrome. After two to 12 days, the patient may go into a coma and experience respiratory failure. Rabies should be considered in the differential diagnosis of any acute rapidly progressive encephalitis, regardless of documentation of an animal bite.

In 2005, the United States and Puerto Rico reported one case of human rabies and 6,417 cases of animal rabies. Wild animals accounted for 92 percent of the animal cases reported in the United States; the top three species with rabies were the raccoon, skunk and bat. The top six rabies-positive bats after speciation (not done in all states) were the big brown bat (62 percent), Mexican free-tailed bat (13 percent), Western pipistrelle (3 percent), little brown bat (6 percent), the hoary bat (5 percent) and red bat (2 percent). The most commonly identified rabid bat in the United States was the big brown bat. The peak of bat rabies in the United States occurs in August.

The human rabies case occurred in Mississippi in September 2005. The strain of rabies virus could not be determined as diagnosis was by serology. Bats were commonly seen outside the home and dead bats were found in the home. The child had removed a live bat from his room. Twenty-three family and close contacts and 32 health care providers received post-exposure prophylaxis.

From 1990 to 2005, 48 human rabies cases were reported in the United States. Ten of 48 were infected outside the continental United States. Thirty-eight of 48 with known rabies virus variants were variants indigenous to the United States. Thirty-five of 38 were infected with bat rabies virus variants (four received transplants from infected donors).

Over the past 40 years in Illinois, skunks and bats have been the main wildlife reservoirs of rabies virus. The last human case of rabies in Illinois was reported in 1954.

Case definition

The case definition for human rabies is a clinically compatible illness that is laboratory confirmed. Laboratory confirmation is through detection by direct fluorescent antibody (DFA) of viral antigens in a clinical specimen (preferably brain tissue or punch biopsy of the nape of neck, including at least 10 hair follicles where associated nerves are likely to show evidence of infection), or isolation of rabies virus from saliva or cerebrospinal fluid (CSF), or identification of a rabies-neutralizing titer of greater than 1:5 in the serum or CSF of an unvaccinated person. A case of animal rabies is
confirmed by DFA of brain tissue. If samples are sent to CDC, as is normally done only for confirmation of a positive result in a domestic species, the CDC results are used as the final results for the purposes of this report.

Descriptive epidemiology
Number of animals submitted for rabies testing in Illinois in 2005 – 6,061; 51 additional heads did not meet criteria established by the testing laboratories (Illinois Departments of Agriculture and Public Health). Examples of unsatisfactory specimens are those determined to be too decomposed or too damaged to test. Fifty-one specimens were DFA positive; 43 were bats, six were skunks, one was a cow and one was a fox (Table 6). In Illinois, typing of rabies virus was done on six rabies positive skunks and all were positive for the north central skunk strain. The cow and horse were also the north central skunk strain. The fox from Champaign was the silver-haired bat strain of rabies.

- Trends in animal rabies testing in Illinois are shown in Figure 64.
- Exposures to rabid bats - There were 43 rabid bat exposure situations.
  - In 32 of the 43 rabid bat situations, no human exposures sufficient to require rabies PEP occurred (for two situations, the human exposure information was unknown). In 35 of the rabid bat situations involving humans, some detail of the location of exposure was reported to the Department by the local health department involved. In eight situations, bats were found inside homes. In 26 situations the bat was found alive outside in yards, pools or near barns and in one situation a bat was found in a truck bed.
- Domestic animals (all dogs or cats) were either exposed or possibly exposed in eight of the 43 situations (Table 7).
- Exposures to other rabid mammals – There were eight other animals with rabies. These animals were collected in the following counties: DeKalb (one skunk), LaSalle (four skunks), Lee (one skunk), Bureau (one cow, previously pastured in LaSalle) and Champaign (one fox).
  - Cow - Seven persons were treated after exposure to this cow including three veterinarians and a veterinary assistant.
  - Fox – No human or animal exposures to the fox occurred.
  - Two skunks were tested for surveillance purposes although no exposures occurred
    - One skunk entered a home and killed a kitten
    - One skunk was caught by a dog coming into the fence
    - Two skunks were seen in daylight hours.
- Testing of bats - Bats accounted for 43 of 51 of the confirmed rabid animals in 2005. The total number of bats tested for rabies was 1,235 (positivity rate = 3.5 percent).
- Geographic distribution - Rabid bats were dispersed in 21 counties across the state. The following counties had rabid bats: Cook (four), Lake (four), Sangamon (four), Franklin (three), Jackson (three), DeKalb (two), DuPage (two), Bureau (two), Madison (two), McHenry (two), Washington (two), Will (two), Winnebago (two), Rock Island (two), Hancock (one), Union (one), Williamson (one), Clinton
McLean (one), Pope (one) and Woodford (one).

- Speciation - The Illinois Natural History Survey speciates bats tested for rabies in Illinois. In 2005, they speciated a total of 1,217 bats submitted for rabies testing. Of the 43 positive bats the species were identified as big brown bats (27), red bats (six), hoary bats (four), little brown bats (two), Eastern pipistrelles (two) and silver-haired bats (two). The 1,174 negative bats that were speciated were identified as: big brown bat (914), silver-haired bat (77), red bat (116), little brown bat (36), northern long-eared bat (eight), hoary bat (eight), eastern pipistrelle (10) and evening bat (five).

- Seasonal variation - Figure 65 shows bats submitted for testing by month in 2005. Bats submitted for rabies testing increase in August and September.

- Testing of skunks - Rabies testing was performed on 216 skunks in 2005 as compared to 100 in 2004. At least one skunk from each of 40 Illinois counties was tested; no skunks were tested in 62 counties. The following counties submitted more than five skunks for rabies testing: DuPage (35 skunks tested), McLean (27), Will (24), LaSalle (20), Lake (19), DeKalb (10), Kane (seven), Peoria (six), Cook (six), Grundy (six) and Jackson (six). Positive skunks were identified in LaSalle (four), Lee (one) and DeKalb (one). The number of skunks tested in Illinois increased from 2004 to 2005. In late 2004 and early 2005, a horse pastured in LaSalle County and a cow that had been pastured in LaSalle County tested positive for rabies and the United States Department of Agriculture Wildlife Services agreed to do skunk trapping in the county for surveillance purposes. Two skunks tested as a part of the trapping effort tested positive for rabies. In addition, four other skunks from LaSalle, Lee and DeKalb counties tested positive after citizens reported the skunks to animal control. One skunk came into a home and attacked and killed a kitten, two skunks were reportedly seen during daylight hours and one was caught by a dog coming through a fence.

- For rabies surveillance to be optimal in Illinois, an adequate number of skunks, the main terrestrial animal reservoir, must be tested. Test results from wild terrestrial mammals is one factor used to determine whether rabies PEP is recommended in cases of stray dog and cat bites. If enough skunks from throughout the state are not tested, recommendations against rabies PEP following such a bite cannot be made with confidence.

- Figure 66 shows the number of rabid skunks found in Illinois and the road kill index from 1975 through 2005. The road kill index is calculated by the Illinois Department of Natural Resources as a measure of changes in the skunk population size. When the road kill index increases, the skunk population is increasing and conditions are likely to be suitable for a rabies epizootic in skunks. This last occurred in the late 1970s and early 1980s, when the road kill index and the rate of skunks testing positive both increased.

- Rabies positivity rate - Table 8 shows the rabies positivity rate in different species
of animals in Illinois from 1971 to 2005. This information can be useful in explaining why rabies PEP is not recommended for the large majority of mouse, rat and squirrel bites. No rats, mice or squirrels have been identified with rabies in Illinois in more than 30 years. Because bats with rabies are identified almost every year in Illinois, rabies PEP is recommended for exposures to these animals and many other wild mammals unless they can be tested and are negative for rabies. When comparing the positivity rates for cumulative 1971-2005 data vs. 1991-2005 data, the percentage of skunks positive for rabies declined dramatically and the percentage of positive bats stayed very constant.

Summary
Bats were the main species identified with rabies in Illinois in 2005. Testing of skunks for rabies has declined in Illinois thereby decreasing the reliability of surveillance of the terrestrial animal reservoir in the state. Terrestrial animal rabies was found to be circulating in north central Illinois, in the counties of DeKalb, Lee and LaSalle. Local animal control jurisdictions are encouraged to increase submission of skunks for rabies testing to maintain surveillance in this species.

Suggested readings

Figure 64. Trends in Animal Rabies Testing in Illinois, 1990-2005
### Table 6. Animal Rabies Testing in Illinois in 2005

<table>
<thead>
<tr>
<th>Species</th>
<th>Total number suitable for testing</th>
<th>Total positive</th>
<th>% positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bat</td>
<td>1,235</td>
<td>43</td>
<td>3.5</td>
</tr>
<tr>
<td>Cat</td>
<td>1,071</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cattle/buffalo</td>
<td>211</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Dog</td>
<td>1,664</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Coyote/fox/wolf</td>
<td>30</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Ferret</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Horse/donkey</td>
<td>41</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Opossum</td>
<td>40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Raccoon</td>
<td>265</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rodents/lagomorphs</td>
<td>180</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sheep/Goats</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Skunk</td>
<td>216</td>
<td>6</td>
<td>2.8</td>
</tr>
<tr>
<td>Other*</td>
<td>26</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6,061</td>
<td>51</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**"Other" species tested in 2005 included cougar, deer, kangaroo, llama, mink, pig, shrew and zebra.**

Source: Illinois Department of Public Health
Table 7. Type of exposure to 43 rabid bats by month, Illinois, 2005

<table>
<thead>
<tr>
<th>Date</th>
<th>Human exposure?</th>
<th>Animal exposure?</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/9</td>
<td>Bat in home bit person</td>
<td>None</td>
</tr>
<tr>
<td>4/16</td>
<td>Found alive on ground, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>4/26</td>
<td>Found alive on porch, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>5/10</td>
<td>Found in hall, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>5/10</td>
<td>Found in bedroom, three exposures</td>
<td>None</td>
</tr>
<tr>
<td>5/12</td>
<td>Found in yard, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>6/2</td>
<td>Found outside home, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>6/8</td>
<td>Found in truck, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>6/15</td>
<td>Found in barn, no exposure</td>
<td>Cats, puppy, horse</td>
</tr>
<tr>
<td>6/27</td>
<td>No exposure</td>
<td>None</td>
</tr>
<tr>
<td>7/12</td>
<td>Found outside barn, no exposure</td>
<td>Horses</td>
</tr>
<tr>
<td>7/19</td>
<td>Found in bedroom, two exposures</td>
<td>None</td>
</tr>
<tr>
<td>7/19</td>
<td>one animal control officer exposed</td>
<td>None</td>
</tr>
<tr>
<td>7/22</td>
<td>Found in yard, two children exposed</td>
<td>None</td>
</tr>
<tr>
<td>7/25</td>
<td>Found dead in barn, Unknown exposure</td>
<td>Unknown</td>
</tr>
<tr>
<td>7/25</td>
<td>Found in swimming pool, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>8/2</td>
<td>No exposure</td>
<td>None</td>
</tr>
<tr>
<td>8/2</td>
<td>Found in yard by dog, no exposure</td>
<td>Dog</td>
</tr>
<tr>
<td>8/3</td>
<td>No exposure</td>
<td>Cat</td>
</tr>
<tr>
<td>8/3</td>
<td>Found in gutter, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>8/7</td>
<td>Found in yard, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>8/10</td>
<td>Found outside, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>8/10</td>
<td>Found outside office, no exposure</td>
<td>Feral cats</td>
</tr>
<tr>
<td>8/16</td>
<td>Found outside, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>8/19</td>
<td>Found in back yard, no exposure</td>
<td>Unknown</td>
</tr>
<tr>
<td>8/23</td>
<td>Found in yard, person bitten</td>
<td>None</td>
</tr>
<tr>
<td>8/24</td>
<td>Found in garage, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>8/29</td>
<td>Found in parking lot, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>8/30</td>
<td>Found on porch, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>9/9</td>
<td>Bat found in yard, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>9/12</td>
<td>Bat found in yard, no exposure</td>
<td>Dog</td>
</tr>
<tr>
<td>9/12</td>
<td>Cat brought bat onto porch, no exposure</td>
<td>Cat</td>
</tr>
<tr>
<td>9/13</td>
<td>Found in school yard, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>9/19</td>
<td>No exposure</td>
<td>None</td>
</tr>
<tr>
<td>9/22</td>
<td>Human exposure</td>
<td>Unknown</td>
</tr>
<tr>
<td>9/30</td>
<td>Bat in basement, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>Date</td>
<td>Location Details</td>
<td>Exposures</td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>10/1</td>
<td>No exposure</td>
<td>None</td>
</tr>
<tr>
<td>10/4</td>
<td>Found on inside wall of house, no exposure</td>
<td>None</td>
</tr>
<tr>
<td>10/18</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>10/18</td>
<td>Found in yard, no exposure</td>
<td>Dog</td>
</tr>
<tr>
<td>10/18</td>
<td>Found in yard, unknown exposures</td>
<td>Unknown</td>
</tr>
<tr>
<td>12/23</td>
<td>Found in bedroom, two exposed</td>
<td>None</td>
</tr>
<tr>
<td>12/27</td>
<td>Cat found in basement, no exposure</td>
<td>Cats</td>
</tr>
</tbody>
</table>

Table 8. Rabies positivity rate by animal species in Illinois, selected time spans.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># tested</td>
<td># positive</td>
</tr>
<tr>
<td>Bat</td>
<td>13,584</td>
<td>646</td>
</tr>
<tr>
<td>Cat</td>
<td>44,632</td>
<td>141</td>
</tr>
<tr>
<td>Cattle</td>
<td>3,808</td>
<td>215</td>
</tr>
<tr>
<td>Dog</td>
<td>46,391</td>
<td>110</td>
</tr>
<tr>
<td>Fox</td>
<td>1,440</td>
<td>73</td>
</tr>
<tr>
<td>Horse</td>
<td>733</td>
<td>23</td>
</tr>
<tr>
<td>Mouse</td>
<td>4,725</td>
<td>0</td>
</tr>
<tr>
<td>Raccoon</td>
<td>9,747</td>
<td>17</td>
</tr>
<tr>
<td>Rat</td>
<td>1,878</td>
<td>0</td>
</tr>
<tr>
<td>Skunk</td>
<td>7,704</td>
<td>2,532</td>
</tr>
<tr>
<td>Squirrel</td>
<td>7,044</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Illinois Department of Public Health
# Table 9. Bat Speciation Results from Bats Submitted for Rabies Testing in 2005

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th># testing neg.</th>
<th># testing pos.</th>
<th># unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Eptesicus fuscus</em></td>
<td>Big brown bat</td>
<td>914</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td><em>Lasiurus borealis</em></td>
<td>Red bat</td>
<td>116</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td><em>Lasiurus cinereus</em></td>
<td>Hoary bat</td>
<td>8</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><em>Lasionycteris noctivagans</em></td>
<td>Silver-haired bat</td>
<td>77</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><em>Pipistrellus subflavus</em></td>
<td>Eastern pipistrelle</td>
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<td>Northern long-eared bat</td>
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</table>

* Two were *Myotis* species

Source: Illinois Natural History Survey
Figure 65. Bat Testing for Rabies by Month, 2005

Figure 66. Skunk Rabies and Skunk Road Kill Index in Illinois, 1975-2005
Rabies, Potential Human Exposure

Background
Exposures to animals, especially those involving bites or bat exposures, often result in the need for public health consultation on whether rabies post-exposure prophylaxis (PEP) is needed for the exposed individual. All animal bites in Illinois are reportable to local animal control for the purposes of following up with the owner of the biting animal. Animal control authorities are responsible for ensuring that dangerous animals are maintained so that they cannot injure the public. Potential human rabies exposures are reportable to human health including all instances when rabies post-exposure prophylaxis is initiated and all bat exposures.

Case definition
The definition of exposed person to be reported is:
1) Any contact (bite or non-bite) with a bat, or
2) Any contact (bite or non-bite) with an animal that subsequently tests positive for rabies virus infection, or
3) Anyone who was started on rabies post-exposure prophylaxis, or
4) Exposure to saliva from a bite, or contact of any abrasion or mucus membrane with brain tissue or cerebrospinal fluid of any suspect rabid animal. Exposure to healthy rabbits, small rodents, indoor-only pets or rabies-vaccinated dogs, cats or ferrets is excluded, unless the exposure complies with subsections (a)(1) through (a)(3) above, or the animal displays signs consistent with rabies.

Descriptive epidemiology
The following information was obtained from INEDSS and investigation forms obtained during the surveillance of rabies potential human exposures (RPHE) to rabies in Illinois during 2005. The investigation forms had questions on demographics, exposure characteristics and rabies post-exposure treatment information. Not all local health jurisdictions have submitted investigation forms so this is a minimum estimate of the number of potential human rabies exposures in Illinois.

- Number of cases reported in Illinois in 2005 - 225 potential human rabies exposures were reported.
- Age – Ages ranged from months to 90 years of age. The mean age of those exposed was 33.
- Gender – Fifty-three percent of RPHE reports were in males.
- Seasonal peak – Higher numbers of exposures occurred in the summer months of May through August.
- Geographic location – Thirty-nine counties reported at least one RPHE. Sixty-five percent of exposures took place in urban settings.
Type of exposure

Three types of exposures can be summarized from the reports: bite, non-bite (scratch or abrasion or contamination of open cuts with saliva or nervous tissue, bat present in room with sleeping person or physical contact with a bat where a bite cannot be ruled out) or non-exposure (petting, handling, blood contact, bat in room but no physical contact and no one asleep in a room with a bat). Of the 225 total exposures reported, 124 (55 percent) were due to animal bites, 84 (37 percent) from non-bite exposures and in 17 (8 percent) there was no human exposure meeting ACIP guidelines for rabies PEP.

Of the 109 bite exposures with the site of bite reported, most bites were to the arm or hand, 83 (76 percent); followed by leg or foot, 20 (18 percent); head or neck, four (4 percent); and torso, three (3 percent). The bite site was not indicated for 14 bite exposures. In 18 of the bite exposures, animals were tested for rabies. The results were negative (16), positive (one) and unsatisfactory (one).

Of the 84 non-bite exposures, bats were found in the room with a sleeping person in 51 (61 percent) of exposures, physical contact with a bat took place in nine (11 percent) of the exposures, a child was unobserved with a bat in six (7 percent) exposures, the bat was in a building and person felt like they may have been bitten in four exposures (5 percent) and bat saliva may have gotten into a mucus membrane in three (4 percent) and unknown type of contact with a bat occurred in one (1 percent) of non-bite exposures. Bats were tested in 14 of the non-bite bat situations. Two bats tested negative, 10 tested positive and two specimens were unsuitable for testing. The other non-bite exposures included five persons exposed to rabies when caring for a rabid cow. Two persons were exposed to raccoons in two separate incidents. One was exposed to raccoon fluids when killing a raccoon and one person had exposure to baby raccoons and was given rabies PEP even though there was no exposure per the ACIP guidelines. On person was exposed to saliva from a rabid skunk that was attacking a kitten. One veterinary personnel was practicing dentistry on a dog when mouth and saliva exposure occurred, it was not clear why this required rabies PEP. One person was scratched by a monkey at a picnic.

Animals causing exposure

The following information is by each individual person’s exposure history. Multiple individuals may have been exposed to a single animal. Of 223 animals with a known type causing exposures, 159 (71 percent) were wild, not domesticated animals. The types of animals causing exposures included bat, 121 (54 percent); raccoon, 30 (13 percent); dog, 29 (13 percent); cat, 23 (10 percent); horse, 7 (3 percent) and other, 13 (6 percent). The type of animal was unknown for two exposure situations. Of the 64 domestic animals exposing persons, 32 (55 percent) were described as stray and 26 (45 percent) were owned. Of the dogs that exposed an individual, 22 (81 percent) of these animals had an unknown vaccination history, three (11 percent) were not rabies vaccinated and two (7 percent) were up to date on rabies vaccinations. Only two of 14 (14 percent) owned dogs causing exposures were known to be up to date on their rabies vaccinations. Rabies vaccination of dogs is required in Illinois. Of the cats that exposed an individual, 17 (77 percent) of these animals had an unknown vaccination
history and five (23 percent) were not rabies vaccinated. Twenty-two (58 percent) of bites from dogs and cats were provoked.

For domestic animal exposures, 40 (71 percent) were unavailable for either confinement or testing, nine (16 percent) were tested for rabies and seven (12 percent) were confined for observation. Nine (35 percent) of the owned domestic animals were owned by the family of the person bitten and 17 (65 percent) were owned by another individual.

A total of 119 (78 percent) wild animals were not available for confinement or testing. One animal, a monkey, was available for confinement. Thirty-three (22 percent) of animals potentially exposing someone to rabies were submitted for rabies testing. Of the 32 wild animals tested for rabies, 16 (48 percent) were negative, 14 (42 percent) were rabies positive and three (9 percent) were unsuitable for testing. Thirteen people were exposed to rabies positive bats and one to a rabid skunk. The specimens that were unsuitable for testing were from bats.

In 24 exposures, the exposing animal was reported to exhibit signs of rabies. Signs of rabies included aggression, 10 (42 percent); impaired locomotion, three (12 percent); no fear of humans, one (4 percent); other, seven (29 percent) and multiple, three (12 percent).

Rabies post-exposure prophylaxis (PEP)

During 2005, 194 persons were reported to have started rabies PEP. The first recommendation about whether rabies PEP was needed for a person starting rabies PEP came from the following sources: health care provider, 132 (75 percent) and public health personnel, 45 (25 percent).

The final recommendation on rabies PEP for those starting rabies PEP came from health care provider, 94 (53 percent); public health personnel, 82 (46 percent); and other, one (1 percent). For 20 exposed persons receiving PEP, the source of the final recommendation was not known.

For 101 (68 percent) of 148 persons with information available, rabies PEP was completed in an emergency department followed by completion in a physician's office, 42 (28 percent). Most rabies PEP was paid for by private insurance, 83 (73 percent); followed by Medicare or Medicaid, 13 (11 percent); no payment source, six (5 percent); worker's compensation, four (3 percent) and out-of-pocket expense, five (4 percent). Payment source was unknown for 83 persons. Eleven (5 percent) of persons recommended for rabies PEP refused to be treated. Of these 11 persons, for nine situations the recommendation was correct per the ACIP guidelines.

Rabies PEP was completed in 147 (76 percent) of 193 persons for whom information was available. In 24 persons, rabies PEP was not completed. In nine persons rabies PEP was not completed because the animal was tested negative. Of these nine situations, four were bat exposures, two were raccoon exposures, one was a cat exposure and one was a dog exposure and one was an “other” type of animal. The rabies PEP recommendation for these nine persons was made mainly by health care providers (seven situations). In five (22 percent) of the situations, the animal survived the confinement period, in six (26 percent) of the situations the patient refused to complete treatment, in one situation the person had a reaction to the rabies PEP
products and two persons had other reasons. Decisions on rabies PEP should be based on ACIP guidelines. For 213 exposed persons, it was possible to determine if the PEP recommendation followed ACIP guidelines. For 155 (73 percent) of these persons, rabies PEP was recommended and the recommendation followed ACIP guidelines. For 46 (22 percent) of persons, rabies PEP was recommended but this was not correct according to ACIP guidelines. For 11 persons (5 percent), rabies PEP was not recommended and that was correct according to ACIP. For one person PEP was not recommended and that was incorrect. In this situation, a bat bite occurred and the person should have been recommended for rabies PEP. In 46 situations, PEP was recommended incorrectly. In four situations, PEP was recommended when a bat was found in a house, even though no one was sleeping in the room. The ACIP recommends rabies PEP if the bat is found in a room with a sleeping person or person who is unable to say whether they were bitten. In seven situations an animal that exposed someone tested negative for rabies but PEP was started. Because the turn around time is rapid for rabies testing, PEP can be delayed until the testing of the animal takes place. Because of the lack of terrestrial animal rabies in the last few years in Illinois, no rabies PEP would be recommended if the dog or cat bite was provoked and the animal showed no signs of rabies. In 32 situations, persons were recommended for PEP even though a domestic animal exposed the person with a provoked bite and was not acting abnormally. In two situations a low risk animal, rodent or opossum, bit someone and PEP was recommended. In the last situation, no actual exposure that could have transmitted rabies occurred from raccoon contact.

Of the persons exposed, 147 completed rabies PEP. For 46 of 105 (44 percent) persons completing rabies PEP and with information available, the ACIP rabies protocol was followed exactly. Fifty-nine people received incorrect administration of rabies PEP. For 57 persons (40 percent) the site of administration was not provided and for six persons the timing for PEP doses was unknown. Types of incorrect administration were incorrect timing of injections (46, 78 percent), multiple problems (six, 10 percent), no RIG given (three, 5 percent), incorrect site of administration of injections (three, 5 percent) and other (one, 2 percent). For the 46 with incorrect timing, 11 persons had minor variations in the correct schedule, 20 had intermediate variations in timing and 15 had major variations in correct timing.

Nine persons started on rabies PEP had been pre-exposure immunized for rabies.

Summary

There is vast underreporting of potential human rabies exposures in Illinois with some jurisdictions not reporting any exposures. Therefore, the summary information is not a complete picture of human rabies exposures in Illinois. Fifty-five percent of reported exposures were due to bites. Most bites were to the hand or arm which is typical as persons reach to pick up or handle an unfamiliar animal. Of the non-bite exposures, 61 percent of reported exposures were from bats found in a room with a sleeping person. In 83 percent of these situations the bat was not available for testing. In 14 situations, it was known that a bat was released without testing and in 13
situations a family member released the bat before it could be tested. Education of the public and animal control personnel could result in increased submission of bats that have exposed persons in homes being tested for rabies. If the bat tests negative, the person would not need rabies PEP.

The main animal causing potential human rabies exposures was the bat, followed by the dog, the raccoon, the cat and the horse. This is primarily due to the definition of possible rabies exposure to a bat. The bat is the only wild mammal where rabies PEP is recommended if a person is in a room sleeping where a bat is found and it cannot be tested, or tests positive.

Most rabies PEP recommendations were made by emergency room health care providers or other health care providers. This indicates the importance of providing health care providers with up to date information on rabies incidence in their area and on rabies PEP recommendations.

Twenty-two percent of rabies PEP given in 2005 would not have been indicated according to public health guidelines. In some situations persons were started on rabies PEP even though the animal was available for testing. Health care providers, especially in emergency rooms, should be advised that rabies testing of animals can be completed rapidly at the state laboratories, and, if necessary, emergency testing can be requested for high priority specimens on holidays or weekends. For emergency testing health care providers can contact local health department personnel or use the state emergency phone number. Rabies PEP can be delayed until testing is completed if testing is prompt.

The rabies PEP protocol is provided in, “Human Rabies Prevention-United States, 1999”. Recommendations of the Advisory Committee on Immunization Practices (ACIP): MMWR 1999;48(RR-1). In 44 percent of cases where rabies PEP was completed, PEP was administered correctly. Common errors in administration included incorrect timing of injections and forgetting to administer RIG. The ACIP recommendation for rabies PEP should be adhered to when administering rabies PEP. It can be difficult to get exposed individuals to adhere to a complicated vaccination schedule but the person should be informed about the universally fatal nature of rabies and the importance of adhering to the ACIP schedule.
Rocky Mountain spotted fever

Background

Rocky Mountain spotted fever (RMSF) is the most frequently reported fatal tick-borne disease in the United States. RMSF has been reported throughout the continental United States. The causative agent is *Rickettsia rickettsii*. Both dogs and humans may experience clinical illness due to RMSF. The estimated incidence of RMSF in the United States from 1997 to 2002 was 2.2 cases per million population. More than half of cases were from five states (North Carolina, South Carolina, Tennessee, Oklahoma and Arkansas).

In 2005, 1,936 human cases were reported nationally to the CDC. Most cases are reported from April through September when the greatest number of *Dermacentor* ticks are present in the environment.

The ticks that are most likely to transmit RMSF include the American dog tick (*Dermacentor variabilis*) in the central United States. Only about 1 percent to 5 percent of ticks are usually infected with *R. rickettsii* in an area where transmission to humans occurs. In order for one of these ticks to transmit the bacteria, it must be attached for at least four to six hours. A history of a tick bite can be elicited in approximately 60 percent of RMSF cases.

The incubation period for RMSF is three to 14 days after a tick bite. Common presenting symptoms include high fever, severe headache, deep myalgias, fatigue, chills and rashes. A rash typically appears within two to four days after onset of fever. The rash typically begins on the ankles, wrists or forearms. A rash can be atypical or absent in up to 20 percent of RMSF cases. Starting most often on the ankles and wrists, the rash then appears on the trunk, palms and soles. Patients also may have gastrointestinal signs such as abdominal pain and nausea which may be serious enough to lead to an erroneous diagnosis such as appendicitis. RMSF can have a case fatality rate of 20 percent in untreated persons, while the case fatality rate is 5 percent in treated persons.

Case definition

The case definition for a confirmed case of RMSF in Illinois is a clinically compatible illness that is laboratory-confirmed. The laboratory confirmation is a four-fold or greater rise in antibody titer by immunofluorescent antibody (IFA), complement fixation (CF), latex agglutination (LA), microagglutination (MA) or indirect hemagglutination antibody (IHA) test in acute and convalescent specimens ideally taken more than three weeks apart; or demonstration of positive immunofluorescence of a skin lesion or organ tissue, positive polymerase chain reaction or isolation of *R. rickettsii* from a clinical specimen. A clinically compatible illness is one characterized by acute onset and fever, usually followed by myalgia, headache and petechial rash. A probable case is defined as a clinically compatible case with a single IFA serologic titer of ≥ 64 or a single CF titer of ≥16 or other supportive serology (four-fold rise in titer or a single titer ≥ 320 by Proteus OX-19 or OX-2, or a single titer ≥128 by an LA, IHA or MA test.
Descriptive epidemiology

- Number of cases reported in Illinois in 2005 – Ten probable and one confirmed case.
- Age - Cases ranged in age from 11 to 72 years of age (median=45).
- Gender – Eight cases were male (73 percent).
- Race/ethnicity - Ten cases were white and one had unknown race; none were Hispanic.
- Geographic distribution - Sites of tick exposure were known to be in Illinois for seven cases (Figure 67). The counties of exposure were Wayne (two), Jackson (one), Pike (one), Saline (one), Union (one) and White (one). Five of these in-state exposures were in southern Illinois. Two cases had both in-state and out-of-state exposures. One had exposure to Cook County, Illinois and Virginia and one had exposure in Wayne County, Illinois and Texas. One had exposure out-of-state, in Missouri and one had an unknown exposure site.
- Seasonal variation - Onsets of the cases ranged from January to August. Nine of the cases had onset from May to August.
- Symptoms/outcomes – Six cases (67 percent) were hospitalized; two had unknown hospitalization. No cases were fatal.
- Past incidence - Rocky Mountain spotted fever cases reported per year in the state were: 1991 (five), 1992 (two), 1993 (four), 1994 (11), 1995 (10), 1996 (four), 1997 (three), 1998 (one), 1999 (seven), 2000 (five), 2001 (12), 2002 (12), 2003 (five) and 2004 (14).

Summary

Most cases of RMSF occurred in summer months with a concentration of in-state exposures in southern Illinois.

Suggested readings

Figure 67. Sites of Exposure for RMSF cases with Illinois exposures, 2005
Rubella

Background
Rubella usually causes a self-limiting disease in adults and children. Transmission is from direct contact with, or droplet spread of, nasopharyngeal secretions of infected persons. The incubation period is 12 to 23 days. Rubella can cause a fever and rash along with enlarged lymph nodes in the head and neck. Rubella is one of the most common causes of birth defects in the world. It can result in spontaneous abortions, stillbirths and congenital rubella syndrome. Congenital rubella syndrome includes hearing impairment, blindness, heart defects and mental retardation.

Immunization against rubella is recommended at 12 to 15 months of age and a second dose at school entry or at adolescence. Vaccine should not be given to anyone who is immunosuppressed, or to pregnant women because it is a live vaccine. Rubella vaccine was licensed in 1969 and measles-mumps-rubella vaccine was licensed in 1971. Rubella vaccination was mandated for school entry in all states by 1979.

In 2005, 12 rubella cases were reported to CDC. One was a congenital rubella case.

Case definition
The clinical case definition for rubella is an illness with acute onset of generalized maculopapular rash, fever and either arthritis/arthralgia, lymphadenopathy or conjunctivitis. A confirmed case of rubella is one that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a laboratory confirmed case.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 – No cases were reported.

Summary
In 2005, no rubella cases were reported in Illinois.
Salmonellosis (non-typhoidal)

Background

There are more than 2,400 serovars of *Salmonella*. However, approximately 50 percent of human cases are caused by three serotypes: *Salmonella enterica* ser Enteritidis, *S*. ser Typhimurium and *S*. ser Newport. Transmission to humans is usually after consumption of contaminated food products. Raw or undercooked meat, eggs, raw milk and poultry have been identified as vehicles for *Salmonella* infection. Fresh produce, such as lettuce, unpasteurized apple or orange juice or sprouts also have caused outbreaks. Contact with reptiles, including lizards, have been linked to infections with *S*. ser. Kingabwai in 2005 as well as other *Salmonella* serotypes in other years.

Hospital and commercial laboratories are required to submit isolates of *Salmonella* to the Department’s laboratory for serotyping. This is necessary to detect increases in specific serotypes. Identification of serotypes is useful in identifying which patients are likely linked to a common source of infection. Another way to link *Salmonella* isolates to a common source is pulse field gel electrophoresis (PFGE).

Of the 10 diseases/syndromes (those caused by *Campylobacter*, *Cryptosporidium*, *Cyclospora*, shiga toxin producing *E. coli* O157, HUS, *Listeria monocytogenes*, *Salmonella*, *Shigella*, *Vibrio* and *Yersinia enterocolitica*) under active surveillance in the federal FoodNet sites, *Salmonella* comprised 39 percent of the reported infections in preliminary data from 2005. The incidence rate was 14.5 per 100,000 and ranged from 10 to 22 at the 10 FoodNet sites in 2005. In preliminary data from 2005, 91 percent of isolates were serotyped. The top six serotypes were: Typhimurium (19 percent), Enteritidis (18 percent), Newport (10 percent), Heidelberg (6 percent), Javiana (5 percent) and monophasic serotype I 4,[5],12:i:- (3 percent). The 2005 FoodNet Report (available at [www.cdc.gov/foodnet/annual/ 2004/2004_report.pdf](http://www.cdc.gov/foodnet/annual/2004/2004_report.pdf)) credits efforts made by the food industry and government interventions in reducing these infections.

In the United States surveillance data, 45,322 cases of *Salmonella* were reported to CDC. The majority of *Salmonella* cases occurred in those younger than 5 years of age. Serotypes Typhimurium and Enteritidis were the most common. Studies in the United States have shown that for each laboratory confirmed case, 38 cases actually occur but are not diagnosed.

*S. ser. Paratyphi A* cases make up an increasing proportion of cases. Patients with paratyphoid fever were likely to have acquired infection in southeast Asia.

A study in Wisconsin has shown an increase in antimicrobial resistant *S. ser. Newport*. Cases with resistant isolates were more likely to report exposures to cattle, farms and unpasteurized milk.

Outbreaks have been associated with *Salmonella*-contaminated pet treats including nine cases of *S. ser. Thompson* in the United States and Canada in 2005. This outbreak was linked to salmon treats. Dehydration of treats did not heat to sufficient temperatures to kill bacteria. Outbreaks also have been linked to infant formula. Infant formula is not sterile and has been implicated in at least six outbreaks of *Salmonella* in recent years. When the implicated powdered infant formula was tested only low levels of *Salmonella* were identified.
Case definition

The case definition for a confirmed case is isolation of *Salmonella* from a clinical specimen. The case definition for a probable case is a person who has a clinically compatible illness that is epidemiologically linked to a confirmed case, but is not laboratory-confirmed.

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 - 1,837 (see Figure 68 for number of cases since 2000). The annual incidence rate for salmonellosis in Illinois in 2005 was 15 per 100,000 population.
- Age – Salmonellosis occurred in all age groups (mean age = 31) (see Figure 69). However, the incidence rate was highest in those younger than 1 year of age (66 cases per 100,000 population), followed by those in the 1 to 4 year age group (34 per 100,000).
- Gender - Fifty percent were female.
- Race/ethnicity – Seventy-eight percent of cases were white, 13 percent African American and 9 percent other races; 17 percent were Hispanic.
- Seasonal variation A peak in salmonellosis cases occurred in the summer months, especially May (Figure 70).
- Geographic distribution The mean annual incidence rates for salmonellosis were highest in some scattered counties in the state (Figure 71). The five counties with the highest mean annual incidence rates per 100,000 population (and at least 20 cases, total) for salmonellosis from 2001-2005 were Kankakee (38 per 100,000), Massac (29), Madison (28), Lake (24) and Stephenson (24).
- Serotypes - 85 percent of Illinois’ *Salmonella* isolates were serotyped. The most common serotypes in 2005 are found in Table 10. The three most common serotypes were S. ser.Typhimurium (376, 24 per cent), S. ser. Enteritidis (325, 21 percent) and S. ser. Heidelberg (93, 6 percent). Serotypes of *Salmonella* found in Illinois from 1997-2005 are shown in Table 11.
- Clinical syndrome – Cases reported diarrhea (94 percent), fever (69 percent) and vomiting (40 percent). Thirty-four percent were admitted to the hospital. Three deaths in cases were attributed to *Salmonella*.
- Risk factors –
  - A history of reptile or amphibian contact was reported by 81 *Salmonella* cases in 2005 but a link between the reptiles and transmission of the infection was not confirmed by culture of reptiles.
    - Cases reported contact with the following types of reptiles: lizards (24), snakes (17), turtles (16), frog (two), not specified (15) and multiple types (seven).
    - For those with reported reptile contact, the median age was 12 years; 17 cases were younger than 5 years of age.
    - Males accounted for 48 percent of the cases.
    - The two most common species in these cases were Typhimurium (22) and Enteritidis (12). *Salmonella* isolates from the subspecies I,
II, III and IV have been associated with reptile contact and, for the 2005 reptile contact cases, the following serotypes from these groups were identified: Eastbourne (one case) and Monschau (one).

- There were 146 cases who reported travel to another country. The most common destination was Mexico (60 cases) followed by Jamaica (17).
- There were 102 of 1,356 (7 percent) cases reported swimming in non-chlorinated water and 177 of 1,321 (13 percent) who reported swimming in chlorinated water.
- 130 of 1,369 (9 percent) reported contact with a residential facility. Ninety-two of 1,357 (7 percent) reported contact with a day care.
- Thirty-four cases attended a day care and 17 lived in a residential facility.

- **Sensitive occupations**
  - Sensitive occupations reported for cases included employees in a food service facility (46), health care workers (29), day care centers (seven), residential facilities (three) and other sensitive occupations (19).

- **Reporters –** Cases were reported primarily by infection control professionals (723), followed by laboratory staff (287) and local health department staff (139).

- **Outbreaks -** There were seven confirmed foodborne outbreaks of *Salmonella* reported in 2005. (See the section of this report detailing foodborne outbreaks for more details.)

**Summary**

In 2005, 1,837 cases of *Salmonella* were reported in Illinois. Illinois had the fourth highest number of reported cases in the United States. The one-year incidence rate of *Salmonella* for 2005 was 15 per 100,000 population, which is lower than the average incidence reported at CDC’s FoodNet sites (14.5 per 100,000). The mean age for *Salmonella* cases was 31 years, although the incidence was highest in those younger than 1 year of age. *Salmonella* cases increased in Illinois during the summer which is similar to national data. The percentage of isolates that were serotyped in Illinois was 85 percent as compared to 91 percent in CDC’s Food Net sites. The percentages of the two most common serotypes were Typhimurium (24 percent) and Enteritidis (21 percent). A higher proportion of Illinois isolates serotyped in Illinois were S. ser. Typhimurium (24 percent) as compared to 2005 FoodNet data (19 percent). In addition, a higher proportion of Illinois isolates serotyped in Illinois were S. ser. Enteritidis (21 percent) as compared to 2005 FoodNet data (18 percent). The proportion of S. ser. Heidelberg (6 percent) was similar to the 2005 FoodNet data. Reptile contact was reported in 17 cases younger than 5 years of age. CDC recommends that households with children younger than 5 years of age not have reptiles as pets.

**Suggested readings**


Figure 71. One-year Salmonellosis Incidence Rates for Illinois, 2001-2005

Source: Illinois Department of Public Health

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Source: Illinois Department of Public Health

Table 11. Frequency of *Salmonella* Serotypes in Illinois, 1997-2005

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Sexually Transmitted Diseases

Included in this section are three diseases - chlamydia, gonorrhea and syphilis - transmitted primarily or exclusively through sexual contact and reportable under Illinois statutes and administrative rules. Other diseases not included in this section (such as herpes and human papillomavirus) may be transmitted sexually. HIV/AIDS is discussed in a separate section.

The control of sexually transmitted diseases (STDs) is an important strategy for the prevention of HIV. The inflammation and lesions associated with STDs increase an individual’s risk for acquisition of HIV, as well as the ability to transmit HIV to others.

Chlamydia

Background

*Chlamydia trachomatis* infection is a significant cause of genitourinary complications, especially in women. Early symptoms of cervicitis or urethritis are mild; asymptomatic infection is common in both women and men. If left untreated, chlamydia infection can lead to pelvic inflammatory disease in women. It may cause severe fallopian tube inflammation and damage, even though symptoms may be mild. Due to the insidious nature of the infection, *C. trachomatis* is a major cause of long-term sequelae such as tubal infertility and ectopic pregnancy and can cause premature rupture of membranes in pregnant women. Chlamydia also can cause ophthalmia neonatorum and pneumonia in newborns exposed to it during birth.

Chlamydia is reportable in all but one state. During 2005, 976,445 chlamydia infections were reported to the CDC, making chlamydia the most commonly reported notifiable disease in the United States. However, national data are incomplete because the majority of testing is currently conducted in females.

Federal and state funding for chlamydia is targeted at providing screening programs in STD clinics, women’s health programs (such as family planning and prenatal clinics), and in adult and juvenile correctional centers. Chlamydia first became reportable in 1987.

Case definition

The case definition is isolation of *C. trachomatis* by culture, or demonstration of *C. trachomatis* in a clinical specimen by detection of antigen or nucleic acid.

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 – 50,559; the overall incidence rate was 407 per 100,000 population. The number of cases increased from 1996 (26,380) to 2005 (50,559) (Figure 72).
- Age - Adolescents and young adults (ages 15 to 24) accounted for percent of reported chlamydia cases in 2005 (Figure 73). The highest case rate was 2,183 and was among young adults aged 20 to 24 years of age. The average age of persons reported with chlamydia was 23. The incidence rate in those 15 to 19 years of age was 1,934 compared to 407 for the total Illinois population.
- Gender - Most reported cases were in women, 37,672, (75 percent) due to
screening efforts that target this group. The female-to-male ratio of reported cases was 2.9: 1.0.

- Race/ethnicity - The racial distribution of cases was 52 percent African American, 19 percent white, 1 percent Asian/Pacific Islander and Native American and 19 percent other or unknown race.
- Geographic distribution - Chlamydia is geographically distributed throughout the state. Cases were reported from all 102 counties. The four counties with the highest incidence rates per 100,000 were Pope (906), Alexander (876), St. Clair (802), and Peoria (704).
- The positivity rate in 2005 from Chlamydia screening sites from females aged 15 to 24 years of age was 18 percent from STD clinics, 16 percent from adult and juvenile correctional facilities, 13 percent from school-based health clinics and 7 percent from family planning clinics.

Summary

Chlamydia is the most commonly reported sexually transmitted disease in Illinois. Cases were reported from all counties in Illinois during 2005. Adolescents and young adults had the highest incidence rates. Reasons for the increase in cases from 1996 to 2005 include increased testing, improved surveillance and the use of more sensitive diagnostic tests.
Gonorrhea

Background
Gonorrhea is a bacterial infection caused by *Neisseria gonorrhoeae*. Uncomplicated urogenital infection may progress, without treatment, to complications such as infertility, pelvic inflammatory disease (PID) and disseminated infection. Resultant scarring of fallopian tubes may result in ectopic pregnancy. Women are more likely than men to suffer complications from gonorrhea infection because early symptoms are often not present or not recognized in females. Infants born to infected mothers may develop gonococcal ophthalmia, which is potentially blinding, or sepsis, arthritis or meningitis. Nationally, there were 339,593 cases of gonorrhea reported in 2005.

Currently recommended therapies for gonorrhea are highly effective, although antimicrobial drug resistance has been a problem. Gonococcal susceptibility to some currently recommended drugs is gradually declining, and active surveillance is required to monitor resistance and to ensure the effectiveness of therapy. In 2005, urine-based testing was implemented by the Department for screening programs.

Case definition
Isolation of typical gram-negative, oxidase positive diplococci (presumptive *Neisseria gonorrhoeae*) from a clinical specimen; demonstration of *N. gonorrhoeae* in a clinical specimen by detection of antigen or nucleic acid; or observation of gram-negative intracellular diplococci in a urethral smear obtained from a male urethral or female endocervical smear.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 - 20,019; case rate was 161 per 100,000 population. Reported cases in 2005 were lower than the number reported in 2004 (20,597) (Figure 74). Gonorrhea is the second most commonly reported STD in Illinois.
- Age - Adolescents and young adults are at greatest risk for gonorrhea infection. Persons aged 15 to 24 accounted for 62 percent of reported cases in 2005 (Figure 75).
- Sex – The ratio of reported female to male cases was 1.2:1.0.
- Race/ethnicity - Illinois minorities are disproportionately affected by gonorrhea. The reported cases were 69 percent African American, 12 percent white, less than 1 percent Asian/Pacific Islander and 16 percent other or unknown race.
• Geographic distribution - At least one case of gonorrhea was reported in each of 92 Illinois counties. The five counties with the highest incidence rate in 2005 were Alexander (521), Macon (418), St. Clair (406), Pulaski (408) and Peoria (327).
• Positivity rate – The gonorrhea positivity rate decreased from 4.5 percent to 3.6 percent between 2001 and 2005.

Summary
Gonorrhea is the second most commonly reported sexually transmitted disease after chlamydia in Illinois. In Illinois in 2005, 62 percent of cases were in those 15 to 24 years of age.

Figure 74. Gonorrhea Cases in Illinois, 2000-2005

Figure 75. Age Distribution of Gonorrhea Cases in Illinois, 2005
Syphilis

Background
Syphilis is a systemic disease caused by the spirochete *Treponema pallidum*. The infection is definitively diagnosed through microscopic examination of lesion exudates and presumptively through serologic testing. Without treatment, syphilis infection progresses through four stages: primary, characterized by a painless ulcer at the point at which the organism entered the body (genitals, mouth, anus); secondary, characterized by lesions, rashes, hair loss, lymphadenopathy and/or flu-like symptoms; latent with no signs or symptoms; and late symptomatic, in the form of neurosyphilis (with neurologic damage) and tertiary (cardiovascular or gummatous disease).

The open lesions of syphilis are infectious to sex partners. Syphilis during pregnancy can lead to a congenital form of the disease that may result in stillbirth or severe illness and lifelong debilitating consequences for the infant. Increases in syphilis often are associated with poverty, limited availability of health services and the exchange of sex for drugs or money. Syphilis outbreaks are often a precursor of HIV increases in affected populations because the lesions caused by syphilis increase the likelihood of both acquisition and transmission of HIV. Without treatment, approximately 10 percent of persons with syphilis will develop neurosyphilis, but in persons co-infected with HIV, 25 percent may develop neurosyphilis.

“Early syphilis” refers to syphilis infection of less than one year duration and progresses through primary, secondary and early latent. Public health disease intervention efforts emphasize control of early syphilis because persons with this stage of the disease are most likely to have been infectious within the past year. Many individuals do not notice or recognize the symptoms of syphilis, so screening for latent disease and partner notification and referral are important components of control efforts.

Congenital syphilis occurs when the syphilis organism is transmitted from a pregnant woman to her fetus. Untreated syphilis during pregnancy can result in stillbirth, neonatal death or infant disorders such as deafness, bone deformities and neurologic impairment.

Significant public health resources must be devoted to the control of syphilis. Untreated syphilis can result in neurological or cardiovascular complications. It also can be transmitted to a fetus from an infected woman during pregnancy, which results in congenital syphilis.

The CDC recorded 8,724 primary and secondary syphilis cases in the United States in 2005. In 2005, a total of 329 cases of congenital syphilis were reported.

Case definition
Syphilis is a complex disease with a highly variable clinical course. The following case definitions are used for surveillance purposes for syphilis that has not progressed to late symptomatic stages.

- **Primary.** A clinically compatible case with one or more ulcers (chancres) consistent with primary syphilis and a reactive serologic test; or demonstration of *T. pallidum* in clinical specimens by dark field microscopy, fluorescent antibody or equivalent methods.
Secondary. A clinically compatible case with a reactive nontreponemal test titer of $\geq 1:4$ (probable case), or demonstration of $T. pallidum$ in clinical specimens by dark field microscopy, fluorescent antibody or equivalent methods (confirmed case).

- Latent. No clinical signs or symptoms of syphilis and the presence of one of the following:
  - No past diagnosis of syphilis, a reactive nontreponemal test and a reactive treponemal test.
  - A past history of syphilis therapy and a current nontreponemal test titer demonstrating fourfold or greater increase from the last nontreponemal test titer.

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2005 ¥ 25 congenital cases and 525 primary or secondary cases (Figure 76). An outbreak in 2005 resulted in a 36 percent increase in cases compared to 2004. The incidence rate for 2005 was four per 100,000 population for primary and secondary syphilis and 14 per 100,000 live births for congenital syphilis. Note: CDC summaries show 23 congenital syphilis cases reported from Illinois in 2005. We will use 25 cases in this report.
- Age - The average age of persons diagnosed with primary and secondary syphilis is 35. Persons 25 to 44 years old accounted for 71 percent of primary and secondary cases (Figure 77).
- Gender – Ninety-one percent of cases were male.
- Race/ethnicity - Minorities in Illinois are disproportionately affected by syphilis, especially African Americans, who accounted for 76 percent of the congenital syphilis cases. The proportion of primary and secondary syphilis cases by race were non-hispanic white (44 percent), non-hispanic African American (40 percent), hispanic (11 percent), other or unknown races (5 percent).
- Geographic distribution - Syphilis is more prevalent in urban populations. The disease has become progressively concentrated geographically. Cases of primary and secondary syphilis were reported from 22 counties. Cases of syphilis increased in the following counties in 2005: Champaign, Cook, DuPage, Kankakee, Lake, McHenry, Peoria, Sangamon and Tazewell. The five highest incidence rates per 100,000 population in counties with at least three cases were Cook (8.6), Kankakee (three), Sangamon (two), McHenry (two) and Champaign (two).
- Clinical presentation – During 2005, African Americans were disproportionately affected by congenital syphilis.

**Summary**

Primary and secondary syphilis cases increased by 28 percent from 2001 to 2005. During 2005, white males and African American females were disproportionately affected by syphilis.
Figure 76. Syphilis Cases in Illinois, 2000-2005

Figure 77. Age Distribution of Syphilis Cases in Illinois, 2005
Shigellosis

Background

Shigellosis is an acute bacterial disease of humans and non-human primates caused by four species or serogroups of *Shigella*: *S. dysenteriae* (group A), *S. flexneri* (group B), *S. boydii* (group C) and *S. sonnei* (group D). The infectious dose is low; as few as 10 to 100 bacteria can cause infection. Transmission is via direct or indirect fecal-oral routes. Outbreaks in day care centers are not uncommon and *Shigella* can be transmitted through unchlorinated wading pools, interactive water fountains, food items such as parsley and bean dip and between men who have sex with men. The incubation period is usually one to three days. Symptoms of the disease are watery or bloody diarrhea with fever and sometimes vomiting or tenesmus. Mild and asymptomatic infections can occur. Duration of illness is usually from four to seven days. *Shigella* can be shed in stool for four weeks. Disease caused by *Shigella dysenteriae* type 1 is the most severe and can cause hemolytic uremic syndrome (HUS) due to a toxin similar to that produced by *E. coli* O157:H7. Antimotility drugs are contraindicated. Antimicrobial therapy can limit the clinical course and duration of fecal excretion of *Shigella*. *Shigella* can develop antimicrobial resistance quickly.

The subgroups, serotypes and subtypes of *Shigella* are:

- **Group A**: *Shigella dysenteriae* 15 serotypes (type 1 produces Shiga toxin)
- **Group B**: *Shigella flexneri* 8 serotypes and 9 subtypes
- **Group C**: *Shigella boydii* 19 serotypes
- **Group D**: *Shigella sonnei* 1 serotype

Of the 10 diseases/syndromes (caused by *Campylobacter*, *Cryptosporidium*, *Cyclospora*, HUS, *E. coli* O157:H7, *Listeria monocytogenes*, *Salmonella*, *Shigella*, *Vibrio* and *Yersinia enterocolitica*) under active surveillance in the federal FoodNet sites, *Shigella* comprised 12 percent of the reported infections in 2005 in preliminary data. The incidence rate overall was five per 100,000 for shigellosis and ranged from 1.7 to 8.7 at the 10 FoodNet sites for preliminary 2005 data. The number of *Shigella* infections decreased by 43 percent in 2005 as compared to incidence from 1996 to 1998.

In 2005, 16,168 *Shigella* isolates and cases (the latter an increase from 2004) were reported to CDC. *S. sonnei* accounts for greater than 75 percent of shigellosis cases in the United States.

Multi-community outbreaks of shigellosis require extensive time and effort on the part of public health. Because of the low infectious dose, shigellosis spreads quickly between people when breaches in hand washing or sanitation occur. Propagation of shigellosis is increased because of the difficulty in maintaining hand washing and sanitation in day care centers, high proportion of mild or asymptomatic *Shigella* infections and frequent contact between children who attend multiple day care centers. Interventions include alerting the media to the outbreak, direct communication with day care centers and the medical community, and promoting control strategies such as supervised hand washing, appropriate diapering practices and exclusion of symptomatic children from day care. However, strict exclusion policies of infected but asymptomatic children can lead to spread of an outbreak if excluded day care attendees are then placed in alternative child care settings. In day care centers, scheduling hand washing on arrival at the facility, before meals and after playing outdoors and supervising hand
washing can decrease disease spread.

In 2005, Kansas, Kentucky and Missouri reported increases in *Shigella* in persons associated with day care centers of multi-drug resistant *S. sonnei*. Testing of *Shigella* isolates submitted to CDC through the NARMS program showed that 80 percent of isolates were resistant to ampicillin and 47 percent to TMP/SMX.

**Case definition**

The case definition for a confirmed case of shigellosis in Illinois is a case from which *Shigella* is isolated from a clinical specimen. The case definition for a probable case is a person who has a clinically compatible illness that is epidemiologically linked to a confirmed case, but is not laboratory confirmed.

**Descriptive epidemiology**

- Number of reported cases in Illinois in 2005 - 409 (five-year median = 1,006; see Figure 78. Overall annual incidence rate was 3.3 per 100,000. Of the 409 cases, 400 were confirmed and nine were probable. The number of shigellosis cases was similar to the number reported in 2004.
- Age - Median age = 10 (Figure 79). By age group, annual incidence rates per 100,000 were: younger than 1 year old, 1; 1-4 years of age, 14; 5-9 years of age, 10; 10-19 years of age, 2; 20-29 years of age, 2; 30-59 years of age, 2; and 60 and older, 1.
- Gender - Fifty percent were female.
- Race/ethnicity – Sixty-eight percent were white, 16 percent were African American and 16 percent were other races; 54 percent were Hispanic. There were significantly higher proportions of Hispanics with shigellosis compared to their representation in the Illinois population (12 percent).
- Geographic distribution - One-year incidence rates by county for 2001 to 2005 ranged from 0 to 106 (35 counties reported no cases) 100,000 population. The five highest annual incidence rates per 100,000 population for this time period were in Stephenson (106), Henderson (49), Warren (27), Hardin (21) and Jo Daviess (20) counties.
- Clinical syndrome – Symptoms reported included diarrhea (98 percent), fever (77 percent) and vomiting (53 percent).
- Outcome – Thirty-four percent of cases were hospitalized. No fatalities were reported.
- Seasonal variation - Shigellosis cases occurred in all months of the year with a peak in the months of August and September (Figure 80).
- Serotypes – Ninety-two percent of isolates were serotyped in 2005. The most common species was *S. sonnei*, 292 (78 percent of typed isolates), followed by *S. flexneri*, 76 (20 percent). *S. boydii* and *S. dysenteriae* each made up less than 1 percent of typed isolates. The boydii serotypes found in Illinois were two and four, and the dysenteriae serotype was 4 (Table 12 and 13). The two most common *S. flexneri* serotypes were 2 (29 cases) and 3 (14 cases) (Table 14). *S. sonnei* does not have subtypes.
- Reporter – Seventy-one percent were reported by infection control professionals.
• Risk factors – Seventy-five cases reported traveling to another country. The majority of these persons had traveled to Mexico, 44 (59 percent), followed by India, 9 (12 percent) and the Dominican Republic 6 (8 percent). Twenty-nine of 339 (8 percent) reported swimming in non-chlorinated water and 41 of 332 (12 percent) swam in chlorinated water. Eighteen cases attended day care and two attended a residential facility. Thirty-four cases reported contact with someone attending a day care center. Twenty cases reported contact with someone in a residential facility.

• Sensitive occupations – Cases were employed in the following sensitive occupations: food service (six), day care (three), health care (two) and other sensitive occupation (seven).

• Foodborne outbreaks – There were no foodborne outbreaks of shigellosis in 2005.

Summary

There was a large decrease in *Shigella* cases from 2003 to 2005. The incidence rate for 2005 of 3.3 per 100,000 is within the range reported at CDC’s FoodNet sites. The proportion who were Hispanic was higher than the representation of this group in the Illinois population. The median age of cases was 10 years. *S. sonnei* was the most common species found in Illinois. Isolates of *Shigella* are required to be submitted to the Department’s laboratories for speciation and/or serotyping (if this cannot be done by the clinical laboratory).

Suggested readings

Figure 79. Age Distribution of Shigella Cases in Illinois, 2005

Figure 80. Shigella Cases in Illinois by Month, 2005
Table 12. Frequency of *Shigella boydii* in Illinois, 1999-2005

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Source: Illinois Department of Public Health

Table 13. Frequency of *Shigella dysenteriae* in Illinois, 1999-2005

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Source: Illinois Department of Public Health
Table 14. Frequency of *Shigella flexneri* subtypes in Illinois, 1999-2005

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<tr>
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<td><em>flexneri</em> 3A</td>
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<tr>
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<td><em>flexneri</em> 4B</td>
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<tr>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>flexneri</em> 6</td>
<td>11</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td><em>flexneri</em> X variant</td>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<tr>
<td><em>flexneri</em> Y variant</td>
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<td>1</td>
<td>3</td>
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<td>0</td>
<td>3</td>
<td>5</td>
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<tr>
<td><strong>TOTAL flexneri</strong></td>
<td>166</td>
<td>130</td>
<td>89</td>
<td>99</td>
<td>107</td>
<td>107</td>
<td>79</td>
</tr>
</tbody>
</table>

Source: Illinois Department of Public Health
**Staphylococcus aureus**, Intermediate or High Level Vancomycin Resistance

**Background**

*Staphylococcus aureus* causes both community and health care associated infections in persons. The National Committee for Clinical Laboratory Standards (NCCLS) defines staphylococci requiring concentrations of vancomycin of \( \leq 4 \) µg/mL for growth inhibition as susceptible to vancomycin. Those requiring concentrations of 8-16 µg/mL as intermediate and those requiring concentrations of \( \geq 32 \) µg/mL as resistant. *S. aureus*—with reduced vancomycin susceptibility (SA-RVS) includes all *S. aureus* isolates with MICS of vancomycin of \( \geq 4 \) µg/mL.

Three cases of SA-RVS have been identified in Illinois, two in 1999 and one in 2000.

**Case definition**

A case of *S. aureus*, intermediate or high level vancomycin resistance is defined as *S. aureus* isolated from infected humans with an MIC of vancomycin of \( \geq 4 \) µg/mL.

**Descriptive epidemiology**

No cases were reported in 2005.

**Summary**

No cases were reported in 2005 in Illinois.
**Streptococcus pyogenes, Group A (Invasive Disease)**

**Background**

The spectrum of disease caused by group A streptococci (GAS) is diverse and includes pharyngitis and pyoderma, severe invasive infections, post-streptococcal acute rheumatic fever and acute glomerulonephritis. Invasive GAS may present as any of several clinical syndromes including pneumonia, bacteremia in association with cutaneous infection (cellulitis, erysipelas or infection of a surgical or nonsurgical wound), deep soft tissue infection (myositis or necrotizing fasciitis), meningitis, peritonitis, osteomyelitis, septic arthritis, postpartum sepsis (puerperal fever), neonatal sepsis and non-focal bacteremia. Two types of invasive GAS are streptococcal toxic shock syndrome (STSS) and necrotizing fasciitis. The symptoms of STSS include fever, myalgia, vomiting, diarrhea, confusion, soft tissue swelling, renal dysfunction, respiratory distress and shock. Necrotizing fasciitis is a deep infection of subcutaneous tissue that results in destruction of fat and fascia and often leads to systemic illness. Risk factors for necrotizing fasciitis include injection drug use, obesity and diabetes mellitus.

Transmission of GAS occurs by direct contact with patients or carriers, or by inhalation of large respiratory droplets. Approximately 5 percent of the population may be asymptomatic carriers, but these individuals are less likely to transmit the organism than symptomatic persons. Predisposing risk factors for invasive GAS include older age, injection drug use, human immunodeficiency infection, diabetes, cancer, alcohol abuse, varicella, penetrating injuries, surgical procedures, childbirth, blunt trauma and muscle strain. A study in the United Kingdom in 2003 and 2004 identified age, alcoholism, IDU, malignancy and use of nonsteroidal medications as risk factors for STSS. STSS developed in 8 percent of patients with invasive GAS. The fatality rate was 19 percent. Treatment guidelines have been established by the Infectious Diseases Society for GAS pharyngitis. Chemoprophylaxis is not recommended for household contacts to cases of invasive GAS. Household members should monitor themselves for signs and symptoms for 30 days after exposure.

During 2005, 1,272 cases of invasive GAS were reported from the Active Bacterial Core Surveillance site projects in 10 states. Incidence was highest in those older than 64 years of age (2 cases per 100,000) and those 50 to 64 years of age (0.8 cases per 100,000). STSS accounted for 5 percent and necrotizing fasciitis accounted for 7 percent of cases.

In routine surveillance, 4,715 cases of invasive GAS were reported to CDC and 129 cases of streptococcal TSS.

**Case definition**

The case definition of invasive GAS disease in Illinois is the isolation of group A *Streptococcus pyogenes* by culture from a normally sterile site.

**Descriptive epidemiology**

- Number of reported cases in Illinois in 2005 - 342 invasive GAS cases including 13 necrotizing fasciitis and 35 streptococcal toxic-shock syndrome cases (five-year median = 284) (see Figure 81). All cases were confirmed. The incidence rate for
2005 was 2.7 per 100,000 population.

- Age - Median age was 55 (Figure 82). By age group, the highest incidence per 100,000 occurred in those older than 79 years of age (12 per 100,000 in that age group), followed by those 70 to 79 years of age (6) and 60 to 69 years of age (6). At least 25 cases were residents of residential institutions.
- Gender – Forty-seven percent were male.
- Race/ethnicity - Cases were 71 percent white, 20 percent African American and 8 percent other races; 16 percent occurred among Hispanics.
- Geographic distribution – Fifty percent were residents of Cook County.
- Seasonal variation - An increase in cases occurred from February to April (Figure 83).
- Thirteen (4 percent) of the invasive GAS cases were described as necrotizing fasciitis and 35 (10 percent) were described as toxic shock syndrome.
- Outcome – Ninety-four percent were hospitalized. Of 246 reported invasive GAS infections with information available, 43 were fatal (overall case fatality rate - 17 percent). Seventy-seven percent of the fatalities were in those older than 49 years of age (median = 71 years).
- Reporting – Eighty-nine percent were reported by infection control professionals.
- Clusters – A cluster of invasive GAS occurred in two residents of a long-term care facility in DuPage county. A cluster of two fatal cases of invasive GAS occurred in a ventilator facility in Chicago.

Summary

The number of reported invasive GAS cases continues to rise in Illinois. The highest incidence occurred in cases older than 79 years of age. Seventy-seven percent of the fatalities were persons 49 years of age or older. STSS occurred in 10 percent of patients in Illinois which is similar to 8 percent reported in a study in the United Kingdom. Fatality rates were similar in Illinois (17 percent) as compared to a study in the United Kingdom (19 percent).

Suggested readings

Figure 82. Invasive GAS and Streptococcal TSS Cases by Age in Illinois, 2005

Figure 83. Invasive GAS and Streptococcal TSS Cases in Illinois by Month, 2005
**S. pneumoniae**

**Background**

*S. pneumoniae* is the most common cause of meningitis, community-acquired pneumonia and bacteremia, and acute otitis media. Pneumococci colonize the nasopharynx of 15 percent to 60 percent of individuals; most remain asymptomatic. Carriage is higher in children attending childcare centers outside the home. The onset of *S. pneumoniae* meningitis is usually sudden with high fever, lethargy and signs of meningeal irritation. It is a sporadic disease in the elderly and in young infants.

In the nine states which are part of the Active Bacterial Core Surveillance, isolates were collected in 2005, 14 percent exhibited intermediate resistance to penicillin and 10 percent were fully resistant. The pneumococcal conjugate 7-valent vaccine (6B, 14, 18C, 19F, 23F, 9V, 4) was licensed in the United States in February 2000 and can be used in children younger than 2 years of age. The vaccine protects against the seven strains of pneumococcus that cause 80 percent of the invasive disease among children in the United States.

The Advisory Committee on Immunization Practices (ACIP) recommends that vaccine be given to infants in a series of four injections (at 2, 4, 6 and 12-15 months of age). The recommendation applies to all children younger than 24 months of age and to children 24 to 59 months of age who are at higher risk of infection, including those with certain illnesses (e.g., sickle cell anemia, cochlear implant, immunocompromising condition, chronic heart or lung disease) and those who are Alaska natives, American Indian or African American. The vaccine also can be considered for other children ages 24 to 59 months who are at increased risk, such as children in group day care, those with frequent otitis media or those who are economically or socially disadvantaged.

The use of vaccine has decreased invasive pneumococcal disease in children younger than five and in the unvaccinated population due to reductions in nasopharyngeal colonization in vaccinated children. In the Behavioral Risk Factor Surveillance System (BRFSS) survey for Illinois in 2005, 57 percent of adults older than 64 years of age received a pneumococcal vaccine. This was lower than the national median of 66 percent. This year, 2005, was the fourth complete year for reporting of all forms of invasive *S. pneumoniae* in Illinois. The Healthy People 2010 objectives are to reduce invasive pneumococcal disease to 46 per 100,000 in children younger than 5 years and to 42 per 100,000 in adults aged 65 years or older.

**Case definition**

A case is defined as a person with clinically compatible symptoms and from whom isolation of the organism from a normally sterile site has occurred.

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2005 -1,226 (See Figure 84). The incidence rate for 2005 was 10 per 100,000.
- Age - Mean age of cases was 50 (see Figure 84 for age distribution).
- Gender - Fifty percent were female.
• Race/ethnicity – Twenty-six percent were African American, 70 percent were white and 4 percent were other races; 7 percent were Hispanic.
• Seasonal peak – An increase in cases occurred in the winter and spring months (Figure 86).
• Diagnosis – *S. pneumoniae* was isolated from blood (742, 92 percent), CSF (57, 7 percent), pleural fluid (13, 2 percent) and other sites (six, 0.7 percent).
• Clinical - The most common types of disease reported were bacteremia (736, 91 percent), pneumonia (461, 57 percent), meningitis (55, 7 percent) and other (74, 9 percent). Cases may have reported multiple types of disease. Ninety-one percent of cases were hospitalized. Eleven percent of cases were fatal.
• Reporting - The majority of cases were reported by infection control professionals (957 of 1045; 91 percent).
• Underlying conditions – There were 810 cases with information available and the most common underlying conditions for invasive pneumococcal disease were chronic cardiovascular (172 cases), chronic pulmonary disease (164) and underlying immunosuppressive condition (122).

**Summary**

According to reported invasive *S. pneumoniae* cases, Illinois already meets the Healthy People 2010 objectives for reducing the incidence of invasive pneumococcal disease. The Illinois rate was below the rate of 14 per 100,000 found in CDC’s Active Bacterial Surveillance sites.

**Suggested readings**


Figure 85. *S. pneumoniae* Cases by Age in Illinois, 2005

Figure 86. *S. pneumoniae* Cases in Illinois by Month, 2005
Tetanus

Background
Tetanus is non-communicable. *Clostridium tetani* spores can be present in the environment and enter the body through nonintact skin. Generalized tetanus presents with trismus (lockjaw) followed by generalized rigidity caused by contractions of the skeletal muscles.

Twenty-seven cases of tetanus were reported to CDC (0.095 per million) in 2005. Two cases were fatal.

Case definition
A confirmed case of tetanus is a clinically compatible case, as reported by a health care professional.

Descriptive epidemiology
One case was reported in Illinois in a 47-year-old female from Williamson County in February. The patient experienced an acute wound. The patient had last received tetanus toxoid two years ago and was not treated for the wound until tetanus onset. The case was confirmed and was hospitalized for six days.

Summary
One case was reported in 2005 in Illinois.

Suggested readings
**Tickborne Diseases Found in Illinois**

Ticks are the most common vector of vector-borne diseases in the United States. Ticks are responsible for the following diseases in the United States: babesiosis, Colorado tick fever, human granulocytic ehrlichiosis, human monocytic ehrlichiosis, Lyme disease, Powassan encephalitis, relapsing fever, Rocky Mountain spotted fever (RMSF), tick paralysis and tularemia.

Ticks usually attach around the head, neck and groin of the human host. The rates of human infection with tickborne diseases are influenced by the prevalence of vector tick species, the tick infection rate, the readiness of ticks to feed on humans and the prevalence of their usual animal hosts.

Six tickborne diseases have been reported in Illinois residents. Five of six tickborne diseases can be acquired in Illinois and are listed in Table 15 and in individual sections of this document. A case of babesiosis was reported each year in 2003 and 2004. According to CDC guidelines, any Illinois resident diagnosed with a tickborne disease is counted in the state’s case count, even though the patient may have reported tick exposures in another state. Case counts by year for 1999 through 2005 for four of these infections that occur regularly in Illinois are shown in Figure 87.

Lyme disease is the only tickborne disease with significantly increased numbers in 2005 over previous years.

**Figure 87. Tickborne Disease Cases in Illinois, 2000-2005**

<table>
<thead>
<tr>
<th>Year</th>
<th>Lyme</th>
<th>RMSF</th>
<th>Tularemia</th>
<th>Ehrlichiosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>35</td>
<td>4</td>
<td>2</td>
<td>17</td>
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<td>2001</td>
<td>32</td>
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<td>71</td>
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<tr>
<td>2004</td>
<td>87</td>
<td>12</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>2005</td>
<td>127</td>
<td>11</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Disease</td>
<td>Organism</td>
<td>Tick vectors</td>
<td>Symptoms</td>
<td>Where found</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>----------------------</td>
<td>---------------------------------------------</td>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Rocky Mountain spotted fever</td>
<td><em>Rickettsia rickettsii</em></td>
<td><em>Dermacentor variabilis</em> (American dog tick), <em>D. andersoni</em> (Rocky Mountain wood tick)</td>
<td>fever, headache, rash</td>
<td>throughout the U.S. but most common in Southeast; entire state of Illinois</td>
</tr>
<tr>
<td>Tularemia</td>
<td><em>Francisella tularensis</em></td>
<td><em>Amblyomma americanum</em> (lone star tick), <em>D. variabilis</em>, <em>D. andersoni</em></td>
<td>ulcer at entry site, enlarged lymph node</td>
<td>throughout North America; primarily central and southern Illinois</td>
</tr>
<tr>
<td>Lyme disease</td>
<td><em>Borrelia burgdorferi</em></td>
<td><em>Ixodes scapularis</em> (deer tick)</td>
<td>fatigue, chills, fever, erythema migrans, enlarged lymph nodes</td>
<td>primarily on the West Coast, in northeastern and north central U.S.; primarily northern Illinois</td>
</tr>
<tr>
<td>Human monocytic ehrlichiosis</td>
<td><em>Ehrlichia chaffeensis</em></td>
<td><em>A. americanum</em></td>
<td>fever, headache, myalgia, vomiting</td>
<td>most common in the southern states; more common in southern Illinois</td>
</tr>
<tr>
<td>Human granulocytic ehrlichiosis</td>
<td><em>Anaplasma phagocytophilum</em></td>
<td><em>I. scapularis</em></td>
<td>fever, headache, myalgia, vomiting</td>
<td>most common in upper Midwest and Northeast; in Illinois, unknown distribution</td>
</tr>
</tbody>
</table>

* Although suspected to be present in Illinois, no diagnostic test is available yet.
Toxic Shock Syndrome (TSS) Due to *Staphylococcus aureus*

**Background**

Toxic shock syndrome is classified by clinical and laboratory evidence of fever, rash, desquamation, hypotension and multiple organ failure caused by toxins produced by *Staphylococcus aureus*. MRSA strains have caused TSS in other countries. Most cases have been associated with strains of *Staphylococcus aureus* that produce a special toxin.

Ninety cases were reported to CDC in 2005.

**Case definition**

The five clinical findings used to establish whether a case meets the case definition for staphylococcal TSS are:

1) Fever - temperature greater than 102 F  
2) Rash  
3) Desquamation  
4) Hypotension  
5) Multisystem involvement (three or more of the following)
   a. Gastrointestinal - vomiting or diarrhea  
   b. Muscular - myalgia or creatine phosphokinase (≥twice upper limit of normal)  
   c. Mucous membrane - vaginal, oropharyngeal or conjunctival hyperemia  
   d. Renal - blood urea nitrogen or creatinine ≥twice the upper limit of normal or urinary sediment with pyuria in the absence of urinary tract infection  
   e. Hepatic - total bilirubin, alanine aminotransferase (ALT) or aspartate aminotransferase (AST) ≥twice the upper limit of normal for the lab  
   f. Hematologic - platelets less than 100,000/mm³  
   g. CNS - disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent.

In addition, there should be negative results on the following tests (if done)

a. Blood, throat or CSF cultures (blood cultures can be positive for *S. aureus*)  
   b. Rise in titer to Rocky Mountain spotted fever, leptospirosis or measles

The CDC case definition for a probable case is one with any four of the five clinical findings above. A confirmed case is one with all five of the clinical findings, including desquamation, unless the patient dies before desquamation can occur.

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2005 - five (five-year median = five cases).  
  Two were confirmed and three were probable.  
- Age - Ages ranged from 21 to 51 years (median = 39 years).  
- Gender - All cases were female.  
- Seasonality – Three cases had onsets in July.  
- Race/ethnicity - All cases were white; none of three cases with information available
were Hispanic.

- Geographic distribution - Cases resided in four different counties (Douglas, DuPage, McLean, Will).
- Symptoms - Diarrhea, fever and hypotension (five cases), myalgia and orthostatic dizziness (four cases), vaginal discharge (three cases), desquamation (two cases) and abdominal pain (one case).
- Laboratory findings - *S. aureus* was isolated from the vagina in three cases, from urine and vagina in one case and from wounds in one. Four cases were classified as menstruation-associated and one was classified as wound-associated.
- Treatment - All patients were hospitalized.
- Outcome - All patients survived.
- Reporting – All cases were reported by infection control practitioners.
- Past cases – Toxic shock syndrome cases due to *S. aureus* reported per year in the state previously were 1998 (seven), 1999 (five), 2000 (three), 2001 (four), 2002 (five), 2003 (six) and 2004 (six).

**Summary**

Five cases of staphylococcal toxic shock were reported in 2005, and four were considered to be associated with menstruation.
Trichinella

Although one case was reported to CDC in 2005 from Illinois. On further review in a later year, this case did not meet case definition and should not have been reported to CDC.
Tuberculosis
Background

The Mycobacterium tuberculosis complex includes *M. tuberculosis*, *M. africanum*, *M. bovis* and *M. microti*. Tubercle bacilli are transmitted by inhalation of airborne droplet nuclei produced by persons with tuberculosis (TB) disease. Prolonged close contact with cases may lead to latent TB infection (LTBI). Tuberculin skin sensitivity often indicates LTBI (as noted by a positive skin test), which usually appears four to 12 weeks after infection. LTBI is different from TB disease and is defined as a condition in which TB bacteria are alive but inactive in the body. People with latent TB infection have no symptoms and cannot spread TB to others. They usually have a positive skin test reaction and may develop TB disease later in life if they do not receive treatment for latent TB infection.

Approximately 90 to 95 percent of newly infected individuals have LTBI where early lung lesions heal and leave no residual changes except small calcifications in the pulmonary or tracheobronchial lymph nodes. In those patients whose infection progresses to disease, early symptoms may include fatigue, fever, night sweats and weight loss. In advanced disease, symptoms such as cough, chest pain, coughing up of blood and hoarseness may occur.

Several issues, such as patient’s immune status and immigration from areas where TB is common, impact the incidence of TB in Illinois. The AIDS epidemic had a profound effect on the number of TB cases in Illinois in the past. Knowing the HIV status of TB patients is important for patient treatment. TB is an AIDS-defining opportunistic infection. Persons with HIV and TB are more than five times as likely to die during TB treatment than those who are not HIV infected. HIV is the greatest risk factor for the progression of latent TB to active TB. In the United States, HIV status reporting among TB patients increased from 35 percent in 1993 to 68 percent in 2003. Also, 31 percent of TB patients had unknown HIV status in 2005. Nine percent of TB patients were HIV positive in 2005. In the United States, 69 percent reported HIV status and 13 percent of those tested were positive. TB is a major opportunistic infection in HIV-infected persons. In Illinois, the percentage of TB cases diagnosed in foreign-born individuals is increasing. CDC recommends that all immigrants, refugees, foreign-born students and their families, and others accompanying them into the country be tuberculin-test screened and medically treated when appropriate.

Both suspected and confirmed cases of TB are reportable in Illinois. The sooner cases are reported to the local TB control authority, the sooner their personnel can begin investigations which may interrupt transmission of TB in the community.

During 2005, a total of 14,097 cases (4.8 per 100,000) were reported to CDC. The annual rate was 2.5 per 100,000 in U.S.-born persons and 21.9 per 100,000 in foreign-born cases. Fifty-five percent of cases were in foreign-born persons. The highest rates were in Asians, Native Hawaiians or other Pacific Islanders and non-Hispanic blacks.
Case definition

A confirmed case of tuberculosis in Illinois is a case that is either laboratory confirmed or is a case that meets the clinical case definition criteria:

1) A positive tuberculin skin test
2) Other signs and symptoms compatible with tuberculosis, such as an abnormal, unstable chest radiograph, or clinical evidence of current disease
3) Treatment with two or more anti-tuberculosis medications
4) Completed diagnostic evaluation

Laboratory criteria for diagnosis are isolation of *M. tuberculosis* from a clinical specimen, demonstration of *M. tuberculosis* from a clinical specimen by DNA probe or mycolic acid pattern on high-pressure liquid chromatography, or demonstration of acid-fast bacilli in a clinical specimen when a culture has not been or cannot be obtained.

Descriptive epidemiology

- Number of cases reported in Illinois in 2005 – 596 (4.7 per 100,000 population) (Figure 88). TB cases in Chicago increased to 333 cases, an increase of 8 percent over 2004 (308 in 2004). Of the 596 cases, 452 (76 percent) were culture confirmed, 85 (14 percent) were provider diagnosed, 54 (9 percent) met a clinical case definition and five (0.8 percent) were smear positive.
- Age - The highest incidence of TB occurred in older age groups (Table 16).
- Race/ethnicity - Thirty-seven percent were African American (non-Hispanic), 13 percent white (non-Hispanic), 23 percent Hispanic, 25 percent were Asian or Pacific Islander and 2 percent were other race/ethnicities.
  - The number and percent of foreign-born TB cases increased in 2005 (N = 268, or 45 percent) as compared to 2004 (N = 230) (Figure 89). The largest number of cases were born in Mexico (26 percent), followed by India (21 percent) and the Philippines (12 percent). Forty-three countries of origin were reported.
- Geographic – Cook County reported the largest number of cases (453), followed by Lake (30), Dupage (29) and Will (18).
- Risk factors – Risk factors for TB included homeless in past 12 months (4 percent), injection drug use (0.8 percent), being an inmate in a correctional facility and residing in a long-term care facility (each 2 percent).
- Underlying illnesses – In 2005, Illinois reported HIV status in 68 percent of TB patients. Eleven percent of patients with a valid response to HIV status were HIV positive in Illinois.
- Drug resistance – INH resistance was found in 29 (6 percent) of culture positive cases. No multi-drug resistant cases were reported.
- Clinical Syndrome – Seventy-three percent of cases were pulmonary and 24 percent were extrapulmonary.
Summary

In 2005, 596 cases of TB were reported in Illinois with an incidence rate of 4.7 per 100,000 which is very similar to the national incidence rate of 4.8. Illinois was ranked fifth state in the nation based on incidence rate in 2005. Illinois is among five states reporting the largest increases in the number of TB cases between 2004 and 2005. This is the first time in nine years that TB has seen an increase in the number of cases (4.7 percent increase). Forty-five percent of these cases were among persons born outside of the United States. An increasing percentage of foreign-born cases is being seen in Illinois, with India, Mexico and the Philippines being the most common countries of origin. Public health attention must continue to focus on high-risk groups, especially those born outside of this country.

Table 16. Age Distribution of Tuberculosis Cases in Illinois, 2005

<table>
<thead>
<tr>
<th>Age</th>
<th>Incidence *</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 years</td>
<td>2.5</td>
</tr>
<tr>
<td>5 - 14</td>
<td>1.3</td>
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<tr>
<td>15 - 24</td>
<td>3.6</td>
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<tr>
<td>25-44</td>
<td>5.3</td>
</tr>
<tr>
<td>45-64</td>
<td>6.7</td>
</tr>
<tr>
<td>65+</td>
<td>6.9</td>
</tr>
</tbody>
</table>

* Incidence per 100,000 based on 2000 population.
Source: Illinois Department of Public Health
Figure 89. Country of Origin for Foreign-born TB Cases, Illinois, 2005

- India (32%)
- Mexico (3%)
- Vietnam (13%)
- Philippines (3%)
- Rep. of Korea (3%)
- Other (22%)
Tularemia

Background
Tularemia is caused by *Francisella tularensis* and is a zoonotic disease that infects vertebrates especially rabbits and rodents. Tularemia can be classified into six primary syndromes: ulceroglandular (the most common form), glandular, typhoidal, oculoglandular, oropharyngeal, and pneumonic. The case fatality rate can be 30 percent to 60 percent if untreated and typhoidal. Tularemia can be divided into four subspecies. Human disease is mainly associated with *F. tularensis subsp tularensis* found only in North America and the moderately virulent *F. tularensis subsp. Holartica* which is endemic throughout the northern hemisphere. *F. tularensis subsp. tularensis* can be separated into two subspopulations in the United States, A.I. and A.II. A.I. occurs primarily in the central United States and A.II. occurs primarily in the western United States. Tularemia can affect many wildlife species, including prairie dogs, squirrel and cats, in addition to humans. Both ticks and biting flies can serve as vectors in the United States.

The most common modes of transmission are tick bites and handling infected animals. The disease also can spread through ingestion of contaminated water or food, inhalation and insect bites.

Tularemia has two peaks in occurrence; a peak in the summer reflects transmission from ticks and a peak in winter reflects transmission from animal contacts, especially rabbits, often during hunting or trapping seasons. The most important epizootic hosts for tularemia in the United States include rodents and lagomorphs. Tularemia has been associated with die-offs in exotic animals, such as prairie dogs. From 1990 to 2000, tularemia was primarily reported from Arkansas, Missouri, Oklahoma and South Dakota.

The most common tick vectors in the United States are the American dog tick (*Dermacentor variabilis*), the Lone Star tick (*Amblyomma americanum*) and the Rocky Mountain wood tick (*D. andersoni*).

The incubation period is three to five days. Clinical signs in people include fever, chills, malaise, cough, myalgias, vomiting and fatigue followed by the development of one of six clinical syndromes. Isolation of *F. tularensis* requires biosafety level 3 facilities. Tularemia is considered a possible bioterrorism agent. Vaccination is recommended only for limited numbers of persons in high-risk occupations.

In 2005, 154 cases were reported to CDC from 29 states. Prevention methods include wearing gloves when handling dead animals, especially rabbits and rodents; avoiding bites of ticks, flies and mosquitoes by using insect repellents, cooking game meat thoroughly and avoiding drinking of untreated water.

Case definition
The CDC case definition for a confirmed case of tularemia is a clinically compatible case with either isolation of *F. tularensis* from a clinical specimen or a four-fold or greater rise in serum antibody titer to *F. tularensis* antigen. A
probable case is a clinically compatible case with either detection of *F. tularensis* in a clinical specimen by fluorescent antibody or an elevated serum antibody titer to *F. tularensis* antigen in a patient with no history of vaccination.

**Descriptive epidemiology**
- Number of cases reported in Illinois in 2005 – One probable case was reported. The median number of cases per year for the last five years is five.
- Age - The case’s age was between 20 and 30 years of age.
- Gender – This case was male.
- Seasonal variation – The illness onset was in August.
- Symptoms/diagnosis/treatment – The case was hospitalized. The case had a very low serologic titer.
- Exposures – The case had exposure to wild rabbits.
- Past incidence - The numbers of cases in Illinois by year are as follows: 1991 (five), 1992 (two), 1993 (three), 1994 (three), 1995 (four), 1996 (four), 1997 (five), 1998 (five), 1999 (two), 2000 (four), 2001 (four), 2002 (five), 2003 (one) and 2004 (five).

**Summary**
- The number of cases of tularemia decreased from 2004. Only one case was reported in 2005.

**Suggested readings**
Typhoid fever

Background
Typhoid fever is a systemic infection caused by infection with Salmonella enterica serotype Typhi. The incubation period is from three days to three months with a usual range of one to three weeks. Transmission of typhoid fever is usually by ingestion of food or water contaminated by fecal or urinary carriers of S. enterica serotype Typhi. Types of products implicated in some countries include shellfish, raw fruits, vegetables and contaminated milk or milk products. Unlike other types of Salmonella, S. enterica ser. Typhi is not found in animal reservoirs; humans are the only reservoirs. In developed countries like the United States, most cases are sporadic after travel to endemic areas. The infectious dose ranges from 1000 to 1 million organisms. Constipation is more common than diarrhea in adults. The onset of bacteremia with typhoid fever results in fever, headache, abdominal discomfort, dry cough and myalgia. Other findings may include bradycardia, rash and splenomegaly. Complications may include gastrointestinal bleeding, intestinal perforation, and typhoid encephalopathy. Relapse may occur in 5 percent to 10 percent of patients, usually two to three weeks after resolution of fever. Up to 10 percent of untreated patients will shed organisms in the feces for up to three months. One to four percent may develop long-term carriage of the organism up to one year. Most carriers are asymptomatic. Chronic carriage is more common in women, the elderly and in patients with cholelithiasis.

Typhoid fever is typically diagnosed with blood cultures. Bone marrow cultures can also be used. For travelers to developing countries, water should be boiled or bottled and food should be thoroughly cooked to avoid acquiring typhoid fever. Vaccination with either of two effective vaccines available in the United States is recommended for persons traveling to areas where typhoid is endemic.

In 2005, 324 typhoid fever cases were reported in the United States. Approximately three-quarters of all cases occur among persons who report international travel during the prior month. Persons visiting friends or relatives in southeast Asia area at particular risk.

Case definition
A confirmed case is a clinically compatible illness with isolation of S. enterica ser. Typhi from blood, stool or other clinical specimen. A probable case is defined as a clinically compatible illness that is epidemiologically linked to a confirmed case in an outbreak.

Descriptive epidemiology
- Number of cases reported in Illinois in 2005 - 23 (five-year median = 18) (see Figure 90). All were confirmed cases.
- Sex – Fourteen (61 percent) were male.
- Age - Cases ranged in age from three to 58 years of age (median = 26 years).
- Race/ethnicity – Eleven of 19 (58 percent) were Asian; four (21 percent)
were white, one (5 percent) was African American and three (16 percent) were other races. Two of 19 (10 percent) were Hispanic.

- Seasonal variation – Eleven cases were reported from July through September.
- Geographic distribution – Thirteen of the 23 cases (56 percent) were Cook County residents.
- Reporting – Ten of 13 cases with information available were reported by infection control professionals.
- Diagnosis – The specimen testing positive was blood (16), stool and blood (three), stool (three) and urine (one).
- Citizenship status - Five cases were known to be citizens of the United States, four were not United States citizens and the status of 14 cases was unknown.
- Employment - No cases were reported to be food handlers.
- Treatment/outcomes - Sixteen of 20 cases were hospitalized. No deaths were reported.
- Vaccination status – One case reported receiving typhoid vaccine within five years of illness onset. Ten cases reported no typhoid fever vaccine and 13 had an unknown vaccination history.
- Risk factors - No cases were known to have been linked to a typhoid carrier. Travel destinations for imported cases included India (eight), Pakistan (four), Mexico (one), Indonesia (one) and Ecuador (one). One person reported travel to Pakistan and Turkey. Four persons reported no travel. Travel history for three cases was unknown. Of the 16 travelers with known destinations, the reason for travel was visiting friends or relatives (six), immigration (two), business (one), multiple reasons (one) and unknown reasons (six).

Summary

There were 23 typhoid fever cases reported in Illinois in 2005. Most cases were acquired outside the United States. India and Pakistan were the most common travel destinations for those cases who reported travel outside the United States. The majority of cases in Illinois are travel-associated. It is unusual to have four cases report no travel outside the United States. No common source could be identified for these four patients.
Figure 90. Typhoid Fever Cases in Illinois, 2000-2005

Year
2000 2001 2002 2003 2004 2005
Number of cases
0 5 10 15 20 25 30

26 18 17 18 16 23
Varicella (chickenpox)

Background

Chickenpox (varicella) caused by varicella-zoster virus is characterized by sudden onset of slight fever and a rash. Lesions present with successive crops and several stages of maturity present at the same time. Serious complications of varicella may occur and can include pneumonia, secondary bacterial infections, hemorrhagic complications an encephalitis. Herpes zoster (shingles) is a local manifestation of reactivation of latent varicella in dorsal root ganglia. Severe pain and paresthesia may accompany this manifestation.

The incubation period is two to three weeks long. A person is communicable as long as five days before rash onset and remains infectious until the rash is crusted over. The disease is transmitted through direct contact between persons, droplet or airborne spread of vesicle fluid or respiratory tract secretions or indirectly through fomites.

Varicella or chickenpox is a highly infectious vaccine preventable disease. Varicella related deaths became nationally notifiable in 1999 to allow for evaluation of the vaccine program. In the United States, three varicella deaths were reported to CDC in 2005. A total of 30 states and Washington D.C. were conducting either statewide or sentinel case-based reporting.

Illinois implemented school entry requirements for varicella in July 2002. It is required for those entering kindergarten in 2002 and for those entering first grade in 2003. Vaccination is also required of all pre-schools that are run by the school district and which have children aged two or older. In 2003, the Department also required reporting of adult chickenpox (in those older than 20 years of age) to be reported within 24 hours under the Medical Studies Practice Act. The Department requests voluntary reporting of varicella deaths. This reporting was implemented because a case of smallpox in an adult might be misidentified as a case of chickenpox.

Case definition

Physician diagnosed cases are reported to IDPH with a weekly summary from local health jurisdictions. Individual cases were not required to be reported in 2005.

Descriptive Epidemiology

- Number of cases – 1,816 (five-year median=9,879) (Figure 91). In adults, 107 cases were reported.
- Fatalities – One varicella death was reported in 2005.

Summary

Varicella (chickenpox) is reportable in aggregate in Illinois and 1,816 cases were reported in 2005. The number of reported chickenpox cases decreased from 2004. One fatal case were reported in 2005.
Figure 91. Varicella Cases in Illinois, 2000-2005
**Vibrio-Non Cholera**

**Background**

*V. cholerae* non 01 and non 0139 have caused gastrointestinal illness, wound infection and occasionally septicemia. These organisms are found in brackish waters worldwide. The organisms peak in warm weather. Transmission through consumption of raw or undercooked seafood can result in gastroenteritis. Wound infections are from contact with contaminated water. The incubation period is 12 to 24 hours.

In preliminary FoodNet data the incidence of non cholera *Vibrio* was 0.3 per 100,000. Non cholera *Vibrio* comprise 0.7 percent of the 10 enteric diseases reported in FoodNet. Among 109 *Vibrio* isolates identified to species, 59 (54 percent) were *V. parahaemolyticus* and 15 (14 percent) were *V. vulnificus*.

In 2005, 546 patients were reported with nontoxigenic *Vibrio*. Almost half were hospitalized and 8 percent were fatal. *V. parahaemolyticus* was isolated from 218 (40 percent) of patients and *V. vulnificus* from 121 (22 percent). In the United States, 42 percent of *Vibrio* isolates were from stool, 18 percent from blood, 28 percent from wounds and 11 percent from other sites. *V. parahaemolyticus* was the most frequent species isolated from stool; *V. vulnificus* was the most frequent *Vibrio* isolated from blood and wounds. The greatest frequency of cases occurred in August. Twenty-eight percent of patients reported having a wound either before, or during exposure to *Vibrio*. Sixty-five percent reported swimming or boating, 22 percent handled seafood and 26 percent had contact with marine wildlife. Excluding cases with wound infections, 87 percent reported eating seafood in seven days before onset. Almost half of them ate oysters (91 percent raw), 10 percent shrimp and 15 percent fish.

It is not known whether some species, such as *damsela, furnissii, metschnikouri* and *cincinnatiensis* are pathogenic.

*Vibrio* illnesses associated with Hurricane Katrina were reported from eight states. None were reported from Illinois.

**Case definition**

A confirmed case is a clinically compatible case from which *Vibrio* spp. has been isolated from a clinical specimen. A probable case is a clinically compatible case that is epidemiologically linked to a confirmed case; or a clinically compatible case who consumed epidemiologically incriminated food (usually seafood) from which 1 million or more organisms per gram have been identified.

**Descriptive Epidemiology**

*V. parahaemolyticus*

- Number of cases - Three cases of *V. parahaemolyticus* were reported in 2005.
- Sex – All three cases were male.
- Age – Age categories of cases were 31 to 40 years (one), 41 to 50 years
(one) and older than 60 years of age (one).

- Seasonal – Illness onsets were in June, August and September.
- Site of isolation – All three isolates were from stool.
- Clinical Outcome – Two cases were hospitalized. No cases were fatal.
- Risk factors – One case reported consumption of raw oysters and two cases had unknown risk factors.

Other *Vibrio* species

- Number of cases – Three other types of *Vibrio* were reported.
- Species - One case was caused by *V. fluvialis*, one from *V. cholerae* non O1 and one had an unknown species.
- Sex – Three cases were male.
- Age – All cases were older than 40 years of age.
- Seasonal – One case had onset in August and two had onset in September.
- Site of isolation – One isolate was from a wound, one from stool and one had an unknown site of isolation.
- Risk factors – All three cases had unknown risk factors.

**Suggested Readings**

Yersiniosis

Background

Yersiniosis, an infrequently reported cause of diarrhea in the United States, is caused by *Yersinia enterocolitica* or *Y. pseudotuberculosis*. Transmission is by the fecal-oral route, through consumption of contaminated food or water or by contact with infected people or animals. The incubation period is three to seven days. Fecal shedding occurs for as long as symptoms are present, usually two to three weeks. Manifestations of the disease include an acute febrile diarrhea and abdominal pain. Symptoms can mimic appendicitis. Bloody diarrhea is seen in 10 percent to 30 percent of children with *Y. enterocolitica*. Animals are the principal reservoir for *Yersinia*, with the pig the primary reservoir of *Y. enterocolitica*; rodents are the main reservoirs for *Y. pseudotuberculosis*. Most pathogenic strains of *Y. enterocolitica* have been isolated from raw pork or pork products. Chitterling consumption or contact with someone preparing chitterlings is one exposure history for those with yersiniosis. *Yersinia* is cold-tolerant and can replicate under refrigeration. A large outbreak of *Y. pseudotuberculosis* occurred in Finland and the source was identified as carrots. Foods implicated in *Yersinia* outbreaks have included carrots, lettuce, other vegetables and pickled products.

Foodborne Diseases Active Surveillance Network (FoodNet) collects data from 10 states (Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, Tennessee and selected counties in California, Colorado and New York) Of the 10 diseases (those caused by *Campylobacter, Cryptosporidium, Cyclospora, E. coli* O157:H7, HUS, *Listeria monocytogenes, Salmonella, Shigella, Vibrio* and *Yersinia enterocolitica*) under active surveillance in the federal FoodNet sites, *Yersinia* comprised 159 (0.4 percent) of the reported infections in data from 2005. The incidence rate per 100,000 for yersiniosis in 2005 data was 0.4 (range from 0.1 to 0.9) at the 10 FoodNet sites with preliminary data.

Case definition

The case definition in Illinois for a confirmed case is a positive culture for *Yersinia*. A probable case is a clinically compatible non-laboratory confirmed case that is epidemiologically linked to a laboratory confirmed case.

Descriptive epidemiology

- Number of reported cases in Illinois in 2005 - 22 (five-year median = 24) (see Figure 92). The incidence rate per 100,000 was 0.17. Twenty were listed as confirmed and two as probable
- Age – Ten cases (45 percent) occurred in those younger than one year of age (Figure 93).
- Gender – Sixty-four percent were female.
- Race/ethnicity – Fifty-three percent were African American and 47 percent were white. Eighteen percent were Hispanic.
- Seasonality – Figure 94 shows the case onsets by month. Six cases had
onset in January.

- Geographic location – Forty-one percent of cases were residents of Cook County.
- Clinical history – Eighteen of 20 (90 percent) had diarrhea; eight of 21 (38 percent) had vomiting and 11 of 20 (55 percent) had fever.
- Outcome – For 19 cases with complete case information, nine cases were hospitalized and no cases were reported to be fatal.
- Risk factors – History of chitterling consumption was obtained for 11 cases and two had exposure to chitterlings.

Summary
The yersiniosis incidence rate of 0.17 per 100,000 for 2005 in Illinois was within the range found in the CDC’s FoodNet sites. Forty-five percent of cases in 2005 with age information occurred in children younger than one year old.

Suggested readings

Figure 92. Yersiniosis Cases in Illinois, 2000-2005

Figure 93. Age Distribution of Yersiniosis Cases in Illinois, 2005
Figure 94. S. pneumoniae Cases in Illinois by Month, 2005

Number of cases

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Year

0 50 100 150 200

2005
Other incidents of interest, 2005

Other states
Lymphocytic choriomeningitis virus (LCM) is a rodent-borne virus that can be transmitted to humans through contact with rodent excretions or blood. LCM may be asymptomatic but can cause aseptic meningitis, encephalitis or life-threatening in immunosuppressed persons. It also can cause severe congenital defects. In May 2005, LCMV was implicated in the deaths of three organ transplant recipients in the United States. A hamster was believed to have transmitted the infection to an organ donor whose organs were then provided to three recipients who died. The wild house mouse is the natural reservoir for the virus.

In February 2005 a case of inhalation anthrax was reported in New York City after a person worked on a hide imported from overseas.

Unusual Illinois cases/clusters
A cluster of *B. cepacia* occurred in ventilated patients in a hospital in Kane County in August.

*Phialemonium* outbreak in dialysis center at Hines Veterans Administration, December 2005.

A water sample collected at a faucet/sink/drain was positive for *Phialemonium*. The dialysis machine was negative, but the tubing had been changed out three days before culturing. Two patients were infected with the fungus and were treated with anti-fungal therapy.

A confirmed leptospirosis case was reported in Cook County. The 40-year-old male was exposed to rat urine while living in a fire damaged home. Illness onset was in July. Infection was confirmed by acute and convalescent sera at a commercial laboratory.
## Table 18. Reported Cases of Infectious Disease in Illinois, 2005

<table>
<thead>
<tr>
<th>Disease</th>
<th>Number</th>
<th>Disease</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>1,321</td>
<td>HIV</td>
<td>2,558</td>
</tr>
<tr>
<td>Amebiasis cases</td>
<td>89</td>
<td>Legionella</td>
<td>66</td>
</tr>
<tr>
<td>Anthrax</td>
<td>0</td>
<td>Leptospirosis</td>
<td>1</td>
</tr>
<tr>
<td>Arbovirus infection</td>
<td>252 WNV, 0 SLE, 1 CE, 1 Dengue</td>
<td>Listeriosis</td>
<td>32</td>
</tr>
<tr>
<td>Aseptic meningitis or encephalitis of unknown etiology</td>
<td>1,244</td>
<td>Lyme disease</td>
<td>127</td>
</tr>
<tr>
<td>Aseptic meningitis or encephalitis of known etiology</td>
<td>134</td>
<td>Malaria</td>
<td>74</td>
</tr>
<tr>
<td>Blastomycosis</td>
<td>102</td>
<td>Measles</td>
<td>2</td>
</tr>
<tr>
<td>Botulism</td>
<td>1 foodborne, 1 infant</td>
<td>Meningococcal, invasive</td>
<td>34</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>13</td>
<td>Murine Typhus</td>
<td>0</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td>1,376</td>
<td>Mumps</td>
<td>10</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>1,816</td>
<td>Pertussis</td>
<td>922</td>
</tr>
<tr>
<td><em>Chlamydia trachomatis</em></td>
<td>50,559</td>
<td>Psittacosis</td>
<td>0</td>
</tr>
<tr>
<td>Cholera</td>
<td>0</td>
<td>Q fever</td>
<td>11</td>
</tr>
<tr>
<td>Cryptosporidosis</td>
<td>160</td>
<td>Rabies, animal</td>
<td>51</td>
</tr>
<tr>
<td><em>Cyclospora</em></td>
<td>9</td>
<td>Rabies, potential human exposure</td>
<td>225</td>
</tr>
<tr>
<td>Cysticercosis</td>
<td>0</td>
<td>Reye syndrome</td>
<td>0</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>0</td>
<td>Rocky Mountain spotted fever</td>
<td>11</td>
</tr>
<tr>
<td>Ehrlichiosis, human granulocytic</td>
<td>2</td>
<td>Rubella</td>
<td>0</td>
</tr>
<tr>
<td>Ehrlichiosis, human monocytic</td>
<td>5</td>
<td>Salmonellosis</td>
<td>1,837</td>
</tr>
<tr>
<td>Ehrlichiosis, unknown type</td>
<td>1</td>
<td>Shigellosis</td>
<td>409</td>
</tr>
<tr>
<td>E. coli, shiga toxin producing</td>
<td>142</td>
<td>S. aureus, vancomycin resistant</td>
<td>0</td>
</tr>
<tr>
<td>Foodborne and waterborne outbreaks</td>
<td>60(0 recreational water)</td>
<td>Streptococcus, group A invasive</td>
<td>342</td>
</tr>
<tr>
<td>Giardiasis case</td>
<td>772</td>
<td>Streptococcus, group B, invasive</td>
<td>77</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>20,019</td>
<td><em>Streptococcus pneumoniae</em>, invasive</td>
<td>1,226</td>
</tr>
<tr>
<td>Guillain Barre syndrome</td>
<td>3</td>
<td>Syphilis, primary or secondary</td>
<td>525</td>
</tr>
<tr>
<td><em>H. influenzae</em>, invasive disease</td>
<td>124</td>
<td>Tetanus</td>
<td>1</td>
</tr>
<tr>
<td>Hantavirus</td>
<td>1</td>
<td>Toxic shock syndrome</td>
<td>5</td>
</tr>
<tr>
<td>Hemolytic uremic syndrome</td>
<td>4</td>
<td>Trichinosis</td>
<td>1</td>
</tr>
<tr>
<td>Hepatitis A case, acute</td>
<td>130</td>
<td>Tuberculosis</td>
<td>596</td>
</tr>
<tr>
<td>Hepatitis B case, acute</td>
<td>157</td>
<td>Tularemia</td>
<td>1</td>
</tr>
<tr>
<td>Hepatitis C case, acute</td>
<td>3</td>
<td>Typhoid fever case</td>
<td>23</td>
</tr>
<tr>
<td>Hepatitis C, chronic or resolved</td>
<td>4,268</td>
<td>Vibrio, non cholera</td>
<td>6</td>
</tr>
<tr>
<td>Histoplasmosis</td>
<td>71</td>
<td>Yersiniosis</td>
<td>22</td>
</tr>
</tbody>
</table>
Methods

Health care professionals - including infection control nurses, physicians and school nurses - are required by Illinois law to report specific infectious diseases to their local health department. There were 94 local health departments in Illinois in 2005. Some serve a city or district, some serve the entire county and some serve residents of several counties. The local health department reports cases to the Illinois Department of Public Health, which, in turn, reports all nationally notifiable diseases to the U.S. Centers for Disease Control and Prevention (CDC). All information about patients is confidential; case reports to the CDC do not identify patients.

This annual report includes only cases reported to the Department. Therefore, these annual numbers will underestimate the total number of cases of each disease in the state. Some patients with disease do not seek medical attention, some may not have the necessary testing done for a diagnosis, or the medical provider may not report the case to public health authorities. Also, to standardize reporting in the state, only cases that are reported and meet the case definition for that disease are included in case counts. For some diseases, a case definition is listed for both confirmed and probable cases. For all diseases except HIV/AIDS, the number of cases reported in a year is “closed out” on a set date of the following year. If cases from the preceding year are reported after April 1, they are not included in the preceding year’s numbers. Instead, they are included in the following year’s numbers. For HIV/AIDS, there are two categories: number of cases reported in a given year vs. number of cases diagnosed in a given year. The number of cases diagnosed in a given year is continually updated even if there is an extremely long delay in reporting a case. Therefore, the numbers for diagnosed AIDS cases in 2005 may be updated.

Reportable diseases diagnosed in college students living away from home and in residents of prisons, long-term care or other residential facilities are reported in the jurisdiction where the patient resides at the time of diagnosis. This results in attributing to rural counties that have a college or prison high incidence rates of certain diseases. Persons who are residents of Illinois but are not citizens of the United States may be counted. Persons who are visiting the United States and become clinically ill with malaria are counted in malaria statistics. Residents of other states who become ill in Illinois are not counted in this state’s statistics but are transferred to the state of residence. However, temporary workers in Illinois are counted in Illinois statistics.

The Illinois population used to calculate incidence rates and race and ethnicity proportions in past editions of this document was from the 1990 Modified Age-Race-Sex (MARS) data. According to the U.S. Census Bureau, Illinois’ population grew from 11,430,602 in 1990 to 12,419,293 in 2000. In 2000, 49 percent of the population was male and 51 percent was female. The following table shows the age distribution of the Illinois population as determined by the 2000 census.
Where it was deemed useful, graphs were produced showing the number of cases by month, the number of cases by year since 1995 and the age distribution. Incidence rates were calculated by age for some diseases. One-year incidence rates by county were calculated for giardiasis, hepatitis A, salmonellosis and shigellosis. Incidence rate was calculated by taking the number of cases in a category, dividing by population size from 2000 census data and multiplying by 100,000. If an annual incidence rate was calculated for the period 2001 to 2005, it was reached by taking the number of cases reported from 2001 through 2005, dividing by the population and multiplying by 100,000; it was then annualized by dividing by five.

The reports for each disease were generated from the INEDSS database. The criteria used were (status=confirmed or probable, onset year=2005, disease selected, transmitted to CDC=yes). For diseases where asymptomatic cases do not meet the case definition (hepatitis A and amebiasis) these laboratory confirmed cases were not included in the detailed information in the disease information. The epidemiologic information presented for each disease is for 2005 only, unless otherwise specified. For some diseases, where the number of cases by year was low, information may have been combined for multiple years to allow demonstration of trends by month and age. When the case population differed from the Illinois population in the racial distribution, a chi-square test for a significant difference in proportions was done using the Epi-Info software package. Means were reported when the data followed a normal distribution; otherwise, the median was reported. In January 2005 the state laboratory began electronically reporting enteric results through INEDSS. In November 2005, Mayo laboratory began reporting electronically to INEDSS.

Suggested reading lists are provided for some diseases.

<table>
<thead>
<tr>
<th>Age category</th>
<th>Census numbers used for 2000 annual report</th>
<th>% of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 year</td>
<td>173,373</td>
<td>1</td>
</tr>
<tr>
<td>1-4 years</td>
<td>703,176</td>
<td>6</td>
</tr>
<tr>
<td>5-9 years</td>
<td>929,858</td>
<td>7</td>
</tr>
<tr>
<td>10-19 years</td>
<td>1,799,099</td>
<td>14</td>
</tr>
<tr>
<td>20-29 years</td>
<td>1,742,602</td>
<td>14</td>
</tr>
<tr>
<td>30-59 years</td>
<td>5,108,274</td>
<td>41</td>
</tr>
<tr>
<td>&gt;59 years</td>
<td>1,962,911</td>
<td>15</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12,419,293</td>
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</tr>
</tbody>
</table>