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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 3 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)
CLASS II-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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*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.

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.
2002 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. 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 (IDPH) 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 IDPH. For selected agents and situations, pulse field gel electrophoresis may be performed to subtype isolates.

There are 53 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 include animal rabies, coccidioidomycosis, and yellow fever. Animal rabies testing is only performed by state laboratories so reporting is complete through state laboratory reporting. In 2002, the 10 most frequently reported notifiable infectious diseases in the United States were chlamydia, giardiasis, gonorrhea, AIDS, salmonellosis, shigellosis, tuberculosis, Lyme disease, pertussis and syphilis.

New reporting requirements which began July 1, 2002, in Illinois included the start of laboratory reporting for vaccine preventable diseases (diphtheria, measles, mumps, polio, pertussis, rubella). Other rule changes included the requirement for forwarding of isolates of Bacillus anthracis, Bordatella pertussis, Corynebacterium diphtheriae, Francisella tularensis, Legionella pneumophila and Listeria monocytogenes to the state laboratory. Cerebrospinal fluid (CSF) also was required to be forwarded to the IDPH lab for patients diagnosed with aseptic meningitis from June 15 through October 31. Other changes included the term “sensitive occupations” that was added back to those occupations for which cases are restricted for enteric diseases (salmonellosis, shigellosis, giardiasis). College and university personnel were added to the list of required reporters of communicable diseases.

In 2002, 65 different types of infectious diseases were reportable to IDPH (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 2002. 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, HIV/AIDS, *Salmonella* and *Shigella*. Diseases with increased reporting in 2002 over the previous five-year median included blastomycosis, California encephalitis, cryptosporidiosis, *Campylobacter*, gonorrhea, *H. influenzae*, chlamydia, *E. coli* O157:H7, HIV/AIDS, Lyme disease, pertussis, Rocky Mountain spotted fever, *Salmonella*, syphilis, Group B *Streptococcus* and invasive group A *Streptococcus*. An increase in the number of foodborne outbreaks also occurred. The number of reported cases of amebiasis, giardia, hepatitis A and B, *N. meningitidis*, typhoid fever and varicella have been decreasing compared to the previous five-year median.

Highlights of 2002 in Illinois included the arrival of West Nile Virus (WNV) disease in people in Illinois. Illinois had the highest number of cases of any state in the nation in 2002. Several foodborne outbreaks were of particular interest. In an outbreak of *Clostridium perfringens* in a prison in central Illinois, more than 900 persons became ill. In an *E. coli* O157:H7 outbreak in multiple counties within the state and in multiple states, illness was linked to consumption of lettuce eaten at a national restaurant chain. In January, an outbreak of S. ser. Enteritidis occurred in Kankakee with illness in 130 persons linked to consumption of food from a restaurant. A cluster of 68 suspect Pontiac fever cases occurred in Stephenson County in August after exposure to a whirlpool at a hotel.

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. IDPH hopes you find this information useful and welcomes any suggestions on additional information that would be of use to you.

**Useful Contact/Surveillance Information**

IDPH 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 IDPH 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
Acquired immune deficiency syndrome/Human immunodeficiency virus

Background
The human immunodeficiency virus (HIV) is the causative agent of acquired immune deficiency virus (AIDS). Since the first cases were reported in the summer of 1981, AIDS has become one of the major health problems to emerge in the past 25 years. 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.

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 lymphocyte cell counts. Opportunistic infections associated with AIDS include *Pneumocystis jaraevis* 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.

Case definition
In the state of Illinois, AIDS has always been reported by name. 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.

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 MMWRs (*Morbidity and Mortality Weekly Report*) 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 2002 - 1,976. The number of reported AIDS cases rose from 2001 to 2002 (See Figure 1). The number of reported HIV cases was 3,430, an increase over the 1,542 reported in 2001.
- Mode of transmission among all AIDS cases reported in Illinois in 2002 is shown in Figure 2 and for HIV in Figure 3.
- The majority of reported AIDS cases in 2002 were in males (1,560 cases or 79 percent). For all cases reported among males, men who have sex with men (MSM) accounted for the largest number of AIDS cases (810 cases or 52 percent), followed by injection drug use (IDU) with 363 cases or 19 percent (Figure 4). The majority of reported HIV cases in 2002 were in males (2,555 or 74 percent). For all cases reported among males, MSM accounted for the largest number of HIV cases (1,373 or 55 percent), followed by IDUs with 485 or 18 percent (Figure 5).
- Reported cases of AIDS among females accounted for 416 cases or 21 percent of the total AIDS cases reported in 2002. Among females, heterosexual contact accounted for 214 cases or 51 percent of the total, with IDU accounting for 107 cases or 26 percent (Figure 6). Reported cases of HIV among females accounted for 875 or 25 percent of the total reported HIV cases in 2002. Among females, heterosexual contact accounted for 394 or 45 percent of the total HIV cases reported, with IDU accounting for 225 or 26 percent (Figure 7).
- African Americans, who represent 15 percent of the state’s population, accounted for 55 percent, or 1,085 of the AIDS cases reported in 2002. This represents a decrease since 2001 when 58 percent of cases reported were among African Americans (Figure 8).
- Heterosexual contact as the mode of transmission accounted for 16 percent, or 316, of all the reported AIDS cases in 2002. This represents an increase since 1994 when 9 percent of all AIDS cases reported heterosexual contact as the mode of transmission (Figure 9).
- In 2002, Cook County and the collar counties (Dupage, Kane, Lake, McHenry and Will) comprised 89 percent of the total, with Chicago accounting for 73 percent of the total reported AIDS cases. Reported AIDS cases residing outside of the Cook and collar counties represented 11 percent of the state total.
The city of Chicago accounted for 75 percent of the total reported HIV cases. Reported HIV cases residing outside of the Cook County and collar counties represented 11 percent of the state total.

Summary

More than 1,900 AIDS cases and 3,400 HIV cases were reported in Illinois between January 1 and December 31, 2002. Most reported AIDS and HIV cases were reported in males. The most common risk factor for transmission for HIV and AIDS in males was MSM. Heterosexual contact was the most common risk factor for females for HIV and AIDS, followed by IDU. The increased number of reported cases of HIV and AIDS is probably due to delays in reporting by providers.
Figure 7. Reported HIV Cases in Illinois Females by Mode of Transmission, 2002

- 45% Heterosexual
- 29% IDU
- 26% Undetermined/other

Figure 8. Reported AIDS Cases in Illinois by Race, 1998-2002

- Number of cases by race and year

Figure 9. Reported AIDS Cases in Illinois by Mode of Transmission, 1998-2002

- Number of cases by mode of transmission and year
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 IDPH for confirmed intestinal amebiasis 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).

Descriptive epidemiology

- Number of cases reported in Illinois in 2002 - 49 (five-year median=59). From 1997 to 2002, the number of cases reported per year ranged from 47 to 65 (Figure 10).
- Age - Cases ranged from younger than one year of age to 80 years of age (mean=35) (Figure 11).
- Gender - Among 30- to 49-year olds, there were 15 male cases and only five females. Overall, males accounted for 67 percent of cases, a significantly higher proportion than in the Illinois population (49 percent male). Within the Hispanic population the male-to-female ratio was 1:1. Within the non-hispanic population the male-to-female ratio was: 2:1.
- Race/ethnicity - 81 percent were white, 11 percent were African American and 6 percent were other; 37 percent identified themselves as Hispanic, a significantly higher proportion than in the total Illinois population (12 percent).
- Seasonal variation - There appeared to be no seasonal peak in amebiasis.
- Symptoms – Detailed information was collected on 24 cases. Diarrhea was reported by 79 percent of cases and vomiting by 27 percent of cases. Eight cases
were hospitalized and no fatalities were reported.

- Treatment – Detailed information was collected on 24 cases. Ninety-one percent of cases reported treatment for their illness.
- Risk factors - Traveling outside the country (33 percent), drinking from a private water supply (19 percent) and swimming in non-chlorinated water (5 percent) were reported risk factors. No cases reported contact with someone in a day care center. In the four weeks prior to illness, five individuals reported a specific travel destination outside the country.

Summary
The number of cases in 2002 was lower than the five-year median. Amebiasis was significantly more common in those reporting Hispanic ethnicity. More males than females were affected in the non-hispanic population which may reflect transmission among men who have sex with men. The male-to-female ratio in the Hispanic cases was 1:1 which may reflect transmission from travel.

Suggested readings
**Bioterrorism**

An important aspect of surveillance for bioterrorism is prompt reporting by the health care community. Physicians and infection control practitioners are an important part of this network. In addition, medical examiners and coroners have authority to investigate deaths that are sudden, suspicious, violent, unattended or unexplained and can report those deaths that may have public health implications.

Listed below are the bioterrorism agents by category.

**Category A Agents**
- Smallpox
- Anthrax
- Plague
- Botulism
- Tularemia
- Hemorrhagic fever viruses

**Category B Agents**
- Q fever
- *Brucella*
- Glanders
- VEE, EEE, WEE
- Ricin toxin
- *C. perfringens* epsilon toxin
- Staph enterotoxin B
- Food and waterborne illness

**Category C Agents**
- Nipah
- Hantavirus
- Tickborne hemorrhagic fever
- Tickborne encephalitis virus
- Yellow fever
- MDR *M. tuberculosis*

**Suggested readings**
- Davis RG. The ABCs of bioterrorism for veterinarians, focusing on Category A agent. JAVMA 2004;224(7):1084-95.
- Morens, D.M. Characterizing a New disease: Epizootic and epidemic anthrax, 1769-1780.
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

Note: A new questionnaire was used for the 2002 surveillance year.

- Number of cases reported in Illinois in 2002 – 87 (previous five-year median=47). From 1997 to 2002, the median number of cases was 47 and cases per year ranged from 29 to 87 (Figure 12). The 2002 incidence rate was 0.70 per 100,000 population in Illinois.
- Age - The mean age was 43 years (range 13 to 80) (Figure 13).
- Gender - 58 percent were male.
- Race/ethnicity - Two-thirds of the cases (66 percent) were white and 28 percent were African American; 24 percent were Hispanic.
- Geographic distribution – More than half of the cases had residential addresses in Cook, Kane or Lake counties.
- Symptoms – Symptoms reported were cough (90 percent), fever (72 percent), dyspnea (71 percent), weight loss (71 percent), weakness (67 percent), night sweats (58 percent), chills (56 percent), anorexia (50 percent), joint pain (31 percent), skin lesions (23 percent), local swelling (23 percent) and hemoptysis (28 percent). In 17 percent of cases, disease was present in tissue other than the lung.
- Diagnosis – 38 cases were only culture positive, 14 were culture positive and the organism identified in a biopsy specimen, eight were culture positive and smear positive, three were culture, smear and biopsy positive and two were biopsy only positive. Diagnostic information on 22 cases was not available at the time of this report. Cultures were positive on 63 cases; the culture sites were bronchial wash (21), lung tissue (10), sputum (9), skin (8), blood (5), bone (2) and multiple sites (8). For the 19 with positive biopsy specimens, 13 were from lung tissue, four were from other tissues and two from unknown sites. Positive smears were identified in 11 cases and the smears were positive in sputum (4), bone (2), ulcer (1), other (3) and multiple (1). In 56 patients, x-ray results were reported which
included the following findings: pulmonary infiltrates (76 percent), nodules (25 percent), cavitation (8 percent) and hilar lymphadenopathy (2 percent).

- Treatment - 78 percent of cases were hospitalized; six cases were fatal.
- Risk factors – Having ever smoked (71 percent); was the biggest risk factor. 37 percent of the ever smokers were current smokers. Other risk factors were exposure to bird or bat droppings (22 percent), walking by waterways (20 percent), potting soil exposure (15 percent), excavation (12 percent), dirt arenas (8 percent) and plowing (6 percent). At least 26 percent of cases had diabetes, 10 percent had a chronic lung condition and 12 percent reported an underlying immunosuppressive condition.

Summary

A higher number of blastomycosis cases were reported in 2002 (87 cases) as compared to the five-year median of 47. This is the highest number of cases reported since at least 1996. Blastomycosis cases occur predominantly in adults. Many cases had symptoms of respiratory involvement, including cough, dyspnea or hemoptysis. Among reported cases, more than 50 percent of cases reported living in Cook, Kane or Lake counties.
Botulism

Background
Botulism is classified as a category A terrorism agent. There are three forms of botulism: foodborne, wound and intestinal (adult and infant). Foodborne botulism is caused by a neurotoxin produced by *Clostridium botulinum*. *C. botulinum* strains can produce 7 neurotoxins (types A-G), with A, B and E causing most human cases. *C. botulinum* spores are common in the environment but toxin production occurs mainly under anaerobic, low-salt, low-sugar and low-acid conditions at non-refrigeration temperatures.

Intestinal botulism is the most common form of botulism reported in the United States with about 110 cases annually. Infant botulism is the primary form of intestinal botulism and results when swallowed spores germinate and temporarily colonize the large intestine. Spores exist in soil and dust. Honey is an avoidable source of spores for infants. 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. This testing of food and human specimens is performed at the CDC laboratory. A request for this testing requires coordination with the local and state health departments. Treatment of infant botulism is intensive care with mechanically assisted ventilation if necessary. Treatment may include botulinal immune globulin-IV, which can be requested through the local and state health departments.

About 28 cases of foodborne botulism are reported annually to CDC. Foodborne botulism results from ingestion of preformed toxin present in contaminated food. Diagnostic clues for foodborne botulism are primary neurologic symptoms including descending flaccid paralysis, normal body temperature, cranial nerve palsies, 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 not reverse existing paralysis. Antitoxin can be requested through the local and state health departments. Equine botulinum antitoxin for types A, B and E can prevent progression of neurologic disease if administered early in the course of illness.

In a study of foodborne botulism cases reported to CDC from 1990 to 2000, 263 cases from 160 foodborne botulism events were identified for an incidence rate of 0.1 per million. The median age of patients was 48 and the case-fatality rate was 4 percent. Toxin type A caused 51 percent of cases. In the lower 49 states, a noncommercial food item was implicated in 91 percent of events, most commonly home-canned vegetables. Occasionally, outbreaks of foodborne botulism occur. An outbreak in Texas involved 15 cases and was from consumption of commercial chili held at improper temperatures.

Wound botulism occurs after the causative organism contaminates a wound that is anaerobic. Symptoms are similar to those for foodborne botulism.
If 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 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 laboratory-confirmed case of intestinal botulism reported in Illinois in 2002. A 15-week-old infant residing in Will County, who was exclusively breast fed, was diagnosed with infant botulism Type B. She received immunoglobulin from the California infant botulism program.
- There were no reported cases of foodborne or wound botulism.

**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. 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. Brucellosis is a potential hazard to those consuming unpasteurized milk or milk products. The disease is most common in residents or travelers to the Mediterranean, Middle East, Mexico, and Central and South America. 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 unpasteurized dairy products. Veterinarians can acquire infection from assisting in births from infected animals or exposure to modified live animal *Brucella* vaccines. The incubation period varies from one to two months. Investigation of *Brucella* cases could reveal foci of infection in the United States. If domestic livestock from Illinois were implicated in transmission, an investigation would be completed by the Illinois Department of Agriculture. However, 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.

In the United States in 2002, 125 human brucellosis cases were reported to CDC. Most were in international travelers or immigrants.

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 ≥ 160 in one or more serum specimens obtained after symptom onset).

Descriptive epidemiology

- Number of cases reported in Illinois in 2002 - Seven (all were confirmed cases) (See Figure 14).
- Age - Median age was 28 years (range 8 to 75).
- Gender - Four cases were male and three were female.
- Race/ethnicity - 67 percent (4) were white and 33 percent (2) were Asian.
- Geographic distribution by residence – Cases resided in Cook (5), DuPage (1) and Sangamon (1) counties.
- Case investigations - Available on six cases
  - Case one - Case had a paraspinal abscess from which *Brucella* species
was isolated. Risk factors were not obtained.

- Case Two – This case of *B. melitensis* biovar 1 had fever, weakness and weight loss of 10 Pounds.
- Case Three – This case of *B. abortus* reported fever, weakness, headache, joint pain and a swollen knee. Patient was in India six months prior to onset.
- Case Four - Case had fever, weight loss, body aches and joint pain and had traveled to India but the food history was unknown.
- Case Five – This case of *B. melitensis* biovar 3 had fever, chills, weight loss and weakness and had consumed Mexican cheese.
- Case Six – This case of *B. melitensis* biovar 3 reported headache and diarrhea and consumed Mexican cheese.

- Diagnosis - Cases were identified through culture (5) and unknown method (2) at the time of this report. Two isolates were identified as *B. melitensis* biovar 3, one was identified as *B. melitensis* biovar 1 and one was identified as *B. abortus*.
- Epidemiology - Of the six cases with investigations completed, four had travel outside the United States (Mexico-1, Pakistan-1, India-2). Two did not travel but ate Mexican dairy products brought in to the country by friends or relatives.

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 consumed unpasteurized products from overseas. In 2002, there were seven cases as compared to the previous five-year median of seven cases.
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. They 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. Of the 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*), *Campylobacter* comprised 30 percent of the reported infections in 2002. The overall incidence rate was 13 per 100,000. The 2010 national health objectives are for less than 12 per 100,000 cases. *Campylobacter* cases decreased 25 percent from 1996 to 2002 in the U.S. 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. A study in Norway found that drinking undisinfected water, eating at barbecues, eating poultry bought raw, having occupational exposure to animals and eating undercooked pork were risk factors for sporadic *Campylobacter*. A study in rural Michigan showed that persons involved in poultry husbandry had an increased risk of acquiring sporadic campylobacteriosis. A study in Denmark showed that foreign travel, eating fresh poultry other than chicken and turkey, and swimming were associated with increased risk for quinolone-resistant *C. jejuni* infection. A study in Finland in 2002 identified eating undercooked or raw meat, drinking untreated dug well water and swimming in natural bodies of water as risk factors for sporadic *Campylobacter*.

Antibiotic resistance is becoming a problem with many pathogens. The primary reasons to prescribe antimicrobial therapy for enteric infections are to reduce symptoms and duration of disease, prevent serious sequelae, prevent mortality, eradicate fecal shedding and to prevent pathogen transmission.

A study in the United States in the nine states participating in the National Antimicrobial Resistance Monitoring System showed that none of the 297 *Campylobacter* isolates from 1989 through 1990 were ciprofloxacin-resistant. The prevalence of ciprofloxacin-resistant *Campylobacter* was 13 percent in 1997 and 19 percent in 2001. *Campylobacter* was isolated from 44 percent of retail chicken products in 1999. Ciprofloxacin-resistant *Campylobacter* was isolated from 10 percent of 180 chicken products purchased from grocery stores in three states in 1999.

In a study by the Food and Drug Administration of retail meat samples in 2002, *Campylobacter* was isolated more frequently from chicken breast (47 percent) than from other meat types such as ground turkey, pork chops and ground beef, which all had less than 1 percent testing positive.
A cluster of antibiotic resistant *Campylobacter* was identified in a community of men who have sex with men (MSM) in Canada. Education about the prevention of sexually transmitted enteric pathogens could be helpful in these situations.

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

The first full year of mandatory *Campylobacter* reporting in Illinois was in 2002.

**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 2002 – 1,204 (five-year median=874); incidence rate of 10 per 100,000 (Figure 15).
- Gender - 52 percent were males.
- Age - Mean age of reported cases was 36; highest incidence rate occurred in those younger than 5 years of age (Figure 16).
- Race/ethnicity - The majority of cases (91 percent) were in whites, with 5 percent in African Americans, 3 percent in Asians and 3 percent in other races. Those indicating Hispanic ethnicity accounted for 11 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 (June to August) (Figure 17).
- Outbreaks- None.

**Summary**

This was the first full year of mandatory reporting of *Campylobacter* and the incidence of *Campylobacter* stayed the same between last year and this year, 10 per 100,000 each year. This was below the 2010 national objectives of 12 per 100,000. *Campylobacter* infections occur more commonly from June to August. The incidence is highest in 1- to 4-year-olds. Whites are more likely to be reported with *Campylobacter* infection than other races.

**Suggested readings**


Figure 15. Campylobacteriosis Cases in Illinois, 1997-2002

Figure 16. Incidence of Campylobacteriosis Cases in Illinois by Age, 2002

Figure 17. Campylobacteriosis Cases in Illinois by Month, 2002
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. From 2000 to 2002, an increase in reported central nervous system (CNS) infections occurred probably due to an increased interest in CNS infections with the arrival of West Nile Virus (WNV) into Illinois. This resulted in a large increase in surveillance efforts and laboratory testing for the local and state health departments.

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 18.

Table 1. Number of Reported CNS Infections Reported in Illinois, 2002

<table>
<thead>
<tr>
<th>Type of CNS Infection</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aseptic meningitis, unknown etiology</td>
<td>981</td>
</tr>
<tr>
<td>Aseptic meningitis, known virus, not arboviral</td>
<td>77</td>
</tr>
<tr>
<td>Encephalitis, acute, known virus, not arboviral</td>
<td>25</td>
</tr>
<tr>
<td>Encephalitis, acute, unknown etiology</td>
<td>170</td>
</tr>
<tr>
<td>WNV</td>
<td>884</td>
</tr>
<tr>
<td>California encephalitis</td>
<td>8</td>
</tr>
<tr>
<td>SLE</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,147</strong></td>
</tr>
</tbody>
</table>

Figure 18. Reported CNS Infections by Year in Illinois, 1997-2002

![Figure 18](image-url)
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 2002 – 1,151 (981 meningitis and 170 encephalitis).
- Age - Annual incidence rate highest in those younger than 5 years of age (23 per 100,000) (Figure 19). In all other age groups, the incidence rate was below 12 per 100,000. The mean age of reported cases was 31.
- Gender - 50 percent were male.
- Race/ethnicity - 80 percent were white, 18 percent were African American and 2 percent were other races; 14 percent were Hispanic.
- Seasonal variation - Most common July through October (Figure 20); 879 cases had onsets between May 15 and October 31 (272 had onsets outside of this time frame).
- Geographic distribution - Highest annual incidence rates per 100,000 population for 2002 were in Stark (6), Adams (6), Cass (6), Edwards (6) and Pulaski (5) counties.
- Diagnosis - Among cases with onset between May 15 and October 31, virus isolation was attempted in 571 of 840 cases with information available (68 percent); no viruses were isolated in this category. The cases where a virus was isolated were included in the next section of known etiology.

Of the cases that met case definition for a CNS infection with onsets during arbovirus season, 577 of 840 with information available (68 percent) had CSF tested for arbovirus antibody. Of those with CSF tested, the number of cases that also had sera tested was as follows: acute and convalescent sera (78), acute only (285), convalescent only (17). Of those with no CSF tested, the number with sera tested was as follow: acute and convalescent (10), acute only (49), convalescent only (17). Of the 840 persons with information on arbovirus testing, 160 were not tested for arboviruses and 49 only had an acute sera tested which is not sufficient
for determining if an arbovirus was the cause of illness. At the IDPH laboratory, these specimens were tested for evidence of arbovirus infections (SLE, LAC and EEE). Cases of arboviruses for 2002 are described in the arbovirus section.

- **Outcome** – 17 fatalities occurred (12 in encephalitis cases and five in aseptic meningitis cases).

**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.
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. Herpes simplex is a common cause of acute encephalitis that occurs most frequently in children and the elderly.

Encephalitis can be caused by infectious, post-infectious and post-immunization causes. Pathogens causing infectious encephalitis include herpes simplex virus, arboviruses, lymphocytic choriomeningitis, mumps, cytomegalovirus, Epstein-Barr virus, human herpesvirus 6 and enteroviruses. Many encephalitis cases in the United States and Illinois are not identified as to the etiology.

On July 1, 2002, it became mandatory for laboratories to submit CSF to the IDPH laboratory for patients diagnosed with aseptic meningitis.

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 four 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 – 102 cases were reported (77 meningitis, 25 encephalitis).
- Age - Median age is 12 years.
- Gender – 46 percent of cases were male.
- Race/ethnicity - 84 percent were white, 13 percent African American and 2 percent Asian; 24 percent were Hispanic.
- Seasonal variation - Aseptic meningitis or encephalitis of known etiology, excluding arboviruses were most common from July through September (Figure 21). Eighty of the 102 cases cases had onsets during arbovirus season from May 15 through October 31.
- Diagnosis - 102 cases were identified as having a virus as the etiologic agent. Viruses identified as the etiologic agent were echovirus 9 (18), echovirus 7 (7), herpes simplex (21), echovirus 11 (3), echovirus 18 (2), echovirus 6 (2), echovirus 30 (2) and one each for echovirus 3, 4 and 5. Other viruses identified as the etiologic agents were enterovirus, not further specified (18), Ebstein Barr virus (4), varicella zoster virus (4), coxsackie B1 (2), coxsackie B (1), coxsackie B3 (1), coxsackie B5 (1) and multiple viruses (3). Eleven were due to unknown viruses. The site of virus isolation for 75 cases was known including CSF (69), rectal (4), nasopharynx (1), stool(1) and unknown (18). Of the 54 cases with information about outcome, one was reported as a fatality.
Summary
In 996 of 2,147 (46 percent) of encephalitis and aseptic meningitis cases, an etiologic agent (including arboviruses) was identified as the cause of illness. Echovirus 7 and 9 were the most common echoviruses identified as the causative agents for aseptic meningitis and encephalitis cases. Enteroviruses, not further specified also was a frequent etiologic agent identified. Arbovirus cases are described in a later section.

Suggested readings
Arboviral Infections

Background

Some forms of infectious encephalitis are caused by mosquito-borne arboviruses that may not always result in the classical encephalitis presentation. Arbovirus infections also may present as aseptic meningitis. 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 include those due to St. Louis encephalitis (SLE), California encephalitis (CE) and Western equine encephalitis (WEE) viruses. WEE has not been seen in Illinois since the 1960s. The most likely mosquito-borne disease to occur in people in Illinois as of 2002 is WNV.

WNV is a flavivirus in the Japanese encephalitis antigenic complex. Birds become infected from mosquitoes or from bird-to-bird transmission. 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. WNV can be isolated from the feces and oral secretions of birds.

Almost all cases of WNV in humans are the result of a bite from an infected mosquito. In 2002, five new modes of transmission for WNV were identified: blood product transfusion, organ transplantation, breast-feeding, transplacental transmission and occupational exposure in laboratory workers. Two occupational cases of WNV were reported by CDC due to sharps injuries in laboratory workers in 2002. One was due to a scalpel injury while doing a bird necropsy, the other was a laboratorian who was harvesting WNV infected mouse brains and punctured a finger with a contaminated needle.

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 also may occur. Older age is a risk factor for death from WNV. Encephalitis, severe muscle weakness and change in consciousness were risk factors predicting death. WNV produces a viremia that tends to disappear with the onset of clinical symptoms. A study of 98 WNV fever cases in Illinois showed that the median absence from work or school for these patients was 10 days. Thirty of 98 were hospitalized. At 30 days following onset, 64 percent still had symptoms, and at 60 days, 48 percent were still symptomatic. WNV fever is a term used to describe symptomatic infections without neurologic disease. The description is sudden onset of febrile illness lasting three to six days, often accompanied by malaise, vomiting, eye pain, headache, myalgias and rash. WNV antibodies can be detected up to 16 months post onset and may reflect past rather than recent infection.

In the United States, human cases of WNV reported to CDC by year are as follows 1999 (62), 2000 (21), 2001 (66) and 2002 (4,156). In 2002, WNV
expanded its range to 44 states and the District of Columbia. WNV activity was reported in all but six states (Arizona, Utah, Nevada, Oregon, Alaska and Hawaii). Seventy-one percent of cases were encephalitis or meningitis and 28 percent were WNV fever (WNF). The median age was 64 years. Neuroinvasive illness and mortality were associated with increasing age and being male. Onsets of human cases were May 19 through December 14. Eleven states in the central United States reported 80 percent of all cases. Other positive WNV results included 16,741 birds, 6,600 mosquito pools and 15,257 horses. Peak incidence occurred from late August to early September. Twenty-three patients in 2002 in the United States were confirmed to have WNV through transfusion products. Transfused red cells, platelets and fresh-frozen plasma can transmit WNV. The median incubation period of a transfusion associated case was 10 days after transfusion.

In 2002, Illinois had the highest number of cases of WNV cases for any state in the United States. In Illinois, 100 of 102 counties had evidence of WNV circulation in mammals, birds or mosquitoes.

Animals that have been infected with WNV include canids, horses, llamas and squirrels. In 2002, 15,257 laboratory confirmed cases of WNV in horses were reported. The most common clinical signs in horses are ataxia, hind limb paresis, lip droop and muscle tremors. The case fatality rate may be up to 30 percent. A vaccine became available to prevent WNV in horses in August 2001.

California encephalitis (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). In the United States, 164 cases were reported from 16 states, the highest number of cases since 1964 probably because of increased testing due to the arrival of WNV.

SLE also can be identified in persons in Illinois. In 2002, 28 cases of SLE were reported from Arizona, Florida, Illinois, Michigan and Texas. Several epidemics of this disease have occurred in Illinois, including a large outbreak in 1975.

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. In 2002, the use of repellents containing N,N-diethyl-3-methylbenzamide (DEET) provided the best protection against mosquitoes. The higher the concentration of DEET up to 50 percent, the longer the protection against mosquitoes. For instance, concentrations of DEET of 24 percent protect for 302 minutes while concentrations of 5 percent protect for 88 minutes. In a cross sectional study in Ontario, Canada, using two or more personal protective measures (avoidance of exposure to mosquitoes, wearing long sleeves and pants or using mosquito repellent) were protective against WNV infection. Persons who spent time outside at dusk or dawn on a non-work day were at increased risk. Removing
tires and other outdoor water receptacles and sealing tree holes can minimize the habitat suitable for mosquitoes capable of transmitting LAC. Prevention involves personal protective behaviors and mosquito control activities. People can eliminate breeding areas for mosquitoes such as standing water in clogged rain gutters.

A study of a random sample of British Columbia residents showed that 68 percent removed standing water, 58 percent practiced mosquito avoidance behavior and 56 percent used DEET-based mosquito repellents. More than one-third of persons believed that DEET is an environmental hazard and one-quarter thought it was not safe for human use.

Application of some insecticides for arbovirus control poses a low risk of acute health effects among persons in areas that were sprayed and among workers handling insecticides. Recommendations to minimize exposure include 1) Public health officials should provide public notice of application times and locations and advice about preventing exposures, 2) Applicators should have adequate training and 3) Integrated pest management practices should be used.

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, acute and convalescent serum samples are requested for testing for arboviral antibody. The CSF is examined for antibodies to LAC, SLE, Eastern equine encephalitis and WEE viruses and cultured for enteroviruses.

**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 four-fold 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 (two-fold 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**

From May 15, 2002, through January 2003, the IDPH laboratory tested 9,497 serum and CSF human specimens for WNV, SLE, Eastern Equine encephalitis and CE; 1,516 specimens from 884 patients were positive for WNV. Among these specimens, 280 were tested by plaque reduction neutralization test (PRNT) for WNV at CDC. Eight were positive for CE and two for SLE.
California Encephalitis (CE) Surveillance

- Occurrence – Eight cases.
- Age - Cases ranged in age from 2 to 54 years of age. Seven cases were younger than the age of 17.
- Sex – Three were female and five were male.
- Clinical presentation - Three cases presented with aseptic meningitis and four cases with encephalitis and one had an unknown presentation type. Symptoms reported by seven cases with symptom information were fever (6), headache (7), stiff neck (3), paresis (1), seizures (2), rash (1), change in consciousness (3), photophobia (2), tremor (1) and gastrointestinal signs (2). Six of seven cases with hospitalization information were hospitalized. No CE cases were fatal.
- Case status - Seven cases were confirmed and one was probable.
- Onset - Two cases had onset in July, five cases in August and one case in September.
- Geographic location - The eight 2002 CE encephalitis cases resided in Cook (1), Cumberland (1), Lee (1), Peoria (2), Rock Island (1) and Winnebago (2) counties.
- Environmental surveys to identify mosquito breeding sites are conducted in some counties. The Cook County case had travel to other states during the incubation period. The two Peoria County cases both lived or went to daycare in areas with ravines and woods nearby, but no known tire dumps or other container breeding sites were found. One Winnebago County case lived at a residence with tall grass and abandoned cars. An environmental investigation was not performed in Lee County. The status of environmental investigations were not known for Rock Island County and one of the Winnebago County cases.

SLE Surveillance

- Occurrence - Two cases of SLE were reported; both were confirmed cases.
- Age – One case was 32 and one was 72 years of age.
- Sex – One case was female and one was male.
- Clinical presentation – For one case with information on clinical presentation, encephalitis was present.
- Onset of illness – Both cases had onset of illness in August.
- Geographic location - One was a resident of Cook County, one was from DuPage County.

West Nile Virus Surveillance

Mosquito pool, bird, horse and human surveillance for WNV was conducted in 2002. Of the 102 Illinois counties, 100 reported WNV activity. Illinois had the highest number of cases and the highest number of fatalities of
any state in 2002 (Figure 23). The total WNV positive results in 2002 included 884 humans, 1237 horses, 624 mosquito pools, 517 birds and 12 other mammals (squirrels, canids).

Human

- Number of cases reported in Illinois - 884 WNV cases were reported; 559 (63 percent) were confirmed and 325 (37 percent) were classified as probable. The incidence in Illinois was 7.1 cases per 100,000 population.
- Age – Ages ranged from 3 months to 97 years of age (mean=56 years).
- Gender – 49 percent were male.
- Race/ethnicity – 89 percent were white, 10 percent African American and 1 percent other races.
- Clinical presentation – Cases were classified as: WNF (331), encephalitis (311), meningitis (232) and flaccid paralysis (10) (Figure 24). For individuals older than 59 years of age, 73 percent had neurologic disease while only 27 percent had WNF. In all other age groups, neurologic disease comprised 55 percent of cases while 45 percent had WNF. Patients older than 50 years of age had a significantly higher risk of being reported with encephalitis (RR=3.3) and death (RR=22.3) as compared to other ages. For 99 Illinois residents with WNV fever, 62 percent had symptoms at 30 days following onset and 47 percent were still symptomatic at 60 days. Among the 73 persons that normally attended work or school, three-quarters were unable to attend due to illness, a median of 10 days.
- Hospitalization – 649 cases were hospitalized.
- Fatalities – 66 cases were fatal. The median age of patients who died was 78 years (range: 49 to 93 years). Seventy-seven percent of the deaths were in patients older than 70 years of age. The overall case fatality rate was 7.2 percent. Among patients who died, 91 percent were diagnosed with encephalitis and the case-fatality rate for patients with encephalitis was 19 percent. One additional fatality was reported after fatalities were finalized for the year.
- 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. Illinois sent some specimens to CDC for confirmatory testing. Fifty-one percent of Illinois cases also tested positive at CDC. Twenty-two percent of cases also had plaque reduction neutralization testing at CDC. Twenty-one percent of cases were only tested at IDPH. Of the 884 reported cases, positive tests occurred as follows: both serum and CSF (338), CSF only (107), serum only (409), brain tissue (2) and not known (28).
- Blood transfusion- Eight total cases were investigated for transmission of WNV by blood transfusion; only one case was definitively attributed to receipt of a unit of red blood cells contaminated with WNV.
- Seasonal distribution – Onset of cases ranged from July 10 through September 29. The first human case with onset on July 10 worked in a
raptor center handling many wild raptors without gloves. The next onset was on July 26. Figure 25 and 26 shows the number of WNV infections by week and month.

- Geographic distribution – 54 counties had evidence of WNV activity in humans (Figure 27). The majority of cases (635 of 884, 72 percent) occurred in Cook County (incidence in Cook County 11.8 per 100,000 population). An increase in human cases occurred in the cities of Skokie, Evanston, Oak Lawn and Evergreen Park (Figure 28). Two other lesser focus areas were found in the northwest part of the city of Chicago and the far southern part of Cook County near the city of Chicago Heights. The tracts in the North Shore mosquito abatement district (MAD) and the South Cook MAD were at higher risk of WNV cases. There was a lower risk in the DesPlaines Valley MAD.

<table>
<thead>
<tr>
<th>Location</th>
<th>2002 WNV Attack rates (cases per 100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago</td>
<td>5.7</td>
</tr>
<tr>
<td>Suburban Cook County</td>
<td>8.4</td>
</tr>
<tr>
<td>Oak Lawn</td>
<td>38.0</td>
</tr>
<tr>
<td>Evergreen Park</td>
<td>43.2</td>
</tr>
<tr>
<td>Skokie</td>
<td>31.6</td>
</tr>
<tr>
<td>Evanston</td>
<td>21.6</td>
</tr>
</tbody>
</table>

Testing for humans was started on May 15, earlier than in previous years. Twenty-two counties had both positive birds and mosquito pools. In 17 of the 22 counties, birds were found positive before mosquitoes. In four counties, mosquito pools were positive before birds and in one county, both were identified as positive on the same day.

**Bird testing**

A total of 793 suitable dead birds were submitted for WNV testing in 2002. To be considered suitable, birds had to be the correct species (blue jays and crows) 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 tested using immunohistochemistry testing (IHC). A total of 517 of 793 birds tested positive (65 percent). The types of birds submitted were blue jays (298), crows (484) and other types of birds (11).

The first WNV positive bird collection was from Kane County on May 2. The last positive bird of the season was collected on September 23 from Mason County. The percentage of submitted birds testing positive for WNV was 65 percent (517 of 793).

Birds were submitted from 98 of the 102 Illinois counties (See Figure 29). No birds were collected from Calhoun, Monroe, Alexander or Hardin counties. Ninety-four counties had positive birds identified.

Wild bird samples were sent to an outside lab and 215 of 3,923 avian specimens tested screened positive for a flavivirus (5.5 percent).
Mosquito Pool Testing

In 2002, 624 of 2,267 (27 percent) pools tested positive. A total of 75,848 mosquitoes were tested. Of the 2,267 mosquito pools, 1,752 were *Culex* spp., 288 were *Aedes vexans*, 212 were other species and 15 were of unknown type. Only 1 of 288 *Aedes* spp. pools were identified as positive for WNV. Of the *Culex* spp pools, 615 tested positive for WNV. The first positive mosquito pool was collected on June 19 from Cook County which was after the collection date (May 2) of the first positive bird. The last positive mosquito pool was collected on October 2. In some areas of Cook County, the mosquito infection rate was up to 80 percent during peak activity. In Cook County, from May 1 to June 14, 0 percent of 94 mosquito pools tested positive, from June 15 through July 14, 4 of 254 (1.6 percent) of mosquito pools were positive and from July 15 through August 9, 120 of 336 (35.7 percent) of pools tested positive. Mosquito pool testing by location is show in Figure 30.

WNV Horse testing

In 2002, 1,237 of 1,674 horses and donkeys (74 percent) tested positive for WNV. Positives were identified in 98 counties (Figure 31). The first positive was identified on July 14 and the last positive on November 19. Approximately 40 percent of horses died or were euthanized.

Other species

Ten grey squirrels, one dog and a wolf tested positive for WNV in Illinois and had a clinically compatible illness. Grey squirrels tested positive in Coles (1), Champaign (1) and Cook (8) counties with tests for virus such as IHC, polymerase chain reaction (PCR) or nucleic acid sequence based analysis (NASBA). CDC isolated WNV from four of the six squirrels submitted. Dates of collection for the squirrels were from August 22 to September 23 (See Table 2). The three-month old captive wolf from Will County developed neurologic signs and tested positive for WNV by immunohistochemistry, PCR and NASBA at several different laboratories. The 8-year-old dog from Mclean County with encephalitis and myocarditis tested positive for WNV by immunohistochemistry, NASBA and PCR at several different laboratories.

Summary

Because encephalitis cases are more commonly reported in the summer months in Illinois, IDPH asks physicians to increase testing to establish the etiology and to report individuals with acute encephalitis from May 15 to October 31 each year. There were eight cases of CE and two cases of SLE reported in 2002. For the first time, Illinois residents tested positive for WNV in 2002. Dead crows and blue jays tested positive for WNV in counties in Illinois. Sixty-five percent of all submitted dead birds were positive for WNV. Positive dead birds were collected in Illinois between April 5 and September 23. Positive mosquito pools were collected between June 19 and October 2.
In 2001, only birds and horses tested positive for WNV. The first indication of WNV activity in the state in 2002 was in birds in May, followed by mosquito pools; horse and human cases followed. Illinois had the highest number of reported cases in the United States and comprised almost a quarter of the United States WNV cases. Within Cook County, Illinois, the incidence rate was 12 per 100,000. During 2002, human WNV cases were reported from 54 of the 102 counties in Illinois. In 2002, the majority of the cases were in the Chicago metropolitan area. In the Chicago metropolitan area, the far northern and southwestern portion of the city, as well as areas centered on the suburbs of Oak Lawn/Evergreen Park and Skokie/Evanston had high numbers of cases.

Nationally, 25 percent of cases were WNF, while in Illinois it was 38 percent. In some states samples were only accepted at public health laboratories if the person had neurologic disease. In Illinois, health care providers were encouraged to submit specimens from any patient with suspected WNV.

Within a week of learning of the first Illinois resident to contract WNV on August 8, 2002, daily meetings of the four-state agency WNV Task Force were instituted and within three weeks the first emergency grants were awarded to LHDs. Due to the shortage of licensed mosquito control personnel in Illinois, the Illinois Department of Agriculture (IDOA), issued an emergency rule to allow health department and municipal officials to apply certain mosquito larvicides without a limited license after attending a one-hour seminar. IDPH staff offered more than 20 emergency rule larviciding seminars to more than 500 local officials. From August through October 2002, the IDPH West Nile Web site received 631,153 hits.

Factors contributing to the 2002 outbreak in Illinois included:

- Abundant WNV vector mosquitoes in urban areas from thousands of residential water impoundments (street catch basins) and water-filled containers. Some catch basins in some areas were in people’s back yards and were not identified for mosquito larviciding treatments.
- Ideal environmental conditions (temperature and rainfall) for vector mosquitoes during the hot summer of 2002.
- Large human populations near forested green belts that provide wild bird nesting areas.
- Prior to the appearance of WNV, many municipalities did little or no mosquito larviciding, which is the most effective means of mosquito control.
- Possibly a low use of insect repellent by the public, despite public education efforts.
- Good surveillance system for arboviruses already in place.

Suggested readings


Table 2. WNV Positive Squirrels, Illinois, 2002

<table>
<thead>
<tr>
<th>Id number</th>
<th>Date of collection</th>
<th>County of collection</th>
<th>Clinical illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0227781</td>
<td>Aug 22</td>
<td>Cook</td>
<td>Ataxic, paw biting, crying</td>
</tr>
<tr>
<td>0227784</td>
<td>Aug 22</td>
<td>Cook</td>
<td>Ataxic, paw biting, crying</td>
</tr>
<tr>
<td>022151</td>
<td>Aug 23</td>
<td>Cook</td>
<td>Details unknown</td>
</tr>
<tr>
<td>0229818</td>
<td>Sep 3</td>
<td>Champaign</td>
<td>Ataxia, crying</td>
</tr>
<tr>
<td>02-31007</td>
<td>Sep 4</td>
<td>Cook</td>
<td>Details unknown</td>
</tr>
<tr>
<td>0231454</td>
<td>Sep 9</td>
<td>Cook</td>
<td>Details unknown</td>
</tr>
<tr>
<td>0231774</td>
<td>Sep 11</td>
<td>Cook</td>
<td>Dead</td>
</tr>
<tr>
<td>0231775</td>
<td>Sep 11</td>
<td>Cook</td>
<td>Depressed</td>
</tr>
<tr>
<td>SQ4</td>
<td>Sep 12</td>
<td>Coles</td>
<td>Seizures, hemorrhage from nose, death</td>
</tr>
<tr>
<td>2704</td>
<td>Sep 23</td>
<td>Cook</td>
<td>Seizures</td>
</tr>
</tbody>
</table>
Figure 22. California Encephalitis Cases in Illinois, 1997-2002

Year | Number of cases
--- | ---
1997 | 3
1998 | 4
1999 | 3
2000 | 3
2001 | 5
2002 | 8

Figure 23. U.S. West Nile Virus Cases, 2002

U.S. excluding Illinois: 79%
Illinois: 21%

Figure 24. Clinical Syndrome for WNV Cases in Illinois, 2002

- WNV fever: 38%
- WNV encephalitis: 26%
- WNV aseptic meningitis: 36%
Figure 25. Human WNV Cases in Illinois, 2002

Number of Cases

Month

May
June
July
Aug
Sep
Oct

Figure 26. Epidemic Curve for Human WNV Cases in Illinois, 2002

Number of cases

Week of onset

7/7/2002
7/14/2002
7/21/2002
7/28/2002
8/4/2002
8/11/2002
8/18/2002
8/25/2002
9/1/2002
9/8/2002
9/15/2002
9/22/2002
9/29/2002
10/6/2002
10/13/2002
10/20/2002

38
Figure 27. Human West Nile Virus Cases by County, 2002
Figure 28. Human West Nile Virus Cases in Cook County, 2002
Figure 29. West Nile Virus Positive Birds, 2002
Figure 30. West Nile Virus Positive and Negative Mosquito Pools, 2002
Figure 31. West Nile Virus Equine Cases, 2002
**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 the United States, conjugate vaccines against *H. influenzae* type b were introduced in 1987 and have resulted in a dramatic drop in case numbers for type b.

In 2002, 331 cases were reported in those less than 5 years of age in the United States; 10 percent of these were *H. influenzae* type b but 46 percent had missing information on 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 2002 - 120 (five-year median = 66). From 1997 to 2002, the number of cases reported per year ranged from 42 to 120 (Figure 32) and demonstrated an overall increasing trend.
- Age – 64 percent of the cases were older than 49 years of age (Figure 33). Three of the reported cases due to *H. influenzae* type b were younger than 5 years of age.
- Gender - 60 percent of cases were in females.
- Race/ethnicity - 14 percent were African Americans, 85 percent were white and 1 percent were other races; 9 percent were Hispanic.
- Seasonal distribution – *H. influenzae* occurred throughout the year although numbers were slightly higher in the winter (Figure 34).
- Presentation - Bacteremia (73 percent), pneumonia (33 percent), meningitis (12 percent), epiglottitis (2 percent), conjunctivitis (1 percent), otitis media (1 percent) and cellulitis (1 percent). (Some individuals had more than one manifestation of disease and were counted in each manifestation.)
- Treatment - 84 of 91 reported cases for which information was available were hospitalized.
- Mortality – 10 (12 percent) of the cases where information was available died. Nine of the 10 fatal cases occurred in individuals older than 50 years of age.
- Diagnosis - All cases were culture confirmed. *H. influenzae* was isolated from blood (86 cases), CSF (11 cases), pleural fluid (1 case) and from other or unknown sites (22). Typing was performed on specimens from 49 percent of reported cases; 10 percent of the isolates for which typing was attempted were type b, 20 percent were type f, 15 percent were type e and 2 percent were type c. Fifty-two percent of cases were nontypable.
Summary
The number of *H. influenzae* cases increased (120 cases) as compared to the five-year median (66 cases). Three of these cases were less than 5 years of age for whom the vaccine is indicated. The 10 percent of isolates serotyped as type b increased from the 4 percent subtyped as type b in 2001. More than half of the cases that were serotyped in 2002 were untypable. Sixty-four percent of all cases occurred in people older than 49 years of age.

Suggested readings
Listeriosis

Background
Listeriosis is caused by infection with *Listeria monocytogenes*. *L. monocytogenes* is common in the environment. It causes a foodborne illness that can progress to sepsis in immunocompromised persons and meningoencephalitis and febrile gastroenteritis in immunocompetent persons. Patients receiving antineoplastic therapy are more susceptible to listeriosis. Listeriosis has the highest case fatality rate (18 percent) 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. Transmission to a fetus may cause miscarriage, stillbirth or neonatal meningitis.

The median incubation period is three weeks, which makes identifying a suspect food vehicle difficult due to recall bias. *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 types 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. Deli meats and non-reheated hot dogs are at particular risk for contamination. In 2002, a large nationwide outbreak of listeriosis was identified in the United States with 54 culture confirmed persons and the source was turkey deli meat. The same strain of *Listeria* was identified in the environment of one plant and in turkey samples from another implicated plant. Two Illinois residents had matching PFGE patterns to the outbreak strain.

Listeria prefers moist cool environments and it multiplies readily at refrigerator temperature. *L. monocytogenes* can resist salt, heat, nitrite and acidity better than many other organisms. Refrigeration 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, *L. monocytogenes*, *Salmonella*, *Shigella*, *Vibrio* and *Yersinia enterocolitica*), listeriosis comprised 0.6 percent of the reported infections in 2002. Incidence rates ranged from 0.08 to 0.46 per 100,000 at the nine sites. Listeriosis cases had the highest percentage hospitalized (19 percent) and the highest case fatality rate (18 percent). From 1996 to 2002, listeriosis cases declined 41 percent in FoodNet sites.

Beginning on July 1, 2002, laboratories were required to forward isolates of *L. monocytogenes* to the IDPH laboratory.

Case definition
IDPH uses the CDC case definition for listeriosis 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 is only counted as one maternal case.
Descriptive epidemiology

- Number of cases reported in Illinois in 2002: 23 total (five were cases of meningitis) (five-year median = 24) (Figure 35). The 2002 incidence for all reported listeriosis was 0.2 per 100,000 population.
- Age - Cases ranged in age from newborn to 87 years of age; 61 percent of cases were older than 59 years of age.
- Gender - Overall, 70 percent of the listeriosis cases were in females.
- Race/ethnicity - 83 percent were white, 11 percent were African American and 6 percent were Asian; one person reported Hispanic ethnicity.
- Diagnosis - The site of Listeria isolation was identified as follows: blood (8), cerebrospinal fluid (3), placenta (1) and unknown sites (11).
- Underlying conditions - Two pregnant women were reported with listeriosis; both resulted in stillbirths at 24 weeks of gestation. For 14 of the other cases, information was available on underlying conditions and all but five had an existing immunosuppressive condition. These included cancer, diabetes mellitus, organ transplant or liver disease.
- Mortality - One case died among 10 cases with information on mortality.
- Outbreaks – Two cases were linked to a national outbreak related to consumption of deli turkey meat.

Summary

In 2002, Illinois recorded 23 listeriosis cases; 61 percent of the cases were older than 59 years of age. The incidence rate per 100,000 (0.2) was within the range (0.08 to 0.46) described by CDC’s FoodNet sites in 2002. Three cases in 2002 were linked to a national outbreak related to consumption of deli turkey meat.

Suggested readings


Invasive *Neisseria meningitidis*

**Background**

*N. meningitidis* is an important cause of bacterial meningitis and septicemia in the world. *N. meningitidis* can produce endotoxin and, in some cases, can result in death within hours after onset. Sequelae to meningococcal disease can include hearing loss, seizures, mental retardation and limb amputation.

*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 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, 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. Septicemia also can result from infection with *N. meningitidis*. The overall case fatality rate is between 5 percent and 10 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.

Antimicrobial chemoprophylaxis is used for close contacts of cases. Vaccination can be used as an adjunct measure to protect against serogroups A, C, Y and W135 serogroups. This vaccine is given routinely to military recruits and to certain travelers. Vaccination campaigns are used in highly selected situations.

In 1997, the American College Health Association recommended that college students consider meningococcal disease vaccination. A CDC study in the United States of 50 college students found that freshmen living in dormitories had an elevated risk of meningococcal disease as compared to other college students. The incidence for freshman in dormitories was five per 100,000.

Clusters can be found in some settings. In Canada, a cluster of six cases occurred in men who have sex with men in a 10-week period in 2001. All six had the same strain of serogroup C *N. meningitidis* by PFGE. None of the patients were known to have direct contact with each other. Mass immunization clinics were held to prevent further cases. Persons recommended for immunization were persons from 13 to 29 years of age in Abbotsford, British Columbia, Canada. Before being vaccinated, pharyngeal swabs were taken from vaccines and 8 percent were carriers of *N. meningitidis*. Factors associated with carriage were male sex, nonresidence in Abbotsford and age 13-29 years of age. Another vaccination was initiated after an increase in *N. meningitidis* serogroup C cases in Quebec. The effectiveness rate was shown to be 97 percent.

In 2002, 1,814 cases were reported in the United States.

**Case definition**

The case definition for a confirmed case of meningococcal disease is a clinically compatible case from whom *N. meningitidis* is 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 case in Illinois.
Descriptive epidemiology

- Number of cases reported in Illinois in 2002 - 57 (incidence of 0.4 per 100,000) (five-year median = 104) (Figure 36). No cases were reported to be in college students and no cases were reported in day care attendees. No clusters requiring vaccination occurred in 2002.
- Age - Median age of cases was 16. Fatal cases ranged from 10 month to 90 years of age (Figure 37).
- Gender - 47 percent were female.
- Race/ethnicity - 15 percent were African American, 83 percent were white and 2 percent were Asian; 18 percent were Hispanic.
- Seasonal distribution - Meningococcal disease occurred throughout the year with a concentration in the spring (Figure 38).
- Presentation - 65 percent of reported cases had bacteremia, 41 percent had meningitis and 4 percent had pneumonia. Some individuals reported multiple presentation types.
- Diagnosis - 55 cases were culture confirmed and two were probable cases. The organism was isolated from blood (35), CSF (11), both blood and CSF (3) and unknown (8). Serogrouping was performed on isolates from 60 percent of cases. In cases where typing was done, serogroups were Y (44 percent), C (23 percent), B (17 percent), W-135 (3 percent) and nontypable (12 percent). Serogroup Y isolates have increased from 4 percent of isolates in 1991 to 44 percent of isolates in 2002 (Figure 39).
- Treatment – 45 of 50 (90 percent) individuals with information available were hospitalized.
- Mortality - The case fatality rate was 16 percent for patients where outcome of infection was known. Ages of fatal cases were younger than 1 year (1), 40-50 years of age (4), and greater than 80 years of age (1).

Summary

The number of \( N. \) meningitidis cases reported in Illinois in 2002 (57 cases) was lower than the five-year median (104 cases). Serogrouping was performed on 60 percent of isolates. Serogroup Y was the most common serogroup reported. No vaccination campaigns were required due to specific clusters in 2002.

Suggested readings

Invasive group B *Streptococcus*

**Background**

Group B streptococcus (GBS) is an important cause 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. The gastrointestinal tract is the reservoir for GBS and a likely source of vaginal colonization.

GBS infections are due to *Streptococcus agalactiae*. These infections can cause disease and death in newborns and morbidity in peripartum women and nonpregnant adults with chronic medical conditions. Early-onset disease of neonates (age<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 associated with 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.

Updated guidelines for GBS prevention were published in a 2002 MMWR as listed in the suggested readings. The 2002 guidelines differ from earlier guidelines in the following recommendations:

1. Universal prenatal screening for vaginal and rectal GBS colonization of all pregnant women at 35-37 weeks of gestation.
2. Updated prophylaxis regimens for women with penicillin allergy.
3. Detailed instruction on specimen collection and culture processing.
4. Recommendations against routine intrapartum antibiotic prophylaxis for GBS colonized women undergoing planned cesarean deliveries who have not begun labor or had rupture of membranes.
5. An algorithm for management of patients with projected preterm delivery.
6. An updated algorithm for management of newborns exposed to intrapartum antibiotic prophylaxis.

A study of late onset group B streptococcal (GBS) disease conducted in Texas identified prematurity, having an African American mother and mother’s culture positive for GBS as risk factors for GBS in infants.

Beginning on April 1, 2001, only invasive GBS in infants younger than 3 months became reportable in Illinois. This was the first full year for mandatory reporting of only invasive GBS in infants younger than 3 months. Previously, invasive GBS in all ages was reportable.

**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 with a latex agglutination test positive for GBS from a sterile site. Only cases less than 3 months of age are required to be reported in Illinois in 2002.
Descriptive epidemiology

- Number of cases reported in Illinois in 2002 – 54 (five-year median=41). All cases were confirmed cases.
- Age - 80 percent of all cases occurred in those younger than 1 year of age. Thirty-eight cases were less than 3 months of age.
- Gender - 50 percent of all cases were female.
- Race/ethnicity - 59 percent of all cases were white and 39 percent were African American; 4 percent were Hispanic. 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 – The organism was isolated from blood (34 cases), CSF (4 cases), blood and CSF (12 cases) and in other or unknown sites (4 cases).
- Case outcome – 47 of 51 cases with information available were hospitalized; four cases were known to be fatal. For those younger than 3 months of age, 34 were hospitalized and three cases were known to be fatal.

Summary

Cases of GBS disease in newborns may be preventable if the appropriate guidelines are followed by health care providers. The number of cases of invasive GBS in Illinois in 2002 increased in comparison to previous years probably due to informational material sent to health care providers and laboratories about new reporting requirements. The percent of cases in those younger than 1 year of age increased from 61 percent to 80 percent from 2001 to 2002. This is likely due to the reporting change that only required reporting of invasive GBS in children younger than 3 months of age beginning on April 1, 2001.

Suggested readings

Cryptosporidiosis

Background

Cryptosporidiosis is primarily a gastrointestinal disease that 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. 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). Cryptosporidium produces a self-limited diarrhea in immunocompetent persons and a potentially life-threatening diarrhea in the immunocompromised. The occurrence of Cryptosporidium has declined in HIV infected patients since the introduction of antiretroviral therapy. The duration and severity of symptoms depends on the immune status of the person. In immunocompetent persons, asymptomatic infections, acute diarrhea or persistent diarrhea may occur as a result of Cryptosporidium infection. Vomiting or fever may be present in more than half of infected persons. Outbreaks can occur when there is fecal contamination of drinking or recreational water.

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 3 percent of the reported infections in data from 2002. Data from 2002 showed the incidence rate was one per 100,000 for Cryptosporidium and ranged from 0.4 to 4.1 at the eight FoodNet sites. From 1997 to 2002, the number of reported cryptosporidiosis cases decreased 43 percent in FoodNet.

A CDC surveillance summary of cryptosporidiosis from 1999 to 2002 showed that a greater number of case reports were seen for children 1 to 9 years of age and adults 30 to 39 years of age compared with other age groups. Incidence was high in the upper Midwest and Vermont from 1999-2002. Peak onsets of illness occurred during early summer to early fall. There was increased diagnosis or reporting in northern states.

Important features of cryptosporidiosis include: 1) water-borne outbreaks are typical, 2) oocysts are resistant to some disinfectants at commonly used concentrations 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. Molecular typing techniques are beginning to be used in countries such as Ireland and England during outbreaks. A case-control study of sporadic cases in England found that travel outside the United Kingdom, contact with another person with diarrhea and touching cattle were risk factors for cryptosporidiosis.

Prevention measures for cryptosporidiosis include handwashing after using the toilet and after contact with fecal material, not swimming with diarrhea, not swallowing water while swimming and washing foods before eating them. In outbreak situations, hyperchlorination of recreational water may be recommended.
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 2002 – 121 cases (five-year median = 90; see Figure 40). The incidence rate was 0.7 per 100,000. In 2001, a large outbreak elevated case numbers.
• Age - Mean age for all 2002 cases was 29. Age distribution of cases is shown in Figure 41.
• Gender - 53 percent were male.
• Race/ethnicity - 81 percent were white, 17 percent were African American and 2 percent were other races; 6 percent were Hispanic.
• Seasonal variation - Cases peaked in August and September (Figure 42).
• Outbreaks – There were no food or waterborne outbreaks of cryptosporidiosis in 2002.

Summary

The number of reported cases of cryptosporidiosis in 2002 was 121 as compared to 483 in 2001. A large outbreak in 2001 increased the numbers in that year. Most cases in 2002 occurred in the summer months when persons are participating in recreational swimming activities. The incidence of reported cryptosporidiosis in Illinois (0.7 per 100,000) was similar to the incidence reported in FoodNet (1 per 100,000).

Suggested readings


Cyclosporiasis

Background
Cyclosporiasis is caused by a protozoon 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 also have been implicated in transmission.

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 0.24 percent of the reported infections in data from 2002. Data from 2002 showed the incidence rate was 0.1 per 100,000 for *Cyclospora* and ranged from 0.03 to 0.26 at the eight FoodNet sites.

Reporting of cyclosporiasis became mandatory in Illinois on April 1, 2001.

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 2002 – Three cases for a rate of 0.02 per 100,000.
- Age-The ages of the three cases were 24, 30 and 52.
- Gender-Two cases were female.
- Race/ethnicity-All three cases were white.
- Seasonal variation- Two cases had onset in June and one in October.
- Travel- One case traveled to Mexico and one to Guatemala. The travel history of the other case is unknown.
- Outbreaks-None.

Summary
The first full year of mandatory reporting of cyclosporiasis was 2002. The incidence in Illinois (0.02 per 100,000) was lower than the incidence in the FoodNet sites (0.1 per 100,000). Three cases were reported in Illinois residents in 2002. Two cases had traveled to Central America before onset. No outbreaks of cyclosporiasis were reported in Illinois in 2002.
**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 ehrlichiosis (HGE), _E. canis_ and _E. ewingii_. Only one human infection with _E. canis_ has been reported in the literature and the person was not clinically ill. _E. chaffeensis_ and _E. canis_ mainly invade monocytes and the disease caused by these organisms is termed HME. _A. phagocytophilum_ and _E. ewingii_ invade mainly granulocytes and the disease is referred to as granulocytic ehrlichiosis. Both HGE and HME are zoonotic diseases requiring an arthropod vector and a mammalian reservoir. Differences in the geographic distribution of the tick vectors result in HME occurring primarily in the South and southeastern United States and HGE in the northeast and northern midwest. In animal studies, ehrlichiosis is transmitted within the first 24 hours a tick is attached. The incubation period is seven to 21 days. Both HME and HGE result in similar symptoms: fever, headache and myalgia. Cases also may have low platelets, low white blood cells and increased liver enzymes. A rash may be present in approximately one-third of HME cases; rashes are much less common in HGE. These _Ehrlichia_ organisms can form clusters of organisms called morulae in white blood cells. The reported case fatality rate is 5 percent in HME and 10 percent in HGE.

HGE can be transmitted by deer ticks, which is the same tick that transmits Lyme disease and human babesiosis in these areas. The primary reservoir host mammals for HGE are thought to be the white-footed mouse and the white-tailed deer. A study in northwestern Wisconsin from 1997 through 1999, found the annual incidence of HGE was nine per 100,000 in this area. Three-quarters of the cases were identified from May through July. The incidence of HGE increased with age. Approximately 13 percent of persons with febrile illnesses studied were positive for HGE.

The majority of the ehrlichiosis cases in the United States are HME. _E. chaffeensis_ and _E. ewingii_ are carried by the lone star tick (_Amblyomma americanum_) in the central, south and southeastern United States.

The first complete year of mandatory reporting of ehrlichiosis in Illinois began in 2002.

**Case definition**

**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_.

**HGE**

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

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**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 *A. phagocytophilum* by PCR, immunostaining or culture.

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2002 - Six; one was HME and five were of unknown type.
- Age - Cases ranged in age from 8 to 62 years of age.
- Gender - Four cases were male.
- Race/ethnicity - All cases were white; none were Hispanic.
- Geographic distribution - Sites of tick exposure for the cases were Cook County (1), Jackson County (1), Richland County (1), and St. Clair County (1), Illinois and Missouri (1) and unknown exposure locale (1). The HME case reported exposure in Jackson County. County location of ehrlichiosis cases reported from 1993 to 2002 are shown in Figure 43.
- Seasonal variation - Onsets of the cases occurred between June and August.
- Outcomes - Two cases were hospitalized.

**Summary**

Most Illinois tick exposures related to ehrlichiosis cases have been in southern Illinois.

**Suggested readings**

Figure 43. Exposure locations of Ehrlichiosis cases

**Illinois Exposure Locales for Ehrlichiosis 1993-2002**

**Single County Exposure Locales**
- HME (N=10)
- Unspecified (N=5)

**Unknown or multiple exposure locales**
- HGE - (N=1)
- HME - (N=7)
- Unspecified Type - (N=7)

Human Granulocytic Ehrlichiosis (HGE) is associated with the black-legged (deer) tick and possibly the American dog tick.

Human Monocytic Ehrlichiosis (HME) is most often associated with the lone star tick.

The American dog and lone star ticks should be presumed present throughout Illinois.

Total number of Ehrlichiosis cases reported between 1993-2002 is 30. The total number of patients citing single county exposure locales within Illinois is 15 cases (0 unspecified, 10 HME). Unknown exposure locales and multiple exposure locales cited by patients are not depicted on this map.
Enteric *Escherichia coli* infections (*E. coli* O157:H7 and other enterohemorrhagic *E. coli*, enterotoxigenic *E. coli*, enteropathogenic *E. coli*)

**Background**

*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 nonimmune 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 Shiga toxin-producing *E. coli* (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. Undercooked ground beef is a primary source for *E. coli* O157:H7 infections. Foods of bovine origin are common causes of sporadic infections and outbreaks. The prevalence of *E. coli* O157 in cattle feedlots can range from 63 percent to 100 percent.

An outbreak in Colorado in 2002 was linked to consumption of ground beef. In 2002, a large recall of ConAgra beef occurred in June after at least 28 *E. coli* O157:H7 cases in Colorado and other state residents were linked to contaminated beef.

However, outbreaks have been associated with other foods, including produce such as lettuce, melons and alfalfa sprouts. In addition, outbreaks have been associated with drinking water. An outbreak in Wyoming was linked to drinking of unchlorinated municipal water.

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 3.6 percent of the reported infections in 2002 data. The incidence rate for *E. coli* O157:H7 was 1.7 per 100,000 and ranged from 0.3 to 2.7 per 100,000 at the nine FoodNet sites in FoodNet data. *E. coli* O157:H7 decreased 42 percent from 1996 to 2003 in the United States.

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. Shiga toxin-producing *E. coli* should be forwarded to the IDPH laboratory for possible subtyping.

Enterotoxigenic *E. coli* (ETEC) is considered to be a common cause of traveler’s diarrhea. United States residents who travel overseas may return to the United States with ETEC.

Reporting for enteric *E. coli* infections in Illinois was expanded in April 2001 to include enteric *E. coli* infections in addition to *E. coli* O157:H7 infections. Other shiga-toxin producing *E. coli* (other than O157), enterotoxigenic *E. coli* (ETEC) and enteropathogenic *E. coli* became reportable under this category.
Prevention for enteric *E. coli* infections include cooking food thoroughly, prompt refrigeration of foods and separation of cooked and raw foods. 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 that come in contact with raw ground beef should be washed thoroughly before reusing.

Antibiotics are contraindicated for treatment of *E. coli* O157:H7 infections; treatment leads to release of toxin as bacteria die and increased risk for development of HUS.

**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* isolates from stool from a clinically compatible person that produce Shiga toxin but are not identified as O157 are also reportable as Shiga toxin-producing *E. coli*.

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.

**Descriptive epidemiology**

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

- Number of cases reported in Illinois in 2002 – 191 *E. coli* O157:H7 and six *E. coli* O157 shiga toxin producers not identified as O157 (five-year median = 173) (see Figure 44). The incidence in 2002 was 1.5 cases per 100,000 population.
- Age - Cases occurred in all age groups with very few in those younger than 1 year of age (median = 17 years of age) (Figure 45).
- Gender - 49 percent were female.
- Race/ethnicity - 94 percent were white and 6 percent were African American; 2 percent were Hispanic.
- Seasonal variation - The largest number of cases were reported in the summer from June to September (54 percent of cases) (Figure 46).
- Symptoms - Among those with culture-confirmed *E. coli* O157:H7 for which symptom information was available, 100 percent reported diarrhea, 86 percent reported bloody diarrhea, 46 percent reported fever and 94 percent reported abdominal cramps; two cases (2 percent of patients for whom information was available) had hemolytic uremic syndrome (HUS) and one case (1 percent) had thrombotic thrombocytopenic purpura (TTP)).
- Treatment - Of 102 patients for whom information was available, 51 percent were hospitalized.
- Mortality - No cases were fatal.
- Outbreaks – Three foodborne outbreaks were reported in 2002 (see detailed description in the “Food and Waterborne Outbreaks” section). Thirty-four cases were outbreak associated.
**Risk factors for ECO157:H7**

The standard case report form developed by CDC is used to investigate ECO157:H7 cases in Illinois. It includes questions on possible sources for ECO157:H7. Individuals are asked if they consumed any ground beef and are then asked if they consumed undercooked ground beef. Cases also are asked if they were around children with diapers or if they changed diapers. The results of investigation of exposure to possible 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 (74 percent), other beef products (35 percent), well water (20 percent), undercooked ground beef (17 percent), other undercooked beef products (12 percent) and other unchlorinated water (3 percent); 10 percent reported visiting or living on a farm. These risk factors were not confirmed as the source of illness in these cases.

**ETEC**

Two sporadic cases of ETEC were reported in 2002.

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

None reported.

**Summary**

The incidence of *E. coli* O157:H7 in 2002 was 1.5 cases per 100,000 population, which is similar to what was found in CDC’s FoodNet sites (1.7 per 100,000). Most cases of *E. coli* O157:H7 occur in the summer months. Bloody diarrhea was reported by 86 percent of individuals; 2 percent of patients reportedly had HUS. Fifty-one percent of cases were hospitalized as compared to 39 percent in 2002 FoodNet data. Information on hospitalization was not available on all Illinois cases. No Illinois cases were known to be fatal. Almost 17 percent of cases reported consuming undercooked ground beef. Although the number of United States cases of *E. coli* O157:H7 has decreased from 1996 to the present, this same trend has not occurred in Illinois.

**Suggested readings**

Figure 44. E. coli O157:H7 and other enterohemorrhagic E. coli Cases in Illinois, 1997-2002

Figure 45. Age Distribution of Enterohemorrhagic E. coli Cases in Illinois

Figure 46. Enterohemorrhagic E. coli in Illinois by Month, 2002
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<th>Characteristic</th>
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<th>Total # with information on factor</th>
<th>Percentage Reporting Characteristic</th>
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<td>Attending or working at an institution</td>
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<td>5</td>
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</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.

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 food borne illness: viruses, bacteria, parasites and fungi. For some viruses, such as hepatitis A or noroviruses, humans are the only reservoir. Noroviruses are suspected to be the most common cause of gastroenteritis in the United States. A study by CDC in six states showed that 50 percent of 2,000 foodborne outbreaks could be attributed to norovirus. When RT-PCR was used in specimens from states sent to CDC, norovirus was identified as the etiologic agent in 93 percent of the outbreaks of nonbacterial gastroenteritis from 1997 to 2000. Norovirus outbreaks were often associated with eating salads, sandwiches and produce. Food handlers were more often implicated in norovirus outbreaks than for bacterial outbreaks or outbreaks of unknown etiologic agents. From 1998 through 2000, Illinois was ranked in the top 11 states in reporting of norovirus outbreaks. Food can be contaminated with viruses if food handlers do not practice good hygiene before preparing food that is later served uncooked or if sewage contaminates the food. Rotaviruses can occasionally cause food borne outbreaks. Raw shellfish have been associated with hepatitis A virus, calicivirus and Vibrio spp. outbreaks and were likely contaminated prior to harvest.

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 food borne 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 U.S. population on nine enteric pathogens and on hemolytic uremic syndrome. At FoodNet sites, the incidence of enteric pathogens for 2002 was Salmonella (16 per 100,000), Campylobacter (13 per 100,000), Shigella (11 per 100,000), E. coli O157:H7 (1.7 per 100,000), Cryptosporidium (1.3 per 100,000), Yersinia (0.4 per 100,000), Listeria (0.3 per 100,000), Vibrio (0.3 per 100,000) and Cyclospora (0.1 per 100,000).

Health care providers can assist in recognition of foodborne outbreaks by obtaining stool cultures, recognizing the potential for a foodborne etiology and reporting of suspect cases and clusters.

The Chicago Department of Public Health reported several foodborne outbreaks, linked to consumption of carnitas. Carnitas are fried chunks of pork served at restaurants or purchased at grocery stores and prepared at homes, mainly in persons

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originating from Mexico. Five foodborne outbreaks in Chicago from 1995 to 2002 were linked to consumption of carnitas. Four of the five outbreaks were due to *Salmonella*. Outbreaks were due to unsafe food handling practices after cooking.

Foodborne outbreaks can be decreased by improved food handler hygiene, preventing food handlers from working while ill, proper cooking of food, holding foods at proper temperatures and preventing cross contamination. Food irradiation is the use of high-energy radiation, such as gamma rays, x-rays or electron beams to decrease pathogens on food and increase shelf life. In the United States irradiation of food is approved for red meat, poultry, pork, fruits and vegetables, spices, seeds, herbs, seasonings, enzyme preparations, eggs and wheat. Irradiation does not prevent later contamination by food handlers.

**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.

IDPH and LHDs receive reports of potential food borne outbreaks from many sources. Outbreak investigations, which are conducted by local health departments, may not result in a foodborne outbreak designation and these outbreaks 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.

In the United States, 35 recreational water outbreaks were reported during 2002. Almost 50 percent of these outbreaks caused gastrointestinal illness. The number of recreational water outbreaks has increased in the United States since 1993.

**Descriptive epidemiology**

The number of possible foodborne or waterborne outbreaks reported to IDPH by local health departments (LHDs) was 111 during 2002. Of these, 18 were determined by the LHD or IDPH to not meet the criteria for a food or waterborne outbreak and not enough information could be obtained for two outbreaks. The total for the year was 91 outbreaks that met the definition of an outbreak and were submitted to CDC as compared to a five-year median of 64 (Figure 47). Of these outbreaks, the etiology was confirmed in 24 outbreaks, suspected in 39 outbreaks and determined to be unknown in 28 outbreaks. One outbreak was due to recreational water exposure.

In the year 2002, a total of 2,730 people were reported to have become ill as the result of the 90 foodborne outbreaks; in two outbreaks the number of ill was estimated due to the large size of the outbreak or difficulty in the interview process. The mean number ill per foodborne outbreak was 30. The waterborne outbreak resulted in 68 ill persons. There were no fatalities reported as part of a foodborne outbreak during the
year 2002. Local health jurisdictions reporting outbreaks during the year 2002 were: Cook County Department of Public Health (29); Chicago Department of Health (14); DuPage County Health Department (8), McHenry County Health Department (8), Will County Health Department (3), Lake County Health Department (3), LaSalle County Health Department (3), Madison County Health Department (2), Coles County Health Department (2), Fulton County Health Department (2), Kane County Health Department (2), DeKalb County Health Department (2); and one (1) each was reported from Bureau County Health Department, Carroll/IDPH, Henry County Health Department, Kankakee County Health Department, Lee County Health Department, Livingston County Health Department, Montgomery County Health Department, Rock Island County Health Department, St. Clair County Health Department, Stephenson County Health Department, Warren/IDPH, Whiteside County Health Department and multiple health departments.

The 91 reported outbreaks occurred in the following months: January, nine (10 percent); February, six (6 percent); March, seven (8 percent); April, 11 (12 percent); May, nine (10 percent); June, six (7 percent); July, five (5 percent); August, 10 (11 percent); September, three (3 percent); October, six (6 percent); November, seven (8 percent); and December, 12 (13 percent).

In the 90 foodborne outbreaks reported to CDC, the etiologic agent was determined to be bacterial, either suspect or confirmed, in 25 (28 percent) (Table 4). The bacterial pathogens were as follows: Clostridium perfringens/Bacillus cereus 8 (32 percent); Salmonella spp., six (24 percent); Staphylococcus aureus/Bacillus cereus 3 (12 percent); Clostridium perfringens, three (12 percent); S. aureus, one (4 percent), Shigella, one (4 percent) and Escherichia coli O157:H7, three (12 percent).

The etiologic agent in 36 (40 percent) of the outbreaks was suspected or confirmed to be caused by noroviruses. Ten (28 percent) outbreaks were confirmed by positive polymerase chain reaction (PCR) testing of two or more stool specimen from ill persons. The remaining 26 [72 percent] outbreaks were classified as suspicious Norovirus outbreaks, largely based on symptoms, incubation and duration in the people who were affected.

One (1 percent) outbreak was confirmed to be caused by ammonia contamination in chicken.

No outbreaks were caused by parasitic agents. One outbreak of the 91 outbreaks was a recreational waterborne outbreak of Pontiac fever.

Although thorough investigations were conducted, there was inconclusive evidence to classify either suspect or confirmed etiologic agents in 28 (31 percent) of the outbreaks and they were thus classified as etiology unknown.

Food handlers were laboratory tested in 13 of the outbreaks. In six of the outbreaks food handlers were found to be positive for the etiologic agent in the outbreak, and in one case a food handler's child was positive for the etiologic agent. Food handler testing was positive for the following pathogens: Salmonella (four outbreaks), Shigella (one outbreak), norovirus (one outbreak).

Food was tested for pathogens in 17 (19 percent) of the outbreaks. Positive foods were found in seven (41 percent) of the samples tested. The responsible pathogens found were ammonia, fecal coliforms (2), E. coli O157:H7, C. perfringens and Salmonella (2). By percentage, the largest single pathogen responsible for
foodborne illnesses is norovirus, but unfortunately it is very difficult to identify these viruses from foods. In food testing, viruses are most often implicated as the result of finding fecal coliform bacteria in food samples, most likely accounted for by poor food handler hygiene.

A food could not be implicated by either epidemiologic analysis or food testing in 74 of 90 outbreaks (82 percent). In 16 outbreaks, a food was linked to illness by either epidemiologic analysis or food testing. The following food items were implicated in illness: meat, poultry, animal products or fish/fish products (7), produce (2), water/ice (1), Mexican (1), multiple (3) and other (2). For meat and poultry products, poultry was implicated in three outbreaks. In one poultry outbreak the etiologic agent/substance was *C. perfringens*, in one ammonia contamination and in one it was an unknown agent or substance. Caviar was implicated in one outbreak of norovirus. In two outbreaks, pork was implicated; one outbreak was caused by *Salmonella* and in one the pathogen was unknown. Beef was implicated in a *C. perfringens* outbreak. In two outbreaks, produce was implicated; in one outbreak lettuce tested positive for *E. coli* O157:H7, in another a green salad was implicated in a suspect norovirus outbreak. In three outbreaks, multiple foods were implicated in illness including a salad bar with a norovirus outbreak, a *C. perfringens* with roast beef, mashed potatoes and gravy and both water and celery in an outbreak with unknown etiology. In one outbreak, Mexican foods were implicated in a norovirus outbreak. Ice in a sink was probably contaminated by uncooked meat in one *E. coli* O157:H7 outbreak. Other foods implicated were potato salad in a suspect norovirus outbreak and ice cream in a suspect norovirus outbreak.

In 11 outbreaks, environmental samples were tested. Environmental samples from water, food processing equipment, surfaces, utensils and food preparation items were tested. Testing was positive in one outbreak. In this outbreak, a sink drain at a residence tested positive for *E. coli* O157:H7.

The site of food preparation in these 90 foodborne outbreaks was: restaurant, 66 (73 percent); caterer, five (5 percent); home, four (4 percent); school, three (3 percent); prison, one (1 percent), work, one (1 percent); multiple, four (4 percent); other, five (5 percent) and unknown, one (1 percent). Other sites included an elderly hi-rise, banquet hall, private clubs and concession stands. The waterborne outbreak was from a whirlpool.

The site where the food was consumed in 90 foodborne outbreaks was: restaurant, 53 (59 percent); home, nine (10 percent); workplace, seven (8 percent); school, seven (8 percent); prison, one (1 percent); picnic, one (1 percent); unknown, one (1 percent); multiple, three (3 percent) or other, eight (9 percent). Other sites included pavilions, arenas, private clubs, concession stands, elderly hi-rises, cafeterias, and banquet halls. The waterborne outbreak was at a whirlpool.

Factors that were identified as contributing to these 90 outbreaks were: bare-handed contact by food handler, 20 (22 percent), inadequate cleaning of processing/preparation equipment/utensils, 23 (25 percent); handling by an infected person or carrier of a pathogen, eight (9 percent); cross contamination from raw ingredient of animal origin, five (5 percent); glove-handed contact by food handler, six (7 percent), raw product/ingredient contaminated by pathogens from animal or environment, two (2 percent) and storage in contaminated environment, 10 (11 percent); and poisonous substance accidental contamination, one (1 percent). Each
outbreak may have had multiple contributing factors. In 48 (53 percent) of the outbreaks, the investigation team could not identify any contributing cause to the outbreak. Proliferation factors and survival factors that may have led to an outbreak only apply to outbreaks where bacterial pathogens are involved. There were 25 outbreaks suspected to be caused by bacteria or toxins associated with bacteria. Proliferation factors identified by LHDs that may have led to an outbreak included keeping foods at room temperature too long, seven (28 percent); slow cooling of food, five (20 percent), inadequate cold holding temperatures, three (12 percent); and preparing foods a half day or more before serving, three (12 percent). Each outbreak may have had more than one proliferating factor. Survival factors that may have led to an outbreak included insufficient time and/or temperature during reheating, five (20 percent) and insufficient time and temperature during initial cooking, three (12 percent).

A graph of the proportion of reported cases caused by the major enteric pathogens is shown in Figure 48. These include both sporadic and those associated to outbreaks. In 2002, a smaller percentage of cases were made up of cryptosporidiosis cases as compared to 2001. In 2001, a large cryptosporidiosis outbreak occurred in Tazewell County.

Thirty-five recreational waterborne outbreaks were reported to CDC during 2002. Almost 50 percent of these outbreaks caused gastrointestinal illness. The number of recreational water outbreaks has increased in the United States since 1993.

**Summary**

In 2002, Illinois recorded 90 foodborne and one waterborne outbreaks compared to a five-year median of 64 outbreaks. The Department interprets the increase as a sign of improved reporting by LHDs. The most common site of food preparation in the reported outbreaks was restaurants. Food handlers who had bare-handed contact with food and inadequate cleaning of equipment and utensils 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 2002 Outbreaks

<table>
<thead>
<tr>
<th>Agent</th>
<th>Confirmed</th>
<th>Suspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. cereus</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B. cereus/S. aureus</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>B. cereus/C perfringens</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>C. perfringens</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Cryptosporidium</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E. coli O157:H7</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>ETEC</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Norovirus</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td>Salmonella</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Shigella</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Ammonia contamination</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>S. aureus</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Pontiac fever (water-borne)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>UNKNOWN (28)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 47. Food and Waterborne Outbreaks in Illinois, 1997-2002

Figure 48. Selected enteric pathogens in Illinois, 1997-2002
Specific types of food borne 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 2002 - None confirmed. There were three outbreaks that may have been caused by either *B. cereus* or *Staphylococcus aureus* as suggested by the clinical presentation and eight outbreaks in which the clinical picture suggested either *B. cereus* or *C. perfringens*.

*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 ill persons, 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 2002 - Three confirmed; eight were suspected to be due to either *C. perfringens* or *B. cereus* but laboratory confirmation did not occur.
  - An outbreak of *C. perfringens* occurred in McHenry County in August 2002.
2002. The investigation identified 19 ill individuals from two different parties who ate at a common restaurant. The median incubation period was 14 hours. Roast beef ajus was tested and found to have greater than 5 million \textit{C. perfringens} per gram. Roast beef ajus also was implicated by epidemiology. Contributory causes were inadequate cooking and improper holding temperatures.

- Approximately 900 persons reported illness at a correctional facility in central Illinois in September. Of those cases, three were laboratory confirmed and 35 were probable. The median incubation period for the outbreak was 12 hours. Of the confirmed and probable cases, 34 (97 percent) reported diarrhea and 28 (80 percent) reported abdominal cramps. Three of the four stool specimens tested for \textit{C. perfringens} were positive. Roast beef, mashed potatoes, and gravy were implicated in the epidemiological investigation.

- A second outbreak occurred in McHenry County in November 2002 after 24 persons became ill from a meal they consumed at a workshop. Turkey for the meal was prepared in a private home and brought to the workshop. All cases reported diarrhea while seven (29 percent) reported abdominal cramps. Epidemiologic information could not be obtained from most individuals attending the event, therefore no individual food source was implicated.

\textbf{Enterohemorrhagic E. coli (E. coli O157:H7 and others)}

Foodborne outbreaks of \textit{E. coli} O157:H7 have been linked to undercooked ground beef, apple cider, sprouts and lettuce. Other types of \textit{E. coli} also can be pathogenic in humans and cause outbreaks.

\textbf{Case definition}

Laboratory confirmation of an outbreak occurs when \textit{E. coli} O157:H7 or other Shiga-like toxin-producing \textit{E. coli} is isolated from the stool of two or more ill persons or from implicated food or water.

\textbf{Descriptive epidemiology}

- Number of outbreaks reported in Illinois in 2002 - Three confirmed \textit{E. coli} O157:H7. In the spring of 2002, 17 individuals from four counties in northeastern Illinois tested positive for \textit{E. coli} O157:H7 with the same PFGE pattern. Five of the 15 interviewed were hospitalized. The reported symptoms were: diarrhea (100 percent), abdominal cramps (87 percent), and fever (40 percent). No common source of the infection could be identified.

- An outbreak occurred in DuPage County in June and was linked to ice from a private party. Four persons were laboratory confirmed for \textit{E. coli} O157:H7 with matching PFGE patterns. Three of the four ill persons were hospitalized and one developed hemolytic uremic syndrome. An environmental isolate from a sink where ice was held with raw meat matched by PFGE. The reported median incubation period was three
days.

- A third *E. coli* O157:H7 outbreak occurred in multiple states and multiple Illinois counties (DuPage, Kane and Winnebago) in November 2002. Eleven persons were laboratory confirmed positive for *E. coli* O157:H7 and had matching PFGE patterns. Two other probable cases were not laboratory confirmed. All of the cases reported diarrhea and 12 (92 percent) experienced bloody stools and abdominal cramps. Four of the 13 (31 percent) were hospitalized. Of the 11 ill persons who completed interviews, all had eaten at the same restaurant chain during a seven-day period in late November. The epidemiologic investigation implicated lettuce as the food source. The CDC and the Food and Drug Administration assisted in the investigation.

**Enterotoxigenic E. coli**

**Descriptive epidemiology**

- Number of outbreaks reported in Illinois in 2002 - None confirmed.

**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 2002 - Six confirmed with 289 people ill (mean of 41 persons ill per outbreak). Outbreaks occurred in Cook (city of Chicago), Lake, Kankakee, Madison, Montgomery, and St. Clair Counties. The *Salmonella enterica* serotypes involved in the outbreaks were Enteritidis (3), Heidelberg (2) and Newport (1).

- The first *Salmonella* outbreak of 2002 occurred in January in 110 persons from different groups who ate at the same restaurant in Kankakee. Sixty-eight persons were laboratory confirmed with *Salmonella enterica* ser. Enteritidis and 42 were probable cases. Sixteen food handlers tested positive. *Salmonella* isolates were identified in patient and food worker specimens. Of those ill, 36 (33 percent) were hospitalized. The symptoms reported were: diarrhea (91 percent), abdominal cramps (84 percent), fever (59 percent), body aches (57 percent), headaches (57 percent, vomiting (46 percent) and bloody stools (19 percent). Ill food handlers may have contributed to illnesses in patrons of the restaurant.

- In January and February, 27 laboratory confirmed and 48 probable cases occurred among patrons of a restaurant in St. Clair County. Patient
specimens and food worker specimens indicated *Salmonella enterica* ser. Enteriditis. A single food vehicle could not be determined. Four (5%) ill persons were hospitalized. Diarrhea and fever were the two most commonly reported symptoms.

- In Lake County, eight persons became ill after a meal at a private party in May. Laboratory testing confirmed *Salmonella enterica* ser. Enteriditis. One person was hospitalized. No food item could be implicated epidemiologically.

- An outbreak occurred in June, sickening 26 persons (12 confirmed and 14 probable) who attended the same private party in Madison County. Eight of the nine human stool specimens tested and meat samples were positive for *S.* ser. Newport and matched using PFGE. Twenty-five (96 percent) reported diarrhea, 23 (88 percent) reported fever and 22 (85 percent) reported abdominal cramps. The median incubation period was 44 hours. Pork was implicated by laboratory and epidemiological evidence.

- In June an outbreak of *S.* ser. Heidelberg occurred in Chicago when 19 persons became ill after eating at a single restaurant. One secondary case also was identified. Thirteen persons were laboratory confirmed, which included restaurant patrons and employees. Three individuals were hospitalized. All ill persons reported diarrhea. Other symptoms reported included fever (80 percent), abdominal cramps (80 percent), vomiting (50 percent), and muscle aches (45 percent) and bloody stools (10 percent). The median incubation period was 15 hours. Leftover food samples taken from case-patient’s homes were positive for the bacteria. Cross contamination of the leftovers in the containers could not be ruled out, so particular food sources could not be identified by laboratory evidence. No food item was implicated by epidemiological investigation.

- A confirmed outbreak of *S.* ser. Heidelberg also occurred in Montgomery County from March until June. A restaurant was the suspected source of illness for the 22 ill persons. Specimens from 21 of the ill persons tested positive for the bacteria, including one restaurant employee. The median incubation period was three days. Six individuals were hospitalized. Case-patients reported vomiting, diarrhea, bloody stools, fever and abdominal cramps. No food vehicle could be determined by epidemiological investigation.

**Listeria**

**Case Definition**

The case definition for an outbreak of *Listeria* is two or more cases of *Listeria* linked to a common meal or food source.

**Descriptive Epidemiology**

Three cases of *Listeria* were linked to a multi-state outbreak associated with consumption of deli turkey.
**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. A nationwide outbreak of *S. sonnei* occurred in 2000 and was linked to consumption of commercial five-layered bean dip. It was determined that an ill employee may have contaminated processing equipment. Illinois had two cases associated with this outbreak. Outbreaks of shigellosis also have been associated with swimming in contaminated water. Forty-five persons became ill during one shigellosis outbreak in Iowa after use of a wading pool in 2001.

**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 2002 - One confirmed.**  
  - Seventeen people became ill during an outbreak of *Shigella sonneii* in August. Ill persons reported diarrhea, vomiting, fever, bloody stools, fever and abdominal cramps. The outbreak was associated with a restaurant in Lake County. Contributory causes were ill food handlers and inadequate food handler hygiene. Two food workers tested positive for the bacteria.

**Suggested readings**


**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. Food borne 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, isolation of 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 2002 - One suspect. There were three outbreaks suspected of being either *S. aureus* or *B. cereus* but the agent was not confirmed.
  - Four probable cases of *S. aureus* were reported in Cook County in December. All cases had eaten at the same restaurant and reported vomiting and diarrhea. The median incubation period was six hours.

**Chemical agents**

This category includes toxins - such as ciguatera and scombrototoxin - associated with fish consumption. Ciguatera toxin poisoning is caused by the ingestion of the toxin in predatory reef fish, such as barracuda, amberjack and grouper. The toxin is initially produced by dinoflagellates that are eaten by herbivorous fish, which are then consumed by the predatory fish. 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. Symptoms of diarrhea and vomiting develop within three to six hours after consuming contaminated fish. Neurologic symptoms may follow and persist for weeks or months. These neurologic symptoms include numbness, tingling of the mouth and extremities, muscle pain and weakness, and reversal of temperature sensation. There is no diagnostic test or treatment available for humans.

Scombrototoxin 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 scombrototoxin 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.

Ammonia is a rare cause of foodborne illness. In food, ammonia at greater than 15 ppm is considered abnormal.

**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 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.

**Descriptive epidemiology**

- Number of outbreaks reported in Illinois in 2002 - One confirmed.
  - In late November, 157 students and teachers became ill after eating lunch at a school in Will County. There were 312 students and 18 teachers interviewed at the schools. Of the 157, 110 met the case definition. The
attack rate was 49 percent. Most of the cases (81 percent) experienced onset of illness within 60 minutes of eating lunch and recovered in a short period of time. Symptoms among cases included stomach ache (82 percent), headache (61 percent), nausea (41 percent), and vomiting (23 percent). Other symptoms reported were dizziness, diarrhea and mouth burning. Forty-two students and two adults were transported to five hospital emergency rooms. No cases were hospitalized. Ninety-one percent of students reported that their chicken tenders smelled unusual. Several persons who ate the lunch and public health investigators noted an ammonia odor in the food. Eating chicken tenders that smelled unusual was associated with being a case. There was a dose response relationship with higher attack rates in those eating more chicken tenders. Laboratory testing detected significant levels of ammonia (as high as 2,468 ppm) in chicken tenders. The investigation linked the contamination to an ammonia refrigerant leak at a food storage facility. The chicken was stored in the freezer for 10 months after the contamination to recondition the product before use. The ammonia penetrated the cardboard box and the sealed plastic bag containing the chicken tenders. The USDA also participated in the investigation of this outbreak.

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 2002 - None confirmed.

Viral gastroenteritis
The most common cause of viral gastroenteritis are small round-structured viruses (SRSV), commonly called Noroviruses. Estimates are that 23 million people are affected by noroviruses in the United States each year. Noroviruses 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 after illness onset. The incubation period and duration of illness ranges from 24 to 48 hours. Virus shedding peaks 25-72 hours after
exposure to the virus. 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.

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 norovirus 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
excess of what is normally present in public water systems.

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. Approximately 25 state health department laboratories, including Illinois, can
do the RT-PCR to detect norovirus. 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 norovirus during
their lifetime.

Outbreaks of norovirus have occurred in military settings. In May 2002, British
soldiers in Afghanistan were involved in an outbreak of norovirus. Several persons
became very ill including needing ventilatory support. Noroviruses were the most
common cause of illness among soldiers in operations Desert Storm and Desert Shield.

From January 1 to December 2, 2002, there were 21 reports of acute
gastroenteritis on cruise ships. Nine were confirmed to be associated with noroviruses.
These outbreaks show how easily noroviruses can be transmitted from person to
person in closed environments. These outbreaks continued on subsequent cruises on
the same ship. An outbreak of norovirus was reported in children playing in a
recreational water fountain in the Netherlands in 2002.

Case definition

Several laboratory tests may help to confirm an outbreak related to Norovirus.
These include positive results on RT-PCR, visualization of noroviruses 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 2002 - 26 suspected outbreaks of viral
gastroenteritis, based on clinical syndrome, incubation period and duration of
illness. Ten laboratory confirmed outbreaks involved an estimated 432 people who experienced compatible illness (median = 25 ill persons per outbreak); three were confirmed as the G1 genogroup and seven were confirmed as the G2 genogroup. The median incubation period for ill persons in the confirmed outbreaks was 29 hours. Laboratory confirmation was made in stool from 28 case-patients. Twenty people visited a health care provider and none were hospitalized.

The confirmed outbreaks occurred in Kane (1), LaSalle (2), Lee (1), McHenry (2), Warren (1), Will (2), and Whiteside County (1).

- A norovirus outbreak followed a private birthday party in Will County in January. Norovirus G2 was identified in the stool of two attendees. All 15 persons attending became ill. No specific food item was implicated and a source was not identified. It is not known if food handlers were ill.
- In Lee County, 32 people became ill after a meal at a restaurant. Three were confirmed for Norovirus (G2). No food could be implicated epidemiologically. All food handlers denied diarrheal illness.
- In February, a confirmed norovirus G1 outbreak occurred in 69 individuals at a school in Kane County. Ill persons reported vomiting, diarrhea, fever, abdominal cramps, headache, body ache, nausea and dizziness. No food vehicle could be implicated. No food handlers reported illness.
- An outbreak of norovirus (G2) occurred in Will County in April. Eighteen persons became ill (two confirmed as norovirus genogroup 2) after eating a meal at a restaurant. Contaminated work surfaces was identified as a contributing factor. Ill food handlers prepared foods. No specific food was implicated in transmission.
- An outbreak of genotype 1 norovirus was identified in two persons who consumed a meal at a restaurant in Whiteside County in April. Both ills were laboratory confirmed by RT-PCR and experience vomiting, diarrhea, fever and abdominal cramps. No single item was epidemiologically identified as the food vehicle. No food handlers reported illness.
- In McHenry County, ten people became ill after consuming ice cream from a restaurant in June. Laboratory investigation identified the genotype 2 norovirus in specimens from two patrons. The median incubation period was 25 hours. Epidemiological evidence and supporting information implicated vanilla ice cream as the food vehicle. An anonymous caller said food handlers were ill.
- In July, a confirmed norovirus (G2) outbreak occurred in 15 patrons of a restaurant in McHenry County. Of those ill, 87 percent reported diarrhea and 73 percent reported vomiting. Laboratory testing confirmed the same subtype of norovirus in five patrons and one child of an employee. No food item could be implicated in the outbreak, but contaminated surfaces were reported as a contributing factor. Although no food handlers reported gastrointestinal illness, a child of an employee was ill and tested positive.
- In October, a norovirus G1 subtype outbreak occurred in a LaSalle County
school. An estimated 100 persons became ill. No specific food or drink item could be identified as the source of the outbreak. Information about employee illnesses was not available.

- In December a norovirus G2 subtype outbreak occurred following a catered wedding reception for 200 persons in LaSalle County. An estimated 52 people became ill. No food or drink item was linked to illness. Food handlers tested negative but no information about their illness status was available.

- The last confirmed outbreak occurred in a Warren County college, with an estimated 119 persons ill with norovirus G2 after a banquet. Because Warren County has no local health department, the IDPH rapid response team did the investigation. Eight food handlers reported illness in the week before the banquet. No single food item could be identified as the cause of the illnesses.

**Suggested readings**


**Waterborne**

**Descriptive epidemiology**

An outbreak of Pontiac fever was identified after exposure to a hotel whirlpool in August in Stephenson County. Guests at the hotel were interviewed. Exposure to the whirlpool spa and pool area was a risk factor for illness. The spa filter backwash tested positive for *Legionella dumoffii* at the Illinois Department of Agriculture Laboratory and for *L. micdadei* and *L. macheachernii* at the CDC. The mean incubation period was 48 hours. Sixty-eight persons reported illness. Symptoms reported by ill persons included headache (63), myalgia (58), fever (54), cough (38) and diarrhea (10). One person was hospitalized. Fourteen persons tested negative on urine antigen, seven were negative on sputum, two persons had a four-fold rise in titer to *Legionella micdadei*. The whirlpool and pool were superchlorinated and the filter changed.

**Suggested Readings**

Table 5. Foodborne and waterborne outbreaks in Illinois in 2002.

<table>
<thead>
<tr>
<th>IDPH Log #</th>
<th>Onset Date</th>
<th>City of exposure</th>
<th>County</th>
<th># ill/# exposed</th>
<th>Symptoms</th>
<th>Incub (hrs)</th>
<th>Foods implicated</th>
<th>Agent</th>
<th>Status</th>
<th>Contributory causes</th>
<th>Place of prep/ Place eaten</th>
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<td>Franklin Park</td>
<td>Cook</td>
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<td>U</td>
<td>C</td>
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<td>1/2</td>
<td>Schaumburg</td>
<td>Cook</td>
<td>4/5</td>
<td>V,D,F</td>
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<td>unknown</td>
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<td>C,H</td>
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<td>Lee</td>
<td>32/71</td>
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<td>Bradley</td>
<td>Kankakee</td>
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<td>PF</td>
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<td>V,D</td>
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<td>U</td>
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<td>U</td>
<td>C</td>
<td>concession stands/arena</td>
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<td>U</td>
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<td>Fairview Hgts</td>
<td>St Clair</td>
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<td>Kane</td>
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<td>C,T</td>
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<td>2/27</td>
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<td>Cook</td>
<td>7/8</td>
<td>V,AC</td>
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<td>IF,H</td>
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<td>Canton</td>
<td>Fulton</td>
<td>56/93</td>
<td>V,D,F,AC,HA,BA</td>
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<td>S, 1 lab positive</td>
<td>IF</td>
<td>workplace/workplace</td>
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1BA=body ache, 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, H=inadequate food handler hygiene, IF=ill food handlers, IC=inadequate cooking, PF=laboratory positive food handler, T=improper holding temperatures, F=unsafe foods, ICL=inadequate cleaning, CE=storage in contaminated environment, U=unknown; 4rest=restaurant
<table>
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<tr>
<th>IDPH Log #</th>
<th>Onset Date</th>
<th>City of exposure</th>
<th>County</th>
<th># ill/# exposed</th>
<th>Symptoms</th>
<th>Incub (hrs)</th>
<th>Foods implicated</th>
<th>Agent</th>
<th>Status</th>
<th>Contributory causes</th>
<th>Place of prep/ Place eaten</th>
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<td>Bloomingdale</td>
<td>DuPage</td>
<td>10/42</td>
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<td>water, celery</td>
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<td>U</td>
<td>U</td>
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<td>U</td>
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<td>multiple</td>
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<td>Whiteside</td>
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<td>Foods implicated</td>
<td>Agent</td>
<td>Status^2</td>
<td>Contributory causes^3</td>
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<td>H</td>
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<td>Incub (hrs)</td>
<td>Foods implicated</td>
<td>Agent</td>
<td>Status²</td>
<td>Contributory causes³</td>
<td>Place of prep/ Place eaten³</td>
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<td>McHenry</td>
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<td>T, IC</td>
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<td>Freeport</td>
<td>Stephen</td>
<td>68/89</td>
<td>F,HA, cough</td>
<td>48</td>
<td>pool</td>
<td>Legionella, Pontiac fever</td>
<td>S</td>
<td>U</td>
<td>whirlpool/whirlpool</td>
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<td>8/11</td>
<td>Mt Prospect</td>
<td>Cook</td>
<td>4/4</td>
<td>V,D</td>
<td>35</td>
<td>unknown</td>
<td>Norovirus</td>
<td>S</td>
<td>U</td>
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<td>Chicago</td>
<td>Cook</td>
<td>4/ unknown</td>
<td>D,V,AC</td>
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<td>U</td>
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<td>2002-70</td>
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<td>Country Club Hills</td>
<td>Cook</td>
<td>6/7</td>
<td>D,AC,HA</td>
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<td>B. cereus/C. perfringens</td>
<td>S</td>
<td>T, C</td>
<td>restaurant/restaurant</td>
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<td>2002-69</td>
<td>8/20</td>
<td>Naperville</td>
<td>DuPage</td>
<td>8/8</td>
<td>V,D</td>
<td>42</td>
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<td>S</td>
<td>H</td>
<td>restaurant/restaurant</td>
</tr>
<tr>
<td>2002-72</td>
<td>8/22</td>
<td>Downers Grove</td>
<td>DuPage</td>
<td>13/28</td>
<td>V,D, AC</td>
<td>37</td>
<td>unknown</td>
<td>norovirus</td>
<td>S</td>
<td>H, C</td>
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<tr>
<td>2002-73</td>
<td>8/24</td>
<td>Woodstock</td>
<td>McHenry</td>
<td>10/unknown</td>
<td>D,AC,HA</td>
<td>9</td>
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<td>B. cereus/C. perfringens</td>
<td>S</td>
<td>U</td>
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</tr>
<tr>
<td>2002-74</td>
<td>8/26</td>
<td>Gurnee Mills</td>
<td>Lake</td>
<td>17/unknown</td>
<td>D</td>
<td>51</td>
<td>unknown</td>
<td>Shigella sonnei</td>
<td>C</td>
<td>H, IF, PF</td>
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<tr>
<td>2002-75</td>
<td>9/9</td>
<td>Dekalb</td>
<td>DeKalb</td>
<td>5/7</td>
<td>V,D,AC</td>
<td>31</td>
<td>unknown</td>
<td>unknown</td>
<td>U</td>
<td>U</td>
<td>restaurant/restaurant</td>
</tr>
<tr>
<td>2002-76</td>
<td>9/24</td>
<td>Canton</td>
<td>Fulton</td>
<td>900 estimated/ 2000</td>
<td>D,AC</td>
<td>12</td>
<td>roast beef, mashed potatoes, gravy</td>
<td>C. perfringens</td>
<td>C</td>
<td>T</td>
<td>prison/prison</td>
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<tr>
<td>2002-79</td>
<td>10/11</td>
<td>DesPlaines</td>
<td>Cook</td>
<td>2/2</td>
<td>V,D,HA,AC</td>
<td>4</td>
<td>unknown</td>
<td>B. cereus/S.</td>
<td>S</td>
<td>C</td>
<td>restaurant/restaurant</td>
</tr>
</tbody>
</table>

¹ Symptoms: F - fatigue, V - vomiting, D - diarrhea, A - abdominal pain, C - chills, H - headache, P - rash
² Status: S - sick, H - healthy, C - convalescent
³ Contributory causes: IF - ingestion, PF - person to person, U - unknown
<table>
<thead>
<tr>
<th>IDPH Log #</th>
<th>Onset Date</th>
<th>City of exposure</th>
<th>County</th>
<th># ill/# exposed</th>
<th>Symptoms</th>
<th>Incub (hrs)</th>
<th>Foods implicated</th>
<th>Agent</th>
<th>Status</th>
<th>Contributory causes</th>
<th>Place of prep/Place eaten</th>
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</thead>
<tbody>
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<td>2002-81</td>
<td>10/20</td>
<td>Rolling Meadows</td>
<td>Cook</td>
<td>2/8</td>
<td>D,AC</td>
<td>7</td>
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<td>unknown</td>
<td>U</td>
<td>C</td>
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<td>Naperville</td>
<td>DuPage</td>
<td>22/30</td>
<td>V,D</td>
<td>36</td>
<td>unknown</td>
<td>unknown</td>
<td>U</td>
<td>U</td>
<td>restaurant/home</td>
</tr>
<tr>
<td>2002-83</td>
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<td>Oglesby</td>
<td>LaSalle</td>
<td>100 est/unknown</td>
<td>V,AC</td>
<td>24-48</td>
<td>norovirus, G1</td>
<td>U</td>
<td>C</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>norovirus</td>
<td>C</td>
<td>U</td>
<td>home&amp;school/school</td>
<td></td>
</tr>
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<td>Cook</td>
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<td>norovirus</td>
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<td>U</td>
<td>restaurant/home</td>
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<td>2002-112</td>
<td>10/31</td>
<td>Chicago</td>
<td>Cook</td>
<td>4/4</td>
<td>D,V</td>
<td>6</td>
<td>unknown</td>
<td>unknown</td>
<td>U</td>
<td>U</td>
<td>restaurant/restaurant</td>
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<td>Cook</td>
<td>33/51</td>
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<td>H</td>
<td>restaurant/restaurant</td>
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<td>2002-84</td>
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<td>Kewanee</td>
<td>Henry</td>
<td>9/9</td>
<td>V,D,AC</td>
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<td>unknown</td>
<td>norovirus</td>
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<td>U</td>
<td>restaurant/work</td>
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<td>2002-87</td>
<td>11/19</td>
<td>Silvis</td>
<td>Rock Island</td>
<td>48/59</td>
<td>D,AC</td>
<td>10</td>
<td>turkey</td>
<td>unknown</td>
<td>U</td>
<td>H,T</td>
<td>elderly hi-rise/elderly hi-rise</td>
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<tr>
<td>2002-88</td>
<td>11/22</td>
<td>McHenry</td>
<td>McHenry</td>
<td>24/77</td>
<td>D</td>
<td>15</td>
<td>turkey</td>
<td>C. perfringens</td>
<td>C</td>
<td>T</td>
<td>home&amp;cafeteria/DD facility cafeteria</td>
</tr>
<tr>
<td>2002-89</td>
<td>11/25</td>
<td>Joliet</td>
<td>Will</td>
<td>157/unknown</td>
<td>V</td>
<td>1-2</td>
<td>USDA chicken tenders</td>
<td>ammonia</td>
<td>C</td>
<td>F</td>
<td>school/school</td>
</tr>
<tr>
<td>2002-100</td>
<td>11/27</td>
<td>Naperville, St Charles, Lisle</td>
<td>Winnebago ,Kane, DuPage, mult-state</td>
<td>13/unknown</td>
<td>BD,D,AC</td>
<td>36</td>
<td>lettuce</td>
<td>E. coli O157:H7</td>
<td>C</td>
<td>U</td>
<td>restaurant/restaurant</td>
</tr>
<tr>
<td>2002-90</td>
<td>12/1</td>
<td>Edwardsville</td>
<td>Madison</td>
<td>9/unknown</td>
<td>V,D,F</td>
<td>24</td>
<td>norovirus</td>
<td>unknown</td>
<td>S</td>
<td>U</td>
<td>restaurant/worksite</td>
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<tr>
<td>2002-94</td>
<td>12/2</td>
<td>Monmouth</td>
<td>Warren</td>
<td>119/unknown</td>
<td>D,V,AC</td>
<td>unknown</td>
<td>norovirus, G2</td>
<td>unknown</td>
<td>C</td>
<td>U</td>
<td>college/college</td>
</tr>
<tr>
<td>IDPH Log # 2002</td>
<td>Onset Date</td>
<td>City of exposure</td>
<td>County</td>
<td># ill/# exposed</td>
<td>Symptoms¹</td>
<td>Incub (hrs)</td>
<td>Foods implicated</td>
<td>Agent</td>
<td>Status²</td>
<td>Contributory causes³</td>
<td>Place of prep/ Place eaten⁴</td>
</tr>
<tr>
<td>----------------</td>
<td>------------</td>
<td>------------------</td>
<td>--------</td>
<td>----------------</td>
<td>-----------</td>
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<td>-----------------</td>
<td>-------</td>
<td>---------</td>
<td>---------------------</td>
<td>---------------------------</td>
</tr>
<tr>
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<td>12/4</td>
<td>Ransom</td>
<td>LaSalle</td>
<td>40/94</td>
<td>V,F</td>
<td>24</td>
<td>unknown</td>
<td>norovirus</td>
<td>S, only 1</td>
<td>U</td>
<td>school&amp;home/school</td>
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<td>Chicago</td>
<td>Cook</td>
<td>38/44</td>
<td>D,V,F,AC</td>
<td>30</td>
<td>enchiladas, nachos</td>
<td>norovirus</td>
<td>S</td>
<td>U</td>
<td>restaurant/restaurant</td>
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<td>2002-99</td>
<td>12/7</td>
<td>Itasca</td>
<td>DuPage</td>
<td>33/62</td>
<td>D,AC</td>
<td>11</td>
<td>unknown</td>
<td>B. cereus/ C. perfringens</td>
<td>S</td>
<td>U</td>
<td>restaurant/restaurant</td>
</tr>
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<td>2002-101</td>
<td>12/5</td>
<td>Schaumburg</td>
<td>Cook</td>
<td>2/2</td>
<td>V</td>
<td>11</td>
<td>unknown</td>
<td>Unknown</td>
<td>U</td>
<td>C</td>
<td>restaurant/restaurant</td>
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<td>2002-103</td>
<td>12/16</td>
<td>Ottawa-caterer/Spring Valley-event</td>
<td>Bureau/LaSalle</td>
<td>40/45</td>
<td>V,D,AC,HA</td>
<td>23</td>
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<td>S</td>
<td>U</td>
<td>caterer/banquet hall</td>
</tr>
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<td>2002-107</td>
<td>12/18</td>
<td>LaGrange Park</td>
<td>Cook</td>
<td>4/18</td>
<td>V,D,AC</td>
<td>5</td>
<td>unknown</td>
<td>S. aureus</td>
<td>S</td>
<td>C,H</td>
<td>restaurant/restaurant</td>
</tr>
<tr>
<td>2002-106</td>
<td>12/19</td>
<td>Oak Lawn</td>
<td>Cook</td>
<td>4/76</td>
<td>V,D,AC</td>
<td>12</td>
<td>unknown</td>
<td>unknown</td>
<td>U</td>
<td>U</td>
<td>restaurant/restaurant</td>
</tr>
<tr>
<td>2002-105</td>
<td>12/21</td>
<td>Unknown</td>
<td>LaSalle</td>
<td>52/200</td>
<td>V,D,AC</td>
<td>24</td>
<td>unknown</td>
<td>norovirus G2</td>
<td>C</td>
<td>F</td>
<td>caterer/pavilion</td>
</tr>
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</table>
Giardiasis

Background

*Giardia*, which causes the disease giardiasis, 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*. 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 and reporting to CDC increased in this year. In 2002, 21,206 cases were reported to CDC. From 1998 to 2002, a greater number of case reports were received for children aged 1-9 years of age and for adults 30-39 years of age compared with other age groups. Incidence of giardiasis was highest in northern states and the peak illness onset occurred from early summer through early fall.

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 reported in Illinois in 2002 - 871 (five-year median = 1,150); the incidence rate was seven per 100,000 population. Reported cases have declined since 1997 (see Figure 49). In addition, there were 140 *Giardia* carriers (Giardia
identified in stool but no clinical disease) reported in 2002. CDC numbers for giardiasis in Illinois for 2002 are 1,011 (including both cases and carriers). The following information only includes cases, not carriers.

- **Age** - Mean age of cases was 30. The age group with the highest incidence was 1 to 4 years of age (see Figure 50).
- **Gender** - 41 percent were female. Males appear to have a higher incidence in the 1-to-4-year-old age group, the 30-to-39-year-old age group and the 40-to-49-year-old age group.
- **Race/ethnicity** - 90 percent were white, 6 percent were African American and 4 percent were other races; 12 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** - Most cases occurred in summer to fall, from August through October (Figure 51).
- **Geographic variation** - Highest incidence rates per 100,000 for giardiasis occurred in central Illinois (Figure 52). One-year incidence rates for the period 1998 to 2002 ranged from 0 to 31 per 100,000 population by county. Counties with the highest average annual giardiasis incidence rates per 100,000 population from 1998-2002 were DeWitt (30), Champaign (16), Peoria (20), Tazewell (17) and Jersey (18).

**Summary**

Giardiasis cases decreased (871) in 2002 compared to the previous five-year median (1,150). Whites were overrepresented in the case population for giardiasis (90 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 was 30, and more cases occurred in the warmer months of the year. Centrally located counties and counties in the northwestern part of the state had the highest incidence of giardiasis in the state.

**Suggested readings**

Figure 52. Average Annual Giardiasis Incidence Rates per 100,000 by County, Illinois, 1998-2002
Hemolytic Uremic Syndrome (HUS)

Background

HUS is characterized by 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. HUS occurs primarily in children younger than 5 years of age after infection by a diarrheal agent producing shiga toxin. HUS usually occurs within two to 14 days of 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 2002, 216 cases of HUS were reported to CDC from 34 states.

Antibiotic therapy has been identified as a risk factor for HUS development and antibiotics should be withheld for treatment until culture confirms that *E. coli* O157:H7 is not present in stool of patients with diarrhea.

A quarter of persons develop long-term renal sequelae following HUS according to a meta-analysis of the literature. Also, severity of the acute illness, especially if CNS symptoms occurred and if dialysis was needed, was strongly associated with worse prognosis in the meta-analysis.

In CDC’s FoodNet sites from 1997 to 2001 there was a 9 percent fatality rate associated with HUS and the median age was 5 years. The median number of days hospitalized was 11 days. In those younger than 5 years of age, the incidence rate per 100,000 was 1.6. In those 5 to 14 years of age, the incidence rate was 0.3 per 100,000.

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 13 years or older, 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

- Four cases of HUS were reported from persons with confirmed *E. coli* O157:H7. These cases were reported to CDC as *E. coli* O157:H7, not as HUS due to a reporting error. These four cases ranged in age from 3 to 50 years. Onsets
ranged from January to September. Two of the four cases were put on dialysis; Three cases were also reported with thrombotic thrombocytopenic purpura. No cases were fatal. One case was linked to a known outbreak. Counties in which cases occurred were Stephenson (2), Lake (1) and DuPage (1).

Summary

Overall, four cases of HUS were reported in Illinois in 2002 and all were confirmed *E. coli* O157:H7 cases; no cases of HUS were fatal. All HUS cases were in person with confirmed *E. coli* O157:H7 cases. These HUS cases were inadvertently left off of reporting to CDC as HUS. This has been corrected for 2003.

Suggested readings

VIRAL HEPATITIS

Viral hepatitis is the primary cause of hepatocellular carcinoma and is the eighth most common cause of cancer in the world. Acute infections with hepatitis A, hepatitis B, hepatitis C, hepatitis non-A, non-B non-C (NANBNC) and hepatitis B carriers are reportable in Illinois. Cases of acute infection must have either jaundice or liver enzymes elevated above normal. On April 1, 2001, reporting of hepatitis C became required so 2002 is the first full year of reporting. Although testing is available for hepatitis C, the role of currently available supplemental tests in diagnosing acute infection is limited. Hepatitis A is usually transmitted by fecal-oral contact or, rarely, by contamination of food by a food handler. Hepatitis B and C are transmitted through percutaneous and permucosal exposure to infective body fluids that may occur through blood transfusions, sharing needles in injection drug use, tattooing, acupuncture or needlestick injury. Hepatitis B can be transmitted through sexual contact. Hepatitis C also may be transmitted through sharing of equipment for intranasal cocaine use. Of the 471 reported acute hepatitis cases in Illinois in 2002, 262 (55 percent) were hepatitis A, 185 (39 percent) were hepatitis B, 13 (3 percent) were hepatitis C and 11 (2 percent) were other types of hepatitis. The percent of hepatitis A cases was lower in 2002 (55 percent) than in 2001 (66 percent) and the percent of hepatitis B was higher in 2002 (39 percent) than in 2001 (32 percent). A comparison of characteristics of these types of hepatitis is found in Table 6 and includes only cases for whom information was gathered on the hepatitis reporting form.

Jaundice was reported in 84 percent of reported hepatitis A cases, in 70 percent of hepatitis B cases, in 80 percent of hepatitis, unspecified and in 50 percent of hepatitis C cases. Hospitalization occurred for 30 percent of hepatitis A cases, 31 percent of hepatitis B cases, 20 percent of hepatitis, unspecified and 50 percent of hepatitis C.

Risk factors for the four types of hepatitis are described in Table 7. Hepatitis C cases were more likely to report a history of injection drug use (50 percent) than were hepatitis A cases (4 percent) or hepatitis B (1 percent) or hepatitis, unspecified (0 percent). Hepatitis A cases were more likely to report travel outside the U.S. or Canada (30 percent) compared to hepatitis B cases (2 percent), or hepatitis, unspecified (0 percent) or hepatitis C (0 percent). Cases reporting more than one sexual partner, from highest to lowest, were hepatitis C (25 percent), hepatitis B (20 percent), hepatitis A (18 percent) and hepatitis, unspecified (0 percent). Less than 5 percent of hepatitis cases of each type reported being employed in a medical field that could entail blood contact. Cases who reported receiving tattoos, from highest to lowest, were hepatitis, unspecified (20 percent), hepatitis C (17 percent), hepatitis A (5 percent) and hepatitis B (4 percent).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Hepatitis A</th>
<th>Hepatitis B</th>
<th>Hepatitis C</th>
<th>Hepatitis, unspecified</th>
</tr>
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<td>%²</td>
<td># (total # reporting)¹</td>
<td>%²</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Age</td>
<td>32 (260)</td>
<td>37 (185)</td>
<td>39 (13)</td>
<td>43 (11)</td>
</tr>
<tr>
<td>Female</td>
<td>98 (262)</td>
<td>37</td>
<td>55 (185)</td>
<td>30</td>
</tr>
<tr>
<td>Race</td>
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</tr>
<tr>
<td>Asian</td>
<td>16 (240)</td>
<td>7</td>
<td>7 (169)</td>
<td>4</td>
</tr>
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<td>41 (240)</td>
<td>17</td>
<td>58 (169)</td>
<td>34</td>
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<tr>
<td>White</td>
<td>181 (240)</td>
<td>75</td>
<td>104 (169)</td>
<td>61</td>
</tr>
<tr>
<td>Other</td>
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<td>1 (169)</td>
<td>0.6</td>
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<tr>
<td>Hispanic</td>
<td>72 (239)</td>
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<td>11 (185)</td>
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<tr>
<td>Clinical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaundice</td>
<td>185 (220)</td>
<td>84</td>
<td>129</td>
<td>70</td>
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<td>Hospitalized</td>
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<td>31</td>
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<tr>
<td>Deaths</td>
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<td>0.9</td>
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</table>

¹ number of cases reporting that factor (total number of cases interviewed about that factor)

Source: Illinois Department of Public Health, 2002
Table 7. Number and Percentage of Cases with Risk Factors for Hepatitis A, B, C and hepatitis, unspecified in Illinois, 2002

<table>
<thead>
<tr>
<th>Factor</th>
<th>Hepatitis A (N=262)</th>
<th>Hepatitis B (N=189)</th>
<th>Hepatitis C (N=13)</th>
<th>Hepatitis, unspecified (N=11)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td># (total # reporting)¹</td>
<td>% ²</td>
<td># (total # reporting)¹</td>
<td>% ²</td>
</tr>
<tr>
<td>Day care contact</td>
<td>5(220)</td>
<td>2</td>
<td>5(185)</td>
<td>3</td>
</tr>
<tr>
<td>Household contact of hepatitis A case</td>
<td>40(193)</td>
<td>21</td>
<td>2(185)</td>
<td>1</td>
</tr>
<tr>
<td>Food handler</td>
<td>14(220)</td>
<td>6</td>
<td>7(185)</td>
<td>4</td>
</tr>
<tr>
<td>Ate raw shellfish</td>
<td>16(202)</td>
<td>8</td>
<td>1(185)</td>
<td>1</td>
</tr>
<tr>
<td>Common source</td>
<td>2(199)</td>
<td>1</td>
<td>0(185)</td>
<td>0</td>
</tr>
<tr>
<td>Travel</td>
<td>62(208)</td>
<td>30</td>
<td>4(184)</td>
<td>2</td>
</tr>
<tr>
<td>Contact to Hepatitis B or C case</td>
<td>2(191)</td>
<td>1</td>
<td>15(185)</td>
<td>8</td>
</tr>
<tr>
<td>Dialysis contact</td>
<td>1(204)</td>
<td>0.5</td>
<td>4(185)</td>
<td>2</td>
</tr>
<tr>
<td>Medical field employee</td>
<td>8(160)</td>
<td>5</td>
<td>7(185)</td>
<td>4</td>
</tr>
</tbody>
</table>

¹ number of cases reporting that factor (total number of cases interviewed about that factor)
² Percentage is number of cases with the risk factor divided by total number with information provided on that risk factor multiplied by 100.

Source: Illinois Department of Public Health
Table 7. Number and Percentage of Cases with Risk Factors for Hepatitis A, B, C and hepatitis, unspecified in Illinois, 2002 (continued)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Hepatitis A (N=262)</th>
<th>Hepatitis B (N=185)</th>
<th>Hepatitis C (N=13)</th>
<th>Hepatitis, unspecified (N=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># (total # Reporting)¹</td>
<td># (total # reporting)¹</td>
<td>%²</td>
<td># (total # Reporting)¹</td>
</tr>
<tr>
<td>Injection drug user</td>
<td>8(200) 4</td>
<td>2(185) 1</td>
<td>3(6) 50</td>
<td>0(5) 0</td>
</tr>
<tr>
<td>Sexual preference</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterosexual</td>
<td>92(126) 73</td>
<td>86(185) 46</td>
<td>6(6) 100</td>
<td>5(5) 100</td>
</tr>
<tr>
<td>Homosexual</td>
<td>31(126) 25</td>
<td>28(185) 15</td>
<td>0(6) 0</td>
<td>0(5) 0</td>
</tr>
<tr>
<td>Bisexual</td>
<td>3(126) 2</td>
<td>6(185) 3</td>
<td>0(6) 0</td>
<td>0(5) 0</td>
</tr>
<tr>
<td>Number of sexual partners</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>39(128) 30</td>
<td>18(185) 10</td>
<td>2(4) 50</td>
<td>0(4) 0</td>
</tr>
<tr>
<td>1</td>
<td>66(128) 52</td>
<td>58(185) 31</td>
<td>1(4) 25</td>
<td>4(4) 100</td>
</tr>
<tr>
<td>2-5</td>
<td>19(128) 15</td>
<td>28(185) 15</td>
<td>1(4) 25</td>
<td>0(4) 0</td>
</tr>
<tr>
<td>&gt;5</td>
<td>4(128) 3</td>
<td>9(185) 5</td>
<td>0(4) 0</td>
<td>0(4) 0</td>
</tr>
<tr>
<td>Dental work</td>
<td>25(185) 13</td>
<td>20(185) 11</td>
<td>1(6) 17</td>
<td>1(5) 20</td>
</tr>
<tr>
<td>Other surgery</td>
<td>9(190) 5</td>
<td>11(185) 6</td>
<td>1(6) 17</td>
<td>1(5) 20</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>1(187) 0.5</td>
<td>5(185) 3</td>
<td>0(6) 0</td>
<td>0(5) 0</td>
</tr>
<tr>
<td>Tattoos</td>
<td>10(197) 5</td>
<td>7(185) 4</td>
<td>1(6) 17</td>
<td>1(5) 20</td>
</tr>
<tr>
<td>Needlestick</td>
<td>1(189) 0.5</td>
<td>7(185) 4</td>
<td>0(6) 0</td>
<td>0(5) 0</td>
</tr>
</tbody>
</table>
**Hepatitis A**

**Background**

Hepatitis A (HAV) is one of the most frequently reported vaccine preventable diseases. Primates are the only natural hosts. There is only one serotype and immunity after infection is lifelong. The hepatitis A rate in the United States in 2002 was three per 100,000. HAV is spread from person to person by the fecal-oral route. 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). 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. 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 post-exposure 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 a study in Amsterdam they found that approximately 50 percent of contacts to a HAV case were immune. Of the non-immune contacts, 28 percent had a coprimary infection, 34 percent developed a secondary infection despite administration of immune globulin within two weeks of disease onset in the patient. Only 6 percent of contacts developed a secondary symptomatic infection.

Hepatitis A vaccines have been available in the United States since 1995. CDC has recommended hepatitis A vaccination for MSM’s, certain travelers, injection drug users, persons in certain occupations, persons with chronic liver disease and children in communities with high rates of hepatitis A.

In 2000, the city of Chicago made available hepatitis A vaccine to Vaccine For Children (VFC) providers in the city. Rates of HAV have declined since 1998 in Chicago.

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. Hepatitis A outbreaks have been associated with fresh produce consumption.

For food handlers with hepatitis A, CDC guidelines recommend that post-
exposure prophylaxis be considered if 1) during the time when the food handler was infectious, the food handler both directly handled uncooked foods or foods after cooking and had diarrhea or poor hygienic practices; and 2) patrons can be identified and treated within two weeks after the exposure. Good personal hygiene is difficult to define.

In a study of reported risk factors for persons reported to CDC with hepatitis A from 1990 to 2000, the proportion of cases attributable to each risk factor was as follows: Unknown (48 percent), household or sexual contact (14 percent), MSM (10 percent), day care (8 percent), IDU (5 percent), international travel (5 percent), common source outbreak (4 percent) and other contact (8 percent).

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 2002 - 262 (five-year median = 821) (see Figure 53).
- Age - Incidence was highest in 5- to 9-year-olds (4 per 100,000) (mean age = 43) followed by the 20-to-29-year-olds (3 per 100,000) and 1-to-4-year-olds (3 per 100,000) (see Figure 56). The overall incidence rate for hepatitis A was 2.1.
- Gender - Among those ages 10 to 49, the incidence of hepatitis A in males was higher than in females (See Figure 54).
- Race/ethnicity - 75 percent were white, 17 percent African American and 8 percent other races; 30 percent were Hispanic. Hispanics were overrepresented in the case population as compared to the Illinois population.
- Employment - Six percent of hepatitis A cases were food handlers.
- Seasonal variation - Cases increased from January through March and in August and September (see Figure 55).
- Geographic variation - The five counties with the highest average annual incidences of hepatitis A per 100,000 population for 1998 to 2002 were Madison (7), Cook (8), Boone (9), Winnebago (8) and Kane (6). The average annual incidence of hepatitis A by county, from 1998 to 2002, is found in Figure 56.
- Risk factors – Household contact with a hepatitis A case, 40 (21 percent), travel outside the United States or Canada, 62 (30 percent) and consumption of raw shellfish, 16 (8 percent). (Figure 57) Symptoms/outcomes - 84 percent of reported cases were jaundiced. Thirty percent of cases were hospitalized. Two deaths were linked to acute hepatitis A.

Summary
Hepatitis A is the most commonly reported acute infectious hepatitis in Illinois. The incidence rate (2.1 per 100,000) was lower than the national incidence (3.0 per 100,000). The number of cases has been decreasing dramatically in the last two years. This may be due to the greater availability of HAV vaccine. The mean age of cases was 45 years, although the highest incidence (3.8 per 100,000) in 2002 occurred in 5- to 9-year-olds. Hispanics were overrepresented in hepatitis A cases.

Suggested readings
Figure 55. Hepatitis A Cases in Illinois by Month, 2002
Figure 56. One-year Hepatitis A Incidence Rates per 100,000 by County, Illinois, 1998-2002
Figure 57. Risk Factors Reported by Illinois Hepatitis A Cases, 2002

- Travel: 40%
- Multiple: 24%
- Household/sexual contact of hepatitis A case: 21%
- MSM: 13%
- Other: 2%
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. 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. An estimated 15 percent to 25 percent of persons with chronic hepatitis B will progress to cirrhosis or hepatocellular carcinoma.

A vaccine became available in 1982. In Illinois, hepatitis B vaccination in children was mandated in 1997. CDC also recommends vaccination for MSM’s, certain travelers, injection drug users, heterossexuals 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 2002, 7,996 acute hepatitis B cases (3 per 100,000) were reported to CDC from across the United States. In 2002, the Midwest region had the lowest incidence in the United States. (1.6 per 100,000). In 2002, men had a higher incidence (3.7 per 100,000) as compared to women (2.2 per 100,000).

In the United States there has been more than a 67 percent decrease in hepatitis B since 1990. The decline was highest in children and adolescents probably due to childhood immunization for hepatitis B. The national strategy is to screen pregnant women for hepatitis B and provide post-exposure prophylaxis to infants born to infected women, routine vaccination of all infants and children younger than 18 years of age and vaccination of others at increased risk of acquiring hepatitis B. For children younger than 18 years of age, the rate has decreased by approximately 90 percent since 1990.

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 2002: 185 confirmed acute cases (five-year median = 218) (see Figure 58). The overall one-year incidence rate of reported acute hepatitis B in Illinois was 1.5 cases per 100,000 population.
- Age: Incidence rate was highest in the 30- to 39-year-old age group (mean age = 37 years) (Figure 59).
- Gender: 70 percent were male. The incidence in males was higher than in females.
- Race/ethnicity: 31 percent of cases were African American, 56 percent were white and 4 percent were Asian; 6 percent were Hispanic.
- Risk Factors: Risk factors identified as occurring in cases from six weeks to six months prior to illness included more than one sexual partner (51 percent), MSM (15 percent), employment in a medical field that entails blood contact (4 percent), tattoos (4 percent), needlestick injury (4 percent) and injection drug use (1 percent).
- Symptoms/outcomes: 70 percent of hepatitis B cases were jaundiced and almost 31 percent were hospitalized.

**Summary**

There were 185 confirmed hepatitis B cases reported in Illinois in 2002. Numbers of reported cases in Illinois declined from 1996 through 2000, increased in 2001, then decreased in 2002 as compared to 2001. Almost 70 percent were jaundiced and almost one-third were hospitalized.
Figure 59. Age Distribution of Hepatitis B Cases in Illinois, 2002

Number of cases

Year

<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
Hepatitis C

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 for 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. The prevalence of HCV in non-injection drug users in a study in Italy was 20 percent.

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. In a study of transfusion related hepatitis C in the United States from 1968 through 1980, the risk for developing cirrhosis was 17 percent. Heavy alcohol use increased the risk for developing cirrhosis. Anti-HCV positive persons had a five- to 50-fold higher risk of primary hepatocellular carcinoma compared to anti-HCV negative patients. These sequelae typically take 20 or more years to develop. Hepatitis C related disease is the leading indication for liver transplantation.

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.

Reporting of acute hepatitis C infection (a person with a supplementary positive test for hepatitis C) began in Illinois on April 1, 2001. Thus, 2003 is the second year with a full year of reporting of acute hepatitis C infection. It is difficult to monitor acute hepatitis C rates because there is no serologic marker for acute infection and limited resources for investigation.

Case definition
The CDC case definition which is used in Illinois 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).

Descriptive Epidemiology
- Number of cases in Illinois in 2002 – 13 cases of acute hepatitis C.
- Age – Acute hepatitis C cases ranged from 17 to 62 years (mean age = 39) (see Figure 62).
- Gender - 54 percent of acute hepatitis C cases were male.
- Race/ethnicity - For acute hepatitis C cases, 69 percent of cases were white, 23 percent were African American and 8 percent were Asian; none were Hispanic.
- Risk factors - For acute hepatitis C, three of six (50 percent) cases reported a history of injection drug use.
- Symptoms/outcomes - 50 percent of six acute hepatitis C cases with histories were hospitalized and no cases were fatal.

Suggested Readings

Hepatitis, unspecified

Background
Acute hepatitis for which a cause is not found is called hepatitis, unspecified. In the United States, approximately 10 percent of cases of acute hepatitis are classified as hepatitis of unknown etiology. Hepatitis D and E virus would be included in this section. Some other possible agents causing acute hepatitis include hepatitis G virus.

In the United States, 1835 cases of hepatitis C and hepatitis non-A non-B were reported in 2002.

Case definition
The CDC case definition is used in Illinois for hepatitis NANB. It requires a discrete onset of symptoms and jaundice or elevated serum aminotransferase levels (>2 times the upper limit of normal). Laboratory confirmation requires IgM anti-HAV-negative, IgM anti-HBc negative (if done) or HBsAg negative.

Descriptive epidemiology
- Number of cases in Illinois in 2002 - 11 cases of acute hepatitis, unspecified.
- Age – Unspecified hepatitis cases ranged from 28 to 61 years (mean age = 43) (see Figure 61).
- Gender - 64 percent of unspecified hepatitis cases were male.
- Race/ethnicity - For unspecified hepatitis cases, 91 percent of cases were white and 9 percent were African American; 27 percent were Hispanic.
- Risk factors - For unspecified hepatitis, 0 percent of 5 (0 percent) cases reported a history of injection drug use.
- Symptoms/outcomes - 20 percent (1 of 5) of unspecified cases were hospitalized and no cases were fatal.

Summary
In 2002, there were 11 cases of reported unspecified hepatitis reported in Illinois.
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
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 2002 - 57 (five-year median = 59) (see Figure 60). At least 14 (25 percent) of these cases were in immunocompromised individuals; therefore, it is not possible to determine whether they represent new infections or reactivation of previous infections.
- Age - Mean age was 44 (Figure 61).
- Race/ethnicity - 70 percent were white, 14 percent were African Americans and 2 percent were Asian; 7 percent were Hispanic.
- Disease type - 32 cases had information available. Cases were localized to the respiratory system (24 cases) and disseminated infections (8 cases). Of 39 cases with chest x-ray results, 34 (87 percent) had abnormalities identified.
- Symptoms – cough, 34 (81 percent), fever, 33 (73 percent); difficulty breathing,
27 (64 percent) and chest pain, 20 (54 percent).

- **Diagnosis** - All cases were reported as confirmed; 33 cases (58 percent) were confirmed by culture. Cultures were positive from blood (12), bone or bone marrow (2), sputum (4), bronchial wash (10), lung (6) and skin (1). Three persons had cultures from multiple sites. Twelve had positive smears from the following sources blood (5), bone (4), sputum (1), other or unknown (3). One had smears positive from multiple sites. Fifteen were M band positive by immunodiffusion. Thirteen had complement fixation titers; four of these also were positive by M band testing. For 24 cases, more than one diagnostic method was positive. For eight cases, the diagnostic method was not available at the time this report was written.

- **Seasonal variation** - No seasonal trend (See Figure 62).

- **Geographic variation** - The four counties reporting the most cases were Cook (9), Champaign (7), Macon (7) and Sangamon (7).

- **Reports of exposure to the following** - Potting soil, nine (25 percent), excavation, six (15 percent), construction, five (14 percent), dirt arenas, five (14 percent), plowing, four (10 percent), pigeon droppings, three (8 percent), attics, two (6 percent) and caves, none (0 percent).

- **Outcomes** – 28 (55 percent) were hospitalized; four cases were fatal.

- **Outbreaks** - No outbreaks were reported in 2002.

**Summary**

Only 57 cases were reported in 2002 as compared to 98 in 2001. Two outbreaks of histoplasmosis in 2001 resulted in higher numbers for that year.
Figure 61. Age Distribution of Histoplasmosis Cases in Illinois, 2002

Number of cases

0 5 10 15 20

0-9 yr 10-19 yr 20-29 yr 30-39 yr 40-49 yr 50-59 yr >59

Age Category

Figure 62. Histoplasmosis Cases in Illinois by Month, 2002

Number of cases

0 2 4 6 8

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

Month
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. Legionnaires disease may be epidemic or sporadic, nosocomial or community acquired. The incubation period for Legionnaires disease is two to 10 days (average five to six days) and, for Pontiac fever, it is five to 66 hours (average 24 to 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. An outbreak of Pontiac fever occurred in patrons of a restaurant in Tennessee. Water from a large fountain at a restaurant was implicated as a source and illness was caused by *Legionella anisa*.

*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. Urine antigen tests can produce a result within 15 minutes. *Legionella* in the urine can be identified as early as one day after symptom onset and may persist for days to weeks. Culture requires adequate processing of specimens and special media. Growth may take three to five days. Lower respiratory tract specimens are the specimens of choice for culture. However, fewer than half of patients with Legionnaires disease produce sputum. Culture of *Legionella* in any human specimen indicates disease as *Legionella* is not a colonizing organism. Testing for *Legionella* species is not performed by the IDPH laboratory. Most test results among reported cases are from hospital or commercial laboratories. On July 1, 2002, it became mandatory to forward isolates of *Legionella* to the IDPH laboratory.

In 2002, 1,321 cases of *Legionella* were reported to CDC from state health departments.
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 four-fold 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 2002 - 28 (five-year median =33) (Figure 63). Case report forms were available for 26 of the cases.
- Age - 75 percent were older than 50 years of age (see Figure 66).
- Geographic distribution - 13 cases were reported from Cook County.
- Risk factors - Three of 19 cases (16 percent) had been hospitalized continuously for three or more days before onset; none were discharged from the hospital within 10 days before onset; 18 (75 percent) had no hospital visits in the 10 days before symptoms, one had other types of health care exposure and seven cases had no information on hospital visits. Seven of 18 cases (39 percent) traveled overnight in the two weeks prior to onset. At least one underlying health problem (diabetes, cancer, transplant, renal dialysis, corticosteroid therapy, other immunosuppressive condition or smoking) was reported by 14 of 20 (70 percent) cases; six reported no underlying health problems.
- Diagnosis - Cases were diagnosed through urine antigen alone (17), serology only (2), culture alone (5), direct fluorescent antibody of respiratory secretions alone (1) or culture in combination with other tests (0) or unknown (3).
- Outcomes - Hospitalization was required for 25 cases with hospitalization information available; All 25 cases (100 percent) with information available had x-ray confirmed pneumonia; four fatalities occurred but not all may have been directly caused by *Legionella* infection.
- Outbreaks – An outbreak of Pontiac fever was identified in August 2002 in Stephenson county. Thirty-one of 36 persons staying at a hotel from August 9 through August 11 reported high fever, headache and muscle aches. Two persons showed a four-fold elevation in antibody titer to Legionella although no titers reached a level of greater than 1:128. Multiple *Legionella* species were identified in pool and spa backwash including *L. dumoffii*, *L. micdadei* and *L. maceachernii*. Factors that may have contributed to the outbreak included spa temperatures averaging 104 F, bromine residuals less than 4 ppm, the length of time between filter backwashes, the filter backwash flow rate, and the length of time between complete spa drain down and refill. Illness risk increased with increasing time exposed to the pool/spa area. The cases from this outbreak did not raise the number of reported legionellosis cases as compared to previous years because most did not meet the surveillance case definition to be counted.
in the CDC surveillance system.

Summary

In 2002, there were 28 cases of legionellosis reported in Illinois. Fourteen of 20 cases had pre-existing medical conditions. An outbreak of Pontiac fever was reported from Stephenson County in 2002.

Suggested readings


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 this 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 more than 23 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. 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. A study of culture confirmed Lyme disease cases showed that approximately 59 percent of the rashes were homogenous and of a median size of 10 cm at three days after onset of the rash or after the rash first appears. 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. These tests are recommended for patients to be diagnosed with EM according to the public health surveillance case definition only where there is no known exposure.

The Infectious Diseases Society of America issued guidelines recommending 14 to 21 days of an oral antibiotic for the treatment of erythema migrans. In February 2002, the only human Lyme disease vaccine was removed from the market due to low demand and sales.

There were 23,763 cases of Lyme disease (8 per 100,000) reported in 2002 in the United States, mainly from the Northeast, mid-Atlantic and north-central regions of the country. This was an increase of 40 percent compared to 2001 numbers. All states except Hawaii, Montana and Oklahoma reported cases during 2002. States reporting incidence higher than the national average were Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Wisconsin. These states accounted for 95 percent of cases reported nationally. A history of EM was reported for 68 percent of U.S. cases in 2001 and 2002. Arthritis was reported in 33 percent, Bell’s palsy (8 percent) and radiculopathy (3 percent) of cases. Meningitis, encephalitis and heart block were reported in less than 1 percent of cases.

Effective prevention measures include personal protective measures (e.g. tick checks, repellents) and decreasing tick exposure.
Case definition

The surveillance case definition for Lyme disease in Illinois is the same as the CDC definition: 1) erythema migrans, 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 \textit{B. burgdorferi} from a clinical specimen, or demonstration of diagnostic immunoglobulin M or immunoglobulin G antibodies to \textit{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 cases without EM. Persons with disseminated or late stage Lyme disease almost always have a strong IgG response to \textit{B. burgdorferi}, therefore, the IgG antibody test should be performed.

Descriptive epidemiology

- Number of cases reported in Illinois in 2002 - 47 (five-year median = 32) (See Figure 65). The incidence was 0.38 per 100,000.
- Age - Cases ranged in age from 3 to 75 years.
- Gender - 33 cases (70 percent) were male.
- Race/ethnicity - 46 cases were white, one was Hispanic and for two the race was unknown.
- Seasonal distribution – Lyme disease case onsets are more common in the summer months from May to September (Figure 66).
- Geographic distribution - The Illinois exposure locations for the 2002 cases are shown in Figure 67.
  - Two persons reported exposures in multiple counties in Illinois
  - Twenty-three cases reported exposures outside of Illinois
    - Connecticut (1)
    - Iowa (1)
    - Massachusetts (1)
    - New York (1)
    - Pennsylvania (1)
    - Wisconsin (13)
    - Multiple states (3)
    - One case reported exposures in both the United States and Canada
    - One case reported an exposure in Europe
    - Unknown exposure location-1
- Tick Distribution – A map with the known distribution of known \textit{Ixodes scapularis} (the vector for Lyme disease) is provided (Figure 68).
- Symptoms - Qualifying manifestations were EM (37), rheumatologic signs (7) and neurologic signs such as Bell’s palsy (3).
Summary
For the 47 cases reported in Illinois residents during 2002, EM was the most common qualifying manifestation for Lyme disease. Lyme disease cases peak in summer months. The incidence in Illinois (0.4 per 100,000) was much lower than the national average (8 per 100,000) in 2002. However, cases have increased in Illinois since 1997.

Suggested readings
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 of 2 life stages (larval, nymphal, adult) identified.

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

Additional tick and host surveillance activities not depicted on this map may have been conducted by other agencies or 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 relaxed and sent in a crush-proof container to:

Illinois Department of Public Health
Entomologist, Division of Environmental Health
625 West Jefferson - 3rd Floor
Springfield, IL 62701
(217) 782-9000

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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 (Plasmodium 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. 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 malaria-endemic areas should take recommended chemoprophylaxis regimens and use appropriate personal protective measures against mosquito bites (mosquito netting and repellents). The risk of malaria depends on geographic location of travel, urban versus rural stay, type of accommodations, stay duration, time of the year, destination, elevation and compliance with preventive measures. 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.

In the United States, malaria is transmitted predominantly by the bite of an infective female anopheline mosquito in travelers overseas. Other less common methods would include infected blood products, congenital transmission or local mosquito borne transmission. The estimated incidence of malaria transmission by blood transfusion is less than 1 case per million units collected. During 2002, 1,430 malaria cases were reported in the United States. Most cases were imported, with twice as many cases occurring among U.S. residents traveling to malaria-endemic areas as occurred among foreign residents traveling to, and diagnosed in the United States. More than 75 percent of cases in U.S. residents were in persons not taking malaria chemoprophylaxis appropriately. Two cases of malaria in northern Virginia in 2002 were probably due to locally acquired mosquito-transmitted malaria. In the outbreak investigation, five mosquito pools of Anopheles spp were positive for malaria using the VecTest. For cases reported in the United States from 1992 through 1998, information
was available for 1,964 cases. The proportion of cases with each species was *P. vivax* (45 percent), *P. falciparum* (43 percent), *P. malariae* (4 percent), *P. ovale* (3 percent) and mixed (0.07 percent). More than 95 percent of patients with *P. falciparum* malaria became ill within two months after returning to the United States and 62 percent of the *P. vivax* or *P. ovale* cases had onset of symptoms more than two months after their return to the United States. Sixty-three percent of these *P. vivax* or *P. ovale* cases had taken appropriate chemoprophylaxis.

Inadequate compliance in chemoprophylaxis for malaria can be due to expensive drugs, drugs that have many side effects and drugs that are inconvenient to administer. Causal drugs act by killing parasites in the liver. Primaquine is a causal drug and is the only drug licensed for prevention of relapse.

There have been increases in cases in the United States probably due to increased international travel and immigration and increased antimalarial drug resistance.

**Case definition**

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

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2002 – 61, all of which were imported from outside the United States (five-year median = 71) (see Figure 69).
  Individual surveillance report forms were not available at the time of this report. Note: IDPH reported 62 cases to CDC because one was accidentally added on to the end of the year file; 61 is the correct number for 2002.
- Age – Peak occurred in the 40- to 49-year-old age group; the mean age was 37 (Figure 70).
- Race/ethnicity – 67 percent were African American, 24 percent were white, 6 percent were Asian and 4 percent were other races; 2 percent were Hispanic. There were significantly higher proportions of African Americans with malaria compared to their representations in the Illinois population and significantly lower proportions of whites and Hispanics with malaria compared to their representation in the Illinois population.
- Seasonal variation – Cases of malaria were reported throughout the year although there was an increase in the summer months (Figure 71).
- Speciation – The malaria species for 2002 are not available.
- Treatment/outcomes – Not available for 2002.
- Past infection - Not available for 2002.

**Summary**

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There were 61 reported cases of imported malaria identified in Illinois in 2002, which was the median number of cases in the previous five years. In 2002, Illinois had the fifth highest number of cases per state in 2002.

African Americans and Asians had a higher proportion of individuals with malaria than their representation in the Illinois population. Laboratories should forward blood smears to the IDPH 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).

**Suggested readings**


![Figure 69. Malaria Cases in Illinois, 1997-2002](image_url)
Figure 70. Age Distribution of Malaria Cases in Illinois, 2002

Figure 71. Malaria Cases in Illinois by Month, 2002
Measles

Background

Measles is a highly communicable viral disease with humans being the only natural host. Transmission most commonly occurs through airborne spread or through direct contact with nasal or throat secretions of infected persons. 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 three to seven days post-exposure. The disease can be prevented by proper immunizations. A two-dose vaccination schedule is recommended in the United States, one at 12-15 months and one at school entry (4-6 years) or by 11-12 years of age. Sustaining high levels of vaccination is important to limit indigenous spread of measles from cases imported into the United States.

Forty-four cases were reported to CDC; 18 were imported and 15 additional cases resulted from these imported cases. A source was not identified for the remaining eight cases because no link to importation was detected. The United States recorded three measles outbreaks (clusters of three or more cases) in 2002. However, a record low measles incidence of 0.15 cases per million population was reported during the same year.

On July 1, 2002, it became mandatory for laboratories in Illinois to report positive results for measles.

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 2002 – one indigenous case (See Figure 72).
- Age – The case was 13 years of age.
- Clinical Information – The case had onset of rash illness in November 2002 and died in February 2003 after developing encephalitis diagnosed by brain biopsy. The source of the patient’s illness was unknown. The patient reportedly had a history of one measles vaccination.
- Race/ethnicity – The case was a white Hispanic.
- Diagnosis – The case was diagnosed by brain biopsy.
- Geographic distribution – The case was from Cook County.
Summary
One case of measles was reported. The case developed encephalitis and died four months after onset.

Figure 72. Measles Cases in Illinois, 1997-2002
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 due to mumps infection. Winter and spring are the times of increased occurrence. Vaccination can prevent mumps. In 2002, 270 mumps cases were reported to CDC.

On July 1, 2002, it became mandatory for laboratories in Illinois to report positive results for mumps.

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 > 2 days, and without other apparent cause.

Descriptive epidemiology
- Number of cases reported in Illinois in 2002 – 18 (Figure 73).
- Age – Median age was 11 years (range, 2 years to 59 years).
- Gender – 61 percent were female.
- Race/ethnicity – 83 percent were white (15 cases), 6 percent were African American (1 case), 6 percent (1 case) were Asian and the other case was unknown. One case was Hispanic.
- Geographic distribution – Cases resided in 11 counties (Cook, DuPage, Henry, Lee, Madison, Marion, McHenry, Ogle, Peoria, St Clair, and Tazewell).
- Seasonal variation – Cases occurred from January through December.
- Fatalities – One fatality occurred in a Henry county resident.
- Immunization status – 12 cases were age-appropriately vaccinated; for two cases, vaccination status was unknown; and three cases had no vaccine history but were ages 44 to 59 years old.

Summary
The median age of the 18 reported mumps cases in 2002 was 11 years. More than half reported being appropriately immunized.
Pertussis

Background

Pertussis is caused by Bordatella pertussis and 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. Peaks in pertussis incidence have occurred every three to four years in the United States. This may be due to an accumulation of susceptibles in populations. Pertussis is a notifiable disease in every state in the United States. A resurgence of cases has been reported in the last decade in the United States. A total of 9,771 pertussis cases (3 per 100,000) were reported to CDC from states in 2002. Of these cases, 21 percent were in infants younger than 6 months of age (too young to have received three doses of vaccine); 3 percent occurred among children aged 6-11 months; 14 percent in 1 to 4-year-olds; 10 percent among 5 to 9-year-olds; 29 percent among 10 to 19-year-olds; 23 percent in those older than 20 years.

Complications were more common in adults than in adolescents. The secondary attack rate in family members older than 11 years of age was 11 percent. The main sources of infection in adolescents was schoolmates or friends and, in adults, it was the workplace or their children.

The attack rate is 80 percent among susceptible persons in contact with a case. For the first week, mild fever, coryza and cough are common. From week one through six, a paroxysmal cough, inspiratory whoop, and post-tussive vomiting may occur. From six to 12 weeks the intensity of cough decreases. 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 vaccination is recommended in the United States. only pertussis has increased in incidence in the past 20 years. Pertussis has increased in adults. Active immunization with five doses of vaccine at 2, 4, and 6 months, at 12-15 months and at school entry can prevent this disease. However, immunity from childhood vaccination decreases beginning five to 15 years after the last pertussis vaccine dose. Since 1995, the coverage rate with greater than three doses of a pertussis-containing vaccine has been greater than 94 percent among U.S. children aged 19-35 years. Whole-cell pertussis vaccination was introduced in the 1940s and cases declined to their lowest levels in 1976. In 1996, a polymerase chain reaction test was accepted by the CDC to confirm cases.

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.

On July 1, 2002, the reporting of positive laboratory results for pertussis became
mandatory. In addition, it became mandatory to forward isolates to the IDPH laboratory.

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 *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 *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 2002 – 231 (five-year median = 151) (Figure 76). The one-year incidence rate for pertussis was 1.9 per 100,000.
- Age – 35 percent occurred in those younger than 5 years of age as compared to 54 percent in 2001 (Figure 77). In 2002, 72 of 232 reported cases (31 percent) occurred in those older than 19 years of age that is higher than what was reported in the United States as a whole.
- Gender – Females comprised 52 percent of cases.
- Race/ethnicity – 89 percent were white, 9 percent were African American, 11 percent were in other races and 1 percent were of unknown race; 9 percent reported Hispanic ethnicity as compared to 16 percent in 2001.
- Seasonal variation — Cases increased in September and October (Figure 78). The outbreak in Crawford County occurred in August and September 2002.
- Outbreaks - One outbreak of pertussis occurred in an oil refinery in Crawford County (Figure 79). From August 1 through October 9, pertussis was diagnosed in 15 (10 percent) of 150 oil refinery workers from two separate operations who were linked by contact with a supervisor with pertussis. Two additional cases in households contacts to refinery workers were identified. Four cases were confirmed (one culture positive, one PCR positive and two epidemiologically linked cases) and there were 13 probable cases. A pulsed-field gel electrophoresis showed the isolate to be PFGE profile 13. After enhanced case finding, 24 cases of pertussis were linked to this outbreak, all in adults older than 19 years of age. Seven of these cases were in patients from the community, not known to be linked to the oil refinery. Close work contacts of the cases were given antibiotic prophylaxis.

Another outbreak occurred in Coles County with 68 percent older than the age of 14 years.
Summary

The number of yearly reported pertussis cases has been increasing since 2000 in Illinois. The highest incidence occurred in those younger than 5 years of age.

There were 231 pertussis cases reported in Illinois in 2002 including one outbreak in Crawford county involving 24 persons (10 percent of the total reported cases). An outbreak in an oil refinery was due to \textit{B. pertussis} PFGE pattern 13, the most common pattern in the United States. Outbreaks of pertussis can be controlled through prompt recognition and treatment of cases and antimicrobial prophylaxis for close contacts. Adolescent and adult pertussis cases have increased in Illinois and this follows a national trend in 2002 of 53 percent of pertussis cases in persons 10 years and older.

Suggested readings


Figure 78. Pertussis Cases in Illinois by Month, 2002

Figure 79. Epidemic Curve of Pertussis Outbreak Cases in Crawford County, August 1-October 11, 2002
Q fever

Background

Q fever is an acute rickettsial disease with Coxiella burnetti as the causative agent. Q fever is a worldwide zoonosis. There are two forms of the organism (Phase I and II). 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. Symptoms include fever, headache and severe sweats. Mild disease can be accompanied by hepatitis, pneumonia or meningoencephalitis. Chronic Q fever may appear as endocarditis. Animal workers are at higher risk of infection. 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 1998 to 1999 an outbreak occurred in France one month after lambing season when heavy winds were documented.

Sixty-one cases of Q fever were reported to CDC in 2002. Q fever became reportable in Illinois on April 1, 2001, due to possible bioterrorism concerns. Therefore, 2002 is the first full year of reporting.

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 four-fold 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 Illinois in 2002 – Three cases were reported
- Age – Ages of cases were 17, 39 and 50 years.
- Gender – Females comprised 33 percent of cases.
- Race/ethnicity – All three cases were white; one case was Hispanic.
- Seasonal variation – Two cases had onsets in January and one case in February.
• Location of cases - The three cases resided in DuPage, Winnebago and Williamson counties.

• Possible exposures – One case reported travel to Mexico and contact with goats, one case reported contact with an ill cat and the third case reported travel to Mexico one year prior to illness but had no contact with sheep or goats.

• Diagnosis – All three cases were diagnosed using serologic testing.

• Clinical presentation-All three cases were hospitalized; all three survived. Symptoms included myalgia (3 cases), fever (2), headache (2), cough (2), rash (1), pneumonia (1), endocarditis (1) and hepatitis (1).

Summary

Three cases of Q fever were reported in Illinois in the first full year of reporting.

Suggested readings

Rabies

Background

In the United States, rabies is a disease that primarily affects 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 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 must be differentiated from Guillain Barré syndrome. After two to 12 days, the patient may go into a coma and experience respiratory failure. Diagnosis is highly reliant on consideration of this rare disease and appropriate testing.

In 2002, the United States and Puerto Rico reported three cases of human rabies and 7,967 cases of animal rabies. Wild animals accounted for more than 92 percent of the animal cases reported in the United States; the top three species with rabies were the skunk, raccoon and bat. Illinois was one of four states reporting rabies in bats, but not in terrestrial animals. The top six rabies positive bats after speciation were the big brown bat (47 percent), Mexican free-tailed bat (27 percent), hoary bat (7 percent), red bats (6 percent), little brown bat (3 percent) and the silver-haired bat (3 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 is in August.

Over the past 20 years in Illinois, the skunk and the bat have been the main wildlife reservoirs of rabies virus. The last human case of rabies in Illinois was reported in 1954.

After a provoked bite, healthy dogs, cats and ferrets can be observed for 10 days rather than be euthanized and tested for rabies. Wild animals that expose a person should be tested for rabies if the animal is available for testing. However, rabbits and small rodents rarely are identified with rabies and testing of them is not encouraged. The need for testing exotic pets, captive animals and farm animals that bite a person are evaluated on a case-by-case basis by local animal control personnel and the staff of the Illinois Department of Agriculture (IDOA). The approved animal rabies vaccines are listed in the Compendium of Animal Rabies Prevention and Control (referenced in suggested readings list).

The three human cases of rabies reported in the United States all were identified with a bat strain of rabies. A bat associated strain of rabies (Mexican free-tailed bat variant) was found in March in a resident of California. The individual had found numerous bats in the house although he never reported direct contact with the bats. Twenty-eight health care workers received rabies PEP after working with the patient. Another case of rabies was identified in a 13-year-old boy from Tennessee who was infected with the silver-haired and Eastern pipistrelle rabies strain and had contact with a bat but did not mention a bite. The third human case in an Iowa resident had no known bat contact and was infected with the silver-haired and Eastern pipistrelle strain. From 1990 through the end of 2002, there have been 36 cases of human rabies in the
United States and Puerto Rico. Seven persons were infected outside the United States. Twenty-nine were infected in the United States; 27 with the bat variant. Only two of these cases reported a bite from a bat. The most likely explanation for the other cases is a bite that was unnoticed, unreported or ignored.

Travelers should be notified that appropriate PEP treatment is not always available in foreign countries, especially in much of Asia, Latin America and Africa. These areas may use nerve tissue-derived rabies vaccines that have unreliable potency and result in complications. Tissue culture vaccines may not be available in these countries.

**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 the brain or the nerves surrounding hair follicles in the nape of the neck), 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 the direct fluorescent antibody test (DFA). If samples are sent to CDC, 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 2002 – 4,006; 36 did not meet criteria established by the testing laboratories (IDOA and IDPH). Examples of unsatisfactory specimens are those determined to be too decomposed or too damaged to test. Thirty-one brains were DFA positive; all positive animals were bats (Table 7). Trends in animal rabies testing in Illinois are shown in Figure 80.
- Exposures to rabid bats – There were 31 rabid bat situations.
  - In 19 of the 31 rabid bat situations, no human exposures sufficient to result in the need for rabies post-exposure occurred. In 12 rabid bat situations, humans were exposed (Table 8). For seven situations, details on the exposure were recorded at IDPH. In one situation a sleeping person awoke to find the dog in the room with a bat and the person received PEP. In Cumberland County, a pet bat in the household resulted in the need for rabies PEP for family members. In the third situation, a bat was found in a room with sleeping family members who received rabies PEP. One person was bitten on the hand and the other was in the room sleeping where a bat was present; both were given rabies PEP. Another person had a bat fly into their hair and felt a sharp sensation and received rabies PEP. Six persons were given rabies PEP upon a health care provider’s advice after finding a dead bat. In one other situation, a bat was found in a home shrieking and was in the bedroom as well as other rooms and two persons received rabies PEP.
  - Domestic animals were either exposed or possibly exposed in seven of the situations (Table 8).
Condition of bat when found – Two of the rabid bats were down and unable to fly, two were found dead, one was killed by a pet, two were described as aggressive, two were found in a swimming pool and the behavior or status of the other 22 was not described.

Testing of bats – Bats accounted for all of the confirmed rabid animals in 2002 (positivity rate = 3 percent). The total number of bats tested for rabies was 912.

Geographic distribution – The rabid bats were widely dispersed across the state: Cook (3), Carroll (1), Coles (1), Cumberland (1), DuPage (3), Fayette (1), Jackson (4), Madison (1), Marion (1), McHenry (1), Sangamon (5), White (4), Will (3) and Winnebago (2) (Figure 81).

Speciation – 758 of 912 bats were speciated by the Illinois Natural History Survey. Twenty-three of the 31 positive bats were speciated. The following species were identified in the positive bat group; big brown bat (11), red bat (8), silver-haired bat (1), eastern pipistrelle (2) and unknown (1). Of the 735 negative bats that were sent for speciation, the following bats were identified: big brown bat (524), red bat (62), silver-haired bat (97), little brown bat (16), northern long-eared bat (11), hoary bat (9), eastern pipistrelle (8), evening bat (2) and unknown (6).

Seasonal variation – Figure 82 shows bats submitted for testing by month in 2002. Bats submitted for rabies testing increased in summer months.

Testing of skunks – Rabies testing was performed on 92 skunks in 2002 as compared to 82 in 2001. At least one skunk from each of 18 Illinois counties was tested; no skunks were tested in 66 counties. The following counties have submitted skunks for rabies testing: Cass, Clay, Cook, Crawford, DeKalb, DuPage, Hancock, Jackson, Jasper, JoDaviess, Kane, Lake, Madison, Mason, McLean, Sangamon, St. Clair and Will. The county submitting the largest number of skunks for testing was Will County with 36 skunks, followed by Cook County with 20 skunks. The number of skunks tested in Illinois increased between 2001 and 2002.

To maintain adequate surveillance in the state, the testing of skunks, the main terrestrial animal reservoir, must be maintained. Negative test results of wild terrestrial mammals is one factor used to determine whether rabies PEP (post-exposure prophylaxis) is recommended in cases of stray dog and cat bites.

Figure 83 shows the number of rabid skunks found in Illinois and the road kill index from 1975 through 2002. 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 is believed to indicate that conditions are suitable for a rabies epizootic in skunks. This occurred in the late 1970s and early 1980s, when the road kill index and the rate of skunks testing positive increased dramatically.

Rabies positivity rate – Table 9 shows the rabies positivity rate in different species of animals in Illinois from 1971 to 2002. This information can be useful in explaining why rabies PEP is not recommended for the large majority of
mouse, rat or squirrel bites. No rats, mice or squirrels have been identified with rabies in Illinois during the past 30 years. Because bats with rabies are identified almost every year in Illinois, rabies PEP is recommended for exposures for these animals and many other wild mammals unless they can be tested and are negative for rabies. When comparing the positivity rates for cumulative 1971-2002 data vs. 1991-2002 data, the percentage of skunks positive for rabies declined dramatically and the percentage of positive bats stayed very constant.

- Past incidence – Figure 84 shows animal rabies in the state since 1933. Peaks of rabies, 10 years apart, have occurred in the state until 1983. No peaks have occurred since that time.

**Summary**

Bats were the only species identified with rabies in Illinois in 2002. Testing of skunks for rabies is low in Illinois thereby decreasing the reliability of surveillance of the terrestrial animal reservoir in the state. This is the fourth consecutive year where no rabid skunks have been identified in the state. Local jurisdictions are encouraged to increase testing of skunks for rabies to maintain surveillance of this species. There have been no human rabies cases in Illinois since 1954.

**Suggested readings**


Table 8. Rabid animals found in Illinois in 2002

<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>891</td>
<td>31</td>
<td>3</td>
</tr>
<tr>
<td>Cat</td>
<td>1,022</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cattle/buffalo</td>
<td>35</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dog</td>
<td>1,421</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Coyote/fox</td>
<td>17</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ferret</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Horse/donkey</td>
<td>39</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Opossum</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Raccoon</td>
<td>139</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rodent/lagomorph</td>
<td>235</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sheep/goats</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Skunk</td>
<td>94</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>23</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3,970</strong></td>
<td><strong>31</strong></td>
<td><strong>-</strong></td>
</tr>
</tbody>
</table>

*Other species include deer, mink, shrew, pig, rabbit, shrew, tiger, wolf and weasel.
Source: Illinois Department of Public Health
Table 9. Animals positive for rabies (all bats) in Illinois and the type of exposure, 2002

<table>
<thead>
<tr>
<th>Date</th>
<th>Human exposure?</th>
<th>Animal exposure?</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>Person awoke to find dog with bat in its mouth; One person given rabies PEP</td>
<td>Dog</td>
</tr>
<tr>
<td>April</td>
<td>None</td>
<td>Cat</td>
</tr>
<tr>
<td>April</td>
<td>Found flopping on ground, handled with heavy gloves</td>
<td>None</td>
</tr>
<tr>
<td>May</td>
<td>Found in house, put coffee can over, no exposure</td>
<td>Cat</td>
</tr>
<tr>
<td>May</td>
<td>Found on porch; no exposure</td>
<td>Possible</td>
</tr>
<tr>
<td>May</td>
<td>None</td>
<td>Dog killed bat</td>
</tr>
<tr>
<td>June</td>
<td>Pet bat in household; three persons given rabies PEP</td>
<td>Unknown</td>
</tr>
<tr>
<td>July</td>
<td>Found on farm; no exposure</td>
<td>No</td>
</tr>
<tr>
<td>July</td>
<td>Found in room with sleeping persons; three family members given rabies PEP</td>
<td>Unknown</td>
</tr>
<tr>
<td>August</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>August</td>
<td>Found in swimming pool; no exposures</td>
<td>None</td>
</tr>
<tr>
<td>August</td>
<td>Found in swimming pool; one person may have received Rabies PEP</td>
<td>None</td>
</tr>
<tr>
<td>August</td>
<td>Yes; unknown type</td>
<td>Unknown</td>
</tr>
<tr>
<td>August</td>
<td>Found in room with sleeping persons; one bitten, other exposed; two given rabies PEP</td>
<td>No</td>
</tr>
<tr>
<td>August</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>August</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>August</td>
<td>No</td>
<td>Horse</td>
</tr>
<tr>
<td>August</td>
<td>Yes; details unknown</td>
<td>None</td>
</tr>
<tr>
<td>August</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>September</td>
<td>Boy brought it home; found dead; no rabies PEP</td>
<td>No</td>
</tr>
<tr>
<td>September</td>
<td>No</td>
<td>Cat</td>
</tr>
<tr>
<td>September</td>
<td>Found in bedroom; aggressive; two persons received rabies PEP</td>
<td>Unknown</td>
</tr>
<tr>
<td>September</td>
<td>Bat dead when found; physician recommended rabies PEP for six persons</td>
<td>Cat, cat euthanized</td>
</tr>
<tr>
<td>October</td>
<td>Yes; one person exposed</td>
<td>No</td>
</tr>
</tbody>
</table>
Table 10. Rabies positivity rate by animal species in Illinois

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bat</td>
<td>10,333</td>
<td>529</td>
<td>5.1</td>
<td>5,160</td>
<td>227</td>
<td>4.4</td>
</tr>
<tr>
<td>Cat</td>
<td>41,544</td>
<td>141</td>
<td>0.3</td>
<td>14,546</td>
<td>4</td>
<td>0.03</td>
</tr>
<tr>
<td>Cattle</td>
<td>3,236</td>
<td>214</td>
<td>6.6</td>
<td>804</td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td>Dog</td>
<td>41,781</td>
<td>110</td>
<td>0.3</td>
<td>18,236</td>
<td>5</td>
<td>0.03</td>
</tr>
<tr>
<td>Fox</td>
<td>1,407</td>
<td>72</td>
<td>5.1</td>
<td>222</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Horse</td>
<td>670</td>
<td>22</td>
<td>3.3</td>
<td>211</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mouse</td>
<td>4,650</td>
<td>0</td>
<td>0</td>
<td>605</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Raccoon</td>
<td>9,179</td>
<td>17</td>
<td>0.2</td>
<td>2,897</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rat</td>
<td>1,831</td>
<td>0</td>
<td>0</td>
<td>328</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Skunk</td>
<td>7,309</td>
<td>2,526</td>
<td>3.5</td>
<td>1,141</td>
<td>44</td>
<td>3.8</td>
</tr>
<tr>
<td>Squirrel</td>
<td>6,735</td>
<td>0</td>
<td>0</td>
<td>1,573</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Illinois Department of Public Health

Figure 78. Trends in Animal Rabies Testing in Illinois, 1990-2002
Figure 79. Rabid Animals in Illinois by County, 2002
Figure 80. Bat Testing for Rabies by Month

Figure 81. Reported Skunk Rabies and Road Kill Index in Illinois, 1975-2002

Figure 82. Animal Rabies in Illinois since 1933
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. On April 1, 2001, the reporting of animal bites to public health was discontinued and replaced with reporting of rabies potential human exposures (RPHE) (Section 690.601 Control of Communicable Disease Code). So, 2002 was the first full year with reporting of rabies, potential human exposure. The purpose of this change in reporting was to limit the reporting of animal exposures to local public health authorities to situations where consultation on rabies PEP was needed. All animal bites in Illinois are still 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.

Case definition
The definition of exposed person to be reported is:
1) Any contact (bite or non-bite) to a bat, or
2) Any contact (bite or non-bite) to 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 investigation forms obtained during the surveillance of potential human exposures to rabies in Illinois during 2002. 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 2002 - 165 potential human rabies exposures were reported.
- Age - The mean age of those exposed was 23.
- Gender - 53 percent of RPHE reports were in males.
- Race/ethnicity – 83 percent were white, 8 percent African American and 9 percent were unknown.
- Seasonal peak - Higher numbers of exposures occurred in the summer months
of August and September.

- Geographic location – 34 counties and 37 local health jurisdictions reported at least one RPHE. Eighty 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) or non-exposure (petting, handling, blood contact). Of the total exposures reported, 69 (43 percent) were due to animal bites, 44 (27 percent) from non-bite exposures and 45 (28 percent) no human exposure. In seven situations, the type of exposure was unknown.

Of the bite exposures, most bites were to the arm or hand, 48 (69 percent), followed by leg or foot, nine (13 percent), head or neck, two (3 percent) and multiple or other body part, four (6 percent) and unknown bite site, six (9 percent).

Of the 44 non-bite exposures, bats were found in the room with a sleeping person in 32 (73 percent) of the exposures, physical contact with a bat took place in 10 (23 percent) of the exposures and other types of exposures occurred in five (11 percent) of non-bite exposures. Three persons were included in both the bat found in the sleeping room and the physical contact with a bat. Bats were tested in nine of the 32 cases where they were found in a room of the house with a sleeping person. Six tested negative, two tested positive and one specimen was unsuitable for testing. For the 10 situations with physical contact with a bat, the bat was tested in two situations and was negative in both situations. For the other five situations, one involved a raccoon spitting into someone’s eye, a toddler in a room with an unknown type of exposure and three persons who had raccoon saliva on their hands and may have had breaks in the skin.

Animals causing exposure

Of animals causing exposures, 138 (84 percent) were wild, not domesticated animals. The types of animals causing exposures included bat, 107 (65 percent), cat, six, (4 percent), dog, 18 (11 percent), raccoon, 17 (11 percent), fox/coyote, two (1 percent), other, 11 (7 percent) and unknown, four (2 percent).

Of the 24 domestic animals exposing persons, 16 (67 percent) were stray and eight (33 percent) were owned. Fifteen (62 percent) of these animals had unknown vaccination history, three (12 percent) were not rabies vaccinated, two (8 percent) had at least one previous rabies vaccination, but were not up-to-date and four (17 percent) were up-to-date on rabies vaccinations. Only four of 18 owned dogs causing exposures were known to be up-to-date on their rabies vaccinations. Sixteen (67 percent) of bites from dogs and cats were provoked.

Eighty-six (52 percent) of the animals were not available for confinement or testing. Sixty-seven (41 percent) of the animals potentially exposing someone to rabies were submitted for rabies testing. Of the 67 animals tested for rabies, 51 (76 percent) were negative, 13 (19 percent) were rabies positive and three (4 percent) were unsuitable for testing. All positive animals were bats. The specimens that were unsuitable for testing were from bats. Thirty-one animals (all bats) tested positive for rabies, but not all were reported through the surveillance system for rabies, potential human exposure.
For domestic animal exposures, 18 (75 percent) were unavailable for either confinement or testing, two (8 percent) were tested for rabies and four (17 percent) were confined for observation. The owned domestic animals were owned by family, one (12 percent) or other person, seven (87 percent).

Thirty-two of 47 animals with information listed were reported to exhibit signs of rabies. Signs of rabies included aggression, 10 (42 percent), impaired locomotion, 14 (78 percent), no fear of humans, three (19 percent) or paralysis, one (8 percent). Other signs included seizures or death.

Rabies post-exposure prophylaxis (PEP)

Ninety-seven persons started rabies PEP. The first recommendation about whether rabies PEP was needed for an exposed person came from the following sources: public health personnel, 42 (43 percent), health care provider, 50 (51 percent), other sources, four (4 percent) and unknown, one (1 percent).

The final recommendation on rabies PEP came from public health personnel, 31 (32 percent), health care provider, 49 (50 percent), other, nine (9 percent), multiple, four (4 percent) or unknown, four (4 percent).

For 68 (77 percent) of 88 persons with information available, rabies PEP was given in an emergency room setting. Most rabies PEP was paid for by private insurance, 51 (52 percent), followed by Medicare or Medicaid, 12 (12 percent), no payment source, five (7 percent) and worker’s compensation, three (3 percent) and out-of-pocket expense, two (2 percent). Payment source was unknown for 24 persons. Two persons recommended for rabies PEP refused to be treated. One was a bite from a raccoon kept as a family pet and the other was from a bat found in the room with a sleeping person.

Rabies PEP was completed in 68 (78 percent) of 87 persons for whom information was available. In 19 persons, rabies PEP was not completed. In eight persons, rabies PEP was not completed because the animal was tested negative. Of these eight situations, four were bat exposures, two were raccoon and two were cat exposures. The rabies PEP recommendation for these eight persons was made by health care providers. In one of the 19 situations an individual was lost to followup; in five individuals there were other reasons they discontinued, for two persons, rabies PEP was not completed because the person refused; and for three persons, the reason was unknown. In 29 of 86 persons with information available (34 percent), rabies PEP would not have been indicated according to public health guidelines. In nine of these situations, the animal tested negative for rabies and the decision about rabies PEP could have been delayed till testing was completed. In the other situations, the bite from the dog or cat was provoked, there were no signs of rabies present in the animal and the animal was not available for testing or confinement. In eight situations, the bite was a provoked bite by a dog or cat or the dog or cat could be confined for observation. In 10 situations, the exposure could be considered a non-exposure. 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.

Sixty-eight persons completed rabies PEP. For 39 of 67 (58 percent) persons
completing rabies PEP and with information available, the ACIP rabies protocol for timing of injection was followed exactly. In 39 of 40 (97 percent) persons with information available, the recommended ACIP location of injection was correct. In one case vaccine was given in the gluteal muscle. Information on both timing and location of rabies PEP injections for 40 persons completing rabies PEP was available. Rabies PEP was given exactly according to ACIP guidelines in 26 of 40 (65 percent) of individuals. Only one person exposed 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. Forty-three 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. Twenty-eight percent of reported exposures were from bats found in a room with a sleeping person. In 28 percent of these situations, the bat was not available for testing. Education of the public and animal control personnel could result in increased submission of bats that have exposed person 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 and the cat. 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.

Fifty-one percent of rabies PEP recommendations were made by emergency room health care providers or other health care providers (HCP). This indicates the importance of providing HCPs with up-to-date information on rabies incidence in their area and on rabies PEP recommendations.

One-third of rabies PEP given in 2002 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. HCPs, 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, HCPs can contact LHD 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 42 percent of cases where rabies PEP was completed, the timing of injections was incorrect. 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 tickborne 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. In 2002, 1,104 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.

Tick vectors include the American dog tick (Dermacentor variabilis) and the lone star tick (Amblyomma americanum). Only about 1 percent to 5 percent of ticks may be infected with R. rickettsii in a given area. In order for one of these ticks to transmit the bacteria, it must be attached for at least four to six hours. 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. If a skin rash is present, it appears an average of three to five days after symptom onset. Only about 15 percent of patients have a rash on the first day of illness and less than one-half develop rash in the first 72 hours after illness. 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, nausea and it may be serious enough to lead to erroneous diagnoses such as appendicitis. The antibiotic of choice for treatment is doxycycline.

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 2002 – 11 probable and one confirmed case.
- Age - Cases ranged in age from 5 to 60 years of age.
- Gender - 10 cases were male (83 percent).
- Race/ethnicity - 12 cases were white; none were Hispanic.
- Geographic distribution - Sites of tick exposure for the cases included the
following Counties: Cook (1), Franklin (1), Kane (1), Pope (1), Randolph (2), Union (2), Wabash (1), Washington (1) and unknown (2).

• Seasonal variation - Onsets of the 12 cases occurred between April and October.
• Symptoms/outcomes - Five cases were hospitalized. None of the 12 cases were fatal. Three cases had complications. One case had respiratory difficulties, another had disseminated intravascular coagulation and renal failure and another case had acute respiratory distress syndrome, meningitis and renal failure.
• Past cases - Rocky Mountain spotted fever cases reported per year in the state were: 1991 (5), 1992 (2), 1993 (4), 1994 (11), 1995 (10), 1996 (4), 1997 (3), 1998 (1), 1999 (7), 2000 (5) and 2001 (12). Figure 83 shows the reported RMSF case exposure sites over time.

Summary
Most cases of RMSF occurred in summer months in locations throughout Illinois. Reported exposure locations for cases over time have occurred in many parts of the state with multiple cases per county in some southern Illinois counties.
Figure 83.

Illinois Exposure Locales for Rocky Mountain Spotted Fever 1993-2002

Single County Exposure Locales

1 - 2
3 - 4

Total number of RMSF cases reported between 1993-2002 is 68. The total number of patients citing single county exposure locales within Illinois is 46 cases. Unknown or multiple exposure locales are not shown on this map.

The primary vector of Rocky Mountain spotted fever (RMSF), the American dog tick, and the secondary vector, the lone star tick, should be presumed present throughout Illinois.
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. It is most important because the virus is a teratogen and can produce congenital anomalies or intrauterine death if a woman is infected during pregnancy. Immunization against rubella is recommended at 12-15 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.

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.

In 2002, 18 rubella cases were reported nationally to CDC. Most cases occurred in individuals born in countries where routine rubella vaccination is not practiced.

On July 1, 2002, it became mandatory for laboratories in Illinois to report positive laboratory tests for rubella to IDPH.

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 2002 – Two cases were reported.
- Age - The cases were 34 and 42 years of age.
- Race/Gender – Both cases were white; one case with information was not Hispanic.
- Gender - Both cases were male.
- Geographic distribution – One was a resident of DuPage County and one was a resident of LaSalle County.

Summary
In 2002, two rubella cases were reported in Illinois. Both cases were in adults.
Salmonellosis (non-typhoidal)

Background

There are more than 2,400 serovars of Salmonella. However, approximately 50 percent of human cases are caused by three serovars: 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. A national outbreak of S. enterica ser. Javiana linked to a Florida theme park was linked to tomato consumption. Another national outbreak of multidrug-resistant S. enterica ser. Newport was linked to ground beef consumption.

The number of produce associated outbreaks has been increasing in the United States along with an increase in consumption of fruits and vegetables from many different countries. The wide distribution of produce results in geographically dispersed outbreaks with low attack rates making these outbreaks hard to identify. An outbreak of Salmonella enterica ser. Newport in 1999 in residents of 13 states in the United States was linked to consumption of mangos. These mangos had been treated with hot water which may have been contaminated. Another outbreak was associated with the U.S. Transplant Games in 2002 and also involved consumption of a produce item, tomatoes, as the risk factor for illness.

Sixty-two persons had PFGE matched S. serotype Typhimurium including 40 customers of a dairy in Ohio, six household contacts and 15 dairy workers. Patients were from four states including Illinois (Chicago). Consumption of raw milk was epidemiologically linked to illness. Salmonella ser. Typhimurium with the same PFGE type as the human isolates was identified in milk from the dairy. Four barn workers were also asymptomatic carriers. In 2002, intrastate sale of raw milk for human consumption was legal in 28 states, including Ohio.

Sporadic S. enterica serotype Enteritidis cases have been linked to shell eggs in several studies. Eighty percent of outbreaks of S. enterica ser. Enteritidis reported to CDC between 1985 through 1999 were egg associated. Phage types reported for outbreaks were PT8 (43 percent), PT13a (22 percent), PT 4 (15 percent). Methods of prevention of egg-related outbreaks include keeping eggs below 45 F, cooling eggs thoroughly, substituting pasteurized eggs for raw shell eggs if the food will not be further cooked and use of pasteurized eggs in facilities with persons at greatest risk for serious complications.

Hospital and commercial laboratories are required to submit isolates of Salmonella to IDPH’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 35 percent of the reported infections in data from 2002. The incidence rate was 16 per 100,000 and ranged from nine to 22 at the nine FoodNet sites in 2002. From 1996 to 2000, *Salmonella* cases declined by 5 percent.

In the U.S. national surveillance data, 44,264 cases of *Salmonella* were reported to CDC. The four most common serotypes were Typhimurium, Enteritidis, Newport and Javiana.

Antibiotic resistance in bacteria is also becoming a problem. In 2000, an increase in *Salmonella* ser. Newport with multidrug resistance was identified (Newport-MDRAmpC). These strains were resistant to ampicillin, chloramphenicol, streptomycin, sulfamethoxazole, tetracycline, amoxicillin/clavulanic acid, cephalothin, cefoxitin and ceftiofur and had decreased susceptibility to ceftriaxone. Cattle on dairy farms were also identified with S. ser. Newport MDRAmpC.

Treatment of intestinal *Salmonella* infections can lead to a prolonged carrier state with culture positive even after three weeks. Treatment also did not decrease length of illness for intestinal *Salmonella*.

The United States Department of Agriculture, Food Safety Inspection Service does routine testing for *Salmonella* in animal carcasses. S. ser. Kentucky and Heidelberg were the most common serotypes in the broiler products, S. ser. Heidelberg and Hadar for ground turkey, S. ser. Montevideo in cattle and Derby for swine products. Up to 30 percent of carcasses or ground product contained *Salmonella* with differences in the different classes of animals. In 2002, S. ser. Typhimurium was the most common serotype isolated from clinical samples from bovine sources and from non-clinical specimens from chicken sources.

CDC has suggested that amphibians (e.g. frogs, toads, newts, and salamanders) may pose risks for salmonellosis in humans.

**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 2002 – 1,770 (see Figure 84 for number of cases since 1997). The annual incidence rate for salmonellosis in Illinois in 2002 was 14 per 100,000 population.
- Age – Salmonellosis occurred in all age groups (mean age = 30) (see Figure 85). However, the incidence rate was highest in those younger than 1 year of age (73 cases per 100,000 population in females and 78 per 100,000 in males).
- Gender – 55 percent were female.
- Race/ethnicity – 82 percent of cases were white, 14 percent African American and 3 percent other races; 11 percent were Hispanic.
- Seasonal variation – A peak in salmonellosis cases occurred from June through August in 2002 (Figure 86).
• Geographic distribution – The mean annual incidence rates for salmonellosis were highest in some scattered counties in the state (Figure 87). The five counties with the highest mean annual incidence rates per 100,000 population for salmonellosis from 1998-2002 were Kankakee (34), Montgomery (25), Wayne (24), Stephenson (24) and Jo Daviess (23).

• Serotypes – 90 percent of Illinois’ Salmonella isolates were sent to the IDPH laboratory for serotyping. The top 18 serotypes in 2002 are found in Table 11. The three most common serotypes were S. ser. Enteritidis (376, 23 percent), S. ser. Typhimurium (314, 20 percent) and S. ser. Heidelberg (171, 11 percent). Serotypes of Salmonella found in Illinois from 1994-2002 are shown in Table 12.

• Risk factors – A history of reptile contact was reported by 65 Salmonella cases in 2002, but a link between the reptiles and transmission of the infection could not be confirmed.
  - Cases reported contact with the following types of reptiles: snakes (22), lizards (16), turtles (15), not specified (2) and multiple types (10).
  - For those with reported reptile contact, the median age was 11 years; 14 cases were younger than 5 years of age.
  - Males accounted for half (51 percent) of the cases.
  - The two most common species in these cases were Enteritidis (14) and Typhimurium (18). Salmonella isolates from the subspecies I, II, III and IV have been associated with reptile contact and, for the 2002 reptile contact cases, the following serotypes from these groups were identified: Kua (1) and Montgomery (1).
  - Outbreaks - There were six confirmed foodborne outbreaks of Salmonella reported in 2002. (See the section of this report detailing foodborne outbreaks for more details.)

Summary

In 2002, 1,770 cases of Salmonella were reported in Illinois. The one-year incidence rate of Salmonella for 2002 was 14 per 100,000 population, which is lower than the average incidence reported at CDC’s FoodNet sites (16 per 100,000). The mean age for Salmonella cases was 30, 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 90 percent. The highest percentages of isolates were Typhimurium (20 percent), Enteritidis (23 percent) and Heidelberg (11 percent). S. ser. Heidelberg replaced S. ser. Newport as the third most common serotype in Illinois as compared to 2001. A higher percentage of Illinois isolates serotyped were S. ser. Enteritidis (23 percent) as compared to FoodNet data for 2002 (15 percent). Reptile contact was reported in 14 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 85. Salmonella Cases in Illinois by Age Group, 2002

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Figure 86. Salmonella Cases in Illinois by Month, 2002

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Figure 87. One-year Salmonellosis Incidence Rates for Illinois, 1998-2002

Source: Illinois Department of Public Health
Table 11. Top 18 *Salmonella* serotypes in Illinois, 2002

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Source: Illinois Department of Public Health

Table 12. Frequency of *Salmonella* Serotypes in Illinois, 1994-2002

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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 papilloma virus) 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 and pneumonia in newborns exposed to it during birth.

Chlamydia is reportable in all but one state. During 2002, 834,555 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.

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 2002 – 48,101; the overall incidence rate was 387 per 100,000 population. The number of cases increased by 90 percent from 1992 (25,253) to 2002 (48,101) (Figure 88).
- Age – Adolescents (ages 15 to 19) accounted for 33 percent of reported chlamydia cases (1,778 per 100,000) in 2002 (Figure 89). The average age of persons reported with chlamydia was 23.
- Gender – Most reported cases were in women (71 percent) due to screening efforts that target this group. The female-to-male ratio of reported cases was
Race/ethnicity – The racial distribution of cases was 49 percent African American, 22 percent white, less than 1 percent Asian/Pacific Islander and Native American and 28 percent other or unknown race.

Geographic distribution – Chlamydia is geographically distributed throughout the state. Cases were reported from all 102 counties. The five counties with the highest incidence rates per 100,000 were Alexander (667), St. Clair (595), Cook (573), Peoria (569) and Macon (527).

The IDPH laboratories conducted more than 200,000 chlamydia tests during 2002 with a positivity rate of 7.3 percent.

Summary
Chlamydia is the most commonly reported sexually transmitted disease in Illinois. Cases were reported from all counties in Illinois during 2002. Adolescents had the highest incidence rates. Reasons for the increase in cases from 1992 to 2002 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. The United States recorded 351,852 cases of gonorrhea in 2002. 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.

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 2002 – 24,026; case rate was 193 per 100,000 population. Reported cases in 2002 were similar to the number reported in 2001 (Figure 90). 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 61 percent of reported cases in 2002 and adolescents (ages 15 to 19) for 27 percent (Figure 91). The case rate among adolescents is much higher than among the general population: 732 cases per 100,000 vs. 193 per group for the total population. The average age of gonorrhea cases in 2002 was 25 years: 27 years for males and 23 years for females.
- Race/ethnicity – Illinois minorities are disproportionately affected by gonorrhea. The reported cases among African Americans was 66 percent, while 11 percent were white, 0 percent were Asian/Pacific Islander and 23 percent were other or unknown race.
- Geographic distribution – At least one case of gonorrhea was reported in each of 91 Illinois counties. The five counties with the highest incidence rate in 2002 were Pulaski (395), Macon (352), Sangamon (343), Peoria (342) and St. Clair (328).
- The IDPH laboratory processed more than 200,000 gonorrhea tests with a positivity rate of 4.2 percent. The highest positivity rate was at STD clinics (10 percent).
Summary

Gonorrhea is the second most commonly reported sexually transmitted disease after chlamydia in Illinois. In Illinois in 2002, 27 percent of cases were in those 15-19 years of age.
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.

“Early syphilis” refers to syphilis infection of less than one year duration that has not yet progressed to: 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. In 2002, congenital syphilis rates decreased in the United States. In all regions except the northeastern United States. The rate of syphilis declined 12 percent in the Midwest between 2000 and 2002.

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

The CDC recorded 6,862 primary and secondary syphilis cases in the United States in 2002. The rate of infection was 2.2 per 100,000 population. In 2002, a total of 412 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 2002 – 41 congenital cases and 479 primary or secondary cases (Figure 92), an increase of 17 percent from 2001. The incidence rate for 2002 was 3.9 per 100,000 population for primary and secondary syphilis and 22 per 100,000 live births for congenital syphilis. Note: CDC summaries show 39 congenital syphilis cases reported from Illinois in 2002; two of the cases from Illinois were older than 11 months of age and were not counted in the CDC summary. For the purposes of this report, we will use 41 congenital cases.

• Age – The average age of persons diagnosed with primary and secondary syphilis is 36. Persons 30 to 44 years old accounted for 57 percent of primary and secondary cases (Figure 93).

• Gender – 77 percent of cases were male.

• Race/ethnicity – Minorities in Illinois are disproportionately affected by syphilis, especially African Americans, who accounted for 83 percent of the congenital syphilis cases. The proportion of primary and secondary syphilis cases by race were white (44 percent), African American (42 percent), and other or unknown races (14 percent). Twelve percent were Hispanic.

• Geographic distribution – Syphilis is more prevalent in urban populations. The disease has become progressively concentrated geographically. Cases were reported from 23 counties. The five highest incidence rates per 100,000 population for counties that had at least three cases were Cook (7.6), Vermilion (7.1), Winnebago (5.7), Champaign (3.9) and Madison (2.3).

• Clinical presentation – During 2002, there was a 74 percent increase (23 to 40) in reported neurosyphilis as compared to 2001; 31 (78 percent) of the 2002 cases were in men.

• Outbreaks – An outbreak of syphilis in men who have sex with men (MSM)
resulted in a 25 percent increase in reporting of primary and secondary syphilis among men during 2002 as compared to 2001. In 2002, of the 398 males with primary and secondary syphilis, 63 percent were MSM. Eighty percent of MSM were white and 49 percent were co-infected with HIV.

Summary
Primary and secondary syphilis cases increased by 17 percent in 2002 compared to 2001. Minority racial/ethnic populations are disproportionately affected by syphilis in Illinois. An outbreak of syphilis resulted in a 25 percent increase in reported primary and secondary syphilis among men during 2002 as compared to 2001.

Suggested readings
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/syndrome (those 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 23 percent of the reported infections in 2002 data. The incidence rate overall was 11 per 100,000 for *Shigella* with a range of two to 19 at the nine FoodNet sites. The number of *Shigella* infections increased in the United States in 2002.

In 2002, 12,992 *Shigella* isolates and 23,541 cases were reported to CDC. *S. sonnei* accounts for three-quarters of shigellosis cases in the United States. About 30 percent of isolates were from children younger than 5 years of age. Ninety-six percent of isolates were subgrouped. Subgroup D (*S. sonnei*) accounted for the largest percentage of isolates (83 percent), followed by subgroup B (*S. flexneri*, 12 percent), subgroup C (*S. boydii*, 0.8 percent) and subgroup A (*S. dysenteriae*, 0.3 percent). Illinois had the fourth largest number of *Shigella* cases reported through the Public Health Laboratory Information System (PHLIS) system.

Multicommunity outbreaks of shigellosis are a common problem which 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. Propogation 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 and exclusion of symptomatic children from day care. However, strict exclusion policies can lead to spread of an outbreak if excluded day care attendees are placed in alternative child care settings.

**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 2002 – 1,105 (five-year median = 1,188; see Figure 94. Overall annual incidence rate was nine per 100,000. The number of *Shigella* cases almost doubled between 2001 and 2002.
- Age – Median age = 9 (Figure 95). By age group, annual incidence rates per 100,000 were 1-4 years of age, 10; 5-9 years of age, 24; younger than 1 year old, 10; 10-19 years of age, six; 20-29 years of age, eight; 30-59 years of age, four; and 60 and older, two.
- Gender – 46 percent were female.
- Race/ethnicity – 61 percent were white, 37 percent were African American and 3 percent were other races; 27 percent were Hispanic. There were significantly higher proportions of African Americans and Hispanics with shigellosis compared to their representations in the Illinois population.
- Seasonal variation – Shigellosis cases occurred in all months of the year with a peak in the months of July, August and September (Figure 96).
- Geographic distribution – One-year incidence rates by county for 1998 to 2002 ranged from 0 to 30 per 100,000 population. The five highest annual incidence rates per 100,000 population for this time period were in Whiteside (30), Peoria (30), Crawford (26), Champaign (24) and Rock Island (24) counties. An outbreak in Stephenson county in 2002 resulted in an annual incidence rate of 23 per 100,000 for 1998 to 2002. Figure 97 shows county incidence for the state.
- Serotypes – 86 percent of isolates were serotyped in 2002. The most common species was *S. sonnei* (89 percent of typed isolates), followed by *S. flexneri* (10 percent). *S. boydii* and *S. dysenteriae* each made up 0.3 percent of typed isolates. The *boydii* serotypes found in Illinois were 2 and 14 and the *dysenteriae* serotypes were 3 and 4 (Tables 13 and 14). The two most common *S. flexneri* serotypes were 2 (36 cases) and 4 (23 cases) (Table 15). *S. sonnei* does not have differing subtypes.
- Foodborne outbreaks – There were no foodborne outbreaks of *Shigella* in 2002.
- Person-person outbreaks – A large county-wide *Shigella* outbreak occurred in Stephenson County (population: 48,979). Four cases occurred from 1996 to 2001. The first case in this outbreak occurred on November 13, 2002. From
November 7, 2002, through July 8, 2003, 305 probable or confirmed cases were reported in Stephenson County. Ninety-seven percent had diarrhea, 45 percent reported vomiting and 25 percent had bloody diarrhea. Seven percent were hospitalized. The epidemic curve is shown in Figure 98 and the map of cases is shown in Figure 99. Thirteen isolates from the outbreak matched by PFGE and were different than sporadic cases in the state. Of the 305 cases, 25 percent attended day care, 15 percent were in kindergarten, 3 percent were in kindergarten and day care and 22 percent were household contacts of kindergarten or day care students.

Summary
There were more than 1,000 reported cases of shigellosis in Illinois in 2002, almost double the reported 2001 case numbers. An outbreak occurred in Stephenson County. The incidence rate for 2002 was nine per 100,000, which is within the range reported at CDC’s FoodNet sites. The proportion who were Hispanic or African American was higher than the representation of each group in the Illinois population. The median age of cases was 9 years. S. sonnei was the most common species found in Illinois, which is the same as the most common species identified in CDC’s FoodNet sites. Isolates of Shigella are required to be submitted to the IDPH laboratories for speciation and/or serotyping (if this cannot be done by the clinical laboratory). This can help in outbreak identification.

Suggested readings
Figure 95. Age Distribution of Shigella Cases in Illinois, 2002

Figure 96. Shigella Cases in Illinois by Month, 2002
Figure 97. One-year Shigellosis Incidence Rates by County for Illinois, 1998-2002

Source: Illinois Department of Public Health
### Table 13. Frequency of *Shigella boydii* in Illinois, 1994-2002

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Source: Illinois Department of Public Health

### Table 14. Frequency of *Shigella dysenteriae* in Illinois, 1994-2002

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Source: Illinois Department of Public Health
Table 15. Frequency of *Shigella flexneri* subtypes in Illinois, 1994-2002

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Source: Illinois Department of Public Health
Figure 98. Shigella Outbreak Cases in Stephenson County by Week, November 2002-July 2003

Figure 99. Cases of Shigellosis in Stephenson County, November 2002-June 2003
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 < 4 ug/mL for growth inhibition as susceptible to vancomycin. Those requiring concentrations of 8-16 ug/mL as intermediate and those requiring concentrations of ≥ 32 ug/mL as resistant. S. aureus-with reduced vancomycin susceptibility (SA-RVS) includes all S. aureus isolates with MICS of vancomycin of ≥ 4 ug/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 ≥ 4 ug/mL.

Descriptive epidemiology

No cases were reported in 2002.

Summary

No cases were reported in 2002 in Illinois.
**Invasive Streptococcus 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, 3,012 isolates were collected in 2002, 9 percent exhibited intermediate resistance to penicillin and 11 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. A shortage of vaccine was reported between August 2001 and May 2003.

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.

In the National Immunization Survey for 2002, 41 percent of the 19-to-35-month-old children were reported to have received at least three doses of pneumococcal vaccine. In Illinois, 57 percent of those older than 65 years of age reported ever having a pneumococcal vaccination from the national Behavioral Risk Factor Survey.

A study in California from 1989 to 1998 identified the age-adjusted pneumococcal disease rate as two deaths per 100,000 population based on vital records data. Mortality rates were highest in those older than 85 years of age and reached 38 deaths per 100,000 population. The majority of deaths in the winter were due to pneumococcal pneumonia.

This year, 2002, was the first 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 2002 - 823 (See Figure 100). The incidence rate for 2002 was seven per 100,000.
- Age - Mean age of cases was 53 (see Figure 101 for age distribution). Incidence per 100,000 of reported *S. pneumoniae* in those younger than five years of age was 12 and for those aged 65 years and older was 22.
- Gender - 51 percent were female.
- Race/ethnicity - 22 percent were African American and 77 percent were white; 6 percent were Hispanic.
- Seasonal peak - The majority of cases occurred in the winter and spring months (Figure 102).
- Diagnosis – *S. pneumoniae* was isolated from blood (764), CSF (81), pleural fluid (18), peritoneal fluid (18), joint (6), and pericardial fluid (1).
- Clinical - The most common types of disease reported were bacteremia 709 (86 percent), meningitis 88 (11 percent) and other 26 (3 percent).
- Underlying conditions - The most common underlying conditions for invasive pneumococcal disease was chronic cardiovascular (189) and chronic pulmonary disease (177).

Summary

This year was the first complete year for mandatory invasive *S. pneumoniae* reporting. On April 1, 2001, mandatory reporting of invasive *S. pneumoniae* began. In previous years, only meningitis due to *S. pneumoniae* was reportable. According to reported invasive *S. pneumoniae* cases, Illinois already meets the Healthy People 2010 objectives for reducing the incidence of invasive pneumococcal disease.

Suggested readings


MMWR. Pneumococcal conjugate vaccine shortage resolved. MMWR 2003; 52 (19): 446.
**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. The symptoms of STSS include fever, myalgia, vomiting, diarrhea, confusion, soft tissue swelling, renal dysfunction, respiratory distress and shock. In a California study, more than half of all necrotizing fasciitis cases were in injection drug users. A third of non-injection drug user cases reported a history of recent spider or insect bite at the site of infection. Clusters of GAS have occurred in health care workers from exposure to a patient with invasive GAS. Outbreaks of group A Streptococcus pneumonia have been reported. In late 2002, an outbreak of 31 cases occurred in a military depot in California.

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.

Treatment guidelines have been established by the Infectious Diseases Society for GAS pharyngitis. Chemoprophylaxis is not recommended for all household contacts to cases of invasive GAS. Household members should monitor themselves for signs and symptoms for 30 days after exposure. Health care providers may chose to offer chemoprophylaxis to household contacts if they are more than 64 years of age or those at increased risk for sporadic invasive GAS infection (HIV infection, diabetes mellitus, chickenpox infection, cancer, heart disease, injection drug use, steroid use, Native Americans).

*S. pyogenes* can be subtyped based on emm type. In five states with active surveillance from 1995 through 1999, the most common emm types were 1, 28, 12, 3 and 11. Predictors of death from invasive GAS were older age, presence of streptococcal toxic shock syndrome, meningitis or pneumonia; and infection with emm 1 and emm 3. The overall case fatality rate for invasive GAS disease was 12.5 percent.

During 2002, 986 cases of invasive GAS were reported from the Active Bacterial Core Surveillance site projects in nine states. Incidence was highest in children younger than one year of age (7 cases per 100,000) and adults greater than 65 years (9 cases per 100,000). STSS accounted for 6 percent and necrotizing fasciitis accounted for 6 percent of cases. The overall case fatality rate was 15 percent. In routine surveillance, 4,720 cases were reported to CDC and 118 cases of streptococcal TSS. In a study in Montreal, Canada, from 1995 to 2001, the yearly reported incidence of invasive group A Streptococcus was 2.4 per 100,000, with a 14 percent death rate. In
In this study, 37 percent of infections were soft-tissue, 28 percent were bacteremia, 10 percent pneumonia and 10 percent STSS. The incidence of pneumonia increased from 1995 to 2001.

**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 2002 – 279 invasive GAS cases and 47 streptococcal toxic-shock syndrome (five-year median for both types= 224) (see Figure 103). The incidence was 2.6 per 100,000 population.
- Age – Mean age was 53 (Figure 104). By age group, the highest incidence per 100,000 occurred in those older than 79 years of age (14), followed by those 70 to 79 years of age (8) and 60 to 69 years of age (4). At least 25 cases were residents of long-term care facilities.
- Gender – 49 percent were female.
- Race/ethnicity – Cases were 79 percent white, 19 percent African American and 2 percent other races; 11 percent were Hispanics.
- Geographic distribution – 48 percent were residents of Cook County.
- Seasonal variation – Cases were more likely to occur during the winter and spring months (Figure 105).
- Positive cultures – Cultures were positive from blood, 253 (81 percent), tissue, 22 (7 percent), synovial fluid, 19 (6 percent), pleural fluid, 11 (3 percent), pericardial fluid, five (2 percent), cerebrospinal fluid, six (2 percent) and other sources, 42 (13 percent). Individual cases may have had positive cultures from more than one site.
- Four of the invasive GAS cases were described as necrotizing fasciitis and 47 were described as toxic shock syndrome. A total of 280 (93 percent) of cases were hospitalized. Signs and symptoms reported by cases included: hypotension, 93 (35 percent); renal impairment, 85 (31 percent); pleural or peritoneal effusion, 66 (29 percent); rash, 51 (19 percent); liver impairment, 47 (21 percent); tissue necrosis, 46 (20 percent); acute respiratory distress syndrome, 21 (9 percent); sore throat 20 (7 percent); myositis, 15 (5 percent) and polyarthritis, two (0.7 percent). Procedures needed on cases included debridement, 32 (14 percent) and amputation, eight (3 percent). Five of seven cases needing amputation with information on diabetic status were diabetic.
- Clinical syndromes – Where type of infection was indicated, the following conditions were reported: sepsis, 62 (22 percent); coagulopathy, 32 (12 percent); cellulites, 18 (6 percent), pneumonia, 49 (17 percent); nonsurgical wound, 44 (15 percent); septic arthritis, 18 (6 percent); osteomyelitis, seven (2 percent); disseminated intravascular coagulation, nine (4 percent); postpartum, six (2 percent); meningitis, five (2 percent); peritonitis, seven (2 percent); sepsis with other infection, 57 (20 percent) and other, 57 (20 percent). Cases may have reported more than one type of infection.
- Underlying disease – Reported in 88 (67 percent of cases); conditions were
diabetes, 61 (33 percent), heart conditions, 67 (36 percent), malignancy, 35 (19 percent), non-surgical wounds, 44 (15 percent), immunosuppressive therapy, 18 (10 percent), chronic lung disease, 29 (16 percent), blunt trauma, 23 (13 percent), surgical wound, nine (3 percent), stroke, 13 (7 percent), renal dialysis, 16 (9 percent), alcohol abuse, eight (4 percent), intravenous drug use, four (2 percent), liver cirrhosis, five (3 percent) and other, five (2.5 percent). Four cases reported prior varicella infections.

- Mortality - Of 312 reported invasive GAS infections with investigation forms available, 40 were fatal (overall case fatality rate of 16 percent). Eighty percent of the fatalities were in those older than 49 years of age. A fatality occurred in January in a 9-year-old girl. She had a three-day history of rash and a history of inability to bear weight on the left foot and leg and a history of fever and was diagnosed with varicella. The patient developed respiratory distress and cardiac arrest. She died 16 hours after initial evaluation. Blood cultures yielded *Streptococcus pyogenes* group A.

- Clusters-None.

**Summary**

The number of reported invasive GAS cases continues to rise in Illinois. Almost half of the cases were older than 60 years of age. Eighty percent of the fatalities were in cases over the age of 49 years. The case fatality rate in Illinois (16 percent) was similar to that reported by the CDC Active Bacterial Core Surveillance sites (15 percent).

**Suggested readings**


Figure 103. Invasive GAS and Streptococcal TSS Cases in Illinois, 1997-2002

Figure 104. Invasive GAS and Streptococcal TSS Cases By Age in Illinois, 2002

Figure 105. Invasive GAS and Streptococcal TSS Cases in Illinois by Month, 2002
Tetanus

Background

Tetanus is an uncommon disease in the United States after introduction of a vaccine in the 1940’s. Tetanus is induced by a toxin produced by *Clostridium tetani*, which grows anaerobically at the site of a skin wound. The disease is characterized by muscular contractions. The reservoir for the organism is the soil or fomites contaminated with human or animal feces. Tetanus spores are common in the environment. The incubation period is three to 21 days. Prevention is through immunization.

In 2002, 25 cases of tetanus were reported to CDC from 14 states. Eleven percent were in persons younger than 25 years of age, 51 percent in those aged 25 to 59 years of age and 28 percent in those older than 59 years of age. There is an increased risk of tetanus with increasing age which is thought to be related to lower protective immunity in older age groups. By 70 years of age, only 30 percent of persons are protected against tetanus. Seventeen percent of cases were fatal.

From 1998 through 2000, the annual incidence of reported tetanus in the United States was 0.16 cases per million population. The highest incidence occurred in those older than 59 years of age, persons with Hispanic ethnicity and older adults with diabetes. Fifteen percent of cases were in injection-drug users (IDU’s). Seventy-four percent of the IDU’s used heroin. Most cases occurred among people who were inadequately vaccinated or had unknown vaccination history who sustained an acute traumatic injury. Only 6 percent of tetanus patients were known to be up-to-date on tetanus vaccination. Among 129 patients with information available in the reported cases in the United States from 1998 through 2000, 73 percent reported an acute injury, 26 percent reported no acute injury (i.e. patients with abscessed, ulcers or gangrene) and one case was reported in a neonate. A puncture wound was the most frequent type of acute trauma (50 percent) followed by lacerations (33 percent) and abrasions (9 percent).

Persons who have received a primary tetanus vaccination series but who have not had a tetanus booster during the 10 years preceding an injury should receive a booster dose. Persons who present with wounds contaminated with dirt, feces, or saliva, or wounds with necrotic tissue and who have not had a booster during the preceding five years also should receive a dose of tetanus vaccine. Persons who have never had tetanus vaccination or those with unknown or uncertain vaccination histories should receive the first dose of a primary series at the time of presentation and tetanus immune globulin.

Descriptive epidemiology

- Number of cases reported in Illinois in 2002 – One case.
- Gender – Female.
- Geographic distribution – Cook County.
- Course of disease for Case– An acute wound to her heel was caused by stepping on a firecracker. She had erythema and swelling of the heel. She recovered.
- Immunization status B No history of tetanus immunization.
Summary
   One case of tetanus was reported in 2002 in Illinois.

Suggested readings
Tick-borne diseases found in Illinois

At least 869 species of ticks have been identified in the world. Ticks are the most common type of vectors for vectorborne diseases in the United States. In the United States, ticks are responsible for a number of diseases: babesiosis, Colorado tick fever, human granulocytic ehrlichiosis, human monocytic ehrlichiosis, Lyme disease, Powassan encephalitis, relapsing fever, Rocky Mountain spotted fever, tick paralysis, tularemia and, possibly, southern tick associated rash illness.

In humans, ticks usually attach around the head and neck and in the groin area. The rates of human infection with tick-borne diseases are influenced by the prevalence of vector ticks, the tick infection rate, the readiness of ticks to feed on humans and the prevalence of their usual animal hosts.

Six tick-borne diseases have been reported in Illinois residents. According to CDC guidelines, any Illinois resident diagnosed with a tick-borne disease is counted in the state’s case count, even though he/she may have reported tick exposures in another state. These tick-borne diseases are listed in Table 16 and in individual sections of this document. Cases by year from 1997 through 2002 are shown in Figure 106.

Reports of Lyme disease increased in 2002 over previous years.

Figure 106. Tick-borne Disease Cases in Illinois, 1997-2002
<table>
<thead>
<tr>
<th>Disease</th>
<th>Organism</th>
<th>Tick vectors</th>
<th>Symptoms</th>
<th>Where found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rocky Mountain spotted fever</td>
<td><em>Rickettsia rickettsii</em></td>
<td><em>D. 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; throughout Illinois</td>
</tr>
<tr>
<td>Tularemia</td>
<td><em>Francisella tularensis</em></td>
<td><em>A. americanum, D. variabilis, 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>B. burgdorferi</em></td>
<td><em>I. scapularis</em> (deer tick)</td>
<td>fatigue, chills, fever, erythema migrans, enlarged lymph nodes</td>
<td>primarily on the West Coast and in northeastern and north central U.S.; primarily northern Illinois</td>
</tr>
<tr>
<td>Human monocytic ehrlichiosis</td>
<td><em>E. chaffeensis</em></td>
<td><em>A. americanum</em> (Lone Star tick)</td>
<td>fever, headache, myalgia, vomiting</td>
<td>most common in the southern states; most 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 northeastern states; in Illinois, distribution unknown</td>
</tr>
<tr>
<td>Southern-tick associated rash illness (STARI)*</td>
<td><em>Borrelia lonestari</em> by DNA analysis, not yet cultured*</td>
<td><em>A. americanum</em></td>
<td>not well defined</td>
<td>not established yet; in Illinois, southern and west central IL</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**

Staphylococcal toxic shock syndrome (TSS) is characterized by sudden high fever, vomiting, profuse watery diarrhea, myalgia and hypotension. A rash, which may result in desquamation of the skin, occurs in the first two weeks of illness. Occasionally, shock occurs. Three or more systems (gastrointestinal, muscular, mucous membranes, renal, hepatic, hematologic or central nervous) are usually involved. Most cases have been associated with strains of *Staphylococcus aureus* that produce a special toxin.

**Case definition**

The six 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 at least twice the upper limit of normal or urinary sediment with pyuria in the absence of urinary tract infection
   e. Hepatic – total bilirubin, serum glutamic-oxaloacetic transaminase (SGOT), or serum glutamic-pyruvic transaminase (SGPT) at least 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
6) 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 five of six of the above clinical findings. A confirmed case is one with all six of the clinical findings, including desquamation, unless the patient dies before desquamation can occur.

**Descriptive epidemiology**

- Number of cases reported in Illinois in 2002 – Five cases (five-year median = 5). Two were confirmed and three were probable.
- Age – Ages ranged from 13 to 47.
- Gender – Five cases were female.
- Race/ethnicity – All five cases were white; none were Hispanic.
• Geographic distribution – Cases resided in Cook, DuPage and St Clair counties.
• Symptoms – Rash (5 cases), fever (4 cases), hypotension (3 cases), desquamation (3 cases), myalgia (4 cases), vomiting (5 cases), vaginal discharge (4 cases), orthostatic dizziness (2 cases), disorientation (1 case), oropharyngeal hyperemia (1 case), conjunctival hyperemia (2 cases), abdominal pain (2 cases), injected tongue (1 case) and syncope (1 case)
• Laboratory findings – *S. aureus* was isolated from the vagina and/or urine in two. Four cases were classified as menstruation-associated.
• Treatment – All five patients were hospitalized.
• Outcome – All patients survived.
• Past cases – Toxic shock syndrome due to *S. aureus* reported per year in the state were 1997 (12), 1998 (7), 1999 (5), 2000 (3) and 2001 (4).

**Summary**

Five cases of staphylococcal toxic shock were reported in 2002, and four of five were menstruated-associated.
Trichinosis

Background
Trichinosis is caused by a nematode, *Trichinella spiralis*. People become infected by consuming undercooked meat containing the cysts of the organism. Initial symptoms of disease include diarrhea, vomiting and nausea that occur within a few days of ingestion. Gastrointestinal symptoms may be absent. In the second phase of illness, which begins one to two weeks after exposure, myalgias, periorbital edema, fever, cough, and cardiac and neurologic complications may occur. Titers to trichinosis rise during the third to sixth week following infection. Eosinophilia is common. Muscle biopsies demonstrating the non-calcified larvae of *T. spiralis* indicate recent infection. Larvae also may be identified in suspect food. The estimated prevalence of *Trichinella* infection in U.S. swine was estimated at 0.013 percent in 1995. Consumption of wild game, however, became a more common source of this infection in U.S. residents between 1997 and 2001. During this five-year period, 72 cases were reported in the United States (median of 12 annually) and 43 percent were linked to wild game consumption, especially bear meat. Only 17 percent of cases were linked to commercial pork production. The median incubation period was 13 days. In 2002, 14 cases of trichinosis were reported to CDC from seven states, including Illinois.

USDA recommends that fresh pork be cooked to an internal temperature of 160 F. Freezing also helps kill *T. spiralis*. However, wild game *Trichinella* types can be found in frozen meat from wild animal carcasses. *Trichinella* is endemic in North America in the artic and subartic area. Cases of *Trichinella* in Canada are caused primarily by the sylvatic species, *T. nativa*. An outbreak of 31 cases of trichinellosis was reported in a Canadian outbreak from eating bear meat that tested positive.

Case definition
A confirmed case is defined as a clinically compatible case with either a positive serologic test for *Trichinella* or demonstration of *Trichinella* larvae in tissue obtained by muscle biopsy.

Descriptive epidemiology
- Number of cases reported in Illinois in 2002 - one.
- Age and Gender – 30-year-old male.
- Risk factor/Symptoms/Diagnosis/Outcome - Unknown.

Summary
Only one case of trichinosis was reported in Illinois for 2002 and no potential source for his illness could be identified.

Suggested Readings
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 and usually have a positive skin test reaction. But they may develop TB disease later in life if they do not receive treatment for latent TB infection.

Approximately 90 percent 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 patients' 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. 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 to TB control staff 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 2002, a total of 15,075 cases (5.2 per 100,000) were reported to CDC. In 2002, 48 percent were among U.S. born persons (3 per 100,000) and 52 percent were among foreign born persons (24 per 100,000).

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 2002 – 680, a 4 percent decrease from 2001. (Figure 107). TB cases in Chicago increased slightly (381 cases) from to 377 cases in 2001.
- Age - The highest incidence of TB occurred in older age groups (Table 17).
- Gender - 57 percent were male.
- Race/ethnicity - 18 percent were African American (non-Hispanic), 35 percent white (non-Hispanic), 22 percent Hispanic and 1 percent were Asian or Pacific Islander.
  - The number of foreign-born TB cases increased in 2002 (N=265) as compared to 2001 (N=261) (Figure 108). Persons born in India, Mexico and the Philippines contributed the largest numbers (65 percent) of foreign-born cases in Illinois. Persons born in Pakistan (3 percent), Poland (3 percent), Vietnam (2 percent), and China (1 percent) were also represented among foreign-born cases.
- Risk factors - Excessive use of alcohol (12 percent), non-injection drug use (10 percent), homelessness (4 percent), injection drug use (3 percent), being an inmate in a correctional facility (3 percent) and residing in a long-term care facility (2 percent).
- Drug resistance – 50 (7 percent) of cases undergoing susceptibility testing were resistant to at least one drug. Nineteen of 679 isolates (3 percent) were resistant to INH and three of 524 tested (0.6 percent) were multi-drug resistant.
- Death during anti-TB treatment - 55 (8 percent) of the reported cases died during treatment.

**Summary**

In 2002, 680 cases of TB were reported in Illinois with an incidence rate of five per 100,000, which is very similar to the national incidence rate. Thirty-eight percent of these cases were among persons born outside of this country. 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. Eight percent of Illinois cases died during anti-TB treatment.

Table 17. Age Distribution of Tuberculosis Cases in Illinois, 2002
<table>
<thead>
<tr>
<th>Age</th>
<th>Incidence *</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 years</td>
<td>3</td>
</tr>
<tr>
<td>5 - 14</td>
<td>1</td>
</tr>
<tr>
<td>15 - 24</td>
<td>4</td>
</tr>
<tr>
<td>25-44</td>
<td>6</td>
</tr>
<tr>
<td>45-64</td>
<td>7</td>
</tr>
<tr>
<td>65+</td>
<td>9</td>
</tr>
<tr>
<td>All</td>
<td>5</td>
</tr>
<tr>
<td>U.S.</td>
<td>5</td>
</tr>
</tbody>
</table>

* Incidence per 100,000 based on 2000 population.
Source: Illinois Department of Public Health

**Figure 107. Tuberculosis Cases in Illinois, 1997-2002**

**Figure 108. Country of Origin for Foreign-born Cases**
Tularemia

Background

Tularemia is a zoonotic infection caused by the bacteria *Francisella tularensis*. There are four biogroups of tularemia designated as Type A and B. Type A is highly virulent for humans and is found mainly in North America. Type B is less virulent and present in North America, Asia and Europe. Tularemia can affect many wildlife species, including prairie dogs, squirrels, cats and humans. Natural transmission of tularemia to persons in the United States is most commonly through tick bites or direct contact with infected tissue. As few as 10 to 50 organisms can cause disease in humans. The bacteria can penetrate intact skin. Less common routes of infection include ingestion, inhalation while shearing infected sheep and exposure to contaminated water. 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. 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, like prairie dogs. In 2002, an outbreak of tularemia in wild caught black-tailed prairie dogs occurred in Texas. These prairie dogs were distributed across the United States, including Illinois, but no cases of tularemia due to this situation were identified in prairie dogs or humans in Illinois. In Texas, one person out of 19 exposed persons tested had a titer to tularemia and experienced a mild upper respiratory infection. This individual worked directly with ill prairie dogs.

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: ulceroglandular, glandular, typhoidal, pleuropulmonary, oculoglandular or oropharyngeal tularemia. Ulceroglandular is the most common form of tularemia; occurring in about 80 percent of cases. 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 2002, 90 cases were reported to CDC. Illinois was the state with the fourth highest number of cases. On July 1, 2002, it became mandatory to forward isolates of *F. tularensis* to the IDPH laboratory.

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 2002 – Five; all cases were probable. The median number of cases per year for the last five years was five.
- Age – Ages ranged from 31 to 63 years of age.
- Gender – Two cases were female and three were male.
- Seasonal variation – Onsets of cases occurred from May to October. The majority of cases occur in the summer months, which may indicate probable transmission from ticks.
- Geographic distribution – Exposure sites for cases were McLean County (1), Sangamon County and other state (1), Missouri (1) and unknown (2). The McLean County case reported an ulcer at the site of a cat bite.
- Symptoms/diagnosis/treatment – At least three cases were hospitalized. Four cases were serologically positive and one was direct fluorescent antibody positive on tissue. None were culture positive.
- Exposures - Three cases reported tick bites prior to onset of illness and one person reported an ulcer at the site of a cat bite. A source of exposure could not be determined for one case.

**Summary**

The number of cases of tularemia decreased in 2002 compared to 2001 and equaled the five-year median. Most case in Illinois have onsets during the tick transmission season.

**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 1,000 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. As many as 10 percent of untreated patients will shed organisms in the feces for up to three months. One to 4 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 also can 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 is recommended for persons traveling to areas where typhoid is endemic.

In 2002, 321 typhoid fever cases were reportable in the United States. Approximately 80 percent of cases reported international travel in the six weeks before illness. Most cases of typhoid fever in the United States occur among travelers. However, sexual transmission of typhoid fever can occur by means of oral and anal sex. A cluster of typhoid fever cases in three states in 2000 was linked to sexual transmission in men who have sex with men. Seven of eight symptomatic cases reported having sex with an asymptomatic person who was culture confirmed with S. enterica ser. Typhi.

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 2002 – 17 (five-year median = 26) (see Figure 109)
- Age – Cases ranged in age from 2 to 86 years of age (median age = 26 years).
- Seasonal variation – Cases occurred throughout the year.
- Geographic distribution – Of the 17 cases, 13 (76 percent) resided in Cook County.
Case surveillance reports – The following information was drawn from 11 case reports:

- Citizenship status – Three cases were known to be citizens of the United States and one was not; the citizenship status of seven cases was unknown.
- Employment – No cases were known to be a food handler.
- Treatment/outcomes – Four cases of 10 (40 percent) with available information were hospitalized.
- Drug resistance – Resistance characteristics of isolates was known for four cases. These four isolates showed resistance to ampicillin (0 of 4 tested, 0 percent), chloramphenicol (1 of 2, 50 percent), trimethoprim-sulfamethoxazole (0 of 4, 0 percent) and fluoroquinolones (0 of 4, 0 percent).
- Vaccination status – No cases reported having received typhoid vaccination within five years of illness onset.
- Risk factors – No cases were known to have been linked to a typhoid carrier. Travel destinations for imported cases included India (2), Mexico (1), Pakistan (2), Indonesia (1), Dominican Republic (1) and Philippines (1).

Summary

There were 17 typhoid fever cases reported in Illinois in 2002, and Illinois was sixth in the nation in number of cases reported. However, many cases were acquired outside the United States. India and Pakistan were the most common travel destination for those cases who reported travel outside the United States.

Suggested readings

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 and 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. In 1995, a live attenuated varicella vaccine became available for use in the United States. In 1996, the Advisory Committee on Immunization Practices recommended routine vaccination of children aged 12-18 months, catch-up vaccination of all susceptible children younger than age 13 years and vaccination of susceptible persons with close contact to persons at high-risk for serious complications. In 1999, ACIP also recommended that vaccine be required for child care and school entry and for post-exposure. They also recommended that susceptible adults should be vaccinated and vaccine may be used for outbreak control. In a study conducted in Connecticut, the adjusted overall effectiveness of the vaccine was found to be 87 percent.

Varicella related deaths became nationally notifiable in 1999 to allow for evaluation of the vaccine program. In the United States, nine varicella deaths were reported to CDC in 2002.

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 also is required of all pre-schools that are run by the school district and which have children age 2 or older. In this year, IDPH 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. Illinois has voluntary reporting of varicella deaths. Permanent rules and regulations are being considered. This reporting was implemented because a case of smallpox in an adult might be misidentified as a case of chickenpox.

CDC evaluated reporting of varicella in four states (Illinois, Michigan, Texas and West Virginia). Starting in 1999, varicella incidence declined. The lowest incidence occurred in 2001 for the period 1990-2001. The reduction in varicella disease in 2001 was 67 percent in Illinois as compared to 1990-1994 levels. Vaccination coverage in 2001 was 57 percent in Illinois. In 2002, 33 states had implemented child care or school entry requirements for varicella.

Case definition
Physician diagnosed cases are reported to IDPH with a weekly summary from local health jurisdictions. Individual cases are not reported.
Descriptive Epidemiology

- Number of cases – 9,879 (median=13,881) (Figures 110 and 111).
- Age - Almost three-quarters of cases occurred in individuals between the ages of 5 and 14 years. There were 413 adult varicella cases reported in 2002.
- Fatalities – Two varicella deaths were reported in 2002. One case was reported in an MMWR article in 2002. The fatality occurred in January in a 9-year old girl. She had a three-day history of rash and a history of inability to bear weight on the left foot and leg and a history of fever. The patient developed respiratory distress and cardiac arrest. She died 16 hours after initial evaluation. Blood cultures yielded *Streptococcus pyogenes* group A. The other varicella death was in a 40-year-old homeless male from Cook County. He presented at the hospital with a four-day history of fever, rash and shortness of breath. His varicella history was unknown. The patient had underlying medical conditions. He was placed in intensive care, but went into shock and died one day after admission.

Summary

Varicella (chickenpox) is reportable in aggregate in Illinois and almost 10,000 cases were reported in 2002. The number of reported chickenpox cases has been declining since 1997. Two fatal cases were reported in 2002.

Suggested readings

Figure 110. Varicella cases by year of report, Illinois 1988 to 2003.

Figure 116. Reported Varicella Cases in Illinois, 1997-2002
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. *Yersinia* is cold tolerant and can replicate under refrigeration. Yersiniosis became reportable in Illinois on April 1, 2001. Prior to this time, reporting of yersiniosis was voluntary.

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 1 percent of the reported infections in data from 2002. The incidence rate per 100,000 for yersiniosis in 2002 data was 0.45 per 100,000 population at the nine FoodNet sites.

*Yersinia* outbreaks have been associated with contaminated water, milk, lettuce, bean sprouts, and pork intestines. In a study in Tennessee of sporadic cases of *Yersinia* in infants, chitterlings had been prepared in the homes of all of the cases of infant yersiniosis from November 2001 to January 2002. None of the infants had consumed chitterlings but may have been exposed by various means within the household. In active surveillance sites in the United States the incidence of *Yersinia enterocolitica* infection was 40-fold higher in infants younger than 1 year of age than in adults. The incidence in African Americans was seven times the incidence of non-African Americans. A seasonal variation in incidence was present only for African Americans in winter months. Chitterlings are prepared by boiling the large intestines of pigs after the removal of fat and fecal material and are a traditional winter holiday food in many African American families. An outbreak of *Yersinia pseudotuberculosis* occurred in Finland and was linked to consumption of iceberg lettuce. Forty-seven laboratory confirmed patients were identified including one fatal case and five patients who underwent appendectomies.

Case definition

The case definition in Illinois includes only a positive culture for *Yersinia*.

Descriptive epidemiology

- Number of reported cases in Illinois in 2002 – 25 (five-year median = 24) (see Figure 112). The incidence rate per 100,000 was 0.2.
- Age – Eight cases (32 percent) occurred in those younger than 5 years of age (Figure 113).
- Gender – 60 percent were male.
• Race/ethnicity – 50 percent were African American, 45 percent white and 5 percent Asian.
• Seasonality – Figure 114 shows the case onsets by month. Fewer cases are reported mid-summer.
• Outcome – For 16 cases with complete case information, nine cases were hospitalized and no cases were fatal.
• Other – From November to December 2002, nine infants were identified with yersiniosis in Chicago. Eight of the nine infants were African American and all eight had either eaten chitterlings or spent time in a household in which chitterlings were prepared.

Summary
The yersiniosis incidence rate of 0.3 per 100,000 for 2002 in Illinois was similar to that found in the CDC’s FoodNet sites. Approximately one-third of cases in 2002 occurred in children younger than 5 years of age. The Chicago Department of Public Health reported eight infants with yersiniosis had been exposed to chitterlings. This may be why there was a high percentage of African-American cases with yersiniosis (50 percent) as compared to the proportion of African Americans in the state (15 percent).

Suggested readings
Figure 113. Age Distribution of Yersiniosis Cases in Illinois, 2002

Figure 114. Yersiniosis Cases in Illinois by Month, 2002
Other incidents of interest, 2002

On November 16, 2002 the first severe acute respiratory syndrome (SARS) cases emerged in Guangdon Province, China but were not immediately recognized as a new disease.

A large conjunctivitis outbreak (CWD) occurred on a university campus in Evanston during the spring semester of 2002. At least 223 cases were identified. An epidemiologic investigation identified that wearing contact lenses was a risk factor for conjunctivitis. Persons who wore eye glasses were at decreased risk. Although the etiology was suspected to be viral, no etiologic agent could be identified.

Chronic wasting disease was identified in the state in deer for the first time on November 1, 2002. During the 2002 deer firearm season, 4,060 deer were sampled. Fourteen positives were identified in 2002 or early 2003. Twelve of the 14 were in the Boone and Winnebago county area. Two positive deer were southeast of Woodstock in McHenry County. No positives were identified in follow-up sampling. Of the 14 positive animals, one was identified after the hunting season and six during the season in the targeted area. Of 185 additional animals collected from the affected area tested, five were positive and two animals tested due to abnormal appearance were positive. Approximately 350-400 deer from urban areas in Cook, Lake, DuPage, Winnebago and Jo Daviess counties were tested and none were positive.

In 2002, 448 captive herds in Illinois were monitored for CWD. The CWD test was done on 499 heads from 108 herds on the program; all were negative.
<table>
<thead>
<tr>
<th>Disease</th>
<th>Number</th>
<th>Disease</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>1,976</td>
<td>HIV</td>
<td>3,430</td>
</tr>
<tr>
<td>Amebiasis case</td>
<td>49</td>
<td>Legionnaires Disease</td>
<td>28</td>
</tr>
<tr>
<td>Anthrax</td>
<td>0</td>
<td>Leprosy</td>
<td>4</td>
</tr>
<tr>
<td>Arbovirus infection</td>
<td>884 WNV, 2 SLE, 8 LAC, 0 Dengue</td>
<td>Leptospirosis</td>
<td>0</td>
</tr>
<tr>
<td>Aseptic meningitis or encephalitis of unknown etiology</td>
<td>1,151</td>
<td>Listeriosi</td>
<td>23</td>
</tr>
<tr>
<td>Aseptic meningitis or encephalitis of known etiology</td>
<td>102</td>
<td>Lyme disease</td>
<td>47</td>
</tr>
<tr>
<td>Blastomycosis</td>
<td>87</td>
<td>Malaria</td>
<td>61</td>
</tr>
<tr>
<td>Botulism</td>
<td>1</td>
<td>Measles</td>
<td>1</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>7</td>
<td>Meningococcal, invasive</td>
<td>57</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td>1,204</td>
<td>Murine Typhus</td>
<td>0</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>9,879</td>
<td>Mumps</td>
<td>18</td>
</tr>
<tr>
<td><em>Chlamydia trachomatis</em></td>
<td>48,101</td>
<td>Pertussis</td>
<td>232</td>
</tr>
<tr>
<td>Cholera</td>
<td>0</td>
<td>Psittacosis</td>
<td>0</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td>121</td>
<td>Q fever</td>
<td>3</td>
</tr>
<tr>
<td><em>Cyclospora</em></td>
<td>3</td>
<td>Rabies, animal</td>
<td>31</td>
</tr>
<tr>
<td>Cysticercosis</td>
<td>2</td>
<td>Rabies, potential human exposure</td>
<td>210</td>
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<tr>
<td>Diphtheria</td>
<td>0</td>
<td>Reye syndrome</td>
<td>0</td>
</tr>
<tr>
<td>Ehrilichiosis, human granulocytic</td>
<td>0</td>
<td>Rocky Mountain spotted fever</td>
<td>12</td>
</tr>
<tr>
<td>Ehrilichiosis, human monocytic</td>
<td>0</td>
<td>Rubella</td>
<td>2</td>
</tr>
<tr>
<td>Ehrilichiosis, unknown type</td>
<td>5</td>
<td>Salmonellosi</td>
<td>1,770</td>
</tr>
<tr>
<td><em>E. coli</em> 0157:H7</td>
<td>191</td>
<td>Shigellosi</td>
<td>1,105</td>
</tr>
<tr>
<td>Foodborne outbreaks</td>
<td>91</td>
<td><em>S. aureus</em>, vancomycin resistant</td>
<td>0</td>
</tr>
<tr>
<td>Giardiasis case</td>
<td>871</td>
<td><em>Streptococcus</em>, group A, invasive</td>
<td>326</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>24,026</td>
<td><em>Streptococcus</em>, group B, invasive</td>
<td>41</td>
</tr>
<tr>
<td>Guillain Barre syndrome</td>
<td>15</td>
<td><em>S. pneumoniae</em>, invasive</td>
<td>823</td>
</tr>
<tr>
<td><em>H. influenzae</em>, invasive disease</td>
<td>120</td>
<td>Syphilis, primary or secondary</td>
<td>479</td>
</tr>
<tr>
<td>Hantavirus</td>
<td>0</td>
<td>Tetanus</td>
<td>1</td>
</tr>
<tr>
<td>Hemolytic uremic syndrome</td>
<td>4</td>
<td>Toxic shock syndrome</td>
<td>6</td>
</tr>
<tr>
<td>Hepatitis A case, acute</td>
<td>262</td>
<td>Trichinosi</td>
<td>1</td>
</tr>
<tr>
<td>Hepatitis B case, acute</td>
<td>185</td>
<td>Tularemia</td>
<td>5</td>
</tr>
<tr>
<td>Hepatitis NANB case, acute</td>
<td>24</td>
<td>Typhoid fever cases</td>
<td>17</td>
</tr>
<tr>
<td>Histoplasmosis</td>
<td>57</td>
<td>Yersiniosis</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Illinois Department of Public Health
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 are 94 local health departments in Illinois. 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 (IDPH), 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 IDPH. 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 April 1 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 2000 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 U.S. citizens 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. This is the first infectious disease annual report that has used the 2000 census numbers. According to the U.S. Census Bureau, Illinois’ population grew from 11,430,602 in 1990 to 12,419,293 in 2000. The percentage of the population in the various age groups changed very little between the 1990 MARS data and the 2000 census. However, the racial and ethnic distribution did change substantially between 1990 and 2000. In 1990, the state’s population was 82 percent white, 15 percent African American, 2 percent Asian and 1 percent other or mixed races. In 2000, the census found the following percentages: 73 percent white, 15 percent African American, 3 percent Asian and 8 percent other or mixed races. Those indicating Hispanic ethnicity accounted for 8 percent of the state’s population in 1990; in 2000, this proportion had increased to 12 percent. 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.

<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>
<td></td>
</tr>
</tbody>
</table>

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 diseases in which more than 150 cases occurred. One-year incidence rates by county were graphed 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 1996 to 2000, it was reached by taking the number of cases reported from 1996 through 2000, dividing by the population and multiplying by 100,000; it was then annualized by dividing by five.

The epidemiologic information presented for each disease is for 2002 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.

Suggested reading lists are provided for some diseases.