The Epidemiology of Infectious Diseases in Illinois, 1999
TABLE OF CONTENTS

Reportable Communicable Diseases in Illinois in 1999

The following diseases must be reported to local health authorities in Illinois (those in bold are also nationally notifiable, which means state health departments must report them to the U.S. Centers for Disease Control and Prevention):

CLASS 1- The following diseases are reportable by telephone within 24 hours:

1. **Anthrax**
2. **Cholera**
3. Diarrhea of the newborn
4. **Diphtheria**
5. Food borne or waterborne illness
6. **Measles**
7. **Meningitis and other invasive disease (due to *N. meningitidis* or *H. influenzae*)**
8. **Plague**
9. **Poliomyelitis**
10. **Rabies, human**
11. Smallpox
12. **Typhoid fever**
13. Typhus
14. **Whooping cough (pertussis)**

CLASS II-The following diseases are reportable by mail or by telephone within seven days of diagnosis (Exceptions to the seven-day notification requirement are marked with an asterisk; see note below):

1. **AIDS**
2. Amebiasis
3. Animal bite
4. Blastomycosis
5. **Brucellosis**
6. **Chlamydia***
7. Chickenpox
8. **Cryptosporidiosis**
9. **Encephalitis**
10. ***E. coli* O157:H7**
11. Giardiasis
12. **Gonorrhea***
13. **Hepatitis A**
14. **Hepatitis B(cases** and carriers)
15. Hepatitis, Delta
16. **Hepatitis, non-A, non-B**
17. Hepatitis, viral unspecified
18. Histoplasmosis
19. HIV infection*
20. Intestinal worms
    - A. Ascariasis
    - B. Tapeworms
21. **Legionnaires' disease**
22. **Leprosy**
23. Leptospirosis
24. Listeriosis
25. **Lyme disease**
26. **Malaria**
27. Meningitis (due to bacteria other than those listed on Class I, fungi, protozoa) and aseptic meningitis
28. **Mumps**
29. Ophthalmia neonatorum (gonococcal)
30. **Psittacosis**
31. Reye syndrome
32. **Rocky Mountain spotted fever**
33. **Rubella, including congenital**
34. **Salmonellosis (other than typhoid)**
35. **Shigellosis**
36. Staphylococcal infections occurring in infants under 28 days within a health care institution, or with onset after discharge
37. **Streptococcal infections (due to Group A** streptococci, including pharyngitis, rheumatic fever, acute glomerulonephritis, scarlet fever and **invasive** disease)
38. **Syphilis**
39. **Tetanus**
40. **Toxic shock syndrome**
41. Trachoma
42. **Trichinosis**
43. **Tuberculosis**
44. Tularemia

*Must be reported by mail or by telephone to the local health authority within five days

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.

A new reportable disease list was issued in April, 2001.

1999 Summary of Selected Illinois Infectious Diseases

In Illinois, the communicable disease surveillance system relies on the passive reporting of data mandated by state law. The current reportable disease list requires reporting of certain diseases and of selected positive laboratory tests. The cooperation and support of health care providers, laboratories and local health departments are essential in maintaining a useful communicable disease surveillance system. Health care providers should report information on cases that fall within the reportable diseases and any unusual clusters of disease.

There are 55 diseases or conditions listed as nationally reportable to the U.S. Centers for Disease Control and Prevention (CDC). In 1999, the 10 most frequently reported notifiable infectious diseases in the entire United States were chlamydia, gonorrhea, AIDS, salmonellosis, hepatitis A, shigellosis, tuberculosis, Lyme disease, hepatitis B and pertussis**.**

In 1999, 58 different types of infectious diseases were reportable to the Illinois Department of Public Health (IDPH) (Table 15). A selection of these diseases is included in specific sections in this annual report along with some non-reportable diseases of importance in 1999. The numbers of cases of the various infectious diseases listed in this summary should be considered to be minimum estimates of the amount of disease in the state. There are several reasons why the 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 trends over time and disease distribution rather than to identify with precision the total number of cases occurring in the state.**

The five most frequently reported nationally notifiable infectious diseases in Illinois were chlamydia, gonorrhea, salmonellosis, AIDS and shigellosis. Diseases that increased in 1999 over the previous five-year median included amebiasis, blastomycosis, *H. influenzae*, *S. pneumoniae*, chlamydia, invasive group A streptococcus and *E. coli* O157:H7. The number of reported cases of aseptic meningitis, *Campylobacter*, *Neisseria meningitidis* and hepatitis B have been decreasing compared to the previous five-year median.

Highlights of 1999 in Illinois included the first case of vancomycin resistant *Staphylococcus aureus* and the largest outbreak of *E. coli* O157:H7 in the state. The outbreak occurred in Menard County and the risk factors for infection were consumption of beef and sitting on pasture ground.

Also in July 1999, the CDC recommended postponing use of rotavirus vaccine after 15 reports of intussusception associated with the vaccine were reported to the Vaccine Adverse Event Reporting System. Following this, a case-control study on the possible association was conducted by public health agencies. The Advisory Committee on Immunization Practices (ACIP) reviewed data from this study on October 22, 1999, and concluded that intussusception occurs with significantly increased frequency in the one to two weeks following administration of rotavirus vaccine. The ACIP then withdrew its recommendation for rotavirus vaccination for U.S. infants.

In the U.S., the highlight of 1999 was the identification of West Nile virus (WNV) in New York. This was the first time this virus had been identified in the United States.

Studies mentioned in the text of this report will be referred to in the selected readings section. 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. The Department welcomes any suggestions on additional information that would be of use to you.

Acquired immune deficiency syndrome/Human immunodeficiency virus

Background

Acquired immune deficiency syndrome (AIDS) has been one of the major health problems to emerge in the past 25 years. The first cases of AIDS were reported in the summer of 1981. In 1984, the human immunodeficiency virus (HIV) was identified as the causative agent of AIDS. HIV is spread by the exchange of blood, semen or vaginal secretions between people. The most common ways HIV is transmitted are 1) having sex (anal, oral or vaginal) with an infected person, 2) sharing drug injection needles with an infected person (including insulin or steroid needles) and 3) perinatal transmission, mother-to-infant transmission before or at the time of birth or through breast feeding. Within weeks to months after infection with HIV, some individuals develop a flu-like illness. After initial infection, individuals with HIV may remain free of clinical signs for months to years. Since the progression of HIV infection to AIDS is as high as 50 percent among untreated HIV-infected adults monitored for 10 years, assessing the impact of the epidemic in Illinois has relied mainly upon the reporting of cases that met the AIDS definition.

Clinical indicators of HIV infection may include lymphadenopathy, chronic diarrhea, weight loss, fever and fatigue followed by opportunistic infections. HIV may progress to AIDS, which includes a variety of late-term clinical manifestations including low T-cell count. Opportunistic infections associated with an AIDS diagnosis in HIV-infected individuals include *Pneumocystis carinii* pneumonia, chronic cryptosporidiosis, central nervous system toxoplasmosis, candidiasis, disseminated cryptococcosis, tuberculosis, disseminated atypical mycobacteriosis and some forms of cytomegalovirus infection. Some cancers may also be associated with AIDS including 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, resulting in a delay in the progression from HIV to AIDS and a reduction in AIDS morbidity and mortality. A number of antiretroviral agents is available for treatment of HIV/AIDS. Combination therapies have been shown to prolong and improve the quality of life for HIV-infected individuals.

Case definition

In the state of Illinois in 1999, AIDS was reported by name, while HIV reporting was without patient identifiers for the first half of the year. For HIV reporting, this meant that individuals with multiple positive test results for HIV were counted as new HIV cases each time they tested positive. On July 1, 1999, reporting of HIV by a patient code number (PCN) became mandatory in Illinois. The PCN is a coding system that permits duplicate reports to be identified but is not specific enough to permit identification of an individual person. It is expected that use of the PCN will allow enhanced surveillance for HIV infection and eliminate duplicate reporting of HIV-positive individuals. Prevalent cases of HIV (not previously reported) treated in Illinois are also reportable using the PCN system.

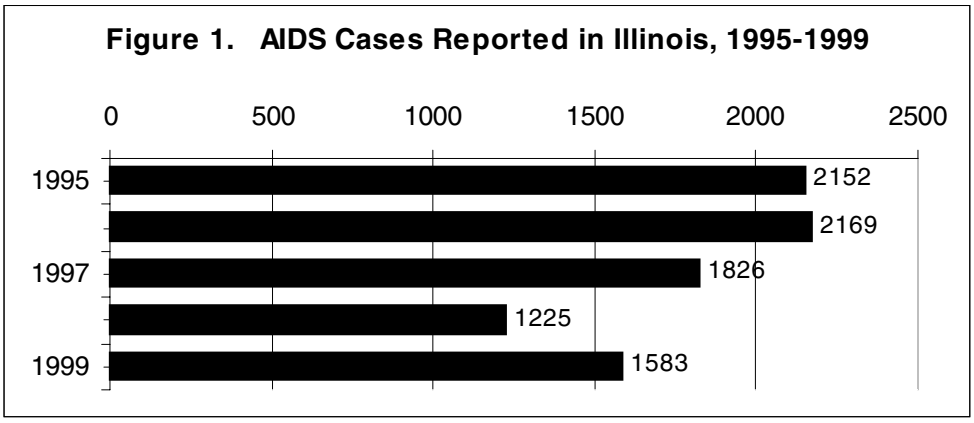
The case definition for AIDS has changed three times, which should be taken into account when reviewing trends over these time periods. The changes may be referred to as pre-1987, 1987 revision and the 1993 revision. To review the case definitions and the change in definition over time, the following MMWRs should be reviewed:

1) Review of the CDC surveillance case definition for acquired immunodeficiency syndrome. MMWR 1987;36 (Suppl:)1-15s.
2) 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. MMWR 1992;41(RR-17):1-19.
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 regarding the 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).

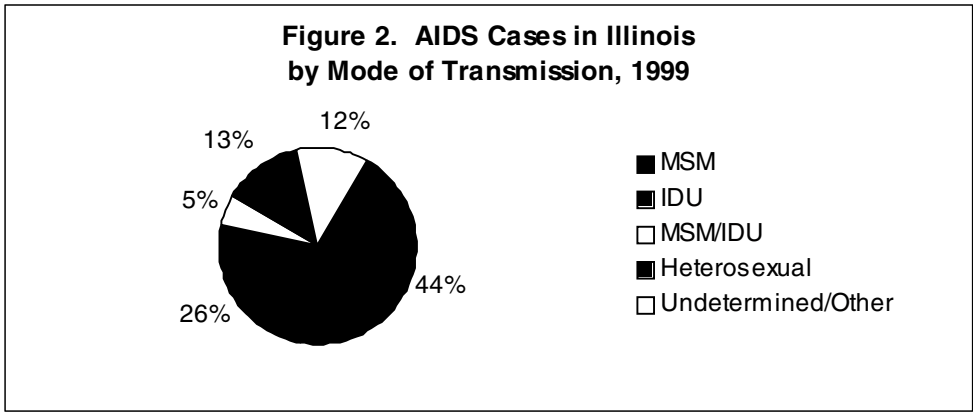
Descriptive epidemiology

From 1981 through December 31, 1999, 23,094 cumulative AIDS cases were reported to IDPH. For the purpose of this report, reference will be made only to AIDS cases reported to IDPH in calendar year 1999, except where otherwise noted. In 1999, 1,583[1] AIDS cases were reported to IDPH. Although the number of AIDS cases reported to IDPH has been declining over the past several years, the number rose in 1999. The addition of laboratory-based reporting of low CD4 counts by patient name in July 1999 led to the discovery of previously unreported AIDS cases in the state. According to the Department, "...the increase can be attributed, in part, to increased awareness among health care providers regarding HIV and AIDS reporting requirements"[2] (Figure 1).



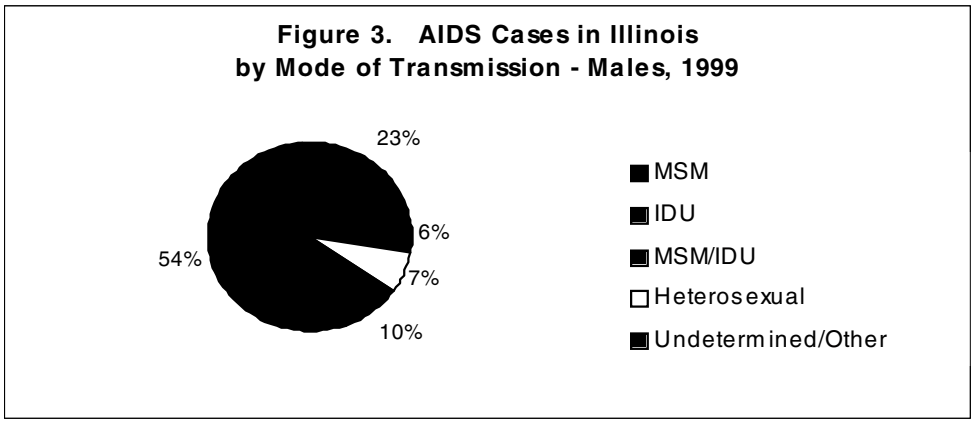
Source: Illinois Department of Public Health 2000

Mode of transmission among all AIDS cases reported in Illinois in 1999 is shown in the following chart (Figure 2).



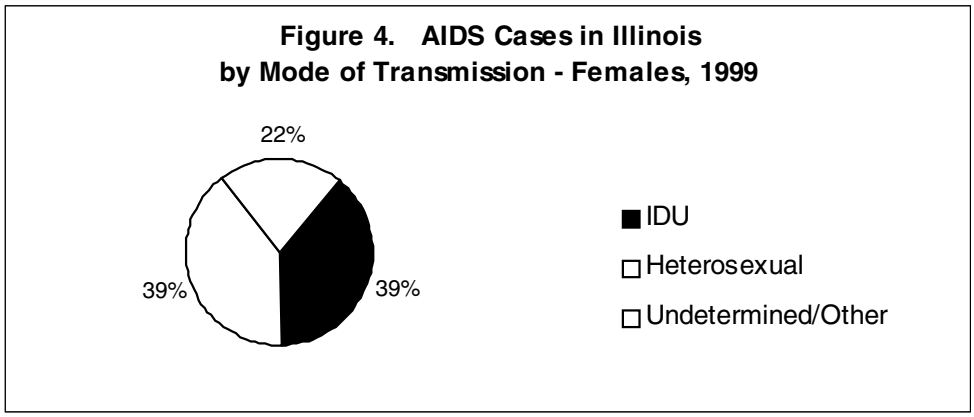
Source: Illinois Department of Public Health 2000

The majority of AIDS cases in 1999 were in males (1,291 cases or 82 percent). For all cases reported among males, men who have sex with men (MSM) accounted for the largest number of AIDS cases (54 percent or 702 cases), followed by injection drug use (IDU) (23 percent or 293 cases) (Figure 3).



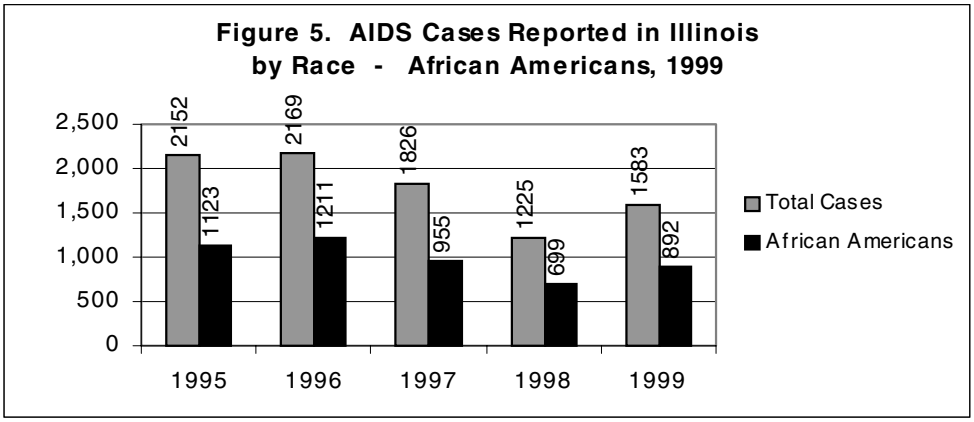
Source: Illinois Department of Public Health 2000

Cases among females accounted for 18 percent (292 cases) of the total AIDS cases reported in 1999. Among females, two modes of transmission were evenly divided: heterosexual contact and IDU, each accounting for 39 percent of all reported cases (116 and 113 cases, respectively) (Figure 4).



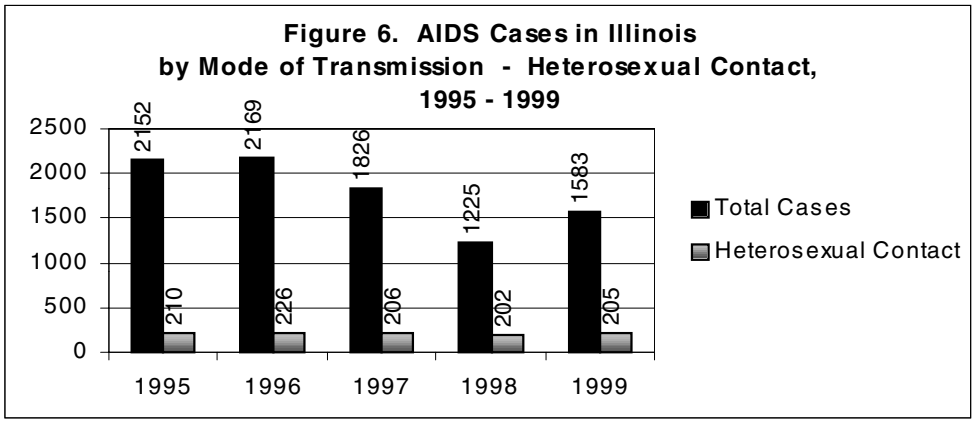
Source: Illinois Department of Public Health 2000

African Americans, who represent 15 percent of the state's population, accounted for 56 percent, or 892 of the AIDS cases reported in 1999. This represented an increase since 1994 when 47 percent of cases reported were among African Americans (Figure 5).



Source: Illinois Department of Public Health 2000

Heterosexual contact as the mode of transmission accounted for 13 percent, or 205, of all the reported AIDS cases in 1999. This represented an increase since 1994 when 9 percent of all AIDS cases reported heterosexual contact as the mode of transmission (Figure 6).



Source: Illinois Department of Public Health 2000

In 1999, metropolitan Chicago cases comprised 86 percent of the total, with Chicago comprising 66 percent of the total Illinois cases. AIDS cases residing outside of the Chicago metropolitan area represented 14 percent of the state total.

Summary

More than 1,500 AIDS cases were reported in Illinois between January 1 and December 31, 1999. Most AIDS cases occurred in males. The most common risk factor for transmission was MSM. Among females, cases were equally attributable to IDU and heterosexual contact. Heterosexual contact as the mode of transmission has increased since 1994 as have cases among African Americans.

[1]Numbers may vary slightly from previously published reports.

[2]AIDS Cases Up After Two-Year Decline, IDPH News Release; February 8, 2000

Amebiasis

Background

Entamoeba histolytica is a protozoal 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 and bloody or mucoid diarrhea. Extraintestinal amebiasis also can occur. Humans are the reservoir for *Entamoeba histolytica*. Transmission occurs by ingestion of cysts in fecally contaminated food or water or through oral-anal contact. The incubation period ranges from two to four weeks.

Case definition

When determining the status of a reported case of amebiasis, Illinois uses the CDC case definition. The case definition for a confirmed case is as follows: a clinically compatible illness that is laboratory confirmed (demonstration of cysts or trophozoites of *E. histolytica* in stool, or demonstration of trophozoites in tissue biopsy or ulcer scraping by culture or histopathology). The definition for a case of extraintestinal amebiasis is a parasitologically confirmed infection of extraintestinal tissue; or, among symptomatic persons with clinical and/or radiographic findings consistent with extraintestinal infection, demonstration of specific antibody against *E. histolytica* as measured by indirect hemagglutination or enzyme-linked immunosorbent assay (ELISA).

Descriptive epidemiology

In 1999, 65 cases of amebiasis were reported in Illinois (five-year median=54). Ages of cases ranged from 2 to 72 years of age (mean=34) (Figure 7). There were 15 male cases identified in the 30 to 39 year age group and only four females. Sixty-one percent of cases were male. Eighty-eight percent were white, 10 percent were African American and 2 percent were Asian. Forty percent identified themselves as Hispanic, a significantly higher proportion than in the total Illinois population. There was no seasonal peak in amebiasis. From 1994 to 1999, the number of cases per year ranged from 45 to 82 (Figure 8).

Diarrhea was reported by 64 percent of cases and vomiting by 16 percent of cases. Ninety-five percent were treated for their illness. Eleven percent of cases where this information was known were hospitalized. The risk factors reported by cases included traveling outside the country (32 percent), drinking from a private water supply (27 percent), swimming in non-chlorinated water (17 percent), contact with someone from a residential institution (11 percent) and contact with someone in a day care center (5 percent). Twelve individuals reported travel outside the country in the four weeks prior to illness; nine of these cases listed Mexico as a travel destination.

Summary

From 45 to 82 cases of amebiasis were reported in Illinois each year from 1994 to 1999. Amebiasis was significantly more common in those reporting Hispanic ethnicity. Thirty-two percent of individuals traveled outside the U.S. The most common travel site outside the U.S. was Mexico.

Figure 7. Age Distribution of Amebiasis Cases in Illinois, 1999

Source: Illinois Department of Public Health, 2000

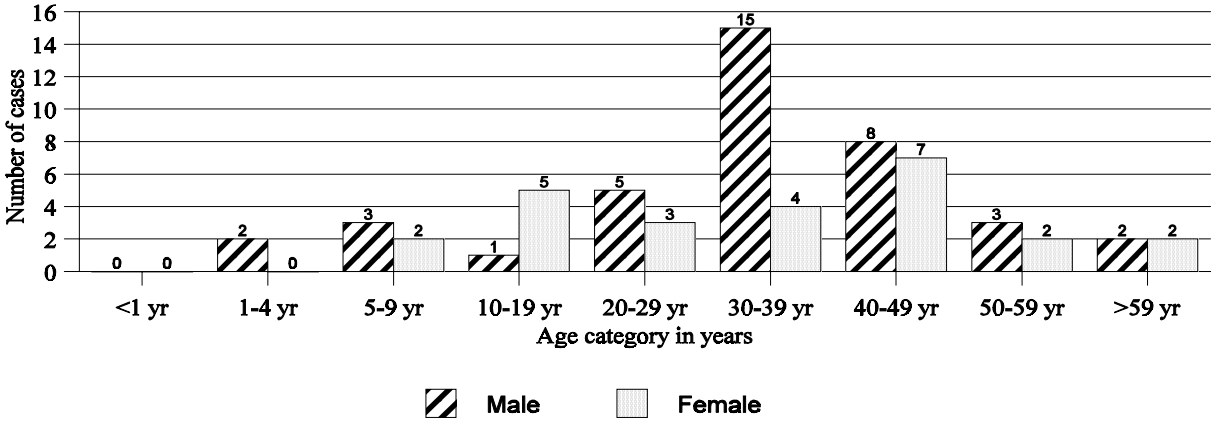
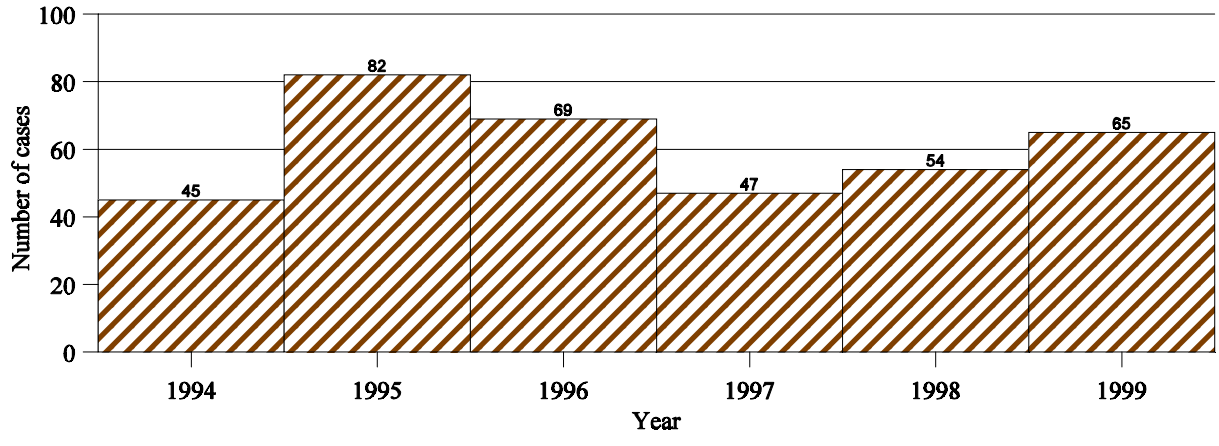


Figure 8. Amebiasis Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000



Animal bites

Background

Animal bites are a major public health hazard. There if often a perception that wild animals are the main cause of animal bites to humans. A study in Pennsylvania showed that the species of animals that caused bites and other possible rabies exposures to persons included dogs (75 percent), cats (17 percent), small rodents (1 percent), squirrels and chipmunks (1 percent), raccoons (0.7 percent), bats (0.4 percent), unknown (2 percent) and other species (2 percent). Owned dogs caused 93 percent of dog exposures and 59 percent of the dogs were up-to-date on rabies vaccinations. Of those persons receiving medical treatment, 50 percent received antimicrobials, 29 percent received tetanus toxoid and 19 percent had suturing, were admitted or referred to a plastic surgeon. Eighty-one percent of those referred for plastic surgery had bites on the head, neck or face. The rabies post-exposure prophylaxis rate for Pennsylvania was five per 100,000 person years. Victims exposed to cats were six times more likely to have received PEP than victims exposed to dogs. Almost one-third of PEP was administered to victims less than 10 years old.

Descriptive epidemiology

In 1999, 9,446 animal bites were reported in the state. Information on the species of biting animal and whether rabies post-exposure treatment was given to the person bitten is not collected. Reported animal bites were slightly higher in 1999 than the five-year median of 9,065 (Figure 9). The incidence rates per 100,000 per year for animal bites are highest in children. The rates were highest for 5- to 9-year-olds (191 per 100,000) followed by 10- to 14-year-olds (146 per 100,000) (Figure 10).

Summary

More than 9,000 animal bites were reported in Illinois in 1999. The highest bite incidence rates occurred in 5- to 9-year-olds. Prevention of animal bites should include education of the public about not approaching wild, unfamiliar or strangely acting animals. Small children should always be supervised around pets. If left unattended, children should be encouraged to tell an adult about any encounter with an animal. Local laws should include those requiring dogs to be leashed when in public and those to regulate dangerous and stray dogs. The need for responsible dog ownership should be emphasized.

Suggested readings

Hanlon CA, Olson JG, Clark CJ. Article 1: Prevention and education regarding rabies in human beings. JAVMA 1999; 215(9):1276-80.

Moore DA, Sischo WM, Hunter A, Miles T. Animal bite epidemiology and surveillance for rabies postexposure prophylaxis. JAVMA 2000;217(2):190-194.

Figure 9. Reported Animal Bites to People in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

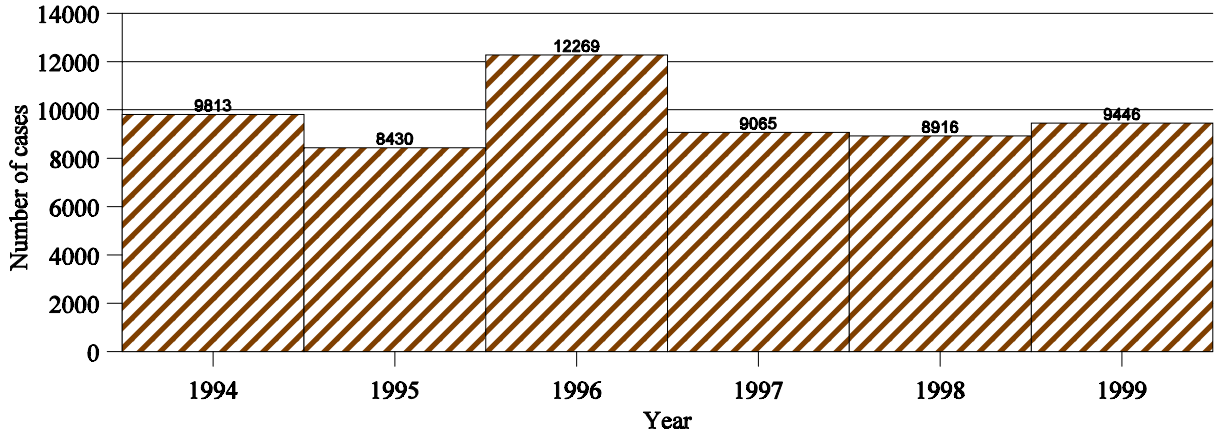
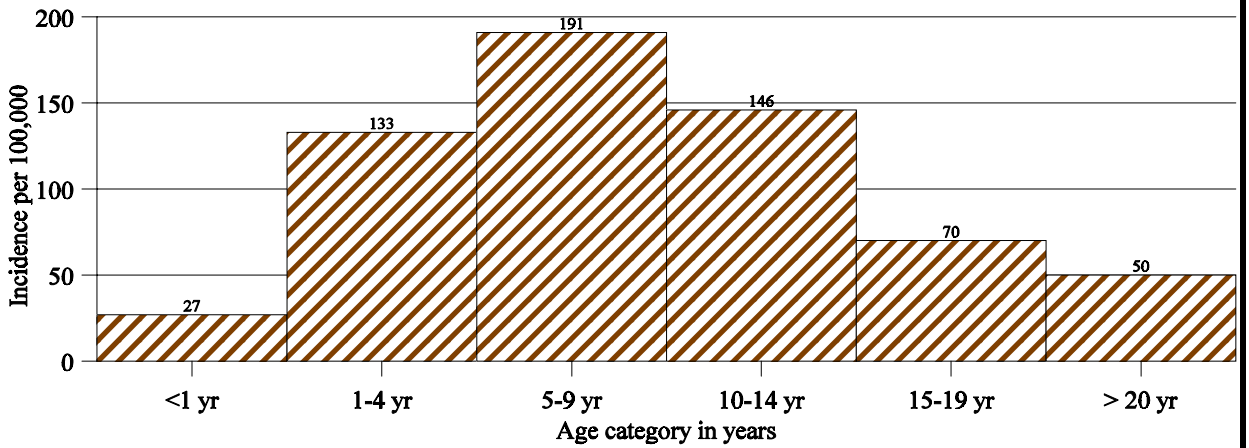


Figure 10. One-year Incidence of Animal Bites per 100,000 in Illinois, 1999

Source: Illinois Department of Public Health, 2000



Blastomycosis

Background

The etiologic agent involved in blastomycosis infections is a dimorphic fungus called *Blastomyces dermatitidis*, which is endemic in the midwestern United States. Areas associated with outbreaks include places with large amounts of decaying vegetation, organic matter or bird or animal droppings. Recreational activities along waterways are considered to be a major risk factor. The reservoir of the organism is moist soil and, for systemic infections, transmission is through inhalation of spore-laden dust. *B. dermatitidis* infections may range from asymptomatic to disseminated disease. Patients with T-cell dysfunction are predisposed to serious disease. For symptomatic infections, the incubation period is approximately 45 days. There is no screening skin test antigen available for *Blastomyces* like there is for histoplasmosis.

Case definition

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

Descriptive epidemiology

There were 50 blastomycosis cases reported in 1999. The mean age was 42 years (range 9 to 81) (Figure 11). Forty-four percent were female. Fourteen percent were African American and 84 percent were white. Twenty-six percent were Hispanic. Fifty percent of cases had residential addresses in either Cook or Lake County. From 1994 to 1999, cases per year have ranged from 25 to 50 (Figure 12).

Eighty percent of cases were hospitalized and two cases were fatal. The following signs and symptoms were seen in cases: cough (82 percent), fever (69 percent), weakness (51 percent), weight loss (51 percent), malaise (46 percent), chills (41 percent), night sweats (41 percent), dyspnea (39 percent), anorexia (36 percent), skin lesions (21 percent), local swelling (18 percent), hemoptysis (15 percent) and arthritis (15 percent). Two cases had portions of their lungs removed.

Forty-five cases were culture confirmed. These cases were confirmed by culture from bronchial washing (17), lung tissue (8), sputum (7), unknown site (7) and other site (10). Four had cultures from multiple sites. Identification of organisms resembling blastomycosis in tissues or secretions (lung, bronchial washings, lymph node, unknown and other) was used for diagnosis in 15 cases; eight of these 15 were also culture positive.

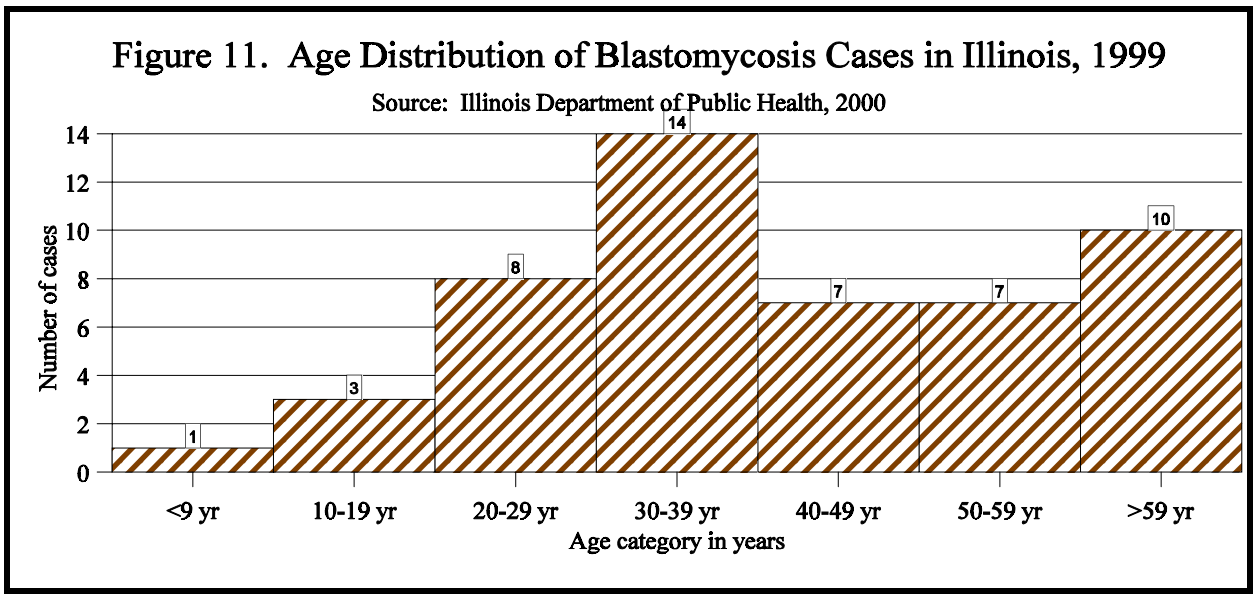
Thirty-six percent of cases were smokers and 47 percent reported gardening as a hobby. At least three had diabetes and at least four reported an underlying immunosuppressive condition.

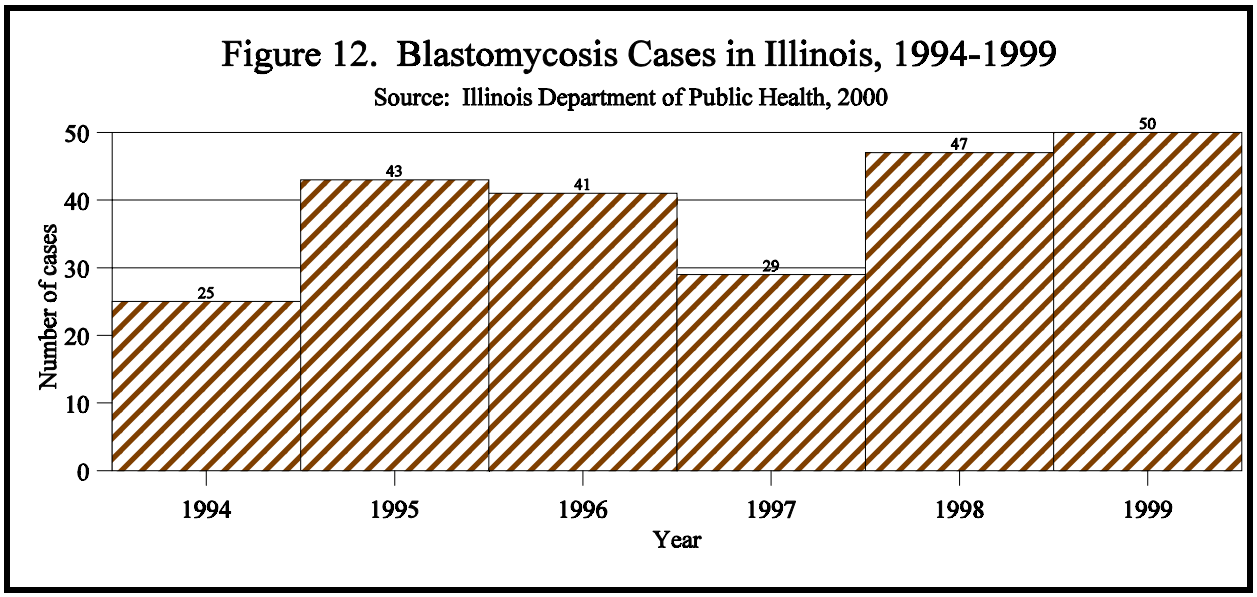
Summary

The number of reported cases (50) in 1999 was higher than the five-year median of 29. Blastomycosis cases occur predominantly in adults. Many cases had symptoms of respiratory involvement, including cough, dyspnea or hemoptysis. More than three-quarters of reported cases were confirmed by culture. Half of reported cases were from Cook or Lake County.

Suggested readings

DeGroote MA, Berjke R et al. Expanding epidemiology of blastomycosis: Clinical features and investigation of 2 cases in Colorado. Clin Inf Dis 2000;30:582-4.





Brucellosis

Background

Brucellosis is a systemic bacterial infection that can cause intermittent or continuous fever and headache, sweating and arthralgia. Symptoms can last from days to years. Species of *Brucella* affecting humans include *B. abortus*, *B. melitensis*, *B. suis* and *B. canis*. 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 dairy products. The incubation period varies from one to two months.

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 fourfold or greater rise in *Brucella* agglutination titer or demonstration of *Brucella* species in a clinical specimen by immunofluorescence. A probable case is defined as a clinically compatible case that is epidemiologically linked to a confirmed case or that has supportive serology (i.e., *Brucella* agglutination titer of $\geq$ 160 in one or more serum specimens obtained after symptom onset).

Descriptive epidemiology

In 1999, 10 brucellosis cases were reported in Illinois; nine were confirmed and one was probable. The median age was 40 (range 6 to 69). Seven were male; all were white. Five were Hispanics. Seven were from Cook and there was one each from DuPage, Lake and Whiteside counties. Case investigations were completed on eight cases.

Of the eight with case investigations, laboratory testing was serology alone for three cases, both culture and serology for one case and four cases had blood cultures performed. Two isolates were speciated and were identified as *B. melitensis*. Symptoms seen in cases were fever (8 cases), body aches (7), weight loss (5), headache (4) and sweats (3). Cases ranged in age from 9 to 69. Three were female; at least five were Hispanic. Of the eight with case histories, three had consumed Central American dairy products, one had consumed goat cheese in France, two had contact with livestock in Central America, one had consumed dairy products and had contact with goats in Europe, and one had no known exposure to suspect dairy products.

Brucella melitensis was identified from a culture from a hospital laboratory in Illinois. Hospital laboratory personnel had smelled the culture plate and there was concern about occupational transmission. No transmission occurred to hospital laboratory personnel after this exposure.

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.

Campylobacteriosis

Background

Campylobacteriosis is a zoonotic bacterial enteric disease caused by *Campylobacter jejuni* and occasionally by *Campylobacter coli*. The reservoir for *Campylobacter* is in animals, most commonly poultry and cattle. Transmission is through consumption of contaminated food and water, or from contact with infected pets, farm animals or infants. *Campylobacter* is a common cause of travelers' diarrhea. The incubation period is two to five days and symptoms may last up to 10 days. Many infections are asymptomatic. Symptoms include diarrhea, abdominal pain, fever and vomiting. Sequelae may include reactive arthritis, febrile convulsions, a typhoid-like syndrome, Guillain-Barre syndrome or meningitis. Guillain-Barre syndrome can occur from 10 days to three weeks after infection with *Campylobacter*. Excretion of the organism can occur for two to seven weeks. Most cases occur during warmer months of the year.

From 1996 through 1999, *Campylobacter* incidence declined by 26 percent in FoodNet sites in the U.S. Reporting of *Campylobacter* in Illinois has been voluntary; new regulations require reporting of *Campylobacter* in the state beginning in April 2001.

Antibiotic resistance is becoming more common in *Campylobacter*. Sixty percent of *Campylobacter* isolates from 1997 through 1999 in the national Antimicrobial Resistance Monitoring System (NARMS) were resistant to at least one antibiotic. Eighteen percent of isolates in 1999 were resistant to ciprofloxacin.

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

In 1999, 721 cases were voluntarily reported in Illinois for an incidence rate of six per 100,000 for the year. Fifty-four percent of Illinois cases were in males. Ninety-four percent of cases were in whites, 4 percent in African Americans, 1 percent in Asians and 1 percent in American Indians. Eleven percent of the cases were Hispanic. There was a significantly higher proportion of whites with campylobacteriosis and a lower proportion of African Americans with the disease. The mean age of reported cases was 35 and the highest incidence rate occurred in those less than 5 years of age (Figure 13). Campylobacteriosis was reported more often in the warmer months of the year in Illinois (May-August) (Figure 14). The number of cases declined in 1999 compared to the five-year median of 951 (Figure 15).

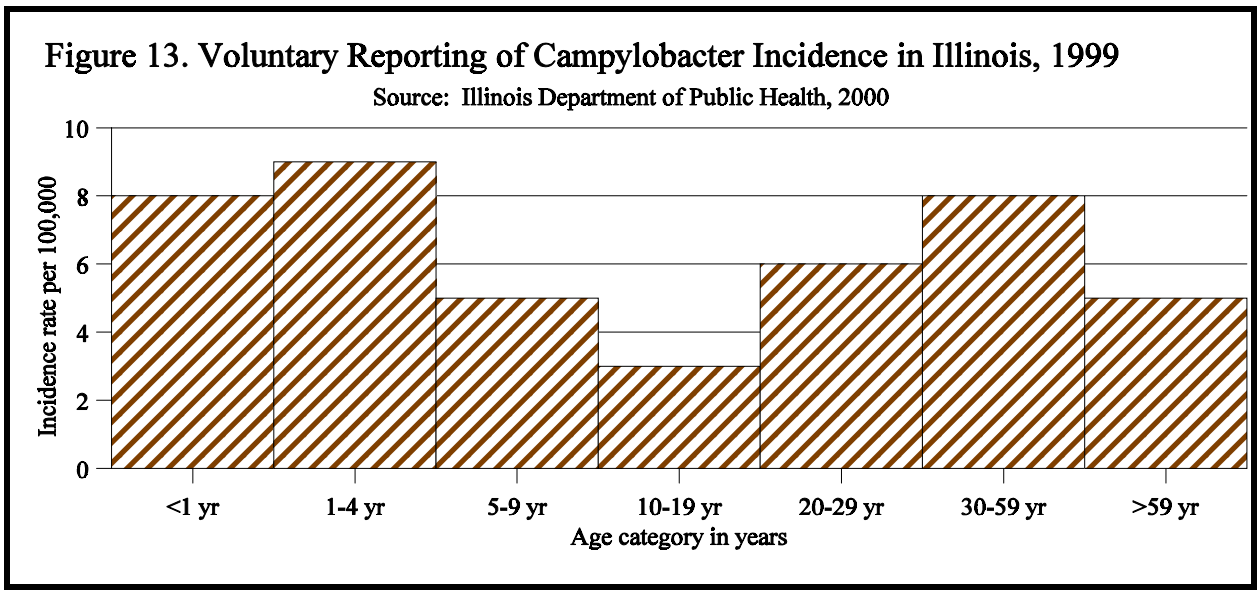
Summary

There is not mandatory reporting for campylobacteriosis in Illinois so 721 cases is a minimum estimate of the number of cases in 1999. *Campylobacter* infections occur more commonly from May to August. The incidence is highest in 1-to 4-year-olds. Whites are more likely to be reported with *Campylobacte*r than other races.

Suggested readings

Marano NN et al. The National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria, 1996-1999: surveillance for action. JAVMA 2000;217(12):1829-30.

MMWR. Preliminary FoodNet data on the incidence of Foodborne Illnesses Selected Sites, United States, 1999. MMWR 2000:49:201-5.



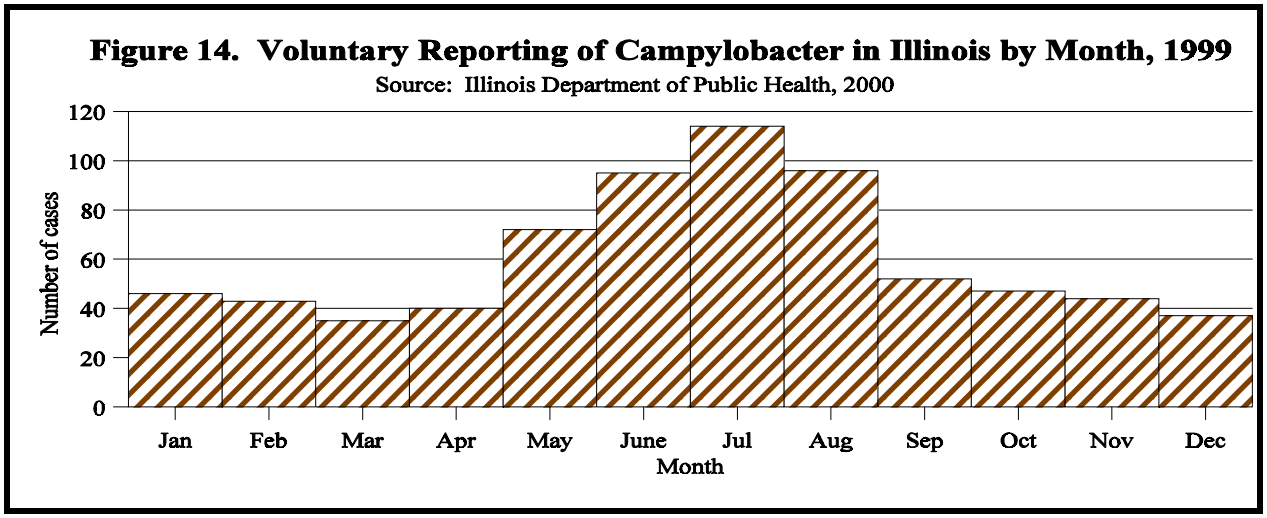
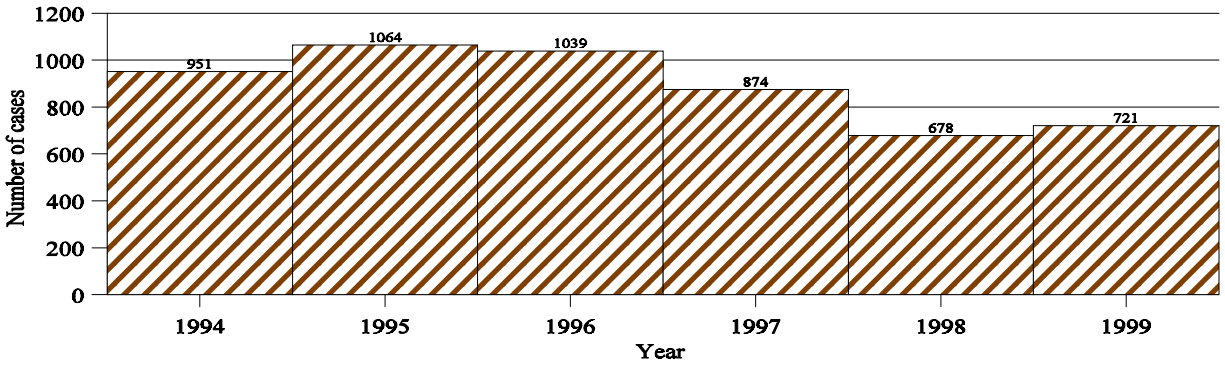


Figure 15. Voluntary Reporting of Campylobacter Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000



CENTRAL NERVOUS SYSTEM INFECTIONS

Aseptic meningitis

Background

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 U.S., enteroviruses cause most cases with known etiology. Some arboviral infections may present as aseptic meningitis. During the period June 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 LaCrosse encephalitis, St. Louis encephalitis (SLE), Eastern equine encephalitis and Western equine encephalitis viruses and culture for enteroviruses. In 1999, no testing for WEE could be performed due to shortages in needed laboratory reagents. In the summer of 1999, an epidemic of West Nile virus (WNV), an arbovirus not previously identified in the U.S., began in New York. Because of this outbreak, specimens in Illinois will be tested for WNV beginning in the summer of 2000.

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.

Descriptive epidemiology

There were 562 cases of aseptic meningitis identified in Illinois in 1999. Cases were more common in the months of July through September (Figure 16). Fifty-two percent of cases were male. Eighty-one percent of cases were white, 16 percent African American and 2 percent Asian; 15 percent were Hispanic. The annual incidence rate was highest in those less than 1 year of age (75 per 100,000) (Figure 17). In all other age groups, the incidence rate was below 10 per 100,000. The mean age was 20. The total number of aseptic meningitis cases in 1999 (562) was lower than the five-year median of 624 (Figure 18).

In counties with more than nine aseptic meningitis cases reported, the highest incidences per 100,000 population were in Tazewell (16), Macon (12), McHenry (9), McLean (8) and Winnebago (7).

There were 421 cases of aseptic meningitis with onsets from June 15 through October 31. Virus isolation was attempted from 197 cases. Viruses were isolated from 113 patients. In 81 of the 113 patients (72 percent), the virus was isolated from the CSF. In the other cases, the virus was isolated from either the stool (six), upper respiratory tract (three), lower gastrointestinal tract (three) or from an unknown site (20). Typing was performed on 69 of 113 (61 percent) of isolates. The most common type was echo 11, which was identified in 49 individuals. Each of the following enteroviruses was identified in less than six persons: coxsackie A9, coxsackie B4, coxsackie B5, echo 16, echo 2 and echo 9. Acute blood specimens were sent to the IDPH laboratory for 73 individuals and convalescent blood specimens for 20 individuals. Convalescent specimens were only obtained for 5 percent of the 421 aseptic meningitis cases from June through

October. One specimen from an aseptic meningitis case tested positive for LAC at a reference laboratory. At the IDPH laboratory, these specimens were tested for evidence of arbovirus infections (SLE, LAC and EEE). None of the specimens sent to the IDPH laboratory from aseptic meningitis cases was positive for LAC. Testing patients with presumed viral infections of the CNS for arboviral antibodies is necessary to identify arboviral infections. Testing only 5 percent of patients was probably inadequate to identify public health threats due to mosquito-borne viruses.

Summary

Aseptic meningitis cases occur with greater frequency in the summer months and in those less than 1 year of age. Reported aseptic meningitis cases have decreased substantially from last year's numbers. Echovirus 11 was the predominant echovirus identified in specimens from patients whose specimens were submitted to the IDPH laboratory in 1999. In 1998, echovirus 30 was most common. Due to the emergence of WNV in the Eastern U.S., it has become even more important to submit both acute and convalescent serum specimens to allow for rapid identification of the arrival of this pathogen in Illinois.

Figure 16. Reported Aseptic Meningitis in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

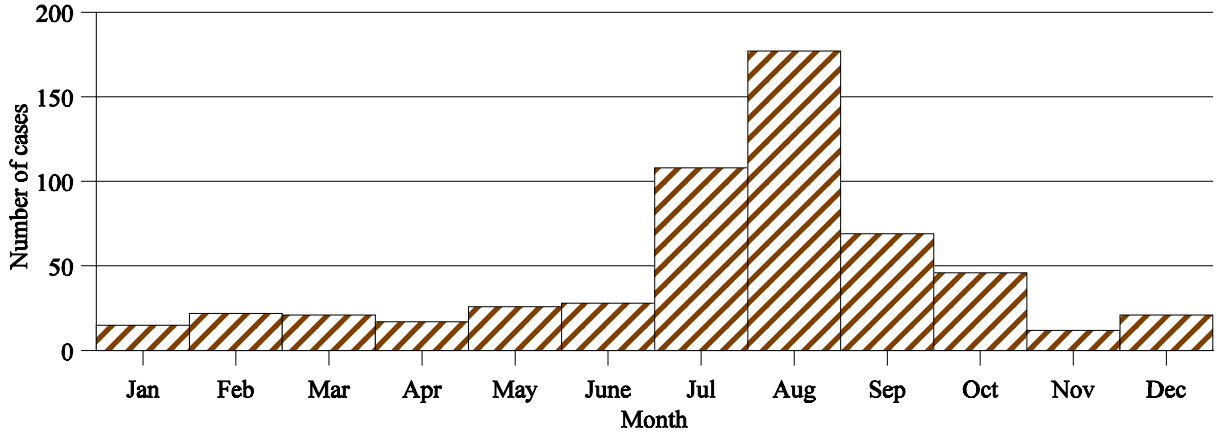


Figure 17. Incidence of Aseptic Meningitis per 100,000 in Illinois, 1999

Source: Illinois Department of Public Health, 2000

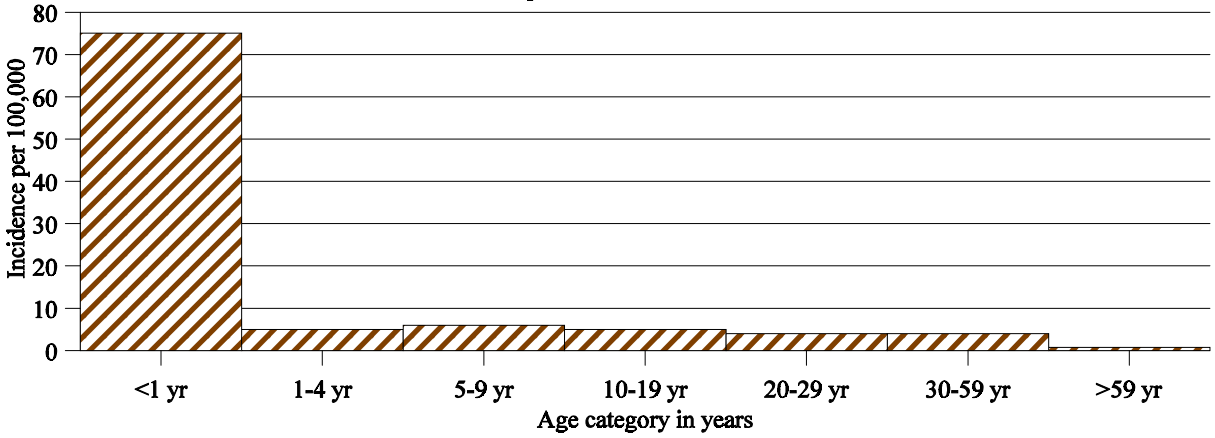
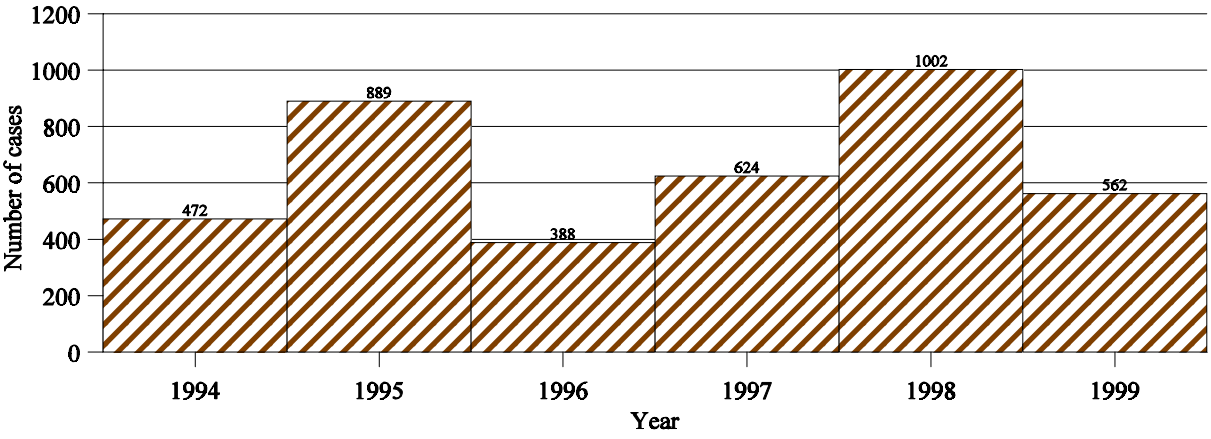


Figure 18. Aseptic Meningitis Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000



Encephalitis

Background

Acute infectious and post-infectious encephalitis is reportable in Illinois. Infections are characterized by headache, high fever, meningeal signs, stupor, disorientation, coma, tremors, convulsions or paralysis. Some forms of infectious encephalitis are arboviruses that are mosquito-borne but may not always result in the "classical" encephalitis presentation. Arboviruses that cause encephalitis are members either 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. Arboviruses may present as aseptic meningitis. Arboviral infections ever reported in Illinois include St. Louis encephalitis (SLE), California (LaCrosse) (LAC) encephalitis and western equine encephalitis (WEE).

Cases of LAC are most often reported from Peoria, Tazewell and Woodford counties in Illinois. LAC encephalitis occurs more commonly in children younger than 15 years of age, while the elderly are at greatest risk of SLE. The incubation periods for mosquito-borne encephalitides are five to 15 days.

For arboviruses such as SLE, WEE and EEE (eastern equine encephalitis), wild birds are the main reservoir and amplifying host. Surveillance for SLE, WEE and EEE is conducted in wild bird populations across the state each year.

In 1999, an outbreak of West Nile virus, an arboviral encephalitis, primarily causing serious disease in the elderly, first appeared in New York. WNV is a flavivirus in the same family as SLE. This is the first time WNV has been identified in North America. Previously the virus was identified in Africa, the Middle East and southwest Asia. The virus is transmitted by mosquitoes, specifically an ornithophilic mosquito*, Culex pipiens*, in New York. Less than 1 percent of infected humans develop severe neurologic disease. Over half of persons with WNV had IgM antibody six months after illness onset, so acute and convalescent specimens are needed when IgM serologies are run. The virus was identified in four states (Connecticut, Maryland, New Jersey and New York) in 1999. After a five-to15-day incubation period, clinical features included fever, myalgias, headaches, conjunctivitis, lymphadenopathy and rash. Human, horse and bird encephalitis cases caused by WNV were reported during this outbreak. There were 61 human cases (55 confirmed, six probable) and seven deaths in 1999.

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. Removing tires and other outdoor water receptacles and sealing tree holes can minimize the habitat suitable for mosquitoes transmitting LAC. A study of six commercial anti-mosquito products (sonic mosquito repeller, insect-killing grid using ultraviolet light and chemical lures, mosquito snake coils containing a pyrethroid, candles containing citronella oil, mosquito plant and a DEET-impregnated wrist band) was conducted. These products were compared using mosquito landing rates to a negative control (untreated volunteers) and a positive control (volunteers with topical DEET applied). Results indicated that none of the nontopically applied products were as effective as topical DEET. Two products, the mosquito smoke coils and the wrist bands, significantly reduced mosquito landing rates.

In Illinois, enhanced sample collection is requested of physicians with patients experiencing encephalitis or aseptic meningitis from June 15 to October 31. Acute and

convalescent sera from patients are requested for antibody testing by IDPH; testing of cerebrospinal fluid (CSF) for mosquito-borne encephalitides also is performed if samples are available. The purpose of this surveillance activity is to identify patients with aseptic meningitis, meningoencephalitis or encephalitis to determine if their infections are the result of an arbovirus or a more common cause, such as an enterovirus. Patients with CSF pleocytosis with no other clinical explanation for this condition are also included in the surveillance system to identify mosquito-borne viruses in the state. The information can be used to focus and guide environmental protection activities.

In 1997, *Aedes albopictus*, an efficient vector of LAC, was identified in Peoria County during the investigation of a suspect LAC case. The mosquito survived the winter and expanded its range.

Case definition

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

Descriptive epidemiology

There were 58 acute encephalitis cases reported in 1999 in Illinois. Cases by month of onset are shown in Figure 19. Fifty percent of cases were female. The mean age was 43. Ninety-one percent of cases occurred in whites, 6 percent in African Americans and 4 percent in Asians; 8 percent reported Hispanic ethnicity. Forty were identified as acute encephalitis, not further specified; seven as herpes encephalitis; three as LAC encephalitis; one as post-mononucleosis encephalitis; six as post-varicella zoster; and one as post-influenza. Thirty-one cases had onset dates between June 15 and October 31. Virus isolation was attempted on specimens from 11 individuals and one was positive for echovirus 71. Twelve acute sera and three convalescent sera from cases with onsets between June 15 and October 31 were sent to the IDPH laboratory. The numbers of reported cases of acute encephalitis were similar in 1998 and 1999 (Figure 20). The number of cases of LAC encephalitis and SLE from 1976 through 1999 are shown in Figure 21. The reported cases of LAC in Illinois are as follows: 1990 (1), 1991 (15), 1992 (7), 1993 (2), 1994 (6), 1995 (5), 1996 (13), 1997 (3), 1998 (4). The reported Saint Louis encephalitis cases in Illinois are as follows: 1990 (0), 1991 (0), 1992 (0), 1993 (two), 1994 (0), 1995 (one), 1996 (0), 1997 (0) 1998 (0). A low level of surveillance may be the reason for the low numbers of California encephalitis from 1985 through 1990. A large outbreak of *Salmonella* in 1985 and the start of the AIDS epidemic left fewer personnel and resources for other infectious diseases in the state.

The three 1999 LAC encephalitis cases were from 1 to 79 years of age. Two presented clinically as encephalitis and one as meningitis. Two cases were confirmed and one was probable. The three cases resided in LaSalle, Peoria and Winnebago counties. One had onset in August and two in September. Environmental surveys of the homes of the LAC encephalitis cases in LaSalle and Peoria counties were done but no tires were identified in the vicinity of the homes. The case in Peoria lived near a site where tires had been removed in previous years. The case in Winnebago had traveled outside the state during the incubation period so no environmental survey was done at the residence of the case.

In 1999, the number of sera from wild birds tested for arboviral encephalitis (SLE, EEE and WEE) was 5,595. The birds were trapped by mist nets at stables, grain elevators, cattle feedlots and other similar locations and blood was collected for testing. Eighteen birds were seropositive for arboviruses, 13 for EEE and five for SLE. Four birds from northeastern Illinois and one bird from southern Illinois had serologic evidence of SLE. Thirteen birds tested positive for EEE; six in northeastern Illinois and seven in southern Illinois. There were no confirmed equine or human cases of EEE reported in Illinois in 1999. No human cases of EEE have ever been confirmed in Illinois.

Summary

Encephalitis cases are more commonly reported in the summer months in Illinois. IDPH requests that physicians increase tests to establish the etiology and report individuals with acute encephalitis from June 15 to October 31 each year. There were three cases of LAC encephalitis and no cases of SLE reported in 1999. The finding of birds with antibodies to EEE underscores the importance of closely monitoring for both equine and human cases of encephalitis and examining specimens for the presence of EEE. Also, the finding of West Nile virus in the eastern United States in 1999 highlights the importance of maintaining a surveillance program for arboviruses.

Suggested readings

Jenson T, Lampman R, Slamecka MC, Novak RJ. Field efficacy of commercial antimosquito products in Illinois. J Am Mosquito Control Assoc 2000;16(2): 148-52.

Kitron U, Swanson J et. al. Introduction of Aedes albopictus into a LaCrosse virus-enzootic site in Illinois. Emerg Inf Dis 1998;4(4):627-630.

MMWR. Guidelines for surveillance, prevention, and control of West Nile virus infection-United States. MMWR 2000;49(2):25-28.

MMWR. Update: West Nile Virus activity-Northeastern United States, January-August 7, 2000. MMWR 2000;49(31):714-17.

Swanson J, Lancaster M, Anderson J, Crandell M, Haramis L, Grimstad P, Kitron U. Overwintering and establishment of *Aedes albopictus* (Dipetera: Culicidae) in an urban LaCrosse virus enzootic site in Illinois). J Med Entom 2000;37(3):454-60.

Asnis D.S. et al. The West Nile virus outbreak of 1999 in New York: The flushing hospital experience. Clin Inf Dis 2000;30:413-8.

Figure 19. Reported Encephalitis in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

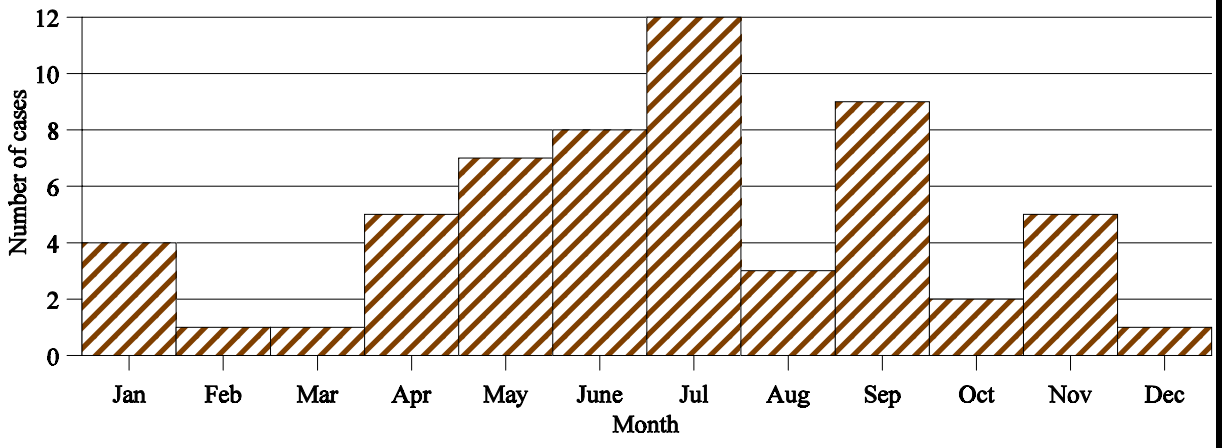


Figure 20. Encephalitis Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

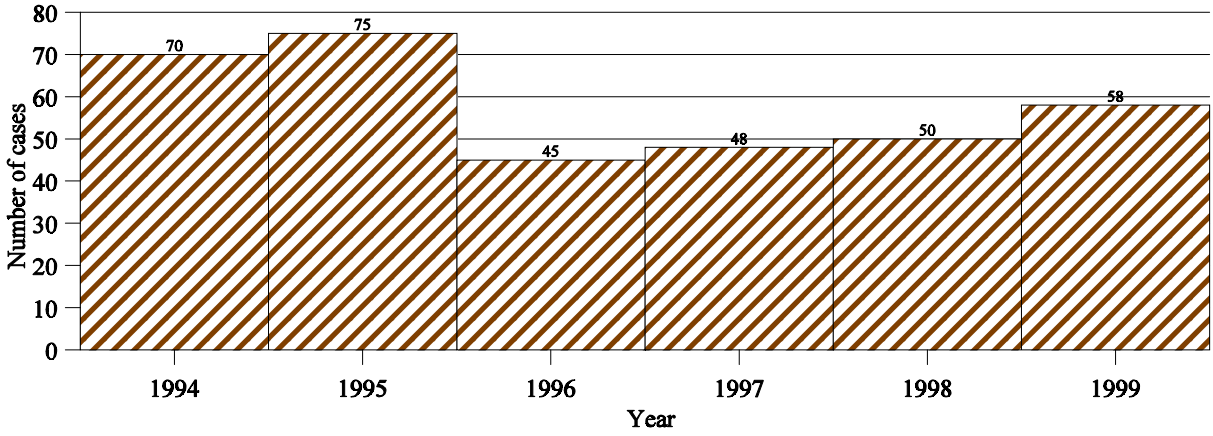
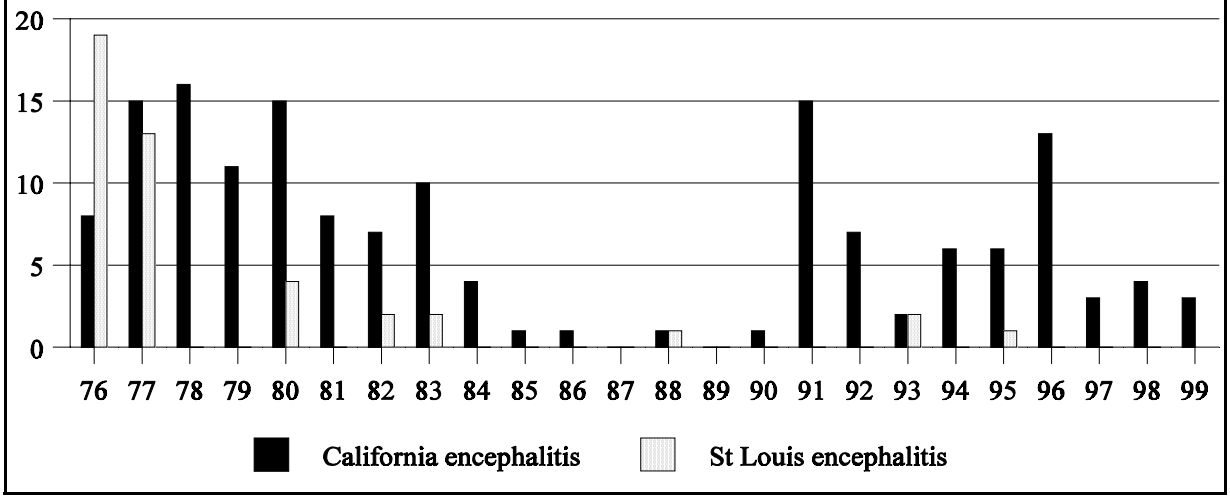


Figure 21. Number of Cases of Mosquito-borne Encephalitis in Illinois,1976-1999

Source: Illinois Department of Public Health, 2000



Bacterial meningitis

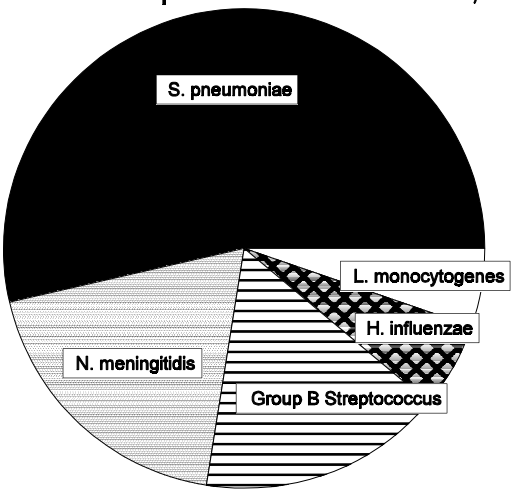
Background

Bacterial meningitis can be caused by a wide variety of pathogens including *Neisseria meningitidis*, *Haemophilus influenzae*, *Streptococcus pneumoniae*, *Listeria monocytogenes* and group B streptococcus. It is very important to differentiate what type of bacteria is causing the meningitis and to differentiate viral from bacterial causes of meningitis, because the public health response is different depending on the pathogen identified.

Descriptive epidemiology

The percentage of cases of meningitis due to five different organisms was determined: *S. pneumoniae* (53 percent), *N. meningitidis* (19 percent), group B streptococcus (16 percent), *L. monocytogenes* (5 percent) and *H. influenzae* (6 percent) (Figure 22).

Figure 22. Proportion of Cases due to Five Types of Bacterial Meningitis, 1999
Source: Illinois Department of Public Health, 2000



Haemophilus influenzae (invasive disease)

Background

Haemophilus influenzae can cause invasive disease such as meningitis, septic arthritis, pneumonia, epiglottitis and bacteremia. It is transmitted by droplets and discharges from the nose and throat. The incubation period is probably short, from two to four days. If the household of a case includes an infant less than 12 months of age, regardless of vaccination status, or a child between 1 and 3 years of age who is not fully vaccinated, then all household contacts should be given an antibiotic effective at eliminating carriage of the organism.

Between 10 percent and 100 percent of healthy children may carry *H. influenzae* in the nasopharynx. From 75 percent to 95 percent of the strains carried may be non-typable or unencapsulated.

A study in Alaska showed that the incidence of *H. influenzae* in unimmunized groups declined after introduction of Hib vaccines. This may be a reflection of decreased carriage in children. Eighty percent of cases of invasive *H. influenzae* had at least one underlying condition including alcohol or drug abuse and pregnancy.

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

The number of reported cases of invasive *H. influenzae* in 1999 was 89 as compared to the five-year median of 48 (Figure 23). Of the 89 reported cases that occurred in 1999, most were in those older than 49 years of age (56 percent) (Figure 24). Fifty-four percent of cases were in females. Twenty-eight percent of cases occurred in African Americans, 70 percent occurred in whites and 1 percent occurred in Asians. African Americans were overrepresented in the cases of invasive *H. influenzae* (28 percent) as compared to the Illinois population (15 percent). Eight percent of the cases on whom information was available were Hispanic.

Of the cases reported in 1999, 75 percent had bacteremia, 21 percent had pneumonia, 13 percent had meningitis, 5 percent had otitis media, 1 percent had septic arthritis and 1 percent had conjunctivitis. Some individuals had more than one manifestation of disease and were counted in each manifestation. Ninety-four percent of 86 cases with information available were hospitalized, and 14 percent of 71 cases where information was available died. *H. influenzae* was isolated from blood in 74 cases and from CSF in 11 cases. Sixty-seven (74 percent) of the isolates were serotyped; 19 percent of the isolates for which typing was attempted were type b and 18 percent of them were type f. One of the 13 reported cases due to type b was under the age of 5 years. This case was an infant who was 8 months of age. Therefore, there were no preventable cases of invasive *H. influenzae* during 1999.

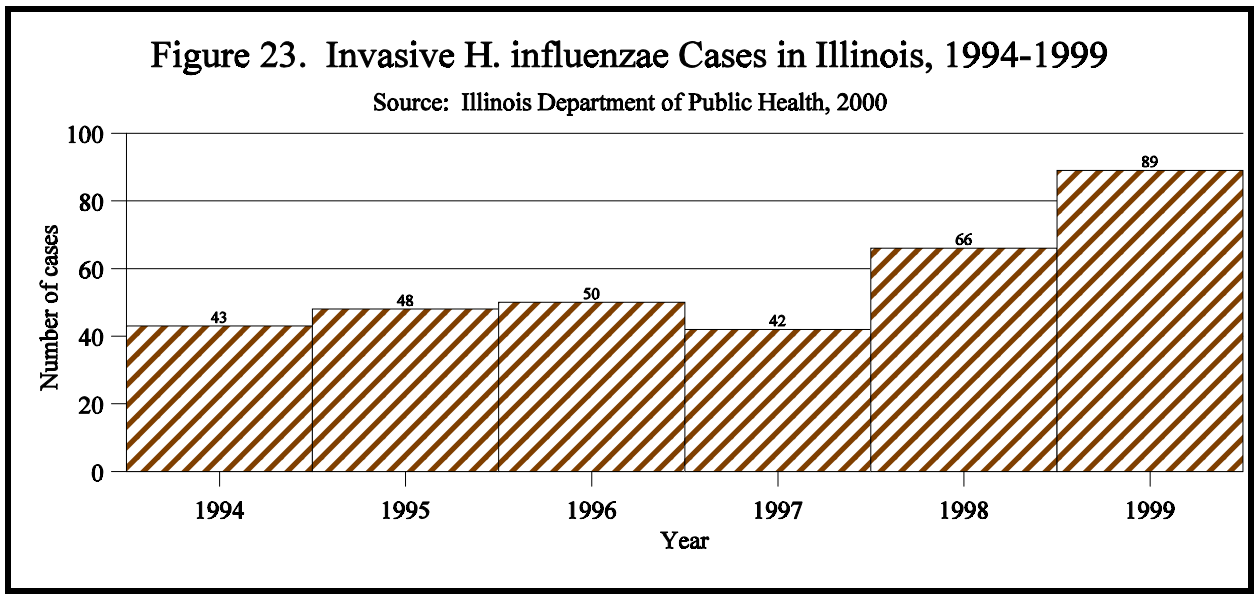
Summary

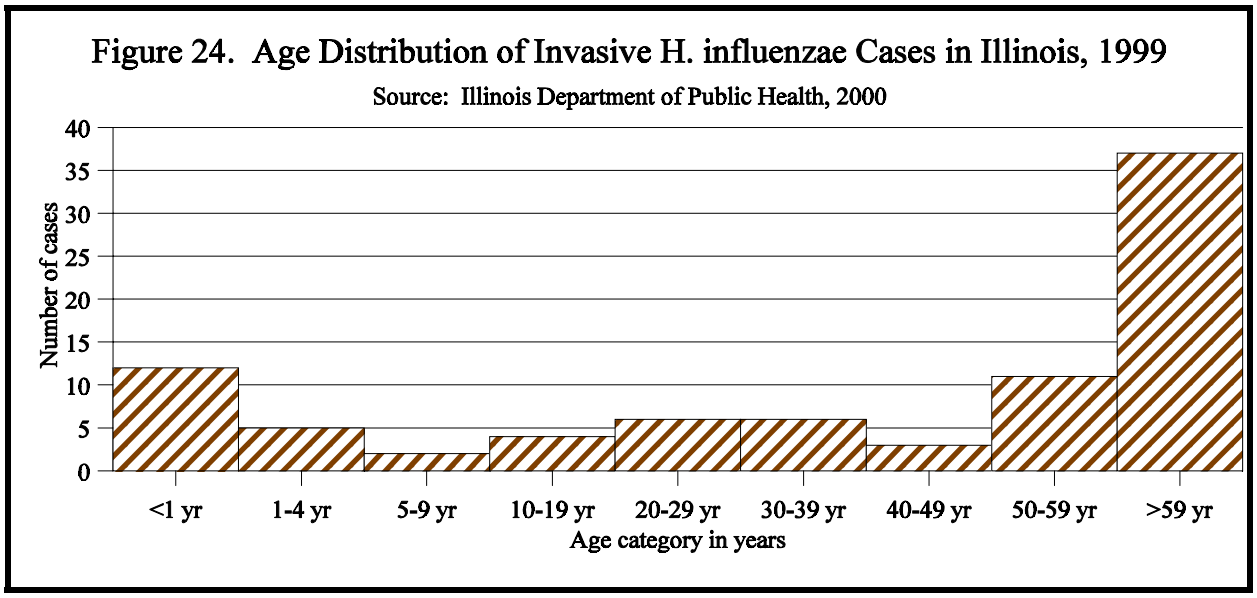
The number of cases of invasive *H. influenzae* cases increased in 1999; however less than a quarter of the isolates were typed as b, which is preventable by vaccination. None of the type b cases could have been prevented by vaccination. More than 50 percent of cases occurred in those more than 49 years of age.

Suggested readings

Peree DG et al. Invasive *Haemophilus influenzae* disease in Alaskan residents aged 10 years and older before and after infant vaccination programs. JAMA 2000;283(23):3089-94.

Shann F. *Haemophilus influenzae* pneumonia: type b or non-type b? Lancet 1999:354:1488-9.





Listeriosis

Background

Listeriosis is caused by infection with *Listeria monocytogenes*. Listeriosis is transmitted by ingestion of raw or contaminated dairy products, milk, vegetables or ready-to-eat meats. In neonatal infections, the organism may be transmitted from mother to infant *in utero* or during the birth process. The median incubation period is three weeks, which makes identifying a suspect food vehicle difficult. The highest risk groups are neonates, the elderly, the immunocompromised and pregnant women. Most infections in adults occur in those over 40 years of age. Manifestations of the disease include meningoencephalitis and/or septicemia in infants and adults, and abortions in pregnant women. In a few outbreaks, diarrheal illness has been reported from *Listeria.*

Case definition

Illinois uses the CDC case definition in identifying *Listeria* cases: a clinically compatible history (stillbirth, listeriosis of the newborn, meningitis, bacteremia or localized infection) and isolation of *L. monocytogenes* from a normally sterile site.

Descriptive epidemiology

There were 11 meningitis and 36 septicemia cases caused by *L. monocytogenes* reported in Illinois in 1999. The incidence for all reported listeriosis was 0.4 per 100,000 population. Seven pregnant women were reported with listeriosis. Two pregnancies ended in stillbirths; the others resulted in live births. Questions on underlying medical conditions were asked of 26 cases and all reported underlying conditions including diabetes, neoplasia, immunosuppressive conditions, heart conditions, ethanol abuse or immunosuppressive therapy.

Overall, 36 percent of the total number of listeriosis cases were in males. Of the total cases of listeriosis, 88 percent occurred in whites, 9 percent in African Americans and 2 percent in Asians. Twelve percent of cases were Hispanic. Cases ranged in age from newborn to 91 years of age. Thirty-one of 47 cases were greater than 59 years of age. For 41 cases, the site of *Listeria* isolation was identified as follows: blood (15), multiple sites (9), cerebrospinal fluid (4), placenta (1) and other sites (2). Nine of 44 reported *Listeria* cases where information was available were fatal, excluding the two stillbirths. Underlying medical conditions were noted in eight of the nine fatal cases; in one case, no information was available on underlying conditions.

Summary

There were a total of 47 reported listeriosis cases in Illinois in 1999. More than 60 percent of cases were older than 59 years of age.

Invasive *Neisseria meningitidis*

Background

The bacteria causing meningococcal disease, *N. meningitidis*, are transmitted by direct contact with respiratory droplets from the nose and throat of infected people. 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 and, often, a rash and vomiting. Septicemia also can occur from infection with *N. meningitidis*.

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 persons exposed who become infected develop invasive disease. About 5 percent to 10 percent of the population are carriers.

Active surveillance sites in the U.S. from 1992 through 1996 showed that serogroup C caused 35 percent of cases, serogroup B caused 32 percent and serogroup Y caused 26 percent of cases. Increasing age, having an isolate obtained from blood and serogroup C were associated with increasing case fatality. The average annual incidence in the seven surveillance areas was one per 100,000 population from 1992 through 1996. The overall case-fatality ratio was 10 percent. *N meningitidis* was isolated from blood in 77 percent of cases, from cerebrospinal fluid in 25 percent, from joint fluid in 2 percent, and from peritoneal and pericardial fluid in 0.1 percent. Meningitis occurred in 47 percent of cases, pneumonia in 6 percent, arthritis in 2 percent, otitis media in 1 percent, epiglottitis in 0.3 percent and pericarditis in 0.1 percent. Infants had the highest age-specific attack rates of meningococcal disease. In the active surveillance sites in the U.S. in 1997, there was a low prevalence of resistance to rifampin.

In the U.S., 95 percent to 97 percent of cases of meningococcal disease are sporadic. Persons with terminal complement pathway deficiencies and asplenia are at higher risk. A preceding viral infection, household crowding, chronic underlying illness and active or passive smoking also increase risk for meningococcal disease. During outbreaks, bar or nightclub patronage and alcohol use have been associated with higher disease risks. Rifampin, ciprofloxacin and ceftriaxone are all 90 percent to 95 percent effective in eliminating nasopharyngeal carriage of *N. meningitidis* and can be used for chemoprophylaxis.

Single and 10-dose vials of Menomune® vaccine are available when needed in a specific outbreak situation; however, 50 dose vials are no longer available. Military recruits in the U.S. receive meningococcal vaccine. Serogroup B cases will not be prevented by vaccination. Conjugate vaccines that reduce pharyngeal carriage are available in Europe and may be licensed based on immunogenicity in the U.S. This vaccine does not eliminate carriage of the organism.

The Advisory Committee on Immunization Practices (ACIP) issued a new recommendation on use of meningococcal vaccine in college students. College freshmen, particularly those who live in dormitories in the U.S., are at a slightly increased risk for meningococcal disease relative to other persons their age. The ACIP recommends that providers of medical care to incoming and current college freshmen, especially those who live in dormitories and residence halls should inform the students and their parents about meningococcal disease and the benefits of vaccination. Public health agencies should provide colleges and health care providers with information about meningococcal disease and the vaccine.

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.

Descriptive epidemiology

In 1999, 111 cases of invasive meningococcal disease were reported in Illinois for an incidence of one per 100,000. Case reports indicated that 65 percent of reported cases had bacteremia, 40 percent had meningitis, 4 percent had pneumonia and 1 percent had pericarditis. *N. meningitidis* was isolated from the cerebrospinal fluid in 29 percent of patients and from blood in 77 percent of patients and 3 percent from other sites. Ninety-five percent of cases were hospitalized. Eleven percent of cases occurred in college students and 5 percent were in day care attendees.

The case fatality rate was 11 percent for case patients where outcome of infection was known. The age distribution of meningococcal disease is shown in Figure 25. The median age was 34. Fifty-one percent of cases were male. Seventeen percent were African American and 82 percent were white; 7 percent were Hispanic. Meningococcal disease occurred more often in the winter months (Figure 26). In 1999, serogroups of meningococcal isolates from cases where typing was done were B (24 percent), C (26 percent), Y (42 percent) and other (8 percent). Thirty percent of isolates were not serogrouped. The number of cases in 1999 (111) was similar to the five-year median (125) (Figure 27).

Serogroup Y isolates continues to increase from 4 percent of isolates serotyped in 1991 to 42 percent of isolates in 1999 (Figure 28). No clusters requiring vaccination campaigns occurred in 1999.

Suggested reading

MMWR. Prevention and control of meningococcal disease and meningococcal disease and college students. Recommendations of the Advisory Committee on Immunization practices (ACIP). MMWR 2000;49(RR-7). 1-22.

Figure 25. Age Distribution of Meningococcal Disease in Illinois, 1999

Source: Illinois Department of Public Health, 2000

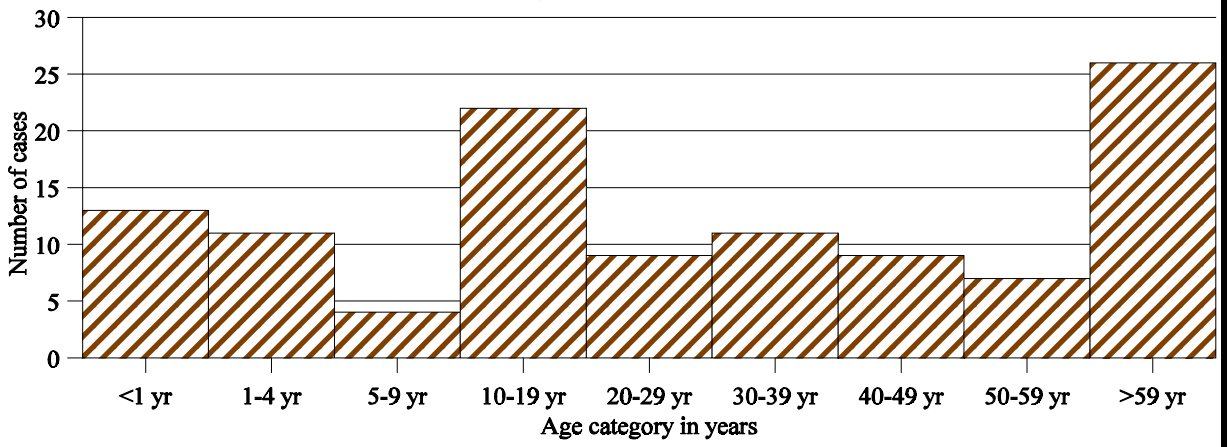


Figure 26. Invasive Meningococcal Disease Cases in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

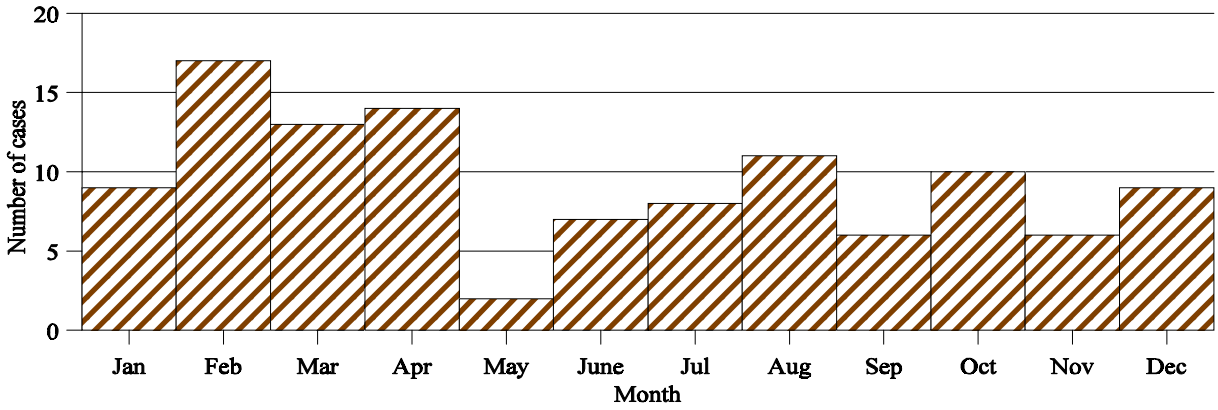


Figure 27. Invasive Meningococcal Disease Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

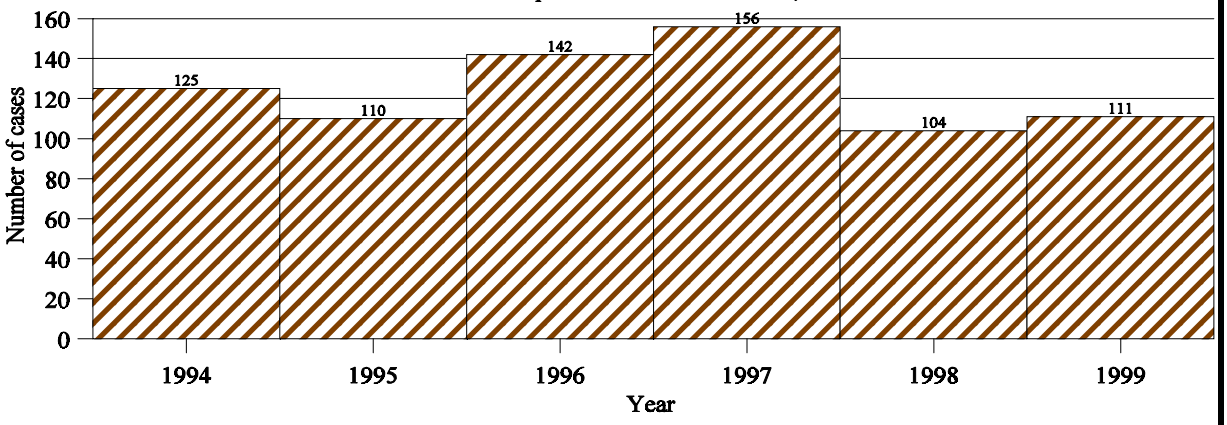
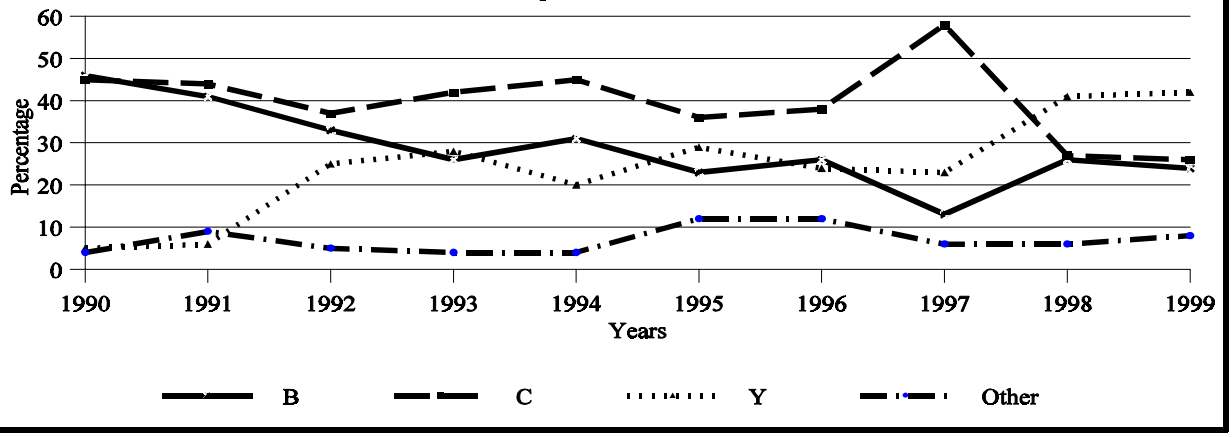


Figure 28. Percentage of Meningococcal Isolates by Serogroup, 1990-1999

Source: Illinois Department of Public Health, 2000



***Streptococcus pneumoniae* meningitis**

Background

S. pneumoniae is the leading bacterial cause of meningitis in U.S. children. The CDC estimates that 3,000 cases of *S. pneumoniae* meningitis occur in the U.S. each year. Pneumococci colonize the nasopharynx of 15 percent to 60 percent of individuals. Most individuals remain asymptomatic. 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. A new conjugate vaccine was licensed for use in children in February 2000.

A study in Connecticut evaluated the comparability of using a centralized location for antibiotic resistance testing of *S. pneumoniae* isolates versus using summary antibiograms from hospital laboratories. The two methods were comparable and approximately 86 percent of isolates were susceptible to penicillin. The Connecticut researchers also found that drug resistance patterns did not differ between invasive and noninvasive isolates. In active surveillance sites in the U.S., strong penicillin resistance was found in 29 percent of *S. pneumoniae* strains in 1997 and 1998 and intermediate resistance was found in 16 percent of isolates. Resistance varied by hospitals within a region and by region.

The Behavioral Risk Factor Surveillance System (BRFSS) asks randomly selected members of the U.S. population a series of questions. In 1997, the percentage of respondents in Illinois receiving pneumococcal vaccination by age group were as follows: greater than 75 years of age (45 percent), 65-74 years of age (47 percent) and 55-64 years of age (17 percent). Healthy People 2000 objectives are for $\geq$ 60 percent of persons to receive pneumococcal vaccine. Illinois was 15 percent lower than the Healthy People 2000 objectives. Pneumococcal vaccination is recommended for the following groups of persons aged 2-64 years of age: a) those with chronic cardiovascular disease, chronic pulmonary disease (COPD, emphysema, but not asthma), diabetes mellitus, alcoholism, chronic liver disease, cerebrospinal fluid leaks, or functional or anatomic asplenia; b) persons in certain environments or social settings (e.g., Alaskan Natives and some American Indian populations on reservations); and c) immunocompromised persons, including persons infected with HIV. Since 1981, pneumococcal vaccinations have been covered for persons enrolled in Medicare Part B.

The case fatality rate for community-acquired invasive pneumococcal pneumonia was 12 percent in active surveillance sites in the U.S. from 1995 through 1997. Older age, underlying disease and Asian race were risk factors. Cigarette smoking was identified as the strongest risk factor for invasive pneumococcal disease in a study conducted by CDC.

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

The numbers of reported cases of *S. pneumoniae* meningitis by year are shown in Figure 29. In 1999, there were 106 cases of *S. pneumoniae* meningitis reported in Illinois compared to the five-year median of 100. The incidence rate for 1999 was 0.9 per 100,000. The mean age of cases was 36. The age distribution of cases is shown in Figure 30. Twenty-one percent of cases were African Americans and 78 percent were white; 11 percent were Hispanic. Forty-nine percent were female. The majority of cases occurred in the winter months (Figure 31). Ninety-seven

percent of reported cases were hospitalized. The case fatality rate was 9 percent for reported cases where outcome was known. Eighty-two percent of cases had *S. pneumoniae* isolated from CSF and 63 percent of cases had isolation from blood.

Summary

Almost all reported cases of *S. pneumoniae* meningitis were hospitalized and 9 percent of cases were fatal. The number of cases was high in those over 59 years of age.

Suggested readings

Chin AE, Hedberg K et al. Tracking drug-resistant *Streptococcus pneumoniae* in Oregon: An alternative surveillance method. Emer Inf Dis 1999;5(5):688-93.

Doern GV, Brueggemann AB. Antimicrobial resistance with *Streptococcus pneumoniae* in the United States, 1997-1998. Emerg Inf Dis 1999;5(6):757-65.

Feiken DR, Schuchat A. et al. Mortality from invasive pneumococcal pneumonia in the era of antibiotic resistance, 1995-1997. AJPH 2000;90(2):2234-229.

MMWR. Surveillance for selected public health indicators affecting older adults-United States. MMWR 1999;48(SS-8). 1-156.

Nuorti JP, Butler JC et al. Cigarette smoking and invasive pneumococcal disease. NEJM 2000;342(10):681-9.

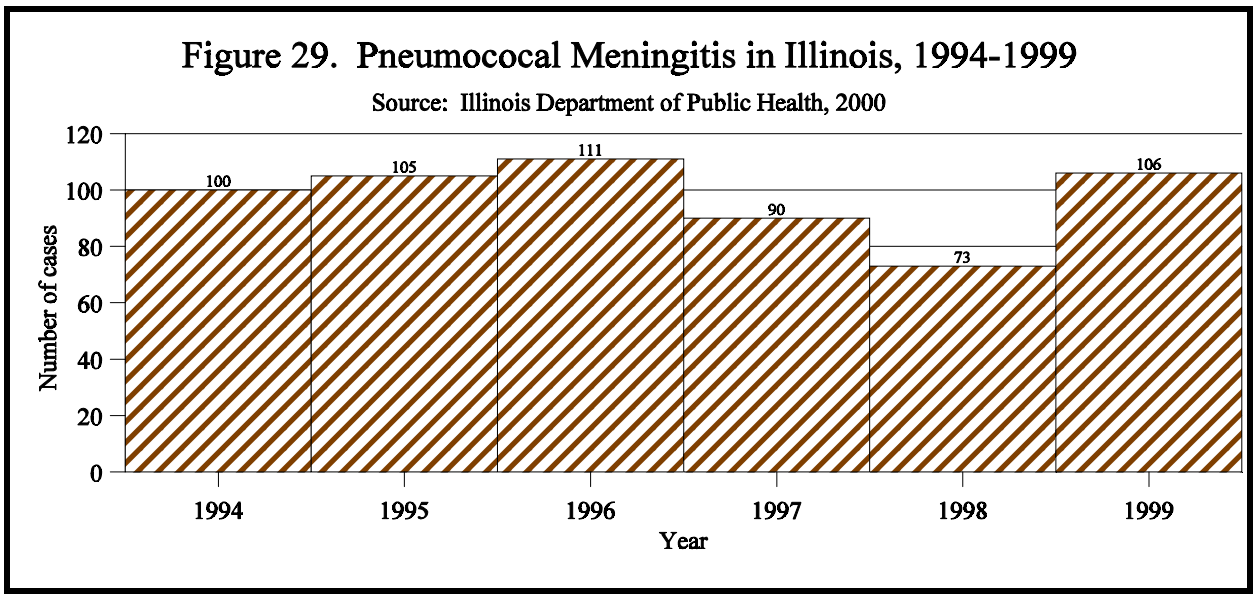


Figure 30. Age Distribution of Pneumococcal Meningitis in Illinois, 1999

Source: Illinois Department of Public Health, 2000

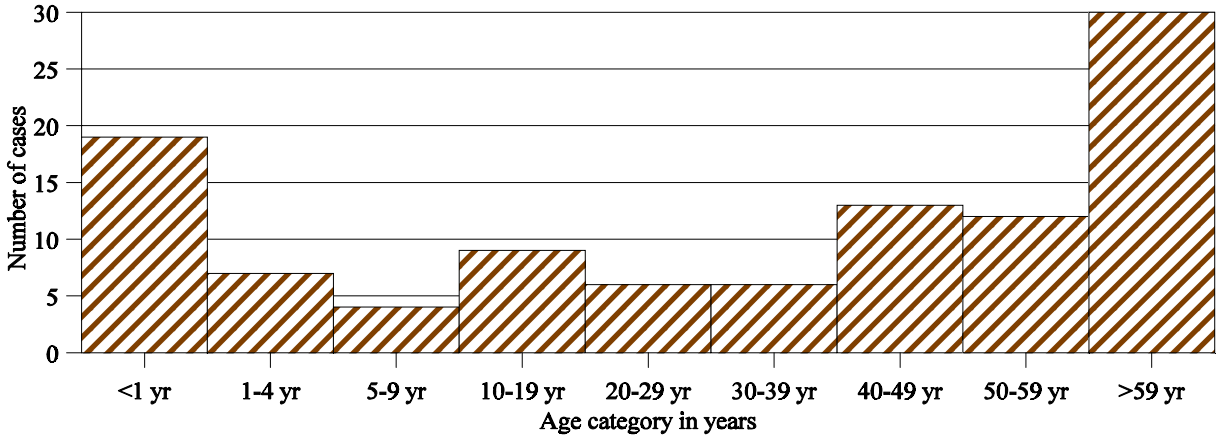
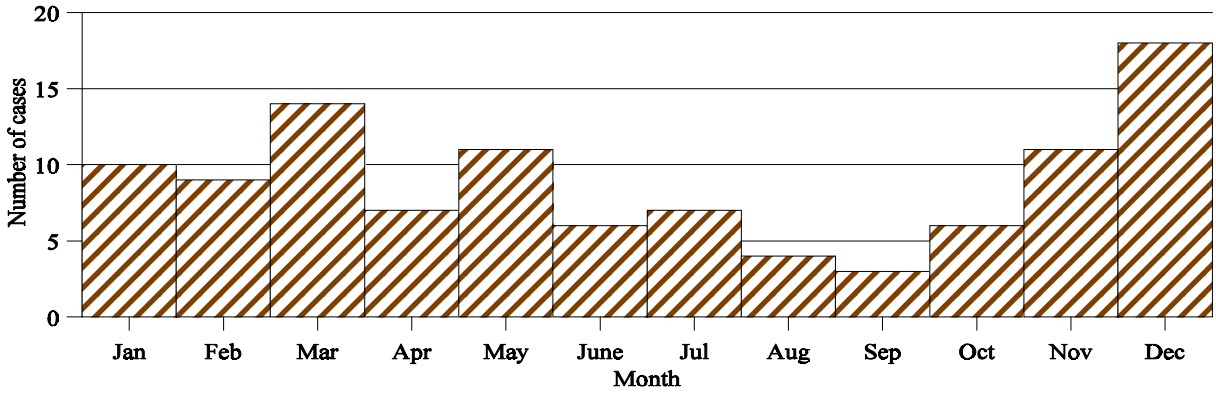


Figure 31. Pneumococcal Meningitis Cases in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000



Invasive group B *Streptococcus*

Background

Group B streptococcus (GBS) is the leading cause of serious bacterial neonatal disease in the United States. GBS infections are due to *Streptococcus agalactiae* and cause disease and death in newborns and morbidity in peripartum women and nonpregnant adults with chronic medical conditions. Early-onset disease of neonates (in infants < 7 days old) may consist of sepsis, respiratory distress, apnea, shock, pneumonia and meningitis. The infection is acquired during delivery or *in utero*. Early GBS infections occur more frequently in infants born where premature rupture of membranes has occurred. Late onset disease (in infants 7 days to several months old) is characterized by sepsis and meningitis and is acquired by person-to-person contact. Approximately 10 percent to 30 percent of pregnant women carry GBS in the genital tract.

In 1996, consensus guidelines recommended one of two approaches for prevention of neonatal GBS disease. One approach was risk-based and the other was screening-based. Women at increased risk are recommended to receive intrapartum antibiotic prophylaxis. More than 90 percent of providers of obstetrical services in Minnesota and Connecticut reported a GBS policy. In Connecticut, the screening-based strategy was most used (72 percent) while in Minnesota the risk-based strategy was most used (55 percent). Perinatal GBS can be prevented through the use of intrapartum antibiotics.

In a study by Schrag et al., the incidence of early onset GBS disease declined 65 percent from 1993 to 1998. In pregnant women, the incidence of invasive GBS disease decreased 21 percent. From 1994 to 1997, the proportion of hospitals with a policy for GBS increased from 39 percent to 58 percent. Late onset disease did not decrease. Reductions in GBS streptococcus have been reported in a variety of settings after the introduction of peripartum prevention programs.

From 1993 through 1996, in four cities in the U.S., surveillance for GBS in neonates revealed rates of 0.8 per 1,000. African American race, Hispanic ethnicity and low birth weight were associated with disease.

In 1999, GBS was added to the adverse pregnancy outcomes reporting system in Illinois.

Case definition

A confirmed case of invasive GBS disease is defined as isolation of GBS from a normally sterile site (e.g., blood or cerebrospinal fluid). A probable case is defined as a person who is latex agglutination positive for GBS from a sterile site.

Descriptive epidemiology

There were 41 reported cases of invasive GBS in Illinois in 1999 (Figure 32). The number of reported cases was similar to the five-year median of 42 cases. Cases occurred throughout the year (Figure 33). Seventy-six percent occurred in those less than 1 year of age (Figure 34). Forty-four percent were female. Sixty-six percent were white and 34 percent were African American; 14 percent were Hispanic. The proportion of African Americans affected with invasive GBS (34 percent) was greater than in the Illinois population (15 percent).

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 1999 was similar to the five-year median.

Suggested readings

MMWR. Adoption of perinatal group B streptococcal disease prevention recommendations by prenatal-care providers-Connecticut and Minnesota, 1998. MMWR 2000;49(11):228-232.

Schrag SJ, Zywicki S et al. Group B streptococcal disease in the era of intrapartum antibiotic prophylaxis. NEJM 2000; 342(1):15-20.

Wendel GD, McIntire DJ, Leveno KJ. Reducing neonatal Group B streptococcal disease. NEJM 2000;342(18):1367-8.

Zaleznik DF, Rench MA et al. Invasive disease due to group B streptococcus in pregnant women and neonates from diverse population groups. Clin Inf Dis 1999;30:276-81.

Figure 32. Invasive Group B Streptococcal Infection in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

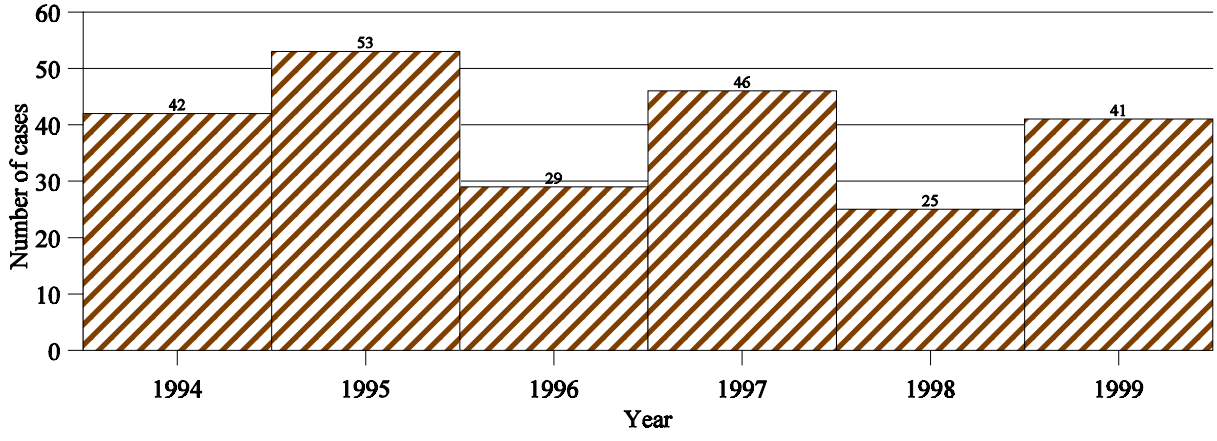


Figure 33. Invasive Group B Streptococcus in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

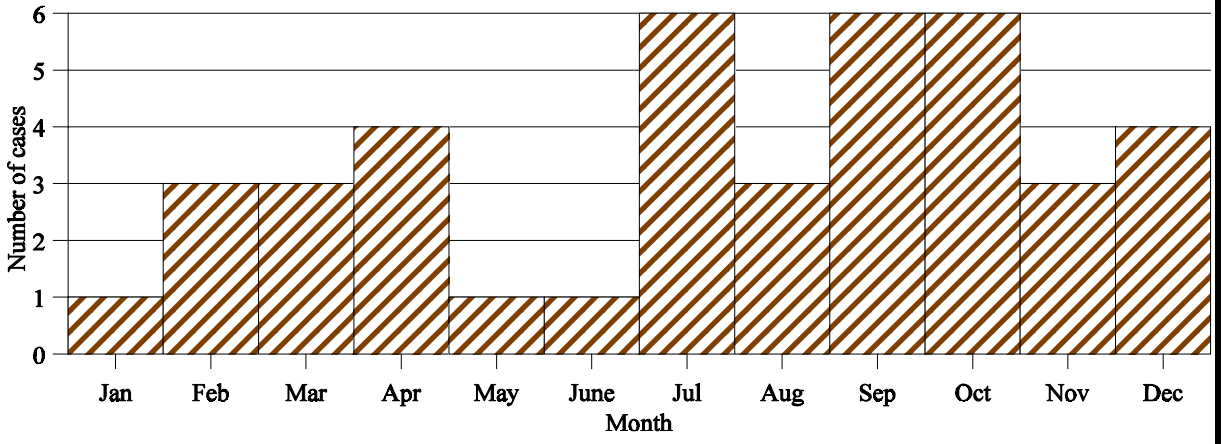
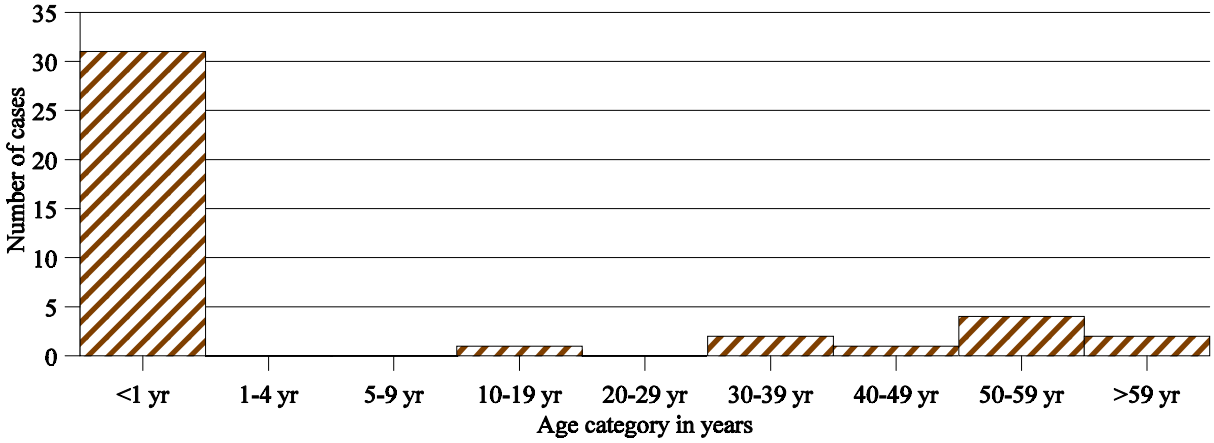


Figure 34. Age Distribution of Group B Streptococcus in Illinois, 1999

Source: Illinois Department of Public Health, 2000



Cryptosporidiosis

Background

Cryptosporidium is one of five genera of coccidia that infect people. *C. parvum* infects a wide range of mammalian species because of a lack of host specificity. There are two genotypes of *C. parvum*: genotype 1 (which affects primarily humans) and genotype 2 (affects humans, cattle and other mammals). Oocysts are immediately infective upon excretion by an infected host and can be shed for up to two weeks in immunocompetent humans. Transmission is fecal-oral, including person to person, animal to person, waterborne or foodborne. The incubation period is an average of seven days (range is one to 12 days). Symptoms include diarrhea, which can be profuse and watery, and abdominal cramps. Symptoms may persist up to 30 days in the immunocompetent and can be life-long in the immunocompromised.

Most laboratories in the U.S. do not routinely test for *C. parvum* and it is not detected on a routine ova and parasite test. This pathogen is very resistant to disinfectants and the oocysts are small which means only select water filters work for this pathogen.

Case definition

A confirmed case of cryptosporidiosis in Illinois is a laboratory-confirmed case (demonstration of *Cryptosporidium* oocysts in stool, or demonstration of *Cryptosporidium* in intestinal fluid or small bowel biopsy specimens, or demonstration of *Cryptosporidium* antigen in stool by a specific immunodiagnostic test such as ELISA) associated with diarrhea and one or more of the following symptoms: abdominal cramps, loss of appetite, low-grade fever, nausea or vomiting.

Descriptive epidemiology

There were 90 cases reported in 1999 compared to 84 in 1998. The number of cases reported per year is shown in Figure 35. (Only five years of data are shown because cryptosporidiosis became reportable for the first time in mid-1994.) Forty-two percent of cases were hospitalized. Information was available on the presence of immunocompromising conditions for 62 cases; 14 of these cases (23 percent) reported immunocompromising conditions. Forty-nine percent of cases were male. Ninety percent were white, 7 percent were African American and 2 percent were other races; 6 percent were Hispanic. The age distribution of cryptosporidiosis is shown in Figure 36. The mean age was 26. Cases peaked from July to September (Figure 37). Six individuals were known to be employed in sensitive occupations.

Risk factors reported by cases included drinking from a private water supply (38 percent), swimming (25 percent), contact with someone in a residential institution (18 percent), contact with someone in a day care center (14 percent) and cattle contact (10 percent).

Summary

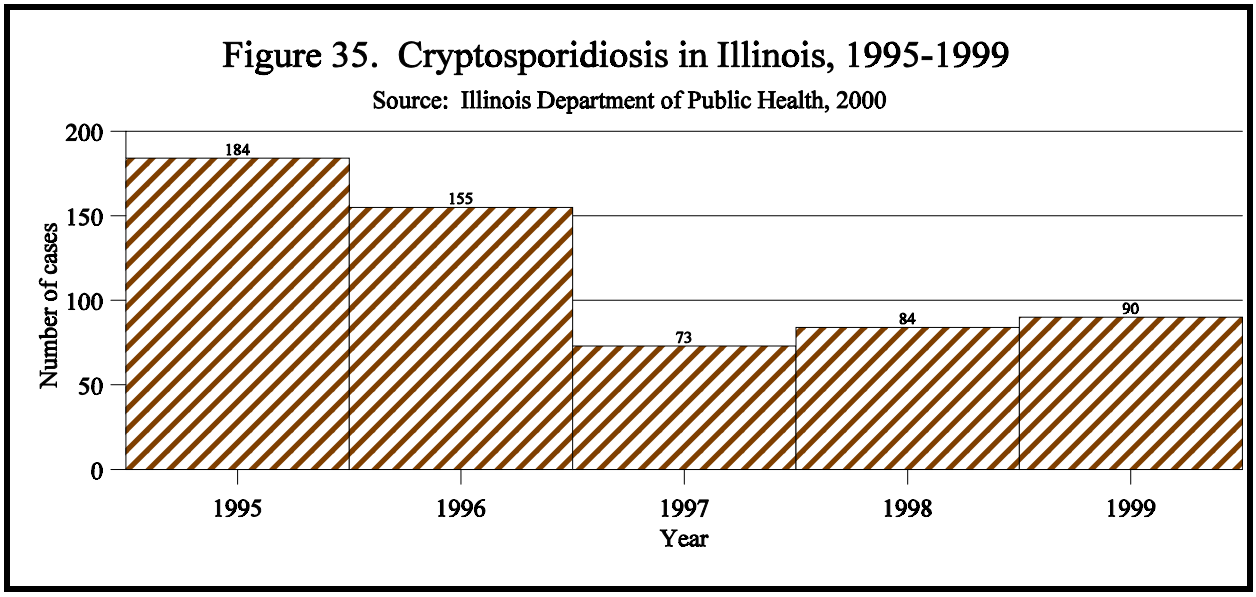
The number of reported cases of cryptosporidiosis in 1999 was 90. The mean age was 26 years. There was a peak in cases from July to September.

Suggested readings

Gostin LO, Lazzarini Z, Neslund VS, Osterholm MT. Water quality laws and waterborne diseases: Cryptosporidium and other emerging pathogens. Am J PH 2000;90(6):947-53.

Saini PK, Ransom G, McNamara AM. Emerging public health concerns regarding cryptosporidiosis. JAVMA 2000;217(5):658-62.

Quiroz ES et al. An outbreak of cryptosporidiosis linked to a foodhandler. J Inf Dis 2000;181:695-700.



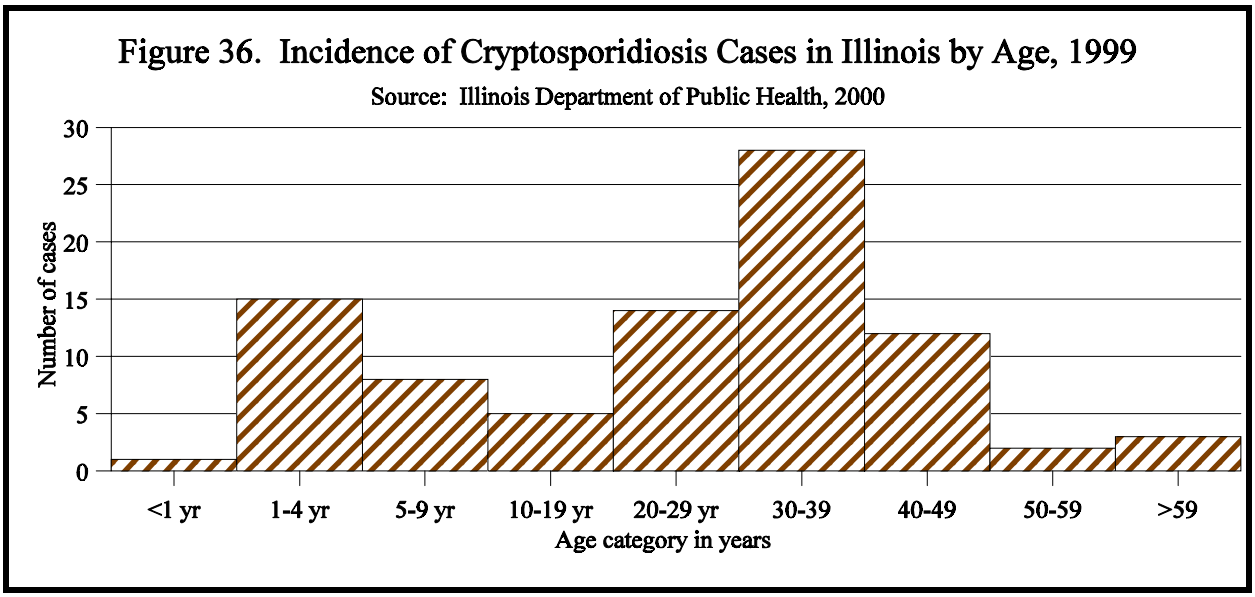
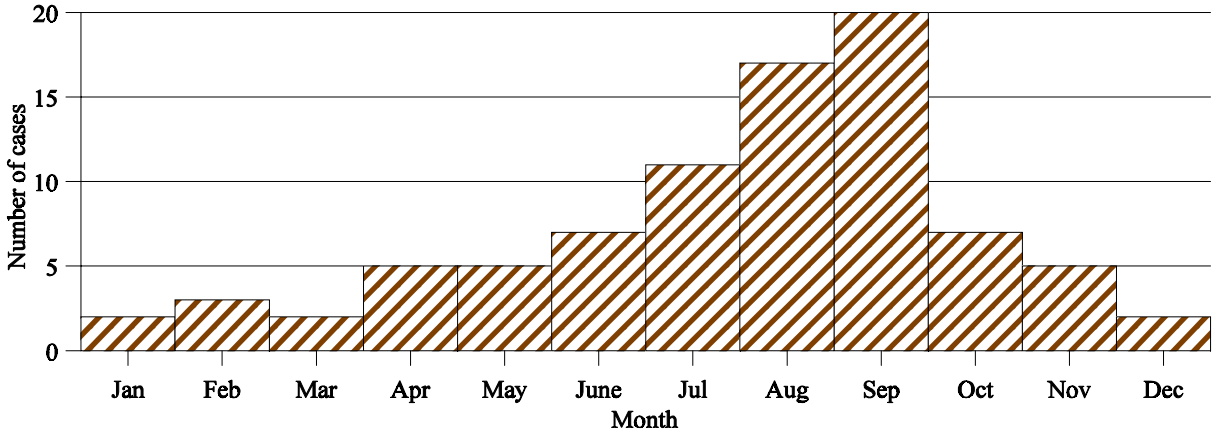


Figure 37. Reported Cryptosporidiosis in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000



Ehrlichiosis

Background

Ehrlichia are gram negative bacteria that infect a wide variety of animals and are transmitted by tick bites. There are three *Ehrlichia* pathogens seen in the U.S.: *E. chaffeensis,* an unnamed *Ehrlichia* causing human granulocytic ehrlichiosis (HGE) and *E. ewingii*. The tick must be attached for at least 24 hours for the transmission of HGE. The incubation period is seven to 10 days.

HGE is caused by an as yet unnamed *Ehrlichia* similar to *E. equi* or *E. phagocytophila*. HGE has been reported in the eastern and central U.S. and is transmitted by deer ticks in these areas. HGE is transmitted by the same tick that transmits Lyme disease and human babesiosis. The primary reservoir host mammals for HGE are thought to be the white-footed mouse and the white-tailed deer.

Human monocytic ehrlichiosis (HME) is caused by *E. chaffeensis*. The majority of the ehrlichiosis cases in the U.S. are HME. *E. chaffeensis* is carried by the lone star tick (*A. americanum*) in the south central and southeastern U.S. In a study of 20 southern Iowa counties, more than 25 percent of serum specimens from deer tested positive for HME.

Another species of bacteria, *E. ewingii* was suspected as a cause of four human cases in Missouri from 1996 through 1999.

Both HME and HGE result in similar symptoms including fever, headache and myalgia. Cases may also have low platelets, low white blood cells and increased liver enzymes. In approximately one-third of HME cases there is a rash. Rashes are much less common in HGE. These *Ehrlichia* organisms form morulae in the white blood cells; HME in monocytes and HGE in granulocytes. *E. chaffeensis* can be isolated from blood cultures in approximately 20 percent of cases. The case fatality rate is 5 percent in HME and 10 percent in HME.

In Wisconsin, identified risk factors for ehrlichiosis included owning property of more than two acres, having a tick bite, jogging, clearing brush and camping.

In 1998, the Council of State and Territorial Epidemiologists recommended that ehrlichiosis be made notifiable. There was only voluntary reporting for ehrlichiosis in 1999 in Illinois. However, reporting became mandatory on April 1, 2001.

Descriptive epidemiology

Five cases of ehrlichiosis were reported in Illinois in 1999. Their ages ranged from 7 to 64 years. Three were female. Two were white, one was African American and the others were of unknown race. Onsets were from May to September. All five were confirmed cases. Signs and symptoms were fever (4), malaise (4), headache (3) and rash (2). Two were hospitalized. One case was fatal. All five were HME. Three were confirmed by IFA, one by PCR and another by unknown methods. Two cases reported tick exposures outside of Illinois, one in Missouri and one in Arkansas. Two reported tick exposures in Illinois, one in Massac County and one in Pulaski County. No information was available on the site of exposure for the fifth case.

Ehrlichiosis cases in Illinois in past years are as follows: 1990 (0), 1991 (0), 1992 (0), 1993 (0), 1994 (1), 1995 (4), 1996 (4), 1997 (0) and 1998 (2).

Summary

Ehrlichiosis is uncommonly reported in Illinois but reporting is currently voluntary. On April 1, 2001, reporting of ehrlichiosis became mandatory in Illinois.

Suggested reading

Bakken JS, Dumler JS. Human granulocytic ehrlichiosis. Clin Inf Dis 2000;31:554-60.

Belongia EA, Reed KD et al. Clinical and epidemiological features of early Lyme disease and human granulocytic ehrlichiosis in Wisconsin. Clin Inf Dis 1999;29:1472-7.

Ijdo JW, Meek JI et al. The emergence of another tickborne infection in the 12-town area around Lyme, Connecticut: Human Granulocytic Ehrlichiosis. J Inf Dis 2000;181:1388-93.

Mueller-Anneling L, Gilchrist MJ, Thorne PS. Ehrlichia chaffeensis antibodies in white-tailed deer, Iowa, 1994 and 1996. Emerg Inf Dis 2000;6(4):397-400.

McQuiston JH, Paddock CD, Holman RC, Childs JE. The human ehrlichioses in the United States. Emer Inf Dis 1999;5(5):635-42.

Staendaert Sm, Yu T et al. Primary isolation of Ehrlichia chaffeensis from patients with febrile illnesses: Clinical and molecular characteristics. J Inf Dis 2000;181:1082-8.

***Escherichia coli* O157:H7** (ECO157:H7)

Background

Escherichia coli O157:H7 is transmitted through consumption of contaminated food, person-to-person contact or swimming in contaminated recreational water. 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. Infection with ECO157:H7 produces symptoms that range from mild to bloody diarrhea and that may progress to hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenia purpura (TTP); 3 percent to 5 percent of HUS cases are fatal. The incidence of ECO157:H7 declined by 22 percent in FoodNet sites from 1996 through 1999.

Although ground beef was the most common contaminated vehicle for *E. coli* O157:H7 outbreaks, a variety of food vehicles including vegetables have now been linked to infection. A large outbreak of ECO157:H7 occurred after consumption of radish sprouts in school children in Japan. More than 9,000 cases were reported during this 1996 outbreak, which was reported in the *American Journal of Epidemiology* in 1999.

HUS in children is caused primarily by infection with enterohemorrhagic strains of *E. coli.* HUS is characterized by hemolytic anemia, low platelets and acute renal insufficiency. Antibiotics may increase risk of HUS by causing release of shiga toxin from dying bacteria, giving ECO157:H7 a selective advantage in the intestine, or by inducing the expression of shiga genes. A small prospective cohort study in four states of children with ECO157:H7 showed that administration of antibiotics increased risk for development of HUS. However, there were only nine children given antibiotics in the study. Further research is needed to verify this finding. Higher initial white blood cell counts were also associated with HUS.

E. coli O157:H7 is the most common shiga toxin-producing *E. coli* causing HUS in the U.S. ECO157:H7 is differentiated from other *E. coli* by its inability to rapidly ferment sorbitol. Non O157:H7 shiga toxin producing *E. coli* (STEC) will not be detected by sorbitol MacConkey agar. Instead, nonculture methods, such as enzyme immunoassay or polymerase chain reaction, must be performed. In a study in Nebraska, 4 percent of stool specimens submitted from persons with diarrheal illness were positive for STEC. Non-O157 were identified in seven of the 14 positive samples.

Case definition

The case definition for a confirmed case used in Illinois is a clinically compatible illness with isolation of ECO157:H7 from a stool specimen or ECO157 organisms that produce shiga toxin.

Descriptive epidemiology

There were 498 cases of ECO157:H7 reported to IDPH in 1999 compared to the previous four-year median of 121 (Figure 38). A large outbreak in Menard County accounted for the increase in cases in 1999. In this outbreak, 321 persons were either probable or confirmed cases. The incidence in 1999 was 4.4 cases per 100,000 population (1.5 cases per 100,000 when outbreak cases were excluded). The largest number of cases reported were in September, which is when the large outbreak occurred in Menard County (Figure 39). Fifty-one percent of cases were female. Ninety-four percent were white and 6 percent were African American; 1 percent were Hispanic. A peak in cases occurred in the age group 30 to 59, which is different than other years, probably because this is the age of most persons who attended the event where the large outbreak

occurred (mean=30 years of age) (Figure 40).

Among individuals with culture confirmed ECO157:H7 for which symptom information was available, 99 percent reported diarrhea, 88 percent reported bloody diarrhea, 52 percent reported fever and 91 percent reported abdominal cramps. Ten percent of patients for whom information was available had hemolytic uremic syndrome (HUS) and 3 percent had thrombotic thrombocytopenic purpura (TTP). Of patients for whom information was available, 58 percent were hospitalized. Two cases were fatal.

Detailed information on the single outbreak of *E. coli* O157:H7 is reported under the foodborne outbreak section.

Risk factors for ECO157:H7

The standard case report form developed by CDC is used to investigate ECO157:H7 cases in Illinois. This form was not used with many of the cases associated with the large outbreak in Menard County. This case report form includes questions on possible sources for ECO157:H7 in patients. Individuals were asked if they consumed any ground beef, and were then asked if they consumed undercooked ground beef. They were also asked if they were around children with diapers or changed diapers. These factors are listed in Table 1. Eleven percent of patients reported attending or working in a day care center and 10 percent had attended or worked in an institutional setting. Two percent of patients were health care workers and 4 percent were food handlers. In the seven days before the illness began, 56 percent reported eating at a fast food restaurant and 43 percent reported eating at another type of restaurant. The following percentages of patients reported consuming foods that are known to be associated with this infection in the seven days before symptom onset: ground beef (68 percent), other beef products (33 percent), well water (17 percent), undercooked ground beef (14 percent), undercooked other beef products (12 percent) and other unchlorinated water (6 percent). Thirty-three percent reported changing diapers, 22 percent reported contact with children attending day care, 22 percent had swam in unchlorinated water, 18 percent reported visiting or living on a farm, 8 percent had contact with diapered children and 3 percent reported travel out of the country.

Summary

A large increase in *E. coli* O157:H7 cases occurred in 1999 due to a large outbreak in Menard County. Most cases of *E. coli* O157:H7 occured in the summer months. Almost 90 percent of individuals reported bloody diarrhea and 10 percent of patients reportedly had HUS. Almost 58 percent of patients were hospitalized. Almost 15 percent of case patients reported consuming undercooked ground beef.

Suggested Readings

Fey PD et al. Prevalence of non-O157:H7 shiga toxin-producing Escherichia coli in diarrheal stool samples from Nebraska. Emerg Inf Dis 2000;6(5):530-3.

Mead PS, Griffin PM. Escherichia coli O157:H7. Lancet 1998;352;1207-1211.

Wong CS et al. The risk of the hemolytic-uremic syndrome after antibiotic treatment of Escherichia coli O157:H7 infections. NEJM 2000; 3421930-6.

Zimmerhackl LB. E. coli, antibiotics, and the hemolytic-uremic syndrome. NEJM 2000;342(26): 1990-1.

Figure 38. Reported E. coli O157:H7 in Illinois, 1995-1999

Source: Illinois Department of Public Health, 2000

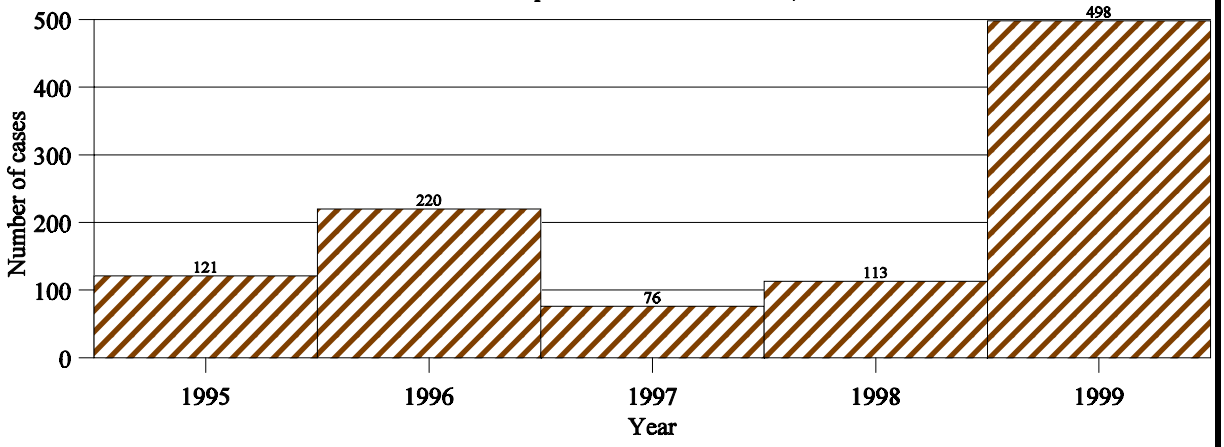
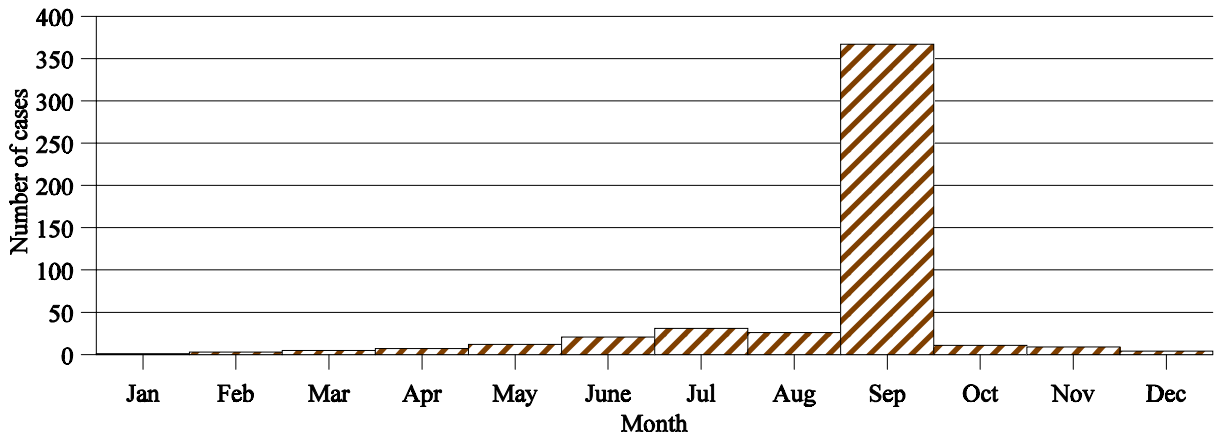


Figure 39. Reported E. coli 0157:H7 Cases in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000



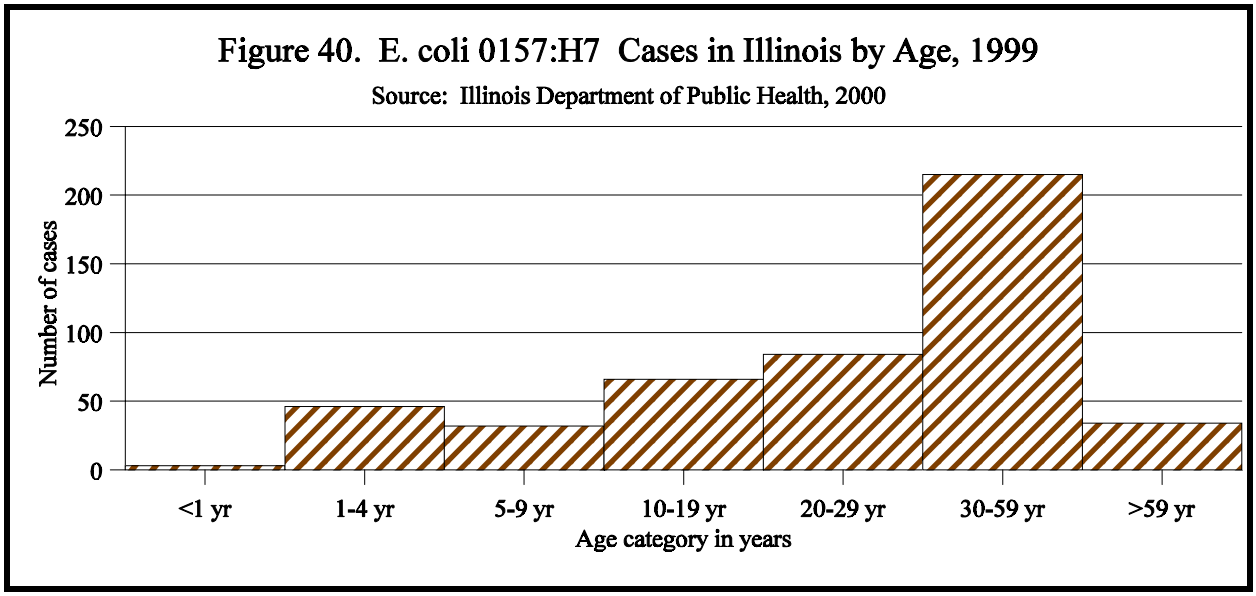


Figure 40. E. coli 0157:H7 Cases in Illinois by Age, 1999
Source: Illinois Department of Public Health, 2000
250
200
150
100
50
0
Number of cases
<1 yr
1-4 yr
5-9 yr
10-19 yr
20-29 yr
30-59 yr
>59 yr
Age category in years

Table 1. Reported Characteristics of *E. coli* 0157:H7 Cases in Illinois, 1999

Characteristic	# reporting factor	Total # with information on factor	Percent reporting characteristic
Attending or working in day care center	16	137	12
Attending or working at an institution	13	124	10
Employed as a health care worker	3	137	2
Employed as a foodhandler	6	136	4
Food/water history in prior seven days			
Ground beef	91	133	68
Fast food	72	128	56
Other restaurant food	46	107	43
Other beef products	44	132	33
Well water	22	129	17
Undercooked ground beef	17	123	14
Undercooked other beef	15	128	12
Other unchlorinated water	8	127	6
Apple cider	8	139	6
Raw milk	1	138	1
Other factors in prior seven days			
Contact with diapered child	11	137	8
Travel away from home	5	143	3
Swam in unchlorinated water	31	142	22
Contact with day-care child	30	135	22
Visit or live on farm	25	142	18
Contact with cattle or cattle manure	12	140	9
Changed diapers	46	138	33

Source: Illinois Department of Public Health, 2000

Foodborne and waterborne outbreaks

Background

More than 200 diseases can be transmitted through foods and these diseases can be caused by viruses, bacteria, parasites, toxins, prions and metals. One of the major factors limiting surveillance of foodborne illness is underreporting of illness by citizens and health care providers.

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 result in serious health effects such as hemolytic uremic syndrome, reactive arthritis, sepsis or Guillain Barre syndrome. The primary forms of foodborne illness include 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. There are four categories of organisms to consider in discussing the causes of foodborne illness: viruses, bacteria, parasites and fungi. Viruses such as hepatitis A or Norwalk-like viruses, also known as small round structured viruses, have humans as the only reservoir. Food can be contaminated with viruses if food handlers do not practice good hygiene before preparing food that is not later cooked or if sewage contaminates the food. 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 can also cause foodborne illness. Some enteric pathogens, such as *Campylobacter*, *Giardia* and *Shigella,* rarely cause foodborne outbreaks.

There are a number of foodborne illnesses that can be transmitted through consumption of seafood. These include cholera, hepatitis A, ciguatera toxin, scombroid fish poisoning and *Vibrio parahaemolyticus*. Scombroid fish poisoning is associated with consumption of tuna, mahi-mahi and bluefish. It is caused by histamine produced by bacteria on fish that grows in warm temperatures. From 1988-1997, 145 outbreaks of scombroid were reported to CDC. The key to prevention is to keep hazardous fish at greater than 32 degrees F. Ciguatera toxin outbreaks are caused by ingestion of ciguatoxin in fish.

Recreational water outbreaks are less commonly reported in Illinois than foodborne outbreaks. In the U.S. in 1997 and 1998, 17 outbreaks were linked to drinking water and 32 from recreational water exposure. Eighty-eight percent of the drinking water outbreaks were linked to groundwater sources. Ten of the 18 gastroenteritis outbreaks associated with recreational water exposure were associated with treated pools or ornamental fountains. Of the eight outbreaks of dermatitis, 87 percent were associated with hot tubs, pools or springs. One drinking water associated and one recreational water outbreak were reported from Illinois for these two years. For recreational water, EPA has established a guideline for microbial water quality for lakes that indicates that the monthly geometric mean must be $\leq$ 126/100 ml for *E. coli.*

Data for U.S. foodborne outbreaks for 1993 through 1997 was published in MMWR 49(SS-1) but the information was not reviewed by IDPH. Therefore, errors were noticed by IDPH after publication of the document; for this time period, it is best to use information released by IDPH rather than use the MMWR.

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. An outbreak is classified as confirmed when the responsible pathogen is identified through laboratory methods in some or all of the ill persons or in the implicated food vehicle.

For foodborne outbreaks, the number ill is the number of people 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 cause was ascribed to this etiologic agent.

IDPH receives reports of potential foodborne outbreaks from many sources, including local health departments. Some cannot be classified as foodborne outbreaks and are not counted as such for the state totals (either due to a lack of information, classification as person-person transmission or because the symptoms and incubation period do not clearly indicate a known foodborne pathogen).

Descriptive epidemiology

Ninety-eight possible food or waterborne outbreaks were reported to IDPH by local health departments in 1999. Of these, 23 outbreaks were determined not to be foodborne or waterborne outbreaks and, for 11 outbreaks, not enough information was provided by the local health department to determine if the outbreak was foodborne or waterborne. A total of 64 outbreaks were determined to be food or waterborne in 1999 as compared to the previous five-year median of 32 (Table 2). One outbreak in 1999 was due to recreational water exposure; all others were due to consumption of contaminated food or drinking water.

A total of 1,237 people became ill as a result of these foodborne or waterborne outbreaks. The median number of ill persons per outbreak was eight (range 2 to 321). No fatalities were reported. Jurisdictions reporting foodborne or waterborne outbreaks in 1999 were Cook County Health Department (CHD) (27 outbreaks), Chicago Department of Public Health (CDPH) (eight), McHenry CHD (three), DuPage CHD (four), Champaign-Urbana Health Department (HD) (three), Skokie HD (two), Kane CHD (two), Lake CHD (two), Will CHD (two), and one each for Coles CHD, DeKalb CHD, Franklin-Williamson HD, JoDaviess CHD, LaSalle CHD, Madison CHD, McLean CHD, Menard CHD, Peoria HD, Sangamon CHD and Springfield HD.

The suspected or confirmed etiologic agent in these outbreaks was Norwalk-like virus (29), bacterial (21 outbreaks), chemical (two) and unknown (12). There were two reported outbreaks caused by chemical causes, both were associated with fish consumption. One was due to scombrotoxin and one due to ciguatera toxin. Five of the Norwalk-like virus outbreaks were confirmed by laboratory testing of stools; the rest were suspected based on the clinical syndrome and incubation period. Laboratory confirmed Norwalk-like virus outbreaks occurred in Cook, DeKalb, JoDaviess, Lake and McHenry. The 21 suspect or confirmed bacterial outbreaks were caused by *Staphylococcus aureus/Bacillus cereus* (8), *Clostridium perfringens/B. cereus* (5), *Salmonella* (3), *Shigella* (3), *C. perfringens* (1) and *E. coli* O157:H7 (1). Eight of 21 bacterial outbreaks were laboratory confirmed by testing of human specimens or food. These eight outbreaks were caused by *Salmonella* (3), *Shigella* (3), *E. coli* O157:H7 (1) and *C. perfringens* (1). The other 13 were suspected to be caused by bacterial pathogens based on incubation period

and symptoms.

The site of food preparation in these 64 outbreaks was restaurant (61 percent), caterer (15 percent), home (10 percent), deli (8 percent), church gathering (2 percent), long-term care facility (2 percent), picnic (2 percent), school (2 percent), unknown (3 percent) and other locations (11 percent). The site of food preparation for outbreaks in 1999 did not include any day care, camps or institutions (excluding schools or long-term care facilities). The site of food consumption was restaurant (40 percent), home (24 percent), work (19 percent), school (5 percent), picnic (3 percent), church (2 percent), long-term care facility (2 percent) and other locations (9 percent). More than one site per outbreak may be reported if there were two possible food sources or if food from more than one source may have been involved.

Food or water was tested in 18 (30 percent) of the outbreaks; in one outbreak food tested positive for a pathogen. The pathogen identified in that outbreak was *E. coli* O157:H7 in meat.

In 25 outbreaks, specimens were collected from ill persons. In 13 of these 25 outbreaks, at least one individual was positive for a pathogen. The type of pathogen identified in outbreaks included Norwalk-like (5), *Salmonella* (3), *Shigella* (3), *C. perfringens* (1) and *E. coli* O157:H7 (1).

In nine (15 percent) of the outbreaks, food handlers were tested; in two outbreaks food handlers were positive. In the first of these two outbreaks, Norwalk-like virus was identified in a food handler and in cases from the outbreak. In another outbreak, *Shigella* was found in a food handler but the outbreak was suspected to be caused by a Norwalk-like virus due to incubation period and symptoms.

In five (8 percent) outbreaks, environmental specimens were tested; in two outbreaks, the tests were positive. In one outbreak, *E. coli* O157:H7 was isolated from a cattle herd where a roasted steer implicated in the outbreak was raised. These cattle had the same strain of the organism as isolates from the cases. In the second situation, fecal coliforms were identified in water in an outbreak where the causative agent was not identified.

The factors identified as contributing to outbreaks included improper holding temperatures (64 percent), contaminated working surfaces (60 percent), poor personal hygiene of food handler (58 percent), unsafe foods (17 percent), inadequate cooking (5 percent) and other factors (16 percent). Multiple factors were involved in most outbreaks. No factors could be identified in 20 (38 percent) of outbreaks.

In 11 (18 percent) outbreaks, a food was epidemiologically linked to illness. The types of foods linked were vegetables or green salads (1), multiple food types (3), meat (2), fish (1), dressing (1) and other (3). In the *Salmonella* outbreak, the food linked to illness was crackers. In four Norwalk-like virus outbreaks, a food was epidemiologically linked to illness. The food types involved were meat (1), vegetables (1), salad bar (1) and rolls (1).

In only one outbreak were there culture positive ill persons and a food item both culture positive and epidemiologically linked to illness. This was a large outbreak of *E. coli* O157:H7 in Menard County.

The highlights of 1999 foodborne and waterborne outbreaks in Illinois included large outbreaks of *E. coli* O157:H7 in Menard County, *C. perfringens* at a work site in Lasalle County and a Norwalk-like virus outbreak in JoDaviess County. An unusual outbreak associated with ciguatera toxin occurred in Chicago in 1999.

Sporadic cases of enteric pathogens from 1994 through 1999 are shown in Figure 41.

Salmonella is the most commonly reported, followed by *Giardia*, *Shigella* and *Campylobacter*. However, *Campylobacter* is the only one of these four pathogens without mandatory reporting in Illinois. The increase in *E. coli* O157:H7 that occurred in 1999 was due to a single large outbreak.

Summary

Sixty-four foodborne outbreaks were reported in Illinois in 1999 as compared to a five-year median of 32. IDPH has increased its efforts by adding a staff member to focus exclusively on foodborne outbreaks. The increase in foodborne outbreaks can be seen as a sign of improved reporting from local health departments to IDPH. Improper holding temperatures and contaminated working surfaces were the most commonly reported contributing factors to outbreaks. Both bacterial and viral agents were important causes of foodborne outbreaks. The most common site of food preparation in the reported outbreaks was restaurants.

Suggested readings

Becker KM et al. Transmission of Norwalk virus during a football game. N Engl J Med 2000:343;1223-7.

Daniels NA et al. Traveler's diarrhea at sea: Three outbreaks of waterborne enterotoxigenic *Escherichia coli* on cruise ships. J Inf. Dis 2000;181: 1491-5.

Daniels NA et al. A foodborne outbreak of gastroenteritis associated with Norwalk-like viruses: First molecular traceback to deli sandwiches contaminated during preparation. J Inf Dis 2000;181:1467-70.

MMWR. Preliminary FoodNet data on the incidence of foodborne illnesses-selected sites, United States, 1999. MMWR 2000;49:201-5.

MMWR. Scombroid fish poisoning-Pennsylvania, 1998. MMWR 2000; 49(18)398-400.

MMWR. Escherichia coli 0111:H8 outbreak among teenage campers-Texas, 1999. MMWR 2000;49(15):321-3.

MMWR. Surveillance for foodborne-disease outbreaks-United States, 1993-1997. MMWR 2000:40(SS-1). 1-54.

MMWR. Surveillance for waterborne-disease outbreaks-United States, 1997-1998.MMWR 2000;49(SS-4):1-36.

Nakata S et al. Members of the family caliciviridae (Norwalk virus and Sapporo virus) are the most prevalent cause of gastroenteritis outbreaks among infants in Japan. J Inf Dis 2000;181:2029-32.

Table 2. Foodborne and Waterborne Outbreaks in Illinois, 1999

Onset date	City	County	# ill/# exposed	Symptoms[1]	Incub (hrs)	Foods implicated	Agent	Status[2]	Contributory causes[3]	Place of prep/Place eaten[4]
1/7	Calumet City	Cook	3/4	D,V,N	4	none	*St. aureus/ B. cereus*	S	unk	rest/private home
1/9	Skokie	Cook	16/unk	D,N,V,C,H	27	none	Norwalk-like	S	unk	rest/rest
1/12	Chicago	Cook	15/16	D,C,H,N	1	none	unk	U	T	rest/work
1/19	Orland Park	Cook	10/16	N,D,V,H	37	potato wedges	Norwalk-like	S	T,H	rest and deli/home
1/20	Bloomington	McLean	7/14	N,D,V,H	36	none	Norwalk-like	S	T	home/work
1/24	Hanover Park	DuPage	10/__	D,V	32	none	Norwalk-like	S	unk	deli and home/home
1/31	University Park	Will	11/11	D,V,N,H,BA	37	none	Norwalk-like	S	unk	rest and home/home
2/1	Niles	Cook	3/3	N,V,D	7	none	unk	U	T,C,H	rest/rest
2/1& 2/6	Matteson	Cook	2/3	N,V,D,F,C	16	none	*S.aureus/ B. cereus*	S	C,H	rest/rest
2/2	Crystal Lake	McHenry	17/32	D,V,N,B	25	none	Norwalk-like	C	H,T	rest and home/home
3/14	Oak Lawn	Cook	9/17	D,C	4	none	unk	U	C	rest/rest
3/14	Chicago	Cook	3/8	D	6	none	unk	U	T,other	rest/rest
3/15	Springfield	Sangamon	4/6	D,C,BA	8.5	none	*C. perfringens*	S	unk	rest/rest
3/16	Chicago	Cook	2/2	D,V,C	3.5	none	*S. aureus/ B cereus*	S	unk	rest/rest
3/19	Chicago	Cook	9/10	D,F,N,C	38	none	*Shigella boydii* 18	C	unk	rest/rest

Table 2. Foodborne and Waterborne Outbreaks in Illinois, 1999 (continued)

3/21	Tinley Park	Cook	3/7	D,C,N	-	none	unk	U	T,C	rest/rest
3/21	Granite City	Madison	20/170	D,V,C,H, BA	39	none	Norwalk-like	S	unk	caterer/banquet hall
4/4	Niles	Cook	33/>50	D,V,N,C,H	35	none	Norwalk-like	S	T,C,H	rest/rest
4/9	Stockton	JoDaviess	80/300	D,V,N,H	24	none	Norwalk-like	C	unk	school/school
4/11	Glendale Heights	DuPage	4/10	D,V,C	34	none	unk	U	unk	rest/home
4/18	Springfield	Sangamon	6/13	D,V,F,C,N, H,BA	30	none	Norwalk-like	S	unk	rest and home/home
4/18	Bartlett	Cook	20/200	N,D,V,C,H	47	none	Norwalk-like	U	C,H,U	banquet hall/ banquet hall
4/25	Sycamore	DeKalb	23/45	D,V,N	40	rolls	Norwalk-like	C	C,H,T	caterer/clubhouse
5/1	Tinley Park	Cook	6/10	D,V,C	27	none	Norwalk-like	U	unk	grocery/home
5/2	Addison	DuPage	7/43	D,V,C,N	37	Italian beef	Norwalk-like	S	unk	caterer/home
5/7	Chicago	Cook	9/13	D,V,F	33	none	Norwalk-like	S	unk	rest/rest
5/11	Marseilles	LaSalle	190/600	D,C,N	11	mushroom/ onion gravy	*C. perfringens*	C	T	work/work
5/13	Winnetka	Cook	2/3	D,V,F	36	none	Norwalk-like	S	T,C	rest/rest
5/24	Skokie	Cook	17/unk	D,V,N	32	none	Norwalk-like	S	unk	rest/rest
6/2	Wheeling	Cook	17/520	V,N,D,F,C	13	none	unk	U	unk	unk/school
6/5	Palos Heights	Cook	8/18	D,N,V,C	37	none	Norwalk-like	S	unk	rest/rest
6/7	Chicago	Cook	5/5	D,F,N,C, BA	31	none	*S. sonnei*	C	unk	rest/rest

Table 2. Foodborne and Waterborne Outbreaks in Illinois, 1999 (continued)

6/12	Lake Villa	Lake	25/250	V	unk	recr water	unk	U	septic sys fail	lake
6/17	Melrose Park	Cook	3/3	D,C	5	none	unk	U	T,C,H	deli/work
6/20	Hinsdale	DuPage	7/7	D,F	unk	none	*S. sonnei*	C	unk	deli/home
7/12	Mahomet	Champaign	10/21	D,V,N,F,C	21	crackers	*S. typhimurium*	C	unk	home/home
7/16	Midlothian	Cook	4/6	D,C,N	4	egg rolls	unk	U	T,IC,C,U ,H	rest/work
7/18	McHenry	McHenry	5/7	V,D,AC,N	12	egg rolls	*S.aureus/ B.cereus*	S	H,T	rest/fair
7/23	Marion	Williamson	8/13	D,V,N,C	5	fish, potatoes	*S. aureus/B. cereus*	S	unk	rest/rest
7/25	Mount Prospect	Cook	2/4	V	1	none	*S. aureus/ B.cereus*	S	T,C,U,H	rest/home
7/28	Chicago	Cook	21/unk	D,C,temp sens, BA, pruritus	8	amberjack	ciguatoxin	S	U	rest/rest
8/1	Chicago	Cook	29/85	D,N,C	41	potato salad, bread	unk	U	unk	caterer/park pavilion
8/5	Westchester	Cook	3/3	D,C	15	none	*B. cereus/C. perfringens*	C	T,C,U	rest/work
8/17	Crystal Lake	McHenry	7/7	D,AC	12	ground beef	*C.perf/B.cerus*	S	H,T	rest/rest
9&10	Plainfield	Will	10/unk	D,C		none	*S. enteritidis*	C	unk	rest/rest
9/1	Berwyn	Cook	11/33	D,V,C	33	none	Norwalk-like	C	T,H,C	caterer/work

Table 2. Foodborne and Waterborne Outbreaks in Illinois, 1999 (continued)

9/4	Petersburg	Menard	321/ 1000	D,HA, abd pain	74	beef	*E. coli* O157:H7	C	IC,T,U	home/home
9/11	Northbrook	Cook	8/12	D,C	15	none	*B. cereus/ C. perfringens*	S	T,C,H	rest/home
9/13	Peoria	Peoria	8/unk	D,C,F,V	unk	cider	*S. agona*	C	U	orchard/orchard
9/15	Niles	Cook	2/2	D,N,C	9	none	*B. cereus/C. perfringens*	S		rest/rest
9/20	Harvey	Cook	17/24	N,V,D,C,F	39h	unk	Norwalk-like	S	T,C,H	caterer/work
10/11	Mattoon	Coles	37/101	N,V,D,C	unk	unk	Norwalk-like	S	T,H	nursinghome/ nursinghome
10/12	Glenview	Cook	7/14	D,V,H,C,N	35	none	Norwalk-like	S	T,C,H	caterer/work
10/19	Grayslake	Lake	17/125	V,BA	9	none	Norwalk-like	C	H	caterer/school
11/4	Harvey	Cook	17/50	D,V,N,C	39	none	Norwalk-like	S	unk	caterer/work
11/13	Rolling Meadows	Cook	21/177	D,V,N,C	16	none	Norwalk-like	S	T,C,H	rest/rest
11/18	Batavia	Kane	24/31	V,D,F,C	14h	unk	Norwalk-like	S	unk	rest/church/church
11/19	Geneva/Batavia	Kane	10/17	V,D,F,C	15h	unk	Norwalk-like	S	unk	rest/store/work
11/23	Orland Park	Cook	2/2	D,V,C,N	61	none	unk	U	C,H,T	rest/rest
12/3	Glenview	Cook	2/10	D,V,C	4	none	*B. cereus/S. aureus*	S	C,H	rest/rest
12/7	Champaign	Champaign	18/65	N,V,D,F,C	8	salad bar	Norwalk-like	S	C,H	sorority/sorority
12/12	Wheeling	Cook	3/15	D,V,C,N	4	unk	*S. aureus/B. cereus*	S	T,C	rest/rest

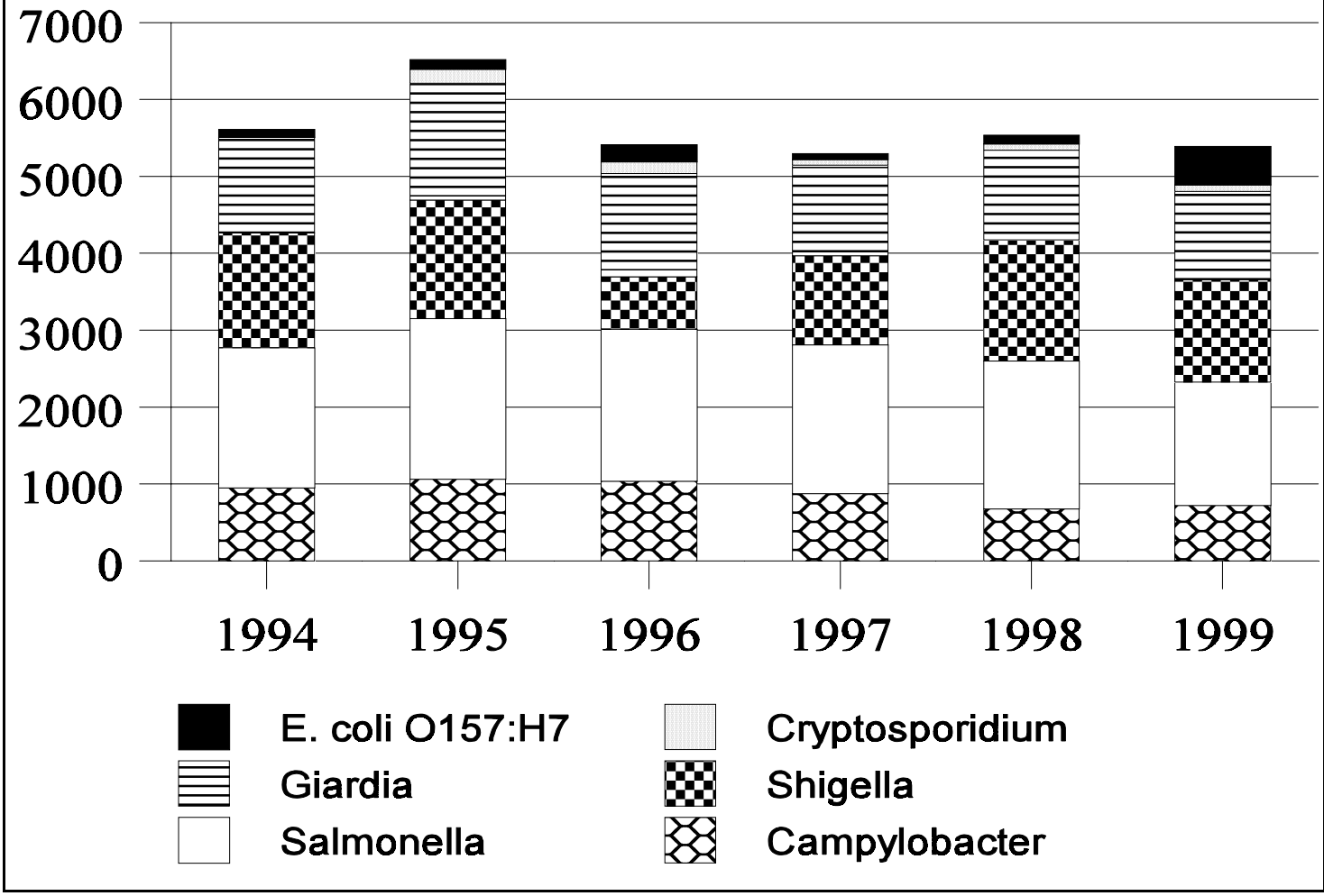
Table 2. Foodborne and Waterborne Outbreaks in Illinois, 1999 (continued)

12/21	Rolling Meadows	Cook	7/13	D,V	30	unk	Norwalk-like	S	T,C,H	rest/work
12/27	Urbana	Champaign	3/14	N,D,flshd	0.5	mahi-mahi	scombrotoxin	C	unk	rest/rest

[1]BA=body ache, D=diarrhea, F=fever, H=headache, N=nausea, V=vomiting, C=cramps; > 40% ills reporting symptoms
[2]S=suspect, C=confirmed
[3]C=contaminated surfaces, H=inadequate food handler hygiene, IC=inadequate cooking, T=improper holding temperatures, U=unsafe foods, unk=unknown
[4]rest=restaurant, unk=unknown

Figure 41. Selected Enteric Pathogens in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000



Specific types of foodborne outbreaks

Bacillus cereus

B. cereus causes an intoxication resulting in foodborne illness. There are two types of *B. cereus* foodborne outbreaks 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 of *B. cereus* outbreak, the incubation period ranges from eight to16 hours and symptoms last less than 24 hours. Diarrhea is a prominent feature but vomiting is absent. Foods previously associated with 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

There were no confirmed outbreaks of *B. cereus* in 1999. There were eight outbreaks that may have been either *B. cereus* or *S. aureus* as suggested by the clinical presentation and five 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 duration of illness is one day or less. Almost all outbreaks are associated with inadequate heating or reheating of meats or gravies. Inadequate heating or reheating allows the organism to multiply. The enterotoxin is heat resistant.

Case definition

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

Descriptive epidemiology

One foodborne outbreak in 1999 was confirmed as *C. perfringens*. Five outbreaks were suspected to be either *C. perfringens* or *B. cereus*. The confirmed outbreak occurred after a worksite luncheon for an estimated 600 persons. Of 280 persons interviewed following the event, 190 persons became ill. Symptoms reported by ill individuals included diarrhea (97 percent) and vomiting (4 percent). The mean incubation period was 11 hours. The outbreak was linked to consumption of an onion mushroom mixture. Improper storage and holding temperatures and improper reheating were suspected to have contributed to the outbreak.

Enterohemorrhagic *E. coli* (*E. coli* O157:H7 and others)

Foodborne outbreaks of *E. coli* O157:H7 have been linked to undercooked ground beef, apple cider, sprouts and lettuce. Other types of *E. coli* can be pathogenic in humans. An outbreak of *E. coli* O111 occurred in Texas in 1999. A commercial enzyme immunoassay kit can be used to isolate shiga toxin producing *E. coli* in stool specimens, and CDC can then serotype isolates that are not *E. coli* O157:H7. *E. coli* O111 is the second most common shiga toxin producing *E. coli* after *E. coli* O157:H7 in the U.S. In the Texas outbreak of enterohemorrhagic *E. coli*, appendectomies were reported in cases.

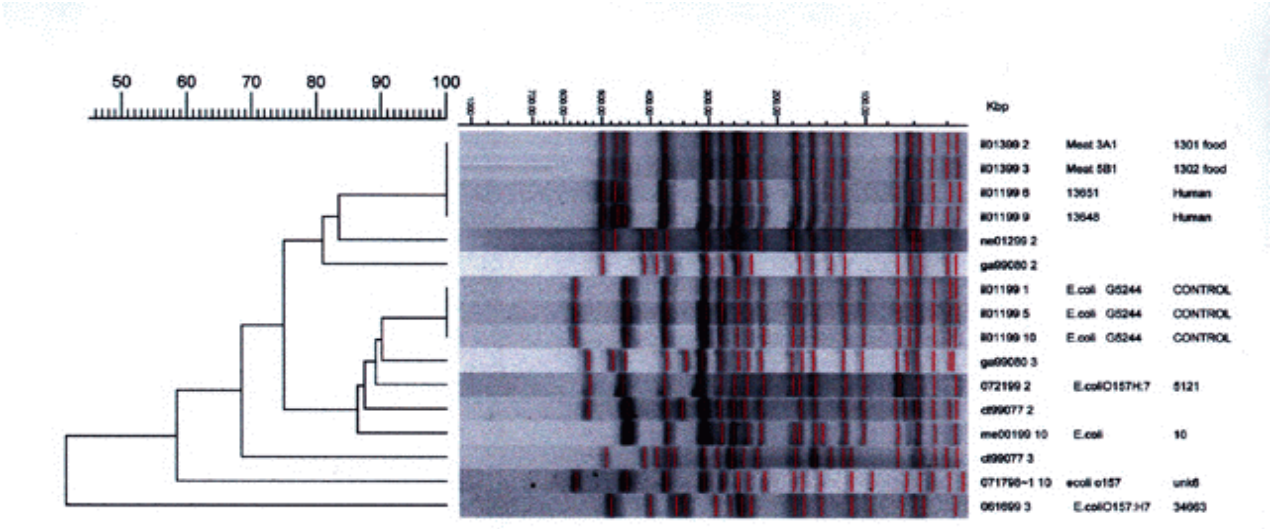
Case definition

Laboratory confirmation of an outbreak occurs when *E. coli* O157:H7 or other shiga-like toxin-producing *E. coli* is isolated from stool of two or more ills or from the implicated food or water.

Descriptive epidemiology

One outbreak due to *E. coli* O157:H7 was reported in Illinois in 1999. The outbreak occurred after a large outdoor party in Menard County. An estimated 1,000 persons attended and 321 met the case definition for illness. Fifty-three of these individuals were laboratory confirmed. Fifteen persons were hospitalized and none developed hemolytic uremic syndrome. However, two patients had to have appendectomies. Risk factors for illness included consumption of beef and barbeque sauce and sitting on the pasture ground. The isolates from meat, humans and cattle matched by PFGE (Figure 42).

Figure 42. *E. coli* O157:H7 Pulsed Field Gel Electrophoresis Patterns, Menard County, 1999



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 *Salmonella* is either cultured from implicated food or *Salmonella* of the same serotype is cultured from clinical specimens from two or more ill individuals.

Descriptive epidemiology

Three foodborne outbreaks in 1999 were confirmed with *Salmonella* as the pathogen. In these outbreaks, 28 persons became ill. A mean of nine persons became ill per outbreak. In one outbreak, the incubation period was able to be determined and was identified as 21 hours. The *Salmonella* serotypes involved in the three outbreaks were *enteritidis* (1), *agona* (1), and *typhimurium* (1). The following counties had *Salmonella* outbreaks in 1999: Champaign, Peoria and Will. In one of the *Salmonella* outbreaks, 10 people became ill (two were laboratory confirmed with *Salmonella typhimurium)* after a home prepared meal in Champaign County. Homemade ice cream made with raw eggs was served but almost everyone ate the ice cream making it difficult to establish this as the vehicle. Crackers were epidemiologically linked to illness. In the second outbreak, *Salmonella enteritidis* affected 10 persons after eating at the same restaurant although a food vehicle could not be identified. A case-control study was not conducted to confirm the restaurant as the source of the illnesses. In the third outbreak, eight persons developed infection with *Salmonella agona* after visiting an apple orchard and drinking apple cider in Peoria. A case-control study was not performed to verify the orchard as the source.

Shigella

Shigella is not commonly involved in foodborne outbreaks. Instead it is a gastrointestinal illness often transmitted person to person. However, outbreaks have been associated with bean dip, lettuce, parsley and contaminated water.

Case definition

The case definition for an outbreak of *Shigella* is identification of the same serotype of *Shigella* in two or more ill persons.

Descriptive epidemiology

Three confirmed outbreaks of *Shigella* were reported in Illinois in 1999. The serotypes involved were *sonnei* (2) and *boydii* 18 (1). The mean incubation period for the three outbreaks was 34 hours. In the first outbreak, nine persons from multiple households experienced illness an average of 38 hours after dining at a restaurant. Four were culture confirmed with *Shigella boydii* 18. No food item was epidemiologically linked to illness. Food handler specimens were all negative for *Shigella*. In the second outbreak due to *Shigella*, four of five individuals from multiple households in Cook County purchased foods at a single deli between June 13 and June 19 and developed *Shigella sonnei*. All food handlers tested negative for *Shigella*. PFGE analysis of four of the isolates from persons purchasing foods from this deli showed identical patterns. In the third reported *Shigella* outbreak, five persons from three separate households

became ill an average of 31 hours after eating food at the same Chicago restaurant. Four individuals were confirmed with *Shigella sonnei*. No foods were epidemiologically linked to illness. All food handlers were tested and were negative for *Shigella*.

Staphylococcal food poisoning

One type of foodborne illness is classified as an intoxication and is caused by enterotoxin-producing strains of *Staphylococcus aureus*. Within 30 minutes to eight hours (usually two to four hours) after eating contaminated food, the 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. The organism may be of human origin (e.g., from purulent lesions from sores, acne, nasopharyngeal secretions), or may be from bovine origin, such as may occur with contaminated dairy products. *S. aureus* can be found in nasal passages, throat, hair and on the skin of healthy people, and are in high numbers in cuts, pustules and abscesses. The enterotoxins produced by *S. aureus* are not destroyed by heat. The organism may produce toxin in foods and then may die so cultures of foods may be negative and yet the foods contained staphylococcal enterotoxin which made people ill. Foodborne outbreaks caused by *S. aureus* and the *B. cereus* type where vomiting predominates have similar incubation periods and clinical syndromes.

Case definition

Laboratory confirmation of a *S. aureus* outbreak requires detection of enterotoxin in food or organisms with the same phage type in stools or vomitus of two or more ills or isolation of greater than 10^5 organisms per gram in properly handled food.

Descriptive epidemiology

No foodborne outbreaks associated with *S. aureus* were confirmed in Illinois in 1999. There were eight outbreaks suspected of being either *S. aureus* or *B. cereus* but the agent was not confirmed.

Chemical agents

This category includes toxins associated with fish consumption, such as ciguatera and scombrotoxin. Ciguatera toxin poisoning is caused by the ingestion of ciguatoxin in predatory reef fish, such as barracuda, amberjack and grouper. The toxin is initially produced by dinoflagellates that are eaten by herbivorous fish that are then consumed by the predatory fish. There is a test to detect toxin in fish. 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 fish consumption. Neurologic symptoms may follow and persist for weeks or months. These neurologic symptoms include numbness, tingling of mouth and extremities, muscle pain and weakness and reversal of temperature sensation. There is no diagnostic test or treatment in humans. The case definition is a clinical syndrome matching ciguatera toxin poisoning among someone who has eaten a type of fish associated with previous ciguatera fish poisoning. From 1983 to 1993, there were 129 outbreaks and 508 cases of ciguatera poisoning in the U.S. Eighty-six percent of these cases occurred in Hawaii. In 1997, an outbreak of ciguatera fish poisoning involving 17 ship crew members who had consumed contaminated barracuda occurred in Texas. Symptoms occurred from two through 16 hours after consumption of the fish. The fish tested positive for the toxin.

Recommendations for people with ciguatera toxin involve dietary changes that include avoiding fish, shellfish, alcoholic beverages and nuts.

Scombrotoxin poisoning occurs when a person consumes fish with a high level of histamine that can be produced in the muscle of fish after harvest. Some fish, such as tuna, mackeral, bluefish, dolphin, bonito and saury, are more likely to have high levels of histamines in their tissue. When there is temperature abuse of fish after harvesting, the potential for outbreaks associated with scombrotoxin increases. The clinical signs of this toxicity in people include lip swelling, itching, a peppery taste in the mouth, nausea, vomiting, facial flushing, headache and stomach pain. Symptoms usually only last a few hours and there are no lasting effects.

Case definition

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

The 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.

Descriptive epidemiology

Two outbreaks associated with fish toxins occurred in 1999. In the first outbreak, ciguatera toxin caused illness in individuals in Chicago in August. Persons reported becoming ill with gastrointestinal and neurologic symptoms after eating amberjack at a restaurant. Additional cases were identified using credit card slips obtained at the restaurant. The case definition was acute onset of diarrhea or vomiting within 24 hours of amberjack consumption followed by neurologic symptoms. Nineteen fish orders resulted in illness, and 21 cases were identified with onsets from July 27 through August 3. The mean age of cases was 37 (range 27 through 49 years). The mean incubation period was eight hours (range three through 14 hours). Nineteen had neurologic symptoms. These included pain/weakness in muscles or joints (84 percent), temperature sensory disturbance (75 percent), pruritis of the hands and feet (68 percent), oral or taste disturbance (56 percent), tingling of the extremities (54 percent) and, less commonly, genital or sexual pain, and tremors and dizziness. No amberjack was available for testing. The source of the fish was a supplier in Florida. The interventions in this outbreak were to decrease consumer risk by making sure the product was no longer available, finding cases to prevent incorrect diagnosis, to prevent unnecessary treatment, to provide diet and behavior modification to decrease symptoms and to share resources with medical providers. The avoidance of alcohol, fish and nuts may decrease symptoms. More than eight weeks after eating the fish, more than 50 percent of cases were still experiencing neurologic symptoms.

In the second outbreak, involving scombrotoxin, three of 10 persons became ill with gastrointestinal illness and toxic reactions after eating at a restaurant. The mean incubation period was three hours. Ill persons consumed mahi mahi. No one was hospitalized. No other patrons became ill after eating mahi mahi. No fish remained for testing.

Suggested readings

MMWR. Ciguatera fish poisoning-Texas, 1997. JAMA 1998;280(16): 1394-5.

Viral gastroenteritis

Norwalk-like viruses cause almost all the outbreaks of acute nonbacterial gastroenteritis in the U.S. Estimates are that 23 million people are affected by Norwalk-like viruses in the U.S. per year. The most common cause of viral gastroenteritis are small round-structured viruses (SRSV), commonly called Norwalk-like virus. SRSV are caliciviruses. These viruses can be classified into two genogroups: genogroup 1 (Norwalk virus, Southampton virus and Desert Shield virus) and genogroup 2 (Toronto virus, Mexico virus, Hawaii virus, Bristol virus, Lordsdale virus, camberwall virus, Snow Mountain agent and Melksham virus). CDC hopes to have a SeqNet for viral gastroenteritis similar to PulseNet, which is used to identify common strains of bacterial pathogens nationwide. Four genotypes have been identified by CDC in samples from 48 viral outbreaks.

Norwalk-like viruses are transmitted through consumption of contaminated food or water, directly from person to person and from airborne droplets produced during vomiting. There have been several outbreaks in nursing homes in which the organism was thought to be transmitted in airborne droplets. The virus is excreted in stool and vomitus for up to 10 days. The incubation period and duration of illness range from 24 to 48 hours. 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 Norwalk-like virus 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. Failure of an ill food handler to perform proper handwashing may result in fecal contamination of food. Illness caused by SRSV can be suspected based on incubation period, duration of illness, symptoms and the absence of bacterial or parasitic pathogens in stool samples.

The virus cannot be grown in cell culture. A polymerase chain reaction test is used in the diagnosis of Norwalk-like virus. The testing for viral gastroenteritis in humans is not useful for screening of individual samples but is useful for multiple samples from an outbreak.

Recently there have been successful attempts to identify Norwalk-like virus in food and water. Norwalk-like virus was identified using reverse transcription polymerase chain reaction from food in an outbreak at a Texas university. Norwalk-like virus has been identified from municipal water samples in an outbreak in Finland using PCR. This outbreak involved thousands of persons and was a result of inadequate chlorination.

Case definition

Several laboratory tests may help confirm an outbreak related to Norwalk-like virus. These tests include positive results on reverse transcription polymerase chain reaction, visualization of SRSV in electron microscopy of stool from ill individuals, or a fourfold rise in antibody titer to Norwalk or Norwalk-like virus is seen in acute and convalescent sera in most serum pairs. At least seven to 10 samples of fresh liquid stools from ills should be obtained for this testing in an outbreak setting. In Illinois, these samples must be sent to CDC through the IDPH laboratory. The IDPH state laboratory is developing the PCR technology.

Descriptive epidemiology

Twenty-nine outbreaks in 1999 were suspect viral gastroenteritis due to the clinical syndrome, incubation period and duration of illness; five were laboratory confirmed. In these 29

outbreaks, 488 people experienced a compatible illness with a mean of 16 ill people per outbreak. The mean incubation period was 34 hours. The outbreaks occurred in the following counties: Cook (15), DuPage (2), Kane (2) and one each in Champaign, Coles, DeKalb, JoDaviess, Lake, Madison, McHenry, McLean, Sangamon and Will. In four outbreaks, a food item was statistically associated with illness. The following food items were implicated: meat (2), vegetables (1), salad bar (1) and rolls (1).

Five outbreaks in 1999 were confirmed as viral gastroenteritis by laboratory testing. The confirmed outbreaks were in Cook, DeKalb, JoDaviess, Lake and McHenry. Four were confirmed as the G2 genogroup and one as the G1 genogroup.

The first laboratory confirmed outbreak in 1999 occurred in McHenry County and was confirmed by CDC with electron microscopy and polymerase chain reaction. The PCR showed the virus to be in the G2 genogroup. Eight of nine stool specimens tested positive for Norwalk-like virus. Seventeen of 32 persons became ill after a party in a private home. Sixty-five percent of persons experienced diarrhea and 94 percent experienced vomiting an average of 25 hours after exposure. No food item was epidemiologically linked to illness. Poor personal hygiene of a food handler was cited as a contributing factor in the outbreak. Several individuals involved in food preparation had very short onsets after the party indicating that they may have been exposed at an earlier time and may have contaminated the food during preparation.

The second confirmed outbreak in 1999 occurred in children at a JoDaviess County school attended by 300 persons. Eighty of 160 persons interviewed became ill. CDC confirmed Norwalk-like virus in 10 of 14 stool specimens. The virus was further identified as the G2 genogroup. The mean incubation period was 24 hours with a duration of 48 hours. Symptoms included vomiting in 98 percent, diarrhea in 58 percent and body aches in 27 percent. No food item was epidemiologically linked to illness. None of the food handlers admitted to illness.

In the third confirmed outbreak in 1999, 45 persons attended a catered party at a clubhouse in DeKalb County. Twenty-three of 35 persons interviewed reported illness with 74 percent reporting diarrhea and 65 percent reporting vomiting. The mean incubation period was 40 hours. The CDC confirmed virus in six stool specimens. The virus was further classified as the G1 genogroup. A food handler reported illness and provided a stool specimen seven days after onset of illness which was found positive for Norwalk-like virus. Poor personal hygiene in the food handler was mentioned as a contributing cause. Rolls were epidemiologically linked to illness.

In the fourth confirmed outbreak in 1999, 33 persons attended a catered event at a worksite in Cook County. Eleven of 19 interviewed became ill following the event. The incubation period was 33 hours with a duration of 16 hours. All ill persons reported diarrhea and 73 percent reported vomiting. Five of nine stool specimens tested by CDC were positive for small round structured virus. The genogroup was identified as G 2/4,8. No food was epidemiologically linked to illness. Poor personal hygiene of the food handler was cited as a contributing factor.

In the fifth confirmed outbreak, 600 persons ate food purchased from a local restaurant at a school in Lake County. Seventeen of 51 persons interviewed reported illness. Sixty-five percent reported vomiting and 29 percent reported diarrhea. The incubation period averaged 30 hours. No food items were epidemiologically linked to illness. CDC identified small round structured viruses in six of seven stool specimens submitted. The genogroup was G2/6,7. Poor personal hygiene of a food handler was cited as a contributing factor to the outbreak.

Suggested readings

Kukkula M, Maunula L, Silvennoinen E, vonBonsdorff C-H. Outbreak of viral gastroenteritis due to drinking water contaminated by Norwalk-like viruses. J Inf Dis 1999; 180:1771-6.

Waterborne outbreaks

One waterborne outbreak was reported and verified by IDPH. Twenty-five of 250 people who were swimming at a lake in Lake County became ill with vomiting and one to two episodes of diarrhea. Two stool specimens tested negative for *Salmonella*, *Shigella* and *Campylobacter*. The pathogen causing illness was unknown. Fecal coliforms were found in lake water. The lake water contamination was attributed to septic system failure.

Giardiasis

Background

Giardia, which causes the disease giardiasis, is the most commonly diagnosed intestinal parasite in public health laboratories. *Giardia* is spread from person to person through fecal-oral transmission with a median incubation period of from seven to 10 days. It is a common intestinal parasite of children, especially those attending day care. 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 can remain viable for months, and the infectious dose is low.

Persons at greatest risk are children in day care, close contacts to these children, men who have sex with men, backpackers, campers and persons drinking from shallow wells contaminated by run-off with the organism. Giardiasis peaks in late summer and early fall. Metronidazole is the most frequent treatment in the U.S.

The prevalence of *Giardia* in stool specimens submitted for examination in industrialized countries is from 2 percent to 5 percent. This prevalence can be as high as 35 percent during non-outbreak times in U.S. day care settings. *Giardia* is not a nationally notifiable disease, although 43 states require reporting. 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 good hygiene, avoiding water or food that might be contaminated and avoiding fecal exposure during sex.

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

There were 1,150 cases of giardiasis reported in Illinois in 1999; the incidence rate was 10 per 100,000 population. Of these cases, 50 percent were female. Ninety-two percent were white, 6 percent were African Americans, 2 percent were Asian; 11 percent were Hispanic. There was a significantly higher proportion of whites with giardiasis and a lower proportion of African Americans with giardiasis compared to the Illinois population. A peak in incidence occurred at 1 to 4 years of age (Figure 43). The mean age of cases was 30. There was a seasonal distribution of giardiasis with most cases occurring in summer to fall, from June through November (Figure 44). In addition, there were 308 giardia carriers reported in Illinois in 1999. In Illinois, the highest incidence rates per 100,000 for giardiasis occurred in central and northern Illinois (Figure 45). One-year incidence rates for the period 1995 to 1999 ranged from 0 to 40 per 100,000 population by county. Counties with the highest average annual giardiasis incidence rate per 100,000 population from 1995-1999 were DeWitt (38.7), Champaign (37.6), Peoria (28.9), Stephenson (26.2) and Cass (23.9).

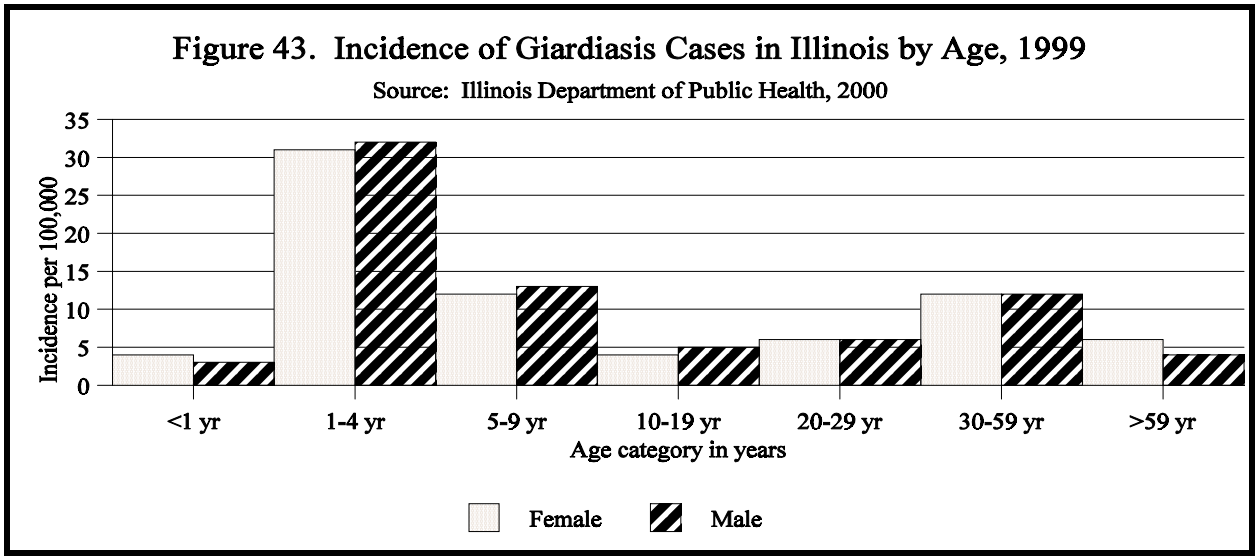
Summary

More than 1,000 cases of giardiasis were reported to IDPH in 1999 in Illinois. Whites were overrepresented in the case population for giardiasis (92 percent) compared to their representation in the Illinois population (82 percent). African Americans were underrepresented among giardiasis cases. The mean age was 30, and more cases occurred in the warmer months of the year. Champaign and DeWitt counties had the highest incidence of giardiasis in the state.

Suggested readings

MMWR. Giardiasis surveillance United States,1992-1997. MMWR 2000;49(SS-7). 1-13.

Heresi GP, Murphy JR, Cleary TG. Giardiasis. Sem Ped Inf Dis 2000;11(3):188-95.



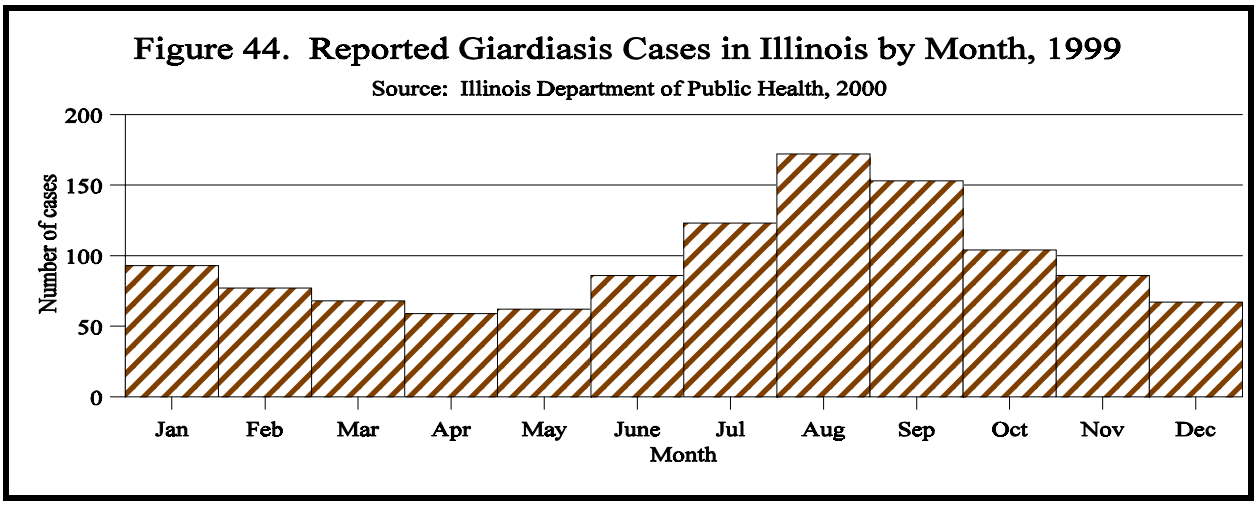
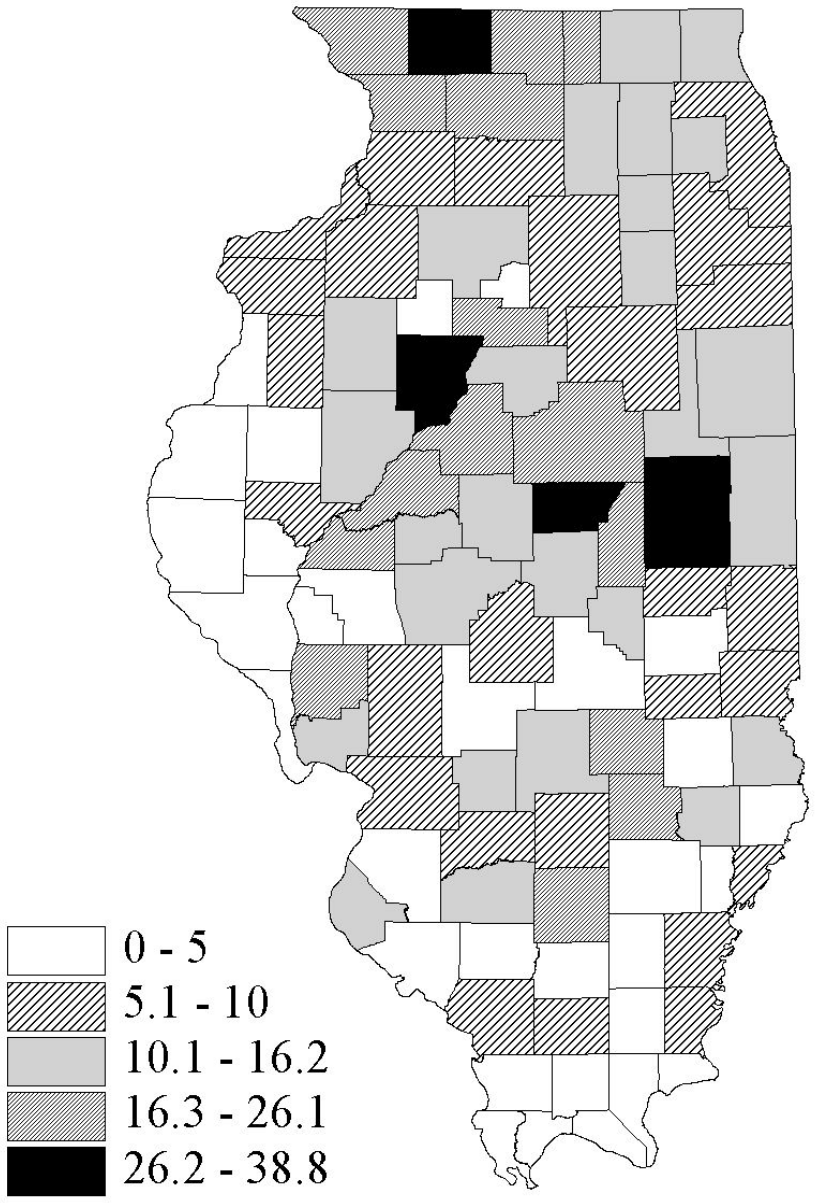


Figure 45. Average Annual Giardiasis Incidence Rates per 100,000 by County, Illinois, 1995-1999



Source: Illinois Department of Public Health, 2000

VIRAL HEPATITIS

Acute infections with hepatitis A, hepatitis B, hepatitis non-A non-B (NANB) and hepatitis B carriers are reportable in Illinois. Cases of acute infection must have either jaundice or liver enzymes elevated over normal. Currently for reporting purposes in Illinois, hepatitis C is included in the category hepatitis NANB. 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 may also be transmitted through sharing of equipment for intranasal cocaine use.

Of the 1,099 reported acute hepatitis cases in Illinois in 1999, 77 percent were hepatitis A, 18 percent were hepatitis B and 4 percent were hepatitis NANB. A comparison of characteristics of these types of hepatitis is found in Table 3 and includes only cases for whom information was gathered on the hepatitis reporting form.

Jaundice was found in 92 percent of reported hepatitis A cases, in 74 percent of hepatitis NANB and in 77 percent of hepatitis B cases. Hospitalization occurred for 36 percent of reported hepatitis NANB, for 29 percent of hepatitis B and for 24 percent of hepatitis A cases.

Risk factors for the four types of hepatitis are described in Table 4. Hepatitis NANB cases were more likely to report a history of injection drug use (14 percent) than were hepatitis B (7 percent) or hepatitis A cases (1 percent). Hepatitis A cases were more likely to report travel outside the U.S. or Canada (14 percent) as compared to hepatitis B cases (7 percent) or hepatitis NANB (3 percent). Cases reporting more than one sexual partner, from highest to lowest percent, were hepatitis B (40 percent), hepatitis NANB (22 percent) and hepatitis A (10 percent). Hepatitis cases were not very likely to report employment in the medical field: hepatitis B cases (2 percent), hepatitis A cases (2 percent) or hepatitis NANB (0 percent). Cases reporting receiving tattoos, from highest to lowest percent, were hepatitis B (10 percent), hepatitis NANB (7 percent) and hepatitis A (2 percent).

Table 3. Demographic and Clinical Information for Hepatitis A, B and NANB in Illinois, 1999

Factor	Hepatitis A		Hepatitis B		Hepatitis NANB	
	# (total # reporting)[1]	%	# (total # reporting) [1]	%	# (total # reporting)[1]	%
Demographics						
Mean age	25(849)	-	38(201)	-	41(48)	-
Female	380(849)	45	73(200)	36	21(48)	44
Race						
Asian	23(823)	3	10(170)	6	1(45)	2
African-American	306(823)	37	71(170)	42	12(45)	27
White	491(823)	60	89(170)	52	32(45)	71
Other	1(823)	0.1	0(170)	0	0(45)	0
Hispanic	169(806)	21	20(153)	13	4(43)	9
Clinical						
Jaundice	731(790)	92	139(181)	77	29(39)	74
Hospitalized	187(781)	24	50(173)	29	14(39)	36
Deaths	5(768)	0.7	2(176)	1	2(36)	5

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

Source: Illinois Department of Public Health, 2000

Table 4. Number and Percentage of Cases with Risk Factors for Hepatitis A, B and NANB Illinois, 1999

Factor	Hepatitis A (N=849)		Hepatitis B (N=202)		Hepatitis NANB (N=48)	
	# (total # reporting)[1]	%[2]	# (total # reporting)[1]	%[2]	# (total # reporting)[1]	%[2]
Day care contact	32(655)	5	0(127)	0	1(31)	3
Household contact of day care	57(649)	9	4(128)	3	1(31)	3
Contact of a hepatitis A case	147(606)	24	1(124)	0.8	1(31)	0
Sexual contact	17(138)	12	1(1)	100	0(0)	0
Household	68(138)	49	0(1)	0	0(0)	0
Other	53(138)	38	0(1)	0	0(0)	0
Food handler	32(655)	5	2(129)	1	1(31)	3
Ate raw shellfish	24(637)	4	6(128)	5	1(31)	3
Common source outbreak	24(610)	0.4	0(126)	0	0(31)	0
Travel	92(646)	14	9(131)	7	1(31)	3
Hepatitis B or C case contact	11(581)	2	15(121)	12	2(28)	7
Sexual contact	1(7)	14	11(13)	85	1(2)	50
Household	2(7)	29	1(13)	8	1(2)	50
Other	4(7)	57	1(13)	8	0(2)	0
Dialysis contact	2(622)	0.2	2(136)	1	0(30)	0
Medical field employee	12(627)	2	3(136)	2	0(28)	0

[1] number of cases reporting that factor (total number of cases interviewed about that factor)
[2]Percent 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, 2000

Table 4. Risk Factor Information for Hepatitis A, B and NANB, Illinois, 1999 (continued)

Factor	Hepatitis A (N=849)		Hepatitis B (N=202)		Hepatitis NANB (N=48)	
	# (total # reporting)[1]	%[2]	# (total # reporting)[1]	%[2]	# (total # reporting)[1]	%[2]
Injection drug user	6(605)	1	9(136)	7	4(29)	14
Sexual preference						
Heterosexual	335(371)	90	117(126)	93	23(25)	92
Homosexual	33(371)	9	6(126)	5	2(25)	8
Bisexual	6(370)	2	3(126)	2	0(25)	0
Number of sexual partners						
0	170(449)	38	17(111)	15	1(23)	4
1	238(449)	53	49(111)	44	15(23)	65
2-5	35(449)	8	38(111)	34	5(23)	22
>5	6(449)	1	7(111)	6	0(23)	0
Dental work	36(589)	6	18(134)	13	7(31)	23
Other surgery	9(588)	2	10(132)	7	3(31)	10
Acupuncture	1(582)	0.2	1(134)	0.7	0(31)	0
Tattoos	14(593)	2	14(135)	10	2(30)	7
Needlestick	4(585)	0.7	9(130)	7	1(26)	4
Hepatitis B vaccine series	85(557)	15	5(131)	4	3(29)	10

*Percent 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, 2000

Hepatitis A

Background

Hepatitis A is caused by an RNA virus in the family picornaviridae. Transmission is from person to person by the fecal-oral route. Only rarely are foodborne outbreaks identified. The incubation period is 15 to 50 days. Onset of illness with hepatitis A 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. HAV can be prevented by good personal hygiene, particularly hand-washing, preexposure or postexposure immunization with immune globulin (IG) and preexposure immunization with hepatitis A vaccine. The administration of IG for persons exposed to hepatitis A is 85 percent effective in preventing symptomatic hepatitis A 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. Hepatitis A vaccination induces protection as soon as 17 to19 days after vaccination for more than 50 percent of recipients. Infection with hepatitis A may lead to acute liver failure in patients with chronic liver disease. Therefore, patients with chronic liver disease should be vaccinated against hepatitis A.

Case definition

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

Descriptive epidemiology

The number of confirmed hepatitis A cases in Illinois was 849 in 1999 (Figure 46). The five-year median was 763. The incidence of hepatitis A was highest in 5- to 9-year-olds (mean age=25) (Figure 47). There was a much higher incidence of hepatitis A in males as compared to females in the ages 20-49. Sixty percent of cases occurred in whites, 37 percent in African Americans and 3 percent in Asians. There was a significantly higher proportion of African Americans with hepatitis A, and a significantly lower proportion of whites than in the Illinois population. Twenty-one percent of reported cases were Hispanic, which was significantly higher than their percentage in the Illinois population. Hepatitis A cases occurred throughout the year (Figure 48). The average annual incidence of hepatitis A by county from 1995 to1999 is found in Figure 49. The counties with the highest average annual incidences of hepatitis A per 100,000 population for 1995 to 1999 were Boone (12.3), Madison (11.8), Cook (10.4), Jackson (9.5), Monroe (8.0), Kane (7.9), and Clinton (7.7).

Five percent of reported cases were involved in food handling. Risk factors reported for hepatitis A cases included contact with a hepatitis A case (24 percent), travel outside the U.S. or Canada (14 percent) and consumption of raw shellfish (4 percent). Twenty-three percent of whites and 29 percent of African Americans had contact with a household member with hepatitis A. A history of travel outside the U.S. or Canada was reported in 19 percent of whites and 1

percent of blacks. Thirty-nine percent of Hispanics and 8 percent of non-Hispanics reported travel outside the U.S. or Canada.

Ninety-two percent of reported cases were jaundiced and for 96 percent elevated liver enzymes were reported. Twenty-four percent of reported hepatitis A cases were hospitalized. Five deaths were linked to acute hepatitis A.

There were 650 hepatitis A cases who could be reached for interview. Ninety-one percent of whites and 74 percent of African Americans could be reached for interview. An equal percentage of Hispanics and non-Hispanics could be reached for interview. Forty-six forms failed to include information on contact prophylaxis.

To avoid secondary cases, IG can be offered for prophylaxis of close contacts if it can be given within 14 days of their exposure. Conservatively, a person should be considered infectious for two weeks prior to symptoms and two weeks after symptoms appear. Therefore, it is extremely important for health care providers and laboratories to report cases quickly and for health departments to interview cases rapidly to ensure that prevention of secondary cases is maximized by prompt administration of IG. For 352 hepatitis A cases, prophylaxis of close contacts was recommended by the health department or physician. At least 1,340 contacts were recommended for IG. For cases where IG was needed for contacts, a mean of two persons was recommended for IG per case.

For 17 cases, by the time of the interview, it was too late to provide IG to the contacts. In 11 of these cases, the interval between diagnosis and interview was more than 14 days; in four cases, the time between onset and diagnosis was greater than 14 days, and in two cases both intervals were greater than 14 days. The interval between diagnosis and interview is influenced by the time it takes the health care provider or laboratory to report and the time it takes the public health employee to get in touch with the case. The interval between onset and diagnosis is influenced by how long it takes the person to seek medical care and how long it takes a health care provider to request testing for hepatitis A and receive the results. For 33 cases, a note on the case history form said it was too late for prophylaxis of contacts when, in fact, it was not too late. To evaluate whether IG might be valuable to a household contact of a hepatitis A case, assume that the contact was exposed to the virus 14 days after the onset of the case. This would mean IG might be valuable if given up to 28 days following the case's onset where there is a continuing daily possibility of exposure.

There were 57 cases who reported contact with a confirmed case of hepatitis A; 45 were household contacts, 11 were non-household contacts and one was a sexual contact of a confirmed case. There were 72 additional cases who mentioned contact with a hepatitis A case but confirmation of that case could not be found. This may be because the person did not seek medical care, was not diagnosed with hepatitis A, was not a case of hepatitis A or was not reported to public health authorities. Thirteen additional cases were listed as having contact with a confirmed case but had onsets within 14 days of the case indicating that the case named was not their source of infection. Forty-five household contacts of confirmed cases could be considered secondary cases. Of these 45 secondary cases, 14 of the primary cases were interviewed too late to provide IG to contacts, 10 primary cases did not list the household contact who subsequently became infected, three primary cases could not be contacted, one secondary case was offered IG but refused, seven did not receive IG, eight received IG within the 14 day window but became infected anyway and for two cases it was unknown whether they received IG. Eleven non-household contacts of confirmed cases could be considered to be secondary cases. Of these 11,

two primary cases were interviewed too late to provide IG to contacts, one secondary case was given IG within the 14 day window but became infected anyway and eight of the secondary cases in non-household contacts were not listed on the primary cases' list of contacts needing IG. Of these last eight secondary cases, four were relatives of the primary cases but were not household contacts.

In 1999, several food handlers with hepatitis A were identified. ACIP's hepatitis A statement recommends that post-exposure prophylaxis be recommended for patrons of restaurants when there is an infected food handler under the following conditions: 1) the infected food handler is directly involved in handling, without gloves, foods that will not be cooked before they are eaten, 2) the hygienic practices of the food handler are deficient or the food handler has had diarrhea and 3) patrons can be identified and treated within two weeks of exposure. In late September, hepatitis A was confirmed in a food handler who worked at a fast food restaurant in St. Clair County. This situation met the ACIP guidelines for offering IG to the public. The LHD for the area offered IG October 4 through October 8 and IG was administered to approximately 1,050 people after this potential exposure was announced through the news media.

Summary

The mean age of cases was 25 years although the highest incidence occurred in 5- to 9-year-olds in 1999. African Americans were overrepresented in reported hepatitis A cases (37 percent) versus their representation in the Illinois population (15 percent), while whites were underrepresented with hepatitis A (60 percent) compared to their representation in the Illinois population (82 percent). Hispanics were overrepresented in hepatitis A cases.

Barriers to prevention of 57 secondary cases included late reporting, late interview of cases, lack of accurate contact information for cases, incomplete lists of contacts to cases and contacts who were not provided with prophylaxis or who refused prophylaxis. There were non-household contacts who were secondary cases; four of these were in relatives to the case. This may mean public health interviewers should more carefully question the case about non-household contacts who may need prophylaxis, especially relatives of the case. To prevent secondary cases, hepatitis A cases should be reported promptly with accurate contact information to the LHD who should interview cases quickly and focus efforts on obtaining an accurate list of contacts, both household and non-household who may need prophylaxis. Steps should be taken to ensure the contacts receive prophylaxis. If the contacts refuse prophylaxis, a second attempt to provide them with information should occur.

Figure 46. Hepatitis A Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

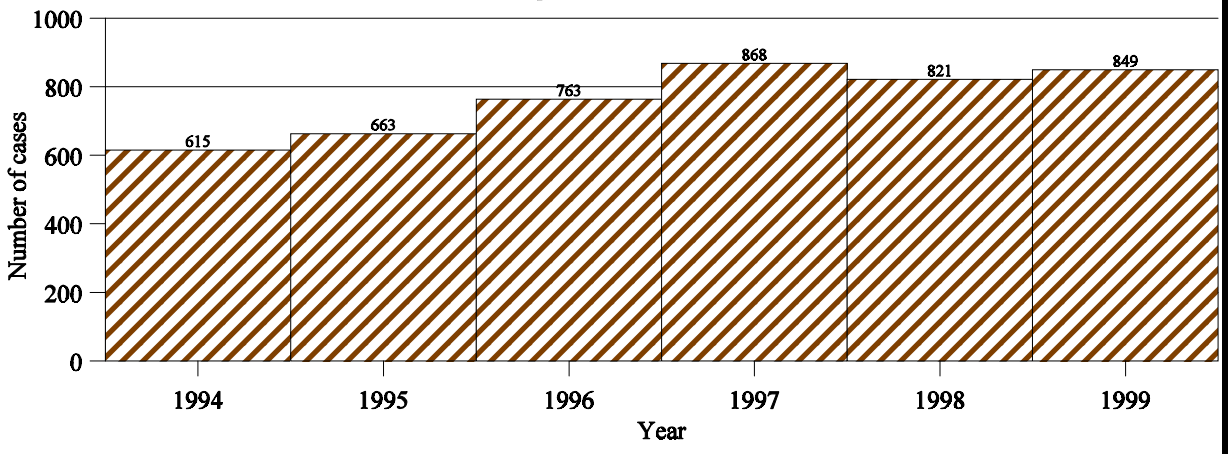


Figure 47. Incidence of Hepatitis A Cases in Illinois by Age and Sex, 1999

Source: Illinois Department of Public Health, 2000

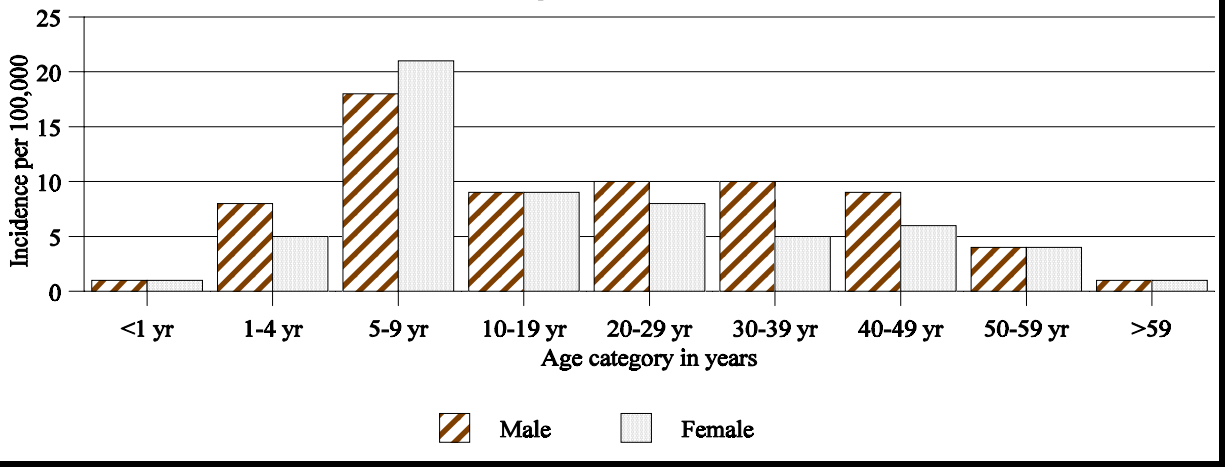


Figure 48. Reported Hepatitis A Cases in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

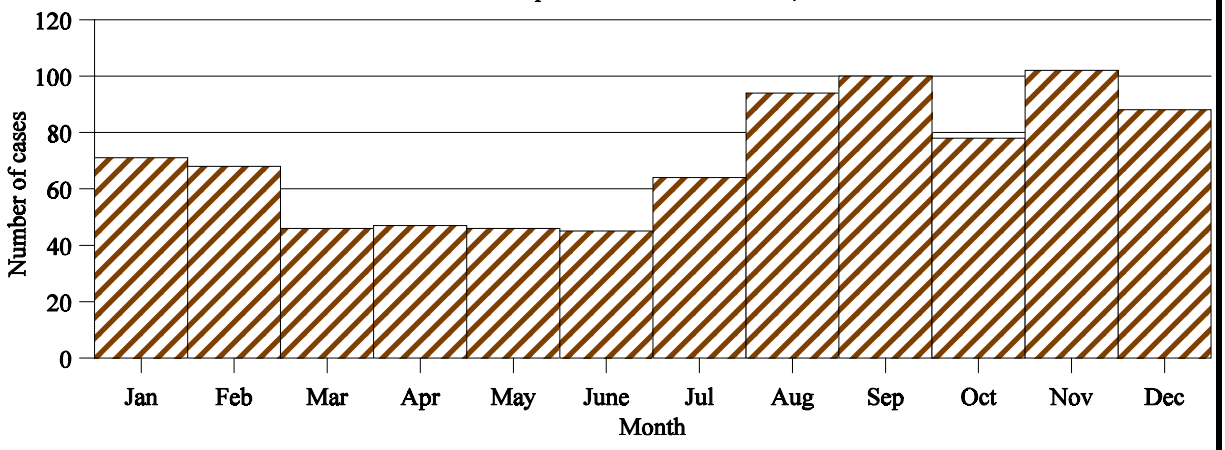
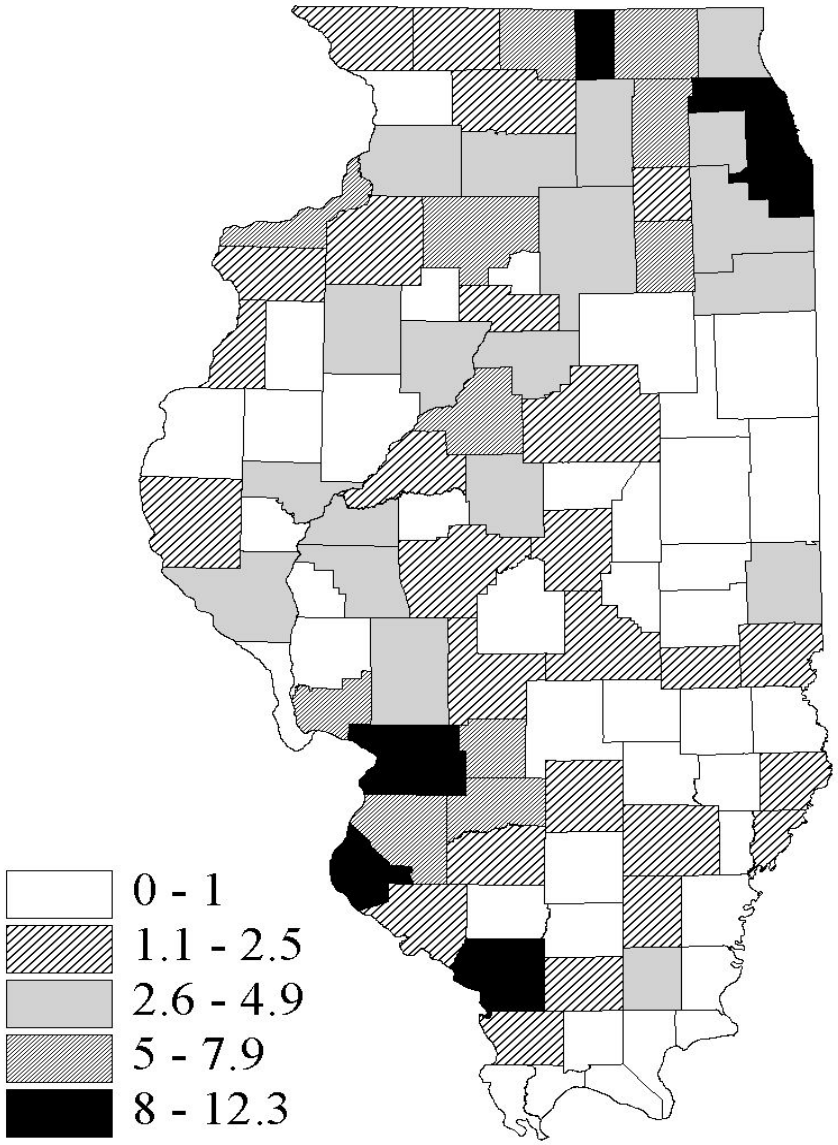


Figure 49. One-year Hepatitis A Incidence Rates per 100,000 by County, Illinois 1995-1999



Source: Illinois Department of Public Health, 2000

Hepatitis B

Background

Hepatitis B is caused by a DNA virus, a hepadnavirus. Transmission occurs by percutaneous and permucosal exposure to body fluids from an infected person. Examples of transmission modes include injecting drug use, hemodialysis, acupuncture, tattooing, blood transfusions and needlestick injuries among health care personnel. Sexual and perinatal transmission occur from mucous membrane exposures to infectious blood and body fluids. 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 U.S. are high-risk sexual activity and injection drug use. The incubation period is 45 to 180 days (average 60 to 90 days). All persons who are hepatitis B surface antigen (HBsAg) positive are potentially infectious (in contrast to hepatitis B core antigen [HbcAg], the presence or absence of which is a measure of relative infectivity).

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.

National immunization survey results from across the U.S. showed that 84 percent of children aged 19 to 35 months in 1997 had received three doses of hepatitis vaccine. The immunization of newborns against hepatitis B has been an ACIP recommendation since November 1991.

The responsibility for reporting of hepatitis B was changed from the IDPH Communicable Disease Control Section to the Immunization Section in 1999.

Case definition

The CDC case definition is used as the surveillance case definition for hepatitis B in Illinois. It is 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

There were 202 confirmed acute hepatitis B cases in Illinois in 1999 as compared to the five-year median of 335 (Figure 50). Sixty-four percent of the cases in 1999 were in males. There was a significantly higher proportion of males among hepatitis B cases compared to the Illinois population. Forty-two percent of cases were African American, 52 percent were white, and 6 percent were Asian; 13 percent were Hispanic. There was a significantly higher proportion of African Americans and a significantly lower proportion of whites in the population with hepatitis B than in the Illinois population. The incidence rate of hepatitis B was highest in the 30- to 39-year-old age groups (mean=38) (Figure 51). There was no seasonal trend in hepatitis B cases. Risk factors identified in cases from six weeks to six months prior to illness included more than one sexual partner (40 percent), sexual contact to a hepatitis B case (9 percent), injection drug use (7 percent), tattoos (10 percent), needlestick injury (7 percent) and employment in medical field (2 percent). Individuals may have had more than one risk factor. Ten percent of whites and 10 percent of African Americans reported sexual contact with a

hepatitis B case. Thirty-nine percent of whites and 40 percent of African-Americans reported more than one sexual partner. Five percent of whites and 9 percent of African Americans reported intravenous drug use. Seven percent of African Americans and 14 percent of whites reported receiving tattoos.

In 1999, 77 percent of patients reported with hepatitis B were jaundiced and 29 percent were hospitalized. The overall one-year incidence rate of reported hepatitis B in Illinois for 1999 was 2.0 cases per 100,000 population. The counties with the highest one-year incidence rates per 100,000 population from 1995 to 1999 were Brown (17 cases per 100,000), Pulaski (11), Wayne (9), Franklin (4), Cook (4) and Macon (4). The reason several rural counties are among those with the highest rates of hepatitis B infection is the presence of state correctional facilities in these counties.

Summary

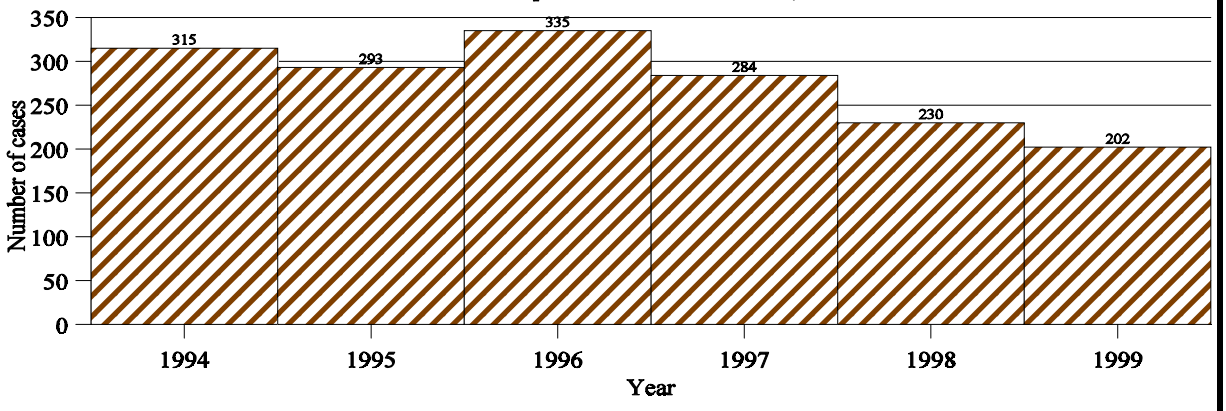
There were 202 confirmed hepatitis B cases in Illinois in 1999. Males and African Americans had higher proportions of individuals affected with hepatitis B.

Suggested readings

Yusuf, HR, Coronado VG et al. Progress in coverage with hepatitis B vaccine among U.S. children, 1994-1997. AJPH 1999; 89(11):1684-89.

Figure 50. Acute Hepatitis B Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000



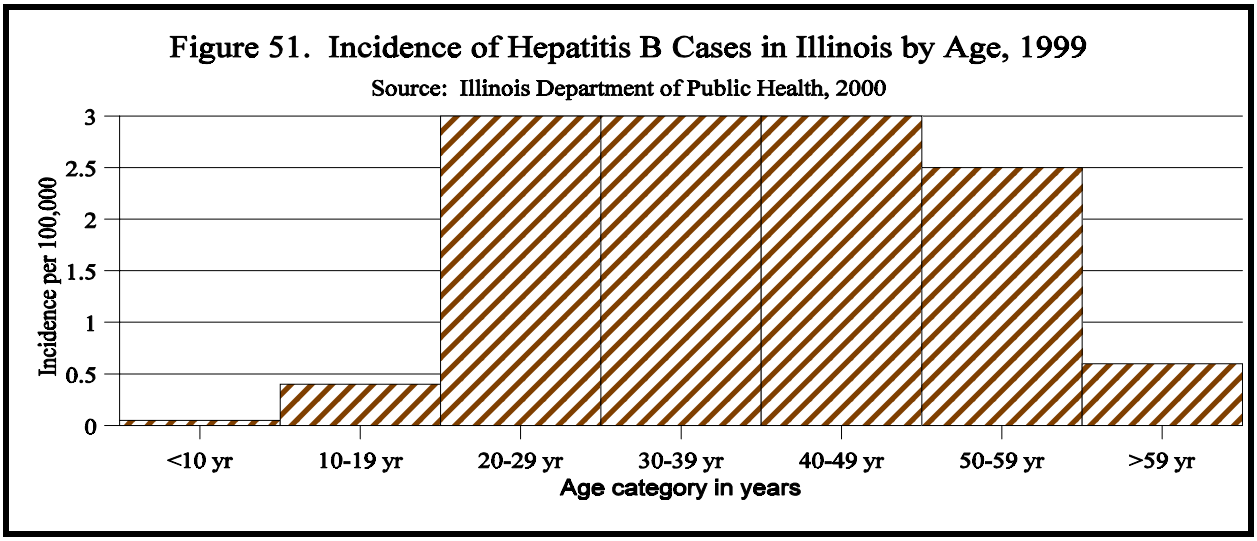


Figure 51. Incidence of Hepatitis B Cases in Illinois by Age, 1999
Source: Illinois Department of Public Health, 2000
Incidence per 100,000
3
2.5
2
1.5
1
0.5
0
<10 yr
10-19 yr
20-29 yr
30-39 yr
40-49 yr
50-59 yr
>59 yr
Age category in years

Hepatitis non-A non-B

Background

Hepatitis C virus (HCV) is an RNA virus of the family flavivirus and is one member of the non-A non-B (NANB) hepatitis group. The most efficient route of transmission is from direct percutaneous exposure (e.g., blood or blood product transfusion, organ or tissue transplants, and sharing of contaminated needles between injection drug users). Low efficiencies of transmission occur from sexual and household exposure to an infected contact.

Four million persons in the U.S. are estimated to be infected with HCV. This virus can cause chronic hepatitis, cirrhosis and hepatocellular carcinoma. Coinfections with HCV and HIV are common due to similar routes of transmission. Screening of donated blood for HCV antibody began in May 1990.

The incubation period for hepatitis C 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. Twenty-six percent to 50 percent of adults who had acute hepatitis C developed chronic active hepatitis and 3 percent to 26 percent developed cirrhosis. Anti-HCV positive persons had a 5- to 50-fold higher risk of primary hepatocellular carcinoma compared to anti-HCV negative patients. Hepatitis C has become the most common reason for liver transplantation in the U.S. These sequelae typically take 20 or more years to develop.

Routine screening for HCV infection is recommended only for persons who ever injected 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 is also 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 needlesticks, sharps or mucosal exposure to anti-HCV-positive blood.

Diagnostic testing for HCV should include use of both an enzyme immunoasasy (EIA) and supplemental or confirmatory testing with a more specific assay such as the recombinant immunoblot (RIBA, Chiron Corporation). The RIBA antibody tests do not distinguish between acute, chronic or resolved infection. Persons with chronic hepatitis C should not drink alcohol and should be vaccinated for hepatitis A and 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.

Reporting of hepatitis C infection (a person with a supplementary positive test for hepatitis C) began in Illinois in April 2001.

Case definition

The CDC case definition is used in Illinois for hepatitis NANB (this encompasses what CDC defines as reportable hepatitis C, but does not require specific hepatitis C serology). It requires a discrete onset of symptoms and jaundice or elevated serum aminotransferase levels (>2 ½ times the upper limit of normal). Laboratory confirmation requires IgM anti-HAV-negative, IgM anti-HBc negative (if done) or HBsAg negative.

Descriptive epidemiology

In Illinois, there were 48 cases of acute hepatitis NANB in 1999. Twenty-three of 25 cases who had a test for hepatitis C tested positive. At least four cases were reported as RIBA polymerase chain reaction positive for hepatitis C. Cases ranged in age from 20 to 80 years (Figure 52). The mean age was 41. Fifty-six percent of reported cases were male. Seventy-one percent of cases were white and 27 percent were African American. A significantly higher proportion of African Americans were reported with hepatitis NANB compared to their representation in the Illinois population. Nine percent of cases were Hispanic. Thirty-six percent of cases were hospitalized and two fatal cases due to acute hepatitis NANB were reported. Fourteen percent of cases reported a history of injection drug use.

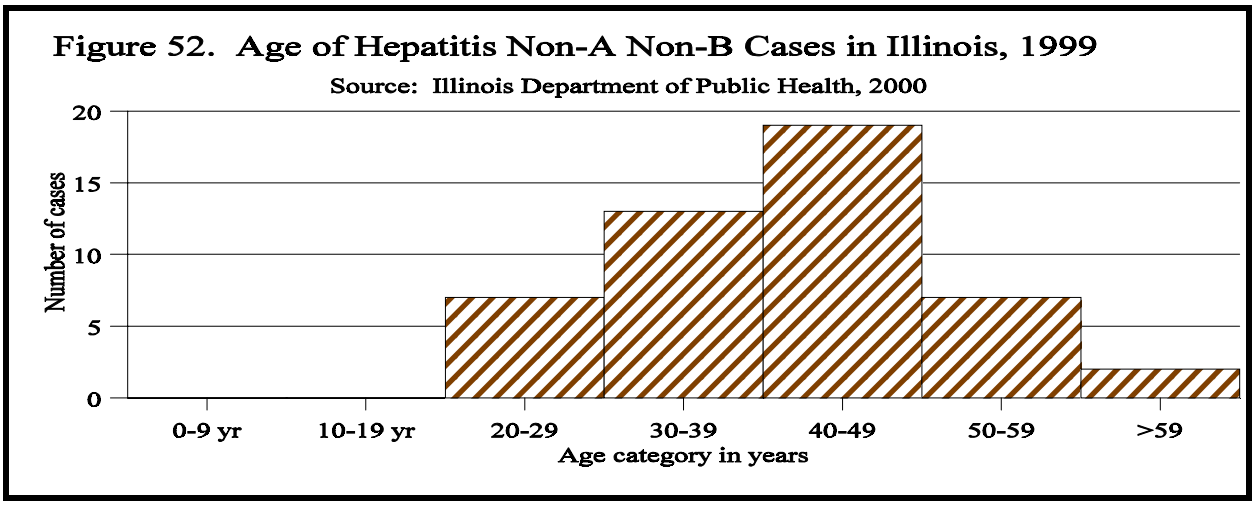
Summary

In 1999, there were 48 cases of reported hepatitis NANB as compared to 41 in 1998. A higher proportion of individuals with hepatitis NANB were African American than their representation in the Illinois population. Fourteen percent of hepatitis cases for whom information was available had a history of injection drug use.

Suggested readings

Sulkowski MS, Mast EE, Seeff LB, Thomas DL. Hepatitis C virus infection as an opportunistic disease in persons infected with human immunodeficiency virus. Clin Inf Dis 2000;30:S77-84.

Thomas DL et al. The natural history of hepatitis C virus infection. Host, viral and environmental factors. JAMA 2000;284(4):450-6.



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. Immunosuppressed individuals are at risk for dissemination of the organism. The reasons for the distribution of histoplasmosis in the Ohio and Mississippi valleys in the U.S. may include moderate climate, humidity and soil characteristics which favor the organism. Bird and bat droppings are beneficial to the growth of the organism. One study showed that persons who work in occupations such as bridge maintenance may be at risk for histoplasmosis because bat or bird droppings may be present on bridge supports. 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.

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 follwing
    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

Descriptive epidemiology

During 1999 in Illinois, 57 cases of histoplasmosis were reported. There was a significantly higher proportion of males among histoplasmosis cases (60 percent) than in the Illinois population (48 percent). Eighty-six percent of cases were in whites, 12 percent in African Americans and 2 percent in Asians; 12 percent were Hispanic. The mean age of cases was 46. Cases occurred only in adults (Figure 53). There was no seasonal trend for histoplasmosis cases. At least seven (12 percent) of these cases were in immunocompromised persons; therefore, it is not possible to determine whether they represent new infections or reactivation of previous infections.

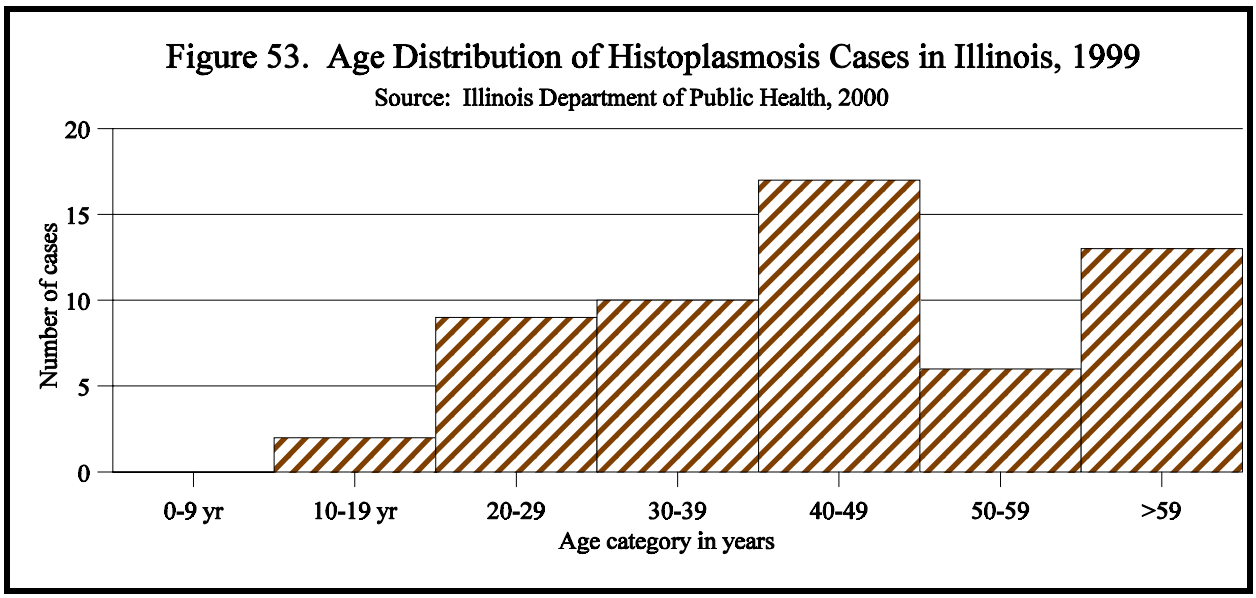
Summary

Almost 60 cases of histoplasmosis were reported in Illinois residents in 1999. Males were a higher proportion of those affected with histoplasmosis (60 percent) than of the Illinois population (48 percent).

Suggested readings

Jones TF et al. Acute pulmonary histoplasmosis in bridge workers: A persistent problem. AM J med 1999;106:480-7.

Wheat J. et al. Practice guidelines for the management of patients with histoplasmosis. Clin Inf Dis 2000:30:688-95.



Legionellosis

Background

Legionellosis is an acute bacterial disease caused primarily by *Legionella pneumophila*. The two clinical manifestations of infection with *Legionella* bacteria are Legionnaires' disease and Pontiac fever. 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 24-48 hours). Initial symptoms of both are anorexia, myalgia and headache often followed by a nonproductive cough and diarrhea. Patients with Legionnaires' disease clinically have pneumonia and abnormal chest radiographs. The disease 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 less severe and does not result in pneumonia or death, and patients generally recover in two to five days without treatment. 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.

Diagnosis of Legionnaires' disease is by serology, urine antigen testing, direct fluorescent antibody testing of tissue or culture. In September 1995, the urine antigen test was introduced for Legionnaires' disease. The sensitivity of the test is 80 percent to 99 percent, and the specificity is 99 percent. Advantages of the urinary antigen test are that urine is easier to obtain than sputum or blood and test results are available quickly. Antigen is excreted within the first three days after onset of symptoms and can remain positive for months. A disadvantage of urine antigen testing is that it only detects *Legionella pneumophila* type 1.

Case definition

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

Descriptive epidemiology

Thirty-three cases of Legionnaires' disease were reported to IDPH in 1999 as compared to the five-year median of 38. Case report forms were available for 31 of these cases. Six (24 percent) stayed or worked in a hospital in the two weeks before onset. Four (18 percent) visited a hospital as an outpatient. Six (27 percent) traveled overnight in the two weeks prior to onset. Nineteen of 26 reported at least one of the following underlying health problems: diabetes, cancer, transplant, renal dialysis, corticosteroid therapy, other immunosuppressive condition or smoking. Seven reported no underlying health problems and information was incomplete for five. Twenty-six (84 percent) had X-ray confirmed pneumonia. Five (23 percent) had been

hospitalized continuously for three or more days before onset. One (4 percent) was discharged from the hospital within 10 days before onset. Thirteen (59 percent) had no hospital visits in the 10 days before symptoms. Eleven had no information on hospital visits. Eight (30 percent) of the cases were fatal. Twenty-five were hospitalized due to *Legionella* infection.

The method of diagnosis for 31 of the cases was urine antigen alone (14), culture alone (3), direct fluorescent antibody of respiratory secretions alone (2) or culture in combination with other tests (12).

Summary

Thirty-three cases of legionellosis were reported in Illinois in 1999. Many cases were over 60 years of age and/or had pre-existing medical conditions. No outbreaks were detected.

Lyme disease

Background

From 1992-1998, 88,867 cases of Lyme disease were reported in the U.S. Ten states (New York, Connecticut, Pennsylvania, New Jersey, Wisconsin, Rhode Island, Maryland, Maine, Minnesota, Delaware) reported 92 percent of the cases.

Lyme disease is a tickborne disease caused by the bacterium *Borrelia burgdorferi*. The reservoir is the black-legged tick, commonly called the "deer tick." Human disease is thought to be primarily caused by nymphal tick bites, usually in spring or summer. Babesiosis and ehrlichiosis are transmitted by the same tick. In the Midwest, wild rodents and other animals maintain the transmission cycle. Deer are the preferred host of the adult tick. Laboratory studies indicate ticks must be attached for $\geq$ 24 hours for transmission to people to occur. The incubation period for erythema migrans (EM) ranges from three to 32 days after tick exposure. The disease is characterized by a rash-like skin lesion (EM), which may be followed by cardiac, neurologic and/or rheumatologic involvement. Sixty percent to 80 percent of case patients develop erythema migrans. Early manifestations include fever, headache, fatigue, migratory arthralgias and possibly lymphadenopathy. It takes approximately two to four weeks or longer for antibodies to be detected by blood tests so these tests are not helpful in diagnosis of early Lyme disease unless a convalescent serum is also obtained.

A skin rash resembling erythema migrans has been associated with bites from *A. americanum*, the lone star tick but the infection (Southern tick-associated rash illness) is thought to be due to an organism other than *B. burgdorferi*. Surveillance is continuing on this illness.

In persons infected with Lyme disease, IgM antibodies appear first, usually within three to four weeks after infection. These antibodies peak after six to eight weeks and then decline. IgG antibodies usually appear six weeks to eight weeks after infection and peak in four months to six months, and these antibodies can be detectable for years. The ELISA test can produce false positive results because of cross-reactive antibodies with various diseases including syphilis, leptospirosis, varicella and systemic lupus erythematosus. Persons should be tested by the ELISA and confirmed with the Western blot. For patients who have been ill for less than one month, either the IgM or IgG Western blot can be positive, if the illness has been present for more than one month, the IgG would also be positive. The Western blot is considered a confirmatory test. The ELISA has high sensitivity and the Western blot has high specificity. The currently licensed ELISA contains OspA surface antigen and will not be useful in vaccinated persons because the vaccine contains purified OspA.

A vaccine against Lyme disease was licensed in December 1998. This vaccine contains genetically engineered protein (OpsA) from the surface of *B. burgdorferi*. The vaccine is approved for people aged 15 through 70. Three doses over a one-year period are needed. In reported studies, the vaccine provides approximately 50 percent protection after two doses and near 80 percent protection after three doses. The need for booster vaccinations is yet to be determined. Recommendations for vaccine use have been issued by the Advisory Committee on Immunization Practices (ACIP) (MMWR 1999;48, RR-7, 1-21).

Case definition

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

Descriptive epidemiology

There were 17 cases of Lyme disease reported in Illinois residents in 1999 as compared to 13 for the five-year median. In Illinois, reported Lyme cases for previous years are as follows: 1990 (30), 1991 (51), 1992 (41), 1993 (19), 1994 (24), 1995 (18), 1996 (10), 1997 (13), 1998 (14). The exposure locations for the 1999 cases were Ogle County (3), Rock Island County (2), Whiteside County (2), Winnebago County (1) and Adams County (1). One case reported exposure both in JoDaviess County, Illinois, and in Wisconsin. Six cases reported exposures in other states including Maryland, Massachusetts, Minnesota, New Jersey or Wisconsin. The exposure location could not be obtained for one case. Qualifying manifestations were erythema migrans (11), neurologic signs such as Bell's palsy or cranial neuritis (3) and rheumatologic signs (3).

Deer ticks infected with *B. burgdorferi* have been identified in Carroll, Grundy, Ogle, Rock Island and Will counties. Deer ticks have also been found in Lee, Monroe and Winnebago counties, but they have not been found to be infected with *B. burgdorferi*. New areas identified in 1999 and 2000 by the University of Illinois and Illinois Natural History Survey that meet the CDC criteria for an established tick population (greater than five ticks or greater than one life stage) include Illinois River areas of Fulton, Kankakee, LaSalle, Marshall, Peoria and Putnam. Further field work will be done to verify that these findings persist for multiple years.

Summary

For cases reported in Illinois during 1999, erythema migrans is the most common qualifying manifestation for Lyme disease. Seventeen cases were reported in Illinois residents in 1999. Lyme disease peaks in summer months. Location of deer tick populations in Illinois is being investigated by several organizations.

Suggested readings

Gardner P. Long-term outcomes and management of patients with Lyme disease. JAMA 2000;2839(5):658-9.

Jones CJ, Kitron U. Populations of *Ixodes scapularis* (Acari: Ixoxdidae) are modulated by drought at a Lyme disease focus in Illinois. J Med Entom 2000;37(3):408-15.

Orloski KA, Hayes EB, Campbell GL, Dennis DT. Surveillance for Lyme disease-United States, 1992-1998. MMWR 2000;49(SS-3):1-11.

Seltzer EG, Gerber MA et al. Long-term outcomes of persons with Lyme disease. JAMA 2000;283(5):609-16.

Shapiro ED, Gerber MA. Lyme disease. Clin Inf Dis 2000;31:533-42.

Thanassi WT, Schoen RT. The Lyme disease vaccine: Conception, development and implementation. Ann Int Med 2000;132(4):661-68.

Wormser GP, Carbonaro C et al. A limitation of 2-stage serological testing for Lyme disease: Enzyme immunoassay and immunoblot assay are not independent tests. Clin Inf Dis 2000;30:545-8.

Malaria

Background

Malaria is a very important global parasitic disease. Imported malaria cases in Illinois can occur when someone immigrates to the U.S. or when someone who travels overseas uses inadequate chemoprophylaxis. The highest risk of malaria is for travelers to sub-Saharan Africa, Papua New Guinea and the Solomon Islands. Malaria is transmitted predominantly by the bite of an infective female anopheline mosquito. The incubation period is from seven days to 10 months. The risk of malaria can be reduced by use of chemoprophylaxis and personal protection measures (air conditioned or well-screened rooms, insecticides and mosquito nets). Four species of malaria (*Plasmodium vivax, P. falciparum, P. malariae* and *P. ovale*) cause disease in people. Identification as to species is important as treatment differs by species. The ability to differentiate *P. falciparum* from the other three species is important because of the more serious prognosis and differences in treatment. The gold standard for diagnosis is the blood smear. Laboratories in Illinois are required to forward slides to the state laboratory for speciation.

Case definition

The case definition of malaria in Illinois is the CDC case definition: a person's first attack that is laboratory confirmed by the demonstration of malaria parasites in blood films and that occurs while in the U.S.

Descriptive epidemiology

There were 77 malaria cases reported in Illinois in 1999 and all were imported from outside the U.S. (Figure 54). The number of cases of malaria in 1999 was similar to the five-year median of 72.

Sixteen percent of the 1999 malaria cases were Asian, 62 percent were African American and 22 percent were white. There were significantly higher proportions of Asians and African Americans with malaria compared to their representations in the Illinois population. Six percent were Hispanic. The peak of cases was in the 30-39 year age group and the mean age was 34 (Figure 55). Cases of malaria were reported throughout the year (Figure 56). The malaria species identified in the reported cases were *falciparum* (43 cases), *vivax* (13), *malariae* (1), *ovale* (0), mixed *vivax* and *falciparum* (1) and unknown (19 cases) (Figure 57). There were individual surveillance report forms for 68 of the1999 malaria cases. Of these 68, 39 (57 percent) were hospitalized. Fifty-eight cases reported a U.S. address.

All 68 cases reported travel outside the U.S. In Asia, countries visited by malaria cases prior to illness were India (15) and Indonesia (2). In Africa, the following countries were visited: Nigeria (21), Ghana (7), Africa, not further specified (6), multiple (3), Guinea (2), Ivory Coast (2), Cameroon (1), Togo (1), Kenya (1) and Madagascar (1). In South America, one case visited Brazil (1). In Central America, the following countries were visited: Honduras (1) and multiple countries (2). Two other cases visited multiple countries on different continents.

In cases reporting travel to Nigeria, 18 of 21 cases were due to *P. falciparum* and three were not speciated. Five of seven cases who visited Ghana had *P. falciparum* and two were not speciated. The cases visiting India had *P. vivax* (9), *P. falciparum* (4), *P. malariae* (1) and *P. malariae* and *P. vivax* (1).

Cases provided the following reasons for travel overseas: visiting relatives (32), tourism (7), refugee (6), business (5), missionary (3), student or teacher (3), Peace Corps (1) and other (9). Twenty (29 percent) reported taking malaria prophylaxis for the trip. Of these 20 cases, five took chloroquin, 11 took mefloquin, one took primaquin, two took other drugs and one took both mefloquin and other drugs (1). Sixteen cases (23 percent) reported a history of malaria in the last 12 months. One case reported a history of transfusion. No fatalities from malaria were reported. No cerebral malaria was reported. One individual had acute respiratory distress syndrome, one had renal failure and 10 cases reported anemia.

The 44 *P. falciparum* cases (one had a mixed infection) were treated with the following medications: untreated (1), chloroquin (5), mefloquin (5), quinine (5), and tetracycline/doxycycline (1), two-drug combinations (16), three-drug combinations (3), other (3) four-drug combinations (2) and unknown (3).

Of the 14 *P. vivax* cases (one had mixed infections), the following drugs were used in treatment: chloroquin (4), mefloquin (1), primaquin (1), two-drug regimen (6) and three-drug regimen (2).

Summary

There were 77 reported cases of imported malaria identified in Illinois in 1999, which was similar to the median number of cases in the previous five years. African Americans and Asians had a higher proportion of individuals with malaria than their representation in the Illinois population. Seventy-five percent of isolates were speciated. 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

Shingadia D, Shulman ST. Recognition and management of imported malaria in children. Sem Ped Inf Dis 2000;11(3):172-77.

Figure 54. Malaria Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

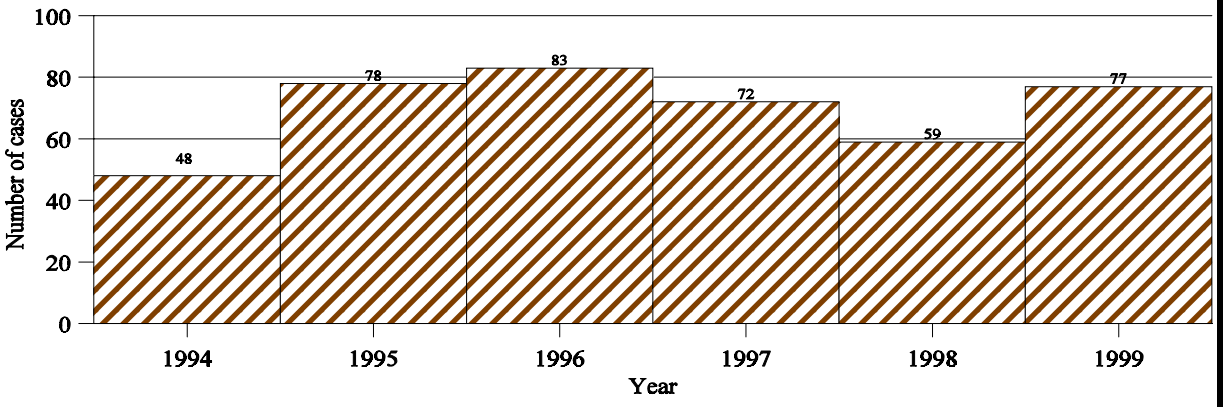


Figure 55. Age Distribution of Malaria Cases in Illinois, 1999

Source: Illinois Department of Public Health, 2000

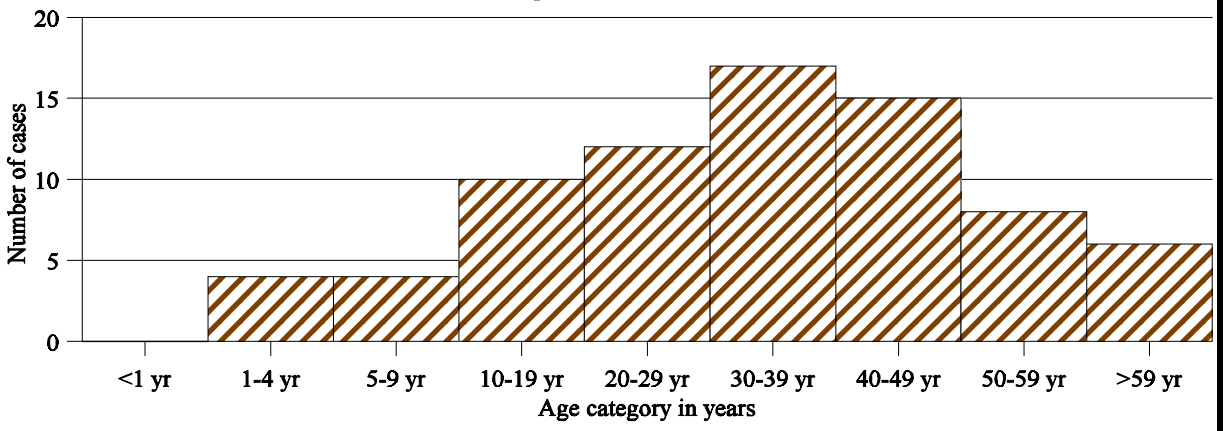


Figure 56. Reported Malaria Cases in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

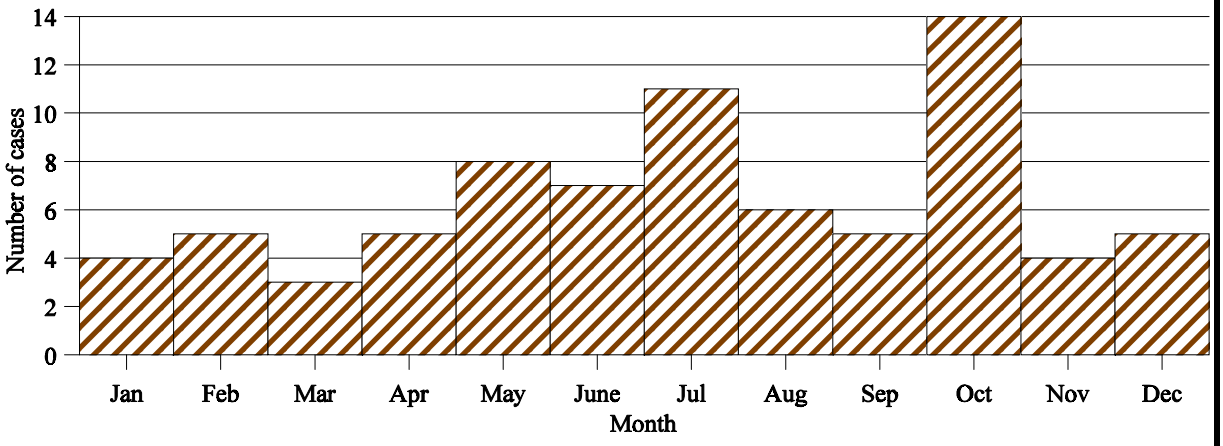
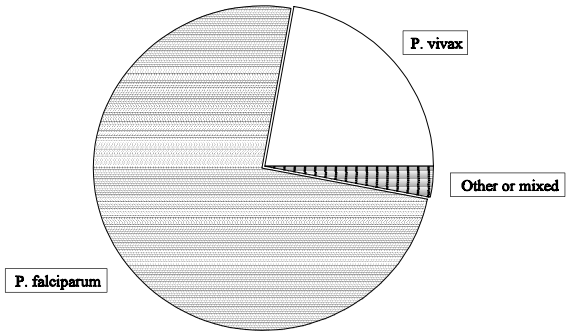


Figure 57. Percentage of Malaria Cases in Illinois by Species, 1999

Source: Illinois Department of Public Health, 2000



Measles

Background

Approximately 1 million children die from measles worldwide annually. There were 100 provisional cases reported to CDC in 1999. Thirty-three were imported and 67 were indigenous. Of the 67 indigenous cases, 33 were import-linked and 34 were unknown source cases. A trend towards increasing proportions of cases being imported continued in 1999. Eleven measles outbreaks (clusters of three or more cases) were reported in the U.S. in 1999. Measles is a highly communicable viral disease. Transmission most commonly occurs through droplet spread or direct contact with nasal or throat secretions of infected people. The incubation period is about 10 days, but varies from seven to 18 days. Infected individuals show fever, conjunctivitis, coryza, cough and Koplik's spots on the buccal mucosa, along with a rash that appears on the third to seventh day. The disease can be prevented by proper immunizations. A two-dose vaccination schedule is recommended in the U.S., one at 12-15 months and one at school entry (4-6 years) or by 11-12 years.

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 $\geq$ three days, and a temperature of $\geq$ 101 F, and a cough or coryza or conjunctivitis.

Descriptive epidemiology

There were two cases of confirmed measles reported in Illinois in 1999. One case was in a 3-month-old Asian male who arrived in the United States July 31 from a Cambodian orphanage that may have had a recent measles outbreak. The child became symptomatic on August 9 with fever, cough, conjunctivitis, coryza and a rash that began on the trunk and then spread to the arms and legs. The child had an IgM titer to measles.

The second case in 1999 involved the first measles case in DuPage County in a five-year time period and occurred in a Swedish visitor. A 30-year-old male arrived with 16 other persons from Sweden to attend restaurant management classes on December 9. He was attending a training session that involved attendees from 27 states and seven countries. He stayed at a hotel and participated in social activities on December 9 and 10. He visited the emergency department at a local hospital on December 11 with a cough, fatigue and runny nose. He was diagnosed with influenza and sent home. He was in class on December 12. On December 13, he presented at a hospital emergency department with a fever of 102.4, cough, coryza, conjunctivitis and a rash. Blood and urine were collected for suspected measles infection. A measles IgM titer was positive. Vaccination history was unknown. Approximately 140 staff, hotel staff and students were exposed to the case and were immunized against measles. Immune globulin was also administered to 18 persons because of uncertain vaccination history and the possibility of transmission as the individuals were leaving the country. Countries of residence for foreign

contacts were identified as France (18), Sweden (16), Peru (2), Canada (2), Oman (1), Kuwait (1) and Martinique (1). All countries and states were notified of the potential for secondary cases before class participants returned home. Sweden was having an outbreak of measles involving more than 45 patrons of Swedish dance clubs. The case who arrived in the U.S. did not go into dance clubs in Sweden but worked nearby some dance clubs. The virus was isolated from urine and identified as the D7 genetic type, which had been seen in England and Italy. No isolates were obtained from the cases in Sweden for comparison.

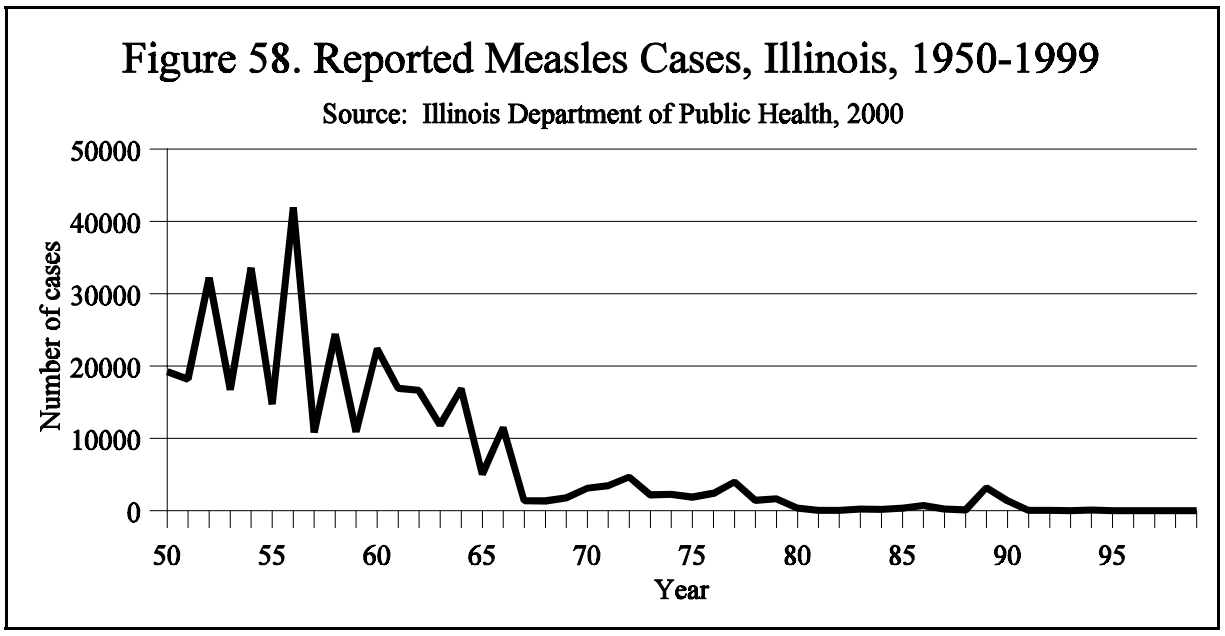
The number of cases of measles reported each year in Illinois has declined from 1950 through 1999 (Figure 58).

Summary

Two cases of imported measles were reported in Illinois in 1999. A case of measles was reported in a Swedish visitor to Illinois in December. He was diagnosed with measles by IgM serology. Sweden was notified of the case and reported that they had experienced an outbreak of measles in Stockholm.

Suggested reading

MMWR. Measles-United States, 1999. MMWR 2000; 49(25): 557-60.



Mumps

Background

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

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 > two days, and without other apparent cause.

Descriptive epidemiology

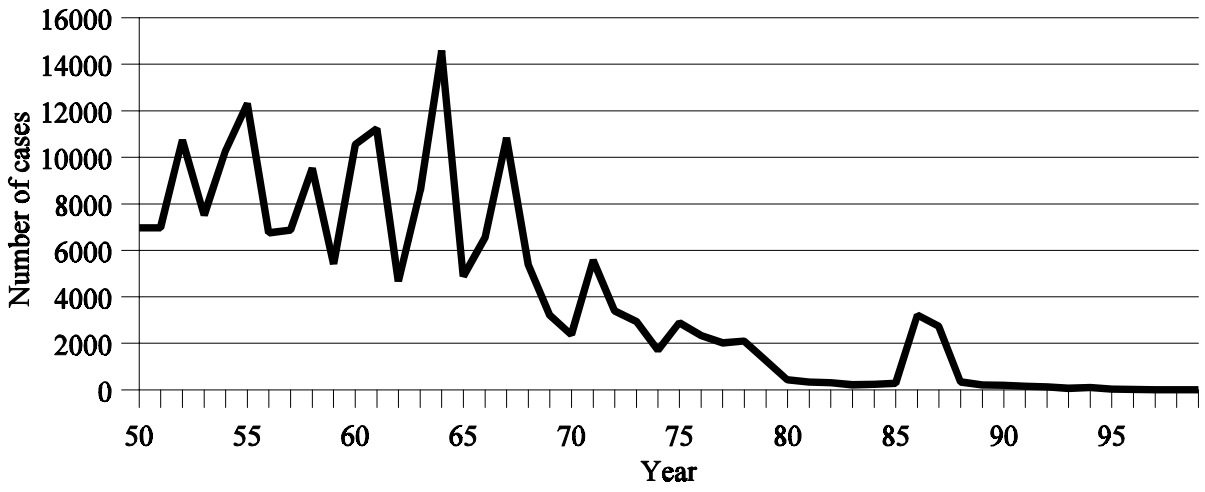
In 1999, there were 16 reported mumps cases in Illinois. The number of reported cases each year from 1950 through 1999 is shown in Figure 59. The median age of reported cases in 1999 was 19 years (age range from 8 months to 71 years). Seventy-five percent of cases were female. Eighty-eight percent were white, 6 percent were African American and 6 percent were other races. One case reported Hispanic ethnicity. Cases occurred throughout the year. Of the 13 confirmed and three probable cases, 10 were appropriately immunized, one had received only one immunization, four had unknown immunization status, and one adult (a recent arrival from a foreign county) reported no previous immunizations for mumps.

Summary

The median age of the 16 reported mumps cases in 1999 was 19 years. Most reported being appropriately immunized.

Figure 59. Reported Mumps Cases, Illinois, 1950-1999

Source: Illinois Departmen of Public Health, 2000



Pertussis

Background

Pertussis is caused by *Bordatella pertussis* and is characterized by a paroxysmal cough that can last several weeks. Transmission is by contact with secretions from respiratory mucous membranes of infected persons. The incubation period is from six to 20 days. Peaks in pertussis incidence have occurred every three to four years in the U.S. Pertussis is a notifiable disease in every state in the U.S. A resurgence of cases has been reported in the last decade in the U.S. 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. In 1999, the national vaccination coverage for children ages 19-35 months obtained by the national immunization survey for the combined vaccination series 4:3:1 (four doses of DTP, three doses of poliovirus vaccine and one dose of measles containing vaccine) was 80 percent. In Illinois, the overall coverage was 79 percent (73 percent for Chicago and 81 percent for the rest of the state).

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; and without other apparent cause.

Descriptive epidemiology

There were 140 cases of pertussis reported in Illinois in 1999 compared to the previous five-year median of 155. The one-year incidence rate was one per 100,000 in 1999. Sixty percent of cases occurred in those less than 5 years of age (Figure 60). Females comprised 55 percent of cases. Ninety-three percent of cases were white, 6 percent were African American and 2 percent were Asian; 16 percent reported Hispanic ethnicity. Cases increased in the winter (Figure 61). The number of reported cases of pertussis over time is illustrated in Figure 62.

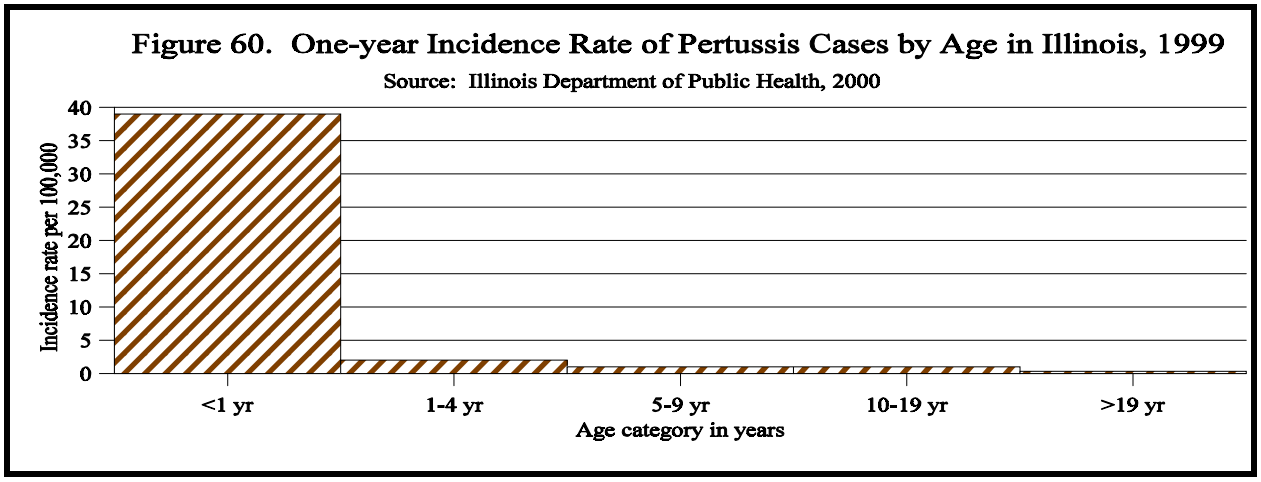
One outbreak of pertussis occurred in 1999. This nosocomial outbreak of pertussis occurred among health care facility staff, physician office staff and patients of these facilities in McHenry County. The McHenry County HD investigated the outbreak. The index case was a 2-month-old infant seen at a physician's office on February 13 and 16 for cough and vomiting. On February 17, the index case was hospitalized in a pediatric unit and later that day a clinical diagnosis of pertussis was made. A 26-year-old nurse, who had spent one hour with the infant was placed on chemoprophylaxis (10 days of penicillin). She later developed symptoms of cough, whoop and vomiting and was diagnosed with pertussis by culture and PCR testing. Approximately 150 patients and family members seen at the physician's office were notified of potential exposure to pertussis. Twelve hospital staff were exposed and offered prophylactic antibiotics. Three of these staff developed cough. Of these, one was confirmed by serology, and two met the clinical case definition for pertussis. Due to multiple work assignments of these three staff persons, including one who worked outside of the hospital in a medical clinic, over 764 patients, family members, and staff were notified of potential exposure to pertussis. Secondary transmission occurred to one family member, two patients (4-month-old infant and a

5-year-old child) and to another hospital staff member.

A total of nine confirmed cases were identified during this outbreak. Of these, three were laboratory confirmed by culture and PCR, one by serology and five by epidemiological link. This outbreak began as nosocomially transmitted cases and eventually led to 15 community cases. This outbreak was also listed in the 1998 report because it carried over from 1998 to 1999.

Summary

There were 140 cases of pertussis reported in Illinois in 1999 including one outbreak. The highest incidence occurred in those less than 1 year of age.



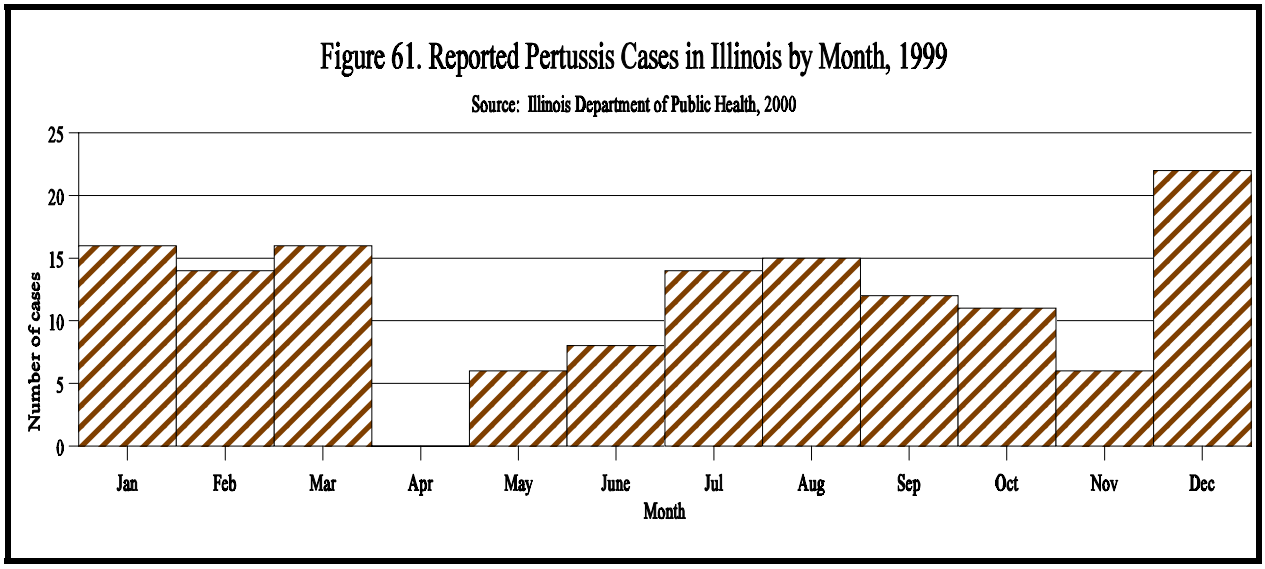


Figure 61. Reported Pertussis Cases in Illinois by Month, 1999
Source: Illinois Department of Public Health, 2000
Number of cases
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
June
Jul
Aug
Sep
Oct
Nov
Dec
Month

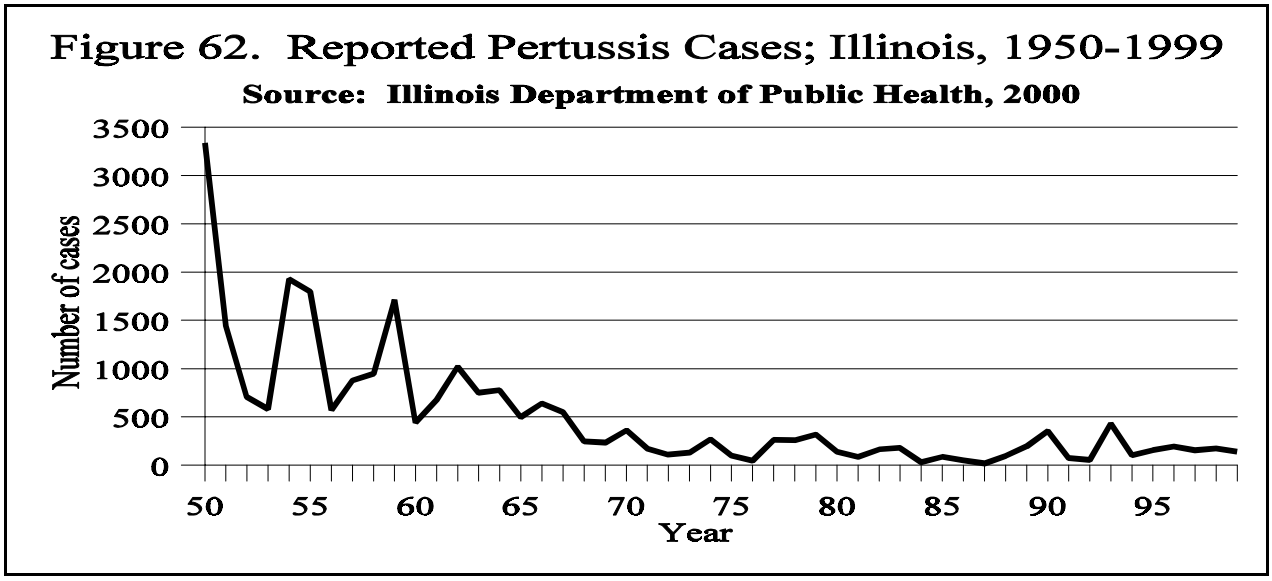


Figure 62. Reported Pertussis Cases; Illinois, 1950-1999
Source: Illinois Department of Public Health, 2000
Number of cases
3500
3000
2500
2000
1500
1000
500
0
50
55
60
65
70
75
80
85
90
95
Year

Rabies

Background

Transmission of rabies to humans is from the bite of a rabid animal. The incubation period is usually three to eight weeks. Symptoms may include fever, anxiety, malaise, tingling and pruritis at the bite site. Neurologic signs may begin two to 10 days later and may include hyperactivity, paralysis, agitation, confusion, hypersalivation and convulsions. The paralytic form must be differentiated from Guillain Barre syndrome. After two to 12 days, the patient may go into a coma and experience respiratory failure.

For rabies, post-exposure prophylaxis (PEP), local cleansing, passive antibody (with rabies immune globulin or RIG) and active immunization is needed. If a traveler returns to the U.S. after receiving one of the cell culture vaccines for PEP, he/she should complete the series with one of the three U.S.-licensed products, but if nerve tissue vaccine was used, they should start PEP as if no treatment had been given. If a person is immunosuppressed, titers should be obtained to be sure the person responds adequately to the vaccine used in PEP.

In Illinois, the skunk and bat are the main wildlife reservoirs of rabies virus. The last human case in Illinois was 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 optional. Handling of exotic pets, captive animals and farm animals that bite a person are evaluated on a case-by-case basis by local animal control and the Illinois Department of Agriculture.

During 1999, there were 7,067 cases of animal rabies reported to the CDC from the U.S. and Puerto Rico. Wild animals comprised 91 percent of the cases. No human cases of rabies were reported. Illinois was one of seven states reporting rabies in bats but not in terrestrial mammals in 1999.

In a U.S. study of persons seeking care for animal exposures in emergency departments, PEP was given to 7 percent of patients with animal exposures. Case management was considered inappropriate for 40 percent of patients given PEP and in 6 percent of patients who were not given PEP. The most common reason that PEP was inappropriate was that the dog or cat was available for observation. The most common reason for inappropriate failure to give PEP was in areas of high-endemicity when the dog or cat was unavailable for observation. Almost a quarter of persons who started rabies PEP did not complete the series for unknown reasons. Public health agencies were consulted in only about 7 percent of these animal exposures. These agencies have up-to-date statistics and treatment recommendations and should be consulted whenever there is a question as to the necessity for PEP.

The raccoon rabies epidemic on the East Coast expanded into Ohio for the first time in 1997 when 62 cases of raccoon strain rabies were identified in animals in that state. An oral rabies vaccine baiting program was begun for raccoons in 1997. The following year, 26 animals with raccoon strain rabies were identified in Ohio. In 1999, five raccoons and one chipmunk tested positive for raccoon strain rabies in Ohio. No raccoons with rabies were identified with rabies in the year 2000. Each year, the oral rabies baiting program has been implemented in the state and it appears to have been effectively used in Ohio. On the East Coast, the raccoon rabies epizootic progressed at about 18-24 miles per year.

Pre-exposure prophylaxis should be given to high-risk groups and travelers who will be staying for some time in countries where a high level of animal rabies exists. Vaccines available in the U.S. include human diploid cell vaccine (HDCV), rabies vaccine adsorbed (RVA) and purified chick embryo-cell (PCECV). Listed below are the products used for pre-exposure vaccination and post-exposure rabies treatment.

Vaccine	Product	Contact information
HDCV	Imovax Rabies®, IM	PMC 800-822-2463
	Imovax Rabies ID® (pre-exposure only)	
RVA	RVA®, IM	BioPort 517-327-1500
PCECV	Rab Avert®	Chiron Behring 800-244-7668
RIG	Imogam Rabies H-T®, BayRab	Bayer 800-288-8370

Case definition

The case definition for a human rabies case 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.

Descriptive epidemiology

During 1999, 3,810 animals were submitted for rabies testing (48 of which were unsatisfactory) to laboratories operated by the Illinois Department of Agriculture and IDPH. Ten were DFA positive; all positive animals were bats (Table 5). There were neither human nor domestic animal exposure in six of the 10 rabid animal situations. In these six cases, the animal was tested either because it was acting abnormally or was found in or near human dwellings. Contact with one of these rabid bats led to human exposures, contact with two bats led to dog exposures and in one situation both dogs and a human were exposed. In one situation, four unvaccinated dogs were euthanized (Table 6). One person was bitten when he/she stepped on a bat; one handled the bat with bare hands. Six of the 10 rabid bats were down and unable to fly, one was described as aggressive, one was described as swooping at people in a pool and the behavior of the other two was unknown.

Only 39 skunks were tested for rabies in 1999. At least one skunk was tested from each of 20 counties in Illinois. No skunks were tested in 82 counties. The number of skunks tested every year has been declining steadily (Figure 63). To maintain adequate surveillance in the state, testing of the main terrestrial animal reservoir, the skunk must be maintained. Negative testing of wild terrestrial mammals in counties is one factor used to determine whether rabies PEP is recommended for stray dog and cat bites. A memo to local health departments and animal control administrators was sent on June 27, 2000, to encourage submission of skunks even if they have not exposed a person or domestic animal. Figure 64 shows the number of rabid skunks found in Illinois and the road kill index from 1975 through 1999. The road kill index is a

measure of changes in the skunk population size. When the road kill index increases, the skunk population is increasing and may 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.

Bats accounted for all of the confirmed rabid animals in 1999. The positivity rate was 4 percent. The rabid bats were widely dispersed across the state. Seven counties had bat rabies: Will (3), Champaign (2) and one each in Cook, DuPage, Greene, Jackson and Madison counties. Seven of the rabid bats were speciated. They were identified as big brown bats (3), red bats (2), small brown bat (1) and hoary bat (1). Figure 65 shows bats tested by month in 1999. Bats submitted for rabies testing increase in summer months. Of the 47 bats submitted for speciation and testing negative for rabies in 1999, 41 were identified as *Eptesicus fuscus* (big brown bat), three were identified as *Lasiurus noctivagans* (silver-haired bat), one as *L. borealis* (red bat), one as *Myotic lucifugus* (little brown bat) and one as *Pipistrellus subflavus* (eastern pipistrelle).

The rabies positivity rate in different species of animals in Illinois from 1971 to 1999 is shown in Table 7. This table can be useful when explaining why rabies PEP is not recommended for the large majority of mouse, rat or squirrel bites. No rats, mice or squirrels have ever been identified with rabies in Illinois during the past 30 years. Because skunks and bats with rabies are identified almost every year in Illinois, rabies PEP is recommended for exposures for these animals unless they can be tested negative for rabies. Figure 66 shows animal rabies in the state since 1970. Two peaks of rabies, 10 years apart, have occurred in the state: one in 1971, the second in 1981. No later peak occurred.

Of the 42 animals testing positive from 1995 through 1999, nine had exposed a person and 14 had exposed domestic animals. Twenty-one animals were submitted with no human or animal exposure. Many of these exhibited abnormal behavior or were found near or in human dwellings.

Summary

Bats were the animal species most commonly identified with rabies in Illinois in 1999. Testing of skunks for rabies has declined in Illinois, which decreases surveillance of the terrestrial animal reservoir in the state. Local jurisdictions are encouraged to increase testing of skunks for rabies. There have been no human rabies cases in Illinois since 1954. Epizootic raccoon rabies was identified in northeastern Ohio but has been controlled through oral rabies baiting programs.

Suggested readings

Hanlon CA, Olson JG, Clark CJ. Article I. Prevention and education regarding rabies in human beings. JAVMA 1999;215(9):1276-80.

Plotkin SA. Rabies. Clin Inf Dis 2000;30:4-12.

MMWR. Update: raccoon rabies epizootic-United States and Canada, 1999. MMWR 2000;49(2):31-34.

Krebs JW, Rupprecht CE, Childs JE. Rabies surveillance in the United States during 1999. JAVMA 2000; 217(12):1799-1811.

Moran GJ et al. Appropriateness of rabies post-exposure prophylaxis treatment for

animal exposures. JAMA 2000; 284(8):1001-7.

Table 5. Rabid Animals Found in Illinois, 1999

Species	Total number suitable for testing	Total positive	% positive
Bat	276	10	3.6
Cat	1,155	0	0
Cattle	54	0	0
Dog	1,610	0	0
Coyote/fox	30	0	0
Ferret	18	0	0
Horse	14	0	0
Opossum	42	0	0
Raccoon	232	0	0
Rodents/lagomorphs	262	0	0
Sheep/Goats	20	0	0
Skunk	39	0	0
Other*	10	0	0
TOTAL	3,762	10	-

*Other species include deer, llama, mink, shrew, weasel.

Source: Illinois Department of Public Health, 2000

Table 6. Animals Positive for Rabies in Illinois and Type of Exposure, 1999

Date	Species	Human exposure?	Animal exposure?
July	bat	no	no
July	bat	no	4 unvaccinated dogs euthanized
July	bat	no	no
August	bat	no	no
August	bat	one bite;one bare hand contact	no
August	bat	no, found in garage	vaccinated dog; revaccinated
September	bat	bare hand contact	vaccinated dog; revaccinated
September	bat	no	no
September	bat	no	no
October	bat	no	no

Figure 63. Trends in Animal Rabies Testing in Illinois, 1990-1999

Source:Illinois Department of Public Health, 2000

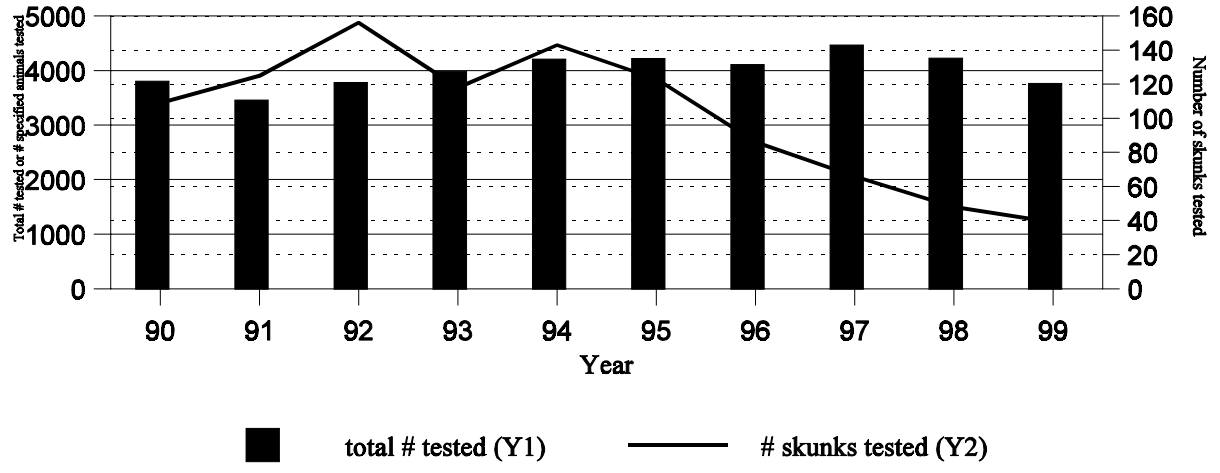


Figure 64. Reported Skunk Rabies and Road Kill Index in Illinois, 1975-1999

Source: Illinois Department of Public Health, 2000

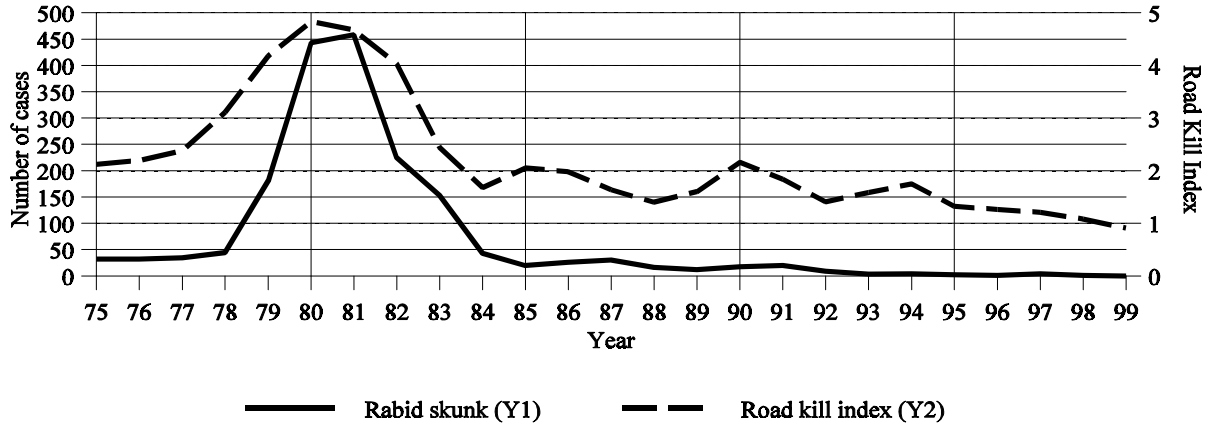


Figure 65. Number of bats submitted for testing and number positive in 1999

Source: Illinois Department of Public Health, 2000

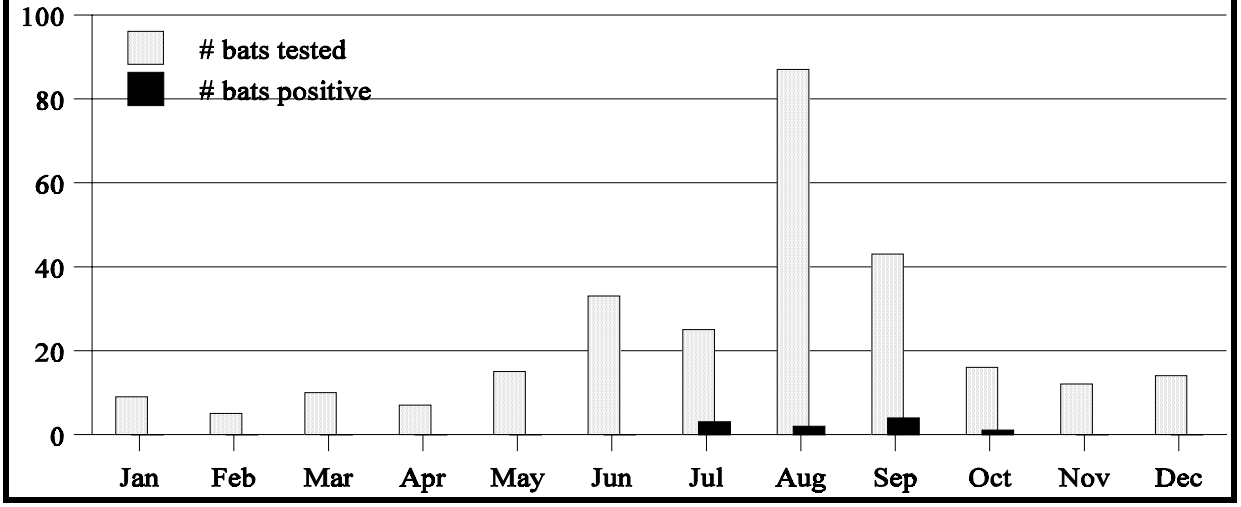


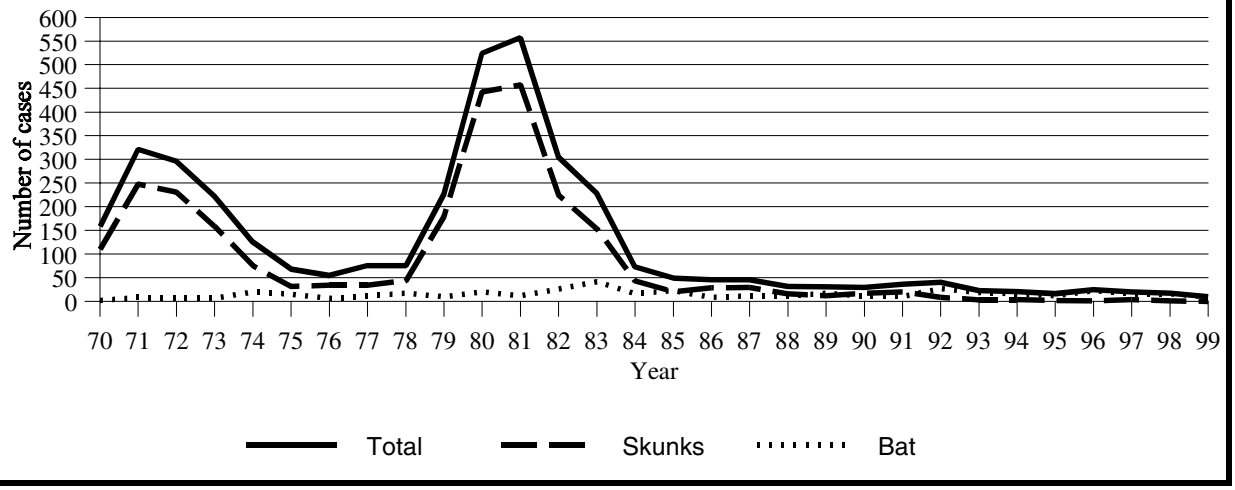
Table 7. Rabies Positivity Rate by Animal Species in Illinois, 1971-1999

Species	# examined	# positive	% positive
Bat	**8,126**	**452**	**5.6**
Cat	**38,211**	**141**	**0.4**
Cattle	**3,118**	**214**	**7.0**
Dog	**38,282**	**110**	**0.3**
Fox	**1,379**	**72**	**5.2**
Horse	**599**	**22**	**3.7**
Mouse	**4,534**	**0**	**0**
Raccoon	**8,623**	**17**	**0.2**
Rat	**1,776**	**0**	**0**
Skunk	**7,072**	**2,526**	**35.7**
Squirrel	**6,387**	**0**	**0**

Source: Illinois Department of Public Health, 2000

Figure 66. Animal Rabies Cases in Illinois, 1970-1999

Source: Illinois Department of Public Health, 2000



Rocky Mountain spotted fever

Background

RMSF is a tickborne disease caused by *Rickettsia rickettsii*. The organism is inoculated with the tick saliva when a bite occurs. The tick must be attached for at least four to six hours for transmission to take place. The tick serves as both the vector and the main reservoir for the bacteria. Tick vectors include the American dog tick (*Dermacentor variabilis*) and the lone star tick (*Amblyomma americanum*). The incubation period is three to 14 days after the 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. It starts most often on the ankles and wrists and then appears on the trunk, palms and soles. Most cases occur in the South Atlantic and south central regions of the U.S. The antibiotic of choice for treatment is doxycycline for at least five to seven days and until the patient has been afebrile for at least two days. Tooth discoloration can occur with repeated courses of tetracyclines in children.

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 $\geq$ 64 or a single CF titer of $\geq$16 or other supportive serology (fourfold rise in titer or a single titer $\geq$ 320 by Proteus OX-19 or OX-2 , or a single titer $\geq$128 by an LA, IHA or MA test.

Descriptive epidemiology

There were seven cases of RMSF reported in Illinois in 1999 as compared to one in 1998. Rocky Mountain spotted fever cases reported per year in the state were 1990 (5), 1991 (5), 1992 (2), 1993 (4), 1994 (11), 1995 (10), 1996 (4), 1997 (3) and 1998 (1). In 1999, four cases were confirmed and three were probable. All cases were white; one was Hispanic. Five were male. Cases ranged from 2 to 63 years of age. Onsets of the six cases occurred between May and October. Three cases were hospitalized. Information on symptoms and signs was reported by five individuals: fever (5), myalgias (5), headache (4) and rash (3). Sites of tick exposure for the cases were Ford County (1), Franklin County (1), Jersey County (1), Marion County (1), White County (1), Kane County or Michigan (1) and Cook or Lee County (1).

Summary

Most cases of RMSF occurred in summer months in white males.

Rubella

Background

Rubella usually causes a self-limiting disease in adults and children. The incubation period is 16 to 18 days, and transmission is from direct contact with, or droplet spread of nasopharyngeal secretions of infected persons. It 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 in women 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.

Case definition

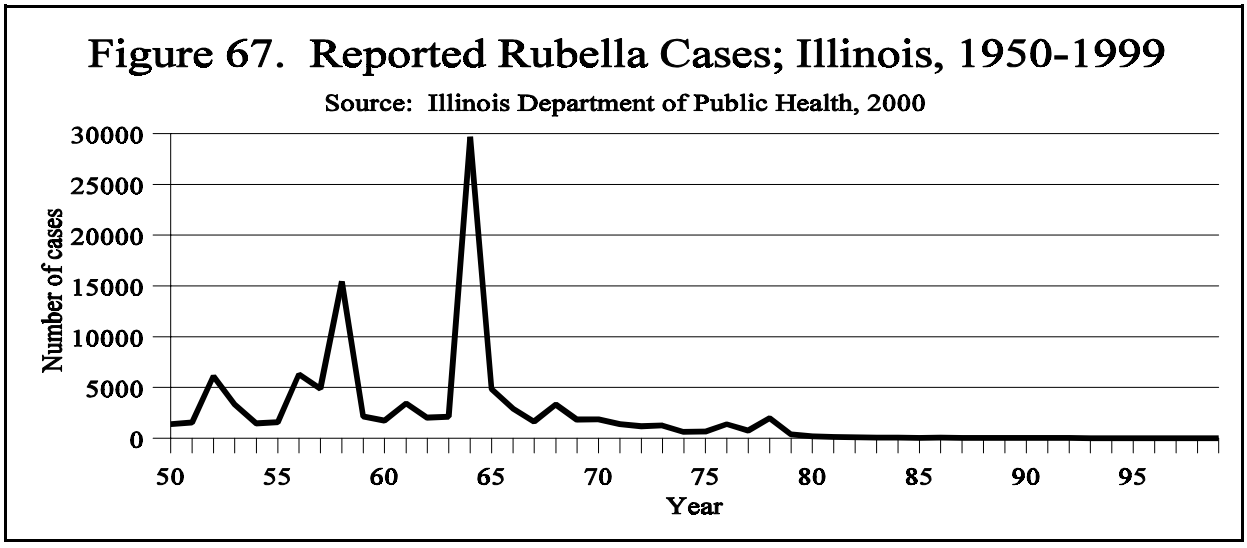
A confirmed case of rubella is one that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a laboratory confirmed case.

Descriptive epidemiology

The number of reported rubella cases in Illinois from 1950 to 1999 is shown in Figure 67. Only one case of rubella was reported in Illinois in 1999. The case was an infant from Ogle County. The child had a positive IgM three days after rash onset. No source of infection was identified.

Summary

In 1999, only one rubella case was reported in Illinois.



Salmonellosis

Background

Salmonella may cause sporadic cases, event outbreaks or community outbreaks. A variety of food sources have been linked to *Salmonella* outbreaks. In recent years, imported produce has been implicated in a number of outbreaks associated with enteric pathogens including *Cyclospora* and *Salmonella*. For instance, outbreaks of *Salmonella* in recent years have been traced to cantaloupes and mangoes imported from foreign countries. In 1996, a case-control study was performed with children in France, and the risk factors for *S. typhimurium* were consuming undercooked ground beef and taking antibiotics in the month before illness.

Of the *Salmonella* isolates identified in the CDC's FoodNet sites in 1999, the following were the top five serotypes: *S. typhimurium* (24 percent), *S. enteritidis* (10 percent), *S. newport* (9 percent), *S. heidelberg* (7 percent) and *S. muenchen* (6 percent). The incidence rate of *Salmonella* cases in FoodNet sites was 18 per 100,000.

A quarter of *Salmonella* isolates in 1999 from the 17 sites in the U.S. where the National Antimicrobial Resistance Monitoring System (NARMS) is active were resistant to at least one antibiotic. Resistance varied between serotypes, with both *hadar* and *typhimurium* having a high level of resistance. In 1999, 28 percent of *S. typhimurium* were resistant to ampicillin, chloramphenicol, streptomycin, sulfamethoxazole and tetracycline (R-type ACSSuT), which is the characteristic pattern for definitive phage type 104. Eleven percent of *S. typhimurium* isolates from 1999 also had a penta resistant pattern to ampicillin, kanamycin, streptomycin, sulfamethoxazole and tetracycline (R-type ACSSuT).

Since October 1, 1995, the U.S. Food and Drug Administration (FDA) has managed a *Salmonella enteritidis* (SE) traceback program. If an investigation implicates contaminated eggs as the source of an SE outbreak, FDA will conduct microbiological assessment of production flocks that provided eggs at the time of the outbreak. To initiate a traceback, FDA requires a letter from the state including epidemiologic and environmental evidence of egg association in the outbreak. For shell egg traceback, information on whether the carton was available for examination and whether any eggs were left in the container is needed. The size, color and packing type of the container are needed. All identifying markings on the container should be given to FDA. Copies of any invoices for the eggs and the dates the eggs were received at the outbreak location are needed. CDC can phage type the isolates from SE outbreaks. From January 1, 1999, through March 2000, 44 confirmed outbreaks of SE from 17 states were reported in the U.S. Six percent of 1,080 ill persons were hospitalized and none died. Of the 19 outbreaks where a vehicle was identified, 79 percent were associated with shell eggs. Of the 37 outbreaks for which an isolate was submitted to CDC for phage typing, 49 percent were caused by phage type 4, mainly on the West Coast. Phage types 8, 13a and 2 each accounted for 11 percent of the outbreaks.

In a study of sporadic *Salmonella enteritidis* infections in Wisconsin, eating eggs and eating at a restaurant were associated with infection. This study also reported traceback investigations for outbreaks. Flocks with SE were identified through this traceback and eggs from these farms were diverted to pasteurization. The number of SE cases in humans declined following the traceback and diversion of eggs to pasteurization.

Commercial and private laboratories are required to submit isolates of *Salmonella* to the IDPH 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.

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

In 1999, there were 1,600 reported cases of salmonellosis in the state. Figure 68 shows the number of cases since 1994. The annual incidence rate for salmonellosis in Illinois in 1999 was 14 per 100,000 population. The mean annual incidence rates for salmonellosis were highest in some scattered counties in the state (Figure 69). The five counties with the highest mean annual incidence rates per 100,000 population for salmonellosis from 1995-1999 were Massac (44.7), Mason (33.2), Randolph (29.5), Boone (24.0), Lake (22.7) and DuPage (21.0). In 1999 in Illinois, 53 percent of reported cases were in females. Eighty-five percent of cases were in whites, 13 percent in African Americans and 2 percent in Asians; 12 percent were Hispanic. There was a significantly higher proportion of Hispanics among persons with salmonellosis than in the Illinois population. Salmonellosis occurred in all age groups (mean=28) (Figure 70). However, the incidence rate was highest in those less than 1 year of age (88 cases per 100,000 population). A peak in salmonellosis cases occurred from June through September in 1999 (Figure 71). The top 20 serotypes of *Salmonella* in 1999 are found in Table 8. The three most common serotypes of *Salmonella* in 1999 were *S. typhimurium* (354)*, S. enteritidis* (264) and *S. heidelberg* (101). Serotypes of *Salmonella* found in Illinois from 1992-1999 are shown in Table 9. Sixty-six salmonellosis cases reported a history of reptile contact. Of these cases, the following types of reptiles had contact with the cases: lizards (34), turtles (23), snakes (14) and multiple types (5). For those with reported reptile contact, the median age was 12 years and 83 percent of the cases were male.

S. typhimurium isolates submitted to the IDPH laboratory from January through June 1999 were tested for resistance to 12 antimicrobials (ampicillin-A, ceftriaxone-Cx, cephalothin-Ce, chloramphenicol-C, ciprofloxacin-Cp, gentamicin-G, kanamycin-K, nalidixic acid-N, sulfisoxazole-Su, streptomycin-S, trimethoprim/sulfamethoxazole-SxT, and tetracycline-T). Of the 284 isolates tested, 151 (53 percent) showed resistance to at least one of the tested antimicrobials. Sixteen percent of isolates had the typical DT104 profile of resistance to ACSSuT.

Summary

More than 1,500 cases of salmonellosis were reported in 1999 in Illinois. The one-year incidence rate for 1999 was 14 per 100,000 population. The northern regions of the state had higher incidences than other areas of the state. The mean age for cases was 28 although the incidence was highest in those less than 1 year of age. The proportion of Hispanics affected with salmonellosis (12 percent) was higher than their representation in the Illinois population (8 percent).

Suggested readings

Davis MA, Hancock DD et al. Changes in antimicrobial resistance among Salmonella enterica serovar *typhimurium* isolates from humans and cattle in the Northwestern United States, 1982-1997. Emerg Inf Dis 1999;5(6):802-6.

Delarocque-Astagneau E et al. Risk factors for the occurrence of sporadic Salmonella enterica Serotype *typhimurium* infections in children in France: A national case-control study. Clin Inf Dis 2000;31:488-92.

Marano NN et al. The National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria, 1996-1999:surveillance for action. JAVMA 2000;217(12):1829-30.

MMWR. Preliminary FoodNet data on the incidence of Foodborne Illnesses-Selected Sites, United States, 1999.

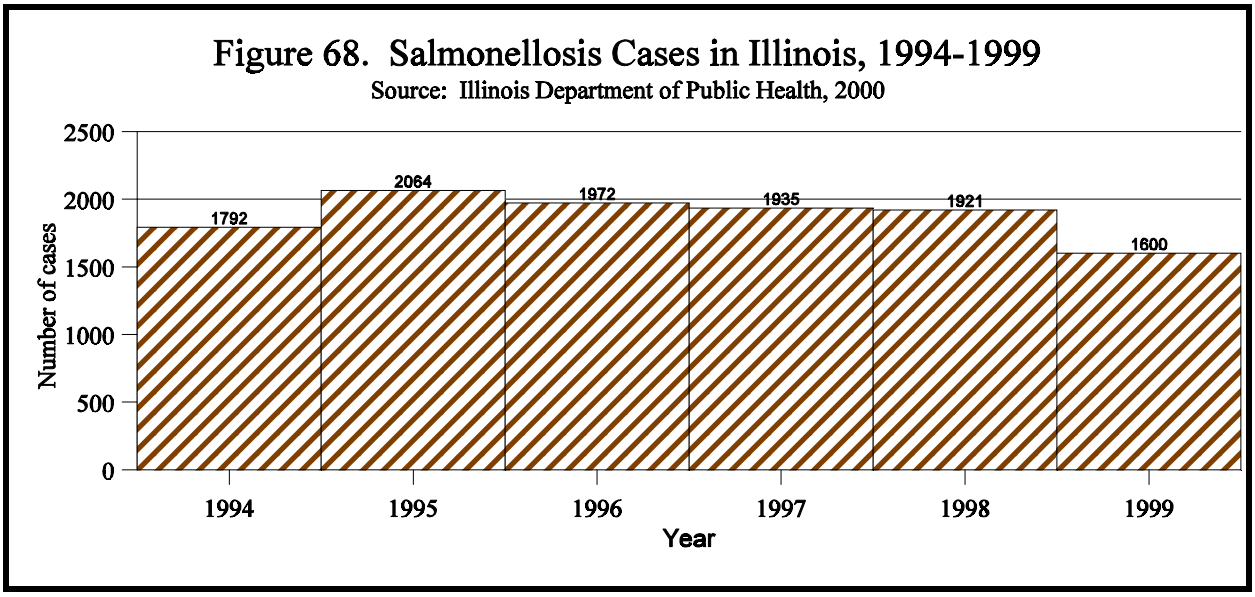
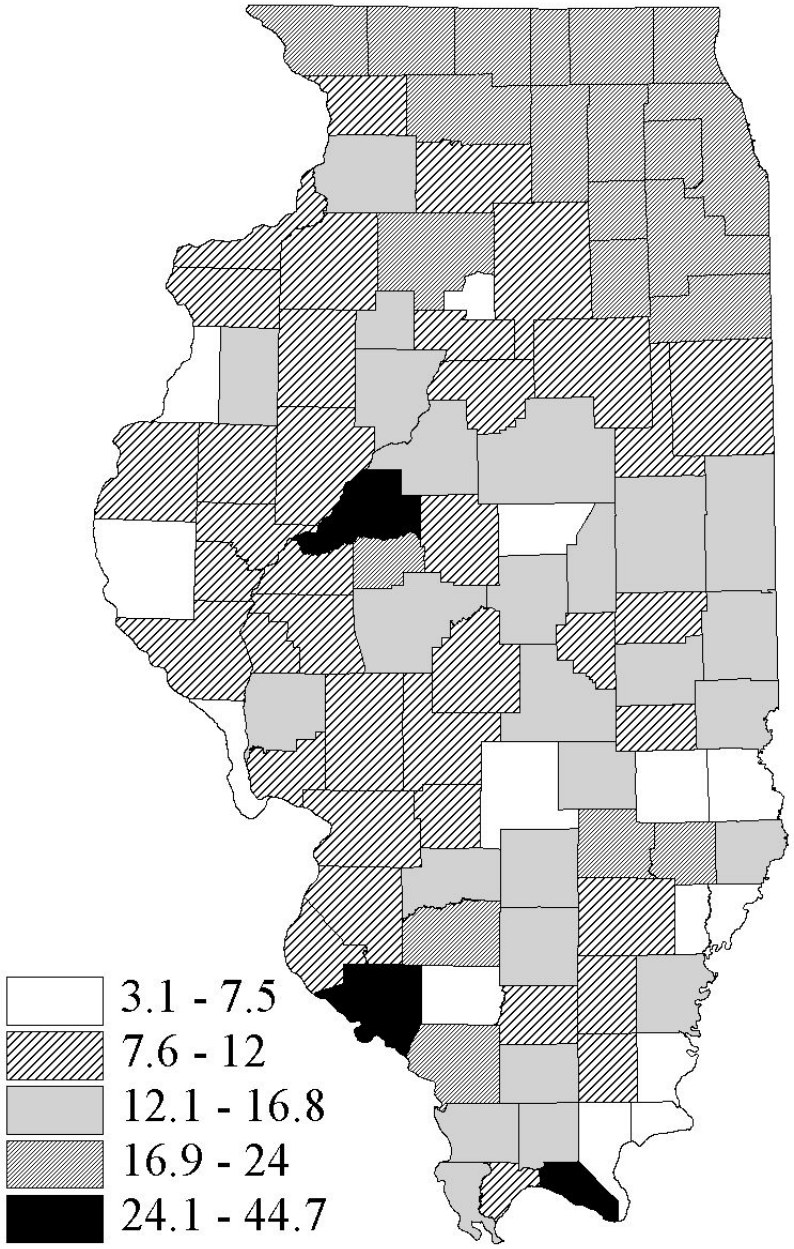


Figure 69. One-year Salmonellosis Incidence Rates for Illinois, 1995-1999



Source: Illinois Department of Public Health, 2000

Figure 70. Incidence Rate of Salmonellosis Cases by Age in Illinois, 1999

Source: Illinois Department of Public Health, 2000

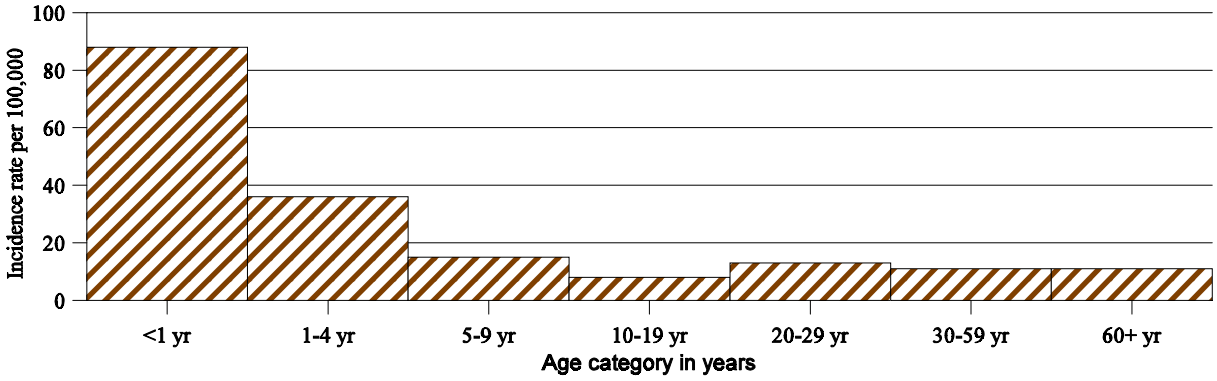


Figure 71. Reported Salmonellosis Cases in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

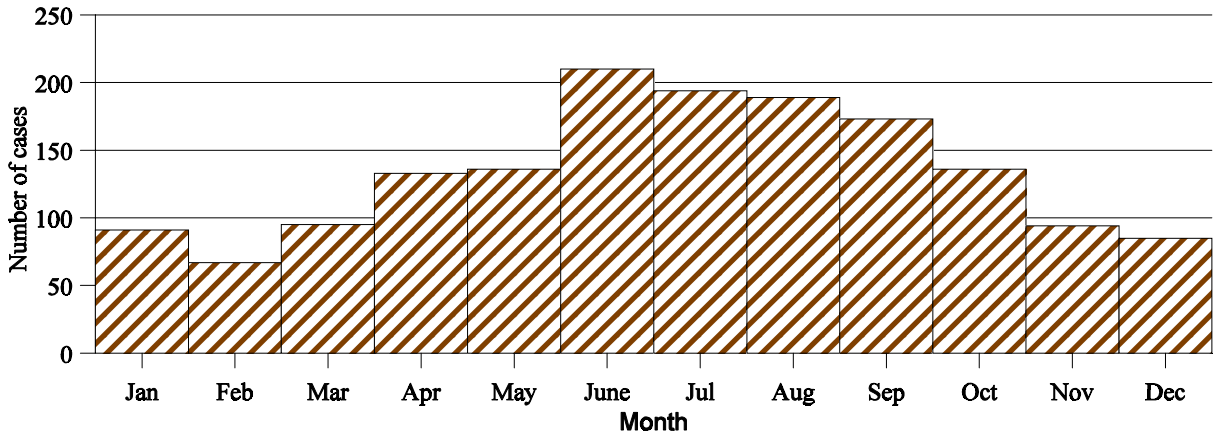


Table 8. Top 20 *Salmonella* Serotypes in Illinois, 1999

Serotype	Frequency
typhimurium	354
enteritidis	264
heidelberg	101
newport	59
montevideo	56
infantis	51
agona	48
java	41
muenchen	36
thompson	30
braenderup	28
javiana	27
saint-paul	21
oranienburg	21
poona	19
hartford	16
hadar	15
manhattan	14
derby	14
senftenberg	13

Source: Illinois Department of Public Health, 2000

Table 9. Frequency of *Salmonella* Serotypes in Illinois, 1992-1999

Serotype	1992	1993	1994	1995	1996	1997	1998	1999
abaetetuba	1	0	1	1	0	0	0	0
abony	0	0	1	0	0	0	0	0
adelaide	7	7	10	10	1	3	2	3
agbeni	0	0	1	4	0	0	0	0
agona	86	57	65	42	38	58	129	48
alachua	0	1	5	3	0	1	1	1
alamo	0	1	0	0	0	0	0	0
albany	2	3	4	2	2	4	2	2
amager	0	0	0	0	0	2	0	0
anatum	13	25	16	15	17	12	10	7
anecho	0	0	0	0	0	0	0	0
ank	0	0	1	0	0	0	0	0
antartica	0	0	2	0	0	0	0	0
antsalova	0	0	0	1	0	0	0	0
arizonae	8	6	2	5	2	5	0	1
augustenborg	1	0	0	0	0	0	0	0
baildon	0	0	0	3	0	0	3	0
bareilly	6	2	6	9	7	3	4	6
bere	0	0	0	0	0	0	0	0
berlin	0	1	0	0	0	0	0	0
berta	22	17	15	108	11	6	7	9
bilthoven	0	0	0	1	0	0	0	0
binza	0	1	0	0	0	0	0	0
bledgam	0	0	0	0	1	0	0	0
blockley	10	5	8	1	3	6	3	4
bonariensis	0	0	0	1	0	0	1	1

Table 9. Frequency of *Salmonella* Serotypes in Illinois, 1992-1999 (Cont.)

Serotype	1992	1993	1994	1995	1996	1997	1998	1999
bonn	0	0	0	1	0	0	1	0
bovis-morb	0	2	4	2	6	4	11	5
bradford	0	1	0	0	0	0	0	0
braenderup	28	25	26	61	37	26	32	28
brandenburg	15	18	18	12	18	14	10	5
bredeney	7	3	4	2	4	6	3	0
california	0	1	0	0	0	0	0	0
carmel	0	0	0	1	0	0	0	0
carrau	0	0	0	2	0	0	0	0
cerro	2	2	3	1	0	1	0	0
chailey	0	2	0	0	0	3	2	0
chameleon	0	1	0	0	1	1	0	1
chandans	0	0	0	0	0	0	0	0
chester	1	2	1	1	3	1	1	3
cholerae-suis	19	21	17	15	11	6	3	7
coeln	0	0	0	0	0	0	0	0
colindale	0	0	0	0	0	0	1	0
cubana	1	5	6	6	3	4	2	0
decatur	0	1	0	0	0	0	0	0
denver	0	0	0	1	0	2	0	0
derby	22	18	18	23	12	11	13	14
drypool	0	1	0	0	0	0	0	0
dublin	2	2	1	0	2	1	0	0
duesseldorf	0	0	0	1	0	0	0	0
durban	0	1	0	0	1	0	0	0
durham	0	0	0	0	0	0	1	0

Table 9. Frequency of *Salmonella* Serotypes in Illinois, 1992-1999 (Cont.)

Serotype	1992	1993	1994	1995	1996	1997	1998	1999
ealing	0	0	2	3	2	0	0	1
eastbourne	0	0	1	2	1	0	1	1
emek	0	0	0	0	1	0	0	1
enteritidis	364	647	413	397	484	519	405	264
finkenwerden	0	0	0	0	0	0	0	1
flint	0	2	0	0	1	1	1	2
fluntern	0	0	1	0	0	0	0	0
gallinarum	0	0	1	0	0	0	0	0
gaminara	1	0	0	2	2	1	0	1
gatuni	0	1	0	0	0	0	0	0
give	2	4	1	3	7	7	5	4
gloucester	0	0	0	0	1	0	0	0
godesburg	0	0	0	0	1	0	0	0
haardt	0	0	0	1	0	0	0	0
hadar	81	43	42	52	37	75	40	15
haifa	0	0	0	1	0	0	0	0
hartford	10	5	12	22	6	4	12	16
havana	3	6	0	0	6	1	1	2
heidelberg	165	159	109	164	117	121	115	101
herston	0	0	0	0	1	0	0	0
hvittingfoss	1	1	0	1	2	0	2	1
idikan	0	1	0	0	1	0	0	0
indiana	2	2	1	0	0	0	0	2
infantis	34	29	27	33	34	42	65	51
inpraw	1	0	0	0	0	0	0	0
inverness	0	0	1	3	1	0	0	1

Table 9. Frequency of *Salmonella* Serotypes in Illinois, 1992-1999 (Cont.)

Serotype	1992	1993	1994	1995	1996	1997	1998	1999
irumu	1	3	3	1	0	0	0	0
jangwani	0	0	0	0	0	0	0	0
java	17	11	28	45	24	30	37	41
javiana	5	18	15	8	23	20	11	27
johannesburg	3	5	8	9	3	6	4	6
kambole	0	0	0	0	0	0	1	0
kentucky	2	3	4	2	2	2	0	4
kiambu	0	0	0	2	0	0	1	4
kibi	1	0	0	0	0	0	0	0
kinshasa	0	0	0	0	1	2	0	1
kintambo	1	1	3	0	0	0	0	1
kottbus	0	0	0	0	1	0	0	0
kralendyk	0	0	1	1	0	0	1	0
krefeld	0	0	0	0	0	0	0	0
kua	0	0	0	1	0	0	0	0
lawra	0	0	0	0	0	0	1	0
litchfield	2	6	4	13	6	4	7	10
liverpool	2	0	0	0	0	1	0	2
livingstone	2	2	1	0	0	0	0	0
lome	0	1	0	0	0	1	0	0
lomita	0	0	0	0	0	0	0	0
london	1	1	4	5	2	4	4	3
lomalinda	0	0	0	2	0	0	0	0
manchester	0	0	0	0	1	0	0	0
manhattan	0	20	12	12	18	35	15	4
marina	1	4	4	5	6	1	3	2

Table 9. Frequency of *Salmonella* Serotypes in Illinois, 1992-1999 (Cont.)

Serotype	1992	1993	1994	1995	1996	1997	1998	1999
matadi	0	0	1	1	0	0	0	0
mbandaka	6	9	1	9	23	10	2	10
meleagridis	0	1	1	0	3	0	3	0
memphis	0	0	0	0	0	1	0	0
menhaden	0	0	0	1	0	0	0	0
miami	3	6	8	5	2	5	3	4
mikawasima	2	0	0	0	0	0	0	0
minnesota	0	0	0	1	2	0	0	0
mississippi	0	0	1	0	0	5	2	3
mjordan	0	1	0	0	0	0	0	0
monschaui	0	0	2	0	0	0	0	0
montevideo	49	122	23	19	18	48	62	56
morotai	0	0	0	0	0	2	0	0
muenchen	16	115	30	64	40	20	31	36
muenster	2	4	1	5	1	4	10	1
new-brunswick	0	1	0	1	0	1	0	1
newington	2	0	2	1	0	1	2	3
newport	45	49	84	95	56	40	71	59
nima	0	0	0	0	0	0	1	0
norwich	1	3	4	1	1	4	0	4
offa	1	0	0	0	0	0	0	0
ohio	7	5	5	9	4	3	7	3
onderstepoort	0	0	0	0	0	0	1	0
oranienberg	25	22	42	25	38	24	26	21
oslo	2	0	0	0	3	0	1	5
overschie	0	1	0	0	0	0	0	0

Table 9. Frequency of *Salmonella* Serotypes in Illinois, 1992-1999 (Cont.)

Serotype	1992	1993	1994	1995	1996	1997	1998	1999
panama	7	8	9	17	9	10	3	3
paratyphi a	9	3	10	11	10	4	11	1
paratyphi b	0	0	0	6	11	5	1	1
parera	0	0	0	0	0	0	0	0
plymouth	0	0	0	0	1	0	0	0
poano	0	0	1	0	0	0	0	1
pomona	0	0	0	1	0	2	11	0
poona	12	11	19	26	16	14	18	19
portsmouth	0	0	0	0	0	1	0	0
potsdam	0	0	1	0	0	0	0	0
putten	0	0	0	0	1	0-	1	1
reading	18	68	8	11	24	6	6	2
richmond	0	0	0	0	1	1	0	0
romanby	0	1	0	0	0	1	0	0
roodepoort	0	0	0	0	0	0	1	0
roterberg	0	0	0	0	0	0	1	0
rubislaw	1	1	0	2	1	1	2	0
san-diego	6	4	2	4	2	2	1	0
saint-paul	18	35	26	20	24	22	30	21
schwarzengrund	7	8	14	4	8	5	4	7
senftenberg	18	6	12	10	18	11	8	13
shubra	0	0	0	0	0	1	0	0
singapore	0	0	0	0	1	0	0	0
stanley	5	6	11	31	10	10	7	12
stanleyville	0	0	0	1	0	0	0	1
stendal	0	0	0	1	0	0	0	0

Table 9. Frequency of *Salmonella* Serotypes in Illinois, 1992-1999 (Cont.)

Serotype	1992	1993	1994	1995	1996	1997	1998	1999
sundsvall	1	0	1	0	1	1	1	0
takoradi	0	0	0	1	0	0	0	0
tallahasse	0	0	0	1	0	0	0	0
telelkebir	0	3	0	0	1	2	0	1
tennessee	9	5	9	8	4	1	3	2
thomasville	2	0	0	0	0	0	0	0
thompson	45	35	34	35	27	24	34	30
treguier	0	1	0	0	0	0	0	0
typhimurium	278	347	384	364	404	417	405	354
uganda	1	4	2	3	7	6	6	5
urbana	2	1	4	2	3	3	5	7
uzaramo	0	0	0	1	0	0	0	0
virchow	3	4	2	3	9	4	1	8
wassenaar	0	1	0	0	1	1	0	0
weltevreden	0	1	1	0	3	1	5	3
weston	0	0	0	0	0	0	0	0
wien	1	0	0	0	0	0	0	0
worthington	6	3	5	8	2	0	2	1
Untyped	68	112	97	130	206	154		152

Source: Illinois Department of Public Health, 2000

Sexually Transmitted Diseases

Included in this section are three diseases (chlamydia, gonorrhea and syphilis) that are transmitted primarily or exclusively through sexual contact and are reportable under Illinois statutes and administrative rules. Other diseases not included in this section may be transmitted sexually, although that is not the primary method of transmission. HIV/AIDS is discussed in a separate section.

The control of sexually transmitted diseases (STD) 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, and asymptomatic infection is common in both women and men. Untreated chlamydia infection often leads to pelvic inflammatory disease in women. The infection 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 sequellae such as tubal infertility and ectopic pregnancy. Chlamydia also can cause ophthalmia and pneumonia in newborns exposed to it during birth.

Case Definition

A case of *C. trachomatis* genital infection in Illinois is confirmed by isolation of *C. trachomatis* by culture, or demonstration of *C. trachomatis* in a clinical specimen by detection of antigen or nucleic acid.

Descriptive Epidemiology

Chlamydia is reportable in all but one state. However, national data are incomplete because the majority of testing is currently conducted in females. During 1999, more than 600,000 chlamydia infections were reported to CDC in the U.S., making chlamydia the most frequently reported sexually transmitted disease in the U.S.

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. In 1999, 32,870 cases of chlamydia were reported in Illinois; the overall incidence rate was 287.6 per 100,000 population.

Chlamydia is geographically distributed throughout the state. Only one of the 102 Illinois counties did not report at least one case in 1999. The five counties with the highest incidence rates per 100,000 in 1999 were Pulaski (677.9), Alexander (658.8), St. Clair (594.6), Pope (526.0) and Macon (447.9).

Chlamydia incidence in Illinois increased by 25 percent in 1999 (32,870 cases) compared to 1998 (26, 364 cases) (Figure 72). The increase is attributable to expansion of screening programs as well as to the use of more sensitive laboratory testing methods by many public and private laboratories. The majority of cases are reported in women (78 percent in 1999) due to

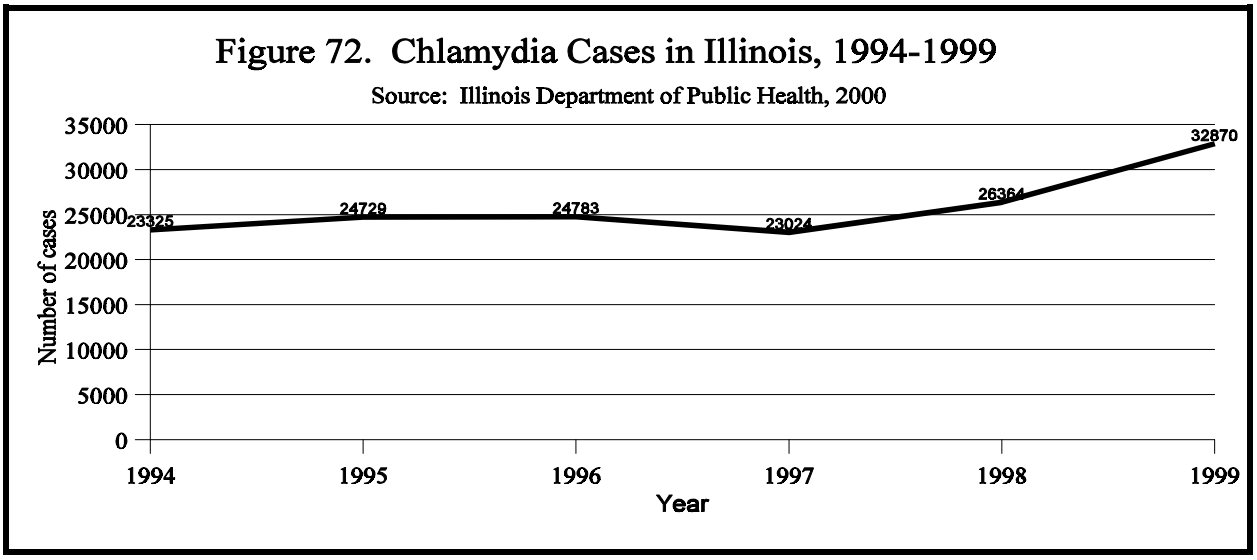
screening efforts that target women. The female-to-male ratio of reported cases in 1999 was 3.5: 1.0.

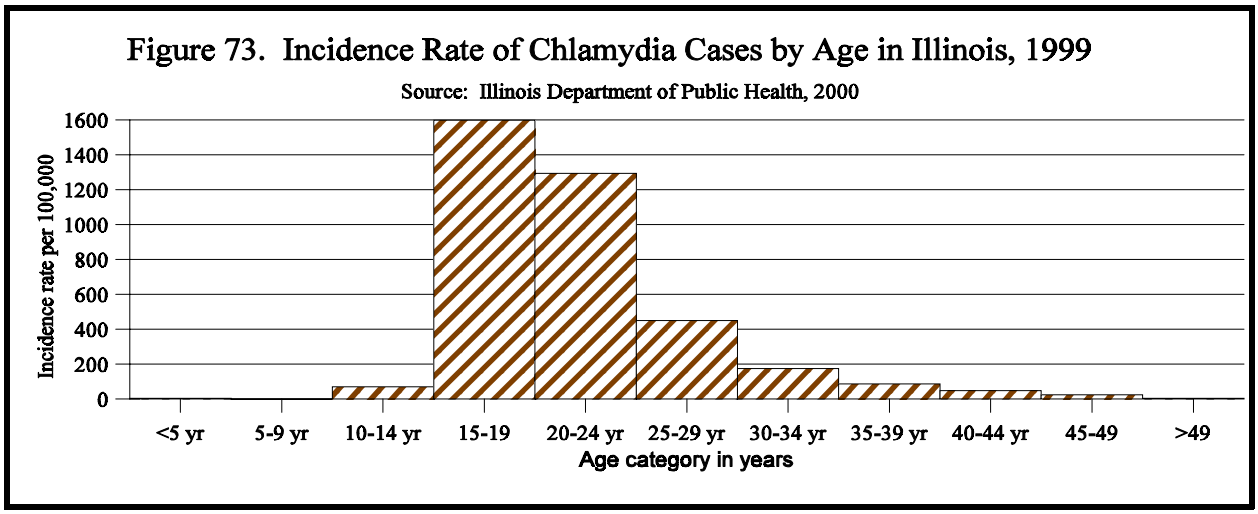
Adolescents (ages 15 to 19) accounted for 40 percent of reported chlamydia cases (1,607.1 per 100,000) in 1999 (Figure 73).

The incidence rates per 100,000 population for 1999 by racial group were African American (18,836), Hispanic (3070), Native American (41), Asian or Pacific Islander (166) and white (8,543).

Summary

Chlamydia is the most commonly reported sexually transmitted disease in Illinois. Cases were reported from all but one county in Illinois during 1999. Adolescents had the highest incidence rates.





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. Damage to the 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 recognizable in the female. Infants born to infected mothers may develop gonococcal ophthalmia, which is potentially blinding, or sepsis, arthritis or meningitis.

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 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.

Descriptive epidemiology

In 1999, 355,642 cases of gonorrhea were reported in the United States. Gonorrhea is the second most commonly reported STD in Illinois; in 1999, there were 23,254 cases reported, resulting in a case rate of 203.4 cases per 100,000 population. Reported cases increased by 7 percent in 1999 compared to 1998 (Figure 74).

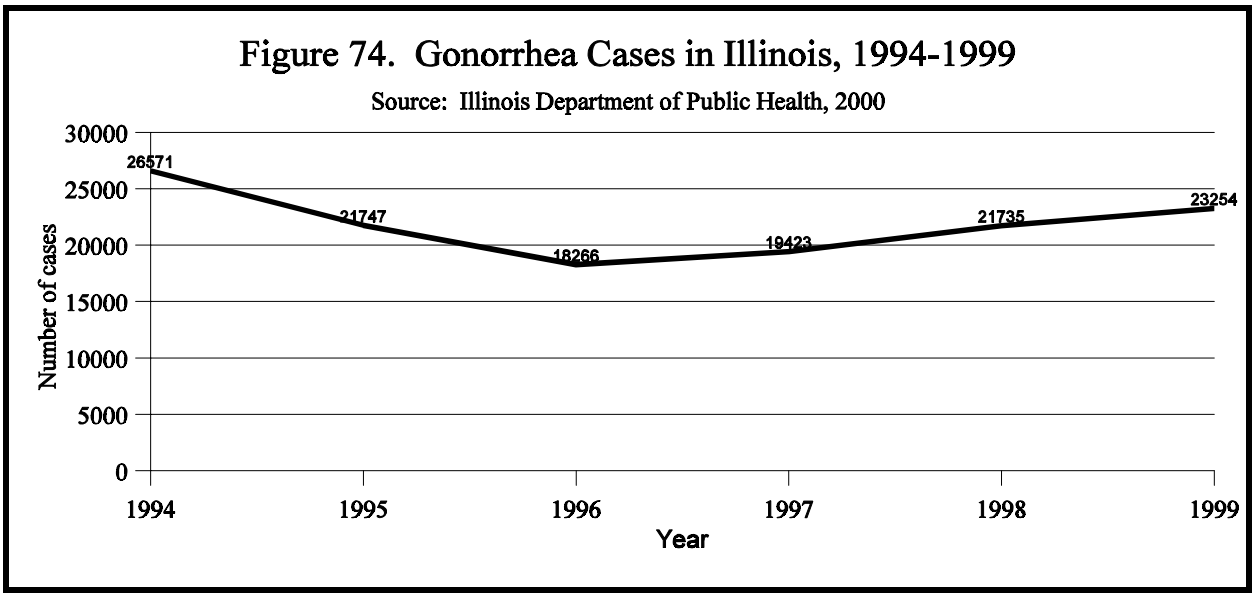
Ninety-one of the 102 Illinois counties reported at least one case of gonorrhea in 1999. The five counties with the highest incidence rates in 1999 were Alexander (385.8), Peoria (341.3), Cook (332.0), St. Clair (321.1) and Macon (282.4). Adolescents and young adults are at greatest risk for

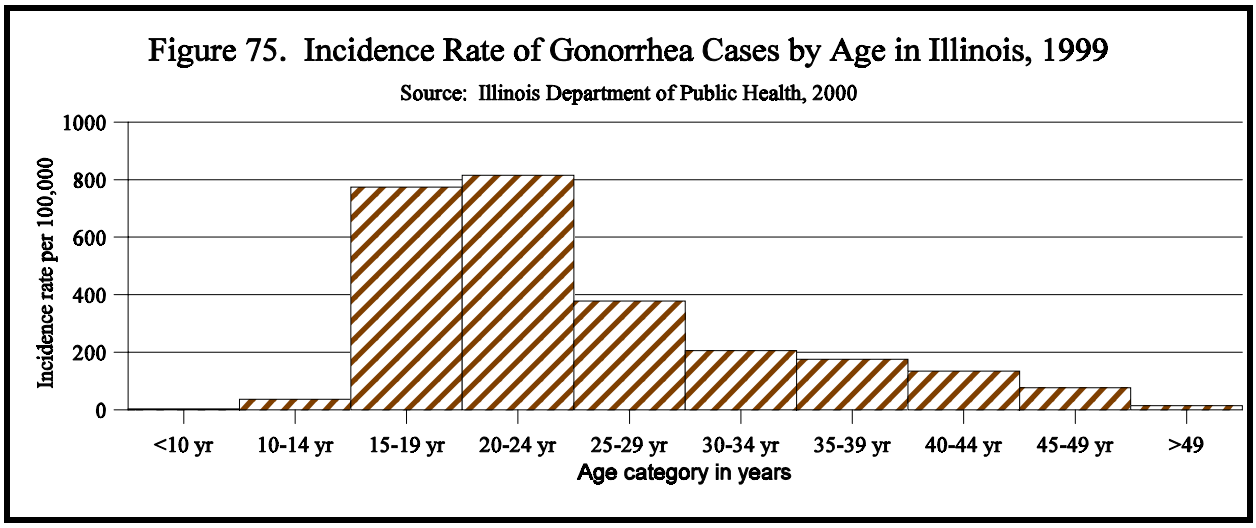
gonorrhea infection in Illinois. Persons aged 15 to 29 accounted for 73 percent of reported cases in 1999 and adolescents (ages 15 to 19) for 27 percent (Figure 75). The case rate is considerably higher among adolescents compared to the general population: 778.8 cases per 100,000 in the adolescent population in 1999 compared to 203.4 for the total population.

Minority racial groups are disproportionately affected by gonorrhea in Illinois. The case rate among African Americans was 1,037.0 per 100,000 population, compared to an overall state rate of 203.4. The rate for Hispanics was 75 per 100,000 population.

Summary

Gonorrhea is the second most commonly reported sexually transmitted disease after chlamydia in Illinois. Reported cases increased by 7 percent in 1999. Twenty-seven 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 (in the form of cardiovascular or gummatous disease). The open lesions of syphilis are infectious to sex partners and also may enhance the transmission or acquisition of HIV. Syphilis during pregnancy can lead to congenital syphilis, which may result in stillbirth or severe illness and lifelong debilitating consequences for the infant.

"Early syphilis" refers to syphilis infection of less than one year duration: primary, secondary and early latent. Public health disease intervention efforts emphasize control of early syphilis, because persons with early syphilis are most likely to have been infectious within the past year. The majority (60 percent) of reported early syphilis cases in Illinois during 1999 were treated during the early latent stage. Since many individuals do not notice or recognize the symptoms of syphilis, screening for latent disease and partner notification and referral are important components of control efforts.

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 darkfield 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

Increases in syphilis often are associated with poverty, limited availability of health services and the exchange of sex for drugs or money. Syphilis is more prevalent in urban populations. 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.

There were 60 congenital cases and 422 primary and secondary syphilis cases reported in 1999 (Figure 76). The incidence rate for 1999 was 3.7 per 100,000 population for primary and secondary syphilis and 32.9 per 100,000 live births for congenital syphilis.

Cases of early syphilis reported in Illinois decreased by only three cases to 1,062 in 1999 compared to 1998. Syphilis has become progressively concentrated geographically. Only seven Illinois counties reported five or more cases in 1999. Cook County ranked second in reported cases among all U.S. counties.

In 1999, the male-to-female ratio of early syphilis cases was 1.3:1.0. The average age of persons diagnosed with syphilis is greater than those with gonorrhea and chlamydia. During 1999, persons 20 to 39 years of age accounted for 61 percent of cases (Figure 77).

Minority racial/ethnic groups are disproportionately affected by syphilis in Illinois. The 1999 incidence rates per 100,000 in racial groups were African Americans (49), Native Americans (14), Hispanic (5), Asian/Pacific Islanders (3) and white (0.8). Ninety-two percent of congenital syphilis cases were in African Americans.

Summary

Early syphilis cases declined by only three cases in 1999 compared to 1998. Minority racial/ethnic populations are disproportionately affected by syphilis in Illinois.

Figure 76. Syphilis Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

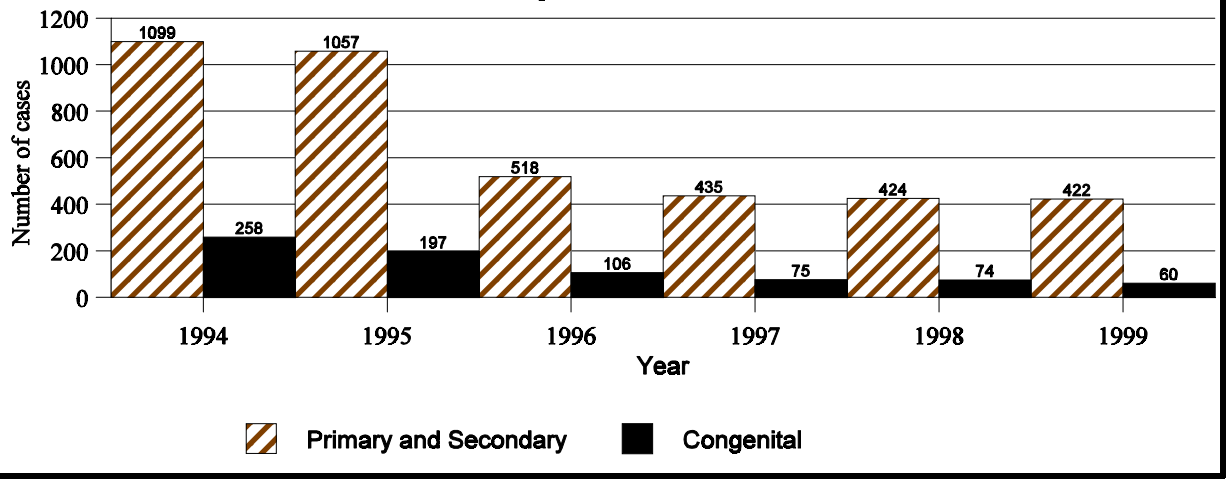
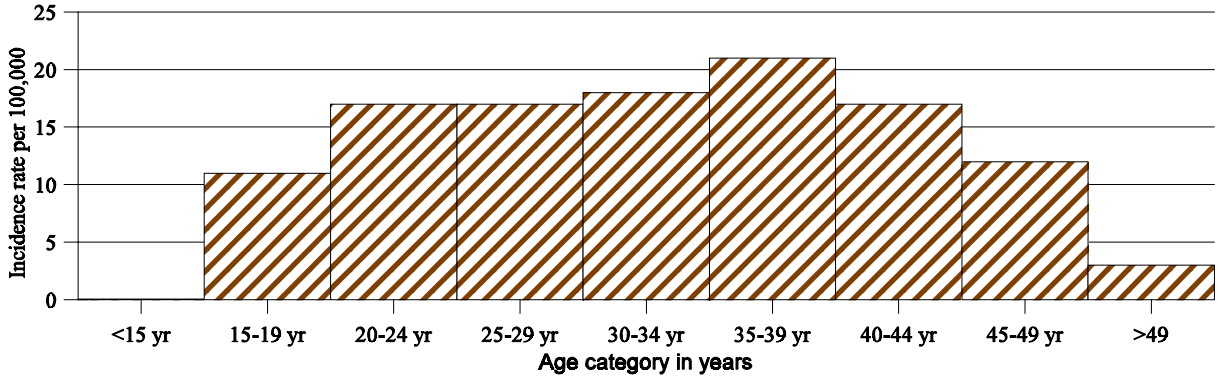


Figure 77. Incidence Rate of Early Syphilis Cases by Age in Illinois, 1999

Source: Illinois Department of Public Health, 2000



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). Symptoms are watery or bloody diarrhea with fever and sometimes vomiting or tenesmus. Mild and asymptomatic infections can occur. The infectious dose is low; as few as 10 to 100 bacteria can cause infection and the incubation period is usually one to three days. The disease is transmitted by direct or indirect fecal-oral routes. The duration of illness is usually from four to seven days. Disease caused by *Shigella dysenteriae* type 1 is the most severe form (case fatality rate=20 percent) 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*.

Among the CDC's FoodNet isolates in 1999, 66 percent of *Shigella* isolates were *S. sonnei* and 31 percent were *S. flexneri*. From 1996 through 1999 in FoodNet sites, *Shigella* incidence declined by 44 percent to four per 100,000. Children less than 5 years of age (20 per 100,000) and Hispanics (28 per 100,000) were most at risk. Fifty-nine percent of *Shigella* isolates were resistant to trimethoprim sulfamethoxazole, and 63 percent were resistant to ampicillin. Eighty-one percent of *S. sonnei* and 29 percent of *S. flexneri* were resistant to TMP-SMZ; 72 percent of *S. flexneri* and 1 percent of *S. sonnei* were resistant to chloramphenicol.

Shigella can be transmitted from consumption of contaminated food or water, from person to person or through swimming in contaminated water. In 1999, a multistate outbreak of *S. sonnei* was linked to five-layer dip (bean, salsa, guacamole, nacho cheese and sour cream). At Fort Bragg, North Carolina, a geographic information system was used to identify a neighborhood where an increase in *Shigella* cases was occurring. Interviews in this area identified the use of communal wading pools. With cessation of this activity and educational messages about transmission, the cases stopped.

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

The reported shigellosis cases in Illinois decreased from 1998 (1,573 cases) to 1999 (1,330 cases) (Figure 78). The five-year median is 1,494. The overall annual incidence rate for shigellosis was 12 per 100,000 for 1999. Fifty-three percent of cases in 1999 were in females. Seventy percent were white, 28 percent were African American, and 1 percent were Asian; 25 percent were Hispanic. There were significantly higher proportions of African Americans and Hispanics with shigellosis compared to their representations in the Illinois population. There was a significantly lower proportion of whites with shigellosis than their representation in the Illinois population. Shigellosis cases occurred in all months of the year with a peak in the months of July through November (Figure 79). Shigellosis cases had a mean age of 16 and a median age of 8 (Figure 80). Annual incidence

rates per 100,000 for 1999 by age group were, 1 to 4 years of age, 53; 5 to 9 years of age, 39; less than 1 year old, 16; 10-19 years of age, nine; 20-29 years of age, eight; 30-59 years of age, six; and those 60 and older, two. One-year incidence rates by county for 1995 to 1999 ranged from 0 to 33 per 100,000 population. The five highest annual incidence rates per 100,000 population from 1995 to 1999 were in Champaign (32.8), Crawford (27.7), Macon (27.1), Whiteside (26.2) and Mercer (20.8) counties. A map of the state shows counties with higher incidences scattered across the state (Figure 81). Individual communities will periodically experience sharp increases in reported shigellosis. These increases are usually related to person-to-person transmission, especially among children. Neighborhoods with a high population density are more likely to experience these increases than other neighborhoods.

Ninety-nine percent of isolates were serotyped in 1999. The most common species was *S. sonnei* (84 percent of isolates), followed by *S. flexneri* (14 percent of isolates). CDC's FoodNet sites had a higher percentage of *S. sonnei* and a lower percentage of *S. flexneri*. The species, *S. boydii* and *S. dysenteriae,* made up 2 percent of typed isolates. The most common *S. boydii* serotypes was 4 (Table 10). Five *S. dysenteriae* cases were reported of types 1 and 2 (Table 11). The two most common *S. flexneri* serotypes were 2 (65 cases) and 3 (24 cases) in 1999 (Table 12). *S. sonnei* does not have differing subtypes.

Summary

There were approximately 1,300 reported cases of shigellosis in Illinois in 1999. 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 8 years. Shigellosis was more likely to occur in the summer months of the year. *S. sonnei* was the most common species found in Illinois. Isolates of *Shigella* are required to be submitted to IDPH laboratories for speciation and/or serotyping (if this cannot be done by the clinical laboratory). This can help in outbreak identification.

Suggested readings

McKee KT. Application of a geographic information system to the tracking and control of an outbreak of shigellosis. Clin Inf Dis 2000;31:728-33.

MMWR. Preliminary FoodNet data on the incidence of Foodborne Illnesses Selected Sites, United States, 1999. MMWR 2000;49:201-5.

MMWR. Outbreak of Shigella sonnei infections associated with eating a nationally distributed dip-California, Oregon, and Washington, January 2000. MMWR 2000;49(3):60-61.

Replogle ML, Fleming DW, Cieslak PR. Emergence of antimicrobial-resistant shigellosis in Oregon. Clin Inf Dis 2000;30:515-19.

Figure 78. Shigellosis Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

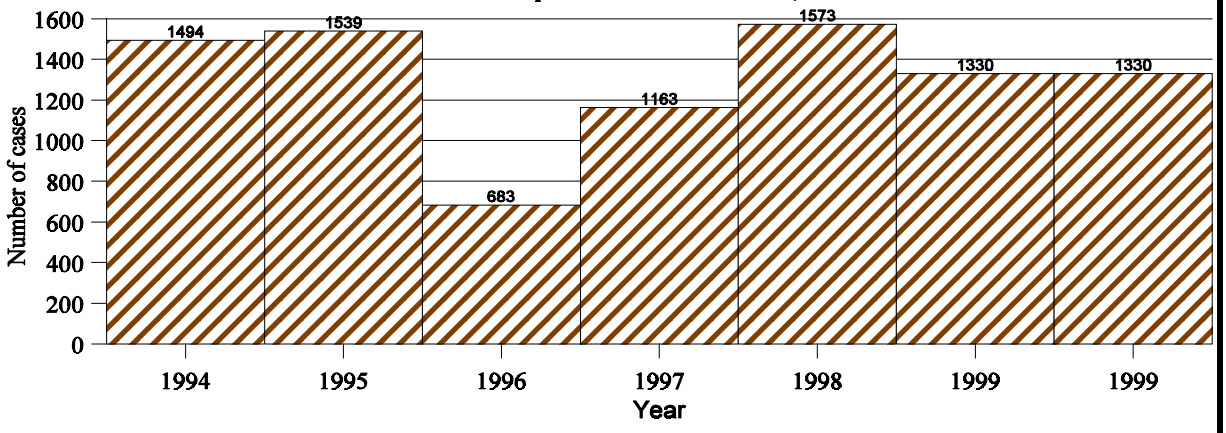


Figure 79. Reported Shigellosis Cases in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

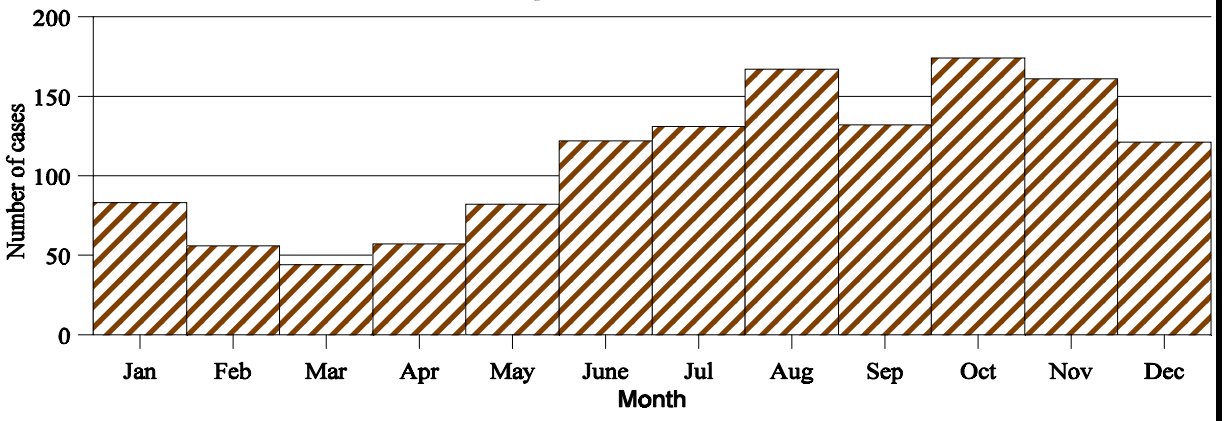


Figure 80. Age Distribution of Shigellosis Cases in Illinois, 1999

Source: Illinois Department of Public Health, 2000

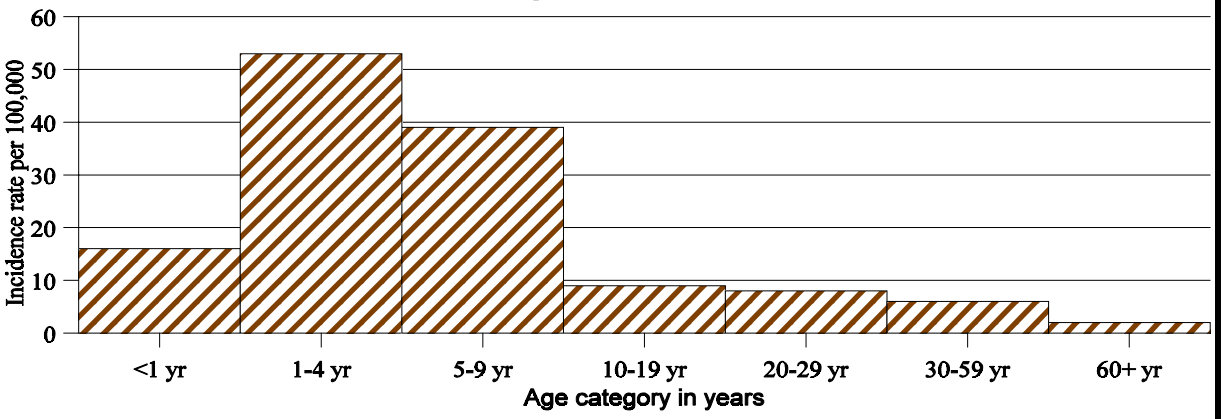
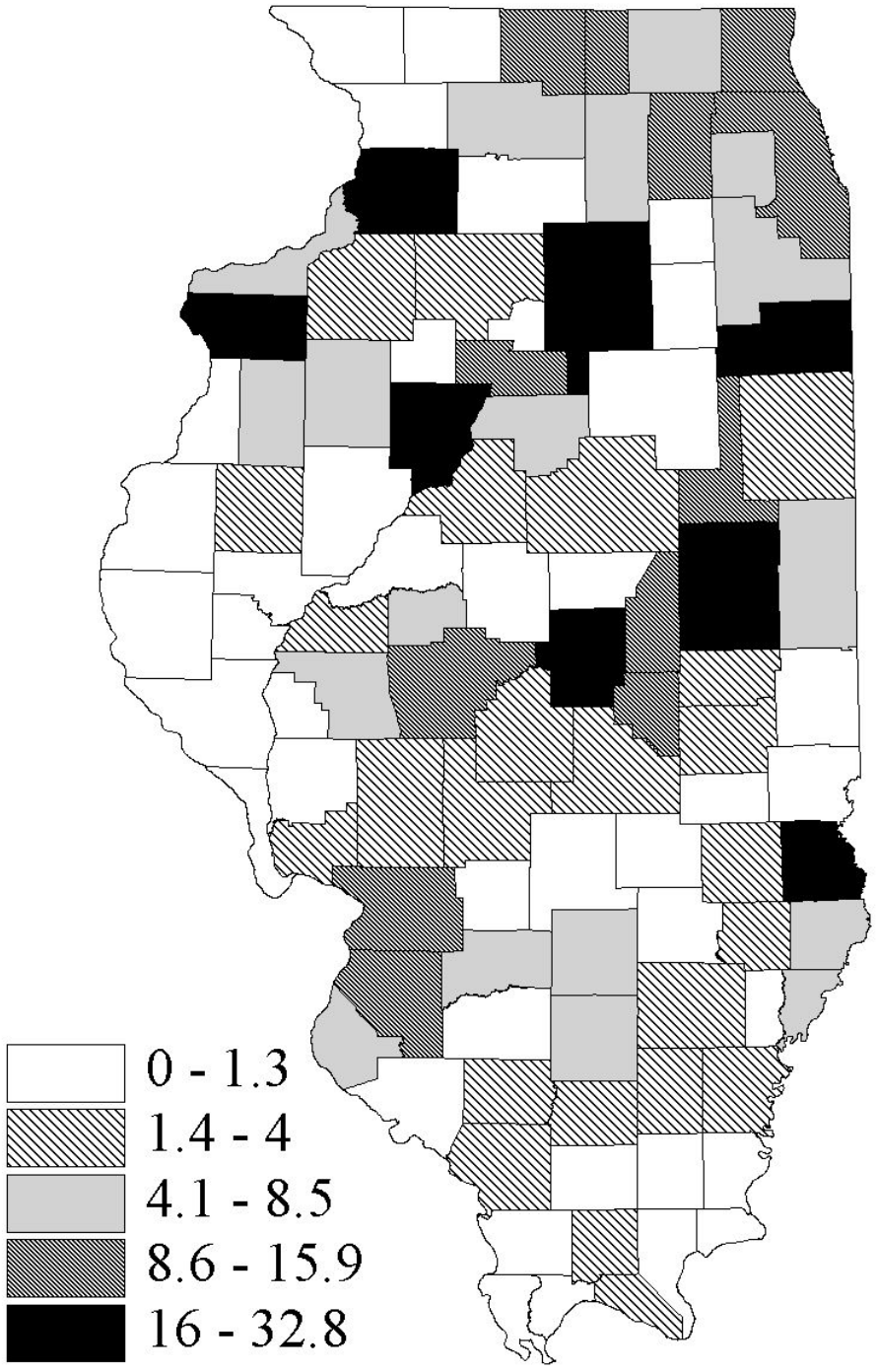


Figure 81. One-year Shigellosis Incidence Rates by County for Illinois, 1995-1999



Source: Illinois Department of Public Health, 2000

Table 10. Frequency of *Shigella boydii* Subtypes in Illinois, 1992-1999

Type	1992	1993	1994	1995	1996	1997	1998	1999
boydii, unknown	1	0	0	0	0	0	0	0
boydii 1	2	4	1	2	2	1	5	0
boydii 2	3	17	6	9	6	9	11	4
boydii 3	0	0	0	1	0	0	0	0
boydii 4	2	2	3	3	6	4	2	7
boydii 5	1	1	0	0	0	0	0	0
boydii 10	0	0	0	1	1	1	1	1
boydii 11	0	0	0	0	0	0	1	0
boydii 12	0	1	0	1	0	0	0	1
boydii 14	0	1	1	1	1	2	2	2
boydii 18	1	0	0	0	0	0	0	4
boydii 19	0	0	0	1	0	0	0	0
TOTAL *boydii*	10	26	11	19	16	17	21	19

Source: Illinois Department of Public Health, 2000

Table 11. Frequency of *Shigella dysenteriae* Subtypes in Illinois, 1992-1999

Type	1992	1993	1994	1995	1996	1997	1998	1999
dysenteriae, unknown	1	0	1	0	1	1	0	0
dysenteriae 1	1	0	1	0	0	0	0	1
dysenteriae 2	12	2	1	3	0	0	4	4
dysenteriae 3	5	0	1	6	3	0	4	0
dysenteriae 4	0	0	0	0	2	0	0	0
dysenteriae 9	1	0	0	1	0	0	0	0
dysenteriae 12	0	0	0	1	0	0	0	0
TOTAL *dysenteriae*	20	2	4	11	6	1	8	5

Source: Illinois Department of Public Health, 2000

Table 12. Frequency of *Shigella flexneri* Subtypes in Illinois, 1992-1999

Type	1992	1993	1994	1995	1996	1997	1998	1999
flexneri, unknown	12	17	31	63	59	36	36	39
flexneri 1	29	67	44	22	31	18	9	11
flexneri 1A	0	0	0	0	0	0	0	0
flexneri 1B	2	1	0	0	0	0	0	1
flexneri 2	77	70	47	44	35	44	53	64
flexneri 2A	0	1	0	0	0	3	0	1
flexneri 2B	0	1	0	0	0	0	0	0
flexneri 3	38	34	19	42	21	20	40	24
flexneri 3A	1	0	0	0	0	0	0	0
flexneri 3B	1	1	0	1	0	0	0	0
flexneri 4	43	22	16	25	16	19	14	15
flexneri 4A	0	0	2	5	8	3	1	0
flexneri 4B	0	0	0	0	0	0	0	0
flexneri 5	4	4	3	1	0	0	0	0
flexneri 5A	0	0	0	0	1	0	0	0
flexneri 6	14	11	38	25	15	6	15	11
TOTAL *flexneri*	221	229	200	228	186	149	168	166

Source: Illinois Department of Public Health, 2000

***Staphylococcus aureus*, vancomycin resistant**

Background

Antibiotic resistance in human pathogens is becoming increasingly important. Antibiotic resistant pathogens are not more virulent than susceptible ones, but they are more difficult to destroy. Some particular pathogens of concern are methicillin resistant *Staphylococcus aureus* (MRSA), vancomycin resistant enterococci (VRE) and, the most problematic, vancomycin resistant *S. aureus* (VISA). Vancomycin is the drug of last resort to treat MRSA. Vancomycin resistant enterococci can be antibiotic resistant opportunist pathogens isolated from patients with previous courses of antibiotics and previously hospitalized. VRE can cause endocarditis and urinary tract infections. The gastrointestinal tract is the most common colonization site.

Since 1996, vancomycin-intermediate *S. aureus* (VISA) (MIC=8-16 ug/mL) have been identified in Europe, Asia and the U.S. The terms VISA and GISA (glycopeptide-intermediate *S. aureus*) have been used in the U.S. to describe *S. aureus* with reduced susceptibility to vancomycin. The first three cases of vancomycin resistant *S. aureus* in the U.S. were reported from Michigan, New Jersey and New York. There are CDC guidelines for VISA published in the MMWR, "Interim guidelines for prevention and control of staphylococcal infection associated with reduced susceptibility to vancomycin" (MMWR 1997;46:626-8,656). A minimum inhibitory concentration susceptibility testing method should be used to confirm vancomycin test results. The National Committee for Clinical Laboratory Standards has set the following breakpoints for vancomycin: susceptibility, $\leq$4 ug/mL; intermediate, 8-16 ug/mL, and resistant, $\geq$32 ug/mL.

Descriptive epidemiology

The fourth case of confirmed VISA in the U.S. was reported from Illinois in 1999. A 63-year-old woman transferred from a long-term care facility and put on vancomycin had a positive blood culture for *S. aureus* with an MIC of 4 ug/mL. Three subsequent blood specimens had *S. aureus* with MICs of 8 ug/mL. The isolates were resistant to penicillin, oxacillin, clindamycin, erythromycin, ciprofloxacin and rifampin. The patient died from endocarditis in spite of treatment with vanomycin, rifampin and tobramycin. None of 10 family members or 171 health care workers were colonized with VISA. No other VISA isolates were identified in other patients.

Suggested reading

MMWR. *Staphylococcus aureus* with reduced susceptibility to vancomycin-Illinois, 1999. MMWR 2000;48(51&52):1166-7.

MMWR. Interim guidelines for prevention and control of staphylococcal infection associated with reduced susceptibility to vancomycin. MMWR 1997;46:626-8, 656.

Murray BE. Vancomycin resistant enterococcal infections. N Eng J Med 2000;342 (10):710-21.

***Streptococcus pyogenes*, group A (invasive disease)**

Background

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

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 who are not as likely to transmit the organism as 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. Outbreaks of needle abscesses in drug users due to GAS occurred in Switzerland in 1997.

Case definition

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

Descriptive epidemiology

The number of reported cases of invasive group A streptococcus cases was 273 in 1999 compared to the five-year median of 89. Cases have increased steadily from 1994 to 1999 (Figure 82). The average annual incidence for the one-year period was two per 100,000 population. The median age of the cases was 52 years (Figure 83). 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 (5) and 60 to 69 years of age (4). Fifty-one percent were male. Cases were more likely to occur during the winter months (Figure 84). Ten percent of cases were in Hispanics. Eighty-one percent of cases were in whites, 19 percent in African-Americans and 0.8 percent in Asians. Almost half (45 percent) of the cases reported were residents of Cook County. At least 16 (6 percent) were residents of nursing homes.

Ten of the invasive GAS cases were necrotizing fasciitis and 27 were toxic shock syndrome. Forty-four of the reported invasive GAS infections were fatal, yielding an overall case fatality rate of 19 percent.

Cultures were positive from blood (82 percent), tissue (7 percent), synovial fluid (5 percent), pleural fluid (5 percent), pericardial fluid (2 percent), cerebrospinal fluid (0.4 percent) and other sources (6 percent).

In the 260 individuals where type of infection was indicated, the following conditions

were reported: cellulitis (33 percent), pneumonia (23 percent), sepsis (20 percent), nonsurgical wound (8 percent), disseminated intravascular coagulation (8 percent), myositis (7 percent), septic arthritis (5 percent), surgical wound (3 percent), osteomyelitis (2 percent), peritonitis (1 percent), polyarthritis (1 percent), postpartum (0.4 percent) and meningitis (1 percent). Septicemia with other conditions was reported in 28 percent of cases.

Signs and symptoms reported by cases included fever (88 percent), hypotension (38 percent), vomiting (25 percent), rash (23 percent), diarrhea (22 percent), myalgia (17 percent), sore throat (16 percent), syncope (15 percent), desquamating rash, (4 percent) and injected tongue (2 percent). Other problems reported by cases included renal impairment (33 percent), debridement (13 percent), acute respiratory distress syndrome (11 percent) and amputation (2 percent).

Underlying disease conditions were reported in 42 percent of cases. The underlying conditions reported were diabetes (15 percent), heart conditions (11 percent), non-surgical wounds (11 percent), malignancy (9 percent), blunt trauma (5 percent), renal dialysis (4 percent), stroke (4 percent), immunosuppressive therapy (4 percent), liver cirrhosis (3 percent), surgical wound (3 percent), chickenpox (3 percent), chronic lung disease (2 percent), alcohol abuse (2 percent), intravenous drug use (2 percent), vascular problems (1 percent) and a device (1 percent).

A cluster of cases occurred in 1999. By March 3, 1999, 37 cases, including nine deaths were identified in a five-county area in northeastern Illinois. The five-year median for this area and time period was 16 cases. By June 16, 103 cases with 19 deaths had been identified. The fatalities were seven cases of NF and 12 cases of STSS. Typing identified at least nine different strains. T type 3 M type 3 was the most commonly identified strain. No two cases had a common link.

Summary

The number of reported invasive GAS cases was 273 in 1999, which was more than double the five-year median. The increase in reported cases in the last few years could either be a true increase or may reflect improved reporting due to greater awareness of this disease. Almost half of the cases were over 60 years of age.

Suggested reading

Bohlen LM, Muhlemann K et al. Outbreak among drug users caused by a clonal strain of group A streptococcus. Emerg Inf Dis 2000;6(2):175-9.

Figure 82. Invasive Group A Streptococcus Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

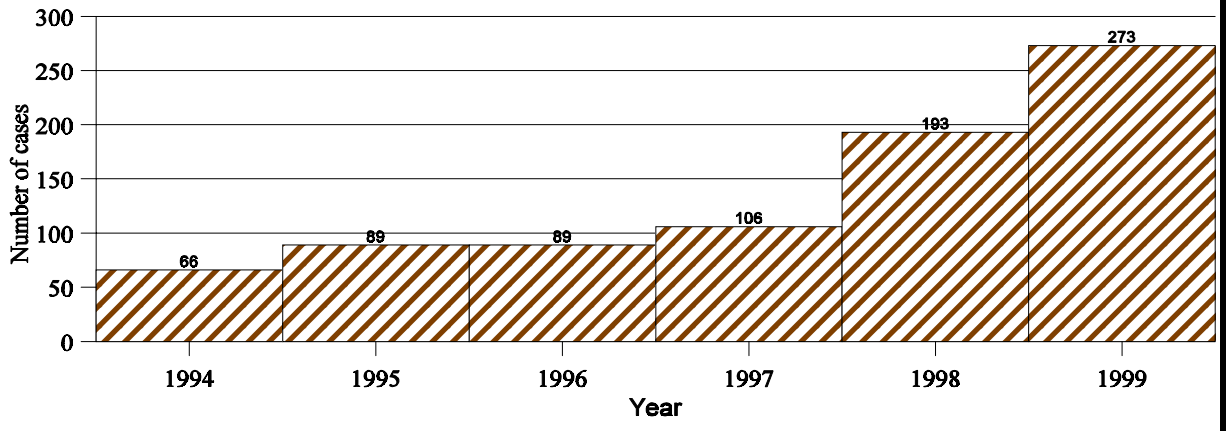


Figure 83. Incidence of Invasive Group A Streptococcus in Illinois by Age, 1999

Source: Illinois Department of Public Health, 2000

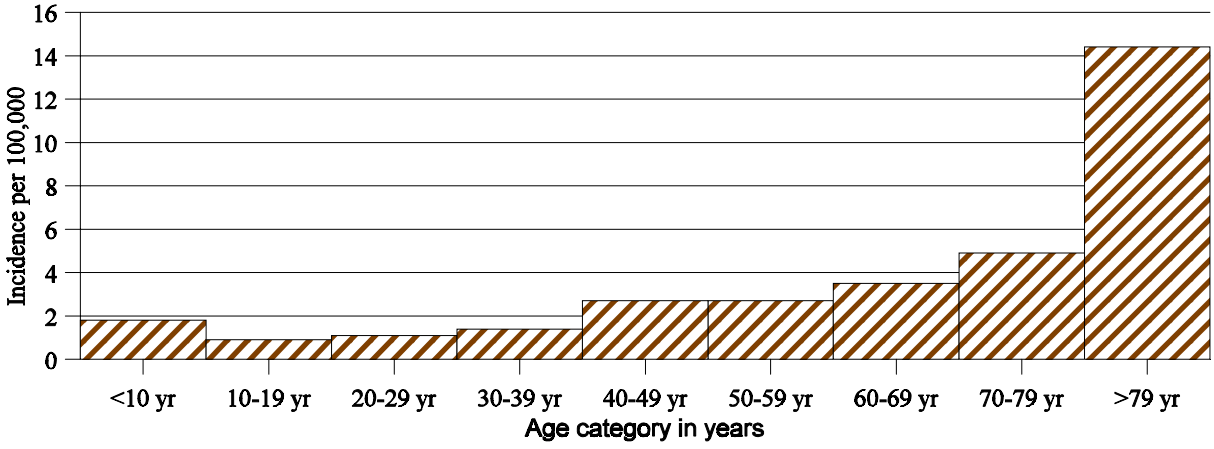
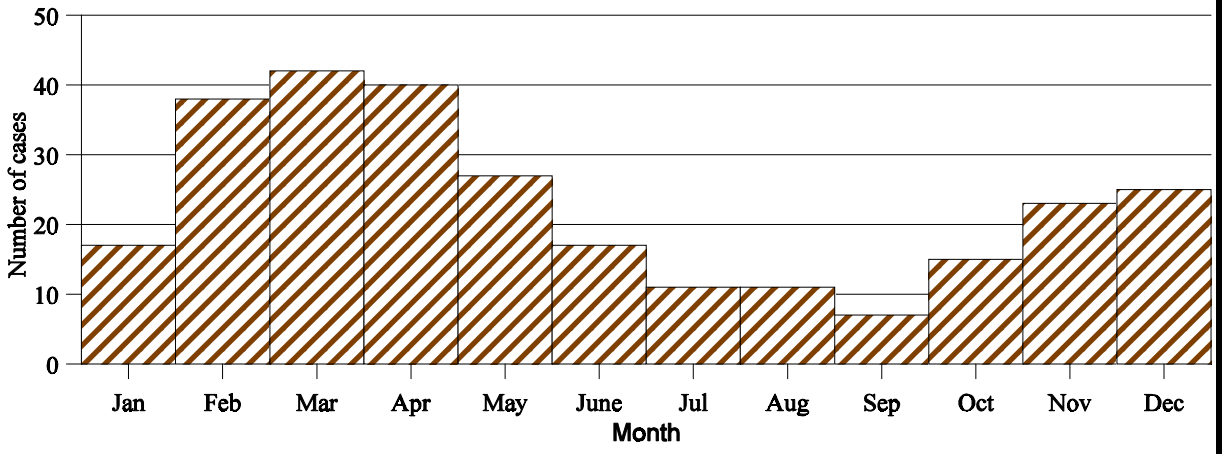


Figure 84. Reported Invasive GAS Cases in Illinois by Month, 1999

Source: Illinois Department of Public Health, 2000

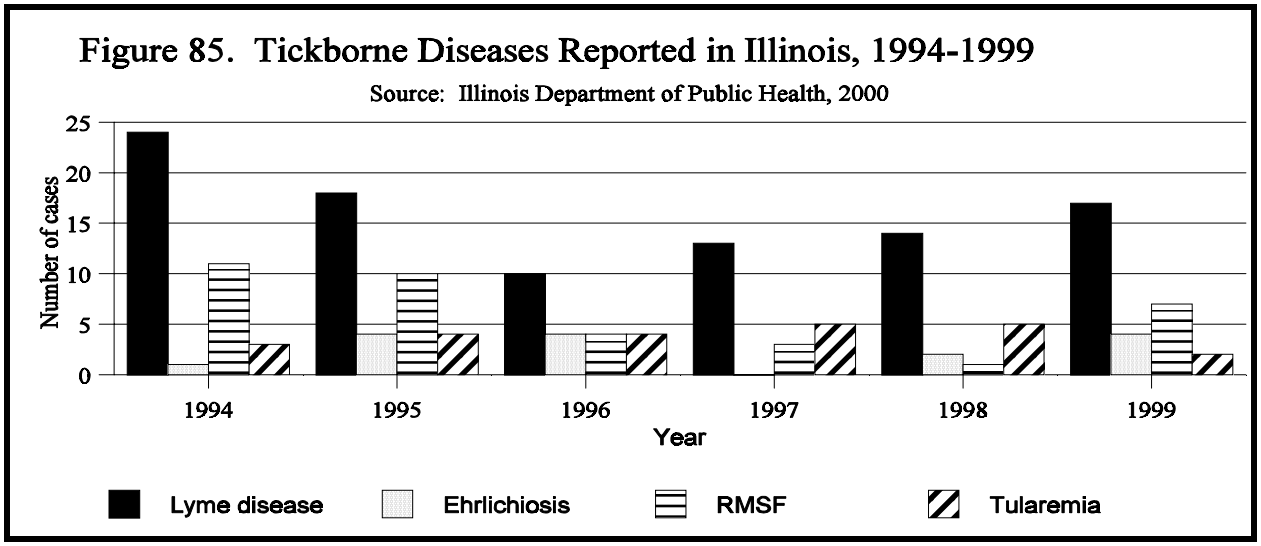


Tickborne Diseases found in Illinois

Five tickborne diseases have been reported in Illinois. Any Illinois resident diagnosed with a tick-borne disease is counted in the Illinois cases even though he/she may have reported tick exposures in another state. These tickborne diseases are listed in Table 13 below and in individual sections in this document. Cases by year from 1994 through 1999 are shown in Figure 85.

Table. 13. Tickborne Diseases Reported in Illinois Residents

Disease	Organism	Tick vectors	Symptoms	Where found
Rocky Mountain spotted fever	*Rickettsia rickettsii*	*D. variabilis* American dog tick, *D. andersoni* (Rocky Mountain wood tick)	fever, headache, rash	Throughout the U.S., most common in SE
Tularemia	*Francisella tularensis*	*A. americanum*, *D. variabilis, D. andersoni*	ulcer at entry site, enlarged lymph node	Throughout North America
Lyme disease	*B. burgdorferi*	*I. scapularis* (deer tick)	fatigue, chills, fever, erythema migrans, enlarged lymph nodes	Primarily on the west coast, N.E. U.S., north central U.S.
Human monocytic ehrlichiosis	*E. chaffeensis*	*A. americanum* (lone star tick)	fever, headache, myalgia, vomiting	Most common in the southern states
Human granulocytic ehrlichiosis	not yet named	*I. scapularis*	fever, headache, myalgia, vomiting	Most common in upper midwest and N.E. states



Toxic shock syndrome (TSS)

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 are usually involved, including the gastrointestinal, muscular, mucous membranes, renal, hepatic, hematologic or central nervous systems. Most cases have been associated with strains of *Staphylococcus aureus* that produce a special toxin.

Women comprised 93 percent of U.S. toxic shock syndrome cases from 1979 to 1996. Ninety-eight percent of cases were hospitalized, and there was a 4 percent case fatality rate.

Case definition

The six clinical findings used in establishing 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

There were five cases of TSS reported in Illinois in 1999 compared to the previous five-year median of 11 (Figure 86). All five cases in 1999 occurred in white females. The majority of the cases (80 percent) occurred in those 20 to 39 years of age. The mean age was 35 (range 22 to 52). One case was Hispanic. The counties of residence were Cook, Macon and Mason.

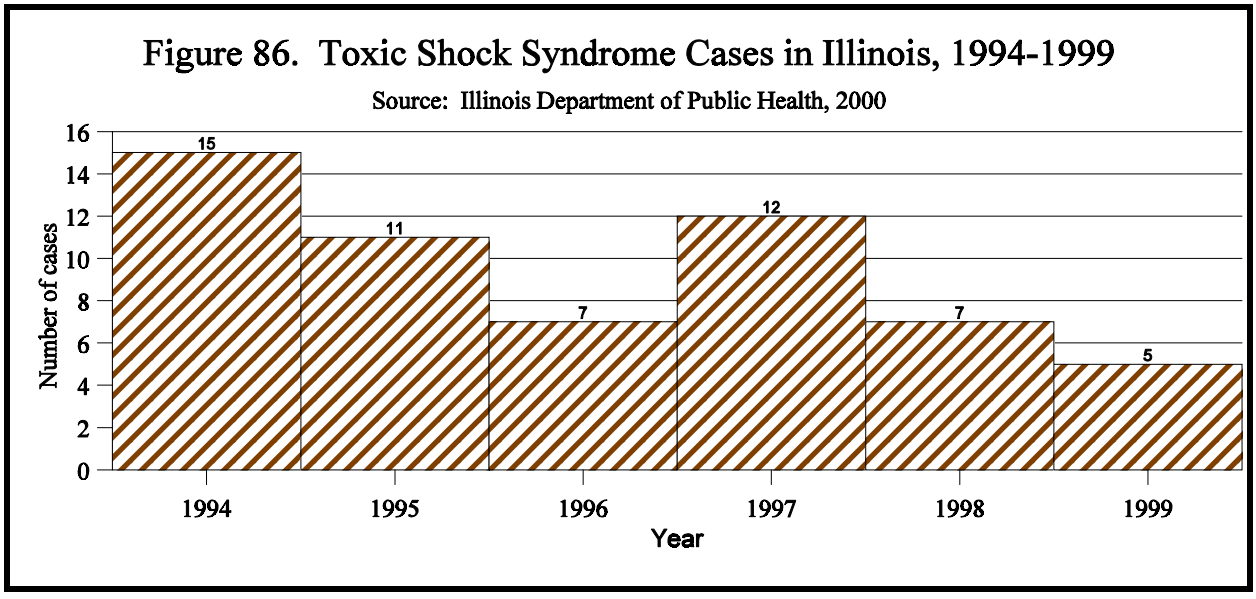
All five patients were hospitalized with TSS in 1999. Three of five cases were classified as menstruation associated. Symptoms and signs in cases included rash (5 cases), fever (5 cases), hypotension (5 cases), diarrhea (4 cases), desquamation (4 cases), myalgia (4 cases), vomiting (3 cases), vaginal discharge (2 cases), sore throat (2 cases) orthostatic dizziness (2 cases), disorientation (2 cases), oropharyngeal hyperemia (2 cases), conjunctival hyperemia (2 cases), vaginal hyperemia (1 case), abdominal pain (1 case), injected tongue (1 case) and syncope (1 case). Information on symptoms and signs was not available for all patients. *Staphylococcus aureus* was isolated from vaginal or wound infections from all five individuals.

Summary

All staphylococcal TSS cases reported in 1999 occurred in women from the ages of 20 to 52 years of age. Three of five were associated with menstruation.

Suggested readings

Hajjeh RA et al. Toxic shock syndrome in the United States: surveillance update, 1979-1996. Emerg Inf Dis 1999;5(6):807-10.



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 at the third to sixth week following infection. Eosinophilia is common. Muscle biopsies with the non-calcified larvae of *T. spiralis* indicate recent infection. Larvae also may be identified in suspect food. Swine in the U.S. rarely have *Trichinella.*

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

Two cases were reported in 1999 from a single family; one case was female. Both cases were over the age of 60. Both individuals were serologically positive at CDC's lab and experienced periorbital edema and muscle pain; both had eosinophilia. Onsets of illness were from March to May. Both individuals recovered. The source of infection for both cases was suspected to be homemade pork sausage consumed in March.

Summary

Only two cases of *Trichinella*, from a single family, were reported in 1999 and both had consumed homemade pork sausage.

Tuberculosis

Background

The *Mycobacterium tuberculosis* complex includes *M. tuberculosis*, *M. africanum* and *M. bovis*. Tubercle bacilli are transmitted by inhalation of airborne droplet nuclei produced by people with tuberculosis (TB) disease. Prolonged close contact with cases may lead to latent TB infection. Tuberculin skin sensitivity, as noted by a "positive" skin test, usually appears four to 12 weeks after infection.

A positive skin test reaction is defined as 15 mm induration for those having no risk factors and living in areas with little tuberculosis. Ten mm induration is considered to be a positive reaction among individuals with medical risk factors (including diabetes mellitus, alcoholism and drug abuse), those who reside in high prevalence areas or areas of low socioeconomic status, residents and staff of long-term care facilities and jails, and children younger than 4 years of age. For household contacts of infectious tuberculosis cases, persons with abnormal chest radiographs suggesting old healed tuberculosis and people with HIV, 5 mm induration should be considered a positive skin reaction.

Approximately 90 percent to 95 percent of newly infected individuals have latent TB infection, 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 country of origin impact on 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 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.

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, or 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 clinical specimen when a culture has not been or cannot be obtained.

Descriptive epidemiology

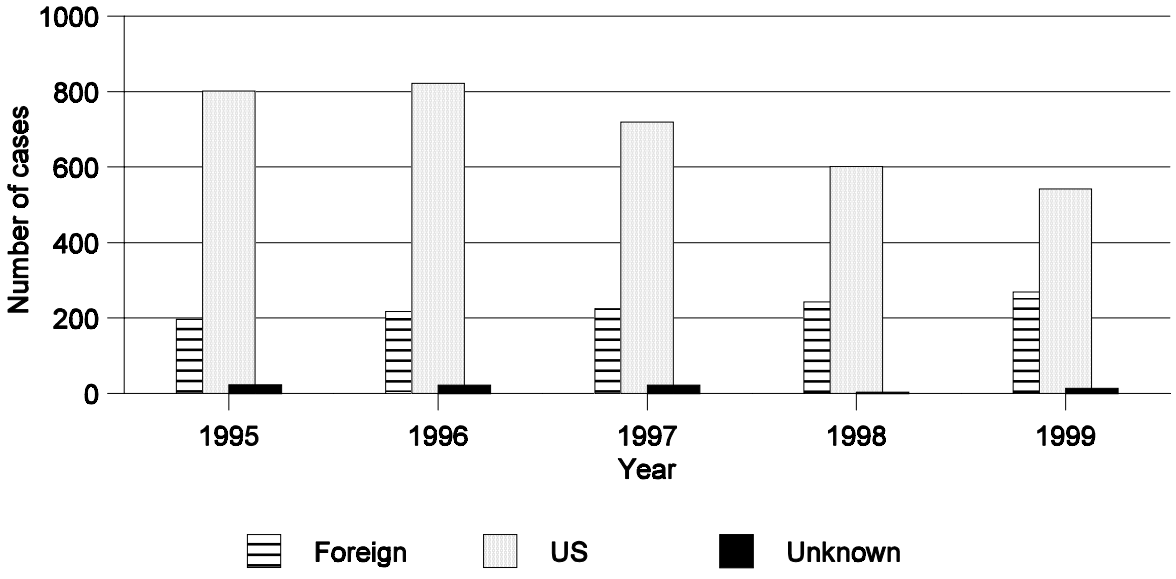
The 825 cases reported in 1999 represent a 3 percent decrease from the 850 cases reported in 1998. Chicago decreased 2 percent with 463 cases compared to 473 in 1998 (Figure 87).

While the yearly number of reported TB cases has declined, the number of foreign-born TB cases are showing yearly increases. Foreign-born cases of TB in Illinois (N=269) accounted for 33 percent of all cases reported in 1999 (Figure 88). Persons born in Mexico, India and the Philippines contributed the largest numbers (60 percent) of foreign-born cases in Illinois. Persons born in Korea (5 percent), Poland (5 percent), Vietnam (4 percent) and China (3 percent) were also represented among foreign-born cases. Forty-two percent were African American, 39 percent white and 18 percent were Asian or Pacific Islander. Seventeen percent of all reported cases were Hispanic. The highest incidence of TB occurred in those over 65 years of age (Table 14). Nine percent of cases undergoing susceptibility testing were resistant to at least one drug. Sixty-one percent of reported cases were males.

The reported cases of TB indicated the following risk factors: excessive use of alcohol (16 percent), non-injecting drug use (8 percent), homelessness (6 percent), long-term care facility resident (4 percent), injecting drug use (4 percent) and correctional facility inmate (2 percent).

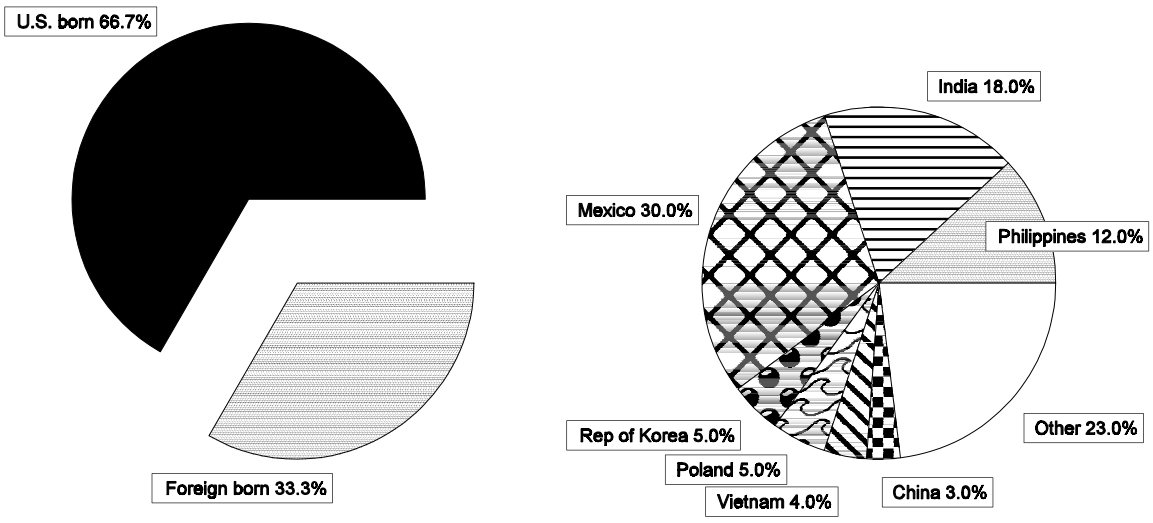
Public health attention must continue to be focused on high-risk groups, especially those persons born outside of this country.

Figure 87. U.S. and Foreign Born TB Cases in Illinois, 1995-1999



Source: Illinois Department of Public Health, 2000

Figure 88. TB by Country of Origin, Illinois, 1999[1]



[1]Left chart indicates U.S. and foreign born, right chart includes only foreign-born

Source: Illinois Department of Public Health, 2000

Table 14. Age Distribution of Tuberculosis Cases in Illinois, 1999

Age	Incidence *
< 5 years	2.8
5 - 14	1.3
15 - 44	6.5
45 - 64	10.3
65 +	12.3
All	7.0

* Incidence per 100,000 based on 1994 population estimate.

Source: Illinois Department of Public Health, 2000

Summary

In 1999, 825 cases of TB were reported in Illinois. Thirty-three 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 Phillippines being the most common countries of origin. The number of cases among U.S.-born persons is decreasing.

Tularemia

Background

Tularemia is caused by the bacteria, *Francisella tularensis*. It can be transmitted by ticks, by biting flies or by entrance into the body, mainly through cuts or scratches when handling tissue from infected animals. Animals in the lagomorph or rodent family are the main reservoirs

for the organism. Clinical signs in people include fever, chills, malaise and fatigue followed by the development of one of five clinical syndromes: ulceroglandular, glandular, typhoidal, oculoglandular or oropharyngeal.

Case definition

The CDC case definition for a confirmed case of tularemia is either isolation of *F. tularensis* from a clinical specimen or a fourfold 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

Two cases of tularemia were reported in Illinois in 1999. Both cases were female and over 55 years of age. Onsets occurred in May and December. One patient had fever, vomiting and cervical adenitis and was hospitalized for 16 days. Detailed information was not available on the other case. The exposure sites for cases were the following Illinois counties: Effingham and Macoupin. The cases in Illinois are as follows: 1990 (6), 1991 (5), 1992 (2), 1993 (3), 1994 (3), 1995 (4), 1996 (4), 1997 (5), 1998 (5).

Typhoid fever

Background

Typhoid fever is caused by infection with *Salmonella typhi*. The disease is transmitted through ingestion of food or water contaminated by feces from cases or carriers. Unlike other types of *Salmonella*, *S. typhi* is not found in animal reservoirs; humans are the only reservoirs.

Types of products implicated in some countries include shellfish, raw fruits, vegetables and contaminated milk or milk products. The incubation period is from three days to three months with a usual range of one to three weeks. The disease is characterized by fever, headache, malaise, bradycardia, splenomegaly, rash and nonproductive cough. Constipation is more common than diarrhea in adults. A carrier state occurs in 2 percent to 5 percent of cases and is more common in those infected during middle age, and in those having biliary tract abnormalities, including gallstones.

The incidence of typhoid fever in the U.S. is 0.2 cases per 100,000 persons per year. More cases have been acquired overseas in recent years than in the past. From 1996 through 1997, CDC conducted a study on antimicrobial resistance in reported cases of *S. typhi* across the U.S. Eighty-one percent of typhoid fever cases reported travel abroad. The top four travel destinations of cases were India, Pakistan, Bangladesh and Haiti. Three-quarters of isolates were susceptible to all 12 antibiotics tested. Almost a quarter were resistant to at least one agent and 16 percent were multi-drug resistant. Almost all those with multi-drug resistant organisms had traveled overseas. Travel to the Indian subcontinent and Vietnam were significantly associated with multi-drug resistant typhoid fever. A group to target for typhoid vaccination is foreign-born U.S. residents who are returning to their country of origin to visit.

Case definition

A confirmed case is a clinically compatible illness with isolation of *S. 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

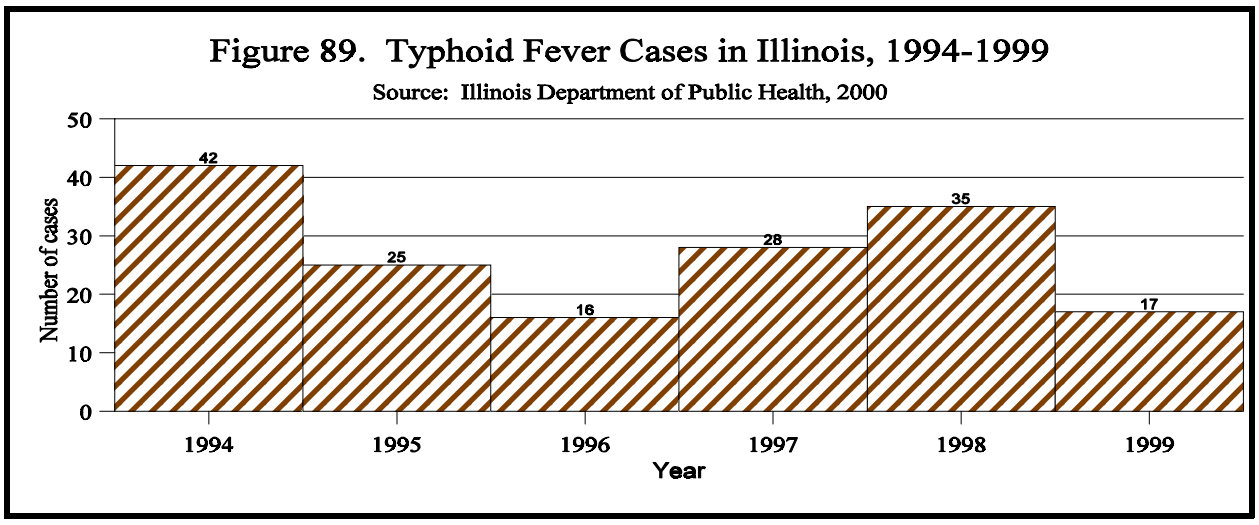
In 1999, there were 17 cases of typhoid fever in Illinois residents, five of which were acquired in the U.S. The number of cases was lower than the five-year median (28 cases). From 1994 through 1999, there have been from 16 to 65 cases of typhoid fever annually in Illinois (Figure 89). Cases ranged in age from 1 year to 56 years of age (mean age=21). Cases occurred throughout the year. Ten cases (67 percent) were hospitalized. Eleven cases were known to be citizens of the U.S., two were not and for four cases their status was unknown. None were food handlers. Resistance characteristics of isolates from cases showed resistance to the following antibiotics: ampicillin (20 percent), chloramphenicol (33 percent), trimethoprim-sulfamethoxazole (11 percent) and fluoroquinolenes (10 percent). Only one case reported having received typhoid vaccination within five years of illness onset. No cases were known to have been linked to a typhoid carrier. Travel destinations for imported cases included India (5), Mexico (2), Nigeria (1), multiple African counties (1) and unknown (3). Most individuals who travelled did so for the purpose of visiting relatives. Eleven cases resided in Cook County.

Summary

There were 17 typhoid fever cases reported in Illinois in 1999. However, the majority of cases were acquired outside the U.S. India was the most common travel destination for those cases who reported travel outside the U.S.

Suggested readings

Ackers M-L, Duhr ND et al. Laboratory-based surveillance of *Salmonella* serotype *typhi* infections in the United States. Antibiotic resistance on the rise. JAMA 2000;283(20):2668-73.



Yersiniosis

Background

Yersiniosis is an infrequently reported cause of diarrhea in the U.S. It is caused by *Yersinia enterocolitica* or *Y. pseudotuberculosis*. Transmission is by the fecal-oral route, with 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. In outbreaks in the U.S. between 1976 and 1982, most were caused by serogroup O:8. Vehicles of transmission in these outbreaks included tofu, chocolate milk, bean sprouts and powdered milk. After 1988, several outbreaks involving infants in the U.S. were attributed to household preparation of chitterlings (pig intestines) and were due to serogroup O:3. An outbreak in the northeastern U.S. in 1995 was attributed to post-pasteurization contamination of milk and was due to serogroup O:8. Yersiniosis is not nationally notifiable and is voluntarily reportable in Illinois. Mandatory reporting began on April 1, 2001.

Case definition

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

Descriptive epidemiology

There were 20 confirmed cases of yersiniosis reported in Illinois in 1999 compared to the five-year median of 24 (Figure 90). In 1999, eight cases (42 percent) occurred in those less than 5 years of age and three (16 percent) in those 60 years or more of age (Figure 91). Fifty-five percent of cases were in males. Twenty-five percent were in African Americans and 62 percent in whites.

Summary

Reporting for yersiniosis in Illinois is voluntary, and from 14 to 42 cases have been reported yearly since 1990. More than 50 percent of cases in 1999 occurred either in those less than 1 year of age or those 60 years or more of age.

Suggested readings

Ackers M-L et al. An outbreak of *Yersinia enterocolitica* O:8 infections associated with pasteurized milk. JID 2000;181:1834-7.

Figure 90. Reported Yersiniosis Cases in Illinois, 1994-1999

Source: Illinois Department of Public Health, 2000

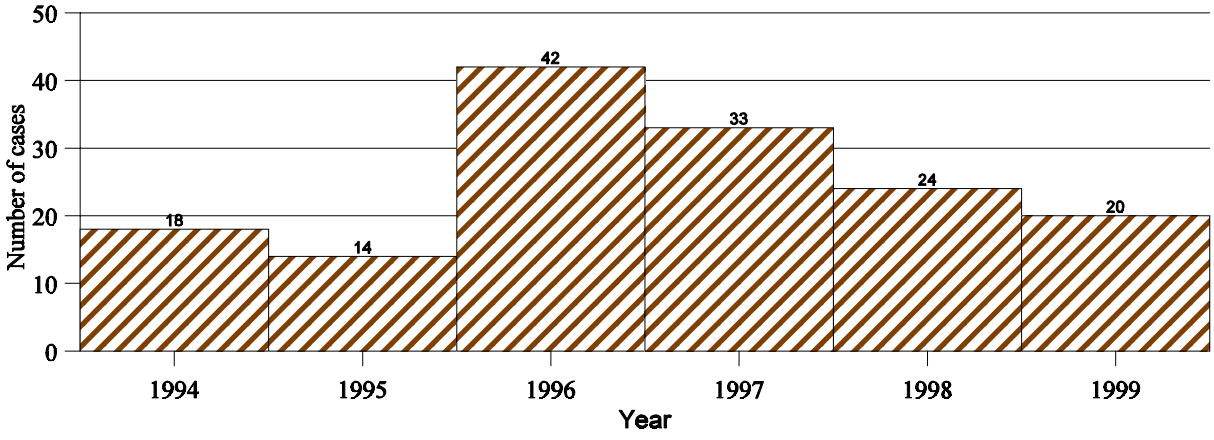


Figure 91. Age Distribution of Invasive Yersiniosis in Illinois, 1999

Source: Illinois Department of Public Health, 2000

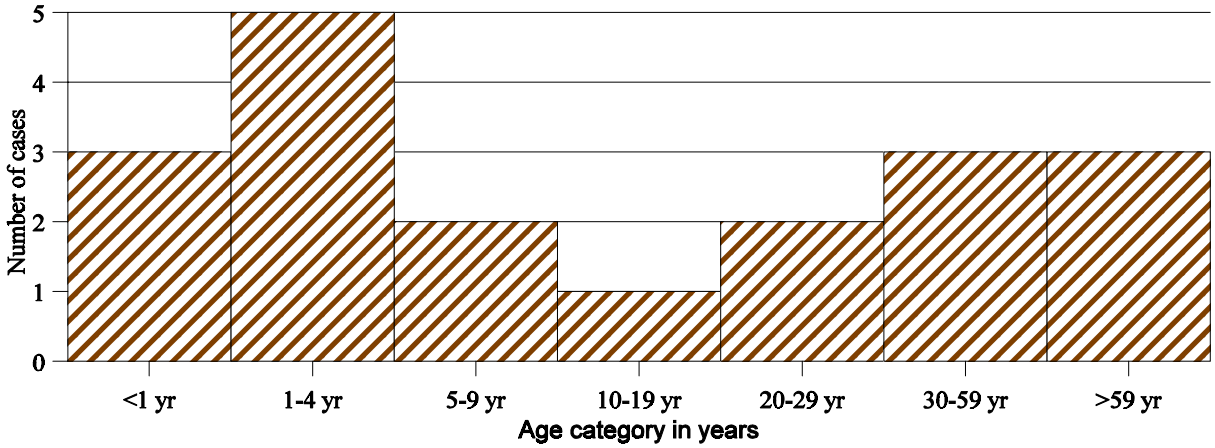


Table 15. Reported Cases of Infectious Diseases in Illinois, 1999

Disease	#	Disease	#
Acquired immune deficiency syndrome	1,583	Meningitis, aseptic	562
Amebiasis case	65	Meningitis, pneumococcal	106
Animal bites	9,446	Meningococcal, invasive	111
Anthrax	0	Mumps	16
Blastomycosis	50	Murine typhus	0
Botulism	0	Pertussis	140
Brucellosis	10	Psittacosis	0
Campylobacteriosis	721	Rabies, animal	10
Cat scratch disease	31	Rabies, human	0
Chickenpox	13,881	Reye syndrome	1
Chlamydia trachomatis	32,870	Rheumatic fever	0
Cholera	0	Rocky Mountain spotted fever	7
Cryptosporidiosis	90	Rubella	1
Cysticercosis	10	Salmonellosis	1,600
Dengue	2	Scarlet fever	2,339
Diphtheria	0	Shigellosis	1,330
Ehrlichiosis	5	*S.aureus,* vancomycin resistant	1
Encephalitis, infectious or post-infectious	58	*Streptococcus*, Grp A, invasive	273
E. coli O157:H7	498	*Streptococcus*, Grp B, invasive	41
Foodborne outbreaks	64	Syphilis	482
Giardiasis case	1,150	Tetanus	0
Gonorrhea	23,254	Toxic shock syndrome	5
Guillain Barre syndrome	8	Trichinosis	2
H. influenzae, invasive disease	89	Tuberculosis	825
Hantavirus	0	Tularemia	2
Hepatitis A cases	849	Typhoid fever (case)	12
Hepatitis B cases	202	Typhoid fever (carrier)	2
Hepatitis NANB cases	48	Yersiniosis	20
Histoplasmosis	57		
Kawasaki	6		
Legionnaire disease	33		
Leprosy	3		
Leptospirosis	1		
Listeriosis	47		
Lyme disease	17		
Malaria	77		
Measles	2		

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). The state health department, 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 the case count for that disease. 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 versus 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 of a case. Therefore, the numbers for diagnosed AIDS cases in 1999 may be updated.

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

The Illinois population used to calculate incidence rates and race and ethnicity proportions was the 1990 Modified Age-Race-Sex (MARS) data. The Illinois population tops 11 million people. The racial distribution includes 82 percent white, 15 percent African American, 2 percent Asian and 1 percent other; 8 percent report Hispanic ethnicity. Fifty-two percent of the population is female. The following table shows the age distribution of the Illinois population.

Age category	Population size
<1 year	183,254
1-4 years	682,885
5-9 years	834,947
10-19 years	1,615,954
20-29 years	1,850,764
30-59 years	4,343,902
>59 years	1,918,896
TOTAL	11,430,602

Where it was deemed useful, graphs were produced showing the number of cases by month, the number of cases by year since 1994 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 1990 MARS data and multiplying by 100,000. If an annual incidence rate was calculated for the period 1995 to 1999, it was reached by taking the number of cases reported from 1995 through 1999, 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 1999 only, unless otherwise specified. For some diseases, where the number of cases by year is low, information may be 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.