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Reportable Communicable Diseases in Illinois¹

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

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

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

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

¹Reporting requirements were changed, effective April 1, 2001.

²Must 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.

2000 Summary of Selected Illinois Infectious Diseases

In Illinois, the communicable disease surveillance system relies on the passive reporting of data required by state law. The current reportable disease list mandates reporting, within specific time frames, of certain diseases and of selected positive laboratory tests. The effectiveness of the surveillance system relies heavily on the cooperation and support of health care providers, laboratories and local health departments in submitting information on reportable disease cases.

There are 57 diseases or conditions listed as nationally reportable to the U.S. Centers for Disease Control and Prevention (CDC). The number reflects certain combinations; for example, HIV and AIDS are combined under one category (human immunodeficiency virus/acquired immune deficiency syndrome [HIV/AIDS]) as are invasive group A streptococcus (GAS) and toxic shock syndrome due to GAS. Diseases reportable to CDC but not in Illinois include animal rabies, botulism, chancroid, coccidioidomycosis, cyclospora, hantavirus, hemolytic uremic syndrome (HUS), human granulocytic ehrlichiosis (HGE), human monocytic ehrlichiosis (HME), Q fever, drug resistant *S. pneumoniae* and yellow fever. In 2000, the 10 most frequently reported notifiable infectious diseases in the United States were chlamydia, gonorrhea, AIDS, salmonellosis, hepatitis A, shigellosis, tuberculosis, Lyme disease, hepatitis B and pertussis.

Several of these diseases were added to the state reporting list as of April 1, 2001 (botulism, chancroid, cyclospora, HUS, hantavirus, HGE, HME, Q fever and drug resistant *S. pneumoniae*). Coccidioidomycosis is not endemic in Illinois. Because only the state public health and agriculture laboratories do animal rabies testing in Illinois, these case are reported through that system. Yellow fever would be reportable in Illinois because it would fall within the category of a "disease of unknown or unusual etiology."

In 2000, 58 different types of infectious diseases were reportable to IDPH (see page 1). Many of these diseases are included in this annual report along with some non-reportable diseases of importance in 2000. Case numbers for the various infectious diseases listed in this summary should be considered minimum estimates. There are several reasons why reported numbers are lower than the actual incidence of disease: Many individuals do not seek medical care and thus are not diagnosed; some cases are diagnosed on a clinical basis without confirmatory or supportive laboratory testing; and among diagnosed cases, some are not reported. **These surveillance data are used to evaluate disease distribution trends over time rather than to identify precisely the total number of cases occurring in the state.**

The five most frequently reported nationally notifiable infectious diseases in Illinois were chlamydia, gonorrhea, AIDS, *Salmonella* and *Shigella*. Diseases that increased in 2000 over the previous five-year median included AIDS, blastomycosis, campylobacter, cryptosporidiosis, *E. coli* O157:H7, foodborne outbreaks, invasive group A streptococcus, Lyme disease, histoplasmosis and gonorrhea. The number of reported cases of animal bites, aseptic meningitis, group B streptococcus, *S. pneumoniae* meningitis, giardiasis, hepatitis A, hepatitis B, hepatitis

non-A non-B and salmonellosis have been decreasing compared to the previous five-year median.

Highlights of 2000 in Illinois included resident cases in two multi-state foodborne outbreaks. In one of these outbreaks, several Illinois residents became ill with Shigella after consuming a five-layer bean dip; the other outbreak involved a meal contaminated with Norwalklike virus that was sent to multiple car dealerships across the U.S., including several in Illinois. Another interesting foodborne outbreak involved eight Illinois residents who traveled to the Caribbean and became ill with a rare foodborne parasitic pathogen, Angiostrongylus cantanensis. (This outbreak is not reflected in the Illinois numbers because the food was consumed overseas.) Another unusual parasite was identified in a 2-year-old child who developed neurologic disease after being infected with the raccoon roundworm, Baylisascaris procyonis. This was only the third case of Baylisascaris reported in Illinois. Also in 2000, five cases of erythema migrans, the distinctive skin lesion associated with Lyme disease, were identified in southern Illinois; however, the cases tested negative for B. burgdorferi, the spirochete that causes this tick-borne (usually carried by the deer, or black-legged, tick) disease. In southern Illinois, the lone star tick, which is not known to carry the bacterium, is prevalent so these cases may represent a new type of tick-borne infection in the state. In the U.S., West Nile virus cases were still reported, indicating that the virus had overwintered in the eastern part of the country. However, no positive birds, animals or humans were identified in Illinois in 2000.

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

Illinois Counties



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Acquired immune deficiency syndrome/Human immunodeficiency virus

Background

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

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

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

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

Case definition

In the state of Illinois, AIDS has always been reported by name, while HIV reporting was without patient identifiers until July 1, 1999. For HIV reporting, this meant that individuals with multiple positive test results for HIV were counted as new HIV cases each time they tested positive. On July 1, 1999, reporting of HIV by a patient code number (PCN) became mandatory in Illinois. The PCN is a coding system that permits duplicate reports to be identified but is not specific enough to permit identification of an individual person. It is expected that use of the PCN will allow enhanced surveillance for HIV infection and eliminate duplicate reporting. Prevalent cases of HIV 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 time. The changes can be referred to as pre-1987, the 1987 revision and the 1993 revision. To review the case definitions and how they have changed over time, the following MMWRs (*Morbidity and Mortality Weekly Report*) should be reviewed:

- 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 about this latest revision, see "Guidelines for national human immunodeficiency virus case surveillance, including monitoring for human immunodeficiency virus infection and acquired immunodeficiency syndrome," MMWR 1999; 48 (No. RR-13).

Descriptive epidemiology

• Number of cases reported in Illinois in 2000 – 1,781. Although the number of AIDS cases reported to IDPH has been declining, the numbers rose in 1999 and again in 2000. 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. "Although the number of AIDS cases reported in Illinois last year showed an increase for the second consecutive year, the upswing most likely is the result of better compliance in reporting older cases



rather than a sudden resurgence in the disease," said Dr. John R. Lumpkin, state public health director¹ (see Figure 1). Cumulative AIDS cases reported in Illinois (1981 through 2000) – 24,934, the sixth highest state total in the United States Mode of transmission among all AIDS cases reported in Illinois in 2000 is shown in Figure 2.



Heterosexual contact as the mode of transmission accounted for 13 percent, or 233, of all the reported AIDS cases in 2000. This represents an increase since 1994 when 9 percent of all AIDS cases reported heterosexual contact as the mode of transmission (Figure 3).



• Gender-Most cases were male (1,354 cases or 76 percent). For all cases reported among males, men who have sex with men (MSM) accounted for the largest number of AIDS cases (585 cases or 43 percent), followed by injection drug users (IDU) with 291 cases or 22 percent (Figure 4).



• Cases among females accounted for 427 cases or 24 percent of the total AIDS cases reported in 2000. Among females, heterosexual contact accounted for 147 cases or 34 percent of the total, with IDU accounting for 115 cases or 27 percent (Figure 5).



• Race/ethnicity - African Americans, who represent 15 percent of the state's population, accounted for 59 percent, or 1,053 of the AIDS cases reported in 2000. This represents an





• Geographic distribution - In 2000, metropolitan Chicago cases comprised 88 percent of the total, with Chicago accounting for 69 percent of the total Illinois cases. AIDS cases residing outside of the Chicago metropolitan area represented 12 percent of the state total.

Summary

More than 1,700 AIDS cases were reported in Illinois between January 1 and December 31, 2000. Most AIDS cases occurred in males. The most common risk factor for transmission in males was MSM. Heterosexual contact was the most common risk factor for females, followed by IDU. In 1999, these two risk factors were equally divided. Heterosexual contact as the mode of transmission has increased since 1994 as have cases among African Americans.

¹AIDS Cases Up for Second Straight Year, IDPH News Release; February 15, 2001

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

The CDC case definition used by IDPH 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

- Number of cases reported in Illinois in 2000 59 (five-year median= 65). From 1995 to 2000, the number of cases reported per year ranged from 47 to 82 (Figure 7).
- Age Cases ranged from 2 to 71 years of age (mean=34) (Figure 8).
- Gender Among 30- to 39-year olds, there were 14 male cases and only two females. Overall, males accounted for 68 percent of cases, a significantly higher proportion than in the Illinois population (49 percent male).
- Race/ethnicity 83 percent were white, 11 percent were African American and 6 percent were Asian; 30 percent identified themselves as Hispanic, a significantly higher proportion than in the total Illinois population (12 percent).
- Seasonal variation No seasonal peak in amebiasis
- Symptoms Diarrhea was reported by 77 percent of cases and vomiting by 23 percent of cases.
- Treatment 70 percent of cases were known to be treated for their illness. Of cases where the information was known, 18 percent were hospitalized.
- Risk factors Traveling outside the country (30 percent), drinking from a private water supply (24 percent), swimming in non-chlorinated water (18 percent), contact with someone from a residential institution (3 percent) and contact with someone in a day care center (5 percent). In the four weeks prior to illness, 12 individuals reported a known travel destination outside the country. Travel to Mexico, the Middle East, Africa and Australia was reported by cases.

• Past incidence – Amebiasis cases in Illinois peaked during two periods: from 1933 to1934 and from 1948 to 1950 (See Figure 9). The 1933-1934 increase was due to a large waterborne outbreak in several hotels in Chicago. The outbreak was thought to have been caused by cross-connections between plumbing and sewage lines and by an overload of the sewage system's safe carrying capacity by large numbers of visitors to a convention. About 1,000 persons became ill, many of them out-of-state residents.

Summary

From 47 to 82 cases of amebiasis were reported in Illinois each year from 1995 to 2000. Amebiasis was significantly more common in those reporting Hispanic ethnicity. Thirty percent of individuals traveled outside the U.S. The most common travel site outside the U.S. was Mexico. Since 1931 there have been two peaks in the occurrence of amebiasis in Illinois.







Animal bites

Background

While reporting occurs in less than 20 percent of cases, animal bites are a major public health hazard. On a per capita basis, the United States has more dogs than any other country (approximately 52 million) and dogs are the most commonly reported biting animal. A dog's tendency to bite may be the result of at least five factors: heredity, early experience, later socialization and training, health and victim behavior.

Reducing dog bites in a community requires the cooperation of animal control agencies, human and veterinary medical communities, public health departments and dog owner groups. The American Veterinary Medical Association (AVMA) has developed some guidelines for creating a community-based dog bite prevention program (see suggested readings). The year 2000 was the last year animal bites were listed on IDPH's reportable disease list. (Animal bites are still reportable to local animal control agencies.) Beginning April 1, 2001, animal bite reporting was replaced with potential human rabies exposures.

Descriptive epidemiology

- Number of animal bites reported in Illinois in 2000 7,531 (five-year median=9,065) (See Figure 10). Information on the species of biting animal and whether rabies post-exposure treatment was given to the person bitten was not collected.
- Age Rates (per 100,000) were highest in children, particularly 5- to 9-year-olds (123 per 100,000) and 10- to 14-year-olds (103 per 100,000) (Figure 11).
- Past incidence Reporting of animal bites by year goes back to 1931 (See Figure 12). In the early 1980s, reporting of animal bites dropped, which may parallel a decline in rabies incidence or reflect a true decline in animal bites to humans.
- Exotic animals Bites from monkeys pose special problems in assessment of zoonotic disease risks. At least two incidents in 2000 involved bites from macaque monkeys, which can transmit herpes B encephalitis, a frequently fatal disease in humans. A 2-year-old Java macaque bit a child in St. Clair County but the family was unwilling to euthanize the monkey for rabies testing. In another incident in Cook County, a 7-year-old Java macaque attacked its owner for a third time. The owner underwent three hours of surgery to repair deep bites on her head, arms and legs and lost a pint of blood. One of the bites resulted in a fist-sized hole. The monkey, which also had attacked a family dog, was euthanized.

Summary

More than 7,500 animal bites were reported in Illinois in 2000; the highest incidence rate occurred in 5- to 9-year-olds. These bites pose a risk of rabies, wound infections and tissue destruction. Investigating them requires confinement of dogs, cats and ferrets for 10 days; the euthanasia of many other species for rabies testing; and consultation on the need for rabies post-exposure prophylaxis in each bite case and often antimicrobial prophylaxis or treatment of the victim.

Prevention of animals bites should include education, especially for children, about not approaching wild or unfamiliar animals or those that act strangely. Ownership of aggressive exotic animals is discouraged.

Suggested readings

Overall KL, Love M. Dog bites to humans-demography, epidemiology, injury, and risk. JAVMA 2001;218(12): 1923-34.

AVMA. A community approach to dog bite prevention. JAVMA 2001;218(11):1732-49.







Blastomycosis

Background

Blastomyces dermatitidis is the causative agent for blastomycosis, a zoonotic disease endemic in the Midwest. 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 for infection. The reservoir of the organism is moist soil and, for systemic infections, transmission is through inhalation of spore-laden dust. *B. dermatitidis* infections can range from asymptomatic to disseminated disease. For symptomatic infections, the incubation period is approximately 45 days.

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

- Number of cases reported in Illinois in 2000 65 (five-year median=43). From 1995 to 2000, cases per year ranged from 29 to 65 (Figure 13).
- Age The mean age was 45 years (range 10 to 86) (See Figure 14).
- Gender 44 percent were female.
- Race/ethnicity –Two-thirds of the cases (67 percent) were white and 27 percent were African American, a significantly higher proportion than their representation in the Illinois population (15 percent); 13 percent were Hispanic.
- Geographic distribution –Nearly two-thirds (65 percent) of the cases had residential addresses in Cook, Lake or Winnebago counties.
- Symptoms Cough (80 percent), fever (67 percent), weight loss (54 percent), night sweats (44 percent), malaise (42 percent), weakness (36 percent), chills (31 percent), dyspnea (29 percent), skin lesions (29 percent), local swelling (29 percent), anorexia (27 percent), hemoptysis (22 percent) and arthritis (16 percent)
- Diagnosis 42 cases were culture confirmed from bronchial washing (13), lung tissue (11), sputum (4), unknown site (1), other site (10) and multiple sites (3). Identification of organisms resembling blastomycosis in tissues or secretions (lung, bronchial washings, lymph node, unknown and other) was used for diagnosis in 16 cases; eight of these 16 were also culture positive.
- Treatment 85 percent of cases were hospitalized; two cases were fatal.
- Risk factors 34 percent of cases were smokers; 29 percent reported gardening as a hobby. At least one case had diabetes and at least one case reported an underlying immunosuppressive condition.

Summary

The 65 reported cases in 2000 was higher than the five-year median of 43. Blastomycosis

cases occur predominantly in adults. Many cases had symptoms of respiratory involvement, including cough, dyspnea or hemoptysis. More than 65 percent of reported cases were confirmed by culture. Among reported cases, 65 percent reported living in Cook, Lake or Winnebago counties.





Botulism

Background

Botulism is a neurologic illness that results from infection with *Clostridium botulinum*. There are three forms of botulism: foodborne, wound and intestinal (adult and infant). Diagnostic clues for botulism are primary neurologic symptoms including diplopia, blurred vision and ptosis. Also, there is no altered mental status. Differential diagnoses include myasthenia gravis and Guillain-Barré syndrome. These can be differentiated using electromyography (EMG), the pattern of paralysis and reaction to Tensilon.® Paralysis with botulism is flaccid, symmetrical and descending.

Foodborne botulism results from ingestion of preformed toxin present in contaminated food. Wound botulism occurs after the causative organism contaminates a wound that is anaerobic. Wound botulism after injection drug use has become an important public health problem in California, but has not been identified in Illinois. Infant or intestinal botulism is the most common form of botulism in the U.S. and occurs when spores of the organism are ingested and growth and toxin production occurs in the intestine. It affects mostly children younger than 1 year of age but cases in older people have been reported occasionally. These adults may have altered gastrointestinal flora, often due to antibiotic treatment.

There are various types of *Clostridium botulinum* that can cause human illness, including types A, B, E and F. Botulism is considered a possible agent of bioterrorism. However, there have been no reports of its successful use for this purpose in the U.S. Prompt diagnosis and treatment of botulism with botulism anti-toxin are key elements of the public health response to each case reported to public health authorities. Botulism should be reported to the local health department immediately.

A total of 309 cases of botulism nationwide were reported to CDC in 1998 and 1999; 61 percent were the intestinal infant form, 22 percent were wound, 16 percent were foodborne and less than 1 percent were adult intestinal colonization botulism. Of the foodborne botulism cases, 45 percent were type A, 41 percent were type E and 14 percent were other or unknown types. Food vehicles for botulism cases were home-canned items (12), fish heads (7), seal meat or oil (4), garlic in oil (3), unknown (16) and other foods (7). In Illinois, the last reported case of foodborne botulism occurred in 1997.

Of the infant botulism cases, 56 percent were type B, 41 percent were type A and 3 percent were other or unknown types. Of the wound botulism cases, 91 percent were type A, 3 percent were type B and 2 percent were other or unknown types. All but one of the wound botulism cases were attributed to intravenous drug use.

Case definition

The case definition for infant botulism is a clinically compatible case that is laboratory confirmed, occurring in a child younger than 1 year of age. Laboratory confirmation consists of detection of botulinum toxin in stool or serum or isolation of *Clostridium botulinum* from stool.

Descriptive epidemiology

- Number of laboratory-confirmed cases reported in Illinois in 2000 2 (both infant botulism)
- Age Both cases occurred in infants younger than 4 four months of age.
- Symptoms One child exhibited an inability to feed, dehydration and progressive neurologic deficit; toxin was identified in the stool. The second infant was irritable and exhibited altered crying, weak suckling, constipation, general weakness and poor head control; type B toxin was found in stool. Both infants recovered.

Suggested readings

SB Werner et al. Wound botulism in California, 1951-1998: Recent epidemic in heroin injectors. Clin Inf Dis 2000;31:1018-24.

Brucellosis

Background

Brucellosis is a systemic bacterial infection caused by *Brucella* species that can cause intermittent or continuous fever and headache, sweating and arthralgia. Symptoms can last from days to years. 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. Investigation of *Brucella* cases could reveal foci of infection in U.S. livestock that should be investigated and eliminated. However, the large majority of human *Brucella* cases are thought to be due to travel outside the country and to consumption of contaminated products from those countries.

A decline in human brucellosis cases in Illinois occurred through the reduction of infection in cattle and state pasteurization requirements for dairy products (pasteurization of grade A milk was required in 1955). In Illinois, the first step in eradicating brucellosis from cattle herds took place in 1930 when a negative serologic test was required of cattle entering Illinois. In 1952, the brucellosis ring test was required of all milk and cream delivered in Illinois. That year, 33 percent of herds were infected; by 1964, less than 5 percent of herds in Illinois were infected. In 1992, Illinois cattle achieved brucellosis-free status.

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

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 8; all cases were confirmed cases
- Age Median age was 32 (range 6 to 77).
- Gender 4 males, 4 females
- Race/ethnicity Nearly 63 percent (5) were white; approximately 37 percent (3) were Asian. Five cases reported Hispanic ethnicity.
- Geographic distribution Cook County (6), DuPage County (1) and Will County (1)
- Case investigations Completed on seven cases
- Diagnosis Cases were identified through positive serology (3), from culture (4) and from both culture and serology (1). Two isolates were speciated and identified as *B*. *melitensis*.

- Diagnosis Three persons traveled to Mexico before becoming ill: two consumed unpasteurized dairy products; for one traveler, this information was unknown. One person traveled to Syria and consumed unpasteurized dairy products. Two persons traveled to India but history of dairy product consumption was unknown. One person could not be interviewed. For another person, no potential source could be identified.
- Past incidence Figure 15 shows the number of reported brucellosis cases in humans and cattle by year since 1951. There has been a dramatic decline in the occurrence of both human and cattle brucellosis in Illinois. Because humans were primarily infected by consuming products from infected livestock, the livestock control programs that resulted in a decline in brucellosis among cattle also resulted in a decline in human infections.

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. A dramatic decline in human infections followed the institution of control programs in cattle and required pasteurization of milk.



Campylobacteriosis

Background

Campylobacteriosis is a zoonotic bacterial enteric disease caused primarily by Campylobacter jejuni and occasionally by Campylobacter coli. Campylobacter is one of the most common causes of gastroenteritis in the U.S. Of the nine diseases (those caused by Campylobacter, Cryptosporidium, Cyclospora, E. coli O157:H7, Listeria monocytogenes, Salmonella, Shigella, Vibrio and Yersinia enterocolitica) under active surveillance in the federal FoodNet sites, Campylobacter comprised 37 percent of the reported infections in 2000. In a study of diarrheal illness in the Netherlands, it was the most commonly identified pathogen.

Campylobacter organisms are motile, gram-negative bacilli with a curved shape. Culture can take 72-96 hours and the organisms grow best at 42° C. The reservoir for *Campylobacter* is in animals, most commonly poultry and cattle. The most important mode of transmission is the consumption and handling of raw poultry products. The infectious dose is very large. The incubation period is two to five days. Symptoms, which may last up to 10 days, include diarrhea, abdominal pain and fever; however, many infections are asymptomatic. Sequelae may include a reactive arthritis, febrile convulsions, a typhoid-like syndrome, Guillain-Barré syndrome or meningitis.

Guillain-Barré syndrome can occur from 10 days to three weeks after infection with *Campylobacter*. A study in Sweden showed that the rate of Guillain-Barré syndrome was 30 per 100,000 in persons with *Campylobacter*. The risk of developing Guillain-Barré syndrome in the two months following *C. jejuni* infection was 100 times the risk in the general population. Excretion of the organism can occur for two to seven weeks. Most cases occur during warmer months of the year.

Most cases of *Campylobacter* are sporadic but occasionally outbreaks occur. An outbreak of *Campylobacter* in Kansas in 1998 was caused by food handler contamination of food. Pulse field gel electrophoresis (PFGE) analysis linked the food handler isolate with an isolate from the ill persons eating the prepared food.

Estimates are that 18 percent to 28 percent of *Campylobacter* isolates from patients treated with fluoroquinolones develop antibiotic resistance.

Case definition

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

Descriptive epidemiology

• Number of cases reported in Illinois in 2000 – 951 (reporting is voluntary); incidence rate of 8 per 100,000.

- Gender 53 percent were males; male cases were more common among infants younger than 1 year of age and among those 30 to 59 years of age.
- Age Mean age of reported cases was 35; highest incidence rate occurred in those younger than 5 years of age (Figure 16). In those less than 1 year of age, males were twice as likely to be reported with campylobacteriosis as females.
- Race/ethnicity The majority of cases (93 percent) were in whites, with 3 percent in African Americans, 3 percent in Asians and 1 percent in other races. Those indicating Hispanic ethnicity accounted for 10 percent of the cases. There was a significantly higher proportion of whites with campylobacteriosis and a lower proportion of African Americans with the disease than their respective representations in the total Illinois population.
- Seasonal variation Campylobacteriosis was reported more often in the warmer months of the year in Illinois (June-August) (Figure 17).
- Past incidence Case number was higher in 2000 compared to five-year median of 874 (Figure 18). Figure 19 shows the reported cases of campylobacteriosis from 1982 through 2000.

Summary

There is no mandatory reporting for campylobacteriosis in Illinois so the 951 cases reported is a minimum estimate of the number of cases in 2000. *Campylobacter* infections occur more commonly from June to August. The incidence is highest in 1- to 4-year-olds. Whites are more likely to be reported with *Campylobacter* infection than other races.

Suggested readings

Allos BM. *Campylobacter jejuni* infections: Update on emerging issues and trends. CID 2001:32;1201-6.

DeWit MAS, Koopmans PG et al. Gastroenteritis in sentinel general practices, the Netherlands. Emerg Inf Dis 2001;7(1):82-90.

Engberg J et al. Quinolone and macrolide resistance in *Campylobacter jejuni* and *C. coli*: resistance mechanisms and trends in human isolates. Emerg Inf Dis 2001;7(1):24-34.

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MMWR. Preliminary FoodNet data on the incidence of foodborne illnesses-Selected sites, United States, 2000. MMWR 2001; 50(13): 241-246.

Olsen SJ et al. An outbreak of *Campylobacter jejuni* infections associated with food handler contamination: The use of pulsed-field gel electrophoresis. J Inf Dis 2001;183:164-7.









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 (LAC), St. Louis encephalitis (SLE), Eastern equine encephalitis and Western equine encephalitis (WEE) viruses and cultured for enteroviruses. In the summer of 2000, West Nile virus (WNV) continued to be identified in the northeastern U.S. Because of this outbreak, specimens in Illinois will need to be tested for WNV during future summer seasons.

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

- Number of cases reported in Illinois in 2000 584 (five-year median=624; see Figure 20)
- Age Annual incidence rate highest in those younger than 1 year of age (91 per 100,000) (Figure 21). In all other age groups, the incidence rate was below 7 per 100,000. The mean age of reported cases was 25.
- Gender 52 percent were male.
- Race/ethnicity 80 percent white, 18 percent African American and 2 percent Asian; 8 percent Hispanic
- Symptoms –
- Geographic distribution Highest annual average incidence rates per 100,000 population from 1996 to 2000 were in Adam (13), Lee (13), Macon (13), Whiteside (12), and Brown (12) counties (Figure 22).
- Seasonal variation Most common July through September (Figure 23); 412 cases had onsets between June 15 and October 31.
- Past incidence Aseptic meningitis reporting has been in place as far back as 1959; data for 1959 to 2000 are shown in Figure 24. Reporting increased in the late 1970s.
- Diagnosis Among cases with onset between June 15 and October 31, virus isolation was attempted in 194 cases (47 percent); viruses were successfully isolated from 51 of 194

patients (26 percent). In 48 of the patients (94 percent), the virus was isolated from the CSF. In the other cases, the virus was isolated from unknown sites. The most common virus type was coxsackievirus B5, which was identified in 18 individuals. Other viruses identified included coxsackievirus A9 (6), coxsackievirus B4 (6), echovirus 9 (3), echovirus 25 (1), echovirus 6 (1), Epstein Barr (2), herpes simplex (2), varicella-zoster (1), enterovirus, not further defined (9) and echovirus, not further defined (1).

Acute blood specimens were sent to the IDPH laboratory for 128 individuals; convalescent blood specimens were submitted for 55 individuals. For 97 individuals, only an acute serum specimen was collected; for 24 individuals only a convalescent serum was submitted; and for 30 individuals, both acute and convalescent serum were obtained. Both acute and convalescent specimens were obtained only for 7 percent of the aseptic meningitis cases from June 15 through October 31. At the IDPH laboratory, these specimens were tested for evidence of arbovirus infections (SLE, LAC and EEE). In addition, 225 serum specimens and 302 CSF specimens from persons with either aseptic meningitis or encephalitis tested negative for WNV. Such testing of patients with presumed viral infections of the CNS is necessary to identify arboviral infections. However, testing of acute and convalescent sera from only 7 percent of patients was probably inadequate to identify public health threats due to mosquito-borne viruses. Cases of LAC encephalitis for 2000 are described in the encephalitis section.

Summary

Aseptic meningitis cases occur with greater frequency in the summer months and in those younger than 1 year of age. Reported cases have decreased substantially from last year's numbers. Coxsackievirus B5 was the predominant virus identified from patients whose specimens were submitted to the IDPH laboratory in 2000. In 1999, echovirus 11 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 areas of risk in Illinois.





Figure 22. Average Annual Aseptic Meningitis Incidence Rates per 100,000 by County, Illinois, 1996-2000







Encephalitis

Background

Acute infectious and post-infectious encephalitis are reportable in Illinois. Infections are characterized by headache, high fever, meningeal signs, stupor, disorientation, coma, tremors, convulsions or paralysis. Some forms of infectious encephalitis are caused by mosquito-borne arboviruses that may not always result in the "classical" encephalitis presentation. Arboviruses that cause encephalitis are members of the Togaviridae, Flaviviridae or Bunyaviridae families. Humans and domestic animals, such as horses, can develop clinical disease but are usually deadend hosts because they do not develop sufficient viremia to contribute to the transmission cycle. Arbovirus infections may present as aseptic meningitis. Arboviral infections ever reported in Illinois include those due to St. Louis encephalitis (SLE), California (LaCrosse) (LAC) encephalitis and Western equine encephalitis (WEE) viruses. In 2000, WNV continued to spread on the East Coast of the U.S. but did not enter the Midwest. However, surveillance efforts for WNV began in Illinois during 2000.

LAC virus is the main cause of pediatric encephalitis in the U.S. The illness occurs most commonly in children younger than 15 years of age (the elderly are at greatest risk of SLE). In Illinois, cases of LAC virus infection are most often reported from Peoria, Tazewell and Woodford counties. The incubation periods for mosquito-borne encephalitides are five to 15 days.

Because wild birds are the main reservoir and amplifying host for arboviruses such as SLE, WEE and EEE, surveillance for these arboviruses is conducted in wild bird populations across the state each year.

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 capable of transmitting LAC.

In Illinois, enhanced sample collection is requested of physicians with patients experiencing encephalitis or aseptic meningitis from June 15 to October 31. Patients are asked to submit acute and convalescent sera for antibody testing by IDPH; testing of cerebrospinal fluid (CSF) for mosquito-borne encephalitides also is performed if samples are available. This surveillance activity identifies patients with aseptic meningitis, meningoencephalitis or encephalitis to determine if the 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 mosquito abatement efforts.

A CDC grant for WNV surveillance enabled IDPH for one year to pay local health departments a fee if serum specimens were submitted from suspect arbovirus cases regardless of whether the blood was collected by a public health agency or health care provider.

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., ≥ 320 by hemagglutination inhibition, ≥ 128 by complement fixation (CF), ≥ 256 by IF, ≥ 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 diagnosed by a physician as primary encephalitis.

Descriptive epidemiology

- Number of acute cases reported in Illinois in 2000 48. The number of reported cases of acute encephalitis was slightly lower in 2000 compared to 1999 (Figure 25).
- Age The mean age was 29.
- Gender 52 percent of cases were female.
- Race/ethnicity 85 percent were white, 13 percent were African American and 2 percent were Asian; one case reported Hispanic ethnicity.
- Seasonal variation 25 reported onsets between June 15 and October 31. Cases by month of onset are shown in Figure 26.
- Diagnosis 42 were identified as acute encephalitis, not further specified; three as herpes encephalitis and three as LAC encephalitis.* Virus isolation was attempted on specimens from 15 individuals; viruses were isolated from four specimens. Two were positive for herpes simplex, one was positive for echovirus 6 and one for echovirus, not further specified. Virus was isolated from CSF (1), nasopharynx (1) and other (2). Either acute and/or convalescent sera was submitted to the IDPH lab from 13 individuals. Both acute and convalescent sera were submitted for two persons, acute sera only was submitted for 10 people and convalescent sera only was submitted for one person.
- Past incidence Data on acute encephalitis in Illinois is available back to 1946. Figure 27 shows the number of acute encephalitis cases (excluding known arbovirus cases) from 1946 to 2000. Reporting in 1974-1975 was probably low because of a large outbreak of SLE. Reporting of acute encephalitis has been lower in the late 1990s. Data on LAC and SLE is available from 1946 to the present (Figure 28). 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), 1999 (3) and 2000 (3). Reported SLE cases in Illinois were few in 1990-2000: There were two cases in 1993 and one case in 1995; no cases were reported in 1990-1992, 1994 and 1996-2000.
- Wild bird surveillance Testing for antibodies against SLE and EEE was conducted on 5,191 wild birds in 2000. The birds were trapped by mist nets at stables, grain elevators, cattle feedlots and other similar locations, and blood was collected for testing. More than 1,000 specimens were collected by the Chicago Department of Public Health. Four

juvenile sparrows collected in Cook County had serologic evidence of EEE (human illness due to EEE has never been confirmed in Illinois); none had serologic evidence of SLE. No human cases of EEE or SLE were reported in 2000. During 2000, Illinois Department of Natural Resources field biologists, local health department personnel and federally licensed exhibitors were asked to submit dead birds (e.g., crows and raptors) for testing. The Illinois Department of Agriculture laboratory performed necropsy on 11 birds. Four birds were submitted to the U.S. Geological Survey lab in Madison, Wisconsin, for WNV testing; all were negative.

Summary

Because encephalitis cases are more commonly reported in the summer in Illinois, IDPH asks physicians to increase testing to establish the etiology and to 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 2000. Finding birds with antibodies to EEE underscores the importance of closely monitoring for both equine and human cases of encephalitis and of examining specimens for the presence of EEE. Also, the finding of WNV in the eastern United States in 2000 highlights the continued importance of maintaining a surveillance program for arboviruses.

Suggested readings

Jones TF et al. Serological survey and active surveillance for LaCrosse virus infections among children in Tennessee. Clin Inf Dis 2000;1284-7.








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 younger 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 in eliminating carriage of the organism. Children younger than 5 years of age should be vaccinated against *H. influenzae*. In the U.S., conjugate vaccines against *H. influenzae* type b were introduced in 1987 and have resulted in a dramatic drop in cases.

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.

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.

- Number of cases reported in Illinois in 2000 62 (five-year median = 50). From 1995 to 2000, the number of cases reported per year ranged from 42 to 89 (Figure 29).
- Age Cases ranged from 22 to 87 years of age; 60 percent were older than 49 years of age and none was younger than 5 years of age. (Figure 30). Therefore, there were no vaccine preventable cases of invasive *H. influenzae* during 2000.
- Gender 60 percent were female.
- Race/ethnicity 9 percent were African Americans and 91 percent were white; 16 percent were Hispanic.
- Presentation 68 percent had bacteremia, 25 percent had pneumonia, 14 percent had meningitis, 5 percent had otitis media and 2 percent had cellulitis. (Some individuals had more than one manifestation of disease and were counted in each manifestation.)
- Treatment All reported cases for which information was available were hospitalized.
- Mortality 14 percent of 42 cases where information was available died. Five of the six fatal cases occurred in individuals older than 77 years of age.
- Diagnosis All cases were culture confirmed. *H. influenzae* was isolated from blood (43 cases), from CSF (8 cases), from pleural fluid (1 case) and from other or unknown sites (10). Typing was attempted on specimens from 77 percent of reported cases; 18 percent of the isolates for which typing was attempted were type b,16 percent were type f and 4 percent were type a.
- Past incidence Data on reported cases of *H. influenzae* in Illinois are available from 1979 to the present (see Figure 31). Of note is the dramatic decrease in reported cases that

followed the initiation of childhood vaccination for *H. influenzae*.

Drug resistance – Between July 1, 2000, and June 30, 2001, 93 isolates of *H. influenzae* from invasive sites and eyes were tested for antibiotic resistance to ampicillin, trimethoprim/sulfamethoxazole (SXT), ceftriaxone, chloramphenicol, erythromycin, ciprofloxacin and rifampin by the disk diffusion method. Of the 93 isolates, 30 percent were resistant to ampicillin and 49 percent were resistant to SXT.

Summary

While the reported cases of *H. influenzae* in Illinois have decreased dramatically since the introduction of an effective vaccine, the number of cases increased in 2000. Of the isolates that were typed, 18 percent were the type (type b) that could be prevented by vaccination of those in the youngest age groups. No type b cases could have been prevented by vaccination in 2000 because they were older than 5 years of age. In fact, 60 percent occurred in people more than 49 years of age.







Listeriosis

Background

Listeriosis is caused by infection with *Listeria monocytogenes*. It is a foodborne illness that can cause sepsis in the immunocompromised and meningoencephalitis and febrile gastroenteritis in immunocompetent persons. Pregnant women whose gastrointestinal tracts become colonized with the bacteria after they eat contaminated foods can transmit the organism to the fetus or can contaminate the baby's skin or respiratory tract during childbirth.

The median incubation period is three weeks, which makes identifying a suspect food vehicle difficult. *L. monocytogenes* is found frequently in nature and can be cultured from foods and the environment, which makes typing of isolates from patients and suspected food items important. The majority of isolates are 1/2 a, 1/2 b or 4b. Pulse field gel electrophoresis can be used to further discriminate between isolates. Contaminated food vehicles often identified in outbreaks of listeriosis include unpasteurized dairy products. However, other vehicles have been identified. An outbreak in Finland in 1999 was attributed to contaminated pasteurized butter.

Of the nine diseases under active surveillance in the federal FoodNet sites (those caused by *Campylobacter, Cryptosporidium, Cyclospora, E. coli* O157:H7, *Listeria monocytogenes, Salmonella, Shigella, Vibrio* and *Yersinia enterocolitica*), listeriosis comprised 0.8 percent of the reported infections in 2000.

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. A maternal-child pair should only be counted as one maternal case.

- Number of cases reported in Illinois in 2000 4 cases of meningitis and 17 cases of septicemia (NOTE: There were three meningitis cases reported in the database; one case reported as bacteremia but incorrectly marked as meningitis on the reporting form. Also, if one maternal/child case that originally was counted as two cases had been reported correctly, there would be only 16 septicemia cases in 2000.) (five-year median = 23). The 2000 incidence for all reported listeriosis was 0.2 per 100,000 population.
- Age Cases ranged in age from newborn to 92 years of age; 65 percent of cases were older than 59 years of age.
- Gender Overall, 75 percent of the listeriosis cases were female.
- Race/ethnicity 94 percent were white and 6 percent were African American; 14 percent were Hispanic.
- Diagnosis For reported cases not involving pregnancy, the site of *Listeria* isolation was identified as follows: blood (10), multiple sites (1) and cerebrospinal fluid (3).
- Underlying conditions Four pregnant women were reported with listeriosis. One

pregnancy ended in stillbirth, two resulted in live births and, for one case, the pregnancy outcome was unknown. For eight of the other cases, information was available on underlying conditions and all but one had an existing immunosuppressive condition. Four of these cases had hematologic malignancies.

- Mortality 5 of 19 cases where information was available were fatal, excluding the stillbirths. Underlying medical conditions were noted in two of the fatal cases; one had no known underlying conditions and two had no information on underlying conditions.
- Past incidence Illinois began recording cases of listeriosis in 1969. An increase in case numbers was noted in the early 1980s (See Figure 32).

Summary

In 2000, Illinois recorded 20 listeriosis cases; 65 percent of the cases were older than 59 years of age. Reported of cases of listeriosis increased in the early 1980s.

Suggested readings

Lyytikainen O et al. An outbreak of *Listeria monocytogenes* serotype 3a infections from butter in Finland.J Inf Dis 2000:181:1838-41.

MMWR. Preliminary FoodNet data on the incidence of foodborne illnesses-Selected sites, United States, 2000. MMWR 2001; 50(13): 241-246.

Schlech WF. Foodborne listeriosis. Clin Inf Dis 2000;31:770-5.



Invasive Neisseria meningitidis

Background

The bacteria that cause meningococcal disease, *N. meningitidis*, are transmitted by direct contact with respiratory droplets from the nose and throat of an infected person. 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 result 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 exposed persons who become infected develop invasive disease. About 5 percent to 10 percent of the population are carriers.

Mass vaccination clinics are used infrequently in very specific circumstances. A mass vaccination campaign in Quebec in 1992 and 1993 resulted in a decrease in the incidence of serogroup C meningococcal disease from 1.4 per 100,000 to 0.3 per 100,000.

Case definition

The case definition for a confirmed case of meningococcal disease is a clinically compatible case from whom *N. meningitidis* is isolated from a normally sterile site. The case definition for a probable case is a compatible illness with positive results on latex agglutination, or gram-negative diplococci in CSF. A person with meningococcemia but no laboratory confirmation of *N. meningitidis* will be considered a case.

- Number of cases reported in Illinois in 2000 91 (incidence of 0.7 per 100,000) (five-year median = 111) (Figure 33). Three cases were known to be in college students; two cases were day care attendees. No clusters requiring vaccination campaigns occurred in 2000.
- Age Median age was 18. Fatal cases ranged from 1 to 90 years of age. The age distribution of meningococcal disease is shown in Figure 34.
- Gender 51 percent were female.
- Race/ethnicity 21 percent were African American, 78 percent were white and 1 percent were Asian; 7 percent were Hispanic.
- Seasonal variation Meningococcal disease occurred more often in the winter months (Figure 35).
- Presentation Case reports indicated that 61 percent of reported cases had bacteremia, 42 percent had meningitis, 4 percent had pneumonia, 1 percent had cellulitis, 1 percent had epiglottitis and 4 percent had other manifestations; 92 percent of cases were hospitalized.
- Diagnosis 83 were culture confirmed, five were positive by latex agglutination, two were clinical diagnoses of meningococcemia and one was gram stain positive. *N. meningitidis* was isolated from the cerebrospinal fluid in 22 percent of patients, from blood in 75 percent of patients and from other sites in 1 percent of patients. Serogrouping was performed on isolates from 72 percent of cases. In cases where typing was done,

serogroups were B (18 percent), C (29 percent), Y (41 percent) and other (12 percent). Serogroup Y isolates have increased from 4 percent of isolates in 1991 to 41 percent of isolates in 2000 (Figure 36).

- Mortality The case fatality rate was 10 percent for patients where outcome of infection was known.
- Drug resistance From July 1, 2000, through June 30, 2001, the IDPH lab tested 122 *N*. *meningitidis* isolates for susceptibility to rifampin, using the e-strip method, and to ampicillin, ceftriaxone, chloramphenicol, erythromycin, tetracycline and trimethoprim/sulfamethoxazole (SXT), using disk diffusion. Isolates were sensitive to all antibiotics except rifampin and SXT. Less than 10 percent of isolates were resistant to SXT.
- Past incidence Data on reported cases of *N. meningitidis* goes back to 1917 (see Figure 37). An increase in *N. meningitidis* occurred in 1945 and 1946, possibly due (in part) to soldiers returning from overseas.

Suggested reading

DeWals P et al. Effectiveness of a mass immunization campaign against serogroup C meningococcal disease in Quebec. JAMA 2001;285(2):177-81.











Streptococcus pneumoniae meningitis

Background

S. pneumoniae is the most common cause of meningitis, community-acquired pneumonia and bacteremia, and acute otitis media. 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 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.

In 1998, the national active bacterial core (ABC) surveillance sites (in three states and regions of five states) recorded the highest incidence rates for *S. pneumoniae* meningitis in children younger than 2 years of age (7 per 100,000). The case fatality rate was 17 percent for those with *S. pneumoniae* meningitis. However, the highest mortality rate for *S. pneumoniae* meningitis was in older age groups.

In a study in Alaska from 1991 through 1998, 7 percent of *S. pneumoniae* isolates had intermediate levels of resistance and 3 percent had high levels of resistance to penicillin. In the ABC program in 1998, 65 percent of pneumococcal isolates were susceptible to all antimicrobial agents tested against. A study in Washington state showed that 22 percent of all isolates had diminished susceptibility to penicillin and almost 11 percent were fully resistant.

Vaccines are available for prevention of *S. pneumoniae* infections. A 23-valent vaccine has been available since 1983 but does not provide adequate protection for children younger than 2 years of age. From 1991 through 1998 in Alaska, health officials found that 92 percent of isolate serotypes were represented in the 23-valent pneumococcal vaccine. Pneumococcal vaccination of adults is recommended for all individuals older than 64 years of age and for others at increased risk for pneumococcal disease. To increase vaccination coverage in long-term care facilities, a study in several Western states used stickers placed on the front of chart indicating the need for vaccination; rates improved from 50 percent to 75 percent in one year. Facilities with standing orders for pneumococcal vaccination had higher coverage rates.

The pneumococcal conjugate 7-valent vaccine (6B, 14, 18C, 19F, 23F, 9V, 4) was licensed in the U.S. in February 2000 and can be used in children younger than 2 years of age. The vaccine protects against the seven strains of pneumococcus that cause 80 percent of the invasive disease among children in the U.S. In the ABC program in 1998, serotypes included in the 7-valent vaccine accounted for 78 percent of penicillin-resistant strains. In England and Wales, the 7-valent conjugate vaccine covered 79 percent of the serotypes in children younger than 5 years of age. This vaccine appears to reduce nasopharyngeal carriage in young children, which should reduce transmission.

The Advisory Committee on Immunization Practices (ACIP) recommends that vaccine be given to infants in a series of four injections (at 2, 4, 6 and 12-15 months of age). The recommendation applies to all children younger than 24 months of age and to children 24-59 months of age who are at higher risk of infection, including those with certain illnesses (e.g.,

sickle cell anemia, HIV, chronic heart or lung disease) and those who are Alaska natives, American Indian or African American. The vaccine also can be considered for other children ages 24 to 59 months who are at increased risk, such as children in group day care, those with frequent otitis media or those who are economically or socially disadvantaged.

In Illinois in 2000, only meningitis due to *S. pneumoniae* was reportable. Starting on April 1, 2001, all forms of invasive *S. pneumoniae* become reportable. In addition, reporting of antibiotic resistance for this pathogen was put into place.

Case definition

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

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 67 (five-year median = 105). The incidence rate for 2000 was 0.5 per 100,000. The number of reported cases of *S. pneumoniae* meningitis by year is shown in Figure 38.
- Age Mean age of cases was 33 (see Figure 39 for age distribution). Compared to 1999, there were fewer cases in the 59+ age group.
- Gender 45 percent were female.
- Race/ethnicity 27 percent were African American and 68 percent were white; 8 percent were Hispanic.
- Seasonal variation The majority of cases occurred in the winter months (Figure 40).
- Diagnosis 90 percent of cases had *S. pneumoniae* isolated from CSF and 49 percent from blood; isolates from both blood and CSF were obtained from 27 people.
- Treatment 95 percent of reported cases were hospitalized.
- Mortality The case fatality rate was 23 percent for cases where outcome was known.
- Drug resistance Between July 1, 2000, and June 30, 2001, 83 isolates of *S. pneumoniae* were tested by the IDPH laboratory for antibiotic resistance: 14 percent were susceptible to penicillin, 77 percent had intermediate resistance and 8 percent were highly resistant. More than 50 percent showed resistance to SXT and erythromycin by the e-strip method. The isolates were all susceptible to ceftriaxone, chloramphenicol, ciprofloxacin and rifampin.

Summary

Almost all reported cases of *S. pneumoniae* meningitis were hospitalized and almost a quarter of reported cases were fatal. High levels of resistance to penicillin were found in 8 percent of isolates submitted to the IDPH laboratory (this falls within the range of 3 percent and 11 percent reported in studies from Alaska and the national ABC surveillance system). The level of intermediate resistance in Illinois was high at 77 percent.

Suggested readings

Diekema DJ et al. Antimicrobial-drug use and changes in resistance in *Streptococcus pneumoniae*. Emerg Inf Dis 2000;6(5):552-6.

Jernigan DB et al. Sentinel surveillance as an alternative approach for monitoring antibiotic-resistant invasive pneumococcal disease in Washington state. Am J PH 2001;91(1):142-5.

Robinson KA, et al. Epidemiology of invasive *Streptococcus pneumoniae* infections in the United States, 1995-1998. JAMA 2001; 285(13):1729-35.

Rudolph KM et al. Serotype distribution and antimicrobial resistance patterns of invasive isolates of *Streptococcus pneumoniae*: Alaska, 1991-1998.

Scheifele D et al. Invasive pneumococcal infections in Canadian children, 1991-1998: Implications for new vaccination strategies. Clin Inf Dis 2000;31:58-64.

Sleeman K et al. Invasive pneumococcal disease in England and Wales: Vaccination implications. J Inf Dis 2001;183:239-46.

Stevenson KB et al. Increasing pneumococcal vaccination rates among residents of longterm-care facilities: Provider-based improvement strategies implemented by peer-review organizations in four Western states. Inf Control Hosp Epid 2000; 21(11):705-10.

Whitney CG et al. Increasing prevalence of multidrug-resistant *Streptococcus pneumoniae* in the United States. NEJM 2000; 343(26):1917-24.







Invasive group B Streptococcus

Background

Group B streptococcus (GBS) emerged as a major cause of invasive disease in infants in the 1970s. Although the incidence of GBS declined 65 percent in the U.S. from 1993 through 1998, it is still a leading cause of neonatal disease in the United States and results in approximately 2,200 infections each year in children younger than 7 days of age. Around 20 percent of pregnant women may be colonized with GBS at the time of labor and, therefore, at risk for transmitting the disease to their infants.

GBS infections are due to *Streptococcus agalactiae* and cause disease and death in newborns and morbidity in peripartum women and nonpregnant adults with chronic medical conditions. Early-onset disease of neonates (<7 days) may consist of sepsis, respiratory distress, apnea, shock, pneumonia and meningitis. The infection is acquired during delivery or *in utero*. Early onset disease is caused by maternal GBS carriage. Early GBS infections occur more frequently in infants where premature rupture of membranes has occurred. Infants acquire infection through aspiration of contaminated amniotic fluid or during passage through the birth canal. Late onset disease (7 days-several months) is characterized by sepsis and meningitis and is acquired by person-to-person contact. Only about 50 percent of late onset disease cases have been shown to be of maternal origin.

In 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. Intrapartum antibiotic prophylaxis is recommended for women at increased risk. From 1994 to 1997, the proportion of hospitals adopting one of these policies increased from 39 percent to 59 percent. However, the proportion of hospitals did not increase from 1997 to 1999. In an ABC study of GBS infections in infants less than 7 days of age, the CDC found that 21 percent of mothers of infants with early onset disease had received intrapartum antibiotic prophylaxis. The study also found that prenatal screening was often not performed at the recommended time (35 to 37 weeks gestation) and combined vaginal and rectal swabs were rarely documented. About 70 percent of women who were unscreened and developed a risk factor did not receive intrapartum antibiotics. Also, 15 percent of isolates were resistant to clindamycin and 20 percent were resistant to erythromycin.

In 1999, GBS was added to the adverse pregnancy reporting system in Illinois. Beginning on April 1, 2001, only invasive GBS in infants younger than 3 three months will be reportable.

Case definition

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

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 32 (five-year median = 41; see Figure 41).
- Age 35 percent occurred in those younger than 1 year of age compared to 76 percent in 1999 (Figure 42).
- Gender 47 percent were female.
- Race/ethnicity 72 percent were white and 24 percent were African American; 14 percent were Hispanic.
- Seasonal variation Cases occurred throughout the year (Figure 43).

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 2000 declined in comparison to previous years.

Suggested readings

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MMWR. Early-onset group B streptococcal disease-United States, 1998-1999. MMWR 2000; 49(35): 793-6.

MMWR. Hospital-based policies for prevention of perinatal group B streptococcal disease-United States, 1999.

Schrag SJ, Whitney CG, Schuchat A. Neonatal group B streptococcal disease: How infection control teams can contribute to prevention efforts. Inf Control Hospital Epid 2000;21(7):473-83.

Schucat A. Neonatal group B streptococcal disease-screening and prevention. NEJM 2000; 343(3):209-10.







Cryptosporidiosis

Background

Cryptosporidiosis is primarily a gastrointestinal disease that results from infection with *Cryptosporidium* species oocysts. Because of a lack of host specificity, *Cryptosporidium parvum* infects a wide range of mammalian species. There are two genotypes of *C. parvum*: genotype 1 (which affects primarily humans) and genotype 2 (which 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 or longer 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, which can persist up to 30 days in the immunocompetent and can be life-long in those with compromised immune systems, include diarrhea, which can be profuse and watery, and abdominal cramps.

Most laboratories in the U.S. do not routinely test for *C. parvum* and it is not detected in a routine ova and parasite test. Therefore, when cryptosporidiosis is suspected, the laboratory should be asked to perform the requisite testing. The reported number of cases in Illinois likely underestimate the true occurrence of this disease. The pathogen is very resistant to disinfectants and the oocysts are small, which means only select water filters work in containing this pathogen.

Of the nine diseases (illnesses caused by *Campylobacter, Cryptosporidium, Cyclospora, E. coli* O157:H7, *Listeria monocytogenes, Salmonella, Shigella, Vibrio* and *Yersinia enterocolitica*) under active surveillance in the federal FoodNet sites, Cryptosporidium comprised 4 percent of the reported infections in 2000. The incidence rate per 100,000 for *Cryptosporidium* ranged from 0.2 to 4 at the eight FoodNet sites.

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.

- Number of cases reported in Illinois in 2000 126 (five-year median = 90; see Figure 44). Five individuals were employed in sensitive occupations, such as food handling, day care or health care.
- Age Mean age was 25. Age distribution of cases is shown in Figure 45.
- Gender 53 percent were male.
- Race/ethnicity 74 percent were white, 24 percent were African American and 3 percent were other races; 7 percent were Hispanic. There was a significantly higher proportion of African Americans with cryptosporidiosis (24 percent) than their proportion in the Illinois

population (15 percent). In addition, 54 percent of African Americans with cryptosporidiosis were immunocompromised compared to 16 percent of whites with cryptosporidiosis.

- Seasonal variation Cases peaked from August to October (Figure 46).
- Risk factors Drinking from a private water supply (28 percent), swimming (29 percent), contact with someone in a residential institution (13 percent), contact with someone in a day care center (21 percent), cattle contact (5 percent) and contact with a petting zoo (3 percent). However, these were not proven to be the source of transmission in these cases.
- Treatment 36 percent of cases were hospitalized. Information on the presence of immunocompromising conditions was available for 94 cases; 25 of these cases (27 percent) reported immunocompromising conditions. Among those with immunocompromising conditions, 71 percent were hospitalized compared to 18 percent of those not reporting such conditions (odds ratio=10.9, confidence limits=3.3,38.1).

Summary

The number of reported cases of cryptosporidiosis in 2000 was 126. Almost a quarter of those reported had some type of immunocompromising condition and these individuals were more likely to be hospitalized than those without these conditions. The mean age of cases was 25 years. There was a peak in cases from August to October.

Suggested readings

MMWR. Preliminary FoodNet data on the incidence of foodborne illnesses-Selected sites, United States, 2000. MMWR 2001; 50(13): 241-246.







Ehrlichiosis

Background

Ehrlichia are gram negative bacteria that infect a wide variety of animals and are transmitted by tick bites. Three *Ehrlichia* pathogens have been identified in the U.S.: *E. chaffeensis*, an unnamed *Ehrlichia* causing human granulocytic ehrlichiosis (HGE) and *E. ewingii*. In animal studies, ehrlichiosis could be transmitted within the first 24 hours a tick is attached. The incubation period is seven to 21 days.

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

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 (*Amblyomma americanum*) in the south, central and southeastern U.S.

Ehrlichia disease classes have been termed "granulocytic" or "monocytic" but this type of classification may not always apply because some of the *Ehrlichia* species have been found in cells other than their chief target cell type. Both HME and HGE result in similar symptoms: fever, headache and myalgia. Cases also may have low platelets, low white blood cells and increased liver enzymes. A rash may be present in approximately one-third of HME cases; rashes are much less common in HGE. These *Ehrlichia* organisms can form clusters of organisms called morulae, in the white blood cells. The case fatality rate has been reported as 5 percent in HME and 10 percent in HGE. However, it is likely that more severe cases are reported.

There was only voluntary reporting for ehrlichiosis in 2000 in Illinois. However, mandatory reporting will be initiated beginning on April 1, 2001.

Case definition

A confirmed case of ehrlichiosis is defined as a clinically compatible case that is laboratory confirmed. Laboratory confirmation is by a fourfold or greater change in antibody titer to *Ehrlichia* species by immunofluorescence test (IFA) in acute and convalescent specimens or positive by polymerase chain reaction or intracytoplasmic morulae identified in blood, bone marrow or cerebrospinal fluid (CSF) leukocytes and an IFA antibody titer of greater than or equal to 64. A probable case is a clinically compatible case with either a single IFA antibody serologic titer of greater than or equal to 64 or intracytoplasmic morulae identified in blood, bone marrow or CSF leukocytes.

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 1. This case complained of fever and headache, was hospitalized, and reported residence and tick exposure in Union County. Onset of illness was in August and diagnosis was confirmed by PCR testing for HME.
- Past incidence Cases of ehrlichiosis in Illinois in past years have been infrequent: 1990 (0), 1991 (0), 1992 (0), 1993 (0), 1994 (1), 1995 (4), 1996 (4), 1997 (0), 1998 (2), 1999 (5) and 2000 (1).

Summary

Ehrlichiosis is uncommonly reported in Illinois but reporting was voluntary in 2000. Most Illinois tick exposures related to ehrlichiosis cases have been in southern Illinois.

Suggested readings

des Vignes F, Piesman J et al. Effect of tick removal on transmission of *Borrelia burgdorferi* and *Ehrlichia phagocytophila* by *Ixodes scapularis* nymphs. J Inf Dis 2001;183:773-8.

Parola P, Raoult D. Ticks and tickborne bacterial diseases in humans: An emerging infectious threat. CID 2001;32:897-928.

Escherichia coli O157:H7 (ECO157:H7)

Background

Escherichia coli O157:H7 is transmitted through consumption of contaminated food or beverage, 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. Occasionally, longer incubation periods have been reported. Infection with ECO157:H7 produces symptoms that range from mild to bloody diarrhea and that may progress to hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenic purpura (TTP); 3 percent to 5 percent of HUS cases are fatal.

Although ground beef was the most commonly contaminated vehicle for *E. coli* O157:H7 outbreaks, a variety of others, including raw vegetables ,have now been linked to infection.

In 2000, at least two outbreaks of *E. coli* O157:H7 in the U.S. were associated with school and family visits to farms. Activities that increased risk in a Pennsylvania outbreak and demonstrated the fecal-oral route of transmission included nail biting, purchasing food at outdoor concessions and contact with cattle. Washing hands before eating was protective against infection.

Of the nine diseases (illnesses caused by *Campylobacter, Cryptosporidium, Cyclospora, E. coli* O157:H7, *Listeria monocytogenes, Salmonella, Shigella, Vibrio* and *Yersinia enterocolitica*), under active surveillance in the federal FoodNet sites, *E. coli* O157:H7 was responsible for 5 percent of the reported infections in 2000. The incidence rate for *E. coli* O157:H7 ranged from 0.5 to 5 per 100,000 at the eight FoodNet sites.

CDC recommends that all bloody diarrheal stools be routinely cultured for *E. coli* O157:H7. Tests also are available to directly detect shiga toxin in stool specimens. Specimens testing positive should be cultured to identify which organism (*E. coli* or *Shigella*) produced the shiga toxin. Shiga toxin producing *E. coli* should be forwarded to the IDPH laboratory for possible subtyping if these isolates are identified at a time when there is a reported increased incidence of *E. coli* O157:H7.

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 are laboratory confirmed as producing shiga toxin.

- Number of cases reported in Illinois in 2000 194 (five-year median = 121) (see Figure 47). The large number of cases in 1999 (498) was primarily due to one large outbreak in Menard County. The incidence in 2000 was 1.6 cases per 100,000 population, which is within the range of what was found in CDC's FoodNet sites (0.5 to 5 per 100,000).
- Age Cases occurred in all age groups with very few in those younger than 1 year of age

(median = 22 years of age) (Figure 48).

- Gender 51 percent were female.
- Race/ethnicity 93 percent were white, 5 percent were African American and 1 percent were other races; 4 percent were Hispanic.
- Seasonal variation The largest number of cases were reported in the summer from June to September (66 percent of cases) (Figure 49).
- Symptoms Among those with culture-confirmed ECO157:H7 for which symptom information was available, 99 percent reported diarrhea, 85 percent reported bloody diarrhea, 42 percent reported fever and 93 percent reported abdominal cramps; 5 percent of patients for whom information was available had hemolytic uremic syndrome (HUS) and 2 percent had thrombotic thrombocytopenic purpura (TTP).
- Treatment Of 170 patients for whom information was available, 56 percent were hospitalized.
- Mortality Two cases were fatal; both were older than 65 years of age. None of the HUS or TTP cases were fatal.

Risk factors for ECO157:H7

The standard case report form developed by CDC is used to investigate ECO157:H7 cases in Illinois. It includes questions on possible sources for ECO157:H7. Individuals are asked if they consumed any ground beef and are then asked if they consumed undercooked ground beef. Cases also are asked if they were around children with diapers or if they changed diapers. These factors are listed in Table 1.

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 (80 percent), other beef products (36 percent), well water (18 percent), undercooked ground beef (19 percent), other undercooked beef products (12 percent) and other unchlorinated water (4 percent); 14 percent reported visiting or living on a farm. These risk factors were not confirmed as the source of illness in these cases.

Summary

Most cases occur in the summer months. Bloody diarrhea was reported by 85 percent of individuals; 5 percent of patients reportedly had HUS. More than half the cases were hospitalized; two cases were fatal. Almost 20 percent of cases reported consuming undercooked ground beef.

Suggested readings

MMWR. Outbreaks of *Escherichia coli* O157:H7 infections among children associated with farm visits-Pennsylvania and Washington, 2000

MMWR. Preliminary FoodNet data on the incidence of foodborne illnesses-Selected sites, United States, 2000. MMWR 2001; 50(13): 241-246.







Characteristic	# reporting factor	Total # with information on factor	Percentage reporting characteristic
Attending or working in day care center	9	153	6
Attending or working at an institution	17	160	11
Employed as a health care worker	10	169	6
Employed as a food handler	7	165	4
Food/water history in prior seven days			
Ground beef	125	156	80
Fast food	85	155	55
Other restaurant food	69	139	50
Other beef products	53	148	36
Well water	29	163	18
Undercooked ground beef	26	134	19
Undercooked other beef	18	146	12
Other unchlorinated water	6	156	4
Apple cider	2	164	1
Raw milk	0	169	0
Other factors in prior seven days			
Contact with diapered child	29	164	18
Travel away from home	4	167	2
Swam	32	167	19
Contact with day-care child	20	161	12
Visit or live on farm	23	168	14
Contact with cattle or cattle manure	12	168	7
Changed diapers	18	166	11

Table 1. Reported characteristics of E. coli 0157:H7 cases in Illinois, 2000

Source: Illinois Department of Public Health, 2001

Foodborne outbreaks

Background

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

Foodborne illness can be caused by microorganisms and their toxins, marine organisms and their toxins, fungi and chemical contaminants. There are four categories of organisms to consider in discussing the causes of foodborne illness: viruses, bacteria, parasites and fungi. For some viruses, such as hepatitis A or Norwalk-like viruses, also known as small round-structured viruses, humans are the only reservoir. Food can be contaminated with viruses if food handlers do not practice good hygiene before preparing food that is not later cooked, or if sewage contaminates the food. Less commonly, foodborne outbreaks can be caused by other viruses. For example, an outbreak of group A rotavirus in adults occurred in the District of Columbia in 2000. This outbreak was unusual because group A rotavirus, the most common cause of childhood diarrhea, leads to early immunity and disease among older children and adults is uncommon.

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

Produce items continue to be reported as vehicles for foodborne outbreaks, including a report of *Salmonella thompson* associated with fresh cilantro in a California outbreak and an outbreak of cyclosporiasis associated with basil in Missouri.

Tracking foodborne disease is becoming more sophisticated. Currently, 46 states, including Illinois, participate in PulseNet, a national molecular subtyping network for foodborne disease surveillance. Standard protocols allow patterns to be compared across laboratories. Matching of patterns can link apparently unrelated cases of foodborne disease in geographically dispersed areas.

Recreational water outbreaks are rarely reported in Illinois. However, swimming is the second most popular method of exercise in the United States. A fecal accident can expose other swimmers. This is especially true of a person with cryptosporidiosis. The parasite is shed in high numbers in diarrhea and has a low infectious dose. In addition, this organism is extremely resistant to chlorine and can remain infective for several days. To prevent transmission of enteric pathogens in swimming pools, persons with diarrhea should not swim, swimmers should avoid

swallowing pool water and persons should practice good hygiene before swimming, after using the restroom and after changing a diaper. Persons with cryptosporidiosis should not swim while diarrhea is present and for two weeks afterwards. Other ways to decrease the risk would be to use separate filtration systems for "kiddie" pools, use appropriate filtration rates, maintain adequate chlorine levels, have a policy on actions to take after fecal accidents and have frequent bathroom breaks for young swimmers.

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 considered confirmed when the responsible pathogen is identified through laboratory methods in at least two ill persons or in the implicated food vehicle.

For foodborne outbreaks, the number ill reflects those who meet a clinical case definition. For outbreaks where the etiologic agent was suspected and not confirmed, and the clinical syndrome matched the suspect etiologic agent but no laboratory confirmation was obtained, the cause is ascribed to this etiologic agent.

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

- Number of outbreaks reported in Illinois in 2000 109 possible food- or waterborne outbreaks were reported by local health departments. Of these, 22 were determined not to be foodborne or waterborne outbreaks. The 87 outbreaks determined to be food- or waterborne represents an increase compared to the previous five-year median of 44 (Table 2). Of these outbreaks, the etiology was confirmed in 16, suspected in 60 and unknown in 11. No outbreaks in 2000 were due to recreational water exposure.
- Total cases of enteric pathogens from 1995 through 2000 See Figure 50; both outbreak and sporadic cases are included in case totals. Cases due to *Salmonella* were the most commonly reported, followed by those attributable to *Shigella* and *Campylobacter*. (In 2000, *Campylobacter* was the only one of these four pathogens without mandatory reporting in Illinois.) In comparing sporadic reports from 1999 with those from 2000, the biggest difference was the decline in cases of *E. coli* O157:H7. This is due to a large outbreak of *E. coli* O157:H7 that occurred in 1999 in Menard County and skewed the annual numbers.
- Number of people ill as a result of food- or waterborne outbreaks 1,485; median number of ill persons per outbreak 7 (range 2 to 148). There was one reported fatality

during an outbreak of S. enteritidis.

- Jurisdictions reporting foodborne or waterborne outbreaks in 2000 26 (Cook County Health Department, 33 outbreaks; Chicago Department of Health, 15; DuPage CHD, 5; McHenry CHD, 3; Whiteside CHD, 3; IDPH, 3; JoDaviess CHD, 2; Lake CHD, 2; McDonough CHD, 2; McLean CHD, 2; Winnebago CHD, 2; and one each for Adams CHD, Champaign-Urbana Health Department, Clay CHD, Coles CHD, Douglas CHD, Evanston HD, Kane CHD, Logan CHD, Madison CHD, Sangamon CHD, Skokie HD, Springfield HD, St. Clair CHD, Vermilion CHD and Will CHD)
- Seasonal variation Outbreaks occurred most frequently in May and November (13), followed by February (9); December (8); April, June and October (7); March and September (6); January and July (4); and August (3).
 - Suspected or confirmed etiologic agents Norwalk-like virus (41 outbreaks), bacterial (32), chemical (2), parasitic (1) and unknown (11).
 - 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 five counties (Adams, Coles, Cook, McHenry and Sangamon); a multi-jurisdictional outbreak took place in Cook, Marion and Ogle counties.
 - The 32 suspected or confirmed bacterial outbreaks were caused by *Staphylococcus aureus/Bacillus cereus* (7), *Clostridium perfringens/B. cereus* (16), *Salmonella* (3), *Shigella* (2), *C. perfringens* (3) and *B. cereus* (1). Eight of the bacterial outbreaks were laboratory confirmed by testing of human specimens or food; they were caused by *Salmonella* spp. (3), *Clostridium perfringens* (3) and *Shigella* spp. (2). The other 24 were suspected to be caused by bacterial pathogens based on incubation period and symptoms.
 - < The two reported outbreaks attributable to chemical causes both were associated with consumption of improperly handled fish and due to a histamine (scombrotoxin).
 - < One outbreak had a parasitic cause, cryptosporidiosis, and was linked to consumption of cole slaw.
- Site of food preparation restaurant (78 percent), caterer (19 percent), home (15 percent), grocery (6 percent), private club (3 percent), long-term care facility (2 percent), school (2 percent) and other locations (9 percent). The site of food preparation for outbreaks in 2000 did not include any church gatherings, day care facilities, camps or institutions (excluding schools and long-term care facilities).
- Site of food consumption restaurant (56 percent), home (26 percent), work (16 percent), school (6 percent); private club (5 percent), church (3 percent), long-term care facility (2 percent), hospital (2 percent) and other locations (13 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 testing Occurred in 23 (26 percent) outbreaks. In six (26 percent) outbreaks where food was tested, it was positive for a pathogen; in 14 outbreaks, the food tested was not the same food served to the ill persons. (In many outbreaks, food from the event is no longer available for testing by the time an investigation begins.) In 12 (14

percent) outbreaks, a food was epidemiologically linked to illness. The types of foods linked were vegetables or green salads (4), multiple food types (1), meat (3), dressing/dips (1), sandwiches (1) and other (3). There were no outbreaks in 2000 where there were culture-positive ill persons and a food item both culture-positive and epidemiologically linked to illness.

Human specimen testing – In 35 outbreaks, specimens were collected from ill persons. In 13 of these outbreaks, at least two individuals were positive for a pathogen. The type of pathogen identified in outbreaks included Norwalk-like (5), *Salmonella* spp. (3), *Shigella* spp. (2), *Clostridium perfringens* (1) and *Cryptosporidium* (1).

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- In 10 outbreaks, testing performed on stool was not for the suspected pathogen. This occurred most commonly in suspected Norwalk-like virus outbreaks, when stools were tested for bacterial pathogens but not for viruses. Often, a viral pathogen is not suspected initially as a cause for the outbreak.
- In seven (8 percent) outbreaks, food handlers were tested; in three of these, food handlers were positive. In two outbreaks, *Salmonella* spp. was identified in both food handlers and ill individuals and, in one outbreak, *Shigella* spp. was identified in food handlers and ill individuals.
- Factors contributing to outbreaks bare-hand food contact by food handler (23 outbreaks), inadequate cleaning of processing/preparation equipment/utensils (19), cross-contamination from raw ingredient of animal origin (9), food handling by an infected person (7), raw product/ingredient contaminated by pathogens from an animal or the environment (6), storage in contaminated environment (5), gloved hand contact with ready-to-eat foods (5), ingestion of contaminated raw products (3) and other (8). Multiple factors were involved in most outbreaks. No factors could be identified in 32 (37 percent) outbreaks.

For outbreaks of suspected or confirmed bacterial pathogens, the following factors contributed to the proliferation of the organism: allowing foods to remain at room or warm outdoor temperature for several hours (7 outbreaks), slow cooling (5), inadequate cold-holding temperature (5), insufficient time and/or temperature during hot holding (5), preparing foods a half-day or more before serving (3), prolonged cold storage for several weeks (1), anaerobic packaging/modified atmosphere (1) and other (4).

Multi-state outbreaks – Illinois was involved in three multi-state outbreaks.

- In one multi-state outbreak in February, a major corporation distributed meals from an Ohio supplier to its dealerships by overnight carrier. Nationwide, it was estimated that 333 employees became ill with gastrointestinal symptoms. In Illinois, 52 employees in three counties became ill. Five were laboratory confirmed with Norwalk-like virus. Pasta salads were epidemiologically linked to illness but virus could not be isolated from the implicated product.
- A second multi-state outbreak involved persons who consumed a commercial Mexican dip contaminated with *Shigella sonnei*. Two Illinois residents were linked to the outbreak as were individuals from California, Oregon and Washington.
- < A third multi-state outbreak was associated with a high school choir competition.

Students from Illinois, Indiana, Missouri and Wisconsin attended the event. Approximately 135 of 355 students became ill with Norwalk-like virus

< Although not counted as an Illinois outbreak, an unusual number of cases of *Angiostrongylus cantonensis* was reported in state residents who traveled outside the United States.

Summary

In 2000, Illinois recorded 87 foodborne outbreaks compared to a five-year median of 44. The Department interprets the increase as a sign of improved reporting by local health departments. At the state level, IDPH has increased its efforts by adding a staff member to focus exclusively on foodborne outbreaks. The most common site of food preparation in the reported outbreaks was restaurants. Food handlers who had bare-hand contact with food and inadequate cleaning of equipment and utensils were the most commonly reported contributing factors to outbreaks. Both bacterial and viral agents were important causes of foodborne outbreaks.

Suggested readings

Campbell JV, Mohle-Boetani J et al. An outbreak of *Salmonella* serotype thompson associated with fresh cilantro. J Inf Dis 2001; 183:984-7.

Lopez AS, Dodson DR et al. Outbreak of cyclosporiasis associated with basil in Missouri in 1999. CID 2001;32:1010-7.

MMWR. Protracted outbreaks of cryptosporidiosis associated with swimming pool use-Ohio and Nebraska, 2000. MMWR 2001; 50(20):406-410.

MMWR. Diagnosis and management of foodborne illnesses. A primer for physicians. MMWR 2001; 50(RR-2).pp1-69.

MMWR. Foodborne outbreak of group A rotavirus gastroenteritis among college students-District of Columbia, March-April 2000. MMWR 2000;49(50):1131-3.

Swaminathan B, Barrett TJ, Hunter SB, Tauxe RV. PulseNet: The molecular subtyping network for foodborne bacterial disease surveillance, United States. Emer Inf Dis 2001;7(3): 382-9.



Onset Date	IDPH Log # 2000	City	County	# ill/ # interviewed / # attending	Symptoms ¹	Incub (hrs)	Foods implicated	Agent	Status ²	Contrib- utory causes ³	Place of prep/ Place eaten ⁴
1/2	200014	Lyons	Cook	2/3/3	V,D,C	8h	U	unknown	U	U	R/home
1/9	200015	Hoffman Estates	Cook	3/4/4	V,D,F,C	47h	U	Norwalk-like	S	U	R/home
1/14	200010	Multi-city, Multi state	Lake & McHenry	2/2/U	V,D,F,C	48h	bean dip	Shigella sonnei	С	U	commercial product/home
1/15	20001	Palatine	Cook	7/19	V,D,C	10h	none	Norwalk-like, G2	S	U	R/R
2/2	20008	LaGrange	Cook	3/5/5	V,D	13h	U	B.cereus/ C.perfringens	S	U	R/R
2/4	20007	Palatine	Cook	2/2/2	V,D,F,C	28h	U	unk	U	U	R/R
2/6	200056	Chicago	Cook	11/17/17	D,V,C,F	41h	U	Norwalk-like	S	storage	R/R
2/6	20005	Hickory Hills	Cook	3/4/5	V,D,C	11h	U	B.cereus/ C.perfringens	S	unk	R/R
2/14	20002	Chicago	Cook	36/42/42	V,D,C,BA,H N,Chills,	18.5h	salmon/ w/filling	Salmonella enteritidis PT13	С	C,H,IC	caterer/home
2/16	20003	Multi city	Cook, Ogle & Marion	57/114/U	V,D,F,C	U	pasta salads	Norwalk- like,G2	C		caterer/work
2/18	20004	Lincoln	Logan	5/7/7	V,DAC,HA	16h	pancake	B.cereus/ C.perfringens	S		R/R

Table 2. Foodborne and waterborne outbreaks in Illinois, 2000

Onset Date	IDPH Log # 2000	City	County	# ill/ # interviewed / # attending	Symptoms ¹	Incub (hrs)	Foods implicated	Agent	Status ²	Contrib- utory causes ³	Place of prep/ Place eaten ⁴
2/19	20009	Flora	Clay	27/60/ 150	V,D,F,C,BA, HA,P	43h	green.beans/ parsley/ potatoes	Norwalk-like	S	food- handler	club/club
2/27	200011	Addison	DuPage	6/20/25	D, AC,	19h	unk	B.cereus/ C.perfringens	S	poor handwsh	caterer/ banquet hall
2/28	200013	Galena	JoDaviess	18/37/37	N,V,D,C,	unk	Unk	unk	U	unk	R/R
3/4	200017	Rockford	Winnebag o	74/286/951	D,C,V,H	11h	pork	B. cereus/ C.perfringens	S	unk	caterer/lodge
3/6	200029	S. Chicago Hgts	Cook	2/2/6	V,D,C,H,N	4h	unk	B.cereus/ S.aureus	S	H,T	R/R
3/13	200019	Worth	Cook	11/14/19	V,D,C,H	36h	Unk	Norwalk-like	S	unk	catereer/home
3/18	200022	Arlington Hgths IL,IN,MO WI, schools	Cook	136/354/unk	V,D,F,N,F,C	unk	unk	Norwalk-like, G2,4,8; only 1 tested positive	S	unk	caterer/school
3/26	200065	Chicago	Cook	3/3/3	D,N,V,C	8h	hamburgers	U	U	U	R/car
4/7	200066	Chicago	Cook	3/3/3	V,D	10h	Cheeseburger	U	U	U	R/home
4/11	200026	Mattoon	Coles	7/16/20	C,N,V,D	38h	Jello jigglers	Norwalk-like	С	Н	school/school
4/11	200031	Chicago	Cook & Chicago HD	10/17/18	F,V,DA,C	36h	unk	Norwalk-like	S	U	caterer/school
4/18	200030	Harvey	Cook	6/13/26	V,D	31h	salad /dressing	Norwalk-like	S	Н	caterer/work
4/23	200032	Schaumburg	Cook	4/8/13	N,V,C,H,D	53h	unk	Norwalk-like	S	С	R/R

Onset Date	IDPH Log # 2000	City	County	# ill/ # interviewed / # attending	Symptoms ¹	Incub (hrs)	Foods implicated	Agent	Status ²	Contrib- utory causes ³	Place of prep/ Place eaten ⁴
4/24	200033	Tinley Park	Cook	2/4/4	F,V,D,C	6h	Chicken taco	B.cereus/ C. perfringens	S	C,T	R/home
4/30	200034	Hebron	McHenry	28/31/31	D,V	8h	turkey stuffing	C. perfringens	С	IC,T	home/church
5/2	200038	Orland Park	Cook	4/7/7	V,D	6h	U	B.cereus/S.aur eus	S	C,H	R/R
5/4	200036	Rockford	Winnebag o	56/150/ 290	C,D,N	43h	U	Unk	U	H,T	caterer/church
5/6	200037	Urbana	Champaig n	55/108/ 154	F,D,V	32h	crab spread	Norwalk-like	S	U	caterer/club
5/10	200040	Chicago	Cook	8/9/10	D,V,T	29hrs	U	Norwalk-like	S	U	R/R
5/13	200044	Elmhurst	DuPage	9/14/unk	V,D,C	34h	lettuce	Norwalk-like	S	Н	R/R
5/14	200039	Matteson	Cook	4/5/10	D,C,V	9.5 hrs	U	B.cereus/ C.perfringens	S	C,improp- er.storage	R/R
5/16	200043	Chicago	Cook	2/9/10	Flush/ tingling	.5h	tuna	Histamine	С	unk	R/R
5/18	200048	Lisle	DuPage	12/25/27	D	<24h	U	B.cereus/ C.perfringens	S	unk	home/home
5/19	200041	Northlake	Cook	6/8/8	N,V,D,C,H	36h	U	Norwalk-like	S	H,C	R/work cafeteria
5/20	200042	S. Chicago Hgts.	Cook	11/12/12	D,F,V,C,F	11h	roast beef	C.perfringens	С	Т	caterer/home
5/20	200045	Rock Falls	Whiteside	7/9/9	V,D,C	36h	U	Norwalk-like	S	U	R/R
5/24	200049	Skokie	Cook	13/unk/ 35	N,V.D,C	25h	U	Norwalk-like	S	U	R/R

Onset Date	IDPH Log # 2000	City	County	# ill/ # interviewed / # attending	Symptoms ¹	Incub (hrs)	Foods implicated	Agent	Status ²	Contrib- utory causes ³	Place of prep/ Place eaten ⁴
5/25	200047	Sterling	Whiteside	7/16/16	C,D,F	21h	U	B.cereus/ C.perfingens	S	U	home/work
6/4	200062	Long Grove	Lake	11/48/ 100	D,V,F	36 h	U	Norwalk-like	S	U	R/R
6/7	200067	Chicago	Cook	5/5/6	N,V,C,D	1h	fried rice	B.cereus	S	U	R/work
6/11	200052	Niles	Cook	6/13/50	D,AC	14.5h	U	B.cereus/ C.perfringens	S	C,H,IC	deli/caterer /home
6/12	200050	Chicago	Cook	2/2/2	erythema	.25h	tuna	Histamine	С	U	R/R
6/14	200053	Chicago	Cook	17/23/ 400	V,D,F	48h	U	Norwalk-like	S	U	R/R
6/19	200054	Chicago	Cook	5/6/7	D,C	12h	U	B. cereus/ C. perfringens	S	U	R/R
6/29	200058	Waukegan	Lake	40/51/ unk	D,V	48h	U	Shigella flexneri	С	Н	R/R
7/3	200057	Galena	Jo Daviess	3/3/3	D,V,F	10h	U	Norwalk-like	S	U	R/R
7/10	200059	Orland Park	Cook	3/9/9	V,D	2.5h	U	B. cereus/S. aureus	S	U	R/R
7/19	200077	Chicago	Cook	9/9/9	N,V,D,C	14h	U	unk	U	U	R/R/work
7/26	200061	Belleville	St.Clair	4/4/4	V,D,C	12h	U	B.cereus/ C.perfringens	S	U	R/R
8/19	200063	Chicago	Cook	49/61/ unk	C,D	8h	burritos	C. perfringens	С	Т	home/work
8/23	200068	Rosemont	Cook	2/2/2	D,N	24h	U	Norwalk-like	S	U	R/R
9/3	200071	Chicago	Cook	9/13/50	V,C	8/14h	U	U	U	U	rest/banquet hall
Onset Date	IDPH Log # 2000	City	County	# ill/ # interviewed / # attending	Symptoms ¹	Incub (hrs)	Foods implicated	Agent	Status ²	Contrib- utory causes ³	Place of prep/ Place eaten ⁴
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9/4	200072	Glenview	Cook	9/14/U	D	30h	U	S. typhimurium	С	U	R/R
9/6	200069	Palos Park	Cook	3/3/3	D,N,H	2.6h	U	B. cereus/ S. aureus	S	U	R/R
9/7	200070	Georgetown	Vermilion	30/45/45	D,V	24/48 h	U	U	U	U	football field
9/18	200074	Bridgeview	Cook	6/U/U	D,V,F,C	22h	U	S. berta	С	C,H	R/R
9/24	200076	Chicago	Cook	6/6/6	V,C	34h	U	Norwalk-like	S	U	R/R
9/26	200073	Villa Park	DuPage	23/28/33	D,C,N,V	30h	U	Norwalk-like	S	Н	R/club
10/4	200075	Macomb	McDonou gh	3/4/4	V,D,C	12h	U	B. cereus/ C. perfringens	S	U	R/work
10/10	200078	Macomb	McDonou gh	3/4/14	V,D,C	36h	chef salad	Norwalk-like	S	U	R/R
10/14	200091	Geneva	Kane	8/17/17	D,N,AC	6d	cole slaw	Cryptospor- idium	С	U	home/home
10/16	200079	Chicago	Cook	5/10/10	V,D	36h	U	Norwalk-like, G2	С	U	R/R
10/20	200081	Springfield	Sangamon	11/16/17	V,D	35h	U	Norwalk-like	S	U	R/R
10/20	200083	Joliet	Will	21/25/ unk	V,D	36h	U	Norwalk-like	S	U	R/R
10/20	200084	Quincy	Adams	62/103/ 225	V,D,C,H,N	36h	U	Norwalk-like, G2	S	U	R/R
11/4	200088	Lockport	Cook	6/21/100	V,D.	12h	U	Norwalk-like	S	Н	caterer/club

Onset Date	IDPH Log # 2000	City	County	# ill/ # interviewed / # attending	Symptoms ¹	Incub (hrs)	Foods implicated	Agent	Status ²	Contrib- utory causes ³	Place of prep/ Place eaten⁴
11/5	200086	Crystal Lake	McHenry	21/39/70	V,C,D	36h	U	Norwalk-like	S	U	R/R
11/6	200087	Edwardsville	Madison	13/29/29	V,D,N,H,AC	23h	U	Norwalk-like	S	U	hotel/ breakfast bar
11/11	200090	Worth	Cook	13/18/18	D,V,AC,	12h	U	B.cereus/ C.perfringens	S	U	club/club
11/12	200089	Palos Hills	Cook	11/15/30	D,V	27.5h	U	Norwalk-like	S	U	caterer/home
11/12	200092	Chicago	Cook	2/2/2	D,AC,N,V	2h	U	U	U	U	R/R
11/15	200093	Wilmette	Cook	8/9/13	N,D,AC,C	28h	U	Norwalk-like	S	U	R/R
11/18	200102	Northbrook	Cook	2/2/2	V,D,AC	6h	U	B.cereus/S.aur eus	S	T,C	R/R
11/26	200099	Springfield	Sangamon	73/unk/ 210	V,D	U	U	Norwalk-like, G2	С	U	LTC/LTC
11/27	200098	Bloomington	McLean	2/2/3	V,D,F	10h	U	B.cereus/ C.perfringens	S	U	R/R
11/30	200100	North Riverside	Cook	2/3/3	V,D	9h	U	B. cereus/ C.perfringens	S	C,T	R/R
11/30	200095	Glen Ellyn	DuPage	8/9/9	D,V	?	U	Norwalk-like	S	U	R/R
11/30	200101	Schaumburg	Cook	2/3/3	V,D	5h	U	B.cereus/ S.aureus	S	U	R/R
12/1	200107	Prophetstown	Whiteside	5/5/5	V,D	27h	U	U	U	U	home/home
12/1	200096	Evanston	Cook	25/47/ 100	V,D	U	U	Norwalk-like	S	U	hotel/hotel

Onset Date	IDPH Log # 2000	City	County	# ill/ # interviewed / # attending	Symptoms ¹	Incub (hrs)	Foods implicated	Agent	Status ²	Contrib- utory causes ³	Place of prep/ Place eaten ⁴
12/4	200097	Bloomington	McLean	25/44/ 156	N,V,D,H,BA	28h	U	Norwalk-like	S	IC,T	club/club
12/6	200109	Northbrook	Cook	3/4/4	V,D,C	36h	U	Norwalk-like	S	C,H	R/R
12/11	200103	Urbana	Champ- aign	8/U/71	V,D	U	U	Norwalk-like	S	U	caterer/school
12/12	200104	Melrose Park	Cook	8/9/9	V,D	U	donuts	Norwalk-like	S	U	R/school
12/18	200105	Schiller Park	Cook	6/19/120	AC,D	6h	U	B.cereus/S.aur eus	S	H,C	caterer/work
12/18	200106	Crystal Lake	McHenry	148/205/262	V,D,F,C	34h	salad/ stuffing	Norwalk-like, G2	С	С,Н	R/R

¹BA=body ache, D=diarrhea, F=fever, H=headache, N=nausea, V=vomiting, C=cramps; > 40% ills reporting symptoms ²S=suspect, C=confirmed

³C=contaminated surfaces, H=inadequate food handler hygiene, IC=inadequate cooking, T=improper holding temperatures, U=unsafe foods, unk=unknown ⁴R=restaurant, U=unknown

Specific types of foodborne outbreaks

Bacillus cereus

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

Case definition

Laboratory confirmation for *B. cereus* includes isolation of greater than 10⁵ organisms per gram in properly handled food or isolation of the organism from two or more ill people and not from controls.

Descriptive epidemiology

• Number of outbreaks reported in Illinois in 2000 – 0. There was one outbreak in Chicago in which 40,000 organisms per gram were found in rice served to persons who subsequently became ill but this was not enough to confirm a *B. cereus* outbreak. There were seven outbreaks that may have been caused by either *B. cereus* or *Staphylococcus aureus* as suggested by the clinical presentation and 16 outbreaks in which the clinical picture suggested either *B. cereus* or *C. perfringens*.

Clostridium perfringens

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

Case definition

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

Descriptive epidemiology

- Number of outbreaks reported in Illinois in 2000 3 confirmed; 16 were suspected to be due to either *C. perfringens* or *B. cereus* but laboratory confirmation did not occur.
 - One outbreak of *C. perfringens* occurred at a McHenry County church potluck in April 2000. Of the 31 persons who attended, 28 (90 percent) were ill and 100 percent of the ill persons had diarrhea; one person was hospitalized. The incubation period was eight hours and three persons tested positive for the organism. Turkey prepared two days ahead of the event was reheated for the potluck. It is likely that temperature abuse of the turkey occurred at some point. The turkey had 1.2 million organisms per gram of food. No persons did not eat the turkey, so it was not possible to epidemiologically link the turkey to illness.
 - Another laboratory-confirmed outbreak occurred after a catered party in a private home in South Chicago Heights in May 2000. Of the 12 people in attendance, 11 became ill; 91 percent reported diarrheal illness with a median incubation period of 11 hours. Roast beef was tested and found to have more than 6 million *C. perfringens* per gram. Roast beef was also implicated by epidemiology. Factors contributing to the outbreak were slow cooling and inadequate holding temperatures.
 - The third laboratory confirmed outbreak took place in Chicago in August after consumption of homemade burritos sold at a work site; 49 of 61 persons (80 percent) became ill. The median incubation period was eight hours. All ill individuals reported diarrhea and four visited a health care provider. Four were laboratory confirmed with *C. perfringens* toxin in their stool. The burritos tested positive, with 2 million organisms per gram. Some of the ingredients were held at room temperature for five hours during preparation.

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* also can be pathogenic in humans and cause outbreaks.

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

• Number of outbreaks reported in Illinois in 2000 – No *E. coli* O157:H7 outbreaks were reported.

Salmonella

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

Case definition

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

- Number of outbreaks reported in Illinois in 2000 3 confirmed outbreaks with 51 people ill (median of nine persons ill per outbreak). All occurred in Cook County (one in the city of Chicago). The *Salmonella* serotypes involved in the outbreaks were *enteritidis, berta* and *typhimurium*.
 - The first Salmonella outbreak of 2000 occurred in February in Chicago, sickening 36 of 42 persons who attended a catered dinner party. One case was fatal. The mean incubation period was 18 hours. Eighteen persons were laboratory confirmed with Salmonella enteritidis. The phage type was identified as 13. The most likely food vehicle was a salmon and seafood dish, but this specific food item was not available for testing. Food handlers were also positive.
 - A second outbreak occurred in Cook County in persons from different groups who ate at one restaurant in September 2000. The mean incubation period was 30 hours. Nine of 14 persons (64 percent) became ill and seven were culture confirmed with *S. typhimurium*. All nine reported diarrhea, five visited health care providers and one was hospitalized. Controls for epidemiologic study were obtained using credit card receipts from the restaurant.
 - A third outbreak occurred in six persons in three groups who ate at a single restaurant in September in Cook County. The incubation period was 22 hours. Three were confirmed as *Salmonella berta*. All reported diarrhea, 83 percent reported fever and 33 percent reported vomiting. No food handlers were tested. A food vehicle could not be identified because only ill individuals could be interviewed.

Shigella

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

Case definition

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

Descriptive epidemiology

- Number of outbreaks reported in Illinois in 2000 2 confirmed; serotypes were *sonnei* and *flexneri*.
 - An S. flexneri outbreak occurred in January and was linked to five-layer bean dip. During this multi-state outbreak, at least 30 culture confirmed cases of S. sonnei occurred in California, Illinois, Oregon and Washington in January 2000. Both Illinois cases (one a resident of Lake County and the other a resident of McHenry County) matched the outbreak PFGE pattern. One Illinois case ate bean dip in California; the other ate bean dip in Illinois.
 - The other *Shigella* outbreak occurred in groups eating at a restaurant in Lake County during a two-day period in June. Forty persons from various groups became ill; 13 were laboratory confirmed cases. The mean incubation period was 48 hours. Cases reported diarrhea (100 percent), fever (80 percent) and vomiting (20 percent). Two individuals were hospitalized. No specific food item was linked to illness.

Staphylococcal food poisoning

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

Case definition

Laboratory confirmation of an outbreak attributable to *S. aureus* requires detection of enterotoxin in food or organisms with the same phage type in stools or vomitus of two or more cases or isolation of greater than 10⁵ organisms per gram in properly handled food.

Descriptive epidemiology

• Number of outbreaks reported in Illinois in 2000 – 0. However, there were seven outbreaks suspected of being either *S. aureus* or *B. cereus* but the agent was not confirmed.

Chemical agents

This category includes toxins – such as ciguatera and scombrotoxin – associated with fish consumption. Ciguatera toxin poisoning is caused by the ingestion of the toxin in predatory reef fish, such as barracuda, amberjack and grouper. The toxin is initially produced by dinoflagellates that are eaten by herbivorous fish, which are then consumed by the predatory fish. There is a test to detect the toxin in fish. However, the toxic fish have a normal taste and appearance. The toxin cannot be destroyed by cooking or freezing. Symptoms of diarrhea and vomiting develop within three to six hours after consuming contaminated fish. Neurologic symptoms may follow and persist for weeks or months. These neurologic symptoms include numbness, tingling of the mouth and extremities, muscle pain and weakness, and reversal of temperature sensation. There is no diagnostic test or treatment available for humans.

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

Case definition

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

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

Descriptive epidemiology

- Number of outbreaks reported in Illinois in 2000 2; in both, scombroid (histamine) was the suspected toxin although testing of fish check-up specimens were negative.
 - < In May 2000, two persons experienced flushing, itching, rash and headache after eating tuna steak at a Chicago restaurant. No fish was available for testing.
 - In June, two individuals became ill with flushing, tingling and redness after eating tuna roll maki at a restaurant in Chicago. No fish was available for testing.

Parasitic agents

There are a variety of parasitic agents that can cause foodborne or waterborne outbreaks, for example, *Cryptosporidia*, *Cyclospora* and *Giardia*. The incubation periods for parasitic agents can be up to 25 days. An unusual cause of foodborne outbreaks in the U.S. is *Angiostrongylus cantonensis*. This organism – the rat lungworm – is the most common cause of eosinophilic meningitis in the world. It is endemic in southeast Asia, Africa, India, the Caribbean and Louisiana. Larvae of *A. cantonensis* leave the rat in its feces and enter an intermediate host (e.g., snails, slugs). Humans then may consume the snails or slugs, often in uncooked vegetables. Humans also may consume the paratenic hosts, which are prawns, crabs or shrimp. The larvae migrate to the central nervous system and cause meningitis.

- Number of outbreaks reported in Illinois in 2000 1. This outbreak of cryptosporidiosis involved eight of 17 family members from five separate households who became ill after a shared meal in October in Kane County. Two people were laboratory confirmed. The median incubation period was six days; duration was 10 days. Cole slaw was implicated by epidemiology. None of the children attending the event ate the cole slaw and none were ill. Symptoms reported were diarrhea (78 percent), fever (55 percent) and vomiting (11 percent).
 - Although not counted in the Illinois foodborne outbreaks in 2000 because the exposure took place outside the U.S., an outbreak of *A. cantonensis* did involve Illinois travelers who visited the Caribbean from April 2 to April 9. In this outbreak, which was investigated by the Chicago Department of Public Health, eight of 23 U.S. students who went on the trip became ill. About three weeks after returning to Illinois, two students were admitted to the hospital with stiff neck, headache, photophobia and paresthesia. Eosinophils were identified in large numbers in the cerebrospinal fluid of one patient. A total of eight students experienced symptoms consistent with this infection. The median incubation period was 10 days. All eight experienced headache and paresthesias, 44 percent had photophobia and 8 percent had stiff necks. Patients were hospitalized for three to 21 days, two had to be readmitted after discharge and no patients died. No anthelmintic agents were given. Patients were diagnosed by sending serum overseas for testing.

Viral gastroenteritis

Norwalk-like viruses cause almost all of the outbreaks of acute non-bacterial gastroenteritis in the U.S. Estimates are that 23 million people are affected by Norwalk-like viruses in the U.S. each year. The most common cause of viral gastroenteritis are small round-structured viruses (SRSV), commonly called Norwalk-like virus. SRSV are caliciviruses and can be classified into two genogroups: genogroup 1 (Norwalk virus, Southampton virus and Desert shield virus) and genogroup 2 (Toronota virus, Mexico virus, Hawaii virus, Bristol virus, Lordsdale virus, camberwall virus, Snow Mountain agent and Melksham virus). G1 and G2 genogroups affect humans and include five to 10 genetic clusters.

Norwalk-like viruses are transmitted through consumption of contaminated food or water, directly from person to person and from airborne droplets produced during vomiting. Most commonly spread is via the fecal-oral route. The virus is excreted in stool and vomitus for up to 10 days. The incubation period and duration of illness ranges from 24 to 48 hours. Virus shedding peaks 25-72 hours after exposure to the virus. Within 48 to 72 hours after symptom onset, virus concentration in the stool declines below levels detectable by electron microscopy. Short-term immunity occurs after infection. Vomiting, diarrhea, headache and body aches are commonly reported. A common feature of 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. Characteristics of the virus that facilitate spread include low infectious dose, high concentration of virus in stool, strain diversity, environmental stability and prolonged shedding. Failure of an ill food handler to perform proper handwashing may result in fecal contamination of food. Illness caused by SRSV can be suspected based on incubation period, duration of illness, symptoms and the absence of bacterial or parasitic pathogens in stool samples.

The virus cannot be grown in cell culture; a polymerase chain reaction (PCR) test is used to diagnose Norwalk-like virus. Testing for viral gastroenteritis in humans is not useful for screening individual samples but is useful when multiple samples are available in an outbreak.

The IDPH laboratory (Springfield and Chicago locations) began testing for enteric viruses using reverse transcriptase (RT)-PCR for the first time in 2000.

Case definition

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

Descriptive epidemiology

• Number of outbreaks reported in Illinois in 2000 – 41 suspected outbreaks of viral gastroenteritis, based on clinical syndrome, incubation period and duration of illness. Five outbreaks, involving 347 people who experienced compatible illness, were laboratory confirmed (median = 62 ill persons per outbreak); four were confirmed as the G2 genogroup and one had an unknown genogroup. The median incubation period for the confirmed outbreaks was 35 hours. Laboratory confirmation was made in 23 cases. Nineteen people visited a health care provider and five were hospitalized.

The confirmed outbreaks occurred in Adams, Coles, McHenry, Sangamon and multiple counties.

- In Adams County, 62 of 255 people became ill after a meal at a restaurant. The incubation period was 36 hours. No food could be implicated epidemiologically.
- < In April, a confirmed Norwalk-like virus outbreak occurred in seven individuals in a Coles County school. The food implicated by epidemiology was jello.
- < An outbreak of Norwalk-like virus (G2) occurred in McHenry County in December. Salad was implicated by epidemiologic analysis.
- An outbreak of genotype 2 Norwalk-like virus was identified in persons at a developmentally disabled facility in Sangamon County in November. Among the 73 persons who were ill (52 patients and 21 staff members), 75 percent had diarrhea and 56 percent had vomiting. Four cases were hospitalized. Four were laboratory confirmed by RT-PCR. There appeared to be two peaks of illness but no food vehicle could be implicated.
- A multi-state outbreak of Norwalk-like virus (G2) occurred during February, when 57 persons in Cook, Marion and Ogle counties became ill. Pasta salads shipped overnight from Ohio to car dealerships were implicated epidemiologically as the cause of illness. Norwalk-like virus could not be isolated from salads.
- Food vehicle In six of the 41 outbreaks, the following food items were statistically associated with illness: vegetables/green salads (2), pasta salad (1), jello (1), sandwiches (1) and multiple vehicles (1).

Suggested readings

MMWR. "Norwalk-like viruses". Public health consequences and outbreak management. MMWR 2001;50(RR-9): 1-18.

Waterborne outbreaks

No waterborne outbreaks were reported in 2000.

Giardiasis

Background

Giardia, which causes the disease giardiasis, is the most commonly diagnosed intestinal parasite in public health laboratories. A common intestinal parasite of children, especially those attending day care, it is spread from person to person through fecal-oral transmission and has a median incubation period of seven to 10 days. Many infections are asymptomatic and repeated infections can occur in the same person. There are three species of giardia: *G. lamblia*, *G. agilis* and *G. muris*. The main human pathogen is *G. lamblia*. Cysts can remain viable for months, and the infectious dose is low.

Persons at greatest risk are children in day care facilities, close contacts of 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.

In industrialized countries, the prevalence of *Giardia* in stool specimens submitted for examination is from 2 percent to 5 percent; however, it can be as high as 35 percent during nonoutbreak times in U.S. day care settings. Giardiasis is not a nationally notifiable disease, but 43 states, including Illinois, 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 practicing good hygiene, avoiding water or food that might be contaminated and avoiding fecal exposure during sex with infected persons.

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.

- Number of cases reported in Illinois in 2000 873 (five-year median = 1,177); the incidence rate was 7 per 100,000 population. Reported cases have declined since 1995 (see Figure 51). In addition, there were 220 *Giardia* carriers reported in 2000.
- Age Mean age of cases was 29. Two age groups showed high incidence: 1 to 4 years of age and 40 to 49 years of age (see Figure 52).

- Gender 42 percent were female.
- Race/ethnicity 90 percent were white, 7 percent were African American and 2 percent were other races; 11 percent were Hispanic. There was a significantly higher proportion of whites with giardiasis and a lower proportion of African Americans compared to the Illinois population.
- Seasonal variation Most cases occurred in summer to fall, from July through September (Figure 53).
- Geographic variation Highest incidence rates per 100,000 for giardiasis occurred in central and northern Illinois (Figure 54). One-year incidence rates for the period 1996 to 2000 ranged from 0 to 31 per100,000 population by county. Counties with the highest average annual giardiasis incidence rates per 100,000 population from 1996-2000 were DeWitt (31), Champaign (29), Peoria (25), Stephenson (22) and Mason (21).

Summary

Giardiasis cases decreased (873) in 2000 compared to the previous five-year median (1,177). Whites were overrepresented in the case population for giardiasis (90 percent) compared to their representation in the Illinois population (73 percent); African Americans were underrepresented among giardiasis cases (7 percent) compared to their representation in the Illinois population (15 percent). The mean age was 29, and more cases occurred in the warmer months of the year. Centrally located counties had the highest incidence of giardiasis in the state.











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. For reporting purposes in Illinois in 2000, hepatitis C was 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 also may be transmitted through sharing of equipment for intranasal cocaine use.

Of the 897 reported acute hepatitis cases in Illinois in 2000, 79 percent were hepatitis A, 19 percent were hepatitis B, 2 percent were hepatitis NANB and 1 percent were of an unknown type. 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 reported in 90 percent of reported hepatitis A cases, in 77 percent of hepatitis B cases and in 50 percent of hepatitis NANB. Hospitalization occurred for almost onequarter of cases for each type of hepatitis.

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 (17 percent) than were hepatitis B (1 percent) or hepatitis A cases (0.7 percent). Hepatitis A cases were more likely to report travel outside the U.S. or Canada (17 percent) compared to hepatitis B cases (4 percent) or hepatitis NANB (0 percent). Cases reporting more than one sexual partner, from highest to lowest, were hepatitis NANB (37 percent), hepatitis B (24 percent) and hepatitis A (10 percent). Less than 5 percent of hepatitis cases of each type reported being employed in a medical field that could entail blood contact. Cases who reported receiving tattoos, from highest to lowest, were hepatitis B (4 percent), hepatitis A (1 percent) and hepatitis NANB (0 percent).

	Hepatitis	A	Hepatiti	is B	Hepatitis NANB		
Factor	# (total # reporting) ¹	%	# (total # reporting) ¹	%	# (total # reporting) ¹	%	
Demographics							
Mean age	25 (692)	-	38 (170)	-	46 (17)	-	
Female	291 (695)	42.0	61 (169)	36.0	8 (17)	47.0	
Race							
Asian	19 (622)	3.0	3 (157)	2.0	0 (16)	0	
African-American	262 (622)	42.0	88 (157)	52.0	4 (16)	25.0	
White	340 (622)	55.0	66 (157)	39.0	12 (16)	75.0	
Other	1 (622)	0.2	13 (157)	7.0	0 (16)	0	
Hispanic	163 (619)	26.0	9 (157)	5.0	2 (15)	13.0	
Clinical							
Jaundice	491 (545)	90.0	126 (161)	77.0	6 (12)	50.0	
Hospitalized	129 (544)	24.0	37 (164)	23.0	3 (13)	23.0	
Deaths	4 (539)	0.7	3 (163)	2.0	0 (13)	0	

Table 3. Demographic and Clinical Information for Hepatitis A, B and NANB in Illinois, 2000

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

Source: Illinois Department of Public Health, 2001

Factor Hepatitis A (N=696) Hepatitis B (N=170) Hepatitis NANB (N=21) $\%^{2}$ $\%^{2}$ $\%^{2}$ # (total # # (total # # (total # reporting)¹ reporting)¹ reporting)¹ Day care contact 15 (473) 3.0 0 (129) 0 0(12)0 Household contact of day care 33 (463) 7.0 3 (127) 2.0 0(12) 0 Contact of a hepatitis A case 110 (450) 24.0 0 (126) 0 0(11) 0 5 (107) 5.0 Sexual contact Household 63 (107) 59.0 Other 39 (107) 36.0 Food handler 16 (467) 3.0 3 (129) 2.0 0(12) 0 Ate raw shellfish 5.0 0 18 (462) 4.0 8 (125) 0(12) 0 Common source outbreak 2 (442) 0.5 0 (127) 0 0 (12) 0 Travel 81 (468) 17.0 4. 0 (12) 6 (127) Hepatitis B or C case contact 2 (429) 0.5 8 (126) 5.0 2 (12) 17.0 Sexual contact 50.0 5 (8) 62.0 50.0 1(2)1(2)Household 0 0(2)0 1 (8) 12.0 0(2)Other 1(2)50.0 2 (8) 25.01(2)50.0 Dialysis contact 3(443) 0.7 0 (12) 0 1 (138) Medical field employee 11(448) 2.0 2 (139) 1.0 0(11) 0

Table 4. Number and Percentage of Cases with Risk Factors for Hepatitis A, B and NANB in Illinois, 2000

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

²Percentage 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, 2001

Factor	Hepatitis A	(N=696)	Hepatitis B (N=170)	Hepatitis NANB (N=17)		
	# (total # reporting) ¹	$\%^2$	# (total # reporting) ¹	$\%^2$	# (total # reporting) ¹	$\%^2$	
Injection drug user	3 (437)	0.7	2 (137)	1.0	2(12)	17.0	
Sexual preference							
Heterosexual	234 (253)	92.0	122 (130)	74.0	12 (12)	100.0	
Homosexual	15 (253)	92.0	7 (130)	4.0	0 (12)	0	
Bisexual	4 (253)	2.0	1 (130)	0.6	0 (12)	0	
Number of sexual partners							
0	161 (329)	49.0	16 (129)	10.0	3 (8)	37.0	
1	134 (329)	41.0	72 (129)	43.0	2 (8)	25.0	
2-5	31 (329)	9.0	38 (129)	23.0	2 (8)	25.0	
>5	3 (329)	0.9	3 (129)	2.0	1 (8)	12.0	
Dental work	30 (424)	7.0	16 (134)	10.0	0 (12)	0	
Other surgery	8 (425)	2.0	9 (134)	5.0	2 (11)	18.0	
Acupuncture	1 (423)	0.2	0 (132)	0	0 (12)	0	
Tattoos	5 (434)	1.0	6 (133)	4.0	0 (12)	0	
Needlestick	0 (426)	0	3 (132)	2.0	1 (12)	8.0	
Hepatitis B vaccine series	120 (383)	31.0	4 (132)	2.0	0 (12)	0	

Table 4. Risk Factor Information for Hepatitis A, B and NANB in Illinois, 2000 (continued)

*Percentage is number of cases with the risk factor divided by total number with information provided on that risk factor multiplied by 100.

Source: Illinois Department of Public Health, 2001

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 handwashing, 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 to 19 days after vaccination for more than 50 percent of recipients. Because infection with hepatitis A may lead to acute liver failure in patients with chronic liver disease, it is important for these individuals to be vaccinated.

In a study in Georgia, approximately one-quarter of the population of men who have sex with men had received at least one dose of hepatitis A vaccine. During a campaign to increase vaccination rates, only 19 percent of men in the targeted group accepted vaccine. Effective parts of the campaign were information provided in local gay newspapers and multiple messages on hepatitis A vaccine.

Case definition

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

- Number of cases reported in Illinois in 2000 696 (five-year median = 821) (see Figure 55).
- Age Incidence was highest in 5- to 9-year-olds (13 per 100,000) (mean age = 25) (see Figure 56).

- Gender Among those ages 20-49, the incidence of hepatitis A in males was higher than in females.
- Race/ethnicity 55 percent were white, 42 percent African American and 3 percent other races; 26 percent were Hispanic. Based on the racial/ethnic composition of the state's population, there were significantly higher proportions of African Americans and Hispanics with hepatitis A and a significantly lower proportion of whites.
- Employment 16 percent of reported cases were involved in food handling.
- Seasonal variation Cases occurred throughout the year (see Figure 57).
- Geographic variation The counties with the highest average annual incidences of hepatitis A per 100,000 population for 1996 to 2000 were Madison (11), Cook (10), Boone (9), Winnebago (8), Bureau (7) and Clinton (7). The average annual incidence of hepatitis A by county, from 1996 to 2000, is found in Figure 58.
- Risk factors Contact with a hepatitis A case (24 percent), travel outside the U.S. or Canada (17 percent) and consumption of raw shellfish (4 percent).
 - < Among those reporting contact with a household member with hepatitis A, 28 percent were white and 20 percent were African American.
 - < A history of travel outside the U.S. or Canada was reported by 25 percent of whites and 2 percent of blacks; 38 percent of Hispanics and 8 percent of non-Hispanics reported travel outside the U.S. or Canada.
- Secondary contacts/cases 110 cases reported contact with a suspect or confirmed case of hepatitis A; 63 were household contacts, 39 were non-household contacts and five were sexual contacts of a confirmed case. Of the 110 cases, 37 mentioned contact with a hepatitis A case but it was not possible to confirm (possible reasons include 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). Five additional cases were listed as having had contact with a confirmed case but had onsets within 14 days of the case, indicating that the case named was not the source of infection.

Secondary cases – 38 household contacts of confirmed cases could be considered secondary cases. Among these cases, 16 of the primary cases were interviewed too late to provide IG to contacts, two primary cases did not list the household contact who subsequently became infected, two primary cases could not be contacted, one secondary case was offered IG but refused, five did not receive IG, nine received IG within the 14 day window but became infected anyway, for one case it was unknown whether he/she received IG and for an additional two cases it was unknown if the secondary case was listed as a contact.

Also considered secondary cases were 14 non-household contacts of confirmed cases. Of these, four primary cases were interviewed too late to provide IG to contacts and eight of the secondary cases in non-household contacts were not listed on the list of primary case contacts needing IG. Of these eight secondary cases, five were relatives of the primary cases but were not household contacts.

• Symptoms/outcomes – 90 percent of reported cases were jaundiced and 94 percent of those tested showed elevated liver enzymes. Almost one-quarter of cases were

hospitalized. One individual required a liver transplant. Four deaths were linked to acute hepatitis A.

- Case interviews 468 hepatitis A cases were reached for interview: 91 percent were white and 80 percent were African American; 92 percent of Hispanics were interviewed and 84 percent of non-Hispanics. Of the 468 investigation forms, 27 failed to include information on contact prophylaxis.
- Administration of IG To avoid secondary cases, IG can be offered for prophylaxis of close contacts if it can be given within 14 days of 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 244 hepatitis A cases, prophylaxis of at least 955 close contacts was recommended by the health department or physician. For cases where IG was needed for contacts, a mean of two persons was recommended for IG per case. In 17 households, multiple primary cases of hepatitis A were reported.

For 24 cases, by the time of the interview, it was too late to provide IG to the contacts. For 10 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, it should be assumed 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.

• Past incidence – Infectious hepatitis reporting has been in place in Illinois since 1943 (Figure 59). Reported cases have declined since the 1970s.

Summary

Hepatitis A is the most commonly reported acute infectious hepatitis in Illinois. The mean age of cases was 25 years, although the highest incidence in 2000 occurred in 5- to 9-yearolds. African Americans were overrepresented in reported hepatitis A cases (42 percent) versus their representation in the Illinois population (15 percent), while whites were underrepresented (55 percent) compared to their representation in the Illinois population (73 percent). Hispanics were overrepresented in hepatitis A cases.

Barriers to prevention of 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 14 non-household contacts who were secondary cases; five of those cases not listed as contacts were relatives to the case. This may mean public health interviewers should more carefully question a case about non-household contacts who may need prophylaxis, especially relatives of the case.

To prevent secondary cases, hepatitis A cases, along with accurate contact information, should be reported promptly to the local health department, which should conduct interviews 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.

Suggested readings

Friedman MS, et al. Factors influencing a communitywide campaign to administer hepatitis A vaccine to men who have sex with men. Am J PH 200:90(12): 1942-46.







Figure 58. One-year Hepatitis A Incidence Rates per 100,000 by County, Illinois, 1996-2000





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 injection drug use, hemodialysis, acupuncture, tattooing, blood transfusions and needle-stick 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.

Children can be vaccinated against hepatitis B. In Illinois, hepatitis B vaccination in children was mandated in 1997. A study by CDC showed that infants who receive their first hepatitis B vaccine at birth are more likely to complete the three-dose series.

Case definition

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

- Number of cases reported in Illinois in 2000 170 confirmed acute cases (five-year median = 284) (see Figure 60). The overall one-year incidence rate of reported acute hepatitis B in Illinois was 1 case per 100,000 population.
- Age Incidence rate was highest in the 20- to 29- year-old age group (mean age = 38) (Figure 61).
- Gender 64 percent were male. There was a significantly higher proportion of males among hepatitis B cases than among the Illinois population.
- Race/ethnicity 52 percent of cases were African American, 39 percent were white and 2 percent were Asian; 5 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.

- Risk factors Risk factors identified as occurring in cases from six weeks to six months prior to illness included more than one sexual partner (25 percent), sexual contact with a hepatitis B case (4 percent), tattoos (4 percent), injection drug use (1 percent), needle-stick injury (2 percent) and employment in a medical field that entails blood contact (1 percent). Individuals may have had more than one risk factor.
- Symptoms/outcomes 77 percent of hepatitis B cases were jaundiced and almost onequarter were hospitalized.
- Past incidence Data on reported serum hepatitis cases in Illinois has been collected since 1969 (Figure 62). In 1984, serum hepatitis was separated into hepatitis B and hepatitis non-A non-B. Since the early 1990s, hepatitis B reporting has declined steadily in Illinois.

Summary

There were 170 confirmed hepatitis B cases reported in Illinois in 2000. Males and African Americans had higher proportions of individuals infected with hepatitis B.

Suggested readings

Yusuf HR et al. Association between administration of hepatitis B vaccine at birth and completion of the hepatitis B and 4:3:1:3 vaccine series. JAMA 2000;284(8):978-83.







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. There are at least six distinct genotypes of HCV; types 1a and 1b are most common in the U.S., where it is estimated that 4 million persons are infected with HCV.

The most efficient route of transmission is by direct percutaneous exposure (e.g., blood or blood product transfusion, organ or tissue transplants, and sharing of contaminated needles between injection drug users [IDUs]). Low efficiencies of transmission occur from sexual and household exposure to an infected contact. Transmission of HCV has been reported from patient to health care worker.

However, the majority of HCV cases are in IDUs. The virus has been shown to be transmitted by the use of shared drug preparation equipment such as drug cookers and filtration cotton. In California and Washington, studies found the prevalence of HCV in IDUs varied from 82 percent to 95 percent. Other studies have found seroprevalence rates of 60 percent to 80 percent in this population. A study of HCV in Texas identified both injection drug use and tattooing at a commercial tattoo parlor as independent risk factors for HCV infection. Receiving a tattoo at a commercial tattoo parlor was also identified as a risk factor in a separate study in Texas. Risk factors associated with HCV positivity in a New York study were number of years of injection drug use, use of cocaine and infection with HBV. The prevalence of HCV in Chicago was 27 percent and was associated with age and duration of injection drug use.

Posttransfusion infections of HCV decreased after routine screening for HCV antibody began in the U.S. in May 1990. In 1992, multiantigen testing was implemented.

The incubation period for HCV ranges from two weeks to six months, most commonly six to nine weeks. Many individuals are asymptomatic and only a small proportion become jaundiced. Forty percent of infected adults are symptomatic, and 85 percent of adults with acute hepatitis C develop persistent infection.

The hepatitis C virus can cause chronic hepatitis, cirrhosis and hepatocellular carcinoma. Among adults who had acute hepatitis C, 26 percent to 50 percent developed chronic active hepatitis and 3 percent to 26 percent developed cirrhosis. Anti-HCV positive persons had a 5- to 50-fold higher risk of primary hepatocellular carcinoma compared to anti-HCV negative patients. These sequelae typically take 20 or more years to develop. Hepatitis C related disease is the leading indication for liver transplantation. Approximately 40 percent of the 5,000 liver transplantations in the U.S. are done because of hepatitis C liver disease.

Coinfections with HCV and HIV are common due to similar routes of transmission. Up to

one-third of HIV-infected persons in the United States also may have HCV. HCV is 10-fold more likely than HIV to be transmitted by an accidental needle-stick and is acquired more easily by injection than HIV. HIV disease accelerates the progression of hepatitis C.

Routine screening for HCV infection is recommended only for persons who have a history of ever injecting drugs, recipients of clotting factor concentrates prior to 1987, recipients of blood transfusions or solid-organ transplants prior to July 1992, and chronic hemodialysis patients. Screening 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 needle-sticks or mucosal exposure to anti-HCV-positive blood. There is no vaccine or effective post-exposure prophylaxis to prevent HCV infection.

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

Qualitative tests for HCV can be used to assess the response to antiviral therapy. The reverse transcription-polymerase chain reaction (RT-PCR) can detect HCV RNA in serum within one to two weeks after exposure to the virus. This test can be use for early diagnosis, in immunocompromised patients (whose antibody production may be impaired) and in patients with indeterminate RIBA results. 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 hepatitis B. HCV-positive persons should not donate blood, organs, tissues or semen. There is insufficient data to recommend that infected persons change sexual practices with steady partners. HCV-positive household members should not share toothbrushes or razors.

Treatment for hepatitis C may be recommended for persons with elevated serum alanine aminotransferase (ALT) and tests that indicate the presence of circulating HCV RNA. Response to therapy is higher in those with genotypes 2 and 3.

In a study among active duty troops in the U.S. military, the prevalence of hepatitis C virus infections (RIBA-positive individuals) was 0.5 percent. For 81 HCV RNA positive troops, the genotypes were 1a (63 percent), 1b (22 percent), 2a (1 percent), 2b (7 percent) and 3a (6 percent), which is similar to what is seen in the civilian population. The military has mandatory testing for illicit drugs prior to induction and throughout service.

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.

Reporting of hepatitis C infection (a person with a supplementary positive test for hepatitis C) began in Illinois on April 1, 2001.

Descriptive epidemiology

- Number of cases in Illinois in 2000 17 cases of acute hepatitis NANB (five-year median = 86). Ten cases who had an ELISA test for hepatitis C tested positive. One case was reported as RIBA or PCR positive for hepatitis C.
- Age Cases ranged from 17 to 88 years (mean age = 46) (see Figure 63).
- Gender 53 percent were male.
- Race/ethnicity 75 percent of cases were white and 25 percent were African American; 13 percent were Hispanic.
- Risk factors Two (17 percent) cases reported a history of injection drug use.
- Case interviews 12 cases were interviewed.
- Symptoms/outcomes Almost a quarter of cases were hospitalized and no cases were fatal.

Summary

In 2000, there were 17 cases of reported hepatitis NANB compared to the previous fiveyear median of 86. Among those for whom the information was available, 17 percent had a history of injection drug use.

Suggested readings

Des Jarlais DC, Schuchat A. Hepatitis C among drug users: Deja vu all over again? Am J PH 2001;91(1):21-2.

Diaz T et al. Factors associated with prevalent hepatitis C: Differences among young adult injection drug users in lower and upper Manhattan, New York City. Am J PH 2001;91(1):23-30.

Hagan H et al. Sharing of drug preparation equipment as a risk factor for hepatitis C. AJPH 2001; 91(1):42-6.

Haley RW and Fischer RP. Commercial tattooing as a potentially important source of hepatitis C infections. Medicine 80(2):134-51.

Hyams KC, Riddle J et al. Prevalence and incidence of hepatitis C infection the US military: A seroepidemiologic survey of 21,000 troops. Am J Epi 2001; 153:764-70.

Lauer GM, Walker BD. Hepatitis C virus infection. NEJM 2001; 345(1):41-52.

Lorvick J et al. Prevalence and duration of hepatitis C among injection drug users in San Francisco, California. Am J PH 2001;91(1):

Ross RS et al. Transmission of hepatitis C virus from a patient to an anesthesiology assistant to five patients. NEJM 2000;343(25): 1851-4.

Schafer DF, Sorrell MF. Conquering hepatitis C, step by step. New Eng J Med 2000;343(23):1723-4.

Sulkowski MS et al. Hepatitis C virus infection as an opportunistic disease in persons infected with human immunodeficiency virus. Clin Inf Dis 2000:30:S77-84.

Thorpe LE et al. Hepatitis C virus infection: Prevalence, risk factors, and prevention opportunities among young injection drug users in Chicago, 1997-1999. J Inf Dis 2000;182:1588-94.



Histoplasmosis

Background

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

Histoplasmosis can be a severe infection in persons with HIV or other immunocompromising conditions. Approximately 5 percent of persons with AIDS who live in endemic areas may develop histoplasmosis, which frequently disseminates. A study in Georgia found that, among risk factors for histoplasmosis in HIV-infected persons, was working with soil contaminated with bird or bat droppings. Decreased risk was associated with antiretroviral therapy.

Case definition

The case definition for histoplasmosis in Illinois is either -

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

- Number of cases reported in Illinois in 2000 59 (five-year median = 41) (see Figure 64). At least 18 (35 percent) of these cases were in immunocompromised persons; therefore, it is not possible to determine whether they represent new infections or reactivation of previous infections.
- Age Mean age was 42 (Figure 65).
- Race/ethnicity 81 percent were white and 18 percent were African Americans; 12 percent were Hispanic.
- Diagnosis 13 cases were confirmed by culture. Four were urine antigen positive; 11

were M band positive by immunodiffusion.

- Seasonal variation No seasonal trend
- Outcomes 63 percent were hospitalized; seven cases were fatal.

Summary

Almost 60 cases of histoplasmosis were reported in Illinois residents in 2000. More than one-half were hospitalized for their illness.

Suggested readings

Hajjeh RA, Pappas PG et al. Multicenter case-control study of risk factors for histoplasmosis in human immunodeficiency. CID 2001:32:1215-20.



Legionellosis

Background

Legionellosis is caused primarily by *Legionella pneumophila*. The two clinical manifestations of infection with *Legionella* bacteria are Legionnaires' disease (legionellosis) 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 legionellosis clinically have pneumonia and abnormal chest radiographs.

Legionellosis most often occurs in those who are immunocompromised due to disease or aging. Risk factors are underlying medical conditions such as human immunodeficiency virus, organ transplantation, renal dialysis, diabetes, chronic obstructive pulmonary disease, cancer, immunosuppressive medication or smoking. Pontiac fever is 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, and have occurred in industrial settings.

Legionella urine antigen testing, serologic antibody testing and culture of respiratory secretions are useful for diagnostic testing. The urine antigen test provides rapid diagnosis for *L. pneumophila* serogroup 1 but will not provide an isolate to compare to clinical and environmental isolates gathered during outbreak investigations. Pulsed field gel electrophoresis (PFGE) analysis must be used with caution unless the distribution of subtypes is known. The ability of PFGE to discriminate between isolates is based on heterogeneity of the organism. A study of clinical isolates in Pennsylvania indicated that the variability of *L. pneumophila* may be



limited and that PFGE alone should not be used to link patient and environmental isolates unless epidemiologic data supports the conclusion.

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 \$ 128 against *L. pneumophila* serogroup 1 between paired acute and convalescent phase serum specimens; or 3) demonstration of *L. pneumophila* serogroup 1 in lung tissue, respiratory secretions, or pleural fluid by direct fluorescent antibody (FA); or 4) demonstration of *L. pneumophila* serogroup 1 antigens in urine by radioimmunoassay (RIA) or enzyme-linked immunoassay (ELISA).

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 33 (five-year median = 36). Case report forms were available for 31 of these cases.
- Age 61 percent were over the age of 59 (see Figure 66).
- Geographic distribution 15 cases were reported from Cook County.
- Seasonal variation Case numbers increased in July and August.
- Risk factors Five (18 percent) stayed or worked in a hospital in the two weeks before onset; three (14 percent) visited a hospital as an outpatient. Six cases (29 percent) had been hospitalized continuously for three or more days before onset; two (9 percent) were discharged from the hospital within 10 days before onset; 10 (48 percent) had no hospital visits in the 10 days before symptoms; and 12 cases had no information on hospital visits. Six (33 percent) traveled overnight in the two weeks prior to onset. At least one underlying health problem (diabetes, cancer, transplant, renal dialysis, corticosteroid therapy, other immunosuppressive condition or smoking) was reported by 27 of 29 cases; two reported no underlying health problems and information was incomplete for four cases.
- Diagnosis Cases were diagnosed through urine antigen alone (19), culture alone (2), direct fluorescent antibody of respiratory secretions alone (2) or culture in combination with other tests (6) or unknown (4).
- Outcomes Hospitalization was required for 29 cases with *Legionella* infection; 25 cases (93 percent) with information available had X-ray confirmed pneumonia; three (12 percent) cases where outcome of infection was available were fatal.

Summary

In 2000, there were 33 cases of legionellosis reported in Illinois. Most of the cases were
more than 60 years of age and/or had pre-existing medical conditions. No outbreaks were detected.

Suggested readings

Drenning SD, Stout JE et al. Unexpected similarity of pulsed-field gel electrophoresis patterns of unrelated clinical isolates of *Legionella pneumophila*, serogroup

MMWR. Outbreak of Legionnaires' disease among automotive plant workers-Ohio, 2001. MMWR 2001; 50(18): 357-9.



Lyme disease

Background

Lyme disease is a tickborne disease caused by the bacterium *Borrelia burgdorferi* sensu lato. 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 also are transmitted by the same tick. In the Midwest, wild rodents and other animals maintain the transmission cycle. Deer are the preferred host of the adult tick.

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

Lyme disease is characterized by a rash-like skin lesion (erythema migrans) that may be followed by cardiac, neurologic and/or rheumatologic involvement. The incubation period for erythema migrans (EM) ranges from three to 32 days after tick exposure; it is present in 60 percent to 80 percent of case patients. 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 diagnosing early Lyme disease unless a convalescent serum is also obtained.

A skin rash resembling EM has been associated with bites from *A. americanum*, the lone star tick, but the infection, called southern tick-associated rash illness (STARI) may be due to an organism called *Borrelia lonestari*. This organism has not yet been isolated from an ill person. *Borrelia lonestari* was identified by PCR in two Alabama *Amblyomma americanum* ticks after a cluster of STARI infections was identified in that state. Surveillance is continuing to determine if *B. lonestari* might be the etiologic agent for this illness.

There were 17,730 cases of Lyme disease reported in 2000 in the U.S., mainly in the Northeast, mid-Atlantic and north-central regions of the country. Twelve states accounted for 95 percent of the cases.

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 supportive laboratory evidence of infection or laboratory confirmation, i.e., isolation of *B. burgdorferi* from a clinical specimen, or demonstration of diagnostic immunoglobulin M or immunoglobulin G antibodies to *B. burgdorferi* in serum or cerebrospinal fluid (CSF). A two-test approach using a sensitive enzyme immunoassay or immunofluorescence antibody followed by Western blot is required by IDPH for confirmation of non-EM cases.

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 35 (five-year median = 14). Of these, five were *B. burgdorferi* negative by serologic testing at CDC. These patients' specimens are being stored at CDC for further study in case a *B. lonestari* assay becomes available.
- Geographic distribution The exposure locations for the 2000 cases were Brown County (4), Williamson County (4), Ogle County (3), Grundy County (2), Union County (2), DeWitt County (1), Morgan County (1), Pike County (1), Sangamon County (1) and Pulaski County (1). One case reported both an in-state and out-of-state exposure location, and one had an unknown exposure location. The remaining 13 cases cited exposures in states other than Illinois (Wisconsin, 11, and Connecticut, 2).

During 2000, the first cluster of EM in Illinois occurred among three attendees of a youth camp in Williamson County. In July, a southern Illinois physician reported clinically diagnosed cases of EM in three children attending the same youth camp on Little Grassy Lake in the Shawnee National Forest. Rash onsets were from June 20 through July 5. The Lyme disease vector, the deer tick, is not known to be established in this area; however, the lone star tick is plentiful. None of the patients in this cluster had supportive laboratory evidence for *B. burgdorferi* at the CDC's laboratory. Tick collections at this site yielded lone star ticks; none were *B. burgdorferi* positive at the CDC's laboratory. The minimum infection rate was 1.5 percent for *B. lonestari*. Seven were positive with an identical Fla sequence for *B. lonestari*. Approximately 400 nymphs and 75 adults were tested. This isolate is identical to others, from Indiana, New Jersey and Wisconsin, examined by the CDC. Recommendations to the youth camp were to have more frequent tick checks, to use DEET and to wear long pants. Parents whose children were at the camp during the summer were sent letters about the illnesses.

Two EM patients with central Illinois exposures in similar areas (where lone star ticks are reported and established deer tick populations have not been found) were also *B. burgdorferi* negative at the CDC. One of these two cases was a reported exposure in Brown County in a child following a tick bite at a summer youth camp in the second half of June. The second EM case was due to a Pike County exposure in a 63-year-old man who had recognized tick exposure and had been at multiple sites in woods and along the river in Pike County during the end of June and first of July. Ticks were collected from one of these central Illinois sites in June. Physicians seeing patients with EM lesions who have been in areas where populations of the deer tick are not known to be established are asked to contact their local health authority or the Illinois Department of Public Health if they are willing to collect patient specimens for inclusion in a study of the possible causes for these EM lesions.

Deer ticks infected with *B. burgdorferi* have been identified in Carroll, Grundy, Ogle, Rock Island and Will counties. Deer ticks also have been found in Lee, Monroe and Winnebago counties, but ticks have not been identified as infected with *B. burgdorferi*. Deer ticks also have been identified in the environment in LaSalle County; it is not known if any of these ticks are infected with *B. burgdorferi*. Some preliminary information indicates that deer ticks might be established in some counties along the Illinois River corridor (Putnam, Marshall, Fulton and Peoria counties) and perhaps in Kankakee County along the Kankakee River. Further field work will be done to verify that these findings persist for multiple years.

- Symptoms Qualifying manifestations were EM (26), neurologic signs such as Bell's palsy or cranial neuritis (2) and rheumatologic signs (2). An additional five presumed STARI cases had EM.
- Past incidence 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), 1999 (17) and 2000 (35).

Summary

For the 35 cases reported in Illinois residents during 2000, EM was the most common qualifying manifestation for Lyme disease. Lyme disease cases peak in summer months. Five presumed cases of STARI infection were reported in 2000 from central and southern parts of Illinois where the deer tick is not known to be established.

Suggested readings

Burkot TR, Mullen GR et al. *Borrelia lonestari* DNA in adult Amblyomma americanum ticks, Alabama. Emer Inf Dis 2001;7(3):471-2.

Campbell GL, et al. Epidemiologic and diagnostic studies of patients with suspected early Lyme disease, Missouri, 1990-1993. J Inf Dis 995;172:470-80.

Des Vignes F, Piesman J et al. Effect of tick removal on transmission of *Borrelia burgdorferi* and *Ehrlichia phagocytophila* by *Ixodes scapularis* nymphs. J Inf Dis 2001;183:773-8.

Kirkland KB et al. Erythema migrans-like rash illness at a camp in North Carolina. A new tick-borne disease. Arch Intern Med 1997;157:2635-41.

MMWR. Lyme disease-United States, 2000. MMWR 2002; 51(2):29-31.

Parola P, Raoult D. Ticks and tickborne bacterial diseases in humans: An emerging infectious threat. CID 2001;32:897-928.

Malaria

Background

Malaria is a very important global parasitic disease. Imported malaria cases occur in Illinois when someone with the disease 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 *Plasmodium (Plasmodium vivax, P. falciparum, P. malariae* and *P. ovale*) cause disease in people. Identification of the species is important because treatment can differ. For example, disease caused by *P. falciparum* has a more serious prognosis and must be treated differently. 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

Illinois uses the CDC's 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

- Number of cases reported in Illinois in 2000 68, all of which were imported from outside the U.S. (five-year median = 77) (see Figure 67). There were individual surveillance report forms for 65 of these cases. A U.S. address was reported by 52 of 59 cases.
- Age Peak occurred in the 20- to 29-year-old age group; the mean age was 35 (Figure 68).
- Race/ethnicity 26 percent were Asian, 37 percent were African American and 37 percent were white; 3 percent were Hispanic. There were significantly higher proportions of Asians and African Americans with malaria compared to their representations in the Illinois population and significantly lower proportions of whites and Hispanics with malaria compared to their representation in the Illinois population.
- Seasonal variation Cases of malaria were reported throughout the year (Figure 69).
- Speciation The malaria species identified in the reported cases were *falciparum* (27 cases), *vivax* (27), *malariae* (5), *ovale* (2), mixed (4) and unknown (11).
- Treatment/outcomes 36 (59 percent) were hospitalized. The 27 *P. falciparum* cases were treated with the following medications: chloroquine (2), mefloquine (2), quinine (2), quinine and tetracycline (6), doxycycline and quinine (3), other two-drug combinations

(5), three-drug combinations (1), other drugs, not specified (1) and unknown (5). No fatalities from malaria were reported. No cerebral malaria was reported.
Risk factors – The major risk factor is travel outside the United States (Figure 70). This applied to 64 of the 2000 cases. In southeast Asia, countries visited by malaria cases prior to illness were Indonesia (2), the Philippines (1), the East Indies (1) and multiple countries (2). On the Indian subcontinent, cases traveled to India (13), Pakistan (1) and Afghanistan (1). In Africa, the following countries were visited: Nigeria (12), Ghana (7), Africa, not further specified (6), Ivory Coast (2), multiple (2), Guinea (1), Cameroon (1), Togo (1), Liberia (1), Mali (1), West Africa (1) and Burkina Faso (1). In South America, two cases visited Ecuador. In Central America, cases visited Honduras (3) and El Salvador (1). One case visited multiple countries on different continents.

Of the 12 cases reporting travel to Nigeria, nine were infected with *P. falciparum* and two were not speciated. Five of seven cases who visited Ghana had *P. falciparum* and one was not speciated. The 13 cases reporting travel to India were infected with *P. vivax* (8) and *P. falciparum* (1); four were not speciated.

Cases provided the following reasons for travel overseas: visiting relatives (31), missionary work (12), tourism (4), student or teacher (3), refugee (1), business (1), Peace Corps (1) and other (2).

Malaria prophylaxis was reported by 30 (50 percent) cases. Cases indicated taking the following medications: chloroquine (7), mefloquine (11), chloroquine plus another drug (3), other drugs (5) and unknown type (4). Among those who indicated they traveled to visit relatives, 31 percent took prophylaxis while 68 percent of those traveling for other reasons took prophylaxis. Individuals who are visiting the country of their birth may be less likely to assume they need to take prophylaxis.

- Past infection 14 cases (24 percent) reported a history of malaria in the last 12 months.
- Past incidence Data on malaria cases in Illinois has been collected since 1917 (see Figure 71). Cases have declined greatly since the 1930s.

Summary

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There were 68 reported cases of imported malaria identified in Illinois in 2000, 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. Eighty-four 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).











Measles

Background

Measles is a highly communicable viral disease. Transmission most commonly occurs through droplet spread or through direct contact with nasal or throat secretions of infected people. The incubation period is about 10 days, but varies from seven to 18 days. Infected individuals show fever, conjunctivitis, coryza, cough and Koplik's spots on the buccal mucosa, along with a rash that appears on the third to seventh day. The disease can be prevented by proper immunizations. A two-dose vaccination schedule is recommended in the U.S., one at 12-15 months and one at school entry (4-6 years) or by 11-12 years.

About one to two deaths per 1,000 cases of measles is reported annually in the U.S. The risk of death and other complications is higher among young children and adults. Nationally, there were 86 provisional cases reported to CDC in 2000: 26 were imported and 60 were indigenous. Of the 60 indigenous cases, 18 were import-linked, nine were imported virus cases (cases that cannot be linked epidemiologically to an imported case, but for which imported virus has been isolated from the case or from an epidemiologically linked case); and 33 were unknown source cases. The U.S. recorded 10 measles outbreaks (clusters of three or more cases) in 2000.

In the U.S., 48 states allow religious exemptions to immunizations and 15 states allow philosophical exemptions. A recent study, using Colorado data from 1987 through 1998, showed that those exempted from immunizations were 22 times more likely to acquire measles and six times more likely to acquire pertussis than vaccinated children. In addition, an increased incidence of measles and pertussis was noted in counties with higher frequencies of exemptions.

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

- Number of cases reported in Illinois in 2000 3. Although the three cases were from separate households, one was the niece of one of the other cases. The common source was unknown but the cases had eaten together at a restaurant. These three cases are considered an outbreak by CDC case definition.
- Age 1 year of age, 32 years of age and 53 years of age

- Race/ethnicity All cases were white, non-Hispanic.
- Diagnosis The two adults had a positive IgM at a hospital laboratory, but only one of the two specimens sent to CDC was confirmed. However, based on the epidemiology, symptoms and other facts, the patient was counted as a case. The child had a high level of IgG on laboratory testing in spite of not being immunized. One adult had one MMR; and the other adult had an unknown vaccination history.
- Geographic distribution Cases were from DeKalb and Kendall counties.
- Past incidence The number of cases of measles reported each year in Illinois declined from 1950 through 2000 (Figure 72).

Summary

Three cases of measles were reported in Illinois in 2000.

Suggested reading

Feikin DR et al. Individual and community risks of measles and pertussis associated with personal exemptions to immunization. JAMA 2000; 284(24):3145-50.



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 > 2 days, and without other apparent cause.

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 6
- Age Median age was 21 years (range was 5 years to 44 years).
- Gender 16 percent were female.
- Race/ethnicity 84 percent were white (5 cases) and 16 percent (1 case) were Asian. None reported Hispanic ethnicity.
- Geographic distribution Cases resided in Cook (2), DeKalb (2), DuPage (1) and Madison (1) counties.
- Seasonal variation Cases occurred January through April.
- Immunization status Of the four confirmed and two probable cases, three were appropriately immunized, one was immunized but number of vaccinations was unknown and two had unknown immunization status.
- Past incidence The number of reported cases each year from 1950 through 2000 is shown in Figure 73.

Summary

The median age of the six reported mumps cases in 2000 was 21 years. Half reported being appropriately immunized.



Pertussis

Background

Pertussis is caused by *Bordatella pertussis* and is characterized by a paroxysmal cough that can last several weeks. 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 2000, the national vaccination coverage for children aged 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 78 percent. In Illinois the coverage was 77 percent (67 percent for Chicago and 81 percent for the rest of the state).

Complications were more common in adults than in adolescents. The secondary attack rate in family members older than 11 years of age was 11 percent. The main sources of infection in adolescents was schoolmates or friends and, in adults, it was the workplace or their children. The classic symptoms of pertussis are paroxysmal coughing, whoop, post-tussive apnea and post-tussive vomiting.

Case definition

The case definition for pertussis in Illinois is a clinically compatible illness that is laboratory confirmed or epidemiologically linked to a laboratory-confirmed case. Laboratory confirmation is through culture of *B. pertussis* from a clinical specimen. A clinically compatible illness is a cough lasting at least two weeks with one of the following: paroxysms of coughing, inspiratory whoop or post-tussive vomiting (without other apparent causes).

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 133 (five-year median = 155); the one-year incidence rate was 1.1 per 100,000. One small pertussis outbreak occurred in 2000; the four cases included two family members and two classmates.
- Age 59 percent occurred in those less than 5 years of age (Figure 74).
- Gender Females comprised 53 percent of cases.
- Race/ethnicity 79 percent were white, 12 percent were African American and 9 percent were other; 20 percent reported Hispanic ethnicity.
- Seasonal variation Cases increased in the summer (Figure 75).
- Past incidence The number of reported cases of pertussis declined between 1950 and 2000 (Figure 76).

Summary

There were 133 cases of pertussis reported in Illinois in 2000 including one small outbreak. The highest incidence occurred in those younger than 5 years of age.

Suggested readings

DeSerres G et al. Morbidity of pertussis in adolescents and adults. J Inf Dis 2000;182:174-9.

Yih WK et al. The increasing incidence of pertussis in Massachusetts adolescents and adults, 1989-1998. J Inf Dis 200;182:1409-16.







Rabies

Background

Rabies is a neurologic illness that follows infection with a rhabdovirus. It produces encephalitis and typically progresses to death. Transmission of rabies to humans results from the bite of a rabid animal or from contact between the saliva of a rabid animal and a mucous membrane or wound. The incubation period is usually three to eight weeks. Symptoms may include fever, anxiety, malaise, and tingling and pruritus at the bite site. Neurologic signs, beginning two to 10 days later, may include hyperactivity, paralysis, agitation, confusion, hypersalivation and convulsions. The paralytic form must be differentiated from Guillain Barré syndrome. After two to 12 days, the patient may go into a coma and experience respiratory failure. Diagnosis is highly reliant on consideration of this rare disease and appropriate testing.

In 2000, the U.S. and Puerto Rico reported five cases of human rabies and 7,364 cases of animal rabies. Four of the five human rabies cases were due to bat variants of rabies and one case, acquired outside the U.S., was caused by the canine variant of the rabies virus. Since 1990, 24 of 26 indigenously acquired human rabies cases were associated with bat variants but only two persons reported a definite history of bite. The last human cases of rabies in Illinois was reported in 1954.

Wild animals accounted for 93 percent of the animal cases reported in the United States; the top three species with rabies were the skunk, raccoon and bat. In Illinois, the skunk and the bat are the main wildlife reservoirs of rabies virus. Cases of rabies in bats were up 25 percent from 1999. The most commonly identified rabid bat in the U.S. was the big brown bat. Illinois was one of nine states that reported rabies in bats but not in terrestrial animals in 2000. A study by CDC in 1999 of dog and cat rabies cases revealed that most animals were infected via spillover from the predicted terrestrial variant of the rabies virus. Only one of 307 cats and dogs examined was infected with a bat variant of rabies.

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. The need for testing exotic pets, captive animals and farm animals that bite a person are evaluated on a case-by-case basis by local animal control personnel and the staff of the Illinois Department of Agriculture.

Case definition

The case definition for human rabies is a clinically compatible illness that is laboratory confirmed. Laboratory confirmation is through detection by direct fluorescent antibody (DFA) of viral antigens in a clinical specimen (preferably the brain or the nerves surrounding hair follicles in the nape of the neck), or isolation of rabies virus from saliva or cerebrospinal fluid (CSF), or identification of a rabies-neutralizing titer of greater than 1:5 in the serum or CSF of an unvaccinated person.

Descriptive epidemiology

- Number of animals submitted for rabies testing in Illinois in 2000 3,967; 34 did not meet criteria established by the testing laboratories (Illinois Department of Agriculture and IDPH). Examples of unsatisfactory specimens are those determined to be too decomposed or too damaged to test. Twenty-two brains were DFA positive; all positive animals were bats (Table 5).
- Exposures to rabid bats There were 22 rabid bat situations.
 - Human exposures were three persons who were bitten, one who was exposed to saliva and one who had an unknown type of exposure; in 17 situations, there was no human exposure to the bat. In two situations, the person was bitten when he/she grabbed a furniture item and did not notice the bat on it until bitten. Another person handled the bat with bare, abraded hands.
 - Comparison of the situations. On three occasions, either a dog or cat was found carrying the bat in its mouth and in four situations a dog or cat was possibly exposed by being in the same area as the bat. Three cats had to be euthanized after exposure (Table 6).
 - Condition of bat when found Five of the 10 rabid bats were down and unable to fly, four were found dead, one was described as aggressive, one was described as unable to fly and shrieking, one was described as flying erratically, and the behavior of the other nine was not described.
- Testing of bats Bats accounted for all of the confirmed rabid animals in 2000 (positivity rate = 5 percent).
 - Geographic distribution The rabid bats were widely dispersed across the state: Saline County (4), DuPage County (3), Fayette County (2), Peoria County (2), Winnebago County (2), and one each in Adams, Clinton, Cook, DeWitt, Effingham, Lake, Madison, Marion and McHenry counties.
 - Speciation Eight of the rabid bats were speciated; all were identified as big brown bats. Of the 29 bats submitted for speciation and testing negative for rabies in 2000, 24 were identified as big brown bats and five were identified as little brown bats.
 - < Seasonal variation Figure 77 shows bats tested by month in 2000. Bats submitted for rabies testing increased in summer months.
 - Testing of skunks Rabies testing was performed on 62 skunks in 2000 compared to 39 in 1999. At least one skunk from each of 20 Illinois counties was tested; no skunks were tested in 82 counties. As was the case with bats, the number of skunks tested increased between 1999 and 2000; overall, however, the number of skunks tested every year has been declining steadily (Figure 78).

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

recommended in cases of stray dog and cat bites. A June 2000 memo to local health departments and animal control administrators encouraged submission of skunks even if there was no human or domestic animal exposure. This may have stimulated increased submission of skunks for testing in 2000.

Figure 79 shows the number of rabid skunks found in Illinois and the road kill index from 1975 through 2000. 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 is believed to indicate that conditions are suitable for a rabies epizootic in skunks. This occurred in the late 1970s and early 1980s, when the road kill index and the rate of skunks testing positive increased.

Rabies positivity rate – Table 7 shows the rabies positivity rate in different species of animals in Illinois from 1971 to 2000. This information can be useful in explaining why rabies PEP is not recommended for the large majority of mouse, rat or squirrel bites. No rats, mice or squirrels have been identified with rabies in Illinois during the past 30 years. Because skunks and bats with rabies are identified almost every year in Illinois, rabies PEP is recommended for exposures for these animals and other wild animals unless they can be tested and are negative for rabies. When comparing the positivity rates for cumulative 1971-2000 data vs. 1991-2000 data, the percentage of skunks positive for rabies declined dramatically and the percentage of positive bats stayed very constant.
 Past incidence – Figure 80 shows animal rabies in the state since 1970. Two peaks of rabies, 10 years apart, have occurred in the state: one in 1971 and the other in 1981. No peaks have occurred since that time.

Summary

Bats were the only species identified with rabies in Illinois in 2000. Testing of skunks for rabies has declined in Illinois thereby decreasing the reliability of surveillance of the terrestrial animal reservoir in the state. This is the second consecutive year where no rabid skunks have been identified 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 in past years but has been controlled through oral rabies baiting programs, slowing the westward progression of this public health problem.

Suggested readings

Krebs JW, Mondul AM, Rupprecht CE and Childs JE. Rabies surveillance in the United States during 2000. JAVMA 2001;219(12):1687-99.

NASPHV. Compendium of animal rabies prevention and control, 2000. JAVMA 2000;216(3):338-43.

Species	Total number suitable for testing	Total positive	% positive
Bat	468	22	5
Cat	1,162	0	0
Cattle	39	0	0
Dog	1,598	0	0
Coyote/fox	27	0	0
Ferret	17	0	0
Horse/donkey	11	0	0
Opossum	54	0	0
Raccoon	208	0	0
Rodents/lagomorphs	267	0	0
Sheep/Goats	4	0	0
Skunk	61	0	0
Other*	17	0	0
TOTAL	3.933	22	_

Table 5. Rabid animals found in Illinois in 2000

*Other species include deer, hedgehog, kangaroo, mink, monkey, pig and shrew.

Date	Human exposure?	Animal exposure?
May	no, found in house	cats, dogs and rabbits
July	no, 2 bats found in barn	horses in barn
July	no, bat fell down in front of person	no
July	yes, bite from paralyzed bat on porch	no
July	no, bat unable to fly	horses in barn
July	bat found under bleachers, parent chose to get PEP for child	no
July	no, outside of house	no
July	no	yes, cat carrying bat
August	no, bat found paralyzed under a deck	no
August	no, found dead	vaccinated cat
August	no, found dead	no
August	no, bat found on porch	vaccinated dog
August	no, aggressive bat found on ground	no
August	child bitten in church and given PEP	no
August	no, found flying erratically	no
August	no	barn cats
August	no	no
September	no	cat
September	bite to person	unknown
October	unknown	unknown
October	child given PEP because he/she was alone with bat	no

Table 6. Animals positive for rabies (all bats) in Illinois and the type of exposure, 2000

	1971-2000			1991-2000		
Species	# examined	# positive	% positive	# examined	# positive	% positive
Bat	8,594	474	5.5	3,421	172	5.0
Cat	39,373	141	0.4	12,375	4	0.03
Cattle	3,157	214	7.0	725	3	0.4
Dog	38,880	110	0.3	15,335	5	0.03
Fox	1,392	72	5.2	207	0	0
Horse	608	22	3.6	149	0	0
Mouse	4,576	0	0	531	0	0
Raccoon	8,831	17	0.2	2,549	0	0
Rat	1,799	0	0	296	0	0
Skunk	7,133	2,526	35.4	965	44	4.5
Squirrel	6,504	0	0	1,342	0	0

Table 7. Rabies positivity rate by animal species in Illinois









Rocky Mountain spotted fever

Background

Rocky Mountain spotted fever (RMSF) is a tick-borne disease caused by *Rickettsia rickettsii*, an obligate intracellular bacteria. RMSF has been reported throughout the continental U.S. Approximately 4,800 cases were reported to the CDC between 1990 and 1998.

Tick vectors include the American dog tick (*Dermacentor variabilis*) and the lone star tick (*Amblyomma americanum*). In order for one of these ticks to transmit the bacteria, it must be attached for at least four to six hours. The incubation period for RMSF is three to 14 days after a tick bite. Common presenting symptoms include high fever, severe headache, deep myalgias, fatigue, chills and rashes. If a skin rash is present, it appears an average of three to five days after symptom onset. Starting most often on the ankles and wrists, the rash then appears on the trunk, palms and soles. The antibiotic of choice for treatment is doxycycline.

Only 3 percent to 18 percent of persons present with rash and fever and report a history of tick exposure on the first medical visit. Laboratory abnormalities such as low platelets, elevated liver enzymes and hyponatremia (low blood sodium level) should also raise the possibility of RMSF. Treatment should not be deferred while awaiting laboratory confirmation. Such delays increase the risk of an adverse outcome.

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 (four-fold 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

- Number of cases reported in Illinois in 2000 5 (2 confirmed and 3 probable)
- Age Cases ranged in age from 33 to 72 years of age.
- Gender Three cases were female.
- Race/ethnicity All cases were white; none were Hispanic.
- Geographic distribution Sites of tick exposure for the cases were Jefferson County (1),

Massac County (1), White County (1), Tazewell County or out-of-state (1) and unknown (1). Figure 81 shows the locations of Illinois tick exposure in cases reported from 1996 through 2000.

- Seasonal variation Onsets of the five cases occurred between May and October.
- Symptoms/outcomes The following symptoms and signs were reported by five individuals: fever (2), myalgias (5), headache (4) and rash (3). Three cases were hospitalized. None of the five cases were fatal.
- Past incidence 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), 1998 (1) and 1999 (7).

Summary

Most cases of RMSF occurred in summer months in southern Illinois counties.

Suggested readings

MMWR. Consequences of delayed diagnosis of Rocky mountain spotted fever in children-West Virginia, Maryland, Tennessee, and Oklahoma, May-July 2000.

Parola P, Raoult D. Ticks and tickborne bacterial diseases in humans: An emerging infectious threat. CID 2001;32:897-928.





Rubella

Background

Rubella usually causes a self-limiting disease in adults and children. Transmission is from direct contact with, or droplet spread of nasopharyngeal secretions of infected persons. The incubation period is 12 to 23 days. Rubella can cause a fever and rash along with enlarged lymph nodes in the head and neck. It is most important because the virus is a teratogen and can produce congenital anomalies or intrauterine death if a woman is infected during pregnancy. Immunization against rubella is recommended at 12-15 months of age and a second dose at school entry or at adolescence. Vaccine should not be given to anyone who is immunosuppressed, or to pregnant women because it is a live vaccine.

Rubella is one of the most common causes of birth defects in the world. It can result in spontaneous abortions, stillbirths and congenital rubella syndrome. Congenital rubella syndrome includes hearing impairment, blindness, heart defects and mental retardation. The largest outbreak of rubella in the U.S. between 1995 and 2000 was in Nebraska in 1999. The outbreak continued for four months and resulted in 125 reported cases. Most were in persons born in Latin America, where rubella vaccination has only recently been implemented. From 1996 through 1998, 14 rubella outbreaks were reported to CDC; most were associated with a workplace and affected primarily Hispanics. In 1998, 83 percent of U.S. rubella cases were in Hispanics.

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

- Number of cases reported in Illinois in 2000 1
- Age The case was 6 years old.
- Gender Female
- Geographic distribution Kendall County
- Diagnosis The case had a positive IgM test seven days after rash onset.
- Vaccination status Case was appropriately vaccinated with two MMR vaccines after age 2 and had no known source of infection. Extensive surveillance activities were done in the community and no further cases were reported.
- Past incidence The number of reported rubella cases in Illinois from 1950 to 2000 is shown in Figure 82.

Summary

In 2000, only one rubella case was reported in Illinois.

Suggested readings

Danovaro-Holliday et al. A large rubella outbreak with spread from the workplace to the community. JAMA 2000;284(21):2733-39.



Salmonellosis (non-typhoidal)

Background

There are more than 2,449 serotypes of *Salmonella*. Most *Salmonella* infections do not occur in recognized outbreaks but as sporadic infections.

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* have been traced to imported cantaloupes and mangoes. Some serotypes have been associated with specific food items. For instance, *S. enteritidis* from shell eggs has spread throughout the world. In the Caribbean, risk factors for *S. enteritidis* included consumption of cake batter, homemade eggnog and ice cream, raw eggs in drinks and undercooked eggs. 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.

Hospital and commercial laboratories are required to submit isolates of *Salmonella* to IDPH's laboratory for serotyping. This is necessary to detect increases in specific serotypes. Identification of serotypes is useful in identifying which patients are likely linked to a common source of infection. Another way to link *Salmonella* isolates to a common source is pulse field gel electrophoresis (PFGE). In a study of *S. enterica* serotype *typhimurium* isolates from 1994 through 1998 in Minnesota, 174 PFGE patterns were identified in 958 isolates tested. Single case isolates, with PFGE patterns distinct from each other and distinct from other PFGE patterns, comprised 61 percent of cases. PFGE subtyping resulted in the initiation of four outbreak investigations.

Studies have been initiated to examine the antibiotic resistance of *Salmonella* isolates. Resistance testing at CDC found 2 percent of *Salmonella* isolates resistant to ceftriaxone in the U.S. in 1999.

Of the nine diseases (those caused by *Campylobacter, Cryptosporidium, Cyclospora, E. coli* O157:H7, *Listeria monocytogenes, Salmonella, Shigella, Vibrio* and *Yersinia enterocolitica*) under active surveillance in the federal FoodNet sites, *Salmonella* comprised 33 percent of the reported infections in 2000. The incidence rate per 100,000 ranged from 0.9 to 18 at the eight FoodNet sites in 2000. From 1987 to 1997, the highest incidence rate in cases of *Salmonella* reported to CDC was in children younger than 1 year of age (122 per 100,000 per year).

From 1987 to 1997, 92 percent of *Salmonella* isolates reported to CDC had a known serotype. The top five Salmonella serotypes reported to CDC were *typhimurium*, *enteritidis*, *heidelberg*, *newport* and *hadar*. Approximately one-quarter of the isolates were *typhimurium* and one-quarter *enteritidis*. The incidence of *S. enteritidis* was 3 per 100,000 in 1996 and 1997. About 6 percent of isolates were *S. heidelberg* in 1997. In the FoodNet sites in 2000,

approximately one-quarter of isolates were *S. typhimurium*, 15 percent were *S. enteritidis*, 11 percent were *S. newport* and 7 percent were *S. heidelberg*.

August and September were the most common time for *Salmonella* infections for isolates (89 percent were from stool specimens) reported to CDC from 1987 to 1997. Of all isolates, 6 percent were from blood, 3 percent were from urine and less than 1 percent were from cerebrospinal fluid. Of the serotypes with more than 100 isolates from 1987 to 1997, those most commonly isolated from blood were *S. paratyphi A* (64 percent), *S. cholerasuis* (63 percent), *S. typhi* (62 percent) and *S. dublin* (52 percent). Several O serogroups, A, C1 and D1, were a more common cause of invasive infection. Children were more likely to have *Salmonella* isolated from blood. Serotypes most commonly isolated from urine were *S. cubana* (18 percent), *S. tennessee* (12 percent), *S. meleagridis* (11 percent) and *S. senftenberg* (9 percent). Serotypes most likely to be isolated from urine included O serogroups, G, C1, E1 and E4. Of the top 20 increasing serotypes from 1987 to 1997, seven were common reptile-associated *Salmonella* subspecies II, III, IV, V or VI were considered to be reptile associated because reptiles were the source of more than 50 percent of these isolates reported to CDC.

Case definition

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

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 1,502 (see Figure 83 for number of cases since 1995). The annual incidence rate for salmonellosis in Illinois in 2000 was 12 per 100,000 population. There were three foodborne outbreaks of *Salmonella* in 2000. (See the section of this report detailing foodborne outbreaks for more details.)
- Age Salmonellosis occurred in all age groups (mean age = 29) (see Figure 84). However, the incidence rate was highest in those younger than 1 year of age (73 cases per 100,000 population).
- Gender 53 percent were female.
- Race/ethnicity 82 percent of cases were white, 15 percent African American and 3 percent other races; 11 percent were Hispanic.
- Geographic distribution The mean annual incidence rates for salmonellosis were highest in some scattered counties in the state (Figure 85). The five counties with the highest mean annual incidence rates per 100,000 population for salmonellosis from 1996-2000 were Massac (41), Mason (32), Stephenson (25), JoDaviess (22) and DeKalb (19).
- Seasonal variation A peak in salmonellosis cases occurred from June through September in 2000 (Figure 86).
- Serotypes 92 percent of Illinois' *Salmonella* isolates were serotyped. The top 20

serotypes in 2000 are found in Table 8. The three most common serotypes were *S. typhimurium* (350, 25 percent), *S. enteritidis* (262, 19 percent) and *S. heidelberg* (101, 7 percent). Serotypes of *Salmonella* found in Illinois from 1992-2000 are shown in Table 9. Risk factors – A history of reptile contact was reported by 57 *Salmonella* cases in 2000 but a link between the reptiles and transmission of the infection could not be confirmed.

- < Cases reported contact with the following types of reptiles: lizards (27), turtles (10), snakes (12) and multiple types (7).
- < For those with reported reptile contact, the median age was 12 years; 17 cases were younger than 5 years of age.
- < Males accounted for slightly more than half (52 percent) of the cases.
- The two most common species in these cases were *enteritidis* (12) and *typhimurium* (10). *Salmonella* isolates from the subspecies I, II, III and IV have been associated with reptile contact and, for the 2000 reptile contact cases, the following isolates from these groups were identified: *arizonae* (2), *marina* (2), *chameleon* (1), *telelkebir* (1) and *wassenaar* (1).
- Drug resistance In 2000, the IDPH laboratory tested 334 isolates of *S. typhimurium*. Of these, 68 percent were resistant to at least one antibiotic (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). All isolates were sensitive to ciprofloxacin. In 2000, 30 percent of *S. typhimurium* isolates had the typical DT104 profile of resistance to ACSSuT compared to 22 percent in 1999.
- Past incidence Data on *Salmonella* cases in Illinois is available back to 1948 (see Figure 87). The large increase in cases, in 1985, was due to a huge outbreak of *Salmonella typhimurium* that was linked to contaminated pasteurized milk.

Summary

Approximately 1,500 cases of *Salmonella* were reported in 2000 in Illinois. The one-year incidence rate of *Salmonella* for 2000 was 12 per 100,000 population, which is within the range reported at CDC's FoodNet sites. The northern regions of the state had higher incidences than other areas of the state. The mean age for *Salmonella* cases was 29, although the incidence was highest in those younger than 1 year of age. Salmonella cases increased in Illinois during the summer as they did nationally. The percentage of isolates that are serotyped in Illinois is the same as that seen at the national level. The percentages of isolates that were *typhimurium* (25 percent), *enteritidis* (19 percent) and *heidelberg* (7 percent) were very similar to what is seen nationally. Reptile contact was reported in 17 cases younger than 5 years of age. CDC recommends that households with children younger than 5 years of age not have reptiles as pets.

Suggested readings

Dunne EF et al. Emergence of domestically acquired ceftriaxone-resistant *Salmonella* infections associated with AmpC B-lactamase. JAMA 2000;284(24):2151-6.

Bender JB et al. Use of molecular subtyping in surveillance for *Salmonella enterica* serotype typhimurium. N Engl J Med 2001; 344(3):189-95.

Indar-Harrinauth L, Daniels N et al. Emergence of Salmonella enteritidis phage tye 4 in the Caribbean: Case-control study in Trinidad and Tobago, West Indies. CID 2001; 32:890-6.

MMWR. Preliminary FoodNet data on the incidence of foodborne illnesses-Selected sites, United States, 2000. MMWR 2001; 50(13): 241-246.

Olsen SJ, Bishop R. et al. The changing epidemiology of *Salmonella:* Trends in serotypes isolated from humans in the United States, 1987-1997. J Inf Dis 2001; 183:753-61.





Figure 85. One-year Salmonellosis Incidence Rates for Illinois, 1996-2000





Table 8. Top 20 Salmonella serotypes in Illinois, 2000

Serotype	Frequency	Serotype	Frequency
typhimurium	350	agona	27
enteritidis	262	hadar	276
heidelberg	101	berta	25
newport	85	javiana	24
infantis	38	oranienberg	24
thompson	36	hartford	18
java	35	poona	16
montevideo	35	derby	14
muenchen	32	paratyphi a	11
saint-paul	28		

Serotype	1993	1994	1995	1996	1997	1998	1999	2000
abaetetuba	0	1	1	0	0	0	0	0
aberdeen	0	0	0	0	0	0	0	1
abony	0	1	0	0	0	0	0	0
adelaide	7	10	10	1	3	2	3	1
agbeni	0	1	4	0	0	0	0	0
agona	57	65	42	38	58	129	48	27
alachua	1	5	3	0	1	1	1	2
alamo	1	0	0	0	0	0	0	0
albany	3	4	2	2	4	2	2	0
amager	0	0	0	0	2	0	0	0
anatum	25	16	15	17	12	10	7	9
anecho	0	0	0	0	0	0	0	0
ank	0	1	0	0	0	0	0	0
antartica	0	2	0	0	0	0	0	0
antsalova	0	0	1	0	0	0	0	0
arizonae	6	2	5	2	5	0	1	4
augustenborg	0	0	0	0	0	0	0	0
austin	0	0	0	0	0	0	0	1
baildon	0	0	3	0	0	3	0	0
bareilly	2	6	9	7	3	4	6	5
bere	0	0	0	0	0	0	0	0
berlin	1	0	0	0	0	0	0	0
berta	17	15	108	11	6	7	9	25
bilthoven	0	0	1	0	0	0	0	0
binza	1	0	0	0	0	0	0	0
bledgam	0	0	0	1	0	0	0	0
blockley	5	8	1	3	6	3	4	5

Table 9. Frequency of Salmonella Serotypes in Illinois, 1992-2000
	1		1		1			
Serotype	1993	1994	1995	1996	1997	1998	1999	2000
bonariensis	0	0	1	0	0	1	1	0
bonn	0	0	1	0	0	1	0	0
bovis-morb	2	4	2	6	4	11	5	7
bradford	1	0	0	0	0	0	0	0
braenderup	25	26	61	37	26	32	28	18
brandenburg	18	18	12	18	14	10	5	5
bredeney	3	4	2	4	6	3	0	0
california	1	0	0	0	0	0	0	0
carmel	0	0	1	0	0	0	0	0
carrau	0	0	2	0	0	0	0	0
cerro	2	3	1	0	1	0	0	1
chailey	2	0	0	0	3	2	0	2
chameleon	1	0	0	1	1	0	1	1
chandans	0	0	0	0	0	0	0	0
chester	2	1	1	3	1	1	3	3
cholerae-suis	21	17	15	11	6	3	7	4
coeln	0	0	0	0	0	0	0	0
colindale	0	0	0	0	0	1	0	0
cubana	5	6	6	3	4	2	0	1
decatur	1	0	0	0	0	0	0	0
denver	0	0	1	0	2	0	0	0
derby	18	18	23	12	11	13	14	14
drypool	1	0	0	0	0	0	0	0
dublin	2	1	0	2	1	0	0	0
duesseldorf	0	0	1	0	0	0	0	0
durban	1	0	0	1	0	0	0	0
durham	0	0	0	0	0	1	0	0

Serotype	1993	1994	1995	1996	1997	1998	1999	2000
ealing	0	2	3	2	0	0	1	0
eastbourne	0	1	2	1	0	1	1	1
emek	0	0	0	1	0	0	1	0
enteritidis	647	413	397	484	519	405	264	262
finkenwerden	0	0	0	0	0	0	1	0
flint	2	0	0	1	1	1	2	0
fluntern	0	1	0	0	0	0	0	0
gallinarum	0	1	0	0	0	0	0	0
gaminara	0	0	2	2	1	0	1	0
gatuni	1	0	0	0	0	0	0	0
give	4	1	3	7	7	5	4	1
gloucester	0	0	0	1	0	0	0	0
godesburg	0	0	0	1	0	0	0	0
haardt	0	0	1	0	0	0	0	0
hadar	43	42	52	37	75	40	15	26
haifa	0	0	1	0	0	0	0	1
hartford	5	12	22	6	4	12	16	18
havana	6	0	0	6	1	1	2	2
heidelberg	159	109	164	117	121	115	101	101
herston	0	0	0	1	0	0	0	0
hull	0	0	0	0	0	0	0	1
hvittingfoss	1	0	1	2	0	2	1	3
idikan	1	0	0	1	0	0	0	0
indiana	2	1	0	0	0	0	2	0
infantis	29	27	33	34	42	65	51	38
inpraw	0	0	0	0	0	0	0	0
inverness	0	1	3	1	0	0	1	0

Serotype	1993	1994	1995	1996	1997	1998	1999	2000
irumu	3	3	1	0	0	0	0	0
lome	1	0	0	0	1	0	0	0
lomita	0	0	0	0	0	0	0	0
london	1	4	5	2	4	4	3	4
manchester	0	0	0	1	0	0	0	0
manhattan	20	12	12	18	35	15	4	8
marina	4	4	5	6	1	3	2	3
matadi	0	1	1	0	0	0	0	0
mbandaka	9	1	9	23	10	2	10	7
meleagridis	1	1	0	3	0	3	0	0
memphis	0	0	0	0	1	0	0	0
menhaden	0	0	1	0	0	0	0	0
miami	6	8	5	2	5	3	4	2
mikawasima	0	0	0	0	0	0	0	0
minnesota	0	0	1	2	0	0	0	3
mississippi	0	1	0	0	5	2	3	3
mjordan	1	0	0	0	0	0	0	0
monschaui	0	2	0	0	0	0	0	1
montevideo	122	23	19	18	48	62	56	35
morotai	0	0	0	0	2	0	0	0
muenchen	115	30	64	40	20	31	36	32
muenster	4	1	5	1	4	10	1	3
new-brunswick	1	0	1	0	1	0	1	1
newington	0	2	1	0	1	2	3	0
newport	49	84	95	56	40	71	59	85
nima	0	0	0	0	0	1	0	1
norwich	3	4	1	1	4	0	4	6

Serotype	1993	1994	1995	1996	1997	1998	1999	2000
offa	0	0	0	0	0	0	0	0
ohio	5	5	9	4	3	7	3	0
onderstepoort	0	0	0	0	0	1	0	0
oranienberg	22	42	25	38	24	26	21	24
oslo	0	0	0	3	0	1	5	1
overschie	1	0	0	0	0	0	0	0
panama	8	9	17	9	10	3	3	2
paratyphi a	3	10	11	10	4	11	1	11
paratyphi b	0	0	6	11	5	1	1	1
parera	0	0	0	0	0	0	0	0
plymouth	0	0	0	1	0	0	0	0
poano	0	1	0	0	0	0	1	0
pomona	0	0	1	0	2	11	0	0
poona	11	19	26	16	14	18	19	16
portsmouth	0	0	0	0	1	0	0	0
potsdam	0	1	0	0	0	0	0	0
putten	0	0	0	1	0-	1	1	0
reading	68	8	11	24	6	6	2	6
richmond	0	0	0	1	1	0	0	0
rissen	0	0	0	0	0	0	0	1
romanby	1	0	0	0	1	0	0	0
roodepoort	0	0	0	0	0	1	0	0
roterberg	0	0	0	0	0	1	0	0
rubislaw	1	0	2	1	1	2	0	1
san-diego	4	2	4	2	2	1	0	3
saint-paul	35	26	20	24	22	30	21	28
schwarzengrund	8	14	4	8	5	4	7	3

Serotype	1993	1994	1995	1996	1997	1998	1999	2000
senftenberg	6	12	10	18	11	8	13	9
shubra	0	0	0	0	1	0	0	0
singapore	0	0	0	1	0	0	0	2
stanley	6	11	31	10	10	7	12	5
stanleyville	0	0	1	0	0	0	1	0
stendal	0	0	1	0	0	0	0	0
sundsvall	0	1	0	1	1	1	0	0
takoradi	0	0	1	0	0	0	0	0
tallahasse	0	0	1	0	0	0	0	0
telelkebir	3	0	0	1	2	0	1	2
tennessee	5	9	8	4	1	3	2	0
thomasville	0	0	0	0	0	0	0	0
thompson	35	34	35	27	24	34	30	36
treguier	1	0	0	0	0	0	0	0
typhimurium	347	384	364	404	417	405	354	350
uganda	4	2	3	7	6	6	5	8
urbana	1	4	2	3	3	5	7	2
uzaramo	0	0	1	0	0	0	0	0
virchow	4	2	3	9	4	1	8	2
wangata	0	0	0	0	0	0	0	2
wassenaar	1	0	0	1	1	0	0	1
weltevreden	1	1	0	3	1	5	3	0
weston	0	0	0	0	0	0	0	0
wien	0	0	0	0	0	0	0	0
worthington	3	5	8	2	0	2	1	1
Untyped	112	97	130	206	154	158	152	123



Sexually Transmitted Diseases

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

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

Chlamydia

Background

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

Chlamydia is reportable in all but one state. During 2000, more than 702,000 infections were reported to the CDC, making chlamydia the most commonly reported notifiable disease in the U.S. However, national data are incomplete because the majority of testing is currently conducted in females.

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

Case definition

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

Descriptive epidemiology

• Number of cases reported in Illinois in 2000 – 32,997; the overall incidence rate was 266 per 100,000 population. Case numbers in 2000 were up 121 over 1999 (32,870 cases) (Figure 88).

- Age Adolescents (ages 15 to 19) accounted for 38 percent of reported chlamydia cases (1,396 per 100,000) in 2000 (Figure 89). The average age of persons reported with chlamydia was 22.
- Gender Most reported cases were in women (77 percent) due to screening efforts that target this group. The female-to-male ratio of reported cases was 3.3: 1.
- Race/ethnicity Incidence rates per 100,000 population by racial/ethnic group were African American, 939; Native American, 132; white, 102; and Asian or Pacific Islander, 55. The incidence rate among Hispanics was 199.
- Geographic distribution Chlamydia is geographically distributed throughout the state. All 102 Illinois counties reported at least one case in 2000. The five counties with the highest incidence rates per 100,000 were Alexander (730), Pulaski (612), St. Clair (529), Champaign (501) and Macon (499).

Summary

Chlamydia is the most commonly reported sexually transmitted disease in Illinois. Cases were reported from all counties in Illinois during 2000. 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 recognized in females. Infants born to infected mothers may develop gonococcal ophthalmia, which is potentially blinding, or sepsis, arthritis or meningitis. The U.S. recorded 358,995 cases of gonorrhea in 2000.

Currently recommended therapies for gonorrhea are highly effective, although antimicrobial drug resistance has been a problem. Gonococcal susceptibility to some currently recommended drugs is gradually declining, and active surveillance is required to monitor resistance and to ensure the effectiveness of therapy.

Case definition

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

- Number of cases reported in Illinois in 2000 20,672; case rate was 167 per 100,000 population. Reported cases decreased by 11 percent from 1999 (Figure 90). Gonorrhea is the second most commonly reported STD in Illinois.
- Age Adolescents and young adults are at greatest risk for gonorrhea infection. Persons ages 15 to 24 accounted for 60 percent of reported cases in 2000 and adolescents (ages 15 to 19) for 27 percent (Figure 91). The case rate among adolescents is much higher than among the general population: 619 cases per 100,000 vs. 167 in 2000. The average age of gonorrhea cases in 2000 was 25.
- Race/ethnicity Illinois minorities are disproportionately affected by gonorrhea. The case rate among African Americans was 792 per 100,000 population, compared to an overall state rate of 167. The rates per 100,000 for other racial groups were Native American, 24, and Asian/Pacific Islanders, 7; the rate for Hispanics was 25.
- Geographic distribution At least one case of gonorrhea was reported in each of 87 Illinois counties. The five counties with the highest incidence rate in 2000 were Alexander (396), Peoria (347), Pulaski (381), St. Clair (336) and Macon (393).

Summary

Gonorrhea is the second most commonly reported sexually transmitted disease after chlamydia in Illinois. In Illinois in 2000, 27 percent of cases were in those 15-19 years of age. Reported cases decreased by 11 percent in 2000.





Syphilis

Background

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

The open lesions of syphilis are infectious to sex partners. Syphilis during pregnancy can lead to a congenital form of the disease that may result in stillbirth or severe illness and lifelong debilitating consequences for the infant. Increases in syphilis often are associated with poverty, limited availability of health services and the exchange of sex for drugs or money. Syphilis outbreaks are often a precursor of HIV increases in affected populations because the lesions caused by syphilis increase the likelihood of both acquisition and transmission of HIV.

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

The CDC recorded 5,979 primary and secondary syphilis cases in the U.S. in 2000. The rate of infection was 2.2 per 100,000 population.

Case definition

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

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

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

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 54 congenital cases and 412 primary or secondary cases (Figure 92), down 10 cases (2 percent) from 1999. Incidence rate was 3 per 100,000 population for primary and secondary syphilis and 30 per 100,000 live births for congenital syphilis.
- Age The average age of persons diagnosed with primary and secondary syphilis is greater than those with gonorrhea and chlamydia: 33 vs. 25 for gonorrhea and 22 for chlamydia. Persons 20 to 39 years old accounted for 65 percent of cases (Figure 93).
- Gender Male-to-female ratio of primary and secondary syphilis cases was 1.3:1.
- Race/ethnicity Minorities in Illinois are disproportionately affected by syphilis, especially African Americans, who accounted for 85 percent of the congenital syphilis cases. The 2000 incidence rates per 100,000 by race were Native Americans, 43; African Americans, 17; Asian/Pacific Islanders, 0.5; and whites, 0.8. The rate for Hispanics was 1.
- Geographic distribution Syphilis is more prevalent in urban populations. The disease has become progressively concentrated geographically. Only six Illinois counties reported five or more cases in 2000. Cook County ranked first (326 cases) in reported cases among all U.S. counties. Only 11 counties in the U.S. had more than 100 cases of syphilis.

Summary

Primary and secondary syphilis cases declined by 2 percent in 2000 compared to 1999. Minority racial/ethnic populations are disproportionately affected by syphilis in Illinois.





Shigellosis

Background

Shigellosis is an acute bacterial disease of humans and non-human primates caused by four species or serogroups of *Shigella*: *S. dysenteriae* (group A), *S. flexneri* (group B), *S. boydii* (group C) and *S. sonnei* (group D). The infectious dose is low; as few as 10 to 100 bacteria can cause infection. Transmission is via direct or indirect fecal-oral routes. The incubation period is usually one to three days. Symptoms of the disease are watery or bloody diarrhea with fever and sometimes vomiting or tenesmus. Mild and asymptomatic infections can occur. Duration of illness is usually from four to seven days. 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*.

Of the nine diseases (those caused by *Campylobacter, Cryptosporidium, Cyclospora, E. coli* O157:H7, *Listeria monocytogenes, Salmonella, Shigella, Vibrio* and *Yersinia enterocolitica*) under active surveillance in the federal FoodNet sites, *Shigella* comprised 18 percent of the reported infections in 2000. The serotypes reported were *S. sonnei* (85 percent) and *S. flexneri* (13 percent). The incidence rate per 100,000 for *Shigella* ranged from 1 to 19 at the eight FoodNet sites. In Illinois in 2000, there were two outbreaks of *Shigella* associated with foodborne transmission (see foodborne outbreak section for details).

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.

- Number of reported cases in Illinois in 2000 1,188 (five-year median = 1,163; see Figure 94). Overall annual incidence rate was 11 per 100,000.
- Age Median age = 9 (Figure 95). By age group, annual incidence rates per 100,000 were 1- 4 years of age, 48; 5-9 years of age, 26; less than 1 year old, 13; 10-19 years of age, 5; 20-29 years of age, 10; 30-59 years of age, 5; and 60 and older, 1.
- Gender 52 percent were female.
- Race/ethnicity 65 percent were white, 33 percent were African American and 2 percent were other races; 22 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.

• Geographic distribution – One-year incidence rates by county for 1996 to 2000 ranged from 0 to 31 per 100,000 population. The five highest annual incidence rates per 100,000 population for this time period were in Champaign (31), Whiteside (30), Crawford (26), Rock Island (24) and Mercer (22) counties. Figure 96 shows county incidence for the state.

Individual communities will periodically experience sharp increases in reported shigellosis. They are usually related to person-to-person transmission, especially among children. Neighborhoods with a high population density are more likely to experience these increases.

- Seasonal variation Shigellosis cases occurred in all months of the year with a peak in the months of June through September (Figure 97).
- Serotypes 95 percent of isolates were serotyped in 2000. The most common species was *S. sonnei* (87 percent of isolates), followed by *S. flexneri* (11 percent). The species *S. boydii* and *S. dysenteriae* made up 2 percent of typed isolates. The most common *S. boydii* serotype was 2 (Table 10). Five *S. dysenteriae* cases were reported (Table 11). The two most common *S. flexneri* serotypes were 2 (49 cases) and 3 (27 cases) (Table 12). *S. sonnei* does not have differing subtypes.

Summary

There were more than 1,000 reported cases of shigellosis in Illinois in 2000. The incidence rate was 11 per 100,000, which is within the range reported at CDC's FoodNet sites. The proportion who were Hispanic or African American was higher than the representation of each group in the Illinois population. The median age of cases was 9 years. Shigellosis was more likely to occur in the summer months of the year. *S. sonnei* was the most common species found in Illinois, which is the same as the most common species identified in CDC's FoodNet sites. Isolates of *Shigella* are required to be submitted to the IDPH laboratories for speciation and/or serotyping (if this cannot be done by the clinical laboratory). This can help in outbreak identification.

Suggested readings

MMWR. Preliminary FoodNet data on the incidence of foodborne illnesses-Selected sites, United States, 2000. MMWR 2001; 50(13): 241-246.







Figure 97. One-year Shigellosis Incidence Rates by County for Illinois, 1996-2000



Source: Illinois Department of Public Health, 2001

Туре	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>boydii</i> , unknown	1	0	0	0	0	0	0	0	0
boydii 1	2	4	1	2	2	1	5	0	0
boydii 2	3	17	6	9	6	9	11	4	4
boydii 3	0	0	0	1	0	0	0	0	0
boydii 4	2	2	3	3	6	4	2	7	2
boydii 5	1	1	0	0	0	0	0	0	1
boydii 10	0	0	0	1	1	1	1	1	0
boydii 11	0	0	0	0	0	0	1	0	1
boydii 12	0	1	0	1	0	0	0	1	0
boydii 13	0	0	0	0	0	0	0	0	1
boydii 14	0	1	1	1	1	2	2	2	2
boydii 18	1	0	0	0	0	0	0	4	1
boydii 19	0	0	0	1	0	0	0	0	0
TOTAL boydii	10	26	11	19	16	17	21	19	12

Table 10. Frequency of Shigella boydii Subtypes in Illinois, 1992-2000

Source: Illinois Department of Public Health, 2001

Table 11. Frequency of Shigella dysenteriae Subtypes in Illinois, 1992-2000

Туре	1992	1993	1994	1995	1996	1997	1998	1999	2000
dysenteriae, unknown	1	0	1	0	1	1	0	0	2
dysenteriae 1	1	0	1	0	0	0	0	1	0
dysenteriae 2	12	2	1	3	0	0	4	4	0
dysenteriae 3	5	0	1	6	3	0	4	0	0
dysenteriae 4	0	0	0	0	2	0	0	0	0
dysenteriae 9	1	0	0	1	0	0	0	0	0
dysenteriae 12	0	0	0	1	0	0	0	0	0
TOTAL dysenteriae	20	2	4	11	6	1	8	5	2

Source: Illinois Department of Public Health, 2001

Туре	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>flexneri</i> , unknown	12	17	31	63	59	36	36	39	31
flexneri 1	29	67	44	22	31	18	9	11	3
flexneri 1A	0	0	0	0	0	0	0	0	0
flexneri 1B	2	1	0	0	0	0	0	1	0
flexneri 2	77	70	47	44	35	44	53	64	49
flexneri 2A	0	1	0	0	0	3	0	1	0
flexneri 2B	0	1	0	0	0	0	0	0	0
flexneri 3	38	34	19	42	21	20	40	24	27
flexneri 3A	1	0	0	0	0	0	0	0	0
flexneri 3B	1	1	0	1	0	0	0	0	0
flexneri 4	43	22	16	25	16	19	14	15	10
flexneri 4A	0	0	2	5	8	3	1	0	1
flexneri 4B	0	0	0	0	0	0	0	0	0
flexneri 5	4	4	3	1	0	0	0	0	0
flexneri 5A	0	0	0	0	1	0	0	0	0
flexneri 6	14	11	38	25	15	6	15	11	8
flexneri Y variant	0	0	0	0	0	0	0	0	1
TOTAL flexneri	221	229	200	228	186	149	168	166	130

Table 12. Frequency of Shigella flexneri subtypes in Illinois, 1992-2000

Source: Illinois Department of Public Health, 2001

Streptococcus pyogenes, group A (invasive disease)

Background

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

Transmission of GAS occurs by direct contact with patients or carriers, or by inhalation of large respiratory droplets. Approximately 5 percent of the population may be asymptomatic carriers, but these individuals are less likely to transmit the organism than symptomatic persons. Predisposing risk factors for invasive GAS include older age, injection drug use, human immunodeficiency infection, diabetes, cancer, alcohol abuse, varicella, penetrating injuries, surgical procedures, childbirth, blunt trauma and muscle strain.

Case definition

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

- Number of reported cases in Illinois in 2000 224 (five-year median = 106) (see Figure 98). Average annual incidence for the one-year period was 1.8 per 100,000 population.
- Age Median age was 55 (Figure 99). By age group, the highest incidence per 100,000 occurred in those older than 79 years of age (9), followed by those 70 to 79 years of age (6) and 60 to 69 years of age (5). At least 18 cases were residents of nursing homes.
- Gender 56 percent were female.
- Race/ethnicity Cases were 85 percent white, 12 percent African American and 3 percent other races; 11 percent were Hispanics.
- Geographic distribution About 42 percent were residents of Cook County.
- Seasonal variation Cases were more likely during the winter months (Figure 100).
- Symptoms Signs and symptoms reported by cases included fever (79 percent), hypotension (29 percent), vomiting (21 percent), rash (18 percent), syncope (14 percent), myalgia (14 percent), sore throat (11 percent), diarrhea (10 percent), desquamating rash (4

percent) and injected tongue (1 percent). Other reported problems included renal impairment (19 percent), debridement (9 percent), acute respiratory distress syndrome (5 percent) and amputation (2 percent).

- Positive cultures Cultures were positive from blood (78 percent), synovial fluid (8 percent), tissue (6 percent), pleural fluid (4 percent), pericardial fluid (1 percent), cerebrospinal fluid (1 percent) and other sources (7 percent). Individual cases may have had positive cultures from more than one site.
- Clinical syndromes Where type of infection was indicated, the following conditions were reported: sepsis (39 percent), cellulitis (32 percent), pneumonia (25 percent), nonsurgical wound (10 percent), myositis (6 percent), septic arthritis (6 percent), surgical wound (4 percent), osteomyelitis (3 percent), disseminated intravascular coagulation (2 percent), postpartum (1 percent), meningitis (1 percent) and peritonitis (0.5 percent). Cases may have reported more than one type of infection. Five of the invasive GAS cases were necrotizing fasciitis and 20 were toxic shock syndrome.
- Underlying disease Reported in 76 percent of cases; conditions were diabetes (34 percent), heart conditions (25 percent), malignancy (23 percent), non-surgical wounds (17 percent), chronic lung disease (12 percent), stroke (10 percent), immunosuppressive therapy (9 percent), blunt trauma (7 percent), surgical wound (7 percent), renal dialysis (6 percent), alcohol abuse (4 percent), intravenous drug use (4 percent), liver cirrhosis (3 percent), chickenpox (1 percent) and vascular problems (1 percent).
- Mortality Of 177 reported invasive GAS infections, 32 were fatal (overall case fatality rate of 82 percent).

Summary

The number of reported invasive GAS cases was 224 in 2000, a decline from 1999 but still higher than the previous five-year median. More than half of the cases were older than 60 years of age. Higher fatality rates occurred in the highest age groups.







Tetanus

Background

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

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 1
- Gender Female
- Geographic distribution Washington County
- Course of disease Case fell in a chicken coop and cut her hand. About a month, later she began developing symptoms of tetanus: fever, stiffness and inability to open her mouth. Although she was given tetanus immune globulin, she had to be put on a ventilator.
- Immunization status No history of tetanus immunization

Summary

Only one case of tetanus was reported in 2000 in Illinois.

Tick-borne diseases found in Illinois

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

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

Six tick-borne diseases have been reported in Illinois residents. (According to CDC guidelines, any Illinois resident diagnosed with a tick-borne disease is counted in the state's case count, even though he/she may have reported tick exposures in another state.) These tick-borne diseases are listed in Table 13 below and in individual sections of this document. Cases by year from 1995 through 2000 are shown in Figure 101.

Suggested readings

Parola P, Raoult D. Ticks and tickborne bacterial diseases in humans: An emerging infectious threat. CID 2001;32:897-928.



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	thoughout the U.S. but most common in southeast; throughout Illinois
Tularemia	Francisella tularensis	A. americanum, D. variabilis, D. andersoni	ulcer at entry site, enlarged lymph node	throughout North America; primarily central and southern Illinois
Lyme disease	B. burgdorferi	<i>I. scapularis</i> (deer tick)	fatigue, chills, fever, erythema migrans, enlarged lymph nodes	primarily on the West Coast and in northeastern and north central U.S.; primarily northern Illinois
Human monocytic ehrlichiosis	E. chaffeensis	A. americanum (Lone star tick)	fever, headache, myalgia, vomiting	most common in the southern states; most common in southern Illinois
Human granulocytic ehrlichiosis	not yet named	I. scapularis	fever, headache, myalgia, vomiting	most common in upper Midwest and northeastern states; in Illinois, distribution unknown
Southern-tick associated rash illness (STARI)*	not yet named	A. americanum	not well defined	not established yet; in Illinois, southern areas

Table 13. Tick-borne Diseases Reported in Illinois Residents

* Although suspected to be present in Illinois, no diagnostic test is available yet.

Source: Illinois Department of Public Health, 2001

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

Case definition

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

- 1) Fever-temperature greater than 102° F
- 2) Rash
- 3) Desquamation
- 4) Hypotension
- 5) Multisystem involvement (three or more of the following)
 - a. Gastrointestinal vomiting or diarrhea
 - b. Muscular myalgia or creatine phosphokinase (>twice upper limit of normal)
 - c. Mucous membrane vaginal, oropharyngeal or conjunctival hyperemia
 - d. Renal blood urea nitrogen or creatinine at least twice the upper limit of normal or urinary sediment with pyuria in the absence of urinary tract infection
 - e. Hepatic total bilirubin, serum glutamic-oxaloacetic transaminase (SGOT), or serum glutamic-pyruvic transaminase (SGPT) at least twice the upper limit of normal for the lab
 - f. Hematologic platelets less than 100,000/mm3
 - g. CNS disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent
- 6) Negative results on the following tests (if done)
 - a. Blood, throat or CSF cultures (blood cultures can be positive for *S. aureus*)
 - b. Rise in titer to Rocky Mountain spotted fever, leptospirosis or measles

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

- Number of cases reported in Illinois in 2000 3 (five-year median = 7) (see Figure 102). Two were confirmed and one was probable.
- Age Ages ranged from 13 to 80.
- Gender Two cases were female.

- Race/ethnicity All cases were white; one case was Hispanic.
- Geographic distribution Cases resided in Cook, Fayette and Winnebago counties.
- Symptoms Rash (2 cases), fever (3 cases), hypotension (3 cases), desquamation (2 cases/1 unknown), myalgia (2 cases/1 unknown), vomiting (2 cases/1 unknown), vaginal discharge (1 case/1 unknown), sore throat (1 case/1 unknown) orthostatic dizziness (1 case/1 unknown), disorientation (1 case), oropharyngeal hyperemia (1 case/1 unknown), conjunctival hyperemia (3 cases), vaginal hyperemia (1 case/1 unknown), abdominal pain (2 cases/1 unknown), injected tongue (1 case/1 unknown) and syncope (1 case)
- Laboratory findings *Staphylococcus aureus* was isolated from arm tissue in one individual. One case was classified as menstruation-associated.
- Treatment All three patients were hospitalized.
- Outcome One case was fatal.

Summary

Only three cases of staphylococcal toxic shock were reported in 2000. One case was fatal.



Trichinosis

Background

Trichinosis is caused by a nematode, *Trichinella spiralis*. People become infected by consuming undercooked meat containing the cysts of the organism. Initial symptoms of disease include diarrhea, vomiting and nausea that occur within a few days of ingestion. Gastrointestinal symptoms may be absent. In the second phase of illness, which begins one to two weeks after exposure, myalgias, periorbital edema, fever, cough, and cardiac and neurologic complications may occur. Titers to trichinosis rise during the third to sixth week following infection. Eosinophilia is common. Muscle biopsies demonstrating the non-calcified larvae of *T. spiralis* indicate recent infection. Larvae also may be identified in suspect food. Swine in the U.S. rarely have *Trichinella*. Consumption of wild game, however, has become a more common source of this infection in U.S. residents.

Case definition

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

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 2 (from the same family)
- Age Both cases were older than 50 years of age.
- Gender One case was female.
- Risk factor Both had visited an eastern European country and ate smoked pork while there.
- Symptoms Cases experienced periorbital edema and muscle pain; both had eosinophilia.
- Diagnosis Both individuals were serologically positive.
- Outcome Both individuals recovered.

Summary

Only two cases of *Trichinella* from a single family were reported in 2000 and both had consumed pork in an eastern European country.

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 (LTBI). Tuberculin skin sensitivity often indicates LTBI (as noted by a "positive" skin test), which usually appears four to 12 weeks after infection. LTBI is different from TB disease and is defined as a condition in which TB bacteria are alive but inactive in the body. People with latent TB infection have no symptoms, do not feel sick, cannot spread TB to others and usually have a positive skin test reaction. But they may develop TB disease later in life if they do not receive treatment for latent TB infection.

A positive skin test reaction is defined as 15 mm induration for those having no risk factors and living in areas with little tuberculosis; 10 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 in 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 and other close 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 LTBI where early lung lesions heal and leave no residual changes except small calcifications in the pulmonary or tracheobronchial lymph nodes. In those patients whose infection progresses to disease, early symptoms may include fatigue, fever, night sweats and weight loss. In advanced disease, symptoms such as cough, chest pain, coughing up of blood and hoarseness may occur.

Several issues, such as patients' immune status and country of origin, affect the incidence of TB in Illinois. The AIDS epidemic had a profound effect on the number of TB cases in Illinois in the past. TB is a major opportunistic infection in HIV-infected persons.

In Illinois, the percentage of TB cases diagnosed in foreign-born individuals is increasing. CDC recommends that all immigrants, refugees, foreign-born students and their families, and others accompanying them into the country be tuberculin-test screened and medically treated when appropriate.

Case definition

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

- 1) A positive tuberculin skin test
- 2) Other signs and symptoms compatible with tuberculosis, such as an abnormal, unstable chest radiograph, or clinical evidence of current disease

- 3) Treatment with two or more anti-tuberculosis medications
- 4) Completed diagnostic evaluation

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

Descriptive epidemiology

- Number of cases reported in Illinois in 2000 743, a 10 percent decrease from 1999 (Figure 103). TB cases in Chicago decreased 13 percent, to 403, in 2000.
- Age The highest incidence of TB occurred in those older than 65 years of age (Table 14).
- Gender 59 percent were male.
- Race/ethnicity 40 percent were African American, 20 percent white and 19 percent Asian or Pacific Islander; 20 percent were Hispanic.
 - While the number of foreign-born TB cases dropped to 255 in 2000, the percentage of these cases continues to increase, from 33 percent in 1999 to 34 percent in 2000 (Figure 104). Persons born in India, Mexico and the Philippines contributed the largest numbers (63 percent) of foreign-born cases in Illinois. Persons born in Korea (4 percent), Poland (4 percent), Vietnam (4 percent) and China (4 percent) were also represented among foreign-born cases.
- Risk factors Excessive use of alcohol (12 percent), non-injection drug use (7 percent), homelessness (3 percent), residing in a long-term care facility (3 percent), injection drug use (3 percent) and being an inmate in a correctional facility (2 percent).
- Drug resistance 10 percent of cases undergoing susceptibility testing were resistant to at least one drug.

Summary

In 2000, 743 cases of TB were reported in Illinois; 34 percent of these cases were among persons born outside of this country. An increasing percentage of foreign-born cases is being seen in Illinois, with India, Mexico and the Philippines being the most common countries of origin. The number of cases among U.S.-born persons is decreasing.



Figure 103. U.S. and Foreign Born TB Cases in Illinois, 1995-2000

Source: Illinois Department of Public Health, 2001

Figure 104. TB by Country of Origin, Illinois, 2000

NOTE: Chart on left indicates U.S. vs. foreign-born cases. The chart on the right includes only foreign-born cases.



Source: Illinois Department of Public Health, 2001

Table 14. Age Distribution of Tuberculosis Cases in Illinois, 2000

Age	Incidence *
< 5 years	2.1
5 - 14	1.0
15 - 44	5.9
45 - 64	7.6
65 +	11.2
All	6.0

* Incidence per 100,000 based on 2000 population. Source: Illinois Department of Public Health, 2001

Tularemia

Background

Tularemia, which is caused by the bacteria *Francisella tularensis*, has been reported in more than 250 animal species. The disease can be transmitted by ticks and biting flies, or the bacteria can gain entrance into the body, mainly through cuts or scratches, when inadequate precautions are taken in handling tissue from infected animals. It is a seasonal disease in North America, occurring in the summer as a result of tick transmission and in the winter in association with hunting. Animals in the lagomorph or rodent family are the main reservoirs for the organism. The incubation period is three to five days.

Clinical signs in people include fever, chills, malaise and fatigue followed by the development of one of six clinical syndromes: ulceroglandular, glandular, typhoidal, pleuropulmonary, oculoglandular or oropharyngeal tularemia. Isolation of *F. tularensis* requires biosafety level 3 facilities. Tularemia is considered a possible bioterrorism agent. Vaccination is recommended only for limited numbers of persons in high-risk occupations.

Case definition

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

- Number of cases reported in Illinois in 2000 4
- Age Ages ranged from 2 to 85 years of age.
- Gender Three cases were male and one female.
- Seasonal variation Onsets occurred from June to August.
- Geographic distribution Exposure sites for cases were Adams and St. Clair counties; one case could not specify an Illinois county and there was one unknown exposure site.
- Symptoms/diagnosis/treatment One culture-positive patient had tularemia pneumonia, was hospitalized for two months and required mechanical ventilation. Another case was hospitalized with fever and vomiting, was serologically positive for tularemia and reported a tick bite one week prior to illness onset. Another serologically positive case reported fever and diarrhea. The fourth case reported fever, a blister on the heel and conjunctivitis and was both culture and serologically positive.
- Past incidence The number of cases in Illinois by year are as follows: 1990 (6), 1991 (5), 1992 (2), 1993 (3), 1994 (3), 1995 (4), 1996 (4), 1997 (5), 1998 (5), 1999 (2).

Suggested readings

Parola P, Raoult D. Ticks and tickborne bacterial diseases in humans: An emerging infectious threat. CID 2001;32:897-928.
Typhoid fever

Background

Typhoid fever is caused by infection with *Salmonella typhi*. It 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.

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

- Number of cases reported in Illinois in 2000 26 (five-year median = 25) (see Figure 105); only one was acquired in the U.S.
- Age Cases ranged in age from 1 year to 63 years of age (mean age = 25).
- Seasonal variation Cases occurred throughout the year.
- Geographic distribution Of the 26 cases, 22 resided in Cook County.
- Case surveillance reports The following information was drawn from 16 case reports:
 - < Citizenship status Nine cases were known to be citizens of the U.S. and three were not; the citizenship status of four cases was unknown.
 - < Employment None were known to be food handlers.
 - < Treatment/outcomes 14 cases (93 percent) were hospitalized.
 - Drug resistance Resistance characteristics of isolates was known for only seven cases. These seven isolates showed resistance to ampicillin (43 percent), chloramphenicol (50 percent), trimethoprim-sulfamethoxazole (43 percent) and fluoroquinolenes (43 percent).
 - < Vaccination status Only one case reported having received typhoid vaccination within five years of illness onset.
 - Risk factors No cases were known to have been linked to a typhoid carrier. Travel destinations for imported cases included India (10), Mexico (1), Pakistan (1) and Philippines (1). Most individuals who traveled did so for the purpose of visiting relatives.

Summary

There were 26 typhoid fever cases reported in Illinois in 2000. 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.



Yersiniosis

Background

Yersiniosis, an infrequently reported cause of diarrhea in the U.S., is caused by *Yersinia enterocolitica* or *Y. pseudotuberculosis*. Transmission is by the fecal-oral route, through consumption of contaminated food or water or by contact with infected people or animals. The incubation period is three to seven days. Fecal shedding occurs for as long as symptoms are present, usually two to three weeks. Manifestations of the disease include an acute febrile diarrhea and abdominal pain. Symptoms can mimic appendicitis. Bloody diarrhea is seen in 10 percent to 30 percent of children with *Y. enterocolitica*. Animals are the principal reservoir for *Yersinia*, with the pig the primary reservoir of *Y. enterocolitica*; rodents are the main reservoirs for *Y. pseudotuberculosis*. Most pathogenic strains of *Y. enterocolitica* have been isolated from raw pork or pork products. *Yersinia* is cold tolerant and can replicate under refrigeration. Yersiniosis is not nationally notifiable; it became reportable in Illinois on April 1, 2001.

Of the nine diseases (those caused by *Campylobacter*, Cryptosporidium, *Cyclospora*, *E. coli* O157:H7, *Listeria monocytogenes*, *Salmonella*, *Shigella*, *Vibrio* and *Yersinia enterocolitica*) under active surveillance in the federal FoodNet sites, *Yersinia* comprised 1 percent of the reported infections in 2000. The incidence rate per 100,000 for yersiniosis ranged from 0.2 to 0.9 at the eight FoodNet sites.

Case definition

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

Descriptive epidemiology

- Number of reported cases in Illinois in 2000 19 (five-year median = 24) (see Figure 106). The incidence rate per 100,000 was 0.1.
- Age 6 cases (35 percent) occurred in those younger than 5 years of age (Figure 107).
- Gender 47 percent were male.
- Race/ethnicity 20 percent were African American, 70 percent white and 10 percent Asian.

Summary

Reporting for yersiniosis in Illinois is voluntary, and from 14 to 42 cases have been reported yearly since 1995. Approximately one-third of cases in 2000 occurred in children younger than 5 years of age.

Suggested readings

MMWR. Preliminary FoodNet data on the incidence of foodborne illnesses-Selected sites, United States, 2000. MMWR 2001; 50(13): 241-246.





Other incidents of interest, 2000

Baylisascaris procyonis infection

Background

Visceral larvae migrans occurs in people when larvae from animal roundworms migrate throughout the human body. Roundworm eggs in animal feces are deposited into the environment and develop into larvae. Contamination of hands can occur if a person works outside in soil where animals have defecated; if the hands are not washed before being placed in the mouth, the larvae can be ingested and begin to migrate around the body.

There are three types of roundworms that have caused visceral larvae migrans: *Ascaris*, *Toxocara* and *Baylisascaris*. Birds, squirrels, rodents and children are incidental hosts for the raccoon roundworm (*Baylisascaris procyonis*). The larvae are neurotropic and preferentially migrate to the neural tissue in more than 90 species of accidental hosts, including humans. The infection has been identified only in children younger than 7 years of age. The incubation period is unknown. The infection can be diagnosed with an immunofluorescence test of serum or cerebrospinal fluid or by brain biopsy.

Because the organism does not complete the life cycle in people, the roundworm will not be found in the feces of the infected human. Questions about pica (the ingestion of dirt) behavior and about exposure to raccoons should be asked in the case of children with meningoencephalitis where eosinophilia is also found. The prognosis is grave with this infection and there are no known neurologically intact survivors. It causes a rapidly progressive meningoencephalitis. The migrating larvae leave toxic products in neural tissue, which results in an increase in eosinophils. It occurs often in infants or toddlers with pica. It also can cause ocular larvae migrans, which is more likely to occur in young adults or older children with no history of pica or raccoon exposure.

Since 1981, 12 cases of severe or fatal encephalitis due to *Baylisascaris procyonis* have been identified in the U.S. (California, Illinois, Michigan, Minnesota, New York, Oregon and Pennsylvania). Ten of the cases were in children ages 9 months to 6 years. The infections often result in several residual neurologic deficits or death. In seven of nine cases where information was known, the case patient was described as having pica; three case patients were described as developmentally delayed or as having Down's syndrome prior to diagnosis with *Baylisascaris*. Prevention of the infection is through public education, including encouraging people not to allow raccoons to visit homes or be kept as pets. Toddlers and young infants should be kept away from areas where raccoons have defecated. Children should be discouraged from eating dirt and handwashing should be emphasized.

Studies in Illinois have shown that up to 82 percent of raccoons can carry the raccoon roundworm. There have been three cases of *B. procyonis* infection reported in Illinois, one in 1985, one in 1996 and one in 2000. The first case, in 1985, was identified in an 18-month old Champaign resident with Down's syndrome and pica. The child had a massive CNS invasion of

the larvae (an estimated 3,200 larvae migrated in the brain of the child). The case was fatal. The child was in areas where firewood was stored; raccoon roundworm eggs were found in the area. The second case occurred in a developmentally delayed 6-year-old child from Cook County in 1996. The child also had pica. An ophthalmology examination was suggestive of *B. procyonis* ocular migrans. Raccoons had been found in the garage. Titers to the organism were 1:4096 in serum. The child had refractory epilepsy, was wheelchair bound and required total nursing care. The third case, with onset in 2000, is described below.

Description of 2000 Illinois case

In 2000, a case of *Bayliscaris procyonis* was identified in a 2-year-old Cook County child. The child developed a low-grade fever several weeks before experiencing neck stiffness, meningoencephalitis, ataxia, opisthotonus, hypertonicity and coma. The blood eosinophils comprised 28 percent of the 21,000 WBC/uL; the cerebrospinal fluid eosinophils comprised 32 percent of the 80 WBC/mm³. Antibody testing by the Purdue Veterinary School yielded an immunofluorescent titer of 1:1024. The child is profoundly neurologically disabled and in need of continuous nursing care. The child had pica and had been seen playing in dirt and eating dirt under a tree in a residential area. An examination of the area found that raccoons had defecated there. Eggs of *B. procyonis* were found in soil and debris in the area.

Suggested readings

MMWR. Raccoon roundworm encephalitis-Chicago, Illinois, and Los Angeles, California, 2000. MMWR 2002;50:51&52:1153-55.

Bioterrorist threats

A suspicious envelope was delivered to a Chicago area abortion clinic. The IDPH lab did not find any powder in the envelope.

Disease	Number	Disease	Number
Acquired immune deficiency syndrome	1,781	Leptospirosis	0
Amebiasis case	59	Listeriosis	21
Animal bite	7,531	Lyme disease	35
Anthrax	0	Malaria	68
Blastomycosis	65	Measles	3
Botulism	2	Meningitis, aseptic	584
Brucellosis	8	Meningitis, pneumococcal	67
Campylobacteriosis	951	Meningococcal, invasive	91
Cat scratch disease	5	Mumps	6
Chickenpox	12,848	Murine typhus	1
Chlamydia trachomatis	32,997	Pertussis	133
Cholera	1	Psittacosis	0
Cryptosporidiosis	126	Rabies, animal	22
Cysticercosis	5	Rabies, human	0
Dengue	2	Reye syndrome	0
Diphtheria	0	Rheumatic fever	0
Ehrlichiosis, human monocytic	1	Rocky Mountain spotted fever	5
Encephalitis (infectious/post-infectious)	48	Rubella	1
E.coli O157:H7	194	Salmonellosis	1,502
Foodborne outbreaks	87	Scarlet fever	1,921
Giardiasis case	873	Shigellosis	1,188
Gonorrhea	20,672	S. aureus, vancomycin resistant	0
Guillain Barré syndrome	4	Streptococcus, group A, invasive	224
H. influenzae, invasive disease	62	Streptococcus, group B, invasive	32
Hantavirus	0	Syphilis, primary or secondary	412
Hepatitis A case	696	Tetanus	1
Hepatitis B case	170	Toxic shock syndrome	3
Hepatitis NANB case	17	Trichinosis	2
Hepatitis C	4	Tuberculosis	743
Histoplasmosis	59	Tularemia	4
Kawasaki	10	Typhoid fever case	26
Legionnaires' disease	33	Typhoid fever carrier 0	
Leprosy	1	Yersiniosis	19

Table 15. Reported Cases of Infectious Diseases in Illinois, 2000

Source: Illinois Department of Public Health, 2001

Methods

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

This annual report includes only cases reported to IDPH. Therefore, these annual numbers will underestimate the total number of cases of each disease in the state. Some patients with disease do not seek medical attention, some may not have the necessary testing done for a diagnosis, or the medical provider may not report the case to public health authorities. Also, to standardize reporting in the state, only cases that are reported and meet the case definition for that disease are included in case counts. For some diseases, a case definition is listed for both confirmed and probable cases. For all diseases except HIV/AIDS, the number of cases reported in a year is "closed out" on April 1 of the following year. If cases from the preceding year are reported after April 1, they are not included in the preceding year's numbers. Instead, they are included in the following year's numbers. For HIV/AIDS, there are two categories: number of cases diagnosed in a given year vs. number of cases diagnosed in a given year. The number of cases diagnosed in a given year is continually updated even if there is an extremely long delay in reporting a case. Therefore, the numbers for diagnosed AIDS cases in 2000 may be updated.

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

The Illinois population used to calculate incidence rates and race and ethnicity proportions in past editions of this document was from the 1990 Modified Age-Race-Sex (MARS) data. This is the first infectious disease annual report that has used the 2000 census numbers. According to the U.S. Census Bureau, Illinois' population grew from 11,430,602 in 1990 to 12,419,293 in 2000. The percentage of the population in the various age groups changed very little between the 1990 MARS data and the 2000 census. However, the racial and ethnic distribution did change substantially between 1990 and 2000. In 1990, the state's population was 82 percent white, 15 percent African American, 2 percent Asian and 1 percent other or mixed races. In 2000, the census found the following percentages: 73 percent white, 15 percent African American, 3 percent Asian and 8 percent other or mixed races. Those indicating Hispanic

ethnicity accounted for 8 percent of the state's population in 1990; in 2000, this proportion had increased to 12 percent. In 2000, 49 percent of the population was male and 51 percent was female. The following table shows the age distribution of the Illinois population as determined by the 2000 census.

Age category	Census numbers used for 1999 annual report	% of population	Census numbers used for 2000 annual report	% of population
<1 year	183,254	1	173,373	1
1-4 years	682,885	6	703,176	6
5-9 years	834,947	7	929,858	7
10-19 years	1,615,954	14	1,799,099	14
20-29 years	1,850,764	16	1,742,602	14
30-59 years	4,343,902	38	5,108,274	41
>59 years	1,918,896	17	1,962,911	15
TOTAL	11,430,602		12,419,293	

Where it was deemed useful, graphs were produced showing the number of cases by month, the number of cases by year since 1995 and the age distribution. Incidence rates were calculated by age for diseases in which more than 150 cases occurred. One-year incidence rates by county were graphed for giardiasis, hepatitis A, salmonellosis and shigellosis. Incidence rate was calculated by taking the number of cases in a category, dividing by population size from 2000 census data and multiplying by 100,000. If an annual incidence rate was calculated for the period 1996 to 2000, it was reached by taking the number of cases reported from 1996 through 2000, dividing by the population and multiplying by 100,000; it was then annualized by dividing by five.

The epidemiologic information presented for each disease is for 2000 only, unless otherwise specified. For some diseases, where the number of cases by year was low, information may have been combined for multiple years to allow demonstration of trends by month and age. When the case population differed from the Illinois population in the racial distribution, a chi-square test for a significant difference in proportions was done using the Epi-Info software package. Means were reported when the data followed a normal distribution; otherwise, the median was reported.

Suggested reading lists are provided for some diseases.