CENTERS FOR DISEASE CONTROL

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Current Trends

Arboviral Surveillance – United States, 1990

Through August 27, 1990, surveillance of mosquito vectors of St. Louis encephalitis (SLE) and eastern equine encephalitis (EEE) has detected unusually early and high levels of viral transmission in several states, indicating a potential risk for epidemic transmission. This report summarizes arboviral surveillance activities in Texas, Florida, Massachusetts, New Jersey, and New York. In addition, the report summarizes cases of confirmed or possible arboviral infections in persons in Texas, Florida, North Carolina, and South Carolina, and equine cases in Georgia and Maryland.

St. Louis Encephalitis

Texas. In the city of Houston and Harris County, the number and distribution of and SLE viral infection rates for *Culex quinquefasciatus* mosquitoes are monitored throughout the year. During the summer transmission season, >300 mosquito pools from various sampling points in the county are tested for SLE virus. Mosquito surveillance is coupled with programs of routine mosquito control and emergency measures directed at areas where viral transmission is detected.

On June 19 (approximately 1 month earlier than in previous epidemic years), SLE virus was recovered from collections in a northeastern Houston neighborhood. In succeeding weeks, >239 suspected SLE viral isolates were recovered from widely separated areas of the county and city–but particularly in the Denver Harbor, Houston Heights, and Fifth Ward sections of central Houston. Six isolates were recovered from Baytown, the site of an SLE outbreak in 1986 (*1*). In central areas of Houston, minimum infection rates (MIRs) in *Cx. quinquefasciatus* have averaged 5 per 1000 mosquitoes (*2*). However, in an intensively studied square-mile area in the northeastern quadrant of the city, MIRs in this species were as high as 25 per 1000 mosquitoes captured in gravid traps between August 3 and August 10. Surveillance of wild birds in this site indicated a point seroprevalence of 60%.

Arboviral Surveillance — Continued

After >40 SLE viral isolates had been identified in mosquitoes, the potential for an outbreak was publicized in a series of news conferences and announcements in early July. Active surveillance by telephone and by mail was instituted to identify patients with central nervous system (CNS) infection in all county hospitals. Two cases were serologically diagnosed by the Houston City Health Department and confirmed by CDC. The cases were in a young woman from northeastern Houston and an elderly woman from Baytown; dates of onset of illness were July 20 and July 21, respectively. Both patients died; however, the causes of death have not been determined.

Mosquito-control measures have been intensified at sites where viral isolates were recovered. In areas of the city where *Cx. quinquefasciatus* use storm sewers as resting sites, pyrethrins administered as thermal fogs into the sewers are the principal means of control.

Florida. Florida maintains a program of SLE and EEE surveillance by monitoring seroconversions in sentinel chickens in 14 counties. In early June, seroconversions to SLE virus were noted in flocks in several central and eastern Florida counties. In July and August, increasing seroconversion rates were noted, including 100% of chickens in Indian River County and 22%–33% of chickens in Lee, Manatee, and Orange county flocks. Surveillance was then intensified, and weekly blood samples of flocks in these counties detected rising seroconversion rates: for example, in Lee and Orange counties, 50% and 80% of chickens, respectively, seroconverted during the week of August 13. Hospital-based surveillance for encephalitis cases was initiated in the affected counties. After seroconversions to SLE virus were noted in early July, ground-based ultralow volume (ULV) adulticiding and larviciding were intensified. Five confirmed cases and one presumptive case subsequently were identified in encephalitis patients from Indian River, Lake, and Highlands counties. The dates of onset of illness in these cases ranged from July 28 to August 17.

Eastern Equine Encephalitis

Massachusetts. Since 1957, adult mosquitoes in freshwater swamps of central southeastern Massachusetts (excluding Cape Cod, Martha's Vineyard, and Nantucket) have been monitored in a standardized surveillance program for EEE. In 1990, EEE virus was recovered earlier and in greater numbers than at any time previously in these areas.

In early June, mosquito surveillance that used unbaited miniature light traps was initiated in Bristol, Plymouth, and other counties. The first EEE viral isolate was from a known enzootic site in southeastern Massachusetts and was obtained from a collection on June 20, nearly 1 month earlier than in previous years. The virus was recovered from a pool of *Culiseta melanura* mosquitoes, the species selectively favored by trap design and placement, and the species believed to be the primary enzootic vector of viral transmission and amplification in Massachusetts. Isolations of EEE have increased progressively during the summer and, in collections through August 8, 597 pools of *Cs. melanura* (24,836 mosquitoes tested in pools of ≤50) have yielded 49 EEE isolates, representing a crude MIR of approximately 2 per 1000. One site has yielded 27 isolates from 5080 mosquitos, an MIR of more than 5 per 1000. In addition, one EEE isolate was recovered from 176 pools (9484 mosquitos) of *Coquillitidea perturbans*, an epizootic vector that transmits the virus from the enzootic cycle to horses and humans. No isolates have been recovered from *Aedes vexans* or *Ae. canadensis*, probably the most important epizootic vectors in Massachusetts;

Arboviral Surveillance — Continued

however, the populations of these species do not usually peak until later in the season, and the risk for epizootic transmission may rise as these vector species increase in number.

The risk of EEE viral transmission in southeastern Massachusetts in 1990 was anticipated from observations of rainfall patterns and the relative abeyance of EEE virus during 5 preceding years. Historically, EEE activity has occurred in the second of two consecutive seasons of excessive rainfall, as occurred in 1989 and 1990. Preseason warnings in April 1990 to local mosquito-control districts and health departments were followed by public warnings in July, when EEE viral isolations in *Cs. melanura* exceeded the historical warning threshold of 1 per 1000 mosquitoes. During August, 18 equine deaths clinically compatible with EEE were reported; EEE virus was recovered from the only well-preserved brain submitted, and two of five horses tested serologically were positive. In early August, a contingency plan was initiated for wide-scale aerial ULV application of malathion over Bristol and Plymouth counties. Shortly after the decision to schedule the ULV application for August 27–29, serologic tests of a comatose 7-year-old Plymouth County resident indicated that he had EEE. His onset of fever was August 16, and EEE antibody titers on specimens from August 23 and 27 were <10 and >40, respectively.

New York. Surveillance of mosquito vectors and avian hosts of EEE virus is conducted in four counties near Syracuse (Madison, Oneida, Onondaga, and Oswego). Since 1971, outbreaks in these counties have resulted in two human deaths and dozens of equine fatalities. As of August 24, arboviral isolation attempts were completed on 1477 pools (110,900 adult female mosquitoes) collected from May 23 to August 16. EEE virus was detected in 17 pools of *Cs. melanura*, two pools of *Cs. morsitans*, and two pools of *Ae. canadensis* mosquitoes captured in Oswego County from July 23 to August 16. In addition, EEE virus was recovered from two pools of *Cs. melanura* collected in Madison County and Onondaga County from July 30 to August 16; this species is the primary enzootic mosquito vector of EEE among wild avians in this region.

A total of 627 samples (brain, cerebrospinal fluid, and blood clots) from vertebrates in five upstate counties also was tested for virus. None of five equine samples from Cayuga, Otsego, and Monroe counties or 79 avian specimens from Onondaga County yielded an isolate. However, 15 of 343 wild avians (36 species) captured in Oswego County were viremic. EEE virus was recovered from blood clots in 15 of 384 passerine birds sampled from July 16 to August 7. EEE was confirmed in two unvaccinated horses from Oswego County by isolation of the virus from brain tissue. Onset of clinical signs of CNS infection were noted on August 15 and August 19, respectively.

Other than the enzootic focus near Syracuse, serologic surveillance has not detected evidence of EEE transmission in Cayuga or other counties. In June, 18% of 96 wild avians in Oswego County had low-titered HI antibody (1:20–1:80) to EEE virus, indicating previous infection. In contrast, 2 weeks after the first viremic birds were detected, 28 (39%) of 72 avians blood sampled between July 29 and August 1 were seropositive for EEE virus, and 18 (64%) of these exhibited HI titers ≥1:160, suggesting a recent infection.

Because this high level of viral activity indicated a potential for epidemic/epizootic transmission, on August 2–3 and August 3, respectively, the Cicero Swamp in northern Onondaga County and Toad Harbor Swamp in southern Oswego County were treated with aerial applications of an insecticide to reduce vector populations.

Arboviral Surveillance — Continued

Insecticide applications were repeated in late August in response to viral isolations from mosquitoes captured inside and near previously treated areas.

New Jersey. At coastal and inland locations, EEE viral transmission is surveyed through collections of *Cs. melanura* and epizootic vectors, including *Cq. perturbans* and *Ae. sollicitans*. In early August, a dramatic surge in abundance of *Cs. melanura* was observed in all sites; however, this surge is typical of the seasonal dynamics of the mosquito in New Jersey. Since July, EEE viral isolates have been recovered in all monitoring sites; MIRs have ranged from 3.8 to 7.8 per 1000 *Cs. melanura*. These rates are high for July for the areas under surveillance and indicate a risk for epizootic transmission; however, one presumptive equine case has been the only evidence of epizootic transmission.

The risk for epizootic transmission also is surveyed by monitoring the age structure of *Ae. sollicitans*, the principal epizootic vector in coastal areas. When landing collections exceed 10 parous females per minute, indicating a relative abundance of mosquitoes that have previously fed (possibly on viremic birds), adulticiding is intensified. This ongoing program of mosquito control maintains young populations of *Ae. sollicitans*, which lowers the risk of epizootic transmission from this species.

Other States. In July, a fatal case of EEE with onset of illness on June 1 was reported in a woman from South Carolina; three equine cases were also reported from this state. From July 13 to August 2, three equine cases of EEE were reported from coastal counties of North Carolina, and a presumptive human case of EEE with onset of illness on August 1 was reported from Orange County, an inland area where EEE rarely occurs. In April and June, three equine cases were confirmed from southeastern Georgia; in July, two equine cases were reported from Maryland's eastern shore.

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Editorial Note: SLE is the leading cause of epidemic viral encephalitis in the United States (*3–5*). Large outbreaks have occurred periodically in areas of the Gulf Coast and the Mississippi and Ohio valleys. The last major outbreak, in 1975, resulted in nearly 3000 reported cases. In response to that outbreak, many state and local health and mosquito-control agencies established programs of avian and mosquito surveillance to monitor SLE viral transmission in its natural cycle and conditions favoring epidemic transmission.

Because of the rare occurrence of outbreaks, rigorous evaluation of the sensitivity, specificity, and cost-benefit of avian and mosquito surveillance has been difficult.

Arboviral Surveillance — Continued

However, in certain instances, human cases have been preceded by a high prevalence of vector mosquitoes, rising infection rates in vectors, and increasing seroprevalence in wild or sentinel avians (*6,7*).

SLE viral activity in Houston-Harris County during 1990 has been unusual because the first viral isolates were discovered remarkably early and because of widespread distribution of viral isolates in the county. The highest infection rates, however, remain within the city's central area, consistent with a previously observed gradient of more intense viral activity at the city's center (*8*). The markedly elevated MIR in northeastern Houston suggests that a risk for epidemic transmission exists in this area. Because enzootic SLE viral transmission in Houston usually does not wane until early October, the risk for human disease potentially will continue or rise throughout this period.

In Florida, the importance of sentinel flock seroconversions as an indicator of epidemic risk has been ambiguous. From 1982 to 1986, up to 20% of sentinel chickens seroconverted each year even though no human cases occurred. However, during that period, October was the peak month of viral transmission to chickens. In 1990, seroconversion rates have been remarkably higher and have occurred 2 months earlier than usual (*7*). These findings suggest that viral transmission in the enzootic cycle could build to higher than usual levels in Florida during the fall months, with a concomitant increase in risk for transmission to humans.

EEE is a rare disease: in most years, fewer than five cases are reported nationwide. The magnitude of EEE outbreaks generally is small; however, during epidemic years, the 30% case-fatality rate associated with the illness underscores the severity of this public health problem (*9–11*). EEE cases are usually sporadic; viral transmission is localized to specific and relatively constant enzootic foci, related to freshwater swampy habitats that support breeding of *Cs. melanura*, the principal enzootic vector of EEE virus (*12*). Southeastern Massachusetts, the four-county area of New York state described in this report, and coastal locations in New Jersey and mid-Atlantic and southeastern states have long been recognized as areas of enzootic EEE. In these locations, individual mosquito species vary in their importance as epizootic vectors for equine and human transmission.

The physical, biologic, and ecologic factors associated with epizootic transmission are complex, but the abundance of EEE virus circulating in the enzootic cycle and various characteristics of the epizootic vectors are important determinants of risk. During 1990, the early appearance of EEE virus in *Cs. melanura* in Massachusetts and New York, as well as the recovery of numerous viral isolates, has indicated a potential for epizootic transmission and triggered intensified programs of mosquito control and public warnings. In New Jersey, an ongoing program of adulticiding is linked to the maturity of *Ae. sollicitans* populations, and emergency measures have not been considered necessary (*13*).

This report illustrates the use of surveillance data on arboviral transmission patterns in nature to guide public health interventions before human infections occur. The approach to surveillance of arboviral diseases is unique in this respect, as are the opportunities to prevent human illness by monitoring and controlling vector mosquitoes. Additional correlations of ecologic and epidemiologic data are needed to assess the predictive value of these indices in forecasting arboviral epidemics.

Arboviral Surveillance — Continued

References

1. Tsai TF, Canfield MA, Reed CM, et al. Epidemiologic aspects of a St. Louis encephalitis outbreak in Harris County, Texas, 1986. J Infect Dis 1988;157:351–6.
2. Chiang CL, Reeves WC. Statistical estimation of virus infection rates in mosquito vector populations. Am J Hyg 1962;75:377–91.
3. Tsai TF, Mitchell CJ. St. Louis encephalitis. In: Monath TP, ed. The arboviruses: epidemiology and ecology. Boca Raton, Florida: CRC Press, 1989:113–44.
4. Monath TP. Epidemiology. In: Monath TP, ed. St. Louis encephalitis. Washington, DC: American Public Health Association, 1980:239–312.
5. Luby JP. St. Louis encephalitis. Epidemiol Rev 1979;1:55–73.
6. Monath TP. Ecology and control of mosquito-borne arbovirus diseases. In: Kurstak E, Marusyk R, eds. Control of virus diseases. New York: Marcel Dekker, 1984:115–34.
7. Monath TP, Tsai TF. St. Louis encephalitis: lessons from the last decade. Am J Trop Med Hyg 1987;37(suppl):40S–59S.
8. Luby JP, Miller G, Gardner P, et al. The epidemiology of St. Louis encephalitis in Houston, Texas 1984. Am J Epidemiol 1967;86:584–97.
9. Przelomski MM, O'Rourke E, Grady GF, Berardi VP, Markley HG. Eastern equine encephalitis in Massachusetts: a report of 16 cases: 1970–1984. Neurology 1988;38:736–9.
10. Bigler WJ, Lassing EB, Buff EE, et al. Endemic eastern equine encephalomyelitis in Florida: a twenty year analysis: 1955–1974. Am J Trop Med Hyg 1976;25:884–90.
11. Tsai TF, Monath TP. Viral diseases in North America transmitted by arthropods or from vertebrate reservoirs. In: Feigin RD, Cherry JD, eds. Textbook of pediatric infectious diseases. Philadelphia: WB Saunders, 1982:1417–56.
12. Morris CD. Eastern equine encephalomyelitis. In: Monath TP, ed. The arboviruses: epidemiology and ecology. Boca Raton, Florida: CRC Press, 1988:1–20.
13. Crans WJ. The status of *Aedes sollicitans* as a vector of eastern equine encephalitis in New Jersey. Mosquito News 1977;37:85–9.

Epidemiologic Notes and Reports

Epidemic Keratoconjunctivitis in an Ophthalmology Clinic — California

From December 14, 1987, through January 19, 1988, an outbreak of epidemic keratoconjunctivitis (EKC) caused by type 8 adenovirus occurred at a large ophthalmology clinic in California.* A telephone survey of a systematic sample of patients treated at the clinic during that outbreak indicated that 17 (17%) of 102 had new onset of four or more symptoms compatible with EKC (conjunctival redness, swelling or redness of the eyelid, discharge from the eye, sticking together of eyelids, pain or discomfort in the eye, photophobia, or a foreign-body sensation) within 3–30 days of visiting the clinic. An additional 46 patients who had onset of EKC after visiting the clinic were identified by review of clinic records. Eye cultures were obtained from 60 patients; 29 were positive for adenovirus 8.

To examine risk factors for acquiring EKC in the clinic, a case-control study was conducted to determine patient characteristics and exposures to various procedures, equipment, and clinic personnel. Cases were clinic-acquired EKC infections in the 63 identified patients. Controls were the 85 patients from the telephone survey who had not developed EKC after visiting the clinic.

Case-patients and controls were similar in age and sex. Based on univariate analyses, risk for EKC was associated with exposure to pneumatonometry (odds ratio

*This article is adapted from *Infection Control and Hospital Epidemiology* 1989;10:547–52.

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[OR]=13.3; 95% confidence interval [CI]=5.1–31) and exposure to three different caregivers, one of whom was a technician who frequently performed pneumatonometry. After controlling for exposure to pneumatonometry, only exposure to a single caregiver remained associated with the risk of acquiring EKC (OR=11.7; $p<0.01$, Fisher's exact test). Sixty-seven percent of case-patients had a documented exposure to pneumatonometry or to this caregiver.

Control measures implemented on January 19, when the outbreak was first recognized, included discontinuing use of the pneumatonometer, reinforcing "strict" handwashing procedures, and furloughing clinic employees with signs or symptoms of EKC. A telephone survey of 54 patients who visited the clinic from January 19 to January 26 indicated that one patient had developed symptoms compatible with EKC.

Before the implementation of control measures, the pneumatonometer tip was disinfected with 70% isopropyl alcohol; other tonometers and other instruments were disinfected with sodium hypochlorite solution. A telephone survey of six other eye clinics in the state indicated those clinics used isopropyl alcohol to disinfect pneumatonometer tips. The instruction manual distributed by the manufacturer of the pneumatonometer directed users to "sterilize" the tip by dabbing it with a 50% isopropyl alcohol pad.

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Editorial Note: In addition to this outbreak, adenovirus 8 has been implicated as the cause of EKC outbreaks in other ophthalmology clinics (*1–4*). In this report, exposures to pneumatonometry and to one health-care worker were epidemiologically linked to cases. The identification of these two risk factors suggested several mechanisms of virus transmission during the epidemic, including inadequate handwashing by health-care personnel between patient contacts and inadequate disinfection of the pneumatonometer between uses on patients' eyes.

As with many types of nosocomial infections, person-to-person transmission of adenovirus 8 occurs primarily through hands of personnel and/or other persons in contact with patients (*1–8*). Therefore, handwashing between patient contacts is the most effective measure for preventing transmission of this microorganism (*8*). When contact with infective secretions is expected (e.g., when patients have obviously infected conjunctivae and/or during an outbreak of EKC), health-care personnel should routinely wear fresh gloves for, and wash hands after, each contact with a patient and/or eye secretions (*8*).

Previous reports have identified contact tonometry (i.e., the process of measuring intraocular pressure using an instrument that directly indents or flattens the patient's cornea) as a risk factor for EKC (*4–6*). In general, contact tonometry in these cases was performed with either the Schiotz tonometer or the crystal-tipped applanation tonometer. In contrast, the pneumatonometer (a contact tonometer that contacts and applanates the patient's cornea with air pressure through a silicone-rubber membrane; it is distinct from the "puff" noncontact tonometer used by optometrists) has been associated with only one previous nosocomial EKC outbreak (*7*).

Problems regarding disinfection or sterilization of the tips of the Schiotz indentation tonometer or the crystal-tipped applanation tonometer have been well characterized (e.g., after each patient use, these instruments must be disassembled to allow

Keratoconjunctivitis — Continued

adequate cleaning and disinfection of the instrument tip and adjacent parts) (*9–12*). In contrast, for disinfection of the pneumatonometer and other types of tonometers, health-care workers have had to rely on the instrument manufacturer's recommendations printed in the product instruction manual. The exact basis of these recommendations is unknown, although they may have been derived from studies on the disinfection of the older types of tonometers (*9–12*) or from standard in vitro assays that have assessed the susceptibility of bacterial and viral indicator strains to the action of germicides (*13,14*). However, tonometers vary in design and material composition; therefore, disinfection or sterilization procedures that are appropriate for one type of tonometer may not be suitable for another (*9–11*). In addition, the in vitro conditions and interaction between test strains and germicides may not simulate in vivo conditions. For example, the test strains, adenoviruses 2 and 7, were susceptible to alcohols after 10 minutes of contact time (*14*), but adenovirus 8 was resistant to the action of 70% isopropyl alcohol (*12*).

Because of the differences in tonometer design and uncertainties regarding disinfection, manufacturers of tonometers and other medical instruments used on the eye should consider 1) designing instruments that can be cleaned and disinfected or sterilized easily, preferably without disassembly, between uses on patients, 2) carefully testing disinfection or sterilization procedures for their products under use-conditions and by using appropriate test microorganisms, and 3) clearly outlining the tested procedures in user manuals. Manufacturers' instructions to users should also emphasize that disinfection or sterilization of instruments that contact the eye should be done after each patient use (*15*) and that adequate disinfection or sterilization cannot be achieved if the instruments are not initially cleaned thoroughly of any organic material that can impede contact between the germicide and the target microorganism(s) during the disinfection or sterilization process (*15,16*).

In the absence of controlled studies specifically on disinfection or sterilization of the pneumatonometer and other tonometers, the tips of such tonometers should be routinely cleaned, then disinfected or sterilized after each patient use. The tip can be cleaned with soap and water or with another cleansing agent suggested by the manufacturer and disinfected by soaking for at least 10 minutes in a solution containing 500–5000 ppm chlorine (e.g., a 1:100–1:10 dilution of household bleach) or in any commercial germicidal solution that is registered with the Environmental Protection Agency as a "sterilant" and is compatible with the tonometer (*12,15–17*). The soaking time in commercial germicides necessary to achieve high-level disinfection (which includes inactivation of adenovirus type 8 and other viruses and bacteria that are pathogenic to the eye) varies by type and concentration of solution and should be indicated by the germicide manufacturer on the product label (*15,16*).

In addition to effective cleaning and disinfection or sterilization, other ancillary procedures have been necessary to control nosocomial EKC outbreaks. These measures decrease the opportunity for direct or indirect contact between infected and uninfected persons, and include 1) cohorting of EKC-infected health-care personnel only with patients known to have EKC, 2) preventing infected personnel from having direct patient contact for up to 14 days following onset in affected personnel, and 3) using unit-dose eye solutions (*2,5–7*). Control of large epidemics or those that occur in association with a community outbreak of EKC have required more stringent measures, such as triaging patients and assigning those suspected of being infected to waiting and examining rooms that are separate from those for uninfected patients

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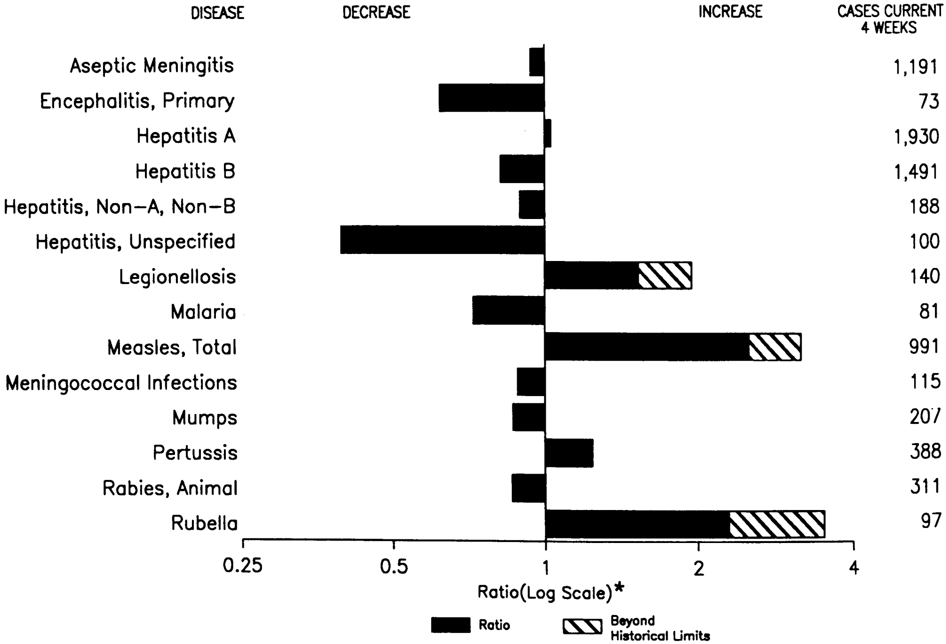
and admitting into the clinic only emergency cases, while postponing examination/ treatment of elective patients until after the outbreak ends (*2,4,5,7*).

The Food and Drug Administration is reviewing the labeling of tonometers and other devices that contact the eye and will be considering labeling modifications, taking into consideration the above recommendations. Physicians are requested to report clusters of eye infections occurring in patients of ophthalmology clinics through their state health departments to the Epidemiology Branch, Hospital Infections Program, Center for Infectious Diseases, CDC; telephone (404) 639-3406.

References

1. Wegman DH, Guinee VF, Millian SJ. Epidemic keratoconjunctivitis. Am J Public Health 1970;60:1250–7.
2. Buehler JW, Finton RJ, Goodman RA, et al. Epidemic keratoconjunctivitis: report of an outbreak in an ophthalmology practice and recommendations for prevention. Infect Control 1984;5:390–4.
3. Reilly S, Dhillon BJ, Nkanza KM, et al. Adenovirus type 8 keratoconjunctivitis—an outbreak and its treatment with topical human fibroblast interferon. J Hygiene 1986;96:557–75.
4. D'Angelo LJ, Hierholzer JC, Holman RC, Smith JD. Epidemic keratoconjunctivitis caused by adenovirus type 8: epidemiologic and laboratory aspects of a large outbreak. Am J Epidemiol 1981;113:44–9.
5. Ford E, Nelson KE, Warren D. Epidemiology of epidemic keratoconjunctivitis. Epidemiol Rev 1987;9:244–61.
6. Barnard DL, Hart JCD, Marmion VJ, Clarke SKR. Outbreak in Bristol of conjunctivitis caused by adenovirus type 8, and its epidemiology and control. Br Med J 1973;2:165–9.
7. Warren D, Nelson KE, Farrar JA, et al. A large outbreak of epidemic keratoconjunctivitis: problems in controlling nosocomial spread. J Infect Dis 1989;160:938–43.
8. Garner JS, Simmons BP. Guideline for isolation precautions in hospitals. Atlanta: US Department of Health and Human Services, Public Health Service, CDC, 1985; DHHS publication no. 83-8314.
9. Clarke SKR, Hart JCD, Barnard DL. The disinfection of instruments and hands during outbreaks of epidemic keratoconjunctivitis. Trans Ophthalmol Soc U K 1972;92:613–8.
10. Wood RM. Prevention of infection during tonometry. Arch Ophthalmol 1962;68:202–18.
11. Corboy JM, Goucher CR, Parnes CA. Mechanical sterilization of the applanation tonometer. Pt 2. Viral study. Am J Ophthalmol 1971;71:891–3.
12. Nagington J, Stehall GM, Whipp P. Tonometer disinfection and viruses. Br J Ophthalmol 1983;67:674–6.
13. Morton HS. Alcohols. In: Block SM, ed. Disinfection, sterilization, preservation. Philadelphia: Lea and Febiger, 1983:225–39.
14. Klein M, Deforest A. Principles of viral inactivation. In: SM Block, ed. Disinfection, sterilization and preservation. Philadelphia: Lea and Febiger, 1983:422–34.
15. Garner JS, Favero MS. Guideline for handwashing and hospital environmental control. Atlanta: US Department of Health and Human Services, Public Health Service, CDC, 1985; DHHS publication no. 99-1117.
16. Favero MS. Sterilization, disinfection and antisepsis in the hospital. In: Manual of clinical microbiology. 4th ed. Washington, DC: American Society for Microbiology, 1985:121–31.
17. CDC. Recommendations for prevention of HIV transmission in health-care settings. MMWR 1987;36(no. 2S).

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending September 1, 1990, with historical data — United States



*Ratio of current 4-week total to mean of 15 4-week totals (from comparable, previous, and subsequent 4-week periods for past 5 years).

TABLE I. Summary — cases of specified notifiable diseases, United States, cumulative, week ending September 1, 1990 (35th Week)

	Cum. 1990		Cum. 1990
AIDS	28,098	Plague	1
Anthrax	-	Poliomyelitis, Paralytic*	-
Botulism: Foodborne	9	Psittacosis	79
Infant	40	Rabies, human	1
Other	6	Syphilis: civilian	32,177
Brucellosis	49	military	168
Cholera	3	Syphilis, congenital, age < 1 year	685
Congenital rubella syndrome	3	Tetanus	35
Diphtheria	2	Toxic shock syndrome	219
Encephalitis, post-infectious	68	Trichinosis	20
Gonorrhea: civilian	445,512	Tuberculosis	15,398
military	6,007	Tularemia	82
Leprosy	144	Typhoid fever	288
Leptospirosis	32	Typhus fever, tickborne (RMSF)	419
Measles: imported	978		
indigenous	18,746		

*Three cases of suspected poliomyelitis have been reported in 1990; five of 13 suspected cases in 1989 were confirmed and all were vaccine-associated.

TABLE II. Cases of specified notifiable diseases, United States, weeks ending September 1, 1990, and September 2, 1989 (35th Week)

Reporting Area	AIDS	Aseptic Menin-gitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionel-losis	Leprosy
			Primary	Post-in-fectious			A	B	NA,NB	Unspeci-fied		
	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990
UNITED STATES	28,098	5,017	493	68	445,512	461,345	19,183	13,544	1,459	1,119	796	144
NEW ENGLAND	1,008	187	17	-	12,512	13,295	398	724	47	45	35	9
Maine	40	6	3	-	136	182	7	26	4	1	3	-
N.H.	48	16	-	-	119	116	6	32	4	3	4	-
Vt.	13	18	2	-	38	44	4	37	4	-	5	-
Mass.	563	59	6	-	5,218	5,215	275	453	25	39	17	8
R.I.	56	62	1	-	778	987	43	31	-	2	6	1
Conn.	288	26	5	-	6,223	6,751	63	145	10	-	-	-
MID. ATLANTIC	8,617	478	35	4	59,902	68,220	2,697	1,871	158	81	258	17
Upstate N.Y.	1,067	254	29	1	9,105	10,647	747	491	45	20	97	1
N.Y. City	4,979	98	3	1	25,160	27,623	371	503	23	43	62	12
N.J.	1,728	-	1	-	10,088	9,781	252	428	33	-	42	3
Pa.	843	126	2	2	15,549	20,169	1,327	449	57	18	57	1
E.N. CENTRAL	2,023	935	125	12	84,858	82,831	1,473	1,592	120	68	179	2
Ohio	484	206	35	4	24,973	21,761	144	283	50	10	64	-
Ind.	176	123	2	6	7,402	5,969	85	286	5	14	30	-
Ill.	845	166	42	2	27,384	26,382	737	314	31	15	8	1
Mich.	367	408	41	-	19,955	21,591	262	460	24	29	57	1
Wis.	151	32	5	-	5,144	7,128	245	249	10	-	20	-
W.N. CENTRAL	645	225	38	2	22,976	20,579	1,112	613	96	27	41	1
Minn.	120	12	11	1	2,907	2,236	156	76	21	-	-	-
Iowa	25	28	5	-	1,735	1,792	224	47	8	3	4	-
Mo.	375	125	5	1	13,858	12,611	343	383	43	20	26	-
N. Dak.	2	11	-	-	55	96	12	4	2	1	-	-
S. Dak.	2	5	2	-	148	173	152	5	3	-	-	-
Nebr.	32	16	7	-	1,160	890	68	24	4	-	6	1
Kans.	89	28	8	-	3,113	2,781	157	74	15	3	5	-
S. ATLANTIC	5,957	1,044	111	19	127,290	125,172	2,314	2,578	221	169	124	5
Del.	65	29	3	-	2,075	2,095	90	69	6	1	6	-
Md.	642	126	15	1	14,595	14,335	796	367	34	9	50	3
D.C.	512	2	-	-	8,922	8,117	12	28	4	-	-	-
Va.	542	161	35	2	11,984	10,355	188	164	31	124	9	-
W. Va.	51	35	22	-	770	959	15	60	4	4	3	-
N.C.	406	114	25	-	19,355	19,192	510	716	82	-	18	1
S.C.	250	14	1	-	9,890	11,463	31	411	13	8	15	-
Ga.	769	196	4	1	27,937	23,962	274	302	8	7	14	-
Fla.	2,720	367	6	15	31,762	34,694	398	461	39	16	9	1
E.S. CENTRAL	731	436	42	1	38,670	36,513	262	1,045	106	4	46	-
Ky.	135	103	17	-	4,052	3,522	66	361	36	3	18	-
Tenn.	237	76	19	1	11,639	12,223	124	561	54	-	16	-
Ala.	144	179	6	-	13,502	11,527	71	119	14	-	12	-
Miss.	215	78	-	-	9,477	9,241	1	4	2	1	-	-
W.S. CENTRAL	3,103	500	25	7	47,548	47,866	2,002	1,424	62	182	38	30
Ark.	137	8	1	-	5,913	5,588	348	55	6	13	7	-
La.	476	64	6	-	8,364	10,192	131	208	3	7	12	-
Okla.	148	48	2	6	4,110	4,166	390	114	19	19	13	-
Tex.	2,342	380	16	1	29,161	27,920	1,133	1,047	34	143	6	30
MOUNTAIN	737	243	17	2	8,447	9,613	3,121	1,030	143	88	31	-
Mont.	9	4	-	-	118	132	90	49	5	4	2	-
Idaho	19	7	-	-	91	125	64	61	8	-	3	-
Wyo.	2	1	1	-	105	67	47	12	5	1	-	-
Colo.	219	55	3	-	1,634	2,090	203	110	31	33	6	-
N. Mex.	68	10	-	-	857	935	614	141	9	5	2	-
Ariz.	231	121	7	-	3,633	3,800	1,519	365	55	31	10	-
Utah	75	24	2	-	277	311	348	75	20	5	3	-
Nev.	114	21	4	2	1,732	2,153	236	217	10	9	5	-
PACIFIC	5,277	969	83	21	43,309	57,256	5,804	2,667	506	455	44	80
Wash.	436	-	6	1	3,536	4,516	965	400	85	25	11	4
Oreg.	219	-	-	-	1,710	2,099	604	287	40	7	-	-
Calif.	4,508	813	71	19	37,011	49,626	4,029	1,888	369	417	32	63
Alaska	22	89	5	-	712	644	143	42	3	1	-	-
Hawaii	92	67	1	1	340	371	63	50	9	5	1	13
Guam	1	2	-	-	149	117	9	1	-	8	-	-
P.R.	998	45	6	-	460	725	113	192	2	19	-	-
V.I.	10	-	-	-	292	476	1	9	-	-	-	-
Amer. Samoa	-	1	-	-	49	32	26	-	-	-	-	10
C.N.M.I.	-	-	-	-	148	71	10	9	-	15	-	4

N: Not notifiable U: Unavailable C.N.M.I.: Commonwealth of the Northern Mariana Islands

TABLE II. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending September 1, 1990, and September 2, 1989 (35th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1990	1990	Cum. 1990	1990	Cum. 1990	Cum. 1989	Cum. 1990	1990	Cum. 1990	1990	Cum. 1990	Cum. 1989	1990	Cum. 1990	Cum. 1989
UNITED STATES	765	542	18,746	7	978	11,515	1,737	41	3,839	124	2,299	2,296	8	784	293
NEW ENGLAND	64	-	254	-	25	313	129	-	36	11	273	260	-	8	6
Maine	1	-	27	-	2	1	10	-	-	-	10	9	-	1	-
N.H.	4	-	-	-	8	11	7	-	8	4	40	5	-	1	4
Vt.	6	-	-	-	1	3	10	-	1	-	6	6	-	-	1
Mass.	34	-	17	-	7	45	60	-	11	7	200	216	-	2	1
R.I.	5	-	27	-	3	41	12	-	5	-	2	11	-	1	-
Conn.	14	-	183	-	4	212	30	-	11	-	15	13	-	3	-
MID. ATLANTIC	162	-	976	-	150	912	255	-	247	-	395	129	-	11	29
Upstate N.Y.	31	-	200	-	110	140	94	-	105	-	276	45	-	10	12
N.Y. City	55	-	226	-	21	93	36	-	-	-	-	4	-	-	15
N.J.	54	-	188	-	10	422	58	-	62	-	21	26	-	-	2
Pa.	22	-	362	-	9	257	67	-	80	-	98	54	-	1	-
E.N. CENTRAL	47	-	3,208	-	143	3,793	236	1	392	27	472	320	-	31	24
Ohio	7	-	549	-	3	834	74	-	89	26	154	45	-	1	3
Ind.	2	-	319	-	1	78	23	-	16	-	83	18	-	-	-
Ill.	19	-	1,249	-	10	2,355	63	-	121	-	97	104	-	18	19
Mich.	15	-	348	-	125	309	55	1	127	1	61	31	-	9	1
Wis.	4	-	743	-	4	217	21	-	39	-	77	122	-	3	1
W.N. CENTRAL	11	-	770	-	13	639	58	4	115	6	116	168	-	14	6
Minn.	1	-	314	-	3	17	11	-	7	-	17	41	-	9	-
Iowa	2	-	25	-	1	9	1	1	17	2	17	13	-	4	1
Mo.	7	-	96	-	-	367	23	1	51	3	65	103	-	-	4
N. Dak.	-	-	-	-	-	-	1	-	-	-	2	2	-	1	-
S. Dak.	-	-	15	-	8	-	2	-	-	-	1	1	-	-	-
Nebr.	-	-	97	-	1	113	5	-	3	1	5	5	-	-	-
Kans.	1	-	223	-	-	133	15	2	37	-	9	3	-	-	1
S. ATLANTIC	159	9	858	2	310	551	313	13	1,586	8	188	203	-	18	9
Del.	3	-	8	-	3	39	3	-	4	-	5	1	-	-	-
Md.	44	-	193	-	18	76	35	12	920	1	48	29	-	2	2
D.C.	10	-	15	-	7	39	11	-	32	-	14	-	-	1	-
Va.	39	1	73	-	2	21	40	-	90	-	15	24	-	1	-
W. Va.	2	-	6	-	-	51	13	-	40	-	14	21	-	-	-
N.C.	11	-	9	-	15	168	47	-	220	-	39	40	-	-	1
S.C.	-	-	4	-	-	3	21	-	45	-	5	-	-	-	-
Ga.	15	-	81	-	201	2	55	-	82	-	24	28	-	-	-
Fla.	35	8	469	2§	64	152	88	1	153	7	24	60	-	14	6
E.S. CENTRAL	16	2	149	-	2	214	99	-	84	4	114	154	1	4	2
Ky.	2	2	33	-	-	32	32	-	-	-	-	1	-	-	-
Tenn.	9	-	70	-	-	136	36	-	47	4	49	93	1	4	2
Ala.	5	-	20	-	2	46	29	-	13	-	59	51	-	-	-
Miss.	-	-	26	-	-	-	2	-	24	-	6	9	-	-	-
W.S. CENTRAL	40	-	3,975	-	87	3,111	119	10	599	7	94	238	-	66	36
Ark.	2	-	12	-	28	5	16	-	133	-	8	18	-	3	-
La.	2	-	10	-	-	11	27	1	102	-	19	14	-	-	5
Okla.	8	-	175	-	-	106	15	-	105	2	34	43	-	1	1
Tex.	28	-	3,778	-	59	2,989	61	9	259	5	33	163	-	62	30
MOUNTAIN	18	4	800	4	95	376	55	7	306	15	203	506	2	107	35
Mont.	1	-	-	-	1	13	10	-	1	-	26	29	-	13	1
Idaho	3	-	16	-	10	2	5	-	142	-	36	65	-	49	32
Wyo.	-	-	-	-	11	-	-	-	2	-	-	-	-	-	1
Colo.	2	-	89	4§	46	73	17	2	23	-	63	44	-	4	-
N. Mex.	3	-	81	-	12	31	7	N	N	1	16	21	-	-	-
Ariz.	8	4	278	-	12	140	5	5	115	14	48	333	2	32	-
Utah	-	-	126	-	-	114	5	-	8	-	10	13	-	1	-
Nev.	1	U	210	U	3	3	6	U	15	U	4	1	U	8	1
PACIFIC	248	527	7,756	1	153	1,606	473	6	474	46	444	318	5	525	146
Wash.	17	-	202	-	69	53	59	1	42	10	111	130	-	-	-
Oreg.	12	-	168	-	44	28	53	N	N	8	52	8	-	10	3
Calif.	214	527	7,300	1†	34	1,497	349	1	410	20	239	171	2	502	122
Alaska	2	-	78	-	2	1	8	-	4	-	4	1	-	-	-
Hawaii	3	-	8	-	4	30	4	4	18	8	38	8	3	13	21
Guam	3	U	-	U	1	4	-	U	3	U	-	1	U	-	-
P.R.	2	U	808	U	-	501	9	U	7	U	6	4	U	-	8
V.I.	-	-	21	-	3	4	-	1	8	-	-	-	-	-	-
Amer. Samoa	35	U	190	U	-	-	-	U	19	U	-	-	U	-	-
C.N.M.I.	-	U	-	U	-	-	-	U	8	U	4	-	U	-	-

*For measles only, imported cases includes both out-of-state and international importations.

N: Not notifiable U: Unavailable †International §Out-of-state

TABLE II. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending September 1, 1990, and September 2, 1989 (35th Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990
UNITED STATES	32,177	28,853	219	15,398	14,097	82	288	419	2,844
NEW ENGLAND	1,185	1,129	16	350	368	2	22	16	5
Maine	5	8	5	-	12	-	-	-	-
N.H.	40	10	1	3	17	-	-	-	2
Vt.	1	-	-	7	7	-	-	-	-
Mass.	465	348	8	192	183	2	21	15	-
R.I.	14	21	1	43	42	-	-	-	-
Conn.	660	742	1	105	107	-	1	1	3
MID. ATLANTIC	6,459	5,945	22	3,668	2,718	1	67	17	666
Upstate N.Y.	581	616	8	284	231	-	13	8	91
N.Y. City	2,997	2,595	5	2,318	1,483	-	37	-	-
N.J.	1,064	956	-	598	541	1	14	6	210
Pa.	1,817	1,778	9	468	463	-	3	3	365
E.N. CENTRAL	2,332	1,204	50	1,485	1,477	1	22	39	119
Ohio	376	102	18	253	259	1	5	30	5
Ind.	59	44	1	128	134	-	1	1	4
Ill.	940	519	7	746	679	-	11	1	23
Mich.	733	435	24	296	320	-	4	7	36
Wis.	224	104	-	62	85	-	1	-	51
W.N. CENTRAL	334	220	24	406	359	30	4	42	440
Minn.	62	34	1	69	70	-	-	-	159
Iowa	45	22	6	42	28	-	1	-	17
Mo.	174	115	8	211	168	22	3	27	19
N. Dak.	1	3	-	15	12	-	-	-	66
S. Dak.	1	1	-	9	18	3	-	2	139
Nebr.	9	17	3	14	18	3	-	1	4
Kans.	42	28	6	46	45	2	-	12	36
S. ATLANTIC	10,585	10,487	20	2,866	2,971	3	32	175	799
Del.	128	119	1	26	30	-	-	1	16
Md.	768	522	1	226	249	-	9	14	298
D.C.	717	608	1	99	132	-	-	-	-
Va.	600	362	2	252	242	1	2	16	136
W. Va.	57	12	-	51	52	-	-	-	30
N.C.	1,187	698	10	364	350	1	2	101	6
S.C.	686	575	2	318	342	1	1	34	98
Ga.	2,706	2,639	1	479	458	-	1	9	152
Fla.	3,736	4,952	2	1,051	1,116	-	17	-	63
E.S. CENTRAL	2,933	1,887	11	1,081	1,121	7	2	57	123
Ky.	60	39	2	271	275	1	1	6	34
Tenn.	1,209	821	7	277	315	6	-	44	27
Ala.	889	583	2	350	325	-	1	7	62
Miss.	775	444	-	183	206	-	-	-	-
W.S. CENTRAL	4,916	3,918	11	1,835	1,677	25	8	55	339
Ark.	362	247	-	236	169	17	-	12	37
La.	1,156	921	1	170	233	-	-	1	18
Okla.	169	67	7	135	148	8	2	39	97
Tex.	3,229	2,683	3	1,294	1,127	-	6	3	187
MOUNTAIN	610	434	24	350	310	10	18	10	144
Mont.	-	1	-	22	11	-	-	4	34
Idaho	6	1	2	11	20	-	-	-	2
Wyo.	-	4	2	3	-	3	-	-	43
Colo.	26	55	7	21	28	2	-	1	10
N. Mex.	32	21	3	78	54	3	-	1	6
Ariz.	453	186	7	154	138	-	16	1	27
Utah	8	13	3	22	26	2	-	3	8
Nev.	85	153	-	39	33	-	2	-	14
PACIFIC	2,823	3,629	41	3,357	3,096	3	113	8	209
Wash.	229	302	4	190	158	1	19	-	-
Oreg.	101	166	-	88	97	-	4	1	1
Calif.	2,475	3,149	36	2,923	2,678	-	86	2	186
Alaska	10	3	-	29	45	2	-	-	22
Hawaii	8	9	1	127	118	-	4	5	-
Guam	2	4	-	29	54	-	-	-	-
P.R.	204	379	-	66	200	-	-	-	33
V.I.	8	8	-	4	4	-	-	-	-
Amer. Samoa	-	-	-	11	6	-	1	-	-
C.N.M.I.	3	7	-	40	17	-	4	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending September 1, 1990 (35th Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	567	378	105	53	18	11	55
Boston, Mass.	164	97	40	16	7	4	13
Bridgeport, Conn.	50	38	8	3	1	-	7
Cambridge, Mass.	16	9	6	1	-	-	3
Fall River, Mass.	18	14	3	1	-	-	-
Hartford, Conn.§	50	32	9	6	3	-	7
Lowell, Mass.	23	16	4	2	-	1	2
Lynn, Mass.	14	7	4	2	-	1	1
New Bedford, Mass.	24	20	3	1	-	-	1
New Haven, Conn.	45	30	6	7	-	2	4
Providence, R.I.	38	29	5	1	1	2	5
Somerville, Mass.	5	3	-	-	-	-	-
Springfield, Mass.	40	31	4	4	1	-	6
Waterbury, Conn.	29	23	1	2	3	-	1
Worcester, Mass.	51	29	12	7	2	1	5
MID. ATLANTIC	2,727	1,602	603	359	90	73	130
Albany, N.Y.	49	29	10	7	1	2	2
Allentown, Pa.	21	15	5	1	-	-	-
Buffalo, N.Y.	100	66	22	5	4	3	2
Camden, N.J.	29	13	12	4	-	-	-
Elizabeth, N.J.	23	16	6	1	-	-	1
Erie, Pa.†	39	27	8	3	1	-	2
Jersey City, N.J.	48	27	12	8	-	1	2
N.Y. City, N.Y.	1,304	710	299	221	38	36	55
Newark, N.J.	61	23	18	12	6	2	9
Paterson, N.J.	22	13	2	2	3	2	-
Philadelphia, Pa.	540	309	126	65	28	12	18
Pittsburgh, Pa.†	81	56	15	3	2	5	3
Reading, Pa.	37	33	2	2	-	-	7
Rochester, N.Y.	119	80	19	11	2	7	18
Schenectady, N.Y.	26	14	10	2	-	-	1
Scranton, Pa.†	27	20	4	2	1	-	-
Syracuse, N.Y.	121	91	22	3	3	2	3
Trenton, N.J.	33	20	8	4	1	-	4
Utica, N.Y.	16	15	1	-	-	-	-
Yonkers, N.Y.	31	25	2	3	-	1	3
E.N. CENTRAL	2,121	1,371	445	156	59	89	109
Akron, Ohio	54	41	7	3	1	2	6
Canton, Ohio	33	28	2	2	1	-	3
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	116	70	27	11	6	2	13
Cleveland, Ohio	142	86	24	14	3	15	1
Columbus, Ohio	142	81	32	8	5	16	12
Dayton, Ohio	98	66	22	3	2	5	7
Detroit, Mich.	228	142	47	18	12	8	4
Evansville, Ind.	33	23	7	2	-	1	3
Fort Wayne, Ind.	54	35	14	2	1	2	4
Gary, Ind.	8	5	2	1	-	-	-
Grand Rapids, Mich.	40	26	8	1	1	4	6
Indianapolis, Ind.	152	90	30	24	5	3	2
Madison, Wis.§	38	28	6	4	-	-	2
Milwaukee, Wis.	120	89	23	5	2	1	10
Peoria, Ill.	45	27	14	3	1	-	3
Rockford, Ill.	40	28	6	3	3	-	5
South Bend, Ind.	53	38	7	3	3	2	5
Toledo, Ohio	100	61	30	3	2	4	6
Youngstown, Ohio	61	45	12	1	1	2	1
W.N. CENTRAL	716	511	115	52	23	15	32
Des Moines, Iowa	66	44	15	5	2	-	3
Duluth, Minn.	30	24	3	3	-	-	2
Kansas City, Kans.	23	14	5	3	1	-	-
Kansas City, Mo.	100	74	14	8	3	1	5
Lincoln, Nebr.	28	19	7	-	1	1	2
Minneapolis, Minn.	154	112	25	8	4	5	12
Omaha, Nebr.	93	68	13	8	3	1	3
St. Louis, Mo.§	125	88	22	7	4	4	2
St. Paul, Minn.	45	27	8	4	4	2	1
Wichita, Kans.	52	41	3	6	1	1	2

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
S. ATLANTIC	1,172	706	253	132	43	37	62
Atlanta, Ga.	177	92	41	26	10	8	11
Baltimore, Md.	239	148	51	31	5	4	12
Charlotte, N.C.	70	42	20	4	1	3	5
Jacksonville, Fla.	92	57	20	8	5	2	3
Miami, Fla.	117	73	18	20	5	1	1
Norfolk, Va.	57	33	15	5	3	1	1
Richmond, Va.	83	54	20	6	3	-	5
Savannah, Ga.	53	35	11	4	3	-	5
St. Petersburg, Fla.	55	38	12	3	1	1	10
Tampa, Fla.	58	41	10	3	2	1	4
Washington, D.C.	153	79	32	21	5	16	5
Wilmington, Del.	18	14	3	1	-	-	-
E.S. CENTRAL	769	513	168	45	23	20	53
Birmingham, Ala.	121	74	27	10	5	5	4
Chattanooga, Tenn.	69	49	14	1	2	3	7
Knoxville, Tenn.	80	51	23	2	3	1	5
Louisville, Ky.§	100	68	21	5	3	3	5
Memphis, Tenn.	150	95	33	15	4	3	13
Mobile, Ala.	73	51	13	3	3	3	2
Montgomery, Ala.§	40	30	6	2	1	1	1
Nashville, Tenn.	136	95	31	7	2	1	16
W.S. CENTRAL	1,611	982	353	173	54	49	63
Austin, Tex.	60	40	11	4	2	3	4
Baton Rouge, La.	30	21	4	3	2	-	3
Corpus Christi, Tex.	47	26	14	3	3	1	2
Dallas, Tex.	147	77	37	19	4	10	5
El Paso, Tex.	72	39	18	9	-	6	4
Fort Worth, Tex	63	42	13	3	2	3	1
Houston, Tex.§	734	436	169	89	24	16	18
Little Rock, Ark.	57	35	13	2	4	3	3
New Orleans, La.	119	77	21	10	6	5	-
San Antonio, Tex.§	172	113	33	19	6	1	12
Shreveport, La.	33	24	8	1	-	-	4
Tulsa, Okla.	77	52	12	11	1	1	7
MOUNTAIN	728	473	147	62	22	24	44
Albuquerque, N. Mex.	80	49	15	10	4	2	4
Colo. Springs, Colo.	44	29	12	3	-	-	5
Denver, Colo.	140	82	38	9	7	4	6
Las Vegas, Nev.	121	74	32	10	1	4	9
Ogden, Utah	23	19	2	1	-	1	4
Phoenix, Ariz.	146	94	24	16	5	7	4
Pueblo, Colo.	23	18	4	-	1	-	4
Salt Lake City, Utah	54	34	10	5	3	2	3
Tucson, Ariz.	97	74	10	8	1	4	5
PACIFIC	1,980	1,274	334	212	87	64	107
Berkeley, Calif.	22	16	3	1	1	1	-
Fresno, Calif.	89	51	13	12	4	8	11
Glendale, Calif.	37	31	4	1	1	-	-
Honolulu, Hawaii	80	49	20	7	2	2	5
Long Beach, Calif.	88	51	20	8	5	4	10
Los Angeles Calif.	462	282	78	56	37	5	15
Oakland, Calif.	53	28	12	6	3	4	1
Pasadena, Calif.	29	20	2	2	-	5	-
Portland, Oreg.	133	95	19	12	2	5	5
Sacramento, Calif.	129	78	26	14	7	4	15
San Diego, Calif.	322	228	42	31	4	14	27
San Francisco, Calif.	169	96	30	34	5	3	7
San Jose, Calif.	166	110	32	12	10	2	7
Seattle, Wash.	129	86	24	12	4	3	2
Spokane, Wash.	45	33	5	2	1	4	1
Tacoma, Wash.	27	20	4	2	1	-	1
TOTAL	12,391††	7,810	2,523	1,244	419	382	655

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

**Pneumonia and influenza.

†Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

††Total includes unknown ages.

§Data not available. Figures are estimates based on average of past available 4 weeks.

Health Objectives for the Nation

Selected Characteristics of Local Health Departments — United States, 1989

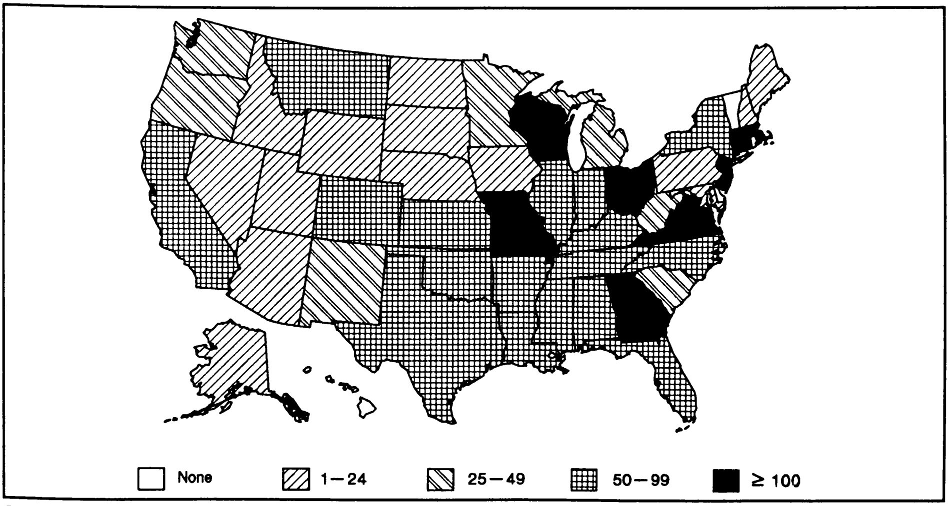
Although a goal of the year 2000 health objectives is to increase the proportion of persons who receive services from local health departments (LHDs) (*1*), information regarding LHDs is limited. To characterize the activities, staff, expenditures, and jurisdictions of LHDs, the National Association of County Health Officials (NACHO), in cooperation with the United States Conference of Local Health Officers (USCLHO) and CDC, conducted a nationwide mail survey of LHDs in 1989 (*2*). This report reviews the services provided by LHDs, the expenditures required to support these services, and health department jurisdictions.

For this survey, an LHD was defined as "an administrative or service unit of local or state government, concerned with health, and carrying some responsibility for the health of a jurisdiction smaller than the state." LHDs were identified through a review of NACHO and USCLHO member mailing lists and inquiries made to state health agencies. The following were excluded: subunits or satellite offices of LHDs; district units providing support for independent local health units; and substate extensions of the state that were not considered by the state to be LHDs.

The questionnaire was mailed in January 1989 to 2932 LHDs in 46 states (Delaware, Hawaii, Rhode Island, and Vermont indicated they had no LHDs) (Figure 1). Three follow-up mailings were made to nonrespondents. To test reliability of responses, a 5% sample was randomly selected, and staff in these health departments were reinterviewed by phone.

Overall, 2269 (77%) of the LHDs returned completed questionnaires. For 1988, the estimated total population in the jurisdictions served by the responding LHDs was

FIGURE 1. Number of local health departments (N=2932), by state — United States



Source: National Association of County Health Officials.

Health Departments — Continued

approximately 210 million persons; of those who answered the question, 1860 (82%) respondents served jurisdictions with populations <100,000, and 403 (18%) served jurisdictions with ≥100,000.

The percentage of LHDs reporting activity in specific functions generally increased as the size of the population served by the jurisdiction increased. At least half the LHDs provided services in the following categories: immunizations; reportable diseases; child health; tuberculosis; health education; sexually transmitted diseases; Women, Infant, and Children (WIC) programs; family planning; prenatal care; acquired immunodeficiency syndrome (AIDS) testing and counseling; chronic diseases; and home health care (Figure 2). From 35% to 49% of LHDs provided services to handicapped children and laboratory and dental health services; <25% provided services in the following categories: occupational safety and health, primary care, obstetrical care, drug and alcohol use, mental health, emergency medical services, long-term facilities, and hospitals (Figure 2).

Annual expenditures by health departments tended to increase by the size of population served. For LHDs serving ≥100,000 population, the median annual expenditure was $3,176,000, and for LHDs serving <100,000 population, $260,000.

Single local jurisdictional units were the governmental base for 72% of responding LHDs: 49% county, 13% town or township, and 10% city. Collaboration by several governmental jurisdictions to operate a combined health department commonly involved a city/county relationship (20%). Multicounty districts were uncommon (7%).

Reported by: National Association of County Health Officials. United States Conference of Local Health Officers. Public Health Practice Program Office, CDC.

Editorial Note: The recent report from the Institute of Medicine entitled *The Future of Public Health* states, "No citizen from any community, no matter how small or remote, should be without . . . the benefits of public health protection, which is possible only through a local component of the public health delivery system" (*3*). In addition, one of the proposed year 2000 health objectives states that the nation should "increase to at least 90 percent the proportion of people who are served by a local health department that is effectively carrying out the core functions of public health" (*1*). The NACHO survey provides a current, comprehensive, and quantitative assessment of the activities, resources, staff, and jurisdictions needed to begin monitoring the achievement of this objective and to measure the effectiveness of efforts to strengthen the capacity of LHDs.

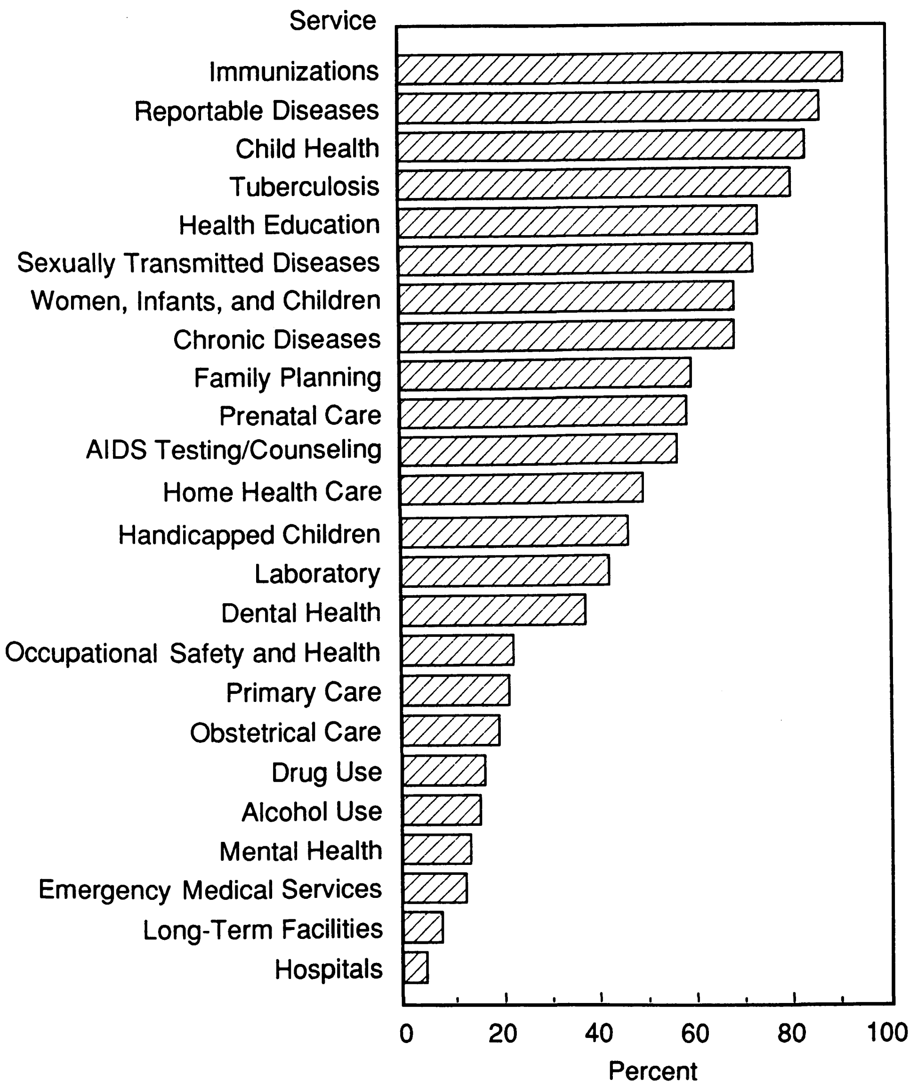
The NACHO survey documented that some of the more traditional functions of public health are performed widely at the local level. For example, immunizations, reportable diseases, child health, and tuberculosis continue to be addressed by almost all LHDs. The survey also demonstrated the level of response of LHDs to emerging health problems. For example, 57% reported services in human immunodeficiency virus (HIV) testing and counseling; in jurisdictions with ≥100,000 population, 90% reported HIV activities. In comparison, only 23% of LHDs reported occupational safety and health activities.

This survey had several limitations. First, the response rate was markedly lower for LHDs serving smaller populations than for those serving larger populations. In addition, of the 663 nonrespondents, 23% were from two New England states and 47% were from 12 southern states. Therefore, in those regions, the data are skewed against LHDs in regions that serve less populated jurisdictions.

Health Departments — Continued

Second, the data were self-reported and the scope, quality, and quantity of activities were not verified. Respondents could have reported that they were "active in" a given service whether they provided the actual service, provided referrals only, or contracted the service. Conversely, LHDs that do not report provision of specific services may not be indicating a lack of those services in the community. For example, even though only 43% of LHDs reported providing laboratory services,

FIGURE 2. Percent distribution of selected services reported by 2263 local health departments



Source: National Association of County Health Officials.

Health Departments — Continued

many more may have access to laboratory services through a local provider or a state health agency (*4*). Finally, the importance of the presence or absence of a service must be judged in relation to the community's need, which was not determined in this survey.

Findings from this survey suggest that additional information is needed about services provided by LHDs, functions and services that need to be provided, and the manner in which LHDs should be supported to assure that their communities' health needs are met. CDC has made the goal of helping to strengthen the public health system a major priority and has developed a detailed plan for achieving this goal (CDC, unpublished data).

References

1. Public Health Service. Healthy people 2000: national health promotion and disease prevention objectives [Conference ed]. Washington, DC: US Department of Health and Human Services, Public Health Service, 1990.
2. National Association of County Health Officials. National profile of local health departments: an overview of the nation's local public health system. Washington, DC: National Association of County Health Officials, 1990.
3. Institute of Medicine. The future of public health. Washington, DC: National Academy Press, 1988.
4. Jonas S. Provision of Public Health Service. In: Last JM, ed. Public health and preventive medicine. 12th ed. Norwalk, Connecticut: Appleton-Century-Crofts, 1986:1628–9.

Epidemiologic Notes and Reports

Nosocomial Transmission of Hepatitis B Virus Associated with a Spring-Loaded Fingerstick Device — California

In March 1990, staff in a hospital in California noted an increase in the number of patients diagnosed with acute hepatitis B (HB). From June 1989 through March 1990, 20 patients with HB were identified; in comparison, from June 1988 through May 1989, four such patients had been identified. All cases were serologically confirmed as recently positive for hepatitis B surface antigen (HBsAg) or positive for IgM antibody to hepatitis B core antigen (IgM anti-HBc). Review of medical records of the 20 patients indicated that 1) all had been admitted to one medical ward during the 6 months before becoming HBsAg-positive; 2) 18 had diabetes mellitus; 3) during hospitalization, capillary blood samples were obtained from 19 patients to measure blood glucose levels using a spring-loaded device to prick the finger; and 4) one patient with diabetes who had been admitted March 15, 1989, was a hepatitis B virus (HBV) carrier and may have been the source of the outbreak.

To assess the extent of HBV transmission, all patients hospitalized on the medical ward from January through December 1989 were requested to provide blood samples for HBV serologic testing. Samples were obtained from 401 (59%) of 676 patients hospitalized; seven additional cases were identified—five patients with and two without diabetes. Seventy-one (18%) patients were immune (positive for total anti-HBc, IgM class negative). Thus, a total of 27 persons with acute HB—seven (26%) of whom were symptomatic—were identified in persons admitted after the HBV carrier patient (Figure 1). Twenty-six were men. Nineteen were white, four were black, and four were Hispanic. The mean age was 65 years (range: 42–79 years).

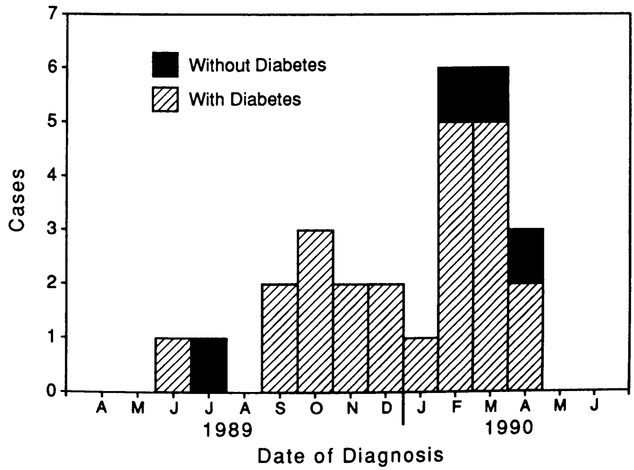
Hepatitis B Virus — Continued

Retrospective cohort and case-control studies were conducted to determine risk factors for acquiring HB in patients with diabetes who were hospitalized on the medical ward from March 15 to December 31, 1989. In addition, a case-control study of patients without diabetes who had acute HB was conducted using a stratified random sample of patients without diabetes as controls. Persons immune for HBV infection were excluded from the analyses. Medical charts were reviewed and patients interviewed to determine potential risk factors for HBV infection; dates and reasons for hospitalization; bed location on the ward; underlying illness; surgery and percutaneous exposures during hospitalization, including number of fingersticks, intramuscular injections, transfusions, insulin injections, subcutaneous heparin injections, or intravenous catheter placement or other invasive procedures.

Among patients with diabetes, HB occurred in 23 (42%) of 55 who had fingersticks by the spring-loaded device compared with none of five who did not have fingersticks ($p=0.08$). A comparison of case- and noncase-patients with diabetes indicated that case-patients had a higher mean number of fingersticks (42 vs. 17; $p=0.002$, Kruskal-Wallis H [KWH] test), a higher mean number of insulin injections (18 vs. five; $p=0.002$, KWH test), and a longer mean length of hospital stay (13.8 days vs. 5.6 days; $p=0.002$, KWH test). Among patients with diabetes, no other exposures were associated with risk of acquiring HBV infection. The case-control study of patients without diabetes indicated that three of four case-patients had capillary blood sampling by fingerstick with the spring-loaded device, compared with none of 20 of the controls ($p=0.002$). No other risk factors for HBV infection were identified in the case-patients without diabetes.

The hospital indicated that only one type of spring-loaded capillary blood sampling device was used in its inpatient services; this device employs a disposable lancet to prick the skin and a disposable platform to stabilize the device on the finger and control the depth of the puncture. Interviews with the nursing staff indicated that although the nurses always changed the lancets between uses, they did not routinely change the platform after each use or clean the device between uses on different patients.

FIGURE 1. Hepatitis B cases associated with a spring-loaded fingerstick device — California, June 1989 – April 1990



Hepatitis B Virus — Continued

A possible source of the outbreak, the patient with diabetes who was an HBV carrier, had been admitted to the ward in March 1989 and required multiple fingersticks. The index patient was a woman with diabetes who had onset of HB in June 1989; she had been hospitalized continuously for 11 years with amyotrophic lateral sclerosis and had no risk factors for HB other than fingersticks with the spring-loaded blood sampling device. Because she was hospitalized for a prolonged period and became an HBV carrier, she served as a long-term reservoir for HBV on the medical ward.

Each of the 13 case-patients on whom HBsAg subtyping was performed had subtype ayw3, including the HBV carrier and the index patient. Subtype ayw3 is relatively rare: of HBsAg-positive carriers in the general population, 10%–20% are ayw3 (P. Smith, M.D., personal communication).

The epidemiologic investigation and HBsAg subtyping implicated the spring-loaded blood sampling device as the mode of transmission in this outbreak. The hospital discontinued use of the spring-loaded device on April 1, 1990, and instituted the use of singly packaged spring-loaded disposable lancets for obtaining capillary blood for glucose monitoring. Since this change, no new cases of HB have been identified.

Reported by: FW Bauer, MD, PM Klotz, P Ginier, MD, California; RR Roberto, MD, GW Rutherford, III, MD, State Epidemiologist, California Dept of Health Svcs. G Wesley, MD, A Graham, MD, D Winship, MD, District of Columbia. Center for Devices and Radiological Health, Food and Drug Administration. Hospital Infections Program and Hepatitis Br, Div of Viral and Rickettsial Diseases, Center for Infectious Diseases, CDC.

Editorial Note: This is the first reported outbreak of HB associated with the use of fingerstick devices in the United States. An HB outbreak in which a similar fingerstick device was implicated was recently reported in France (*1*). These fingerstick devices are used specifically for obtaining capillary blood samples. When the finger is pricked, the device is stabilized on the patient's finger with a platform containing a hole through which the lancet punctures the skin. The investigation in France found that the platform had visible blood contamination in 20 (24%) of 85 finger-sticking tests (*1*), suggesting that the platform may be easily contaminated with blood from the skin puncture. Contamination of the platform with blood from an HBV-infected patient could enable percutaneous transmission to other patients.

Because HBV circulates in the blood at high titers and can remain viable for at least 1 week in blood samples that have dried on surfaces (*2*), lancets and platforms should be changed after every use of the spring-loaded device. Other surfaces on the device may also become contaminated with patients' blood during use of the device. In addition, because platforms may not be routinely changed after each use, fingerstick devices with disposable platforms optimally should be used only on individual patients. However, if used on multiple patients, after disposal of the lancet and platform, the device should be cleaned and disinfected at the end of the day and more frequently if visibly contaminated with blood.

Some spring-loaded fingerstick devices do not employ disposable platforms. Use of these devices also optimally should be restricted to one patient, but if used on multiple patients, the lancet should be discarded and the device disinfected between patients. The Food and Drug Administration recommends that the manufacturers' guidelines for disinfection be followed. When no instructions for disinfection are provided, the device should be discarded. Some fingerstick devices do not have disposable lancets; use of these devices should be restricted to use in only one

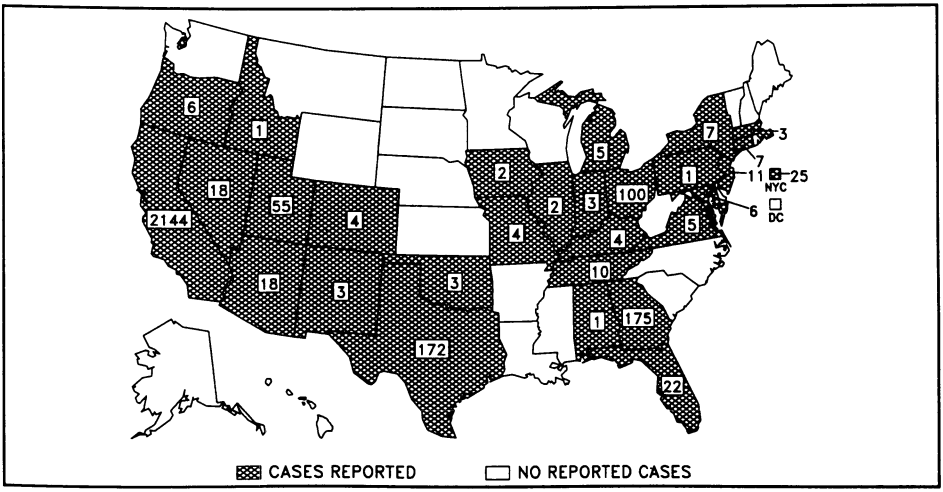
Hepatitis B Virus — Continued

patient and, because they cannot be disinfected, should be discarded when no longer needed by that patient. The Food and Drug Administration is issuing a safety alert concerning the use of all spring-loaded fingerstick devices.

References

1. Douvin C, Simon D, Zinelabidine H, Wirquin V, Perlemuter L, Dhumeaux D. An outbreak of hepatitis B in an endocrinology unit traced to a capillary-blood–sampling device. N Engl J Med 1990;322:57–8
2. Bond WW, Favero MS, Peterson NJ, Gravelle CR, Ebert JW, Maynard JE. Survival of hepatitis B after drying and storage for one week. Lancet 1981;1:550–1.

Reported cases of measles, by state — United States, weeks 31–35, 1990



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The data in this report are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday. Accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials, as well as matters pertaining to editorial or other textual considerations should be addressed to: Editor, *Morbidity and Mortality Weekly Report*, Mailstop C-08, Centers for Disease Control, Atlanta, Georgia 30333; telephone (404) 332-4555.

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