CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

March 5, 1999 / Vol. 48 / No. 8

MMWR™
MORBIDITY AND MORTALITY
WEEKLY REPORT

Hemolysis Associated with 25% Human Albumin Diluted with Sterile Water — United States, 1994–1998

Since 1994, a shortage of 5% human albumin, a product used off-label during therapeutic plasma exchange (TPE), has existed in the United States. Because of this shortage, hospital pharmacists may prepare 5% solution of human albumin by diluting 25% human albumin with 0.9% NaCl or, when sodium load is a concern, 5% dextrose. However, if sterile water alone is used as the diluent, the osmolarity (tonicity) of the albumin solution is reduced and may cause hemolysis in recipients. This report describes two of 10 episodes of hemolysis (one fatal)* among persons who received 25% human albumin diluted with sterile water and emphasizes that sterile water alone should not be used to dilute albumin.

Case 1

In January 1998, a 44-year-old patient in a Maine hospital underwent TPE with 5% human albumin prepared by diluting 25% human albumin 1:5 with sterile water to treat cryoglobulinemia. After an infusion of 270 mL of the solution, the fluid in the plasma exchange device tubing became tinged red, and the procedure was stopped. The patient reported no symptoms; however, the patient's hematocrit decreased within 24 hours from 36% to 29% (normal: 37%–48%) and 48 hours later, serum creatinine increased from 0.9 mg/dL to 3.5 mg/dL (normal: <1.5 mg/dL). During the next 2 weeks, the patient's renal function recovered, and the patient subsequently underwent TPE with 5% human albumin without complication.

Case 2

In July 1998, a 76-year-old patient with multiple myeloma, chronic renal insufficiency, anemia, and thrombocytopenia was hospitalized in Pennsylvania for hip replacement. Two days after surgery, the patient underwent TPE for the multiple myeloma with 5% human albumin prepared by diluting 25% human albumin 1:5 with sterile water. After 750 mL were infused, red-tinged plasma was observed in the exchange tubing and red-tinged urine in the catheter bag, and the procedure was discontinued. The patient reported no symptoms.

Within 4 hours, hematocrit, blood urea nitrogen, and creatinine had not changed from baseline values, but the serum lactate dehydrogenase had increased from

*Reported to the Food and Drug Administration during 1994–1998.

Hemolysis — Continued

149 IU/L to 734 IU/L (normal: 100 IU/L–225 IU/L). Eight hours after TPE, the patient went into shock and had a cardiac arrest. The hematocrit had decreased from 22% to 19%. Shortly after resuscitation, the patient developed disseminated intravascular coagulation (DIC) and bled from multiple sites. During the next 48 hours, progressive renal insufficiency developed; creatinine levels increased from 2.8 mg/dL to 3.9 mg/dL, and bleeding continued. The patient died 72 hours after TPE.

Reported by: LR Pierce, MD, J Finlayson, PhD, JS Epstein, MD, Office of Blood Research and Review; A Gaines, PhD, F Varricchio, MD, Div of Biostatistics and Epidemiology, Center for Biologics Evaluation and Research, Food and Drug Administration. Hospital Infections Program, National Center for Infectious Diseases; and an EIS Officer, CDC.

Editorial Note: When a 5% albumin solution is prepared by diluting 25% human albumin with sterile water, its osmolarity is approximately one fifth that of plasma. Hemolysis and the consequent acute renal insufficiency in case 1 probably resulted from the hypotonicity of the 5% albumin solution used during TPE (*1*). In case 2, the DIC and the accompanying renal insufficiency probably also were triggered by TPE-induced hemolysis (*2*). The large volumes used in the procedure may have aggravated the hemolysis in these cases, because the hypotonic plasma replacement mixture accounted for a significant fraction of the patients' blood volume. In addition, the shearing force of the plasma exchange device, in association with hypotonic stress, may have damaged RBCs and contributed to the hemolysis.

Since 1994, FDA has received 10 reports of hemolysis associated with infusion of 25% albumin diluted with sterile water. Eight of the 10 occurred after 1996. Four of the 10 patients had no hemolysis-associated complications; five developed acute renal insufficiency. Two patients died: one from the underlying disease, and the other was described in case 2 of this report.

In five cases, including case 2, the hospital pharmacists relied on the seventh or eighth editions of Trissel's *Handbook on Injectable Drugs*, both of which give incorrect instructions on diluting 25% albumin (*3,4*). In another case, the pharmacist relied on the ninth edition, in which the entry is ambiguous. In case 1 of this report, the pharmacist failed to follow the pharmacy's standard procedure of using 0.9% NaCl as the diluent (*5,6*). In the other three cases, the references used are not known.

The national shortage of 5% human albumin occurred during the same period as most of the hemolysis episodes. This shortage may be partially attributed to changes in production capacity. In 1997, two of the five manufacturers suspended or slowed production to bring their operations into compliance with Food and Drug Administration (FDA) good manufacturing practice regulations (Center for Biologics Evaluation and Research, FDA, personal communication, 1999). These manufacturers shared 20%–40% of the 5% human albumin market.

To stop the potentially life-threatening error that can occur when incorrectly preparing replacement albumin solution for TPE, FDA has recommended safety measures to manufactures (revise package inserts with a warning about the risk for hemolysis), and to hospital pharmacists (a "drug warning" appeared in the FDA medical bulletin in 1998 [*7*], and two alerts were issued through the Institute for Safe Medication Practices). FDA also has published letters in peer-reviewed journals (*5,8–10*), and has worked with the American Society of Health-Systems Pharmacists, publisher of Trissel's handbooks, to revise the ambiguous entry. In addition, FDA has notified manufacturers of plasma exchange devices of this serious but preventable error.

Hemolysis — Continued

Pharmacists and clinicians who encounter hemolysis associated with 25% human albumin diluted to 5% with sterile water for infusion are encouraged to report it to MedWatch, HF-2, FDA, 5600 Fishers Lane, Rockville, MD, 20852-9787; telephone (800) 332-1088; fax (800) 332-0178; World-Wide Web site <http://www.fda.gov/medwatch>; to CDC's Hospital Infections Program, National Center for Infectious Diseases, telephone (404) 639-6413; or to the product manufacturer.

References

1. Brady HR, Brenner BM. Acute renal failure. In: Isselbacher KJ, Braunwald E, Wilson JD, Martin JB, Fauci AS, Kasper DL, eds. Harrison's principles of internal medicine. 13th ed. New York, New York: McGraw-Hill, Inc, 1994:1265–74.
2. Handin R. Disorders of coagulation and thrombosis. In: Isselbacher KJ, Braunwald E, Wilson JD, Martin JB, Fauci AS, Kasper DL, eds. Harrison's principles of internal medicine. 13th ed. New York, New York: McGraw-Hill, Inc, 1994:1804–10.
3. Trissel LA. Handbook on injectable drugs. 7th ed. Bethesda, Maryland: American Society of Hospital Pharmacists, 1992.
4. Trissel LA. Handbook on injectable drugs. 8th ed. Bethesda, Maryland: American Society of Hospital Pharmacists, 1994.
5. Forte FJ, Caravone D, Coyne MJ. Albumin dilution as a cause of hemolysis during plasmapheresis [Letter]. Am J Health Syst Pharm 1995;52:207.
6. Steinmuller DR. A dangerous error in the dilution of 25% albumin [Letter]. N Engl J Med 1998;338:1226.
7. Food and Drug Administration. Hemolysis and renal failure associated with inappropriate use of sterile water to dilute 25% albumin solution. FDA Medical Bulletin 1998;28:5. Available at <http://www.fda.gov/medbull/summer98.html>. Accessed February 25, 1999.
8. Pierce LR, Gaines A, Finlayson JS, Varricchio F, Epstein JS. Hemolysis and acute renal failure due to the administration of albumin diluted in sterile water [Letter]. Transfusion 1999;39:110.
9. Pierce LR, Gaines A, Varricchio F, Epstein JS. A dangerous error in the dilution of 25% albumin [Letter]. N Engl J Med 1998;338:1226–7.
10. Pierce LR, Finlayson JS, Epstein JS. More on dangerous dilution of 25% albumin [Letter]. N Engl J Med 1998;339:635.

Availability of Immune Globulin Intravenous for Treatment of Immune Deficient Patients — United States, 1997–1998

Immune globulin intravenous (IGIV) is a lifesaving treatment for patients with primary immunodeficiency. Since November 1997, a shortage of IGIV has existed in the United States. In 1998, the Food and Drug Administration (FDA) required pharmaceutical companies to increase the frequency of reporting on IGIV distribution from biannually to monthly; in addition, FDA facilitated IGIV distribution and informed clinicians about the ongoing shortage. To assess the impact of the IGIV shortage on patient care, in 1998 the Immune Deficiency Foundation (IDF) surveyed physicians caring for immunodeficient patients about whether they have had difficulty obtaining IGIV, measures they have taken because of the shortage, and the effect of the shortage on their patients. This report summarizes data reported to FDA and data obtained from the IDF survey and provides recommendations for IGIV use during the shortage.

Reporting to FDA

Based on industry reports of IGIV distribution from all seven pharmaceutical companies handling IGIV during 1995–1998, the FDA estimated shortfall of IGIV compared with demand was 20% for 1997 and 30% for 1998. For 1997, FDA attributed approxi-

Immune Globulin Intravenous — Continued

mately 60% of the decreased availability to production impediments related to compliance and approximately 20% to withdrawals of plasma products because of the theoretical risk for contamination with the Creutzfeldt-Jakob disease (CJD) agent. The remainder of the shortage was attributed to other problems, including increased use, wastage, and export of IGIV.

To address the shortage, on January 28, 1998, FDA sent a letter to physicians reminding them of the six approved uses for IGIV (Table 1) and recommended that priority for IGIV be given to patients who have FDA-approved indications for use. In addition, a review of data from FDA, NIH, and CDC suggested that the risk for transmission of classic CJD by blood products, if it exists, is considerably lower than the risk for harm to public health from CJD-related quarantines and withdrawals. Therefore, on August 27, 1998, the Surgeon General recommended that plasma derivatives, including IGIV, be withdrawn only if the blood donor developed new-variant CJD.

IDF Survey

In March 1998, IDF conducted a survey using its database of 1567 self-identified physicians who treat immunodeficient patients in 42 states; the physicians reported concurrently treating 23,341 primary immunodeficient patients. Of the physicians, each of 221 reported having treated ≥25 immunodeficient patients concurrently, accounting for 15,044 (64%) of primary immunodeficient patients in the survey. The survey, which inquired specifically about IGIV use and the effects of the shortage on immunodeficient patients during the previous 6 months, was sent to the 221 physicians and to a random sample of 265 of the physicians treating <25 immunodeficient patients concurrently. Responses were received from 151 (68%) of the 221 physicians treating ≥25 immunodeficient patients and from 117 (44%) of the 265 physicians treating <25 immunodeficient patients. Of the 268 (55%) who responded, 215 (80%) reported treating immunodeficient patients using IGIV. Most (184 [86%]) reported difficulty obtaining IGIV. Altered dosage schedules because of the shortage were reported: postponed IGIV infusions, 148 (69%); increased interval between IGIV infusions, 120 (56%); decreased IGIV dosages, 82 (38%); and substitution of alternative therapy to IGIV, 39 (18%). The shortage adversely affected patients of 97 (45%) respondents; adverse effects reported by respondents included increased infections, stress, anxiety, and malaise.

Reported by: M O'Day, J Boyle, PhD, TL Moran, J Winkelstein, MD, Immune Deficiency Foundation, Towson, Maryland. Div of Hematology, Office of Blood Research and Review, Center for Biologics Evaluation and Research, Food and Drug Administration. Div of Viral and Rickettsial Diseases and Hospital Infections Program, National Center for Infectious Diseases; and an EIS Officer, CDC.

Editorial Note: During the early 1980s, IGIV was developed as an infusion product that did not have large immunoglobulin aggregates and that allowed immunodeficient patients to receive enough immune globulin at monthly intervals to protect them from infections until their next infusion. IGIV is recommended for a limited number of approved or proven purposes (*1*). In 1990, a National Institutes of Health (NIH) Consensus Development Conference recognized the usefulness of IGIV for chronic inflammatory demyelinating polyneuropathy (Table 1) (*2*). In 1995, the University Hospital Consortium Expert Panel for Off-Label Use of Polyvalent Intravenously Administered Immunoglobulin Preparations (UHC) stated its position regarding IGIV use for several diseases (Table 1).

TABLE 1. Recommendations for use of immune globulin intravenous (IGIV), by recommending source

Acceptability	Agency recommendations		
	FDA*	NIH†	UHC§
Accepted	Primary immunodeficiencies; immune-mediated thrombocytopenia; Kawasaki syndrome; recent bone marrow transplant in adults; chronic B-cell lymphocytic leukemia; pediatric HIV infection	FDA-accepted indications and chronic inflammatory demyelinating polyneuropathy	Post-transfusion purpura (FDA indications were not re-evaluated)
Equal to other therapy			Guillain-Barré syndrome and chronic inflammatory demyelinating polyneuropathy
May be useful			Anemia because of parvovirus B19; patients with stable multiple myeloma who are at high risk for recurrent infection; cytomegalovirus (CMV)-negative recipients of CMV-positive organs; hypogammaglobulinemic neonates with risk factor for infection or morbidity; intractable epilepsy; systemic vasculitic syndromes; warm-type autoimmune hemolytic anemia; neonatal alloimmune thrombocytopenia when unresponsive to other treatments; immune-mediated neutropenia; decompensation in myasthenia gravis; dermatomyositis; polymyositis; thrombocytopenia when severe and unresponsive to other treatments
Not useful			Acute lymphoblastic leukemia; acute renal failure; adrenoleukodystrophy; adult HIV infection; anemia not otherwise specified (NOS); asthma; bleeding disorders; neurologic disease or thrombocytopenia if NOS; Behçet's syndrome; chronic fatigue syndrome; congenital heart block; cystic fibrosis; diabetes mellitus; endotoxemia; euthyroid ophthalmopathy; inclusion body myositis; membraneous nephropathy; nephrotic syndrome; prophylaxis for solid organ transplantation, surgery, or trauma; recurrent otitis media; recurrent spontaneous abortion; rheumatoid arthritis

*Food and Drug Administration. Different IGIV products may be approved for different indications.
†National Institutes of Health Consensus Development Conference.
§University Hospital Consortium Expert Panel for Off-Label Use of Polyvalent Intravenously Administered Immunoglobulin.

Immune Globulin Intravenous — Continued

Information reported to FDA suggests that distribution and production factors contributed to the IGIV shortage, leading to the problems for patients documented by the IDF survey. However, part of the shortage has resulted from increasing IGIV administration for both approved and unapproved uses. Despite FDA, NIH, and UHC attempts to guide clinicians, >50% of IGIV use is for purposes not approved by FDA (*3*). If IGIV were administered only for conditions for which its efficacy is supported by adequate scientific evidence and for which no other treatment exists, then more IGIV would become available for immunodeficient patients, whose physicians have had difficulty obtaining IGIV.

The FDA analysis of information on the shortage has at least three limitations. First, reports and shortage evaluations are based on passive reporting to the agency. Second, information on monthly IGIV production (in contrast to distribution) and demand is not available. Finally, FDA has minimal information on the export of IGIV.

The findings of the IDF survey are subject to at least four limitations. First, physicians surveyed were from a database of physicians who self-identified as treating immunodeficient patients, and they may not represent the practices of all physicians treating patients with IGIV. Second, the response rate for the survey was low. Third, because the survey specifically inquired about difficulty obtaining IGIV, physicians having problems obtaining IGIV may have been more likely to respond. Finally, although the findings of the IDF survey suggest that the IGIV shortage may be adversely affecting physician prescribing practices and patients' health, the survey design did not permit more precise estimation of possible adverse effects. These limitations may lead to overestimation of the severity of the shortage.

FDA is using several methods to improve IGIV distribution to patients, such as evaluating products manufactured in Europe for possible use in the United States, encouraging manufacturers to set aside emergency supplies of IGIV, continuing to monitor IGIV supplies and distribution, and shortening the lot-release time for IGIV. Long-term plans include reevaluating uses of plasma derivatives and expanding plasma product production capacity.

Clinicians should review their IGIV use to ensure consistency with current recommendations, and pharmacists should facilitate appropriate use by assisting in triage of available IGIV to high priority patients as outlined by FDA, NIH, and the UHC (Table 1). IDF, in cooperation with IGIV manufacturers, is distributing a limited supply of IGIV product on an emergency basis to clinical immunologists enrolled in the program. Additional information about this program is available from IDF, telephone (800) 296-4433, Monday through Friday from 8 a.m. to 5 p.m.

References

1. Buckley RH, Schiff RI. The use of intravenous immune globulin in immunodeficiency diseases. N Engl J Med 1991;325:110–7.
2. National Institutes of Health. Intravenous immunoglobulin: prevention and treatment of disease: NIH consensus statement. Washington, DC: US Department of Health and Human Services, National Institutes of Health, 1990;8:1–23.
3. Robert P. The fractions market in the United States. Orange, Connecticut: The Market Research Bureau, 1996.

Nosocomial Group A Streptococcal Infections Associated with Asymptomatic Health-Care Workers — Maryland and California, 1997

Group A *Streptococcus* (GAS), a common cause of pharyngitis and uncomplicated skin and soft tissue infections, can cause serious invasive infections (including necrotizing fasciitis and streptococcal toxic-shock syndrome [STSS]) and death. Since 1965, at least 15 postoperative or postpartum GAS outbreaks attributed to asymptomatic carriage in health-care workers (HCWs) have been reported (*1*). This report describes two nosocomial outbreaks of GAS infection in Maryland and California during 1996–1997; the findings suggest that early infection-control measures that include active surveillance may interrupt transmission and prevent morbidity and mortality.

Maryland

During July 1996–August 1997, seven patients with postpartum GAS infections were identified by hospital A. A case of GAS infection was defined as GAS isolated from any nonpharyngeal site in a patient whose symptoms began >12 hours after admission to hospital A during January 1996–September 1997. Review of the hospital's microbiology records for all nonpharyngitis GAS cultures during the study period identified two additional postpartum cases. No cases were identified on other wards. Of nine case-patients, seven had endometritis; two of these had sepsis; one developed hypotension and required admission to the intensive-care unit (ICU). One patient developed postcesarean delivery wound infection, and another had a urinary tract infection. No patients died.

Each of the nine case-patients was compared with five controls. Controls were selected randomly from patients on the obstetric ward during the study period. Exposure to one HCW (HCW A) was associated strongly with infection (odds ratio=25; 95% confidence interval=2.8–1200.0).

Swab specimens were collected and cultured from the throat, rectum, vagina, and skin of 198 HCWs who worked on the labor and delivery or postpartum wards during the outbreak period. GAS isolates from the HCWs and a patient isolate were typed by sequencing the variable portion of the M-protein gene (*emm* typing). Three HCWs had positive cultures for GAS. Only the rectal isolate from HCW A was identical to that of the case-patient (*emm* type 77). HCW A's wife, who was asymptomatic, had positive rectal and vaginal cultures for the same strain. HCW A and his wife were treated with oral vancomycin and rifampin. Surveillance cultures of HCW A have remained negative, and hospital A has had no additional cases.

California

During December 23, 1996–January 1, 1997, three patients who had surgery at hospital B developed STSS. On December 23, a previously healthy 28-year-old woman underwent a parathyroidectomy performed by surgeon A. The day before surgery, surgeon B performed direct laryngoscopy on the patient. She developed chest pain and hypotension on December 24. On December 26, she was transferred to the ICU because of respiratory distress, then developed cardiopulmonary arrest. Cultures taken December 25 from the neck wound and pleural fluid grew GAS. She went into shock and developed renal failure, coagulopathy, and purpura and died on December 29.

Group A Streptococcal Infections — Continued

On December 30, a previously healthy 56-year-old woman underwent a subtotal thyroidectomy performed by surgeon A with the assistance of surgeon B. She was discharged December 31. Later that day, she was found dead in her home. Postmortem cultures of blood and tissue grew GAS. The cause of death was attributed to septicemia and GAS.

On December 30, a previously healthy 57-year-old woman underwent a subtotal thyroidectomy performed by surgeon A with surgeon B assisting. The next day she was discharged. On January 1, 1997, she sought care at the emergency department and was admitted to the ICU in shock, with acidosis, respiratory failure, renal impairment, and bilateral pleural effusions. Cultures from the surgical wound, pleural fluid, and blood grew GAS. After a hospital course including sepsis, global myocardial hypokinesis, and lower gastrointestinal bleeding, she was discharged on February 4.

Review of hospital B's microbiology records revealed no episodes of postoperative GAS infection during the 6 months before the outbreak. Surgeon A was the only HCW who had contact in the operating room with all three patients. Nasopharyngeal, throat, rectal, and vaginal cultures were obtained from the 41 staff members who worked in the operating room and the pre- or postoperative areas on the days of surgery for the patients. All cultures were negative except a throat culture from one orderly that grew GAS. Surgeon A received self-initiated penicillin on January 2, before adequate cultures were obtained. Rifampin was added following adequate culturing. Throat cultures from surgeon A's household contacts were negative.

GAS isolates from all three patients were *emm* type 1 and had indistinguishable restriction fragment length polymorphism patterns. The orderly's GAS isolate was *emm* type STNS5.

Surgeons A and B were restricted from patient care until each had completed a 10-day course of penicillin and rifampin. No further postoperative GAS infection has occurred in hospital B.

Reported by: T Aragon, MD, M Katz, MD, City and County of San Francisco Dept of Public Health; L Mintz, MD, Univ of California, San Francisco; D Vugia, MD, S Waterman, MD, State Epidemiologist, California Dept of Health Svcs. D Bradshaw, MD, T Lacey, M Sanders, PhD, D Dwyer, MD, State Epidemiologist, Maryland Dept of Health and Mental Hygiene. Respiratory Diseases Br, Div of Bacterial and Mycotic Diseases, National Center for Infectious Diseases; Div of Applied Public Health Training, Epidemiology Program Office; and EIS officers, CDC.

Editorial Note: GAS is an unusual cause of surgical site or postpartum infections. The bacterium is isolated from <1% of surgical-site infections (*2*) and 3% of infections after vaginal delivery (CDC, unpublished data, 1986–1997). The most common site of asymptomatic carriage among HCWs is the anus (*3–5*), but vaginal (*6,7*), skin (*2*), and pharyngeal (*8*) carriage have been implicated. GAS carriers can shed the organism into the immediate environment despite proper gowning and gloving (*2,3,5–7*). The mode of transmission is presumed to be airborne.

Surgical and obstetric patients are particularly vulnerable to infection because broken cutaneous or mucosal barriers facilitate invasive infection after exposure. In Toronto, Ontario, Canada, three of eight investigations following an episode of nosocomial GAS on surgical or obstetric wards identified an asymptomatic HCW (*9*).

To prevent additional nosocomial GAS infections, enhanced surveillance and limited epidemiologic investigation are warranted following one episode of nosocomial GAS infection on a surgical or obstetric ward. After identification of a patient with postoperative or postpartum GAS, medical and laboratory records should be re-

Group A Streptococcal Infections — Continued

viewed to identify other infections, and isolates from infected patients should be stored and surveillance heightened to identify additional episodes.

When an episode of postoperative or postpartum GAS is identified, limited HCW screening should be undertaken. Most nosocomial transmission is traced to carriers involved in direct patient care. For a postpartum GAS-infected patient, screening should include all HCWs present at the delivery and those who performed vaginal examinations before delivery. For a postoperative GAS-infected patient, screening should include all HCWs present in the operating room during the procedure and those who changed dressings on open wounds. Screening of HCWs should include culture of the nares, throat, vagina, rectum, and skin. HCWs may return to work pending culture results. Any HCW culture-positive for GAS should refrain from patient care for the first 24 hours of antimicrobial treatment. The regimen should be tailored to the carriage site; previous reports have indicated anal carriage may be difficult to eradicate (*6*). For example, appropriate treatment for a positive rectal culture may be vancomycin 250 mg orally four times a day and rifampin 600 mg orally twice a day for 10 days (*3,5*). For a positive throat, vaginal, or skin culture, appropriate treatment may be penicillin 500 mg four times a day for 10 days with rifampin 600 mg orally twice a day for the last 4 days of the 10-day course (*10*).

If surveillance identifies additional patients or HCWs with positive cultures for GAS, the isolates should be typed by *emm*, serologic, or other molecular methods to identify the strain. When the isolates are the same and a carrier has not been identified, screening should be expanded to include HCWs who had less direct patient care. CDC also recommends obtaining cultures from household contacts of implicated carriers to identify and treat potential reservoirs for reinfection. Because carriage may recur (*4*), implicated carriers should be monitored with periodic surveillance cultures for 1 year after treatment.

References

1. Kolmos HJ, Svendsen RN, Nielsen SV. The surgical team as a source of postoperative wound infections caused by *Streptococcus pyogenes*. J Hospital Infection 1997;35:207–14.
2. Mastro TD, Farley TA, Elliot JA, et al. An outbreak of surgical-wound infections due to group A *Streptococcus* carried on the scalp. N Engl J Med 1990;323:968–72.
3. Schaffner W, Lefkowitz LB Jr, Goodman JS, Koenig MG. Hospital outbreak of infections with group A streptococci traced to an asymptomatic anal carrier. N Engl J Med 1969;280:1224–5.
4. Viglionese A, Nottebart VF, Bodman HA, Platt R. Recurrent group A streptococcal carriage in a health care worker associated with widely separated nosocomial outbreaks. Am J Med 1991;91:S329–S333.
5. McKee WM, DiCaprio JM, Roberts CE Jr, Sherris JC. Anal carriage as the probable source of a streptococcal epidemic. Lancet 1966;2:1007–9.
6. Stamm WE, Feeley JC, Facklam R. Wound infections due to group A *Streptococcus* traced to a vaginal carrier. J Infect Dis 1978;138:287–92.
7. Berkelmam RL, Martin D, Graham DR, et al. Streptococcal wound infections caused by a vaginal carrier. JAMA 1982;247:2680–2.
8. Paul SM, Genese C, Spitalny K. Postoperative group A beta-hemolytic *Streptococcus* outbreak with the pathogen traced to a member of the healthcare worker's household. Infect Control Hosp Epidemiol 1990;11:643–6.
9. Green K, Low D, Schwartz B, Cann D, Wilson P, McGeer A. Prospective surveillance for nosocomial group A streptococcal infections in Ontario: do single cases warrant an investigation? [Abstract 1393]. In: 1993 Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC). New Orleans, Louisiana: American Society for Microbiology, 1993.

Group A Streptococcal Infections — Continued

10. The Working Group on Prevention of Invasive Group A Streptococcal Infections. Prevention of invasive group A streptococcal disease among household contacts of case-patients: is prophylaxis warranted? JAMA 1998;279:1206–10.

Notice to Readers

Satellite Broadcast on Epidemiology and Prevention of Vaccine-Preventable Diseases

CDC's National Immunization Program and the Public Health Training Network will cosponsor a live satellite broadcast for physicians, nurses, nurse practitioners, physician assistants, pharmacists, residents, and their colleagues who either administer vaccinations or set policy in their workplace. The four-part series, "Epidemiology and Prevention of Vaccine-Preventable Diseases," will be broadcast on March 25 and April 1, 8, and 15, 1999, from 12 noon to 3:30 p.m. eastern time.

The program will provide the most current information available in the field of immunization. Session one will cover principles of vaccination, general recommendations on vaccination, and strategies to improve vaccination coverage levels. Session two will cover diphtheria, tetanus, pertussis, poliomyelitis, and rotavirus; session three will cover measles, mumps, rubella, and varicella; and session four will focus on hepatitis B, *Haemophilus influenzae* type b, influenza, and pneumococcal disease. Continuing education credit will be offered for a variety of professions based on 14 hours of instruction.

Additional information about this course, including registration, is available from state or county health department immunization programs. A list of state immunization coordinators is available on the World-Wide Web at <http://www.cdc.gov/nip>.

Notice to Readers

Conference on Needle-Free Injection Technology

The Conference on Needle-Free Injection Technology will be held March 31–April 1, 1999, in Bethesda, Maryland. Cosponsors are the U.S. Agency for International Development, the World Health Organization, the Program for Appropriate Technology in Health, the Association of Needle-Free Injection Manufacturers, and CDC. The conference will include public and private sector agencies, organizations, and companies that are collaborating to solve problems associated with administering drugs and biologic products with conventional needles and syringes.

Program and registration information is available on the World-Wide Web at <http://www.cdc.gov/nip/vaccine/dev/inject/> and from CDC's National Immunization Program, telephone (404) 639-8638, fax (404) 639-8614, and e-mail epp1@cdc.gov.

Notice to Readers

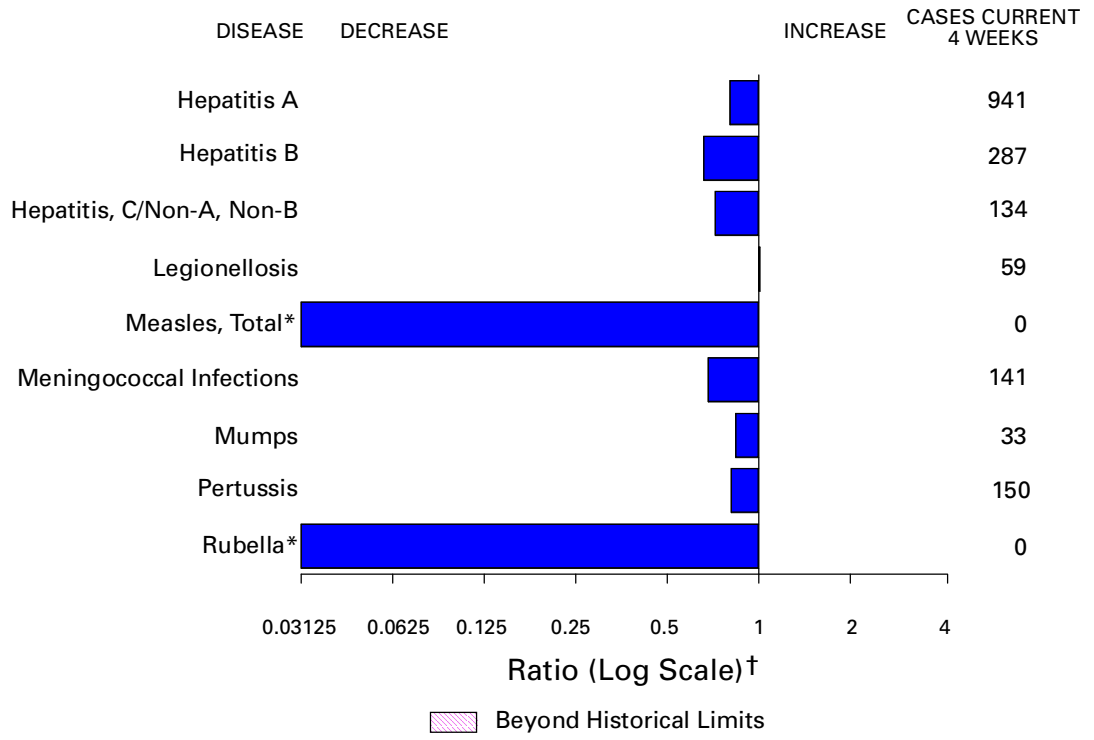
Introduction to Public Health Surveillance Course

CDC and the Rollins School of Public Health at Emory University will cosponsor a course, "Introduction to Public Health Surveillance" during June 7–11, 1999, in Atlanta. The course is designed for state and local public health professionals.

The course will provide practicing public health professionals with the theoretical and practical tools necessary to design, implement, and evaluate effective surveillance program. Topics include overview and history of surveillance systems; planning considerations; sources and collection of data; analysis, interpretation, and communication of data; surveillance systems technology; ethics and legalities; state and local concerns; and future considerations. There is a tuition charge.

Deadline for applications is April 30. Additional information and applications are available from Emory University, International Health Dept., 1518 Clifton Rd., N.E., Room 746, Atlanta, GA 30322; telephone (404) 727-3485; fax (404) 727-4590; or World-Wide Web at <http://www.sph.emory.edu/EPICOURSES>; or e-mail pvaleri@sph.emory.edu.

FIGURE I. Selected notifiable disease reports, comparison of provisional 4-week totals ending February 27, 1999, with historical data — United States



*No measles or rubella cases were reported for the current 4-week period, yielding a ratio for week 8 of zero (0).

† Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where the hatched area begins is based on the mean and two standard deviations of these 4-week totals.

TABLE I. Summary — provisional cases of selected notifiable diseases, United States, cumulative, week ending February 27, 1999 (8th Week)

	Cum. 1999		Cum. 1999
Anthrax	-	Plague	-
Brucellosis	7	Poliomyelitis, paralytic	-
Cholera	-	Psittacosis	4
Congenital rubella syndrome	-	Rabies, human	-
Cryptosporidiosis*	131	Rocky Mountain spotted fever (RMSF)	22
Diphtheria	-	Streptococcal disease, invasive Group A	162
Encephalitis: California*	1	Streptococcal toxic-shock syndrome*	5
eastern equine*	-	Syphilis, congenital¶	-
St. Louis*	-	Tetanus	1
western equine*	-	Toxic-shock syndrome	10
Hansen Disease	7	Trichinosis	1
Hantavirus pulmonary syndrome*†	1	Typhoid fever	29
Hemolytic uremic syndrome, post-diarrheal*	5	Yellow fever	-
HIV infection, pediatric*§	7		

-:no reported cases
*Not notifiable in all states.
† Updated weekly from reports to the Division of Viral and Rickettsial Diseases, National Center for Infectious Diseases (NCID).
§ Updated monthly from reports to the Division of HIV/AIDS Prevention–Surveillance and Epidemiology, National Center for HIV, STD, and TB Prevention (NCHSTP), last update January 24, 1999.
¶ Updated from reports to the Division of STD Prevention, NCHSTP.

TABLE II. Provisional cases of selected notifiable diseases, United States, weeks ending February 27, 1999, and February 28, 1998 (8th Week)

Reporting Area	AIDS		Chlamydia		*Escherichia coli* O157:H7		Gonorrhea		Hepatitis C/NA,NB	
					NETSS†	PHLIS§				
	Cum. 1999*	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1999	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998
UNITED STATES	3,137	7,332	69,253	86,363	151	37	40,072	52,365	353	524
NEW ENGLAND	158	198	2,114	3,243	23	11	638	926	40	17
Maine	3	4	99	157	1	-	9	7	-	-
N.H.	3	10	138	147	1	-	12	19	-	-
Vt.	-	8	69	40	-	-	7	1	1	2
Mass.	124	70	1,381	1,339	15	7	471	336	39	15
R.I.	9	22	341	387	-	-	93	52	-	-
Conn.	19	84	86	1,173	6	4	46	511	-	-
MID. ATLANTIC	489	2,103	10,460	12,255	10	-	5,521	7,340	15	40
Upstate N.Y.	17	299	N	N	8	-	405	1,024	15	38
N.Y. City	237	1,154	5,717	5,342	-	-	2,866	2,496	-	-
N.J.	162	284	616	1,794	2	-	262	1,165	-	-
Pa.	73	366	4,127	5,119	N	-	1,988	2,655	-	2
E.N. CENTRAL	179	509	11,617	13,229	33	4	8,217	10,278	85	75
Ohio	38	94	3,788	4,519	21	3	2,248	2,696	-	3
Ind.	25	79	-	-	5	-	726	988	-	1
Ill.	77	247	4,294	3,082	2	-	2,724	2,879	1	10
Mich.	22	57	3,092	3,473	5	-	2,324	2,878	84	61
Wis.	17	32	443	2,155	N	1	195	837	-	-
W.N. CENTRAL	110	147	2,273	5,432	30	9	793	2,145	2	74
Minn.	20	22	761	1,086	14	8	298	376	-	-
Iowa	3	9	294	534	5	1	97	154	-	2
Mo.	72	77	-	1,892	1	-	-	912	2	71
N. Dak.	-	3	-	147	2	-	-	12	-	-
S. Dak.	-	5	277	275	-	-	23	44	-	-
Nebr.	6	14	349	476	2	-	161	175	-	-
Kans.	9	17	592	1,022	6	-	214	472	-	1
S. ATLANTIC	883	1,855	18,196	16,307	16	5	13,751	13,373	32	15
Del.	13	36	476	325	1	-	273	228	-	-
Md.	81	239	1,258	1,127	2	-	1,117	1,328	15	2
D.C.	8	189	N	N	-	-	484	487	-	-
Va.	54	112	2,131	1,812	5	-	1,810	1,092	6	1
W. Va.	10	19	373	775	-	1	81	248	2	-
N.C.	69	107	3,609	3,033	2	2	3,255	2,685	-	5
S.C.	60	126	4,134	2,733	1	1	2,184	1,871	1	-
Ga.	111	228	1,993	3,679	1	-	1,468	3,059	-	3
Fla.	477	799	4,222	2,823	4	1	3,079	2,375	8	4
E.S. CENTRAL	157	289	5,247	5,974	7	-	4,789	6,008	22	17
Ky.	15	39	-	965	-	-	-	624	-	4
Tenn.	64	104	2,141	2,088	5	-	1,772	1,856	21	11
Ala.	31	86	2,017	1,473	2	-	1,987	1,995	1	2
Miss.	47	60	1,089	1,448	-	-	1,030	1,533	-	-
W.S. CENTRAL	532	885	4,517	11,921	5	-	3,276	7,631	15	12
Ark.	19	33	748	467	2	-	328	833	-	2
La.	27	148	2,531	1,858	1	-	2,286	1,649	6	-
Okla.	6	52	1,238	1,213	1	-	662	670	-	-
Tex.	480	652	-	8,383	1	-	-	4,479	9	10
MOUNTAIN	45	199	3,085	4,210	8	1	792	1,202	35	66
Mont.	-	8	186	107	-	-	3	6	4	4
Idaho	4	5	245	291	-	-	18	24	3	17
Wyo.	-	-	-	126	1	-	-	9	12	18
Colo.	26	39	928	963	2	1	261	410	4	5
N. Mex.	4	36	728	666	1	-	135	125	4	9
Ariz.	4	61	764	1,521	2	-	349	521	7	-
Utah	4	26	234	266	2	-	26	31	1	7
Nev.	3	24	U	270	U	-	U	76	U	6
PACIFIC	584	1,147	11,744	13,792	19	7	2,295	3,462	107	208
Wash.	29	73	1,922	1,614	1	2	333	287	2	2
Oreg.	15	31	682	927	7	5	85	144	-	1
Calif.	525	1,028	8,679	10,657	11	-	1,796	2,917	105	171
Alaska	5	-	264	282	-	-	48	51	-	-
Hawaii	10	15	197	312	-	-	33	63	-	34
Guam	1	-	-	43	N	-	-	4	-	-
P.R.	92	271	U	U	1	U	51	79	-	-
V.I.	-	8	N	N	N	U	U	U	U	U
Amer. Samoa	-	-	U	U	N	U	U	U	U	U
C.N.M.I.	-	-	N	N	N	U	-	7	-	-

N: Not notifiable U: Unavailable -: no reported cases C.N.M.I.: Commonwealth of Northern Mariana Islands

*Updated monthly from reports to the Division of HIV/AIDS Prevention–Surveillance and Epidemiology, National Center for HIV, STD, and TB Prevention, last update January 24, 1999.

†National Electronic Telecommunications System for Surveillance.

§Public Health Laboratory Information System.

TABLE II. (Cont'd.) Provisional cases of selected notifiable diseases, United States, weeks ending February 27, 1999, and February 28, 1998 (8th Week)

Reporting Area	Legionellosis		Lyme Disease		Malaria		Syphilis (Primary & Secondary)		Tuberculosis		Rabies, Animal
	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999*	Cum. 1998*	Cum. 1999
UNITED STATES	102	182	331	459	136	168	806	1,105	491	932	576
NEW ENGLAND	10	15	52	70	2	6	13	13	36	48	91
Maine	1	-	-	1	-	-	-	-	1	-	16
N.H.	1	2	-	1	-	-	-	1	-	-	4
Vt.	3	-	-	-	-	-	1	-	-	1	15
Mass.	2	5	48	17	2	6	8	11	11	22	26
R.I.	1	3	-	2	-	-	1	-	13	8	8
Conn.	2	5	4	49	-	-	3	1	11	17	22
MID. ATLANTIC	13	36	156	282	33	64	37	64	163	190	133
Upstate N.Y.	5	9	62	87	12	13	2	4	3	20	90
N.Y. City	-	9	1	9	6	38	14	7	95	124	U
N.J.	3	1	85	37	13	7	1	15	65	46	32
Pa.	5	17	8	149	2	6	20	38	U	U	11
E.N. CENTRAL	30	66	16	15	12	16	159	147	28	17	1
Ohio	14	20	10	10	2	1	14	35	U	U	-
Ind.	5	9	5	4	4	1	32	28	U	U	-
Ill.	-	13	-	-	-	7	106	56	U	U	-
Mich.	11	11	1	1	5	6	7	15	24	-	1
Wis.	-	13	U	U	1	1	-	13	4	17	-
W.N. CENTRAL	1	11	4	5	5	6	3	26	41	45	56
Minn.	-	-	-	-	-	-	-	1	23	18	15
Iowa	1	-	1	5	2	1	1	-	-	-	14
Mo.	-	6	-	-	3	4	-	18	13	25	-
N. Dak.	-	-	1	-	-	-	-	-	-	-	15
S. Dak.	-	-	-	-	-	-	-	-	2	-	-
Nebr.	-	5	-	-	-	-	1	4	1	-	1
Kans.	-	-	2	-	-	1	1	3	2	2	11
S. ATLANTIC	25	23	60	60	41	35	322	409	90	208	244
Del.	2	1	-	-	-	1	1	2	-	3	-
Md.	1	6	47	56	14	17	66	115	U	U	55
D.C.	-	2	1	2	5	2	10	13	7	17	-
Va.	2	3	-	-	7	2	27	38	9	30	56
W. Va.	N	N	-	-	1	-	1	-	5	10	13
N.C.	3	3	10	-	1	4	90	114	37	101	56
S.C.	4	3	-	-	-	-	43	47	32	47	11
Ga.	-	-	-	2	4	6	37	29	U	U	28
Fla.	13	5	2	-	9	3	47	51	U	U	25
E.S. CENTRAL	3	8	6	9	3	5	156	205	41	72	19
Ky.	-	4	-	-	-	-	-	23	U	U	-
Tenn.	3	2	2	5	2	3	85	100	U	U	13
Ala.	-	1	4	4	1	1	53	44	39	46	6
Miss.	-	1	-	-	-	1	18	38	2	26	-
W.S. CENTRAL	1	1	-	-	5	2	83	135	16	273	1
Ark.	-	-	-	-	-	-	13	17	8	5	-
La.	1	-	-	-	3	2	34	60	U	U	-
Okla.	-	-	-	-	1	-	36	8	8	20	1
Tex.	-	1	-	-	1	-	-	50	-	248	-
MOUNTAIN	6	9	1	1	6	8	13	46	12	34	17
Mont.	-	1	-	-	1	-	-	-	-	-	7
Idaho	-	-	-	-	1	1	-	-	-	-	-
Wyo.	-	-	-	-	-	-	-	-	-	1	5
Colo.	1	2	-	-	1	3	-	3	U	U	1
N. Mex.	1	1	1	-	1	3	-	4	3	8	-
Ariz.	-	-	-	-	2	-	13	34	U	U	4
Utah	4	4	-	-	-	1	-	2	9	6	-
Nev.	U	1	U	1	U	-	U	3	U	19	U
PACIFIC	13	13	36	17	29	26	20	60	64	45	14
Wash.	1	-	-	-	2	-	1	4	33	28	-
Oreg.	-	-	-	-	3	5	-	1	U	U	-
Calif.	12	13	36	17	23	21	18	55	U	U	14
Alaska	-	-	-	-	-	-	-	-	6	4	-
Hawaii	-	-	-	-	1	-	1	-	25	13	-
Guam	-	1	-	-	-	-	-	-	-	13	-
P.R.	-	-	-	-	-	-	41	36	-	6	6
V.I.	U	U	U	U	U	U	U	U	U	U	U
Amer. Samoa	U	U	U	U	U	U	U	U	U	U	U
C.N.M.I.	-	-	-	-	-	-	-	3	-	11	-

N: Not notifiable U: Unavailable -: no reported cases

*Cumulative reports of provisional tuberculosis cases for 1998 and 1999 are unavailable ("U") for some areas using the Tuberculosis Information Management System (TIMS).

TABLE III. Provisional cases of selected notifiable diseases preventable by vaccination, United States, weeks ending February 27, 1999, and February 28, 1998 (8th Week)

Reporting Area	*H. influenzae*, invasive		Hepatitis (Viral), by type				Measles (Rubeola)					
			A		B		Indigenous		Imported†		Total	
	Cum. 1999*	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	1999	Cum. 1999	1999	Cum. 1999	Cum. 1999	Cum. 1998
UNITED STATES	147	177	2,065	2,766	688	1,179	-	7	-	4	11	3
NEW ENGLAND	14	12	22	66	10	20	-	-	-	1	1	1
Maine	1	-	2	8	-	-	-	-	-	-	-	-
N.H.	2	1	2	3	2	2	-	-	-	1	1	-
Vt.	3	-	-	3	-	-	-	-	-	-	-	-
Mass.	8	11	7	16	6	11	-	-	-	-	-	1
R.I.	-	-	-	4	2	-	-	-	-	-	-	-
Conn.	-	-	11	32	-	7	-	-	-	-	-	-
MID. ATLANTIC	19	27	92	209	69	180	-	-	-	-	-	1
Upstate N.Y.	11	11	35	44	20	38	-	-	-	-	-	-
N.Y. City	-	8	13	83	7	47	-	-	-	-	-	-
N.J.	8	8	25	42	19	33	-	-	-	-	-	1
Pa.	-	-	19	40	23	62	-	-	-	-	-	-
E.N. CENTRAL	16	27	539	496	68	282	-	-	-	-	-	1
Ohio	13	12	112	61	18	12	-	-	-	-	-	-
Ind.	1	2	29	68	4	125	-	-	-	-	-	-
Ill.	2	12	37	137	-	41	-	-	-	-	-	-
Mich.	-	-	359	201	46	83	-	-	-	-	-	1
Wis.	-	1	2	29	-	21	-	-	-	-	-	-
W.N. CENTRAL	6	1	52	268	20	68	-	-	-	-	-	-
Minn.	-	-	2	5	2	2	-	-	-	-	-	-
Iowa	2	-	12	94	6	10	-	-	-	-	-	-
Mo.	-	-	16	143	4	48	-	-	-	-	-	-
N. Dak.	-	-	-	1	-	-	U	-	U	-	-	-
S. Dak.	1	-	-	1	-	1	-	-	-	-	-	-
Nebr.	1	-	14	4	6	2	-	-	-	-	-	-
Kans.	2	1	8	20	2	5	-	-	-	-	-	-
S. ATLANTIC	39	28	214	186	124	109	-	-	-	-	-	-
Del.	-	-	-	-	-	-	-	-	-	-	-	-
Md.	19	8	55	59	28	27	-	-	-	-	-	-
D.C.	-	-	9	8	2	1	-	-	-	-	-	-
Va.	2	3	14	25	8	10	-	-	-	-	-	-
W. Va.	1	1	-	-	-	-	-	-	-	-	-	-
N.C.	4	3	25	14	31	40	-	-	-	-	-	-
S.C.	2	-	1	7	14	-	-	-	-	-	-	-
Ga.	1	10	52	41	12	21	-	-	-	-	-	-
Fla.	10	3	58	32	29	10	-	-	-	-	-	-
E.S. CENTRAL	12	13	69	83	46	62	-	-	-	-	-	-
Ky.	-	3	-	2	-	3	U	-	U	-	-	-
Tenn.	8	5	47	40	34	46	-	-	-	-	-	-
Ala.	4	5	21	23	12	13	-	-	-	-	-	-
Miss.	-	-	1	18	-	-	U	-	U	-	-	-
W.S. CENTRAL	10	11	160	206	21	86	-	-	-	2	2	-
Ark.	-	-	5	4	6	14	-	-	-	-	-	-
La.	3	5	6	4	4	5	-	-	-	-	-	-
Okla.	5	4	46	69	3	6	-	-	-	-	-	-
Tex.	2	2	103	129	8	61	-	-	-	2	2	-
MOUNTAIN	22	35	191	482	72	119	-	1	-	-	1	-
Mont.	1	-	2	6	1	1	-	-	-	-	-	-
Idaho	1	-	5	33	4	4	-	-	-	-	-	-
Wyo.	1	-	1	7	-	1	-	-	-	-	-	-
Colo.	1	6	59	47	18	13	-	1	-	-	1	-
N. Mex.	5	-	5	31	34	42	-	-	-	-	-	-
Ariz.	9	17	107	287	8	31	-	-	-	-	-	-
Utah	4	2	12	33	7	11	-	-	-	-	-	-
Nev.	U	10	U	38	U	16	U	U	U	U	U	-
PACIFIC	9	23	726	770	258	253	-	6	-	1	7	-
Wash.	-	1	48	50	2	16	-	-	-	-	-	-
Oreg.	4	11	31	54	9	22	-	6	-	-	6	-
Calif.	4	8	644	656	244	208	-	-	-	1	1	-
Alaska	1	1	2	1	2	2	-	-	-	-	-	-
Hawaii	-	2	1	9	1	5	-	-	-	-	-	-
Guam	-	-	-	-	-	-	U	-	U	-	-	-
P.R.	-	1	8	6	13	71	-	-	-	-	-	-
V.I.	U	U	U	U	U	U	U	U	U	U	U	U
Amer. Samoa	U	U	U	U	U	U	U	U	U	U	U	U
C.N.M.I.	-	-	-	-	-	14	U	-	U	-	-	-

N: Not notifiable U: Unavailable -: no reported cases

*Of 24 cases among children aged <5 years, serotype was reported for 7 and of those, 2 were type b.

†For imported measles, cases include only those resulting from importation from other countries.

TABLE III. (Cont'd.) Provisional cases of selected notifiable diseases preventable by vaccination, United States, weeks ending February 27, 1999, and February 28, 1998 (8th Week)

Reporting Area	Meningococcal Disease		Mumps			Pertussis			Rubella		
	Cum. 1999	Cum. 1998	1999	Cum. 1999	Cum. 1998	1999	Cum. 1999	Cum. 1998	1999	Cum. 1999	Cum. 1998
UNITED STATES	318	545	5	50	56	51	360	585	-	3	33
NEW ENGLAND	18	32	-	1	-	9	61	122	-	-	10
Maine	3	3	-	-	-	-	-	4	-	-	-
N.H.	-	1	-	1	-	9	12	12	-	-	-
Vt.	2	1	-	-	-	-	10	19	-	-	-
Mass.	13	12	-	-	-	-	39	84	-	-	1
R.I.	-	3	-	-	-	-	-	-	-	-	-
Conn.	-	12	-	-	-	-	-	3	-	-	9
MID. ATLANTIC	36	56	-	5	1	9	25	56	-	-	16
Upstate N.Y.	7	13	-	2	1	9	24	40	-	-	12
N.Y. City	13	9	-	-	-	-	-	3	-	-	-
N.J.	12	17	-	-	-	-	-	4	-	-	4
Pa.	4	17	-	3	-	-	1	9	-	-	-
E.N. CENTRAL	45	87	-	2	9	1	58	73	-	-	-
Ohio	25	35	-	1	6	-	50	29	-	-	-
Ind.	7	9	-	-	-	-	2	4	-	-	-
Ill.	7	21	-	-	-	-	-	-	-	-	-
Mich.	6	9	-	1	3	1	6	10	-	-	-
Wis.	-	13	-	-	-	-	-	30	-	-	-
W.N. CENTRAL	21	46	-	1	1	-	5	42	-	-	-
Minn.	-	-	-	-	1	-	-	23	-	-	-
Iowa	8	9	-	1	-	-	3	10	-	-	-
Mo.	4	22	-	-	-	-	1	4	-	-	-
N. Dak.	-	-	U	-	-	U	-	-	U	-	-
S. Dak.	4	4	-	-	-	-	1	-	-	-	-
Nebr.	2	1	-	-	-	-	-	2	-	-	-
Kans.	3	10	-	-	-	-	-	3	-	-	-
S. ATLANTIC	60	82	2	11	12	3	46	45	-	3	1
Del.	1	1	-	-	-	-	-	-	-	-	-
Md.	10	11	-	2	-	-	15	7	-	-	-
D.C.	1	-	1	1	-	-	-	-	-	-	-
Va.	5	8	1	1	2	1	7	-	-	-	-
W. Va.	-	2	-	-	-	-	-	-	-	-	-
N.C.	8	18	-	1	5	-	16	25	-	3	1
S.C.	8	9	-	2	3	1	3	5	-	-	-
Ga.	8	23	-	-	-	-	-	-	-	-	-
Fla.	19	10	-	4	2	1	5	8	-	-	-
E.S. CENTRAL	22	47	1	1	-	-	9	12	-	-	-
Ky.	-	8	U	-	-	U	-	-	U	-	-
Tenn.	10	16	-	-	-	-	6	3	-	-	-
Ala.	12	19	1	1	-	-	3	9	-	-	-
Miss.	-	4	U	-	-	U	-	-	U	-	-
W.S. CENTRAL	16	30	-	9	13	3	15	13	-	-	1
Ark.	4	6	-	-	-	-	3	3	-	-	-
La.	6	10	-	-	-	-	-	-	-	-	-
Okla.	5	13	-	1	-	-	2	-	-	-	-
Tex.	1	1	-	8	13	3	10	10	-	-	1
MOUNTAIN	32	32	-	3	4	19	100	121	-	-	4
Mont.	-	1	-	-	-	-	-	1	-	-	-
Idaho	4	2	-	-	-	16	66	60	-	-	-
Wyo.	1	2	-	-	1	-	1	-	-	-	-
Colo.	5	11	-	2	-	-	5	15	-	-	-
N. Mex.	8	5	N	N	N	-	7	38	-	-	1
Ariz.	11	9	-	-	1	3	6	3	-	-	-
Utah	3	1	-	1	-	-	15	2	-	-	2
Nev.	U	1	U	U	2	U	U	2	U	U	1
PACIFIC	68	133	2	17	16	7	41	101	-	-	1
Wash.	6	16	-	-	-	7	11	29	-	-	-
Oreg.	10	28	N	N	N	-	3	8	-	-	-
Calif.	45	86	2	15	10	-	26	64	-	-	1
Alaska	3	1	-	1	2	-	1	-	-	-	-
Hawaii	4	2	-	1	4	-	-	-	-	-	-
Guam	-	-	U	-	1	U	-	-	U	-	-
P.R.	1	-	-	-	-	-	-	2	-	-	-
V.I.	U	U	U	U	U	U	U	U	U	U	U
Amer. Samoa	U	U	U	U	U	U	U	U	U	U	U
C.N.M.I.	-	-	U	-	2	U	-	-	U	-	-

N: Not notifiable U: Unavailable -: no reported cases

TABLE IV. Deaths in 122 U.S. cities,* week ending February 27, 1999 (8th Week)

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	>65	45-64	25-44	1-24	<1	
NEW ENGLAND	574	439	88	29	7	11	76
Boston, Mass.	169	127	24	13	2	3	26
Bridgeport, Conn.	63	48	10	2	-	3	3
Cambridge, Mass.	25	19	5	1	-	-	3
Fall River, Mass.	33	30	2	1	-	-	1
Hartford, Conn.	U	U	U	U	U	U	U
Lowell, Mass.	33	28	5	-	-	-	6
Lynn, Mass.	15	11	3	1	-	-	2
New Bedford, Mass.	22	17	3	-	2	-	1
New Haven, Conn.	50	35	9	3	2	1	3
Providence, R.I.	U	U	U	U	U	U	U
Somerville, Mass.	4	2	1	1	-	-	1
Springfield, Mass.	69	53	9	4	1	2	10
Waterbury, Conn.	29	26	2	1	-	-	6
Worcester, Mass.	62	43	15	2	-	2	14
MID. ATLANTIC	2,750	2,012	488	160	47	43	158
Albany, N.Y.	59	47	5	4	2	1	7
Allentown, Pa.	20	19	1	-	-	-	3
Buffalo, N.Y.	96	66	19	5	1	5	3
Camden, N.J.	37	28	5	3	-	1	2
Elizabeth, N.J.	15	11	2	2	-	-	-
Erie, Pa.	45	37	4	4	-	-	4
Jersey City, N.J.	49	36	8	3	-	2	-
New York City, N.Y.	1,287	920	250	82	20	15	42
Newark, N.J.	70	37	22	10	-	1	6
Paterson, N.J.	34	19	8	4	2	1	-
Philadelphia, Pa.	401	274	80	22	13	12	17
Pittsburgh, Pa.§	109	87	15	3	4	-	9
Reading, Pa.	33	25	5	2	1	-	4
Rochester, N.Y.	156	136	14	6	-	-	27
Schenectady, N.Y.	32	26	6	-	-	-	1
Scranton, Pa.	38	34	3	1	-	-	3
Syracuse, N.Y.	174	135	28	5	2	4	23
Trenton, N.J.	59	43	12	2	1	1	7
Utica, N.Y.	36	32	1	2	1	-	-
Yonkers, N.Y.	U	U	U	U	U	U	U
E.N. CENTRAL	2,738	1,959	494	169	56	55	225
Akron, Ohio	57	42	9	3	1	2	3
Canton, Ohio	59	51	8	-	-	-	4
Chicago, Ill.	532	353	120	30	12	12	47
Cincinnati, Ohio	209	152	33	16	3	5	23
Cleveland, Ohio	183	128	37	14	4	-	6
Columbus, Ohio	250	192	41	10	3	4	34
Dayton, Ohio	154	117	27	6	3	1	7
Detroit, Mich.	218	129	50	23	9	7	3
Evansville, Ind.	56	44	10	2	-	-	5
Fort Wayne, Ind.	69	53	10	5	1	-	5
Gary, Ind.	27	17	4	3	2	1	1
Grand Rapids, Mich.	78	53	15	8	-	2	7
Indianapolis, Ind.	276	197	38	21	9	11	19
Lansing, Mich.	64	49	10	4	1	-	5
Milwaukee, Wis.	156	108	31	10	3	4	17
Peoria, Ill.	61	47	8	4	1	1	9
Rockford, Ill.	67	49	13	1	1	3	14
South Bend, Ind.	55	44	8	1	1	1	6
Toledo, Ohio	99	81	12	6	-	-	8
Youngstown, Ohio	68	53	10	2	2	1	2
W.N. CENTRAL	776	590	106	35	24	21	88
Des Moines, Iowa	87	70	9	6	2	-	11
Duluth, Minn.	24	15	5	-	1	3	1
Kansas City, Kans.	U	U	U	U	U	U	U
Kansas City, Mo.	80	56	15	5	2	2	7
Lincoln, Nebr.	54	38	13	1	2	-	7
Minneapolis, Minn.	189	155	17	6	5	6	24
Omaha, Nebr.	103	72	19	5	3	4	19
St. Louis, Mo.	93	59	17	7	6	4	4
St. Paul, Minn.	146	125	11	5	3	2	15
Wichita, Kans.	U	U	U	U	U	U	U
S. ATLANTIC	1,415	999	239	130	31	15	113
Atlanta, Ga.	U	U	U	U	U	U	U
Baltimore, Md.	355	233	62	47	8	5	50
Charlotte, N.C.	104	71	23	7	-	3	12
Jacksonville, Fla.	171	117	32	17	2	3	8
Miami, Fla.	112	78	19	12	3	-	1
Norfolk, Va.	58	45	7	4	2	-	4
Richmond, Va.	70	45	14	8	3	-	8
Savannah, Ga.	71	50	13	7	1	-	6
St. Petersburg, Fla.	78	65	8	4	-	1	4
Tampa, Fla.	277	223	33	10	7	3	16
Washington, D.C.	100	59	25	11	5	-	4
Wilmington, Del.	19	13	3	3	-	-	-
E.S. CENTRAL	929	632	181	60	28	27	54
Birmingham, Ala.	170	125	31	8	2	3	15
Chattanooga, Tenn.	104	72	24	4	1	3	-
Knoxville, Tenn.	94	72	15	4	2	1	1
Lexington, Ky.	87	60	14	8	1	4	5
Memphis, Tenn.	181	111	43	12	8	7	13
Mobile, Ala.	66	43	11	6	6	-	5
Montgomery, Ala.	71	46	14	4	4	3	10
Nashville, Tenn.	156	103	29	14	4	6	5
W.S. CENTRAL	1,868	1,232	364	165	59	44	136
Austin, Tex.	130	92	20	10	5	3	10
Baton Rouge, La.	23	20	1	2	-	-	-
Corpus Christi, Tex.	72	49	10	7	3	3	8
Dallas, Tex.	248	167	49	17	9	6	16
El Paso, Tex.	106	79	17	3	2	1	5
Ft. Worth, Tex.	120	80	25	9	3	3	10
Houston, Tex.	451	265	104	55	18	9	41
Little Rock, Ark.	74	49	11	8	3	3	5
New Orleans, La.	136	73	40	13	4	6	-
San Antonio, Tex.	291	209	48	22	4	8	28
Shreveport, La.	35	25	7	1	2	-	3
Tulsa, Okla.	182	124	32	18	6	2	10
MOUNTAIN	1,017	730	172	66	27	22	78
Albuquerque, N.M.	136	93	23	11	4	5	8
Boise, Idaho	42	33	5	3	1	-	3
Colo. Springs, Colo.	71	52	12	4	2	1	6
Denver, Colo.	111	79	20	7	2	3	12
Las Vegas, Nev.	192	130	40	13	4	5	8
Ogden, Utah	23	21	1	-	1	-	4
Phoenix, Ariz.	101	66	21	10	2	2	-
Pueblo, Colo.	37	35	2	-	-	-	3
Salt Lake City, Utah	100	63	14	12	8	3	11
Tucson, Ariz.	204	158	34	6	3	3	23
PACIFIC	2,031	1,470	359	120	51	28	216
Berkeley, Calif.	26	24	1	-	1	-	3
Fresno, Calif.	120	83	29	6	2	-	17
Glendale, Calif.	25	20	3	2	-	-	3
Honolulu, Hawaii	90	71	12	2	3	2	5
Long Beach, Calif.	84	61	16	4	2	1	18
Los Angeles, Calif.	478	325	99	30	19	5	22
Pasadena, Calif.	31	15	11	2	2	1	2
Portland, Oreg.	192	142	27	11	6	6	18
Sacramento, Calif.	164	118	28	12	3	3	34
San Diego, Calif.	231	170	38	14	4	4	29
San Francisco, Calif.	U	U	U	U	U	U	U
San Jose, Calif.	228	166	45	10	2	5	36
Santa Cruz, Calif.	31	26	2	3	-	-	-
Seattle, Wash.	174	123	31	15	4	1	2
Spokane, Wash.	69	55	11	3	-	-	9
Tacoma, Wash.	88	71	6	6	3	-	18
TOTAL	14,098¶	10,063	2,491	934	330	266	1,144

U: Unavailable -: no reported cases

*Mortality data in this table are voluntarily reported from 122 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 this Pennsylvania city, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶Total includes unknown ages.

Contributors to the Production of the *MMWR* (Weekly)
Weekly Notifiable Disease Morbidity Data and 122 Cities Mortality Data

Samuel L. Groseclose, D.V.M., M.P.H.

State Support Team
Robert Fagan
Scott Connolly
Gerald Jones
David Nitschke
Carol A. Worsham

CDC Operations Team
Carol M. Knowles
Deborah A. Adams
Willie J. Anderson
Patsy A. Hall
Amy K. Henion

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format and on a paid subscription basis for paper copy. To receive an electronic copy on Friday of each week, send an e-mail message to *listserv@listserv.cdc.gov*. The body content should read *SUBscribe mmwr-toc*. Electronic copy also is available from CDC's World-Wide Web server at *http://www.cdc.gov/* or from CDC's file transfer protocol server at *ftp.cdc.gov*. To subscribe for paper copy, contact Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone (202) 512-1800.

Data in the weekly *MMWR* 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 following Friday. Address inquiries about the *MMWR* Series, including material to be considered for publication, to: Editor, *MMWR* Series, Mailstop C-08, CDC, 1600 Clifton Rd., N.E., Atlanta, GA 30333; telephone (888) 232-3228.

☆**U.S. Government Printing Office: 1999-733-228/87061 Region IV**