CENTERS FOR DISEASE CONTROL

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MORBIDITY AND MORTALITY WEEKLY REPORT

Recommendation of the Immunization Practices Advisory Committee (ACIP)

Polysaccharide Vaccine for Prevention of *Haemophilus influenzae* Type b Disease

INTRODUCTION

A polysaccharide vaccine* against invasive (bacteremic) disease caused by *Haemophilus influenzae* type b recently has been licensed in the United States. The purposes of this statement are to summarize available information about this vaccine and to offer guidelines for its use in the prevention of invasive *H. influenzae* type b disease.

HAEMOPHILUS INFLUENZAE DISEASE

H. influenzae is a leading cause of serious systemic bacterial disease in the United States. It is the most common cause of bacterial meningitis, accounting for an estimated 12,000 cases annually, primarily among children under 5 years of age. The mortality rate is 5%, and neurologic sequelae are observed in as many as 25%-35% of survivors. Virtually all cases of *H. influenzae* meningitis among children are caused by strains of type b (Hib), although this capsular type represents only one of the six types known for this species. In addition to bacterial meningitis, Hib is responsible for other invasive diseases, including epiglottitis, sepsis, cellulitis, septic arthritis, osteomyelitis, pericarditis, and pneumonia. Nontypeable (noncapsulated) strains of *H. influenzae* commonly colonize the human respiratory tract and are a major cause of otitis media and respiratory mucosal infection but rarely result in bacteremic disease. Hib strains account for only 5%-10% of *H. influenzae* causing otitis media.

Several population-based studies of invasive Hib disease conducted within the last 10 years have provided estimates of the incidence of disease among children under 5 years of age, the major age group at risk. These studies have demonstrated attack rates of meningitis ranging from 51 cases per 100,000 children to 77/100,000 per year and attack rates of other invasive Hib disease varying from 24/100,000 to 75/100,000 per year (*1*). Thus, in the United States, approximately one of every 1,000 children under 5 years of age develops systemic Hib disease each year, and a child's cumulative risk of developing systemic Hib disease at some time during the first 5 years of life is about one in 200. Attack rates peak between 6 months and 1 year of age and decline thereafter. Approximately 35%-40% of Hib disease occurs among children 18 months of age or older, and 25% occurs above 24 months of age.

Incidence rates of Hib disease are increased in certain high-risk groups, such as Native Americans (both American Indians and Eskimos), blacks, individuals of lower socioeconomic status, and patients with asplenia, sickle cell disease, Hodgkin's disease, and antibody deficiency syndromes. Recent studies also have suggested that the risk of acquiring primary Hib disease for children under 5 years of age appears to be greater for those who attend day-care facilities than for those who do not (*2,3*).

*Official name: Haemophilus b Polysaccharide Vaccine.

ACIP: Haemophilus b Polysaccharide Vaccine — Continued

The potential for person-to-person transmission of systemic Hib disease among susceptible individuals has been recognized in the past decade. Studies of secondary spread of Hib disease in household contacts of index patients have shown a substantially increased risk of disease among exposed household contacts under 4 years of age (*4*). In addition, numerous clusters of cases in day-care facilities have been reported, and recent studies suggest that secondary attack rates in day-care classroom contacts of a primary case also may be increased (*5,6*).

HAEMOPHILUS b POLYSACCHARIDE VACCINE

The Hib vaccine is composed of the purified, capsular polysaccharide of *H. influenzae* type b ([→3] ribose-β1 →1 ribitol-1 phosphate-5→). Antibodies to this antigen correlate with protection against invasive disease. The Hib vaccine induces an antibody response that is directly related to the age of the recipient; infants respond infrequently and with less antibody than do older children or adults (*7*). Improved responses are observed by 18 months of age, although children 18-23 months of age do not respond as well as those 2 years of age or older. The frequency and magnitude of antibody responses reach adult levels at about 6 years of age (*8,9*). Levels of antibodies to the capsular polysaccharide also decline more rapidly in immunized infants and young children than in adults.

In a manner similar to other polysaccharide antigens, revaccination with Hib vaccine results in a level of antibody comparable to that for a child of the same age receiving a first immunization (*10*). Such polysaccharide antigens have been termed "T-cell independent" because of their failure to induce the T-cell memory response characteristic of protein antigens.

Limited data are available on the response to Hib vaccine in high-risk groups with underlying disease. By analogy to pneumococcal vaccine, patients with sickle cell disease or asplenia are likely to exhibit an immune response to the Hib vaccine. Patients with malignancies associated with immunosuppression appear to respond less well. Additional data on the immune response to Hib vaccine in these groups are needed.

A precise protective level of antibody has not been established. However, based on evidence from passive protection in the infant rat model and from experience with agammaglobulinemic children, an antibody concentration of 0.15 μg/ml correlates with protection (*7,8,11*). In the Finnish field trial, levels of capsular antibody greater than 1 μg/ml in 3-week postimmunization sera correlated with clinical protection for a minimum of 1½ years (*9,12,13*). Approximately 75% of children 18-23 months of age tested achieved a level greater than 1 μg/ml, as did 90% of 24-35 month old children (*9*). Measurement of Hib antibody levels is not routinely available, however, and determination of antibody levels following vaccination is not indicated in the usual clinical setting.

EFFECTIVENESS OF VACCINE

In 1974, a randomized, controlled trial of clinical efficacy was conducted in Finland among children 3-71 months of age (*9*). Approximately 98,000 children, half of whom received the Hib vaccine, were enrolled in the field trial and followed for a 4-year period for occurrence of Hib disease. Among children 18-71 months of age, 90% protective efficacy (95% confidence limits, 55%-98%) in prevention of all forms of invasive Hib disease was demonstrated for the 4-year follow-up period. Although no disease occurred among over 4,000 children 18-23 months of age immunized with Hib vaccine and followed for 4 years, only two cases occurred in the control vaccine recipients in this age group. As a result, vaccine efficacy in the subgroup of children immunized at 18-23 months of age could not be evaluated statistically. The vaccine was not efficacious in children under 18 months of age.

REVACCINATION

Limited data regarding the potential need for revaccination are available at present. Current data show that children who have received the Hib vaccine 2-42 months previously have an immune response to the vaccine similar to that in previously unvaccinated children of the

ACIP: Haemophilus b Polysaccharide Vaccine — Continued

same age. No immunologic tolerance or impairment of immune response to a subsequent dose of vaccine occurs (*10*). As with other polysaccharide vaccines, the shorter persistence of serum antibodies in young children given Hib vaccine, compared with adults, suggests that a second dose of vaccine may be needed to maintain immunity throughout the period of risk, particularly for children in the youngest age group considered for vaccination (those 18-23 months of age). A second injection following the initial dose is likely to increase the protective benefit of vaccination for this high-risk group, because antibody titers 18 months after vaccination, although detectable in most vaccine recipients, are no longer significantly different from those in unvaccinated children of the same age.

RECOMMENDATIONS FOR VACCINE USE

Recently published data regarding vaccine efficacy and the risk of Hib disease among young children strongly support the use of Hib vaccine in the United States in high-risk persons for whom efficacy has been established. Specific recommendations are as follows:

1. **Immunization of all children at 24 months of age is recommended.** The precise duration of immunity conferred by a single dose of Hib vaccine at 24 months of age is not known, although, based on available data, protection is expected to last 1½-3½ years. Until further data are available to determine whether an additional dose of vaccine may be necessary to ensure long-lasting immunity, routine revaccination is not recommended.
2. **Immunization of children at 18 months of age, particularly those in known high-risk groups, may be considered.** Although the precise efficacy of the vaccine among children 18-23 months of age is not known, this age group accounts for approximately 12% of all invasive Hib disease among children under 5 years of age, and Hib vaccine has been shown by serologic methods to be immunogenic in most children of this age group. However, physicians and parents should be informed that the vaccine is not likely to be as effective in this age group as in older children. These younger children may need a second dose of vaccine within 18 months following the initial dose to ensure protection. Additional data regarding the duration of the antibody response are needed to define the timing of a second dose more precisely.

   Children who attend day-care facilities are at particular risk of acquiring systemic Hib disease. Initial vaccination at 18 months of age for this high-risk group should be considered.

   Children with chronic conditions known to be associated with increased risk for Hib disease should receive the vaccine, although only limited data on immunogenicity and clinical efficacy in this group are available. These conditions include anatomic or functional asplenia, such as sickle cell disease or splenectomy (*14*), and malignancies associated with immunosuppression (*15*).
3. **Immunization of individuals over 24 months of age who have not yet received Hib vaccine should be based on risk of disease.** The risk of invasive Hib disease decreases with increasing age over the age of 2 years. Because the vaccine is safe and effective, however, physicians may wish to immunize previously unvaccinated healthy children between 2 years and 5 years of age to prevent the Hib disease that does occur in this age group. The potential benefit of this strategy in terms of cases prevented declines with increasing age of the child at the time of vaccination. Therefore, children 2-3 years of age who attend day-care facilities should be given a higher priority than day-care attendees who are 4-5 years old.
4. **Insufficient data are available on which to base a recommendation concerning use of the vaccine in older children and adults with the chronic conditions associated with an increased risk of Hib disease.**
5. **Vaccine is not recommended for children under 18 months of age.**

ACIP: Haemophilus b Polysaccharide Vaccine – Continued

6. **Simultaneous administration of Hib and DTP vaccines at separate sites can be performed, because no impairment of the immune response to the individual antigens occurs under these circumstances.**

SIDE EFFECTS AND ADVERSE REACTIONS

Polysaccharide vaccines are among the safest of all vaccine products. To date, over 60,000 doses of the Hib polysaccharide vaccine have been administered to infants and children, and several hundred doses have been given to adults (*9,16*). Only one serious systemic reaction has been reported thus far—a possible anaphylactic reaction that responded promptly to epinephrine. High fever (38.5 C [101.3 F] or higher) has been reported in fewer than 1% of Hib vaccine recipients. Mild local and febrile reactions were common, occurring in as many as half of vaccinated individuals in the Finnish trial. Such reactions appeared within 24 hours and rapidly subsided. Current preparations appear to result in fewer such local reactions. Simultaneous administration with DTP does not result in reaction rates above those expected with separate administration (*17*).

PRECAUTIONS AND CONTRAINDICATIONS

The Hib vaccine is unlikely to be of substantial benefit in preventing the occurrence of secondary cases, because children under 2 years old are at highest risk of secondary disease. Because the vaccine will not protect against nontypeable strains of *H. influenzae*, recurrent upper respiratory diseases, including otitis media and sinusitis, are not considered indications for vaccination.

NEW VACCINE DEVELOPMENT

New vaccines, such as the Hib polysaccharide-protein conjugate vaccines, are being developed and evaluated and may prove to be efficacious for children under 18 months of age.

References

1. Cochi SL, Broome CV, Hightower AW. Immunization of US children with *Hemophilus influenzae* type b polysaccharide vaccine: a cost-effectiveness model of strategy assessment. JAMA 1985;253:521-9.
2. Istre GR, Conner JS, Broome CV, Hightower A, Hopkins RS. Risk factors for primary invasive *Haemophilus influenzae* disease. Increased risk from day care attendance and school-aged household members. J Pediatr 1985;106:190-5.
3. Redmond SR, Pichichero ME. *Hemophilus influenzae* type b disease. An epidemiologic study with special reference to day-care centers. JAMA 1984;252:2581-4.
4. CDC. Prevention of secondary cases of *Haemophilus influenzae* type b disease. MMWR 1982;31:672-80.
5. Murphy TV, Breedlove JA, Fritz EH, Sebestyen DM, Hansen EJ. County-wide surveillance of invasive *Haemophilus* infections: risk of associated cases in child care programs (CCPs). Twenty-third Interscience Conference on Antimicrobial Agents and Chemotherapy 1983;229 (abstract #788).
6. Fleming D, Leibenhaut M, Albanes D, et al. *Haemophilus influenzae* b (Hib) disease—secondary spread in day care. Twenty-fourth International Conference on Antimicrobial Agents and Chemotherapy 1984;261 (abstract #967).
7. Smith DH, Peter G, Ingram DL, Harding AL, Anderson P. Responses of children immunized with the capsular polysaccharide of *Hemophilus influenzae*, type b. Pediatrics 1973;52:637-44.
8. Robbins JB, Parke JC Jr, Schneerson R, Whisnant JK. Quantitative measurement of "natural" and immunization-induced *Haemophilus influenzae* type b capsular polysaccharide antibodies. Pediatr Res 1973;7:103-10.
9. Peltola H, Käyhty H, Virtanen M, Mäkelä PH. Prevention of *Hemophilus influenzae* type b bacteremic infections with the capsular polysaccharide vaccine. N Engl J Med 1984;310:1561-6.
10. Käyhty H, Karanko V, Peltola H, Mäkelä PH. Serum antibodies after vaccination with *Haemophilus influenzae* type b capsular polysaccharide and responses to reimmunization: no evidence of immunological tolerance or memory. Pediatrics 1984;74:857-65.
11. Robbins JB, Schneerson R, Parke JC Jr. A review of the efficacy trials with *Haemophilus influenzae* type b polysaccharide vaccines. In: Sell SH, Wright PF, eds. *Haemophilus influenzae*. New York: Elsevier Science Publishing Co., 1982:255-63.
12. Käyhty H, Peltola H, Karanko V, Mäkelä PH. The protective level of serum antibodies to the capsular polysaccharide of *Haemophilus influenzae* type b. J Infect Dis 1983;147:1100.

ACIP: Haemophilus b Polysaccharide Vaccine — Continued

13. Anderson P. The protective level of serum antibodies to the capsular polysaccharide of *Haemophilus influenzae* type b [Letter]. J Infect Dis 1984;149:1034-5.
14. Ward J, Smith AL. *Hemophilus influenzae* bacteremia in children with sickle cell disease. J Pediatr 1976;88:261-3.
15. Siber GR. Bacteremias due to *Haemophilus influenzae* and *Streptococcus pneumoniae*: their occurrence and course in children with cancer. Am J Dis Child 1980;134:668-72.
16. Parke JC Jr, Schneerson R, Robbins JB, and Schlesselman JJ. Interim report of a controlled field trial of immunization with capsular polysaccharides of *Haemophilus influenzae* type b and group C *Neisseria meningitidis* in Mecklenburg County, North Carolina (March 1974-March 1976) J Infect Dis 1977;136:S51-6.
17. Lepow ML, Peter G, Glode MP, et al. Response of infants to *Haemophilus influenzae* type b polysaccharide and diphtheria-tetanus-pertussis vaccines in combination. J Infect Dis 1984;149: 950-5.

Epidemiologic Notes and Reports

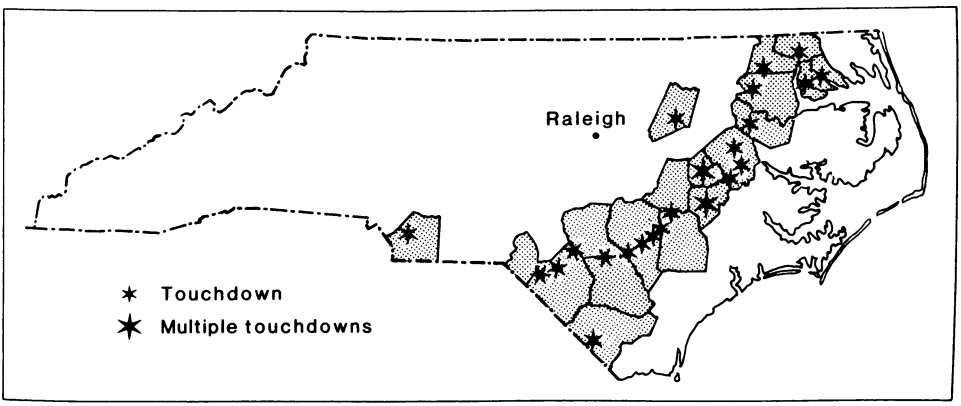
Tornado Disaster — North Carolina, South Carolina, March 28, 1984

On the evening of March 28, 1984, a series of tornadoes touched down in northeastern South Carolina and cut a swath almost exclusively through rural areas and small towns in a northeasterly direction through eastern North Carolina (Figure 1). In a 5-hour period, these storms caused more than 1,000 casualties (killed and seriously and slightly injured), along with extensive property damage of more than $100,000,000. The severity of the tornadoes varied from one to four on the Fujita scale (maximum five) and generated winds of at least 260 miles per hour.

Emergency room (ER) charts and medical records from several of the temporary first aid posts were reviewed in both North Carolina and South Carolina, and death certificates for persons with fatal injuries were analyzed. In addition, all hospitals that treated 15 or more casualties were visited and evaluated for: (1) ER treatment of these casualties; (2) "disaster drill" response of each hospital; and (3) problems that each hospital encountered in coping with the disaster.

A case was defined as an individual in either North Carolina or South Carolina who, on March 28, 1984, was injured in a tornado storm and required medical treatment. A total of

FIGURE 1. Tornado disaster, by path of storm and counties* involved — North Carolina, March 28, 1984



*The affected counties are: Bertie, Bladen, Chowan, Cumberland, Duplin, Gates, Greene, Hertford, Lenoir, Martin, Nash, Perquimans, Pitt, Robeson, Sampson, Scotland, Union, and Wayne Counties.

Tornado Disaster – Continued

955 individuals were injured by the tornado storms and sought medical assistance. Of these, 640 (67%) had minor injuries (i.e., were treated and released); 256 (27%) were hospitalized; and 59 (6%) were killed. The age and sex distribution (56% were female) of those injured (excluding fatal injuries) for the counties in which the tornadoes struck reflected the age distribution of residents in these counties. Residents of the affected North Carolina counties who are 55 years of age or older comprise 18% of the population. Of those in North Carolina with nonfatal injuries and recorded ages, 106 (16%) of 660 were in this age group; of the fatalities, 19 (43%) of 44 were in this group ($p < 0.0001$). As expected, contusions and lacerations, as well as other minor injuries (caused usually by blunt trauma), predominated (Table 1). Injuries to vital organs were uncommon.

The ER records recorded the location of each person at the time of injury for 346 (39%) of the 896 nonfatal injuries. The death certificates recorded this in 55 (93%) of 59 fatalities. Where location was recorded, 19 (46%) of 41 of the North Carolina fatalities and 176 (51%) of 348 of the injured persons in North Carolina and South Carolina were in trailers or mobile homes at the time of injury. Of the counties that sustained tornado damage, an estimated 11% of residents live in trailers or mobile homes.

(Continued on page 211)

TABLE I. Summary—cases of specified notifiable diseases, United States

Disease	15th Week Ending			Cumulative, 15th Week Ending		
	Apr. 13, 1985	Apr. 14, 1984	Median 1980-1984	Apr. 13, 1985	Apr. 14, 1984	Median 1980-1984
Acquired Immunodeficiency Syndrome (AIDS)	205	62	N	1,888	1,008	N
Aseptic meningitis	68	51	57	1,023	1,165	1,144
Encephalitis: Primary (arthropod-borne & unspec.)	22	19	18	260	229	232
Post-infectious	3	1	1	37	26	26
Gonorrhea: Civilian	15,304	14,397	16,560	223,895	232,601	266,039
Military	266	341	400	5,234	5,866	7,685
Hepatitis: Type A	386	356	426	5,989	6,040	6,802
Type B	526	482	411	7,059	7,039	5,836
Non A, Non B	92	64	N	1,508	1,012	N
Unspecified	125	108	134	1,479	1,319	2,441
Legionellosis	8	8	N	150	141	N
Leprosy	6	4	6	92	58	58
Malaria	11	15	23	184	181	224
Measles: Total*	97	38	58	713	750	750
Indigenous	91	35	N	525	657	N
Imported	6	3	N	188	93	N
Meningococcal infections: Total	43	65	69	882	1,033	1,041
Civilian	43	65	68	882	1,032	1,032
Military	-	-	-	-	1	5
Mumps	59	84	111	1,188	1,063	1,623
Pertussis	19	44	24	360	533	312
Rubella (German measles)	11	11	64	117	156	727
Syphilis (Primary & Secondary): Civilian	428	487	540	7,061	8,155	8,771
Military	3	7	8	53	96	109
Toxic Shock syndrome	4	8	N	99	128	N
Tuberculosis	439	417	521	5,377	5,725	6,827
Tularemia	-	-	2	24	19	27
Typhoid fever	8	5	7	71	89	106
Typhus fever, tick-borne (RMSF)	2	3	4	13	22	22
Rabies, animal	87	159	164	1,295	1,341	1,588

TABLE II. Notifiable diseases of low frequency, United States

	Cum 1985		Cum 1985
Anthrax	-	Plague	-
Botulism: Foodborne	1	Poliomyelitis: Total	1
Infant	10	Paralytic	1
Other	-	Psittacosis (N.Y. City 1, Ohio 1, Fla. 1, Colo. 1)	40
Brucellosis (Ga. 2, Fla. 1, Calif. 1)	23	Rabies, human	-
Cholera	-	Tetanus (Fla. 1)	13
Congenital rubella syndrome	-	Trichinosis	23
Diphtheria	-	Typhus fever, flea-borne (endemic, murine)	3
Leptospirosis (Mass. 1)	8		

*Five of the 97 reported cases for this week were imported from a foreign country or can be directly traceable to a known internationally imported case within two generations.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending April 13, 1985 and April 14, 1984 (15th Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum 1985	1985	Cum 1985	Cum 1985	Cum 1985	Cum 1984	1985	1985	1985	1985	1985	Cum 1985
UNITED STATES	1,888	68	260	37	223,895	232,601	386	526	92	125	8	92
NEW ENGLAND	58	1	4	-	7,099	7,044	1	41	5	14	-	2
Maine	3	-	-	-	307	268	1	4	-	-	-	-
N H	-	-	2	-	151	185	-	-	-	-	-	-
Vt	-	-	-	-	63	105	-	1	1	-	-	-
Mass	37	-	2	-	2,621	2,772	-	28	3	13	-	2
R I	4	-	-	-	524	456	-	3	1	-	-	-
Conn.	14	1	-	-	3,433	3,258	-	5	-	1	-	-
MID ATLANTIC	796	5	39	-	30,976	32,290	38	62	14	5	1	7
Upstate N Y	109	3	15	-	4,332	4,776	11	22	6	1	-	-
N Y City	527	-	3	-	14,072	14,126	1	1	-	-	-	7
N J	100	-	9	-	6,342	5,131	22	30	5	4	-	-
Pa	60	2	12	-	6,230	8,257	4	9	3	-	1	-
E N CENTRAL	96	10	61	8	32,404	31,820	16	42	4	8	1	2
Ohio	23	2	23	3	8,200	7,821	6	18	3	4	1	2
Ind	4	2	12	-	3,061	3,443	2	9	-	2	-	-
Ill	39	1	6	4	9,243	7,743	1	-	-	-	-	-
Mich	17	5	17	-	9,380	9,132	7	15	1	2	-	-
Wis	13	-	3	1	2,520	3,681	-	-	-	-	-	-
W N CENTRAL	21	1	26	3	11,495	10,849	14	29	3	1	-	-
Minn	3	-	12	1	1,701	1,574	3	4	1	-	-	-
Iowa	3	-	9	-	1,221	1,239	-	4	-	-	-	-
Mo	10	1	-	-	5,306	5,087	2	14	-	1	-	-
N Dak	2	-	-	1	84	112	-	-	-	-	-	-
S Dak	-	-	-	-	208	315	4	1	-	-	-	-
Nebr	-	-	1	-	1,136	748	4	2	-	-	-	-
Kans	3	-	4	1	1,839	1,774	1	4	2	-	-	-
S ATLANTIC	204	19	27	13	48,106	58,864	39	129	15	10	3	2
Del	6	1	1	-	1,071	1,011	1	-	-	-	1	-
Md	30	2	8	1	7,384	6,958	4	30	3	-	-	-
D C	29	-	-	-	4,036	4,226	-	4	1	-	-	-
Va	14	3	3	4	5,170	5,649	1	3	1	2	1	-
W Va	1	1	2	-	659	702	1	2	-	-	-	-
N C	15	1	10	-	9,203	9,513	2	7	1	-	-	1
S C	2	1	3	-	6,274	5,586	2	21	1	1	-	-
Ga	38	2	-	-	-	11,558	8	23	-	-	1	-
Fla	69	8	-	8	14,309	13,661	20	39	8	7	-	1
E S CENTRAL	13	6	9	3	19,665	19,719	9	42	6	1	-	-
Ky	7	1	3	-	2,196	2,456	1	-	-	-	-	-
Tenn	-	1	4	-	7,676	8,079	5	18	1	-	-	-
Ala	5	3	2	3	6,119	6,173	1	23	5	1	-	-
Miss	1	1	-	-	3,674	3,011	2	1	-	-	-	-
W S CENTRAL	146	13	24	-	31,624	31,616	66	47	8	46	1	10
Ark	2	-	1	-	2,993	2,666	-	-	-	-	-	-
La	20	-	1	-	6,805	6,811	5	4	-	-	-	1
Okla	2	1	9	-	3,199	3,476	6	2	1	3	-	-
Tex	122	12	13	-	18,627	18,663	55	41	7	43	1	9
MOUNTAIN	31	4	9	3	7,266	7,192	59	28	9	6	-	-
Mont	-	-	-	-	221	338	3	-	-	-	-	-
Idaho	-	-	-	-	244	339	13	-	1	-	-	-
Wyo	-	-	-	-	199	219	-	2	-	-	-	-
Colo	12	4	3	-	2,191	2,067	11	4	3	4	-	-
N Mex	4	-	-	-	846	833	4	1	-	-	-	-
Ariz	10	-	1	-	2,143	1,851	17	10	4	-	-	-
Utah	2	-	5	3	283	390	1	4	-	2	-	-
Nev	3	-	-	-	1,139	1,155	10	7	1	-	-	-
PACIFIC	523	9	61	7	35,260	33,207	144	106	28	34	2	69
Wash	30	-	3	-	2,385	2,367	5	10	5	-	-	9
Oreg	10	-	-	-	1,847	1,935	32	6	4	1	-	2
Calif	470	8	58	7	29,591	27,511	106	86	18	33	2	53
Alaska	2	1	-	-	867	819	-	3	-	-	-	-
Hawaii	11	-	-	-	570	575	1	1	1	-	-	5
Guam	-	U	-	-	6	83	U	U	U	U	U	-
P R	27	2	2	1	1,109	1,008	3	3	-	-	-	2
V I	1	-	-	-	130	127	-	-	-	-	-	-
Pac. Trust Terr.	-	U	-	-	-	-	U	U	U	U	U	-

N: Not notifiable U: Unavailable

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending April 13, 1985 and April 14, 1984 (15th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported *		Total									
	Cum 1985	1985	Cum 1985	1985	Cum 1985	Cum 1984	Cum 1985	1985	Cum 1985	1985	Cum 1985	Cum 1984	1985	Cum 1985	Cum 1984
UNITED STATES	184	91	525	6	188	750	882	59	1,188	19	360	533	11	117	156
NEW ENGLAND	7	-	-	-	40	6	37	2	28	1	18	12	-	4	11
Maine	-	-	-	-	-	-	1	1	3	-	2	-	-	-	1
N.H.	-	-	-	-	-	4	3	1	5	-	10	3	-	1	-
Vt.	-	-	-	-	-	-	6	-	2	-	2	5	-	-	-
Mass.	4	-	-	-	40	-	8	-	15	1	3	3	-	3	10
R.I.	1	-	-	-	-	-	6	-	2	-	1	1	-	-	-
Conn.	2	-	-	-	-	2	13	-	1	-	-	-	-	-	-
MID ATLANTIC	33	10	43	2	10	25	150	4	124	1	43	28	1	29	7
Upstate N.Y.	14	8	25	-	1	4	72	4	82	1	19	18	1	7	5
N.Y. City	8	-	16	- †§	5	14	14	-	12	-	7	1	-	7	1
N.J.	4	2	2	2	4	3	23	-	11	-	1	1	-	3	1
Pa.	7	-	-	-	-	4	41	-	19	-	16	8	-	12	-
E.N. CENTRAL	9	1	134	-	92	326	159	16	541	-	51	201	-	7	31
Ohio	2	-	-	-	11	2	55	-	164	-	13	31	-	-	2
Ind.	1	-	-	-	1	2	26	-	20	-	11	136	-	-	1
Ill.	-	1	73	-	66	76	31	1	93	-	9	15	-	2	17
Mich.	6	-	35	-	14	239	33	15	221	-	7	10	-	5	4
Wis.	-	-	26	-	-	7	14	-	43	-	11	9	-	-	7
W.N. CENTRAL	4	-	1	-	3	-	41	1	39	2	37	64	-	7	17
Minn.	1	-	-	-	1	-	10	-	1	-	11	3	-	-	1
Iowa	-	-	-	-	-	-	7	1	6	1	2	3	-	-	-
Mo.	1	-	-	-	2	-	21	-	5	-	8	12	-	-	-
N. Dak.	1	-	-	-	-	-	-	-	-	-	6	-	-	-	3
S. Dak.	1	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Nebr.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Kans.	-	-	1	-	-	-	2	-	27	1	10	43	-	7	13
S. ATLANTIC	22	65	98	-	3	6	166	5	85	7	83	53	-	11	14
Del.	-	-	-	-	-	-	3	-	1	-	-	-	-	-	-
Md.	5	1	3	-	1	-	21	1	11	4	19	3	-	1	-
D.C.	3	-	-	-	1	-	4	-	-	-	-	-	-	-	-
Va.	5	-	11	-	1	2	25	-	12	-	2	7	-	-	-
W. Va.	1	-	2	-	-	-	3	2	30	-	-	6	-	-	-
N.C.	2	-	-	-	-	-	22	-	7	-	7	17	-	-	-
S.C.	-	-	-	-	-	-	16	2	5	-	-	1	-	2	-
Ga.	1	-	8	-	-	-	25	-	4	-	36	5	-	4	2
Fla.	5	64	74	-	-	4	47	-	15	3	19	14	-	4	12
E.S. CENTRAL	3	-	-	-	-	3	41	-	6	-	4	2	-	1	2
Ky.	1	-	-	-	-	1	2	-	1	-	1	1	-	1	1
Tenn.	-	-	-	-	-	2	17	-	4	-	1	1	-	-	-
Ala.	2	-	-	-	-	-	12	-	-	-	2	-	-	-	1
Miss.	-	-	-	-	-	-	10	-	1	-	-	-	-	-	-
W.S. CENTRAL	9	11	23	-	-	91	79	20	117	-	18	70	-	13	5
Ark.	-	-	-	-	-	-	7	-	3	-	7	9	-	1	2
La.	-	-	1	-	-	-	13	2	2	-	1	2	-	-	-
Okla.	-	-	-	-	-	4	13	N	N	-	10	50	-	-	-
Tex.	9	11	22	-	-	87	46	18	112	-	-	9	-	12	3
MOUNTAIN	7	1	160	4	21	108	48	5	96	1	21	47	-	3	6
Mont.	-	-	105	-	17	-	3	-	4	1	3	16	-	-	-
Idaho	-	-	-	1 †	1	-	-	-	4	-	-	1	-	1	1
Wyo.	-	-	-	-	-	-	3	-	1	-	-	3	-	-	-
Colo.	2	-	-	3 †	3	-	13	1	11	-	8	12	-	-	-
N. Mex.	4	-	-	-	-	83	6	N	N	-	3	5	-	1	-
Ariz.	1	1	55	-	-	-	15	4	47	-	3	7	-	1	-
Utah	-	-	-	-	-	25	6	-	2	-	4	1	-	-	5
Nev.	-	-	-	-	-	-	2	-	27	-	-	2	-	-	-
PACIFIC	90	3	66	-	19	185	161	6	152	7	85	56	10	42	63
Wash.	7	-	1	-	-	39	27	-	9	1	12	8	-	-	1
Oreg.	4	-	2	-	-	-	17	N	N	-	16	6	-	2	-
Calif.	65	3	60	-	15	144	113	5	133	5	53	26	4	32	61
Alaska	1	-	-	-	-	-	4	-	2	-	1	-	-	-	-
Hawaii	13	-	3	-	4	2	-	1	8	1	3	16	6	8	1
Guam	-	U	7	U	-	83	-	U	-	U	-	-	U	-	1
P.R.	-	19	59	-	-	-	5	2	51	-	1	-	-	4	2
V.I.	-	-	4	-	5	-	-	-	3	-	-	-	-	-	-
Pac. Trust Terr.	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-

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

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

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending April 13, 1985 and April 14, 1984 (15th Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum 1985	Cum 1984	1985	Cum 1985	Cum 1984	Cum 1985	Cum 1985	Cum 1985	Cum 1985
UNITED STATES	7,061	8,155	4	5,377	5,725	24	71	13+2	1,295
NEW ENGLAND	155	174	1	179	155	-	5	-	-
Maine	5	1	-	16	8	-	-	-	-
N.H.	-	2	1	-	12	-	-	-	-
Vt.	-	-	-	3	2	-	-	-	-
Mass.	87	109	-	109	81	-	4	-	-
R.I.	5	8	-	16	14	-	-	-	-
Conn.	58	54	-	35	38	-	1	-	-
MID ATLANTIC	949	1,119	2	1,046	1,049	1	9	-	117
Upstate N.Y.	65	93	-	157	165	-	5	-	26
N.Y. City	606	662	-	561	440	1	-	-	-
N.J.	206	205	-	92	200	-	3	-	2
Pa.	72	159	2	236	244	-	1	-	89
E.N. CENTRAL	340	371	-	697	786	-	6	-	17
Ohio	35	73	-	129	164	-	2	-	1
Ind.	29	41	-	83	83	-	3	-	3
Ill.	178	134	-	301	327	-	1	-	3
Mich.	82	95	-	149	171	-	-	-	-
Wis.	16	28	-	35	41	-	-	-	10
W.N. CENTRAL	75	134	1	142	147	7	2	-	202
Minn.	19	30	1	23	24	1	2	-	29
Iowa	11	10	-	23	23	-	-	-	52
Mo.	29	77	-	65	64	5	-	-	13
N. Dak.	-	-	-	2	5	-	-	-	22
S. Dak.	4	-	-	7	5	-	-	-	59
Nebr.	3	5	-	8	9	1	-	-	11
Kans.	9	12	-	14	17	-	-	-	16
S. ATLANTIC	1,781	2,495	-	1,104	1,244	5	9	8+2	399
Del.	14	8	-	8	16	1	-	-	-
Md.	127	166	-	102	130	-	2	-	216
D.C.	96	88	-	52	41	-	-	-	-
Va.	97	128	-	79	107	-	1	-	54
W. Va.	2	8	-	25	51	-	-	-	3
N.C.	211	273	-	131	209	4	1	6+2	-
S.C.	231	234	-	140	139	-	-	1	19
Ga.	-	424	-	159	169	-	-	-	53
Fla.	1,003	1,166	-	408	382	-	5	1	54
E.S. CENTRAL	666	505	-	454	533	2	2	3	72
Ky.	25	26	-	78	125	-	-	-	12
Tenn.	173	128	-	138	167	2	-	1	17
Ala.	220	170	-	164	177	-	2	2	43
Miss.	248	181	-	74	64	-	-	-	-
W.S. CENTRAL	1,728	1,950	-	556	590	2	4	2	251
Ark.	82	71	-	40	57	1	-	-	38
La.	305	361	-	82	74	-	-	-	4
Okla.	48	61	-	69	59	1	-	2	31
Tex.	1,293	1,457	-	365	400	-	4	-	178
MOUNTAIN	237	191	-	126	131	5	3	-	95
Mont.	1	-	-	19	8	1	-	-	50
Idaho	2	9	-	3	6	-	-	-	-
Wyo.	4	2	-	1	-	-	-	-	3
Colo.	55	43	-	16	11	-	2	-	-
N. Mex.	27	26	-	22	31	2	1	-	1
Ariz.	133	75	-	56	56	-	-	-	41
Utah	3	7	-	3	10	2	-	-	-
Nev.	12	29	-	6	9	-	-	-	-
PACIFIC	1,130	1,216	-	1,073	1,090	2	31	-	142
Wash.	35	44	-	49	48	-	-	-	1
Oreg.	29	38	-	35	44	1	-	-	-
Calif.	1,045	1,108	-	892	918	1	30	-	141
Alaska	-	1	-	45	20	-	-	-	-
Hawaii	21	25	-	52	60	-	1	-	-
Guam	-	-	U	2	14	-	-	-	-
P.R.	262	263	-	84	112	-	1	-	8
V.I.	1	6	-	1	2	-	-	-	-
Pac. Trust Terr.	-	-	U	-	-	-	-	-	-

U Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending April 13, 1985 (15th Week)

Reporting Area	All Causes, By Age (Years)						P&I** Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	714	501	126	46	20	21	46
Boston, Mass.	172	112	32	14	5	9	9
Bridgeport, Conn.	51	36	10	3	1	1	2
Cambridge, Mass.	25	22	2	1	-	-	5
Fall River, Mass.	13	12	1	-	-	-	-
Hartford, Conn.	81	55	13	7	4	2	-
Lowell, Mass.	29	16	6	4	3	-	2
Lynn, Mass.	30	25	4	-	1	-	2
New Bedford, Mass.	25	20	3	-	1	1	-
New Haven, Conn.	56	32	15	6	1	2	4
Providence, R.I.	75	54	15	4	2	-	8
Somerville, Mass.	6	5	1	-	-	-	-
Springfield, Mass.	51	36	7	4	2	2	3
Waterbury, Conn.	41	30	9	2	-	-	4
Worcester, Mass.	59	46	8	1	-	4	7
MID. ATLANTIC	2,851	1,885	601	218	75	71	132
Albany, N.Y.	53	36	9	3	2	3	2
Allentown, Pa.	26	23	3	-	-	-	-
Buffalo, N.Y.	135	90	26	12	2	5	13
Camden, N.J.	29	20	8	-	-	1	1
Elizabeth, N.J.	36	25	7	3	1	-	2
Erie, Pa.†	45	35	8	1	1	-	4
Jersey City, N.J.	59	37	15	6	-	1	-
N.Y. City, N.Y.	1,463	949	317	125	39	33	55
Newark, N.J.	84	42	21	10	5	5	5
Paterson, N.J.	38	22	9	3	4	-	3
Philadelphia, Pa.	411	265	90	30	14	12	21
Pittsburgh, Pa.†	65	46	13	3	2	1	1
Reading, Pa.	30	23	5	-	1	1	2
Rochester, N.Y.	132	99	21	4	3	5	12
Schenectady, N.Y.	30	21	6	2	1	-	-
Scranton, Pa.†	34	28	4	2	-	-	5
Syracuse, N.Y.	91	65	20	4	-	2	-
Trenton, N.J.	41	22	12	5	-	2	2
Utica, N.Y.	19	15	3	1	-	-	1
Yonkers, N.Y.	30	22	4	4	-	-	3
E.N. CENTRAL	2,398	1,639	451	152	65	90	99
Akron, Ohio	75	43	18	6	4	4	5
Canton, Ohio	57	39	14	1	1	2	2
Chicago, Ill. §	553	462	11	26	16	37	16
Cincinnati, Ohio	150	102	32	8	1	7	13
Cleveland, Ohio	189	117	45	10	12	5	4
Columbus, Ohio	129	74	38	10	3	4	8
Dayton, Ohio	99	67	25	7	-	-	3
Detroit, Mich.	263	152	64	35	6	6	7
Evansville, Ind.	52	39	11	-	1	1	2
Fort Wayne, Ind.	69	44	17	5	2	1	1
Gary, Ind.	17	10	4	3	-	-	1
Grand Rapids, Mich.	52	34	13	4	1	-	4
Indianapolis, Ind.	156	96	39	13	3	5	1
Madison, Wis.	31	20	5	3	2	1	3
Milwaukee, Wis.	154	105	31	7	6	5	8
Peoria, Ill.	40	22	14	1	1	2	3
Rockford, Ill.	45	27	12	2	1	3	2
South Bend, Ind.	55	38	12	2	2	1	8
Toledo, Ohio	129	84	33	5	3	4	6
Youngstown, Ohio	83	64	13	4	-	2	2
W.N. CENTRAL	816	558	164	39	28	27	32
Des Moines, Iowa	59	41	12	5	1	-	4
Duluth, Minn.	28	21	5	1	-	1	-
Kansas City, Kans.	32	17	7	1	4	3	2
Kansas City, Mo.	134	96	26	6	5	1	6
Lincoln, Nebr.	54	38	10	3	3	-	5
Minneapolis, Minn.	112	82	14	8	3	5	4
Omaha, Nebr.	101	57	31	4	5	4	3
St. Louis, Mo.	154	106	29	7	4	8	1
St. Paul, Minn.	69	52	12	2	-	3	2
Wichita, Kans.	73	48	18	2	3	2	5
S. ATLANTIC	1,132	727	255	74	31	41	65
Atlanta, Ga.	139	89	31	5	4	10	4
Baltimore, Md.	179	115	35	11	7	11	9
Charlotte, N.C.	64	44	14	2	3	1	6
Jacksonville, Fla.	109	71	27	7	3	1	11
Miami, Fla.	141	84	28	21	4	4	-
Norfolk, Va.	63	42	13	2	1	5	3
Richmond, Va.	79	45	26	7	1	-	5
Savannah, Ga.	45	28	14	2	1	-	3
St. Petersburg, Fla.	97	82	14	1	-	-	8
Tampa, Fla.	80	51	18	6	1	2	7
Washington, D.C.	114	60	31	8	6	7	7
Wilmington, Del.	22	16	4	2	-	-	2
E.S. CENTRAL	782	514	170	48	27	23	38
Birmingham, Ala.	119	78	24	8	5	4	2
Chattanooga, Tenn.	64	45	13	5	1	-	8
Knoxville, Tenn.	70	44	17	6	2	1	4
Louisville, Ky.	99	67	21	6	4	1	3
Memphis, Tenn.	223	137	54	15	8	9	9
Mobile, Ala.	66	50	9	3	3	1	2
Montgomery, Ala.	39	28	10	-	-	1	2
Nashville, Tenn.	102	65	22	5	4	6	8
W.S. CENTRAL	1,245	756	296	109	55	29	54
Austin, Tex.	61	39	10	8	3	1	7
Baton Rouge, La.	49	24	21	3	1	-	4
Corpus Christi, Tex.	37	27	8	1	-	1	-
Dallas, Tex.	193	108	40	27	11	7	3
El Paso, Tex.	57	44	7	2	4	-	2
Fort Worth, Tex.	106	65	25	10	5	1	9
Houston, Tex.	196	102	54	29	5	6	3
Little Rock, Ark.	62	41	15	1	3	2	5
New Orleans, La.	135	83	29	13	7	3	-
San Antonio, Tex.	182	108	52	7	11	4	12
Shreveport, La.	33	19	13	-	-	1	-
Tulsa, Okla.	134	96	22	8	5	3	9
MOUNTAIN	724	462	165	52	16	29	50
Albuquerque, N.Mex.	83	53	18	10	1	1	4
Colo. Springs, Colo.	51	32	12	2	2	3	9
Denver, Colo.	130	79	34	11	1	5	6
Las Vegas, Nev.	102	58	29	10	2	3	7
Ogden, Utah	19	14	1	2	-	2	2
Phoenix, Ariz.	163	100	34	10	8	11	6
Pueblo, Colo.	27	21	5	-	1	-	4
Salt Lake City, Utah	53	32	13	4	1	3	-
Tucson, Ariz.	96	73	19	3	-	1	12
PACIFIC	1,756	1,173	341	132	55	49	115
Berkeley, Calif.	24	17	5	2	-	-	-
Fresno, Calif.	72	43	18	4	5	2	14
Glendale, Calif.	20	17	2	-	1	-	-
Honolulu, Hawaii	51	29	14	3	3	2	2
Long Beach, Calif.	112	76	19	7	4	6	6
Los Angeles, Calif.	316	205	66	32	6	2	7
Oakland, Calif.	77	53	13	6	2	3	9
Pasadena, Calif.	31	22	7	2	-	-	1
Portland, Oreg.	120	89	15	8	5	3	8
Sacramento, Calif.	133	87	29	9	5	3	10
San Diego, Calif.	166	110	32	8	8	7	22
San Francisco, Calif.	166	119	26	12	4	5	5
San Jose, Calif.	165	96	39	20	5	5	10
Seattle, Wash.	167	117	29	10	5	6	7
Spokane, Wash.	55	39	8	4	1	3	7
Tacoma, Wash.	81	54	19	5	1	2	7
TOTAL	12,418††	8,215	2,569	870	372	380	631

* 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 4 weeks.

TABLE V. Years of potential life lost, deaths, and death rates, by cause of death, and estimated number of physician contacts, by principal diagnosis, United States

Cause of morbidity or mortality (Ninth Revision ICD, 1975)	Years of potential life lost before age 65 by persons dying in 1983*†	Estimated mortality November 1984		Estimated number of physician contacts November 1984*¶
		Number*§	Annual Rate/100,000*§	
ALL CAUSES (TOTAL)	9,170,000	166,280	854.0	108,600,000
Accidents and adverse effects (E800-E949)	2,219,000	8,020	41.2	5,300,000
Malignant neoplasms (140-208)	1,808,000	38,300	196.7	1,500,000
Diseases of heart (390-398, 402, 404-429)	1,559,000	61,300	314.8	6,000,000
Suicides, homicides (E950-E978)	1,218,000	3,680	18.9	—
Chronic liver disease and cirrhosis (571)	248,000	2,200	11.3	100,000
Cerebrovascular diseases (430-438)	226,000	11,740	60.3	700,000
Congenital anomalies (740-759)	134,000	930	4.8	300,000
Chronic obstructive pulmonary diseases and allied conditions (490-496)	123,000	5,080	26.1	2,100,000
Diabetes mellitus (250)	115,000	2,900	14.9	2,800,000
Pneumonia and influenza (480-487)	106,000	4,540	23.3	900,000
Prenatal care*				2,800,000
Infant mortality*††		3,200	10.7 /1,000 live births	

*For details of calculation, see footnotes for Table V, *MMWR* 1985;34:2.

†Years of potential life lost for persons between 1 year and 65 years old at the time of death are derived from the number of deaths in each age category as reported by the National Center for Health Statistics, *Monthly Vital Statistics Report* (MVSR), Vol. 32, No. 13, September 21, 1984.

§National Center for Health Statistics, *Monthly Vital Statistics Report* (MVSR), Vol. 33, No. 12, March 26, 1985, pp. 8-9.

¶IMS America *National Disease and Therapeutic Index* (NDTI), Monthly Report, November 1984, Section III.

††MVSR Vol. 33, No. 11, February 27, 1985, p. 1.

Tornado Disaster – Continued

All 20 hospitals in North Carolina that treated tornado-associated injuries had implemented their respective disaster plans and recall systems well before the first persons arrived; thus, rarely was an ER overloaded. The disaster plan had relatively few problems, but important among them were: poor radio communication between the hospital ER and the centralized, nonhospital disaster-control staff at the disaster sites; reluctance to treat the tornado storm as a mass casualty disaster; infrequent use of casualty "tags" in contrast to that hospital's ER medical record; only partial implementation of triage; inadequate recording of essential information on the health records of most patients (e.g., vital signs not recorded in 44% of cases); and a relative deficiency of clerical, administrative, and other support staff (e.g., kitchen workers, social services staff, transport employees, chaplains).

Tornado Disaster — Continued

Reported by administrative staffs of the following hospitals and clinic: Duplin General Hospital, Kenansville, Wayne County Memorial Hospital, Goldsboro, Cape Fear Valley Hospital, Fayetteville, Wilson Memorial Hospital, Wilson, Lenoir Memorial Hospital, Kinston, Southeastern General Hospital, Lumberton, Pitt County Memorial Hospital, Greenville, Bertie County Memorial Hospital, Windsor, Scotland Memorial Hospital, Laurinburg, Beaufort County Hospital, Washington, Bladen County Hospital, Elizabethtown, Chowan Hospital, Edenton, Columbus County Hospital, Whiteville, Roanoke-Chowan Hospital, Ahoskie, Moore Memorial Hospital, Pinehurst, Nash General Hospital, Rocky Mount, Albemarle Hospital, Elizabeth City, Robersonville Community Hospital, Robersonville, Sampson County Memorial Hospital, Clinton, Family Medicine Clinic, Mount Olive, D Cognilio, Pitt County Memorial Hospital, EJ Allison, MD, JE Williamson, MD, Dept of Emergency Medicine, School of Medicine, East Carolina University, Greenville, CG Smith, MD, B Watson, M Swift, D Button, MSPH, J Williams, MPH, L Wright, MPH, Epidemiology Section, JM Bowling, MA, State Center for Health Statistics, JN MacCormack, MD, State Epidemiologist, North Carolina Div of Health Svcs; Administrative staffs of the following hospitals: Loris Community Hospital, Loris, Anderson Memorial Hospital, Anderson, Hillcrest Hospital, Simpsonville, Marlboro Park Hospital, Bennettsville, Fairfield County Memorial Hospital, Winnsboro, Elliott White Springs Memorial Hospital, Lancaster, Kershaw County Hospital, Camden, Richland Memorial Hospital, Baptist Medical Center, Columbia, Laurens District Hospital, Laurens, Chesterfield General Hospital, Cheraw, Newberry County Memorial Hospital, Newberry, RL Parker, DVM, State Epidemiologist, South Carolina Dept of Health and Environmental Control; Div of Field Svcs, Office of the Director, Epidemiology Program Office, Special Studies Br, Chronic Diseases Div, Center for Environmental Health, CDC.

Editorial Note: Tornado-related trauma has been responsible for more than 9,000 deaths in the past 50 years (*1*). Recommended safety measures (updated with information from a recent epidemiologic study [*1*]) are as follows:

1. Persons in buildings should seek shelter indoors—on the lowest floor, preferably in a basement. Central rooms, including closets and stairwells, are safer than rooms along the outside of the house, and areas near windows should be avoided.
2. Drivers should not attempt to drive away from a tornado. Instead, they should seek shelter indoors immediately on hearing a tornado warning.
3. If drivers in open country cannot find indoor shelter, they should drive away from the tornado path at right angles. If there is not time to escape, persons outdoors should lie flat in the nearest ditch or ravine.
4. Even properly anchored mobile homes are unsafe when wind speeds exceed 50 miles per hour. In tornado-prone states, mobile-home parks should have alternative tornado shelters.

Tornado-related mortality rates have decreased continuously over the past 50 years (*1*).

TABLE 1. Tornado-associated injuries — North Carolina, South Carolina, March 28, 1984

Injury	No.*	(%)
Fractures		
None	543	(62.1)
One	216	(24.7)
Two	78	(8.9)
Three or more	37	(4.2)
Lacerations		
None	378	(43.2)
One	309	(35.4)
Two	122	(14.0)
Three	46	(5.3)
Four or more	19	(2.2)
Contusions		
None	442	(50.6)
One	277	(31.7)
Two	112	(12.8)
Three or more	43	(4.9)

*A total of 874 medical records/charts contained adequate medical information.

Tornado Disaster – Continued

Possible factors in this decrease are: more effective early warning systems, better public education and preparedness, and improved emergency medical services during disasters. Further epidemiologic studies are needed to evaluate to what extent these factors contribute to the continued decline in deaths and injuries from tornadoes.

Reference

1. Glass RI, Craven RB, Bregman DJ, et al. Injuries from the Wichita Falls tornado: implication for prevention. Science 1980;207:734-8.

Perspectives in Disease Prevention and Health Promotion

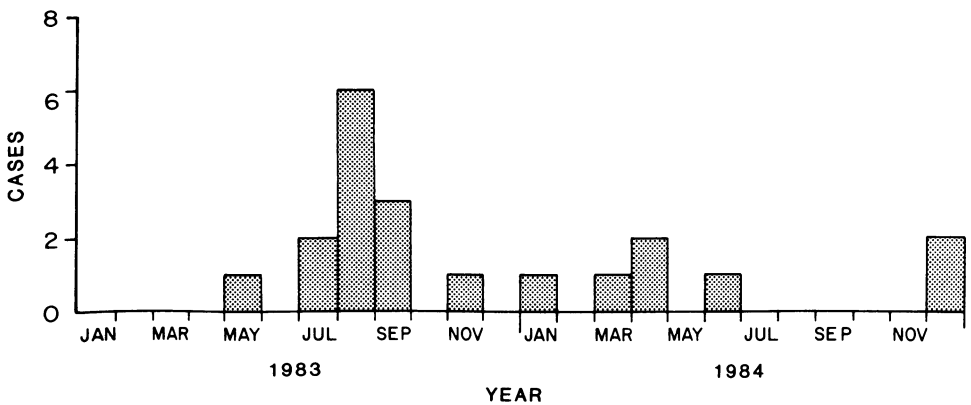
Injuries Associated with Three-Wheel All-Terrain Vehicles — Alaska

From January 1983 through December 1984, at least 20 deaths and 538 injuries, including six persons permanently disabled by neurologic injuries, were associated with three-wheel all-terrain vehicles ("3-wheelers" or ATVs) in Alaska. These preliminary data came from an ongoing statewide study conducted by the Alaska Division of Public Health with the assistance of CDC. Of the 20 fatalities, 11 (55%) occurred among males. Ages at death ranged from 12 years to 53 years; 15 (75%) were in the 15- to 34-year age group. Eleven (55%) deaths occurred during a 3-month period in 1983 (Figure 2). No similar cluster was observed in 1984. All but three fatal incidents occurred in the south-central and southwestern portions of Alaska.

Ten persons (50%) died as a result of direct impact to the head (Table 2); only two wore protective helmets when the incidents occurred. Four others not wearing helmets—two of three persons who drowned and two who died of asphyxiation—died following presumed loss of consciousness. Nineteen persons who died were operating the vehicle; in one instance, both the driver and his passenger were killed.

Blood alcohol was measured in 11 individuals who survived less than 4 hours following injury. In eight individuals, the blood alcohol concentration (BAC) exceeded 0.1 g%, the level of intoxication. Two others had blood alcohol detected at levels below 0.1 g%. Only one person had no blood alcohol detected. Five persons died 4 or more hours following injury, so BAC obtained at autopsy may not reflect accurately the BAC at the time of the incident. Blood alcohol was not measured for four persons.

FIGURE 2. Fatalities associated with all-terrain vehicles, by month and year — Alaska, 1983-1984



ATV-Associated Injuries — Continued

Hospital admissions for persons with ATV-associated injuries were identified by reviewing inpatient records from the Indian Health Service hospitals and from two of the three major private referral hospitals in Alaska. During the 2-year period, 324 patients were hospitalized for ATV-related injuries. The average duration of stay was 8.5 days. Of the 324 hospitalizations, 113 (35%) occurred as a result of fractures/dislocations of the lower extremity. Six patients (ranging in age from 21 years to 51 years) were hospitalized as a result of severe head or spinal cord injuries; they are now permanently disabled and will require long-term skilled care. In one private hospital, 43 (66%) of 65 inpatients required a surgical procedure under general anesthesia. Although data on outpatients from all hospitals are far less complete, 214 outpatient visits for ATV-associated injuries were documented during the study period.

Based on the current estimates for hospital care in Alaska (average of $578 per inpatient day) (*1*), ATV-associated injuries accounted for approximately $1.6 million in health-care dollars spent for inpatient care alone during 1983-1984. Using estimated costs of basic care for residents of a large long-term care facility in Anchorage ($4,800 per month*), the six permanently disabled individuals may require additional expenditures of $11.5 million for basic long-term skilled care if each lives to age 65 years.

The Alaska Department of Public Safety and Department of Transportation (DPS/DOT) received police reports of 234 incidents involving 304 injured riders or property damage associated with ATV use during the study period. Reports from DPS/DOT were used to characterize riders, vehicles, and environmental conditions involved in fatal and nonfatal ATV incidents investigated by police. Persons in the 10- to 14-year age group (24%) were most frequently involved in incidents reported to DPS/DOT, and more than twice as many males as females were involved. Incidents were reported more frequently on Saturdays and Sundays than on weekdays. Although ATVs are marketed for off-road use, 63% of incidents occurred on roads. Police reported that vehicles were most frequently moving straight at a constant speed (57%) rather than changing speed or direction before the event. The most frequent contributing factors cited by police were alcohol (20%), speeding (16%), driver inexperience (12%), and driver inattention (11%).† Only 9% of riders wore helmets at the time of the incident. Although all ATV models are designed for use by a single rider, 29% of incidents reported by police involved multiple riders.

Reported by S Jenkerson, J Middaugh, MD, State Epidemiologist, Alaska Dept of Health and Social Svcs; Epidemiologic Studies Br, Div of Surveillance and Epidemiolgic Studies, Epidemiology Program Office, Special Studies Br, Chronic Disease Div, Center for Environmental Health, CDC.

Editorial Note: Injuries are the leading cause of premature mortality in the United States (*2*). Mortality associated with unintentional injuries is the leading cause of premature mortality in Alaska and probably reflects the age structure of the state (median age is 26.3 years). During

*This figure does not include costs for physicians' fees, medications or occupational, physical, recreational, or speech therapy.

†Only one factor per incident was cited.

TABLE 2. Fatalities associated with all-terrain vehicles, by cause of death — Alaska, 1983-1984

Cause of death	No.	(%)
Impact to head	10	(50)
Impact to trunk	3	(15)
Drowning	3	(15)
Asphyxiation	2	(10)
Hypothermia	1	(5)
Unknown	1	(5)
Total	**20**	**(100)**

ATV-Associated Injuries — Continued

1983-1984, fatal injuries resulting from transportation and recreational vehicle crashes accounted for 353 (9%) of 3,881 deaths in Alaska, including: 285 (7%) automobile and truck collision fatalities, 86 (2%) aircraft crash fatalities, 20 (0.5%) ATV-associated fatalities, and 11 (0.3%) snowmachine-associated fatalities. In addition to the premature mortality associated with ATV use, related nonfatal injuries result in substantial costs for both individuals and society.

Interpretation of transportation and vehicle-related injury studies is often constrained by an absence of denominator data, particularly the number of persons at risk of injury. Information concerning the number of vehicles in use and rider-usage patterns is often difficult, if not impossible, to obtain.

Potential risk factors for injuries associated with ATVs include alcohol use, ineffective helmet use, rider inexperience and inattention, and excessive speed. Of major importance is the finding that 12 (60%) of the 20 fatalities may have been prevented by wearing a helmet. These factors, as well as vehicle-use patterns and vehicle characteristics, must be evaluated as part of a rational approach to plan intervention strategies. Injury investigations, such as this study, can serve as a basis for developing and implementing comprehensive injury surveillance systems to monitor the public health impact of injuries.

References

1. American Hospital Association. Hospital statistics. Chicago: American Hospital Association, 1984:45.
2. CDC. Changes in premature mortality—United States, 1982-1983. MMWR 1985;34:17-8.

Epidemiologic Notes and Reports

Update: Milk-borne Salmonellosis — Illinois

The number of culture-confirmed cases of salmonellosis reported to the Illinois Department of Public Health during the outbreak of milk-borne salmonellosis reported last week (*1*) reached 5,770 on April 16. Fifty-eight percent of the first 765 cases occurred among persons under 10 years of age. *Salmonella typhimurium* has been isolated from unopened containers of two lots of milk: Bluebrook 2% milk, dated March 29 and produced March 20, and Hill Farm 2% milk, dated April 8 and produced March 30. Both lots were from the same dairy plant in Illinois, which stopped producing milk April 9. The milk was sold in Jewel, Eisner, and Magna supermarkets in Illinois, Indiana, Iowa, and Michigan. All milk produced by the plant has been removed from sale. Although the plant produces milk with several different concentrations of butterfat, thus far only 2% milk has been strongly implicated. Investigations of the plant by state, federal, and industry officials are continuing to determine the precise cause of the contamination of the milk.

By April 16, the Illinois Department of Public Health had received reports of milk-associated, culture-confirmed cases of salmonellosis from the three other states where the milk was distributed—Indiana (289 cases), Michigan (43), and Iowa (28). In addition, three state health departments (Minnesota, Wisconsin, and Florida) have reported a total of 19 cases among persons returning to their states.

Reported by local Illinois health departments, Illinois Dept of Public Health; Enteric Diseases Br, Div of Bacterial Diseases, Center for Infectious Diseases, CDC; US Food and Drug Administration.

Editorial Note: This is the largest number of culture-confirmed cases ever associated with a single outbreak of salmonellosis in the United States. Although *Salmonella* is sometimes found in dairy cattle and in raw milk (*2*), pasteurization kills *Salmonella*. The implicated milk

Salmonellosis — Continued

underwent the pasteurization process, suggesting that it was either inadequately pasteurized or contaminated after pasteurization.

References

1. CDC. Milk-borne salmonellosis—Illinois. MMWR 1985;34:200.
2. Marth EH. *Salmonellae* and salmonellosis associated with milk and milk products. A review. J Dairy Sci 1969;52:283-315.

Reported Measles Cases — United States, Past 4 Weeks

The following states have reported measles during the past 4 weeks: Arizona, California, Florida, Georgia, Hawaii, Illinois, Indiana, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, New Jersey, upstate New York, Oregon, Texas, Virginia, and West Virginia; New York City has also reported measles.

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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.

The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: ATTN: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333.

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