CENTERS FOR DISEASE CONTROL

October 12, 1990 / Vol. 39 / No. 40

MMWR

MORBIDITY AND MORTALITY WEEKLY REPORT

Topics in Minority Health

Health Beliefs and Compliance with Prescribed Medication for Hypertension among Black Women — New Orleans, 1985–86

In the United States, the prevalence of definite hypertension (i.e., having systolic blood pressure ≥160 mm Hg and/or diastolic blood pressure ≥95 mm Hg, and/or taking antihypertensive medication) is 1.5 times higher among blacks (25.7%) than among whites (16.8%) (*1*). Although hypertension-related mortality appears to be declining among blacks, this problem continues to be disproportionately higher among blacks than among whites, particularly in younger age groups (*2*). Poor compliance with prescribed treatment is cited as the major reason for inadequate control of hypertension in blacks and whites (*3*). Improved understanding of patients' beliefs about hypertension could aid the development of public health strategies to reduce or control the disease. This report summarizes a study of the relationship between beliefs about hypertension and compliance with antihypertensive treatment among black women who received health care at a public hospital clinic in New Orleans.

From May 1985 through July 1986, 54 (72%) of 75 black women aged 45–70 years receiving treatment for essential hypertension and possibly one other chronic disease unrelated to hypertension were included in the study. Each patient participated for 2 months. To elicit beliefs and attitudes about hypertension and general health, investigators interviewed each patient twice using a standardized questionnaire. Patients were visited in their homes at 2-week intervals to monitor blood pressure and compliance with prescribed medication. The 15 resident physicians who treated these patients at the clinic were interviewed about their awareness of patient health beliefs.

Based on medication diaries, field notes, and pill counts (at the initial visit and at 1 and 2 months after the initial visit), patient compliance was categorized as "poor" (pill use <60%) or "good" (use >80%). For women with pill use 60%–79% (n = 14) or for whom complete pill-use records were not available, diaries and field notes were used to determine whether compliance was "good" or "poor." The likelihood of poor

Hypertension Beliefs — Continued

compliance among women who professed folk beliefs* was compared with the likelihood of poor compliance among women who believed in a biomedical model of hypertension.

The 54 patients conceptualized their disease as "pressure trouble" or simply "pressure." One group (n=22) believed in the existence of the biomedical disease, hypertension; the other group (n=32) believed instead in the existence of two diseases, "high blood" and "high-pertension," distinguished by folk etiology, symptomatology, and treatment.

Patients characterized "high blood" as a physical disease of the blood and heart in which the blood was too "hot," "rich," or "thick"; the level of the blood rose slowly in the body and remained high for extended periods. These participants considered "high blood" to be caused by heredity, poor diet, and "heat" (from either the body or the environment); to be predictable and controllable; and to be capable of resulting in illness or death. "High blood" was thought to be appropriately treated by dietary control (i.e., abstention from pork, hot or spicy foods, and "grease") and by various folk remedies such as ingestion of lemon juice, vinegar, or garlic water. Patients believed these treatments cooled and thinned the blood, causing its level in the body to drop.

Patients considered "high-pertension" to be a disease "of the nerves" caused by stress, worry, and an anxious personality. Unlike "high blood," "high-pertension" was believed to be volatile and episodic. These patients believed that at times of emotional excitement, the blood would "shoot up" rapidly toward the head, then "fall back" or "drop back" quickly. Rather than medication and dietary control, these patients considered the appropriate treatment for "high-pertension" to be mitigation of stress and emotional excitement through control of emotions and the social environment.

Of the 32 women who believed in either of the two folk illnesses, 20 (63%) complied poorly with antihypertensive treatment, compared with six (27%) of 22 who believed in biomedical hypertension (relative risk=2.3; 95% confidence interval [CI]=1.2–4.4). Differences in compliance were also related to self-diagnosis: women who believed they had "high-pertension" were 3.3 times as likely to comply poorly as women who believed they had biomedical hypertension (95% CI=1.7–6.8). Those with "high blood" were 0.5 times as likely to be poor compliers (95% CI=0.1–3.1). Patients who believed they had both folk illnesses were 2.4 times as likely to be poor compliers as those who believed they had biomedical hypertension (95% CI=1.1–5.2).

The 15 resident physicians had limited knowledge of the existence among their patients of folk beliefs about hypertension. Only two physicians knew of their patients' beliefs about the role of blood and emotional states in hypertension. Although 12 of the 15 physicians were aware of folk terms for hypertension, eight believed such terms were simply folk expressions for the biomedical illness.

Reported by: S Heurtin-Roberts, PhD, Dept of Epidemiology and Biostatistics, Univ of California, San Francisco. E Reisin, MD, Dept of Medicine, Louisiana State Univ Medical Center, New Orleans. Div of Technical Support, International Health Program Office; Div of Surveillance and Epidemiology, Epidemiology Program Office, CDC.

---

*Belief in two distinct illnesses, "high blood" and "high-pertension," instead of a biomedical model of hypertension as recognized by physicians.

Hypertension Beliefs — Continued

Editorial Note: Compliance with drug therapy has been a major focus of research on the control of hypertension since 1979, when the Hypertension Detection and Follow-Up Program Cooperative Group (*1*) reported lower mortality in persons with moderate hypertension who received therapy. Although the benefits of drug therapy are well established, excess mortality associated with essential hypertension persists among black persons in the United States. The findings in this report suggest that physicians might decrease the excess mortality associated with hypertension through health education efforts and by taking into consideration their patients' beliefs.

This study 1) documented hypertension-related beliefs of a high-risk population under treatment, 2) demonstrated a measurable relationship between patients' perceptions of illness and compliance behavior, 3) determined that physicians treating these patients were unaware of their patients' perceptions of their illness, and 4) suggested the importance of training physicians to elicit patients' conceptions of the illness (*4*) before selecting a therapeutic regimen.

Limitations of the study sample are that it was small and facility-based and included only black women. Nonetheless, the findings about these patients' perceptions of hypertension are consistent with other studies that used larger, community-based samples of blacks (*5,6*) and facility-based samples of whites (*7*). These studies advocate educating physicians about the importance of patient beliefs about hypertension.

The practice of clinical preventive medicine is critical to achieving the public health goal of risk reduction. Ensuring that patients understand what is prescribed and that physicians understand the patients' views of the illness requires dialogue; however, minority patients are less likely than whites to receive adequate time in primary-care settings (*8*). This study demonstrates the role physicians might have in influencing mortality in a high-risk group by eliciting the patient's conception of the illness (*9,10*). Further evaluation and more consistent use of approaches that improve physician-patient relationships will be necessary if compliance with hypertension drug regimens is to improve and if morbidity and mortality associated with hypertension are to be reduced.

References

1. Drizd T, Dannenberg AL, Engel A, NCHS. Blood pressure levels in persons 18–74 years of age in 1976–80, and trends in blood pressure from 1960 to 1980 in the United States. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, CDC, 1986; DHHS publication no. (PHS)86-1684. (Vital and health statistics; series 11, no. 234).
2. National Heart, Lung, and Blood Institute. The 1988 report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med 1988; 148:1023–38.
3. National Heart, Lung, and Blood Institute. The 1984 report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med 1984; 144:1045–57.
4. Kleinman A. Patients and healers in the context of culture: an exploration of the borderland between anthropology, medicine, and psychiatry. Berkeley, California: University of California Press, 1980:105–6.
5. Snow L. Traditional health beliefs and practices among lower class black Americans. Western J Med 1983;139:820–8.
6. Wilson RP. An ethnomedical analysis of health beliefs about hypertension among low income black Americans [Dissertation]. Stanford, California: Stanford University, 1985.
7. Blumhagen D. The meaning of hyper-tension. In: Chrisman NJ, Maretzki TW, eds. Clinically applied anthropology. Boston: Reidel Publishing, 1982.

Hypertension Beliefs — Continued

8. Gemson DH, Elinson J, Messeri P. Differences in physician prevention practice patterns for white and minority patients. J Community Health 1988;13:53–64.
9. Kleinman A, Eisenberg L, Good B. Culture, illness and care: clinical lessons from anthropologic and cross-cultural research. Ann Intern Med 1978;88:251–8.
10. Harwood A. Introduction. In: Harwood A, ed. Ethnicity and medical care. Cambridge: Harvard University Press, 1981.

Health Objectives for the Nation

Progress Toward Achieving the 1990 High Blood Pressure Objectives

In the United States, an estimated 58 million persons have high blood pressure (HBP [hypertension]), placing them at increased risk for stroke, heart disease, and kidney failure (*1*). Many federal, state, and community programs and professional societies have targeted control of HBP, and nine of the 1990 Health Objectives for the Nation addressed HBP (*2*). Seven of the objectives have been met, all or in part, and one will not be met; the status of one is unknown. This report summarizes progress toward achieving the 1990 objectives for HBP.

By 1990, at least 50 percent of adults should be able to state the principal risk factors for coronary heart disease and stroke, i.e., high blood pressure, cigarette smoking, elevated blood cholesterol levels, diabetes.

This objective has been met. The 1985 National Health Interview Survey, conducted by CDC's National Center for Health Statistics (NCHS), determined that 91% of the population recognized HBP as a risk factor for coronary heart disease and stroke; 90%, cigarette smoking; 86%, elevated blood cholesterol; and 60%, diabetes (*3*).

By 1990, at least 90 percent of adults should be able to state whether their current blood pressure is normal (below 140/90) or elevated, based on a reading taken at the most recent visit to a medical or dental professional or other trained reader.

This objective has been met. In 1985, 94% of adults who had ever had their blood pressure measured reportedly knew their blood pressure by categories of "high," "low," or "normal" at their last reading (*3*). Data from CDC's 1988 Behavioral Risk Factor Surveillance System (BRFSS) indicate that 99.8% of adults have had their blood pressure measured, 95.4% within the past 2 years.

By 1990, no geopolitical area of the United States should be without an effective public program to identify persons with high blood pressure and to follow up on their treatment.

This objective has been met. All state health departments have HBP control programs, although limited resources constrain many states from reaching and providing follow-up to all persons in need.

By 1985, at least 50 percent of processed food sold in grocery stores should be labeled to inform the consumer of sodium and caloric content, employing understandable, standardized, quantitative terms.

This objective has been met. In 1988, approximately 65% of processed food sold in grocery stores had sodium and caloric content labeling that employed standard quantitative terms (*4*).

1990 High Blood Pressure Objectives — Continued

By 1985, a methodology should be developed to assess categories of high blood pressure control, and a National baseline study of this status should be completed. Five categories are suggested: (1) Unaware; (2) Aware, not under care; (3) Aware, under care, not controlled; (4) Aware, under care, controlled; and (5) Aware, monitored without therapy.

This objective has been met. The 1984 Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure established categories of blood pressure control (*5*); the Third National Health and Nutrition Examination Survey (NHANES III), conducted by NCHS, includes methodology to assess these categories and will provide baseline data.

By 1985, a system should be developed to determine the incidence of high blood pressure, coronary heart disease, congestive heart failure and hemorrhagic and occlusive strokes. After demonstrated feasibility, by 1990 ongoing sets of these data should be developed.

The first portion of this objective has been met. Regional data sets have been or are being collected in time-limited studies that will permit estimations of national cardiovascular disease incidence. In particular, three studies by the National Heart, Lung, and Blood Institute (NHLBI) should provide adequate incidence data for adults of all ages: the Coronary Artery Disease Risk Development in Young Adults, for persons aged 18–30 years; the Atherosclerosis Risk in Community program, for persons aged 35–74; and the Cardiovascular Health Study, for persons aged ≥65 years. In addition, a follow-up analysis of NHANES I will provide incidence data for coronary artery disease. However, ongoing surveillance of cardiovascular disease is not yet institutionalized but will be required to regularly produce data for state and national estimates of disease prevalence and incidence.

By 1990, at least 60 percent of the estimated population having definite high blood pressure (160/95)* should have attained successful long term blood pressure control, i.e., a blood pressure at or below 140/90 for two or more years.

The Public Health Service has been tracking this objective at two levels: 1) the level of 160/95 mm Hg that was used as the standard for hypertension control when the objective was written in 1979 and 2) the level of 140/90 mm Hg that was adopted as the standard for hypertension control in 1984. This report addresses progress toward both standards.

This objective has most likely been met at the measurement defined for HBP when the objective was written (160/95 mm Hg). For 1976–1980, NHANES II indicated that 34% of persons with HBP were controlling their blood pressure at the level of 160/95 mm Hg. During 1982–1984, 57% of persons with HBP in a seven-state area were controlling their blood pressure at 160/95 mm Hg (*6*). In 1987, 65% of a sample of persons in South Carolina were controlling their HBP at the 160/95 mm Hg level (*7*).

For the revised measurement promulgated in 1984 (140/90 mm Hg) (*5*), evidence suggests progress has been made: 1) NHANES II indicated that 11% of persons with HBP were controlling at the level of 140/90 mm Hg; 2) in the study of the seven-state area cited above, 24%; and 3) in South Carolina, 38%. However, progress toward the 140/90 mm Hg level cannot be definitively determined until data from NHANES III become available in the early 1990s. Because none of the rates above include control by nonpharmocologic measures, they may underestimate actual levels of control.

*When originally written, this objective used 160/95 mm Hg as the standard for control; in 1984, the standard was revised to 140/90 mm Hg.

1990 High Blood Pressure Objectives — Continued

By 1990, the prevalence of significant overweight (120 percent of "desired" weight) among the U.S. adult population should be decreased to 10 percent of men and 17 percent of women, without nutritional impairment.

This objective will not be met. Data from NHANES I for 1971–1974 indicated that 14% of adult men and 24% of adult women were >120% above "desired" weight (*8*). NHANES II data for 1971–1980 indicated no reduction in the percentage of substantially overweight persons (*8*). In the 1988 BRFSS, 26.7% of adult men and 25.3% of adult women reported weights corresponding to >120% of desired weight.

By 1990, the average daily salt† ingestion (as measured by excretion) for adults should be reduced at least to the 3 to 6 gram range.

No data are available to determine if this objective will be met. Because direct measures of sodium consumption by excretion are not available, progress toward achieving this objective was determined by indirect measures of food intake, such as dietary surveys and the Food and Drug Administration's (FDA) Total Diet Study. These measures provide information only for nondiscriminatory sodium intake (i.e., sodium naturally present and sodium added by manufacturers) and exclude sodium added in cooking or at the table. The FDA Total Diet Study indicated that for 1982–1984, excluding salt added at the table or in cooking, daily sodium intake for women was within the desired range but that daily sodium intake for men exceeded 2.6 g (*4*). More recently, the Continuing Survey of Food Intakes by Individuals indicated that for 1985–1986, excluding salt added at the table or in cooking, the mean 4-day intake for women aged 19–50 years was 2.3 g (*9*); for men aged 19–50 years, daily sodium intake exceeded 3.4 g (*10*). However, an FDA survey indicated that in 1988 45% of respondents read the ingredients listed on labels to help them avoid or limit their sodium consumption (*4*). In addition, from 1972 through 1985 food-grade salt sales in grocery stores, in pounds per capita, declined 36% (*6*).

Reported by: National High Blood Pressure Education Program, National Heart, Lung, and Blood Institute, National Institutes of Health. Office of Disease Prevention and Health Promotion, Office of the Assistant Secretary for Health, Public Health Service. Food and Drug Administration. Bur of Community Health Svcs, Health Resources and Svcs Administration. Cardiovascular Health Br, Div of Chronic Disease Control and Community Intervention, Center for Chronic Disease Prevention and Health Promotion, CDC.

Editorial Note: Progress toward achieving the 1990 national objectives for HBP is due in large part to the National High Blood Pressure Education Program (NHBPEP). Coordinated by NHLBI with support from federal agencies, state and local health departments, and voluntary organizations, the NHBPEP has led to improvements in blood pressure control that have contributed to a 50% decrease in stroke and a 35% decrease in coronary heart disease since 1972 (*11*).

Despite this progress, 30 million persons in the United States still have inadequately controlled blood pressure. Sustained attention and resources are needed to decrease the prevalence of HBP, particularly within the black population, which is disproportionately burdened by hypertensive disease. Patients with HBP must be referred into the health-care system, effectively treated, and maintained on treatment.

The same nonpharmacologic strategies used to treat hypertension (e.g., weight loss, physical activity, and restriction of salt and alcohol intake) are epidemiologically associated with lower blood pressure (*12*). Thus, alterations in physical activity and

---

†When originally written, this objective incorrectly referred to "daily sodium ingestion." Three to six g of salt is equivalent to 1.2–2.4 g of sodium.

1990 High Blood Pressure Objectives — Continued

dietary patterns in the U.S. population have the potential to further reduce the burden of cardiovascular disease through reductions in the prevalence of overweight and HBP (*13*). The successes of HBP control efforts highlight the value of maintaining or developing similar national programs for other major cardiovascular disease risk factors and chronic disease conditions.

References

1. 1984 Joint National Committee. Hypertension prevalence and the status of awareness, treatment, and control in the United States: final report of the Subcommittee on Definition and Prevalence of the 1984 Joint National Committee. Hypertension 1985;7:457–68.
2. Public Health Service. Promoting health/preventing disease: objectives for the nation. Washington, DC: US Department of Health and Human Services, Public Health Service, 1980.
3. Roccella E, Bowler A, Ames M, Horan M. Hypertension knowledge, attitudes and behavior: 1985 NHIS findings. Public Health Rep 1986;101:599–606.
4. Center for Food Safety and Applied Nutrition. Health and diet surveys and the food label and package surveys. Washington, DC: Food and Drug Administration, Center for Food Safety and Applied Nutrition, 1988.
5. National Heart, Lung, and Blood Institute. The 1984 report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med 1984; 144:1045–57.
6. Roccella EJ, Horan MJ. The National High Blood Pressure Education Program: measuring progress and assessing its impact. Health Psychol 1988;7(suppl):297–307.
7. Lackland DT, Wheeler FC, Mace ML. The ten-year change in prevalence, awareness, treatment and control of high blood pressure [Abstract]. Presented at the 1989 National Conference on High Blood Pressure Control, Orlando, Florida, May 6–8, 1989.
8. Office of Disease Prevention and Health Promotion. The 1990 health objectives for the nation: a midcourse review. Washington, DC: US Department of Health and Human Services, Public Health Service, 1987.
9. US Department of Agriculture. National Food Consumption Survey: Continuing Survey of Food Intakes by Individuals, women 19–50 years and their children 1–5 years, 4 days. Hyattsville, Maryland: US Department of Agriculture, 1988; USDA report no. 86-3.
10. US Department of Agriculture. Nationwide Food Consumption Survey: Continuing Survey of Food Intakes by Individuals, men 19–50 years 1-day, 1985. Hyattsville, Maryland: US Department of Agriculture, 1986. (NFCS, CSF II report no. 85-3).
11. National Heart, Lung, and Blood Institute. The 1988 report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med 1988; 148:1023–38.
12. Horan M, Roccella E. Nonpharmacologic treatment of hypertension: does it work? Eur Heart J 1987;8(suppl B):77–86.
13. Farquhar J, Fortman S, Flora J, et al. Effects of communitywide education on cardiovascular risk factors. JAMA 1990;264:359–65.

International Notes

Update: Health and Nutritional Profile of Refugees — Ethiopia, 1989–1990

Since 1983, Ethiopia has provided refuge to hundreds of thousands of persons from northern Somalia and southern Sudan who have fled armed conflict in those areas. Relief efforts have included the ongoing public health surveillance of these populations. This report summarizes the nutritional and health status of these refugees.

Refugee Health Status — Continued

Eastern Ethiopia (Somali refugees)

In June 1988, refugees from northern Somalia began entering eastern Ethiopia, where they are now housed in six camps: Hartisheik A and B, Daror, Rabasso, Camaboker, and Aysha (Figure 1). By June 1990, approximately 360,000 Somali refugees had registered for relief assistance.* From late 1988 through mid-1989, the nutritional status of the population in Hartisheik A camp (population: approximately 170,000) was poor (*1*). In March 1989, the prevalence of acute protein-energy malnutrition (PEM)[†] peaked at 26%. Cases of scurvy were also reported.

Consequently, in May 1989, relief agencies implemented a dry supplementary feeding program in Hartisheik A camp for all children <5 years of age. The program provided 900–1000 extra kilocalories of energy per child per day and vitamin C supplements on a weekly basis. By June and August 1989, PEM prevalence among children aged <5 years had decreased to 15% and 7%, respectively; improvement was sustained through mid-1990 (Figure 2). In August, a more precise population estimate on which ration distributions could be based was obtained from a census conducted by the Government of Ethiopia (GOE) and the Office of the United Nations High Commissioner for Refugees (UNHCR).

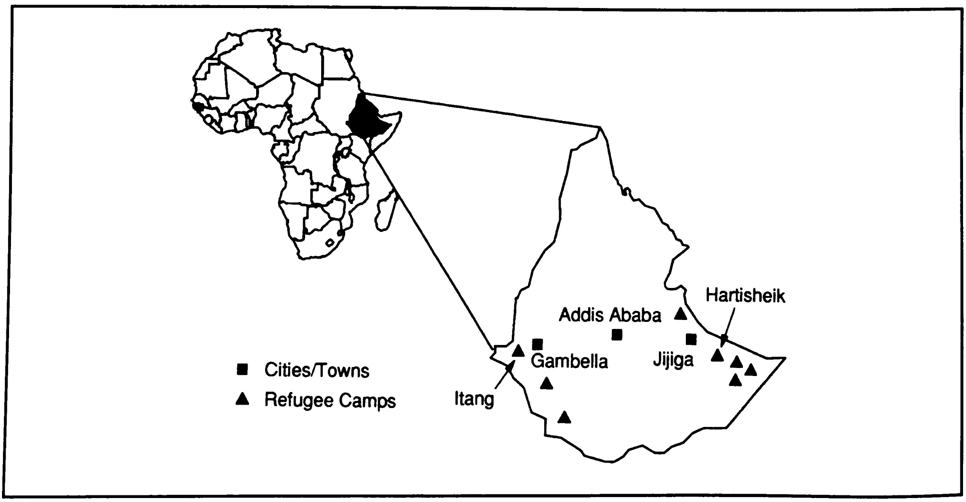
In August 1989, to assess mortality during the first year of operation of Hartisheik A camp, a joint agency team[§] conducted a cluster sample survey of 1350 households. A standard questionnaire was used to record the number of deaths during each of the preceding 12 months. From August 1988 through July 1989, the crude mortality rate (CMR) was an estimated 46 per 1000 population (95% confidence interval [CI] = 39–53 per 1000), and the Under 5 Mortality Rate (U5MR) was 152 deaths per 1000 children aged <5 years (95% CI = 124–182). CMRs were highest from February through May,

*As provided by the Government of Ethiopia, the Office of the United Nations High Commissioner for Refugees, and other international agencies and private voluntary organizations.

[†]Defined as weight-for-height <80% of the median World Health Organization reference population (*2*).

[§]Administration for Refugee Affairs and Ministry of Health, GOE; UNHCR; and Save the Children Fund (United Kingdom).

FIGURE 1. Refugee camps – Ethiopia, 1990



Refugee Health Status — Continued

when acute PEM prevalence rates were also high (Figure 2); the mean monthly CMR during this period was 6.6 per 1000, corresponding to an annual CMR of 79 per 1000. In contrast, annual CMRs reported for the nonrefugee populations of Ethiopia and Somalia were 24 and 20 per 1000, respectively (*3*). Annual U5MRs are not available for Ethiopia or Somalia; however, a 1988 demographic and health survey in nearby Uganda estimated the probability of dying between birth and age 5 years at 180.4 (equivalent to a mean annual U5MR of approximately 45 per 1000) (*4*).

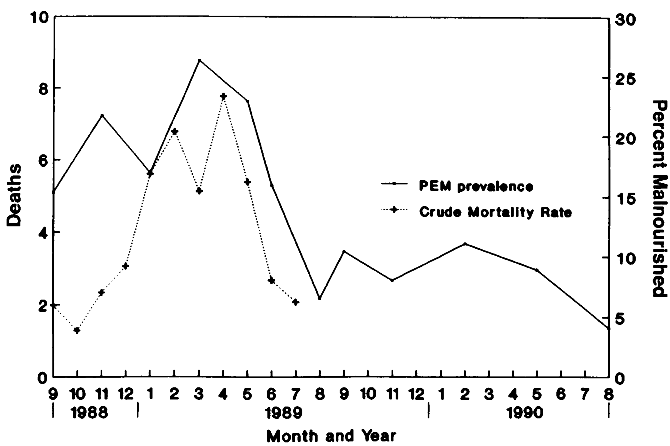
Surveillance data for Hartisheik A camp determined that 89% of deaths among hospitalized children aged <5 years during 1989 were caused by diarrheal diseases, acute lower respiratory infections (ALRI), and malnutrition. No measles deaths were reported. The major causes of death among hospitalized adults were ALRI, hepatitis, and tuberculosis.

For persons of all ages, health center records documented 5185 cases and 96 deaths attributed to hepatitis. Of these, 1116 (22%) cases and three deaths were in children <5 years of age. Cases peaked during March 1989. Serologic testing of a small number of hepatitis cases failed to identify the etiologic agent. From January through June 1990, a second outbreak of hepatitis in Hartisheik A camp accounted for 730 cases and 22 deaths. For this outbreak, although the overall case-fatality ratio (CFR) was 3.1%, the CFR among pregnant women was 20%.

The improvement in nutritional status of children in Hartisheik A camp coincided with the onset of the rainy season (usually May–September), when local food availability traditionally improves. The rains also provided the refugees with increased quantities of water in local dams and tanks. In the dry season (usually October–April), the sole supply of water had been well water trucked from the town of Jijiga, approximately 100 km (62 miles) away. Water from Jijiga provided an average of 3 L per person per day. The UNHCR recommends 15–20 L of water per person per day for drinking and domestic purposes (*5*).

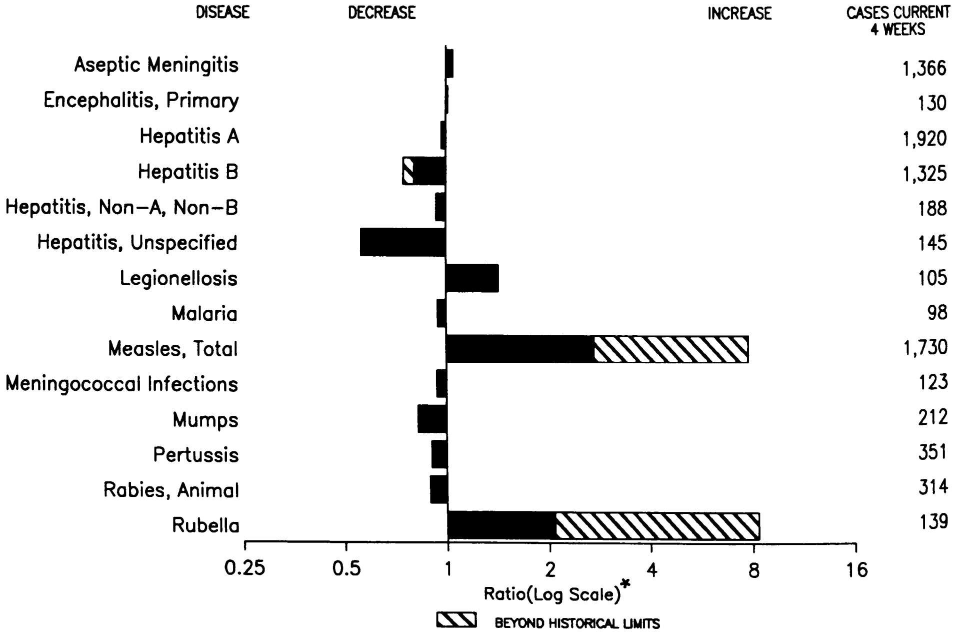
(Continued on page 715)

FIGURE 2. Prevalence of acute protein-energy malnutrition (PEM)* among children <5 years of age and crude mortality rates† — Hartisheik A camp, eastern Ethiopia, September 1988–August 1990



*Weight-for-height <80% of the median World Health Organization reference population (*2*).
†Deaths per 1000 persons of all ages per month.

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending October 6, 1990, with historical data — United States



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

TABLE I. Summary — cases of specified notifiable diseases, United States, cumulative, week ending October 6, 1990 (40th Week)

	Cum. 1990		Cum. 1990
AIDS	33,215	Plague	1
Anthrax	-	Poliomyelitis, Paralytic*	-
Botulism: Foodborne	15	Psittacosis	86
Infant	47	Rabies, human	1
Other	5	Syphilis: civilian	37,143
Brucellosis	62	military	179
Cholera	4	Syphilis, congenital, age < 1 year	685
Congenital rubella syndrome	3	Tetanus	44
Diphtheria	3	Toxic shock syndrome	234
Encephalitis, post-infectious	75	Trichinosis	22
Gonorrhea: civilian	509,896	Tuberculosis	17,793
military	6,831	Tularemia	105
Leprosy	163	Typhoid fever	361
Leptospirosis	36	Typhus fever, tickborne (RMSF)	533
Measles: imported	1,043		
indigenous	21,748		

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

TABLE II. Cases of specified notifiable diseases, United States, weeks ending October 6, 1990, and October 7, 1989 (40th Week)

Reporting Area	AIDS	Aseptic Menin-gitis	Encephalitis: Primary	Encephalitis: Post-in-fectious	Gonorrhea (Civilian)		Hepatitis (Viral), by type: A	Hepatitis (Viral), by type: B	Hepatitis (Viral), by type: NA,NB	Hepatitis (Viral), by type: Unspeci-fied	Legionel-losis	Leprosy
	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990
UNITED STATES	33,215	7,223	699	75	509,896	535,258	21,951	15,385	1,756	1,288	956	163
NEW ENGLAND	1,143	282	21	-	14,221	15,482	473	821	56	55	49	10
Maine	48	9	3	-	155	216	7	24	4	1	4	-
N.H.	51	29	-	-	119	135	7	36	5	3	4	-
Vt.	12	27	2	-	44	50	5	41	4	-	5	-
Mass.	636	96	10	-	5,998	5,945	316	513	33	49	29	9
R.I.	66	89	1	-	900	1,127	45	37	-	2	7	1
Conn.	330	32	5	-	7,005	8,009	93	170	10	-	-	-
MID. ATLANTIC	9,611	687	39	6	67,270	78,422	3,064	2,009	179	85	304	20
Upstate N.Y.	1,173	390	32	1	10,999	12,511	905	558	61	23	117	1
N.Y. City	5,577	120	3	2	27,232	31,867	459	540	24	43	77	14
N.J.	1,919	-	1	-	11,321	11,684	342	434	35	-	43	4
Pa.	942	177	3	3	17,718	22,360	1,358	477	59	19	67	1
E.N. CENTRAL	2,363	1,803	189	13	97,521	98,685	1,726	1,798	178	75	222	2
Ohio	521	372	60	4	29,800	26,160	158	312	65	12	71	-
Ind.	228	216	4	7	8,858	7,393	117	314	12	15	37	-
Ill.	965	316	57	2	31,514	31,953	867	350	37	16	15	1
Mich.	458	690	54	-	21,436	24,947	298	492	27	32	64	1
Wis.	191	209	14	-	5,913	8,232	286	330	37	-	35	-
W.N. CENTRAL	840	379	74	2	26,522	24,647	1,305	710	111	31	53	1
Minn.	147	63	38	1	3,336	2,735	182	88	24	1	4	-
Iowa	42	69	5	-	1,882	2,140	238	48	10	4	4	-
Mo.	487	158	7	1	15,989	15,057	391	442	50	20	26	-
N. Dak.	2	16	3	-	76	113	16	5	2	1	1	-
S. Dak.	3	6	3	-	207	207	205	7	4	-	2	-
Nebr.	43	28	7	-	1,314	1,155	77	30	4	-	9	1
Kans.	116	39	11	-	3,718	3,240	196	90	17	5	7	-
S. ATLANTIC	7,233	1,375	169	22	145,536	143,323	2,610	3,009	256	193	145	5
Del.	72	38	4	-	2,414	2,477	98	77	6	2	10	-
Md.	839	182	19	1	18,150	16,734	864	425	44	11	54	3
D.C.	571	9	-	-	9,962	8,802	14	36	4	-	1	-
Va.	580	251	42	1	13,728	12,374	244	196	33	139	11	-
W. Va.	58	47	41	-	960	1,080	17	64	4	7	4	-
N.C.	462	150	33	-	22,054	21,358	566	840	97	-	22	1
S.C.	287	18	1	-	11,628	13,200	34	473	14	8	17	-
Ga.	985	237	4	1	31,932	27,554	300	362	10	7	17	-
Fla.	3,379	443	25	19	34,708	39,744	473	536	44	19	9	1
E.S. CENTRAL	837	542	50	2	44,456	42,145	304	1,215	152	8	49	-
Ky.	146	135	22	-	4,606	4,148	72	416	45	6	20	-
Tenn.	272	108	21	2	14,014	14,220	142	655	88	-	16	-
Ala.	182	213	7	-	14,773	13,129	89	140	17	1	13	-
Miss.	237	86	-	-	11,063	10,648	1	4	2	1	-	-
W.S. CENTRAL	3,558	596	37	7	55,034	55,816	2,352	1,589	76	211	42	33
Ark.	168	20	1	-	6,894	6,520	414	64	9	19	9	-
La.	587	79	6	-	9,530	12,123	154	250	4	7	13	-
Okla.	158	63	3	6	4,696	4,844	467	128	23	21	13	-
Tex.	2,645	434	27	1	33,914	32,329	1,317	1,147	40	164	7	33
MOUNTAIN	870	307	19	2	10,075	11,434	3,562	1,159	172	96	38	2
Mont.	10	4	-	-	150	148	136	57	7	4	3	-
Idaho	20	7	-	-	107	142	79	65	8	-	3	-
Wyo.	2	2	1	-	123	81	49	14	5	1	1	-
Colo.	281	78	4	-	2,301	2,371	232	134	42	32	7	-
N. Mex.	75	15	-	-	981	1,037	723	155	9	7	3	-
Ariz.	264	150	7	-	4,147	4,767	1,649	406	62	36	11	2
Utah	82	25	3	-	310	364	436	85	23	6	3	-
Nev.	136	26	4	2	1,956	2,524	258	243	16	10	7	-
PACIFIC	6,760	1,252	101	21	49,261	65,304	6,555	3,075	576	534	54	90
Wash.	475	-	6	1	4,022	5,108	1,072	446	93	28	12	5
Oreg.	244	-	-	-	1,957	2,418	681	321	45	8	-	-
Calif.	5,891	1,080	88	19	42,104	56,627	4,574	2,202	423	489	40	70
Alaska	24	101	6	-	813	729	163	50	5	4	-	-
Hawaii	126	71	1	1	365	422	65	56	10	5	2	15
Guam	2	2	-	-	185	127	12	2	-	11	-	-
P.R.	1,278	59	6	-	541	850	117	249	5	22	-	6
V.I.	10	-	-	-	338	507	1	11	-	-	-	-
Amer. Samoa	-	1	-	-	51	41	26	-	-	-	-	10
C.N.M.I.	-	-	-	-	153	75	10	9	-	15	-	4

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

TABLE II. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending October 6, 1990, and October 7, 1989 (40th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1990	1990	Cum. 1990	1990	Cum. 1990	Cum. 1989	Cum. 1990	1990	Cum. 1990	1990	Cum. 1990	Cum. 1989	1990	Cum. 1990	Cum. 1989
UNITED STATES	903	25	21,748	1	1,043	13,213	1,910	50	4,170	78	2,837	2,817	132	934	314
NEW ENGLAND	76	-	263	-	25	333	144	1	38	5	323	298	-	8	6
Maine	1	-	27	-	2	1	12	-	-	-	10	17	-	1	-
N.H.	4	-	-	-	8	15	11	-	9	-	48	6	-	1	4
Vt.	6	-	-	-	1	3	11	1	2	-	6	6	-	-	1
Mass.	40	-	22	-	7	60	66	-	11	-	232	242	-	2	1
R.I.	8	-	27	-	3	41	12	-	5	-	4	11	-	1	-
Conn.	17	-	187	-	4	213	32	-	11	5	23	16	-	3	-
MID. ATLANTIC	195	3	1,174	1	155	963	303	2	268	21	452	210	-	11	34
Upstate N.Y.	41	3	203	1†	111	152	111	2	118	3	296	90	-	10	13
N.Y. City	72	-	362	-	21	111	43	-	-	-	-	5	-	-	15
N.J.	59	-	234	-	14	437	63	-	63	-	21	31	-	-	6
Pa.	23	-	375	-	9	263	86	-	87	18	135	84	-	1	-
E.N. CENTRAL	55	1	3,253	-	143	4,473	249	-	441	3	530	386	130	161	27
Ohio	7	-	549	-	3	1,244	80	-	89	-	154	45	130	131	3
Ind.	3	1	325	-	1	78	24	-	19	3	103	19	-	-	-
Ill.	22	-	1,286	-	10	2,575	64	-	154	-	103	132	-	18	20
Mich.	16	-	348	-	125	322	60	-	133	-	73	40	-	9	1
Wis.	7	-	745	-	4	254	21	-	46	-	97	150	-	3	3
W.N. CENTRAL	16	11	878	-	14	685	61	-	134	3	167	191	-	22	6
Minn.	4	11	417	-	4	23	12	-	14	-	31	51	-	17	-
Iowa	2	-	25	-	1	11	1	-	19	-	18	14	-	4	1
Mo.	9	-	96	-	-	398	25	-	54	2	89	114	-	-	4
N. Dak.	-	-	-	-	-	-	1	-	-	-	2	2	-	1	-
S. Dak.	-	-	15	-	8	-	2	-	-	-	1	1	-	-	-
Nebr.	-	-	97	-	1	113	5	-	5	-	7	6	-	-	-
Kans.	1	-	228	-	-	140	15	-	42	1	19	3	-	-	1
S. ATLANTIC	182	2	890	-	356	614	339	18	1,728	9	255	283	1	19	10
Del.	3	-	8	-	3	40	3	-	4	-	5	1	-	-	-
Md.	51	-	194	-	18	97	39	13	977	1	60	54	-	2	2
D.C.	10	-	15	-	7	40	11	-	33	-	14	-	-	1	-
Va.	47	-	84	-	2	22	43	1	98	-	17	32	-	1	-
W. Va.	2	-	6	-	-	53	13	-	42	-	20	26	-	-	-
N.C.	13	-	9	-	15	187	50	-	281	-	64	58	-	-	1
S.C.	-	-	4	-	-	3	24	1	51	-	5	-	-	-	-
Ga.	15	-	82	-	239	2	57	3	85	8	32	37	-	-	-
Fla.	41	2	488	-	72	170	99	-	157	-	38	75	1	15	7
E.S. CENTRAL	19	2	183	-	3	233	116	2	90	4	142	189	-	5	3
Ky.	2	1	41	-	1	44	34	-	-	-	-	1	-	1	-
Tenn.	9	1	93	-	-	139	50	2	51	2	68	109	-	4	2
Ala.	8	-	23	-	2	50	30	-	14	1	66	68	-	-	1
Miss.	-	-	26	-	-	-	2	-	25	1	8	11	-	-	-
W.S. CENTRAL	50	-	4,182	-	91	3,172	133	10	628	4	153	289	-	66	36
Ark.	3	-	16	-	28	19	16	1	135	2	17	21	-	3	-
La.	6	-	10	-	-	11	30	4	107	2	30	18	-	-	5
Okla.	9	-	177	-	-	110	20	-	111	-	47	48	-	1	1
Tex.	32	-	3,979	-	63	3,032	67	5	275	-	59	202	-	62	30
MOUNTAIN	22	4	828	-	100	411	63	1	313	2	243	569	-	109	36
Mont.	1	-	-	-	1	13	10	-	1	-	32	33	-	14	1
Idaho	4	-	16	-	10	7	6	-	143	-	38	67	-	49	32
Wyo.	1	-	-	-	15	-	-	-	2	-	-	-	-	-	2
Colo.	2	-	91	-	47	96	19	-	23	-	74	61	-	4	-
N. Mex.	4	-	81	-	12	31	9	N	N	-	17	26	-	-	-
Ariz.	9	-	291	-	12	145	5	1	120	-	49	362	-	32	-
Utah	-	-	127	-	-	114	7	-	9	2	29	19	-	2	-
Nev.	1	4	222	-	3	5	7	-	15	-	4	1	-	8	1
PACIFIC	288	210097	-	156	2,329	502	16	530	27	572	402	1	533	156	
Wash.	22	-	202	-	69	54	62	2	46	10	155	162	-	-	-
Oreg.	12	-	168	-	44	29	55	N	N	5	72	14	-	11	4
Calif.	248	-	9,631	-	37	2,216	371	13	460	12	292	204	1	509	130
Alaska	2	-	78	-	2	1	9	-	4	-	4	1	-	-	-
Hawaii	4	2	18	-	4	32	5	1	20	-	49	21	-	13	22
Guam	3	U	-	U	1	4	-	U	4	U	1	1	U	-	-
P.R.	3	3	1,653	-	-	546	10	-	7	3	10	4	-	-	8
V.I.	-	-	21	-	3	4	-	1	11	-	-	-	-	-	-
Amer. Samoa	35	U	190	U	-	-	-	U	19	U	-	-	U	-	-
C.N.M.I.	-	U	-	U	-	-	-	U	8	U	4	-	U	-	-

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

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

TABLE II. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending October 6, 1990, and October 7, 1989 (40th Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990
UNITED STATES	37,143	33,211	234	17,793	16,328	105	361	533	3,299
NEW ENGLAND	1,325	1,316	19	433	449	3	22	18	5
Maine	7	11	7	6	12	-	-	-	-
N.H.	40	11	1	3	19	-	-	1	2
Vt.	1	1	1	8	8	-	-	-	-
Mass.	531	392	8	226	238	3	21	15	-
R.I.	17	26	1	56	53	-	-	-	-
Conn.	729	875	1	134	119	-	1	2	3
MID. ATLANTIC	7,076	6,911	23	4,259	3,238	1	77	24	723
Upstate N.Y.	673	725	8	308	256	-	16	13	91
N.Y. City	3,314	3,094	5	2,664	1,815	-	44	-	-
N.J.	1,196	1,098	-	710	626	1	14	7	254
Pa.	1,893	1,994	10	577	541	-	3	4	378
E.N. CENTRAL	2,701	1,410	52	1,727	1,660	2	27	44	148
Ohio	413	121	18	309	288	1	6	32	9
Ind.	76	50	1	151	156	1	1	2	14
Ill.	1,127	603	8	877	759	-	13	2	26
Mich.	819	507	25	322	364	-	6	8	46
Wis.	266	129	-	68	93	-	1	-	53
W.N. CENTRAL	394	254	26	459	412	37	5	46	535
Minn.	71	39	2	84	75	-	-	-	202
Iowa	57	29	7	44	44	-	1	1	17
Mo.	213	133	8	239	190	28	3	29	23
N. Dak.	1	3	-	16	12	-	-	-	74
S. Dak.	1	1	-	10	24	4	-	2	177
Nebr.	9	21	3	15	18	3	-	1	4
Kans.	42	28	6	51	49	2	1	13	38
S. ATLANTIC	12,696	11,830	21	3,314	3,460	4	62	225	921
Del.	141	152	1	28	34	-	-	1	22
Md.	928	609	1	233	304	-	31	16	348
D.C.	881	623	1	123	143	-	-	2	-
Va.	660	435	2	283	281	1	6	19	153
W. Va.	64	14	-	53	59	-	1	1	34
N.C.	1,333	819	10	452	423	2	2	131	8
S.C.	808	640	2	370	383	1	1	37	108
Ga.	3,130	2,946	1	567	531	-	2	16	168
Fla.	4,751	5,592	3	1,205	1,302	-	19	2	80
E.S. CENTRAL	3,498	2,318	12	1,286	1,282	7	3	69	147
Ky.	72	43	2	296	308	1	1	10	42
Tenn.	1,480	1,032	8	360	405	6	1	49	27
Ala.	1,050	695	2	388	359	-	1	10	75
Miss.	896	548	-	242	210	-	-	-	3
W.S. CENTRAL	5,564	4,513	11	2,081	1,975	34	11	87	379
Ark.	443	292	-	273	201	26	-	18	30
La.	1,176	1,107	1	185	264	-	-	2	28
Okla.	193	87	7	153	176	8	2	61	110
Tex.	3,752	3,027	3	1,470	1,334	-	9	6	211
MOUNTAIN	688	516	26	419	379	13	18	10	187
Mont.	-	1	-	22	11	-	-	4	42
Idaho	6	1	2	11	22	-	-	-	6
Wyo.	2	6	2	5	-	3	-	-	47
Colo.	38	58	7	27	39	3	-	1	20
N. Mex.	35	25	3	83	66	4	-	1	10
Ariz.	495	240	8	188	169	-	16	1	30
Utah	11	13	4	32	36	3	-	3	15
Nev.	101	172	-	51	36	-	2	-	17
PACIFIC	3,201	4,143	44	3,815	3,473	4	136	10	254
Wash.	252	359	4	213	185	1	20	2	-
Oreg.	107	186	2	99	107	-	4	1	1
Calif.	2,819	3,585	37	3,324	2,998	-	105	2	231
Alaska	15	3	-	32	49	3	-	-	22
Hawaii	8	10	1	147	134	-	7	5	-
Guam	2	4	-	34	65	-	-	-	-
P.R.	246	419	-	66	229	-	1	-	33
V.I.	10	8	-	4	4	-	-	-	-
Amer. Samoa	-	-	-	12	7	-	1	-	-
C.N.M.I.	3	8	-	42	23	-	4	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending October 6, 1990 (40th Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	627	441	105	48	15	17	51
Boston, Mass.	155	91	27	24	6	6	15
Bridgeport, Conn.	45	35	5	3	2	-	2
Cambridge, Mass.	19	16	3	-	-	-	4
Fall River, Mass.	29	29	-	-	-	-	1
Hartford, Conn.	72	45	14	7	1	5	7
Lowell, Mass.	29	21	5	3	-	-	3
Lynn, Mass.	13	8	2	2	-	1	1
New Bedford, Mass.	20	19	1	-	-	-	1
New Haven, Conn.	56	39	9	5	2	1	4
Providence, R.I.	43	35	5	1	1	1	3
Somerville, Mass.	7	4	2	-	1	-	-
Springfield, Mass.	49	32	15	1	-	1	3
Waterbury, Conn.	24	19	3	1	1	-	2
Worcester, Mass.	66	48	14	1	1	2	5
MID. ATLANTIC	2,632	1,670	528	299	69	65	151
Albany, N.Y.	47	34	7	3	1	2	2
Allentown, Pa.	6	3	1	1	1	-	-
Buffalo, N.Y.	103	77	20	2	2	2	5
Camden, N.J.	45	29	6	6	4	-	-
Elizabeth, N.J.	28	18	7	2	1	-	2
Erie, Pa.†	37	28	6	3	-	-	4
Jersey City, N.J.	53	40	8	5	-	-	1
N.Y. City, N.Y.	1,325	812	260	187	30	36	61
Newark, N.J.	59	23	21	9	4	2	7
Paterson, N.J.	31	14	9	7	-	1	2
Philadelphia, Pa.	512	303	121	53	19	15	22
Pittsburgh, Pa.†	54	36	8	7	2	1	9
Reading, Pa.	43	35	8	-	-	-	9
Rochester, N.Y.	97	76	12	4	2	3	14
Schenectady, N.Y.	27	18	7	1	-	1	3
Scranton, Pa.†	25	23	1	-	1	-	1
Syracuse, N.Y.	76	55	14	4	1	2	2
Trenton, N.J.	21	15	5	1	-	-	2
Utica, N.Y.	17	13	2	2	-	-	3
Yonkers, N.Y.	26	18	5	2	1	-	2
E.N. CENTRAL	2,265	1,488	476	162	57	81	108
Akron, Ohio	48	35	8	4	-	1	-
Canton, Ohio	34	23	8	1	-	2	4
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	133	82	35	8	5	3	20
Cleveland, Ohio	145	88	32	13	7	5	7
Columbus, Ohio	166	104	33	14	5	10	7
Dayton, Ohio	110	77	22	8	-	3	4
Detroit, Mich.	271	154	65	27	11	13	4
Evansville, Ind.	29	19	8	1	-	1	1
Fort Wayne, Ind.	62	42	13	4	2	1	2
Gary, Ind.	18	11	4	1	2	-	-
Grand Rapids, Mich.	45	34	5	-	2	4	2
Indianapolis, Ind.	168	103	37	14	5	9	13
Madison, Wis.	38	26	7	3	1	1	2
Milwaukee, Wis.	143	108	24	7	2	2	5
Peoria, Ill.	56	47	7	2	-	-	4
Rockford, Ill.	52	40	6	3	2	1	7
South Bend, Ind.	22	17	3	2	-	-	3
Toledo, Ohio	101	75	17	3	3	3	6
Youngstown, Ohio	60	41	17	2	-	-	1
W.N. CENTRAL	742	525	134	41	21	21	28
Des Moines, Iowa	60	43	14	2	1	-	1
Duluth, Minn.	27	20	4	3	-	-	2
Kansas City, Kans.	33	23	7	3	-	-	1
Kansas City, Mo.	100	73	20	5	2	-	2
Lincoln, Nebr.	25	17	3	4	-	1	1
Minneapolis, Minn.	166	115	25	9	8	9	10
Omaha, Nebr.	97	72	21	1	1	2	3
St. Louis, Mo.	124	81	26	5	8	4	5
St. Paul, Minn.	48	34	6	6	-	2	1
Wichita, Kans.	62	47	8	3	1	3	2
S. ATLANTIC	1,234	728	268	143	47	48	55
Atlanta, Ga.	153	73	39	29	5	7	3
Baltimore, Md.	180	107	39	24	6	4	10
Charlotte, N.C.	78	49	20	3	2	4	6
Jacksonville, Fla.	112	74	22	9	6	1	6
Miami, Fla.	147	81	34	18	6	8	1
Norfolk, Va.	82	56	11	5	5	5	6
Richmond, Va.	73	46	16	6	1	4	5
Savannah, Ga.	34	23	5	4	-	2	4
St. Petersburg, Fla.	60	48	8	1	-	3	4
Tampa, Fla.	104	65	26	10	3	-	6
Washington, D.C.§	194	96	44	32	13	9	4
Wilmington, Del.	17	10	4	2	-	1	-
E.S. CENTRAL	659	422	135	61	23	18	39
Birmingham, Ala.	115	77	23	9	2	4	4
Chattanooga, Tenn.	52	31	13	6	1	1	2
Knoxville, Tenn.	47	30	10	4	2	1	2
Louisville, Ky.	78	49	19	4	2	4	5
Memphis, Tenn.	146	91	27	17	6	5	11
Mobile, Ala.	64	43	13	5	2	1	5
Montgomery, Ala.	39	26	9	2	1	1	3
Nashville, Tenn.	118	75	21	14	7	1	7
W.S. CENTRAL	1,738	1,066	364	197	65	46	59
Austin, Tex.	59	37	11	8	2	1	6
Baton Rouge, La.	37	30	4	3	-	-	6
Corpus Christi, Tex.	46	29	9	6	1	1	1
Dallas, Tex.	231	136	43	33	8	11	4
El Paso, Tex.	66	46	13	5	2	-	3
Fort Worth, Tex	81	49	16	6	4	6	6
Houston, Tex.§	734	436	169	89	24	16	18
Little Rock, Ark.	87	54	16	6	5	6	2
New Orleans, La.	135	82	30	11	9	3	-
San Antonio, Tex.	151	102	31	14	4	-	5
Shreveport, La.	44	19	15	7	3	-	-
Tulsa, Okla.	67	46	7	9	3	2	8
MOUNTAIN	611	373	108	79	21	30	35
Albuquerque, N. Mex.	65	39	8	11	4	3	1
Colo. Springs, Colo.	49	33	6	8	1	1	7
Denver, Colo.	86	51	12	13	4	6	6
Las Vegas, Nev.	107	58	26	15	5	3	5
Ogden, Utah	16	13	3	-	-	-	1
Phoenix, Ariz.	125	76	26	14	3	6	4
Pueblo, Colo.	29	22	3	2	-	2	2
Salt Lake City, Utah	35	17	6	5	3	4	3
Tucson, Ariz.	99	64	18	11	1	5	6
PACIFIC	1,652	1,057	325	175	44	48	107
Berkeley, Calif.	15	9	4	2	-	-	1
Fresno, Calif.	84	59	15	6	1	3	4
Glendale, Calif.	18	14	2	1	1	-	1
Honolulu, Hawaii	73	47	14	9	1	2	11
Long Beach, Calif.	74	47	14	8	1	4	16
Los Angeles Calif.	370	236	73	45	10	4	16
Oakland, Calif.§	58	36	11	6	4	1	3
Pasadena, Calif.	30	22	4	1	1	2	1
Portland, Oreg.	100	70	17	5	2	6	3
Sacramento, Calif.	139	86	31	10	7	5	14
San Diego, Calif.	144	89	32	15	3	5	15
San Francisco, Calif.	136	76	25	26	2	6	2
San Jose, Calif.	176	120	34	15	4	3	11
Seattle, Wash.	138	84	35	15	3	1	2
Spokane, Wash.	59	40	8	8	2	1	1
Tacoma, Wash.	38	22	6	3	2	5	6
TOTAL	12,160††	7,770	2,443	1,205	362	374	633

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

**Pneumonia and influenza.

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

††Total includes unknown ages.

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

Refugee Health Status — Continued

Although data on nutrition and mortality in the other four camps were limited, trends were similar to Hartisheik A: acute PEM prevalence rates steadily decreased after May 1989 (Table 1). Population-based mortality surveys in June 1990 indicated that substantial improvement had occurred in the five camps since 1989. The decrease in CMR between the two periods surveyed (August 1988–July 1989 and November 1989–May 1990) ranged from 32% to 62%.

Western Ethiopia (Sudanese refugees)

Since 1983, refugees from southern Sudan have entered western Ethiopia, where they are now housed in three camps: Dimma, Fugnido, and Itang (Figure 1). By June 1990, an estimated 380,000 Sudanese refugees had been registered for relief assistance. In Dimma and Fugnido camps, <5% of the population were children aged <5 years; in Itang, >20% of the population were children aged <5 years, which is more typical of rural African communities.

From April through June 1990, approximately 20,000 new refugees from Sudan entered Ethiopia and were placed in a well-defined area of Itang camp. Before the addition of these new arrivals, the population of the camp was approximately 240,000.

A June 1990 review of the health status of refugees in western Ethiopia indicated that CMRs were relatively low in all camp populations except the new refugees in Itang. From mid-April through May 1990, a community-based mortality surveillance system for this population, based on interviews with family members of deceased refugees, indicated a CMR equivalent to 6.9 per 1000 per month. In comparison, the monthly CMR in the remaining Itang population was 0.6 per 1000 during the same period, although this may be an underestimate because population data were incomplete. Clinic-based records suggested that the most common causes of morbidity in the newly arrived refugee population were febrile illnesses (most likely caused by malaria) and diarrheal diseases. These two diagnoses accounted for 72% of all clinic visits.

Based on anthropometric screening of children <5 years of age among the new group, the prevalence of acute PEM was 58% when they arrived at Itang. In July 1990, a cluster sample survey by the joint agency survey team[¶] indicated that in the new

[¶]Administration for Refugee Affairs and Ministry of Health, GOE; UNHCR; and Médecins Sans Frontières (Belgium and Holland).

TABLE 1. Percentage of children <5 years of age with acute protein-energy malnutrition* in five camp populations of Somali refugees — eastern Ethiopia, 1989–1990

	1989						1990		
Camp	Jan	Mar	May	Jul	Aug	Nov	Feb	May	Aug
Hartisheik A	16.9	26.3	22.9	15.9	6.5	8.0	11.1	8.9	4.1
Hartisheik B	12.5	29.4	15.7	11.5	—[†]	13.8	10.2	8.1	4.3
Camaboker	17.0	24.8	—	2.3	—	7.0	—	4.9	—
Rabasso	15.0	14.5	—	3.9	—	6.4	—	6.5	—
Daror	13.9	21.3	—	9.1	—	9.8	—	4.6	—

*Weight-for-height <80% of the median World Health Organization reference population (*2*).
[†]No data collected.

Refugee Health Status — Continued

refugee population in Itang 36% of children <5 years of age were acutely malnourished (95% CI=32–40), compared with 7% (95% CI=5–10) of children in this age group in Fugnido. In March 1990, 12% (95% CI=9–15) of children <5 years of age in the stable Itang population were acutely malnourished.

Although a population-based vaccination coverage rate was not estimated in the review, the quantity of vaccine administered indicated that approximately 85% of the target population of children aged 6 months to 5 years received measles vaccinations during April and May 1990.

The June 1990 health status review indicated that adequate quantities of food rations were available for new arrivals in Itang; however, both enrollment and attendance rates of malnourished children in nutrition rehabilitation programs (supplementary and therapeutic feeding) were low. In addition, the quantity of water being provided to new refugees (an average of 0.8 L per person per day) was inadequate.

Reported by: Administration for Refugee Affairs, Ministry of Internal Affairs; Regional Liaison Office of the United Nations High Commissioner for Refugees; Save the Children Fund (United Kingdom); Médecins Sans Frontières (Belgium and Holland), Addis Ababa, Ethiopia. Bur for Refugee Programs, US Department of State. Technical Support Div, International Health Program Office, CDC.

Editorial Note: Risk factors and diseases that increase mortality in dependent refugee populations in developing countries include malnutrition, diarrheal diseases, measles, malaria, and pneumonia (*6*). In this report, inadequate food rations contributed to high malnutrition prevalence rates among children aged <5 years. Inadequate food rations resulted from the remoteness of some of the refugee camps, difficult logistics of food transport and storage, and the limited variety of food items supplied to refugees. Imprecise refugee population counts also contributed to the distribution of inadequate food rations. In addition to inadequate rations, high PEM prevalence was probably associated with high incidences of diarrheal and other communicable diseases, which in turn were associated with insufficient water supplies. In western Ethiopia, new refugees from southern Sudan had high PEM prevalence rates when they arrived because of widespread food shortages in their native homelands.

In Hartisheik A camp, the increase in PEM in early 1989 resulted in substantial excess mortality. In this camp, two interventions improved nutritional status and decreased mortality: supplementary rations for all children aged <5 years and improved census data that allowed for more equitable distribution of rations. Supplementary rations were probably more effective because they were targeted for those at greatest risk: PEM prevalence decreased soon after supplementary feeding was instituted in May and before the August census. Improvements in Hartisheik A camp also coincided with increases in the quantity of water available and with normal seasonal improvements in childhood nutrition in the region.

Community-based mortality surveillance in refugee camps should be implemented as soon as possible after camps are established; however, when mortality surveillance cannot be implemented, PEM prevalence rates can be used reliably as indicators of death rates (*6*). In nonrefugee, nonfamine-affected populations in sub-Saharan Africa, which usually have acute PEM prevalence rates <5% (*7*), a PEM prevalence rate of 5.0%–9.9% has been associated with a more than twofold increase in CMR, and PEM prevalence rates of 10.0%–19.9%, with a mortality risk ratio of 4.7 (*8*). The 1989 data from Hartisheik A camp and the 1990 data from Itang are consistent with these findings.

Refugee Health Status — Continued

The monitoring of vaccination coverage for measles, which should be an integral part of a health-information system in refugee populations, is facilitated through the routine distribution of vaccination record cards. Unlike some refugee emergencies (*6*), measles has not been a major cause of childhood deaths in eastern Ethiopia—possibly because measles vaccination coverage rates were high before the refugees' departure from northwest Somalia, where a community-based health-care program had been in place for several years (*9*).

Because diarrheal diseases are an important cause of death among children in refugee camps (*6*), health programs should emphasize provision of adequate supplies of clean water, sanitation, and prompt treatment of dehydration with Oral Rehydration Salts. The two hepatitis outbreaks in Hartisheik A camp may have been associated with the scarcity of water and its impact on personal hygiene. A similar outbreak during 1986 in a refugee camp in Somalia (<100 km from Hartisheik) was attributed to enterically transmitted, non-A, non-B viral hepatitis (hepatitis E) (*10*). Although hepatitis has not contributed to a large proportion of all deaths in the camps, the outbreaks highlight the vulnerability of refugees to epidemics of potentially lethal water-related diseases.

In Itang, an acute health emergency was superimposed on an otherwise stable refugee-relief situation by the sudden arrival of a large group of severely malnourished refugees. Relief efforts have focused on the provision of adequate food rations, nutrition rehabilitation programs for the acutely malnourished, and measles vaccination. With high PEM prevalence rates and low feeding program enrollment rates in this new population, however, vigorous efforts are necessary to identify all malnourished children: supplementary feeding programs have limited effectiveness in the absence of effective community outreach (*11*).

Recommendations of the June 1990 review stressed improvements in water supply in both eastern and western camps; strengthening of surveillance for mortality, malnutrition, and potentially epidemic communicable diseases; active case-finding for malnourished children; better vaccination records; establishment of oral rehydration units; and formulation of standard public health policy guidelines for the camps. The emergency created by the large influx of new refugees into Itang and the recurrent outbreaks of communicable diseases in Hartisheik underscore the need for detailed emergency preparedness plans in each camp.

References

1. CDC. Nutritional status of Somali refugees—eastern Ethiopia, September 1988–May 1989. MMWR 1989;38:455–6,461–3.
2. World Health Organization. Measuring change in nutritional status: guidelines for assessing the nutritional impact of supplementary feeding programmes for vulnerable groups. Geneva: World Health Organization, 1983.
3. United Nations Children's Fund. The state of the world's children 1990. New York: Oxford University Press, 1990:84.
4. Institute for Resource Development. Demographic and Health Survey, Uganda 1989. Columbia, Maryland: Macro Systems, 1989:53–8.
5. Office of the United Nations High Commissioner for Refugees. Handbook for emergencies. Geneva: United Nations High Commissioner for Refugees, 1982:100.
6. Toole MJ, Waldman RJ. Prevention of excess mortality in refugee and displaced populations in developing countries. JAMA 1990;263:3296–302.
7. Serdula M, Seward J. Diet, malnutrition, and mortality. In: Proceedings of Seminar on Mortality and Society in Sub-Saharan Africa, Yaounde, Cameroun, October 19–23, 1987. Liege, Belgium: International Union for the Scientific Study of Population, 1987.

Refugee Health Status — Continued

8. Person-Karell B. The relationship between child malnutrition and crude mortality among 42 refugee populations [Thesis]. Atlanta: Emory University, 1989.
9. Bentley C. Primary health care in northwestern Somalia: a case study. Soc Sci Med 1989;28:1019–30.
10. CDC. Enterically transmitted, non-A, non-B hepatitis—East Africa. MMWR 1987;36:241–4.
11. Taylor WR. An evaluation of supplementary feeding in Somali refugee camps. Int J Epidemiol 1983;12:433–6.

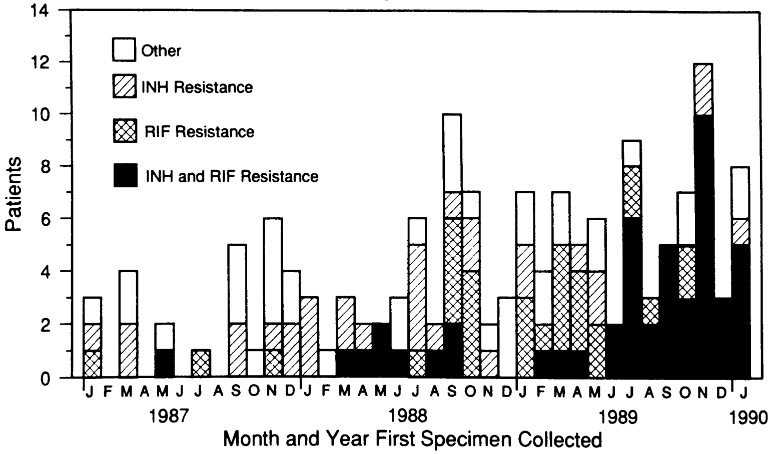
Epidemiologic Notes and Reports

Nosocomial Transmission of Multidrug-Resistant Tuberculosis to Health-Care Workers and HIV-Infected Patients in an Urban Hospital — Florida

From January through April 1990, tuberculin skin-test conversions* occurred among eight health-care workers (HCWs) on a specialized ward for human immunodeficiency virus (HIV)-infected patients at a large urban hospital in Florida. In February 1990, hospital personnel initiated an investigation of possible nosocomial transmission of tuberculosis (TB) at the hospital. In May, the hospital laboratory reported that the number of isolates of *Mycobacterium tuberculosis* resistant to multiple anti-TB drugs had increased during 1989 (Figure 1). This report provides preliminary findings from the ongoing investigation of possible nosocomial transmission of multidrug-resistant TB (MDR-TB) at the hospital. The investigation is being conducted by the hospital, the local health department, the Florida Department of Health and Rehabilitative Services, and CDC.

*Reaction of ≥10 mm to a Mantoux skin test using 5 tuberculin units of purified protein derivative in a person who previously had no reaction.

FIGURE 1. Patients with drug-resistant *Mycobacterium tuberculosis* isolates at a large urban hospital, by drug* susceptibility pattern and by month of first specimen collection — Florida, January 1987–January 1990



*INH = isoniazid; RIF = rifampin.

Multidrug-Resistant Tuberculosis — Continued

A case of MDR-TB was defined as a positive culture for *M. tuberculosis* in any patient at the hospital from January 1, 1988, through January 31, 1990, whose clinical course was consistent with TB and whose isolate was resistant to at least isoniazid (INH) and rifampin. Drug-resistant isolates were identified by review of microbiology records at the hospital and at the state mycobacteriology laboratory. Twenty-nine cases were identified, of which 22 (76%) were diagnosed between June 1, 1989, and January 31, 1990. Nine (31%) of the 29 case-patients had medical-record evidence of prior TB or a positive tuberculin skin test.

To identify risk factors for MDR-TB, a case-control study was conducted by comparing case-patients with randomly selected TB patients at the hospital with drug-susceptible *M. tuberculosis* isolates. Case-patients were more likely to have HIV infection or acquired immunodeficiency syndrome than control-patients (27/29 vs. 16/28; odds ratio [OR] = 10.1; 95% confidence interval [CI] = 1.8–100.4).

A second case-control study compared case-patients with randomly selected patients at the hospital who had both HIV infection and TB with drug-susceptible *M. tuberculosis* isolates. This study found that case-patients were more likely to have had opportunistic infections (e.g., *Pneumocystis carinii* pneumonia) before their TB diagnosis (18/29 vs. 3/29; OR = 14.2; 95% CI = 3.1–85.7) and less likely to respond clinically to anti-TB therapy (4/27 vs. 21/24; OR = 0.02; 95% CI = 0.0–0.2). Before onset of TB, case-patients were more likely to have attended the HIV clinic on the same day as and/or to have been hospitalized on the HIV ward at the same time as a case-patient with acid-fast bacilli (AFB)-smear–positive sputum (14/29 vs. 1/29; OR = 26.1; 95% CI = 3.2–1143.2). Two case-patients who did not have hospital exposure were household contacts of another case-patient. Compared with controls, case-patients were hospitalized and/or in the HIV clinic more days while sputum AFB-smear–positive (mean: 23 vs. 7 days, $p = 0.002$). There were no statistically significant differences between case- and control-patients in sex, age, race, or HIV transmission category.

From January 1988 through July 1990, 10 (36%) of 28 HIV-ward HCWs had documented skin-test conversions (27 conversions per 100 person years); in the HIV clinic, three (25%) of 12 susceptible HCWs had documented skin-test conversions (16 per 100 person years). In contrast, on a thoracic surgery ward where patients with TB were rarely admitted, none of 15 susceptible HCWs had skin-test conversions during the same period. The probable periods of exposure for the 10 HCW converters on the HIV ward coincided with the periods that case-patients who were sputum AFB-smear–positive were hospitalized on that ward.

Infection-control policy on the HIV ward required that patients with any pulmonary symptoms and/or abnormal chest radiographs be routinely placed in TB isolation (AFB isolation) until TB was excluded or until they had been on anti-TB therapy for at least 7 days. For some patients who presented with nonpulmonary complaints, TB was not initially suspected, and they were not placed in AFB isolation. Patients with TB who were on anti-TB drugs were not routinely placed in isolation on readmission; however, some of these patients were later recognized to have AFB-smear–positive MDR-TB.

Hospital personnel reported that, on the HIV ward, doors of AFB isolation rooms were sometimes left open, and HCWs and visitors entering the rooms sometimes used masks improperly. Patients in isolation were sometimes allowed to leave their

Multidrug-Resistant Tuberculosis — Continued

rooms if they wore masks; however, patients sometimes removed masks for short periods while out of their rooms. Aerosolized pentamidine treatments and diagnostic sputum inductions were performed at the bedside. All 24 rooms on the HIV ward were used for AFB isolation. Testing of 23 of these rooms with smoke tubes indicated that six had positive pressure relative to the hallway.

Patients with TB (including some subsequently reported to have MDR-TB) received follow-up care, including aerosolized pentamidine administration and sputum inductions, at the HIV clinic. Based on tests using smoke tubes, the pentamidine rooms had positive pressure relative to the central treatment area, which, in turn, had positive pressure relative to the adjacent waiting area. The engineering diagrams indicated that air from the sputum induction room was recirculated into other areas of the HIV clinic.

Primary isolation and identification of *M. tuberculosis* was performed at the hospital's mycobacteriology laboratory. Isolates were then sent to the state mycobacteriology laboratory for drug-susceptibility testing. Because of the time required for completion and verification of susceptibility testing, results were not available to clinicians for at least 8 weeks after specimen collection.

Reported by: R Uttamchandani, MD, R Reyes, MD, S Dittes, MD, T Cleary, PhD, A Pitchenik, MD, M Fischl, MD, Univ of Miami; J Otten, A Breeden, C Hilsenbeck, PhD, Jackson Memorial Hospital; J Burr, MD, Dade County Public Health Unit; J Simmons, MD, District 11, W Bigler, PhD, H Valdez, R Cacciatore, J Witte, MD, RA Calder, MD, State Epidemiologist, Florida Dept of Health and Rehabilitative Svcs. Hospital Infections Program, Center for Infectious Diseases; Div of Tuberculosis Control, Center for Prevention Svcs, CDC.

Editorial Note: Although airborne transmission of *M. tuberculosis* in health-care settings has been described (*1–4*), this appears to be the first documentation of nosocomial transmission of drug-resistant TB. The clinical and epidemiologic findings in this investigation suggest that most MDR-TB cases were newly acquired tuberculous infection rather than reactivation of latent infection. In addition, the findings indicate transmission of infection to household contacts and, possibly, to HCWs.

Factors that may have contributed to this outbreak included 1) delays in adequate treatment of MDR-TB because of the length of time required to perform and verify drug-susceptibility tests; 2) prolonged periods of infectiousness in patients whose cure was delayed by MDR-TB; 3) inadequate duration of, and occasional lapses in, AFB isolation precautions on the HIV ward; 4) delays in recognition of TB in some patients (*5*); 5) presence of MDR-TB patients in the HIV clinic while still infectious because of delayed recognition of drug resistance; and 6) improperly balanced ventilation in the HIV ward and clinic.

To reduce the risk for nosocomial TB transmission, patients with suspected or confirmed TB should be placed in AFB isolation and started on effective anti-TB therapy. While hospitalized, they should remain in AFB isolation until clinically improved with substantial reduction in cough and until the number of organisms on sequential sputum AFB smears is decreasing (*6,7*; CDC, unpublished data[†]). Determination of infectiousness should be based on assessment of both clinical *and* bacteriologic response to therapy (*6,7*; CDC, unpublished data). Patients who are likely to be infected with drug-resistant organisms should remain in AFB isolation until AFB smears are negative (*6*; CDC, unpublished data). Patients with infectious TB

[†]Updated guidelines for preventing transmission of TB in health-care settings where persons with HIV infections receive care are in preparation as an *MMWR Recommendations and Reports.*

Multidrug-Resistant Tuberculosis — Continued

should not be discharged to homes with immunocompromised persons or to community group settings (e.g., correctional facilities, nursing homes, hospices, or other organized group homes) unless AFB precautions can be provided. After patients are discharged, they should be followed with serial sputum AFB smears to verify continued bacteriologic response to therapy. When TB patients return for follow-up care, provisions should be made to prevent TB transmission in the outpatient setting (CDC, unpublished data).

Initial *M. tuberculosis* isolates from all patients should be tested for drug susceptibility. Radiometric techniques may reduce the time required for culture and drug- susceptibility testing (*8*). All drug-resistant isolates should be reported to care providers rapidly so that adequate therapy can be ensured. All patients with drug-resistant TB and all patients at high risk for noncompliance should be placed on directly observed therapy.

Ventilation in AFB isolation rooms and other areas of health-care facilities should be designed and maintained according to published guidelines (*6*; CDC, unpublished data). Ideally, sputum induction and aerosolized pentamidine treatments should be administered only in single-patient rooms or booths that have negative pressure relative to adjacent areas and are exhausted directly outside (*9*). Direction of air flow in patient isolation rooms, sputum induction rooms, and pentamidine rooms or booths should be frequently monitored. All HCWs, including nonpatient-care workers and volunteers, who have potential exposure to TB should participate in an organized TB skin-testing program to identify infected HCWs who may be candidates for preventive therapy and to monitor the effectiveness of infection-control practices (*10*; CDC, unpublished data).

This outbreak was characterized by *M. tuberculosis* isolates resistant to the two first-choice anti-TB drugs, INH and rifampin. Outbreaks of MDR-TB can be difficult and expensive to control and are typically associated with prolonged morbidity and increased mortality (*11,12*). Management of drug-resistant TB patients and their contacts is complex and needs to be individualized with consideration of multiple factors, including their immunologic status.

The extent of this problem nationally is not known because surveillance for *M. tuberculosis* drug resistance is not routinely conducted. To better characterize the problem, health departments should consider establishing surveillance for drug-resistant *M. tuberculosis*. Outbreaks of drug-resistant TB should be reported through state health departments to CDC's Division of Tuberculosis Control, Center for Prevention Services (telephone [404] 639-2519), to help determine the extent of this problem, identify risk factors, and develop and implement control measures.

References

1. Brennen C, Muder RR, Muraca PW. Occult endemic tuberculosis in a chronic care facility. Infect Control Hosp Epidemiol 1988;9:548–52.
2. Catanzaro A. Nosocomial tuberculosis. Am Rev Respir Dis 1982;125:559–62.
3. Ehrenkranz NJ, Kicklighter JL. Tuberculosis outbreak in a general hospital: evidence of airborne spread of infection. Arch Intern Med 1972;77:377–82.
4. Haley CE, McDonald RC, Rossi L, et al. Tuberculosis epidemic among hospital personnel. Infect Control Hosp Epidemiol 1989;10:204–10.
5. Kantor HS, Poblete R, Pusateri SL. Nosocomial transmission of tuberculosis from unsuspected disease. Am J Med 1988;84:833–8.
6. Garner JS, Simmons BP. Guideline for isolation precautions in hospitals. Infect Control 1983;4(suppl):245–325.

Multidrug-Resistant Tuberculosis — Continued

7. CDC. Guidelines for prevention of TB transmission in hospitals. Atlanta: US Department of Health and Human Services, Public Health Service, 1982; DHHS publication no. (CDC)82-8371.
8. Saddiqi S, Libonati J, Middlebrook G. Evaluation of a rapid radiometric method for drug susceptibility testing of Mycobacterium tuberculosis. J Clin Microbiol 1981;13:908–12.
9. CDC. *Mycobacterium tuberculosis* transmission in a health clinic—Florida, 1988. MMWR 1989;38:256–8,263–4.
10. Williams WW. Guidelines for infection control in hospital personnel. Infect Control 1983; 4(suppl):326–49.
11. CDC. Outbreak of multidrug-resistant tuberculosis—Texas, California, and Pennsylvania. MMWR 1990;39:369–72.
12. CDC. Drug-resistant tuberculosis—Mississippi. MMWR 1977;26:417–8,423.

The *Morbidity and Mortality Weekly Report* is prepared by the Centers for Disease Control, Atlanta, Georgia, and is available on a paid subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 783-3238.

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

Director, Centers for Disease Control
William L. Roper, M.D., M.P.H.
Director, Epidemiology Program Office
Stephen B. Thacker, M.D., M.Sc.

CDC
CENTERS FOR DISEASE CONTROL

Editor, *MMWR* Series
Richard A. Goodman, M.D., M.P.H.
Managing Editor
Karen L. Foster, M.A.

☆U.S. Government Printing Office: 1991-531-130/22027 Region IV

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
Atlanta, Georgia 30333

Official Business
Penalty for Private Use $300

FIRST-CLASS MAIL
POSTAGE & FEES PAID
PHS/CDC
Permit No. G-284

Z4 *HCRU9FISD22 8721
DANIEL B FISHBEIN, MD
CID VRL G13
7-844

X

HHS Publication No. (CDC) 91-8017

Redistribution using permit imprint is illegal.