A Cluster of Tuberculosis among Crack House Contacts in San Mateo County, California

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ABSTRACT

In March 1992, a cluster of 89 persons with tuberculosis infection was identified in San Mateo County, California. Thirteen persons (15%), including 11 children, were diagnosed with active pulmonary tuberculosis. All contacts were African Americans who resided in or visited one of two houses used for crack cocaine smoking or dealing. The patient with the index case, a male infected with human immunodeficiency virus, contributed to the transmission of tuberculosis as a transient resident of several dwellings. Public health authorities applied unique intervention methods to control the outbreak, including the use of a mobile health van. Further innovative strategies will be necessary to meet the challenge of this reemerging disease. (*Am J Public Health.* 1994;84:1834–1836)

Introduction

Factors contributing to the reemergence of tuberculosis as a public health problem include the epidemic of human immunodeficiency virus (HIV) infection, drug use, and adverse socioeconomic conditions.[1,2] Recent outbreaks of tuberculosis have occurred among drug-using populations and substance abuse treatment facilities.[3,4]

In March 1992, a 39-year-old HIV-infected male was admitted to San Mateo County General Hospital with a 3-month history of productive cough. Abundant acid-fast bacilli on initial sputum smears indicated pulmonary tuberculosis. Three days later, a 73-year-old male with tuberculosis, presenting with fevers and chills, was admitted to the same hospital. The patient with the initial index case was a transient resident in two houses, in one of which the second person admitted also lived, in an economically depressed neighborhood known for its high crime rate and drug use. Public health workers discovered, on interview with the two affected individuals, that both houses provided lodging for several extended families with children and initiated an investigation.

Methods

Public health investigators identified contacts through interviews with the patient with the index case, the heads of the two residences in which he lived for periods of days or weeks, and others who identified themselves or were identified by community members. The level of exposure was defined according to the time spent in either of the two residences between November 1991 and March 1992, and it was ascertained by standardized questions about high, medium, or low levels of contact. Persons who spent nights or visited daily at either residence were assigned to the high-exposure category. Persons who visited less than once per week were assigned to the lowest exposure category. Intermediate levels of contact were assigned to the medium category.

Public health workers screened contacts for tuberculosis infection in clinics, a mobile health van, or private residences. Skin testing was performed with purified protein derivative of tuberculin (prepared by Parke–Davis), and an induration of greater than 10 mm was considered positive. Reactors to purified protein derivative, persons with symptoms, and those in the high-exposure category had radiologic testing. Sputum was also examined if persons reported a history of cough or had abnormal chest x-rays. Restriction fragment length polymorphism testing was performed on isolates cultured from the two adult case patients. HIV testing of those who consented was conducted by the public health laboratory. Disease status was defined according to the tuberculosis classification of the American Thoracic Society.[5]

The association between skin test reactivity and level of exposure was evaluated by chi-square test for trend.

Results

Three of 110 individuals identified as contacts could not be located. Eighteen who had either low or unknown levels of exposure were lost to follow-up after skin testing. Eighty-nine African Americans, 42 of whom were less than 19 years old, were screened. Ten volunteered for HIV testing; the patient with the index case was the only one positive (10%).

Public health workers conducted interviews at the two residences in which

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This paper was accepted October 11, 1993.

Editor's Note. See related editorial by Frieden (p 1721) and commentary by Comstock (p 1729) in this issue.

TABLE 1—Level of Exposure to Tuberculosis Index Case, by Results of Skin Test, in 89 Identified Contacts

Skin Test Result	Level of Exposure			
	Low	Medium	High	Total
PPD+	1	19	26	46
PPD−	27	12	4	43

Note. Chi-square test for trend = 39.24; $P < .001$. PPD = purified protein derivative.

TABLE 2—Tuberculosis Skin Test Reactivity (PPD) and Disease Classification (%) within Age Groups in 89 Contacts

	n	PPD+, %	Disease Classification,[a] %				
			0	I	II	III	IV
Age group, y							
≤5	13	46	46	8	8	38	0
6–18	29	48	45	7	27	21	0
19–44	42	57	41	2	45	2	10
45–75	5	40	60	0	20	20	0
Total	89	52	43	5	32	15	5

Note. PPD = purified protein derivative.
[a]0 = low or medium exposure—skin test negative; I = medium or high exposure—skin test negative, chest x-ray negative; II = medium or high exposure—skin test positive, chest x-ray negative; III = low or medium or high exposure—skin test positive, chest x-ray positive; IV = low or medium exposure—skin test positive, chest x-ray positive (old disease).

the source patient resided and in the neighborhood. Children and adults indicated they lived in different residences in the neighborhood for various lengths of time, often with friends or relatives. Drug use, particularly use of crack cocaine, was disclosed by several individuals. Discussions with law enforcement personnel and community workers verified the presence of drug-related activities at the residences.

Skin test reactivity was significantly associated with increasing level of exposure (χ^2 for linear trend = 39.24) (Table 1). Fifty-seven percent (17 of 30) of the highly exposed contacts were 18 years of age or less. Skin test reactivity and disease classification are summarized by age group in Table 2. Thirteen active cases (class III) were diagnosed, 11 involving children 18 years of age or less. Symptoms of active tuberculosis were present in four of the class III patients. The class III children had enlarged hilar adenopathy on chest radiograph; four of them also had infiltrates. Both adult case patients had infiltrates and cavitary lesions. Restriction fragment length polymorphism testing confirmed that the two adult case patients had the same strain of tuberculosis. All 13 patients with active cases were treated with antitubercular chemotherapy and completed 6 months or more of therapy.

All reactors (29 patients), 3 of 4 class I contacts, and the 3 class IV patients were started on isoniazid. Twenty-six of these 35 patients (74%) completed 6 months of prophylactic chemotherapy. Class 0 contacts had negative skin tests with low or medium exposure levels and did not warrant treatment. One additional case of pulmonary tuberculosis was identified after March 1992.

Discussion

Though tuberculosis has previously been associated with crack houses,[6] this instance presented special features. First, a large number of people were involved over a short time period. The high flow of human traffic, close contact in enclosed environments, and coughing induced by smoking cocaine presumably facilitated the rapid dissemination of infection. Second, large numbers of children were exposed (47% of the screened contacts were under 19 years of age). The number of active cases exceeded the total for that age group over the previous 3 years in this county. This reflects the unstable environment of the community, with children moving from one house to another for periods of days to weeks, living with friends or distant relatives. Third, the patient with the index case presented interesting epidemiologic findings. His shifting residence, close contact with families and the drug community, and extended symptomatic period left a complex trail of infection. His identification as the index case was supported by his connection to all involved as well as by his symptomatic condition. (The 73-year-old male never changed residences, was not an active member of the drug community, and had no history of cough, and a positive sputum test was obtained only on bronchoscopy.)

Finally, use of intensive outreach was critical in controlling the outbreak. Public health workers were assisted by community members in successfully identifying over 100 contacts of the patient with the index case. In a generally noncompliant population, the delivery of services directly to those involved by means of the mobile health van maintained the continuity of relations with those at risk in the course of the investigation.

This outbreak demonstrates a combination of factors that have fostered the resurgence of tuberculosis. Inadequate access to health centers, noncompliance once access is obtained, and a social environment with pervasive drug use and homelessness are obstacles that current health services are not competent to cope with. The patient with the index case had never received prophylactic treatment despite a reactive skin test while incarcerated 1 year before. Had current recommendations for tuberculosis prevention in HIV-infected individuals been followed, this outbreak could have been averted.[7] Delivery of services directly to communities could improve compliance with treatment and limit the spread of tuberculosis. Without a special effort, tuberculosis will continue to burden our overtaxed health care system. □

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The Incidence of Tuberculosis among North Carolina Migrant Farmworkers, 1991

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ABSTRACT

All locatable subjects (n = 94) for whom tuberculosis prevalence had been determined in an earlier study were tested with purified protein derivative (PPD) and control antigens, sputum sampling, and chest x-rays. Of the 46 who had been tuberculin negative (confirmed with control antigens) 3 years earlier, 2 had developed active tuberculosis in the interim and 14 (30%) were tuberculin positive. All had been engaged continuously in migrant farmwork. Lack of access to health care, an institutional feature of migrant farmwork, was significantly associated with primary infection. (*Am J Public Health.* 1994;84:1836–1838)

Introduction

We recently reported a prevalence study of tuberculosis in a random sample of 543 migrant farmworkers.[1] The prevalence of active tuberculosis among African-American subjects was 3.6% (over 300 times the national prevalence) and exceeded the prevalence in any other population-based sample of immunocompetent nonhospitalized individuals.[2] We report here a follow-up study of tuberculosis infection and disease in a segment of these subjects.

Methods

Eligible subjects consisted of all former subjects who had been purified protein derivative (PPD)-tuberculin negative (reaction size < 10 mm) and control antigen–positive (reaction size > 5 mm) and had been employed continuously in farmwork since the 1988 prevalence study of tuberculosis.[1] The migrant farmworker population is typically without fixed addresses or telephone numbers. To relocate subjects for the 1991 follow-up study, two methods were employed: (1) visits to labor camps in the study area and (2) review of various listings of farmworkers. All labor camps in which subjects had previously resided were revisited. Interviews were conducted with individuals in these camps who knew the subjects and sometimes were able to provide information about their current whereabouts. Additional visits were made on the basis of this information. Other labor camps (between 20 and 30) in the area of the previous study were surveyed. These site visits recovered nearly all of the subjects finally enrolled. In addition, the outreach records of migrant health centers and North Carolina Labor Department records were reviewed. All of these are partial listings of migrant farmworkers.

PPD-tuberculin and control antigen testing, sputum sampling, and radiography were conducted according to the methods of the initial study.[1] Questionnaires administered in English and Spanish assessed risk factors for tuberculosis and CAGE type questions estimated alcohol use.[3]

PPD converters were persons who were formerly PPD negative and control antigen–positive (reaction size > 5 mm) who had PPD reactions of more than 10 mm on retesting and an increase in reaction size greater than 5 mm. New tuberculosis patients were subjects who had previously been PPD-tuberculin negative who met the standard case definition criteria.[4]

Analysis included chi-square and Fisher's Exact tests, Student's *t* tests, and logistic regression analysis, performed with PC-SAS software (SAS Institute, Inc, Cary, NC). Variables found to be

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This paper was accepted March 8, 1994.

Editor's Note. See related editorial by Frieden (p 1721) and commentary by Comstock (p 1729) in this issue.