

years, United States, 1974-75. Vital Health Stat [1] No. 14. DHEW Publication No. (PHS) 78-1314. U.S. Government Printing Office, Washington, DC, 1978.

4. Cornoni-Huntley, J., et al.: National Health and Nutrition Examination I—Epidemiologic Followup Survey. Public Health Rep 98:245-251, May-June 1983.
5. National Center for Health Statistics: Plan and operation of the NHANES I Epidemiologic Followup Study. In press.
6. Madans, J. H., et al.: 10 years after NHANES I: report of initial followup, 1982-84. Public Health Rep 101:465-473, September-October, 1986.

7. SAS Institute, Inc.: SAS user's guide: statistics, version 5 edition. SAS Institute, Inc., Cary, NC, 1985.
8. SAS Institute, Inc.: SAS supplemental library user's guide, 1983 edition. SAS Institute, Inc., Cary, NC, 1983.
9. National Center for Health Statistics: Vital statistics of the United States, 1979. Vol. II, Mortality, Part A. DHHS Publication No. (PHS) 84-1101. U.S. Government Printing Office, Washington, DC, 1984.
10. National Center for Health Statistics: The National Death Index: user's manual. DHHS Publication No. (PHS) 81-1148. National Center for Health Statistics, Hyattsville, MD, September 1981.

## Management of Tuberculosis in Urban Homeless Indigents

GARY SLUTKIN, MD

Dr. Slutkin is Associate Clinical Professor in the Departments of Medicine, Epidemiology, and International Health at the University of California at San Francisco and the Division of Infectious Diseases at San Francisco General Hospital. He was formerly Director of Tuberculosis Control for the San Francisco Department of Public Health.

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Tearsheet requests to Dr. Slutkin at San Francisco General Hospital, Division of Infectious Diseases, Bldg. 80, Ward 84, 1001 Potrero, San Francisco, CA 94110.

### Synopsis.....

*Tuberculosis patients who are homeless, indigent, and alcoholic infrequently complete a course*

*of chemotherapy, risking treatment failure, recurrence, and continued spread of infection in the community. Obstacles to successful treatment include an erratic schedule, mistrust of authority, and uncooperative or aggressive behavior.*

*Successful management of this problem requires the use of proven case holding techniques, a correct choice of drug regimen, and a prompt and appropriate response to the patient who is lost or refuses treatment.*

*Nine- and six-month drug regimens with proven success are now available; however, the direct observation of medication-taking should be maximized.*

*Patient default may be further minimized by encouraging prompt notification of the health department. Occasionally, the threat or use of existing public health laws on confinement for purposes of treatment are required for noncompliant patients.*

**M**ORE AMERICANS WERE HOMELESS in the winter of 1983-84 than at any time since the Great Depression (1).

Epidemiologic studies have shown an increased risk of tuberculosis among persons of lower socioeconomic status (2) and among unmarried men in large cities (3). Poor nutritional status and emotional stress have also been cited as possible risk factors for tuberculosis (4,5). Those performing recent screening studies at clinics and shelters for homeless persons have found from 1.6 to 6.8 percent of the clients to have active tuberculosis (6,7). These rates are 150 to 300 times the national average (8), higher than rates for most groups of refugees and immigrants (9), and well above the 1

percent threshold at which screening is recommended (10).

Homeless and indigent persons represent a significant reservoir of both current and future tuberculosis. In addition to high rates of disease, screening has also found 35 to 50 percent of them to be infected (without current disease) as demonstrated by a reactive tuberculin skin test (11). These persons may be at sufficiently high risk of future tuberculosis to warrant isoniazid preventive therapy. However, neither increased screening nor expanded preventive therapy efforts should be the primary focus of improved tuberculosis control activities because the major obstacle to effective implementation of tuberculosis control continues

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to be failure to complete therapy successfully for persons with already diagnosed (and currently infectious) tuberculosis (12).

Although lack of adherence to a drug regimen is common to all groups, homeless and socially isolated tuberculosis patients—particularly those also suffering from alcoholism and psychiatric illness—present many additional obstacles to completion of therapy (1,13). As a result, these patients have a substantially higher risk of treatment failure, recurrence of tuberculosis, and continued spread of infection to others (14,15). This report focuses on elements of case holding strategy that require special attention for the successful management of tuberculosis in urban homeless and indigent patients.

### **Obstacles to Treatment**

Alcoholism, or other substance abuse, and psychiatric illness are present in 50–90 percent of homeless persons (1). These factors are associated with poor adherence to a treatment regimen (16). Other identified obstacles to compliance which are common among homeless, indigent, and socially isolated tuberculosis patients include an erratic daily schedule, mistrust of authority, and uncooperative and aggressive behavior (17–21).

Motivation to a drug regimen adherence may be limited for indigent tuberculosis patients since they rarely view tuberculosis as their most important problem; many must search for shelter, food, or clean clothing (1). Some direct their day around alcohol or drug dependency. Encounters with violence are common, and many homeless persons must hide to protect themselves and their few possessions. Feelings of isolation and low self-esteem are constant. Furthermore, even if motivated, they are usually without the personal

resources required to take daily or biweekly medications. The record for medication-taking is poor, even for persons with less serious obstacles (12,16,21).

Because the goal in management of the tuberculosis patient is the completion of chemotherapy (10,15), the individual problems of the indigent TB patient that interfere with successful therapy are a public health concern. Resources no longer allow for the simple but expensive solution of long-term inpatient care. Therefore, these obstacles to treatment must be overcome in an ambulatory setting (22).

### **Case Holding**

Most medical care of indigent persons with tuberculosis is provided by the public health sector. Approaches to successful case holding (keeping persons on therapy until completion of a course of treatment) have focused on improving delivery of medications in the public health clinic and in the community (23,24). The use of drug regimens that are shorter, can be delivered bi-weekly, and are directly observed is also frequently stressed.

Medications should be supplied free of charge. Once daily (or biweekly) dosing using a minimum number of total pills simplifies the task of drug-taking and is associated with improved compliance (16,25,26). The most accessible and reliable mechanism of drug delivery should be used; neighborhood or satellite clinics and outreach workers have demonstrated value.

Clinic hours should include evening time and a relatively forgiving appointment schedule. Use of the treatment facility should be encouraged by providing bus tokens or by directly providing transportation. Waiting time should be minimized, and visits should not be unduly hurried.

Clinic conditions that most encourage patient comfort should be promoted. This is most heavily influenced by staff attitudes (27). Staff members should be nonjudgmental and offer as much personal attention as possible in a respectful and supportive way.

The importance of education for improving compliance has been debated (18,19,28–30). Nevertheless, educational approaches should stress the fact that completion of chemotherapy is expected to result in lifetime cure. Many indigent and alcoholic patients have had the diagnosis of tuberculosis for several years, have received days to months of therapy several times, and have no hope

or expectation of the lasting benefit that is possible with a completed course of treatment.

Especially encouraging is the recent report from New Jersey of successful ambulatory treatment of 19 of 21 tuberculosis patients, all of whom had been prior failures (31). A total of 17 patients had either alcohol or drug abuse problems, and 14 had disease attributable to drug-resistant organisms. Only five patients were hospitalized for the initiation of therapy (mean duration 18.2 days), and only two patients required field visits. Important program elements included biweekly visits to an assigned physician and five-times-a-week directly observed medication taking for the first 6 months.

Many experts believe that direct observation of the ingestion of medication should be maximized (12,24). Staff members can deliver and observe the ingestion of antituberculosis drugs in the clinic or in the field. Arrangements may be made to meet the patient in his current dwelling, chosen street corner, or bar.

### Choice of Drug Regimen

The choice of drug regimen may be the most discussed but least important determinant of successful treatment of the homeless or indigent patient. However, regimens of shorter duration, consisting of three or four drugs, may be of value if the effort to keep patients on therapy is also intensified.

Most recent treatment recommendations have emphasized the use of a 9-month regimen consisting of isoniazid (INH) and rifampin (32). This regimen has a greater than 95 percent effectiveness for persons who complete therapy (33,34). However, 7–20 percent relapse rates are expected for patients who complete only 6 months (35,36). For persons who do abscond early and subsequently relapse, the emergence of drug-resistant *Mycobacterium tuberculosis* has been much less frequent than for those following nonrifampin regimens.

The INH-rifampin regimen is without excessive hepatic toxicity for alcoholic patients, although abnormalities in liver chemistry results are more common than for nonalcoholic patients (37). Baseline liver function tests may be advised to help minimize confusion resulting from subsequently determined results that are abnormal due to alcohol use.

If drug susceptibility results are not available at the outset, it is advisable to include ethambutol in the regimen (until drug susceptibility is demonstrated). This precaution serves as a relatively

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inexpensive and low toxicity insurance policy against the risk of drug resistance. The indigent and alcoholic patient may be more likely to have had, and less likely to report, prior treatment.

Six-month regimens of isoniazid and rifampin which include 2 months of pyrazinamide and either streptomycin or ethambutol have been demonstrated to be greater than 95 percent effective without undue toxicity (34,36,38). These regimens are especially attractive because relapse rates of only 5–16 percent have been seen in treatment trials of 4 months duration (38,39). Although these rates of relapse are unacceptably high at 4 months, they are considerably lower than expected for less intensive regimens. Therefore, these shorter course regimens offer better probabilities of success for the early absconder. An additional advantage is that most relapses following short course regimens occur with the drug-susceptible organisms. Care must be taken to ensure that the possible additional toxicity of pyrazinamide is not ignored and that maximal efforts at case holding do not relax.

Any of these regimens can be given twice or three times weekly instead of daily; however dose adjustments are necessary (32,33,40). The dose of rifampin is not altered for biweekly administration because higher doses given intermittently increase the risk of fever, skin rashes, and other manifestations of hypersensitivity (41).

### Prompt Notification

Successful management of the homeless or itinerant TB patient begins with notification of the health department as soon as diagnosis is determined or highly suspected (for example, a positive sputum smear for acid-fast bacilli or a highly suspicious chest film).

All States require by statute that physicians, hospitals, hospital personnel, and others likely to be knowledgeable report tuberculosis (42,43). Rapid reporting is especially important for this group of patients.

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The diagnosis of tuberculosis in an itinerant patient commonly follows a police-or self-referral to a public emergency room for trauma, inebriation, or alcohol-related illness or, less often, for symptoms of tuberculosis (usually at a late stage). Because these patients frequently leave the hospital against medical advice, delay or failure to notify the health department may result in a lost patient and no chance for successful implementation of any treatment plan.

Laboratories serving public hospitals should report positive sputum smear results to the health department by telephone if there is more than a 1- or 2-day delay in the routine method of reporting.

Upon notification, staff members of the health department should visit the hospitalized TB patient promptly when it appears likely that the health department will be participating in the long-term plan. At this first visit, the patient should be interviewed to determine his close contacts. These contacts may be eligible for prevention services and may also prove useful later in locating the patient should he become delinquent. A list of most-frequented locations may also prove useful.

Discussions about the long-term treatment plan should involve the attending physician and should begin early. The patient should be acquainted with the location, hours, and services of the health department clinic(s). His first visit to the clinic or other place of intended care should be made before or at discharge, perhaps with the accompaniment of the health department staff. In these early visits, staff members must be particularly sensitive to the feelings and circumstances of the patient, who may be confused and frightened or angry and mistrustful.

### **Lost or Refuses Treatment**

Staff members and supervisors should regularly discuss problem patients to minimize default and to promote effective staff responses. The response

to missed appointments should be rapid. Lost patients frequently have not moved far and may be located by consulting local bars, corner grocery stores, or hotel managers. The institutional records of lost patients who are hospital, jail, or alcohol rehabilitation program repeaters should be specially tagged for early notification of the health department.

For patients who refuse treatment, the threat or use of existing public health laws should be considered. Confinement or quarantine may be ordered by public health officers, by boards of health, or by the courts (29,42-44). When the patient with pulmonary tuberculosis refuses treatment or is consistently uncooperative and is judged to pose a threat to the health of others, it is the duty of physicians and public health officials to use these measures.

A lawsuit filed against Los Angeles County, its sheriff, and its health officials by a tuberculosis patient with a history of uncooperativeness who had been held in jail was recently settled with a stipulated judgment that includes guidelines for future health department efforts to confine a patient (45). (See box.) These guidelines are specific and may be useful for health officials considering an order of isolation.

### **References**.....

1. Bassuk, E. J.: The homeless problem. *Sci Am* 251: 40-45, July 1984.
2. Lowell, A. M., Edwards, L. B., and Palmer, C. E.: Tuberculosis. Harvard University Press, Cambridge, MA, 1969, pp. 84-93.
3. Horwitz, O.: Tuberculosis risk and marital status. *Am Rev Respir Dis* 104: 22-31, July 1971.
4. Comstock, G. W., Edwards, L. B., and Livesay, V. T.: Tuberculosis morbidity in the U.S. Navy: its distribution and decline. *Am Rev Respir Dis* 110: 572-580, November 1974.
5. Comstock, G. W.: Epidemiology of tuberculosis. *Am Rev Respir Dis* 125: 8-15, March 1982.
6. Brickner, P. W., et al.: A clinic for male derelicts. *Ann Intern Med* 77: 565-569, October 1972.
7. Sherman, M. N., et al.: Tuberculosis in single-room occupancy hotel residents: a persisting focus of disease. *NY Med Q* 2: 39-41, fall 1980.
8. Centers for Disease Control: Tuberculosis—United States, 1983. *MMWR* 33: 77-78, Feb. 17, 1984.
9. Centers for Disease Control: Tuberculosis among Indochinese refugees—United States, 1979. *MMWR* 29: 383-384, 389-390, Aug. 15, 1980.
10. American Thoracic Society: Control of tuberculosis. *Am Rev Respir Dis* 128: 336-342, August 1983.
11. Brickner, P. W., et al.: Medical aspects of homelessness. *In* The homeless mentally ill, edited by H. R. Lamb. American Psychiatric Press, Washington, DC, 1984.

12. Addington, W. W.: Patient compliance: the most serious remaining problem in the control of tuberculosis in the United States. *Chest* 76 (supp) 6: 741-743, December 1979.
13. Khan, M. A.: Tuberculosis: behind the scene. *N Engl J Med* 297: 1294-1295, Dec. 8, 1977.
14. Edsall, J., Collins, J. G., and Gray, J. A. C.: The reactivation of tuberculosis in New York City in 1967. *Am Rev Respir Dis* 102: 725, November 1970.
15. American Thoracic Society: Treatment of tuberculosis in alcoholic patients. *Am Rev Respir Dis* 116: 559-561, September 1977.
16. Haynes, R. B., Taylor, D. W., and Sackett, D. L.: Compliance in health care. Johns Hopkins University Press, Baltimore, 1979.
17. Richards, A. D.: Attitude and drug acceptance. *Br J Psychiatry* 110: 46-52, January 1964.
18. Blackwell, B.: Patient compliance. *N Engl J Med* 289: 249-252, Aug. 2, 1973.
19. Komaroff, A. L.: The practitioner and the compliant patient. *Am J Public Health* 66: 833-835, September 1976.
20. Dudley, D. L.: Why patients don't take pills. *Chest* 76 (supp) 6: 744-749, December 1979.
21. Blackwell, B.: The drug defaulter. *Clin Pharmacol Ther* 13: 841-848, November-December 1972.
22. Moulding, T.: New responsibilities for health departments and public health nurses in tuberculosis—keeping the outpatient on therapy. *Am J Public Health* 56: 416-427, March 1966.
23. Curry, F. J.: Neighborhood clinics for more effective outpatient treatment of tuberculosis. *N Engl J Med* 279: 262-267, Dec. 5, 1968.
24. Sbarbaro, J. A.: Public health aspects of tuberculosis: supervision of therapy. *Clin Chest Med* 1: 253-263, May 1980.
25. Weintraub, M., Au, W., and Lasagna, L.: Compliance as a determinant of serum dioxin concentration. *JAMA* 22: 481-485, Apr. 23, 1973.
26. Ayd, F. J., Jr.: Once-a-day neuroleptic and tricyclic antidepressant therapy. *Int Drug Ther Newsletter* 7: 33, November 1972.
27. Curry, F. J.: Encounters in training clinic support staff. *Chest* 68 (supp): 462-465 (1975).
28. Sackett, D. L., et al.: Randomized clinical trial of strategies for improving medication compliance in primary hypertension. *Lancet* No. 7918: 1205-1208, May 31, 1975.
29. Sbarbaro, J. A.: Compliance: inducements and enforcements. *Chest* 76 (supp): 750-755, December 1979.
30. Hulka, B. S., Cassel, J. C., Kuppner, L. L., and Burdette, A.: Communication, compliance, and concordance between physicians and patients with prescribed medication. *Am J Public Health* 66: 847-853, September 1976.
31. McDonald, R. J., Memon, A. M., and Reichman, L. B.: Successful supervised ambulatory management of tuberculosis treatment failures. *Ann Intern Med* 96: 297-302, March 1982.
32. American Thoracic Society: Treatment of tuberculosis and other mycobacterial diseases. *Am Rev Respir Dis* 127: 790-796, June 1983.
33. Dutt, A. K., Jones, L., and Stead, W. W.: Short-course chemotherapy for tuberculosis with largely twice weekly isoniazid and rifampin. *Chest* 75: 441-447, April 1979.
34. British Thoracic Association: A controlled trial of six months chemotherapy in pulmonary tuberculosis. Second report: results during the 24 months after the end of chemotherapy. *Am Rev Respir Dis* 126: 573-579, April 1984.
35. Snider, D. E., Long, M. W., Cross, F. S., and Farer, L. S.: Six-months isoniazid-rifampin therapy for pulmonary tuberculosis. *Am Rev Respir Dis* 129: 573-579, April 1984.
36. Snider, D. E., et al: Successful intermittent treatment of smear-positive pulmonary tuberculosis in six months. A cooperative study in Poland. *Am Rev Respir Dis* 125: 265-267, February 1982.
37. Cross, F. S., Long, M. W., Banner, A. S., and Snider, D. E.: Rifampin-isoniazid therapy of alcoholic and nonalcoholic tuberculosis patients in a U.S. Public Health Service cooperative therapy trial. *Am Rev Respir Dis* 122: 349-352, August 1980.
38. Singapore Tuberculosis Service-British Medical Research Council: Clinical trial of 6 month and 4 month regimens of chemotherapy in the treatment of pulmonary tuberculosis. The results up to 30 months. *Tubercle* 62: 95-102, June 1981.
39. East African-British Medical Research Council Study: Controlled clinical trial of five short-course (4-month) chemotherapy regimens in pulmonary tuberculosis. Second report of the 4th study. *Am Rev Respir Dis* 123: 165-170, February 1981.
40. Sbarbaro, J. A., Catlin, B. J., and Iseman, M.: Long term effectiveness of intermittent therapy for tuberculosis: final report of three Denver studies. *Am Rev Respir Dis* 121: 172-174, January 1980.
41. Aquinas, M., et al.: Adverse reactions to daily and intermittent rifampin regimens for pulmonary tuberculosis in Hong Kong. *Br Med J* 1: 765-771, Mar. 25, 1972.
42. Mills, M., and Mills, J.: Legal aspects of infectious disease practice. *Medical Times*, September 1983, pp. 85-92.
43. California Health and Safety Code 3125; New York Public Health Law 2101; Colorado Rev. Stat. 25-1-649; Florida Stat. 381.231, 384.06; Texas Civ. Stat. art. 4445, 1, art. 4447 Rules 1,3, etc., 1981.
44. California Health and Safety Code 3115-3117, 3123, 3285, 3350-3353; New York Public Health Law 2120; Colorado Rev. Stat. 25-4-404, 405, 506, 507; Florida Stat. 381.241, ch. 392; Texas Civ. Stat. art. 4477, Rules 5-19.
45. Balderas v. Pitchess, Civil No. CA 000617, Superior Court, Los Angeles County, California, 1980.