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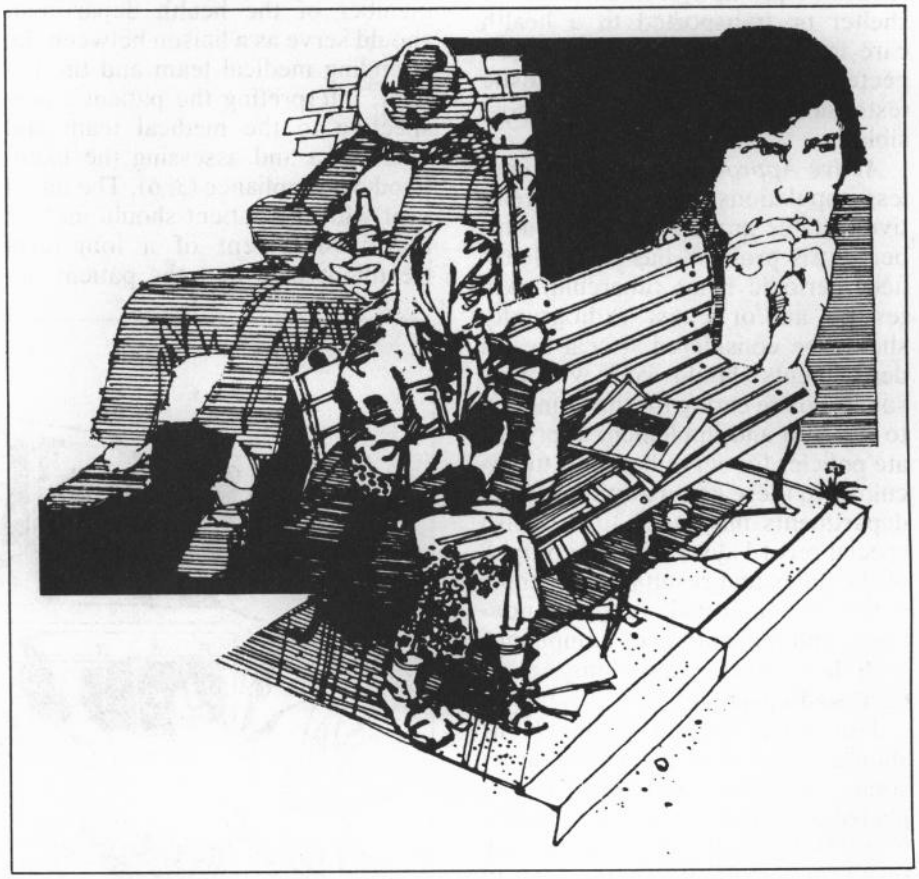
Tuberculosis Control Among Homeless Populations



Homeless persons suffer disproportionately from a variety of health problems, including tuberculosis. Although there is no generally agreed upon definition of homelessness, the homeless can be defined, on a general level, as those who do not have customary and regular access to a conventional dwelling or residence (*1*). Since 1984, three outbreaks of tuberculosis in shelters for the homeless have been reported to CDC (unpublished data) (*2*), and recent investigations have shown a prevalence of 1.6%–6.8% for clinically active tuberculosis among selected homeless populations (*3*). These prevalence rates are 150 to 300 times higher than the nationwide prevalence rate. The prevalence of asymptomatic tuberculosis infection among the homeless has been reported to be as high as 22%–50% (*3–5*), thus indicating that a large reservoir of infection may exist from which future cases will emerge unless large-scale preventive measures are undertaken.

In January 1987, CDC convened a group of individual consultants* to assist in developing strategies for dealing with this problem. After reviewing these strategies, CDC developed the following recommendations. State and local health departments are urged to consider implementing these recommendations where applicable.

A. Assessment of the Magnitude of the Problem

Each community should assess the nature and magnitude of the problem by determining the proportion of tuberculosis patients who are homeless. Health departments should obtain as much information as possible about where each tuberculosis patient lives. Homeless patients sometimes give the mailing ad-

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dress of a friend or relative; therefore, a mailing address does not necessarily indicate whether or not a patient is homeless. Health departments also should maintain, and regularly update, listings of single-room-occupancy hotels and shelters for the homeless in their areas so that patients' addresses can be compared with locations on the list.

B. Case Finding

Passive Approaches. Shelter employees should be educated about tuberculosis, particularly regarding its mode of spread and the potential hazards of transmission in shelters. Any person with a persistent cough should be promptly evaluated at the shelter or transported to a health care facility. If tuberculosis is suspected, more definitive diagnostic tests should be done as soon as possible.

Active Approaches. Where homeless populations are housed in relatively stable groups and where a tuberculosis problem has been identified, periodic mass tuberculin skin testing and/or chest radiography should be considered. Local health departments should work with persons who are caring for the homeless to develop and implement appropriate policies for surveillance of tuberculosis in these communities. Health departments may need to establish special record systems to keep track of the dates and results of screening activities, medical recommendations, and indications of compliance with those recommendations.

C. Case Reporting

The local health department should be notified by telephone as soon as a case of tuberculosis is suspected or diagnosed. Delay or failure to notify the health department may result in a patient's being lost to follow-up, with little or no chance for treatment.

D. Case Holding

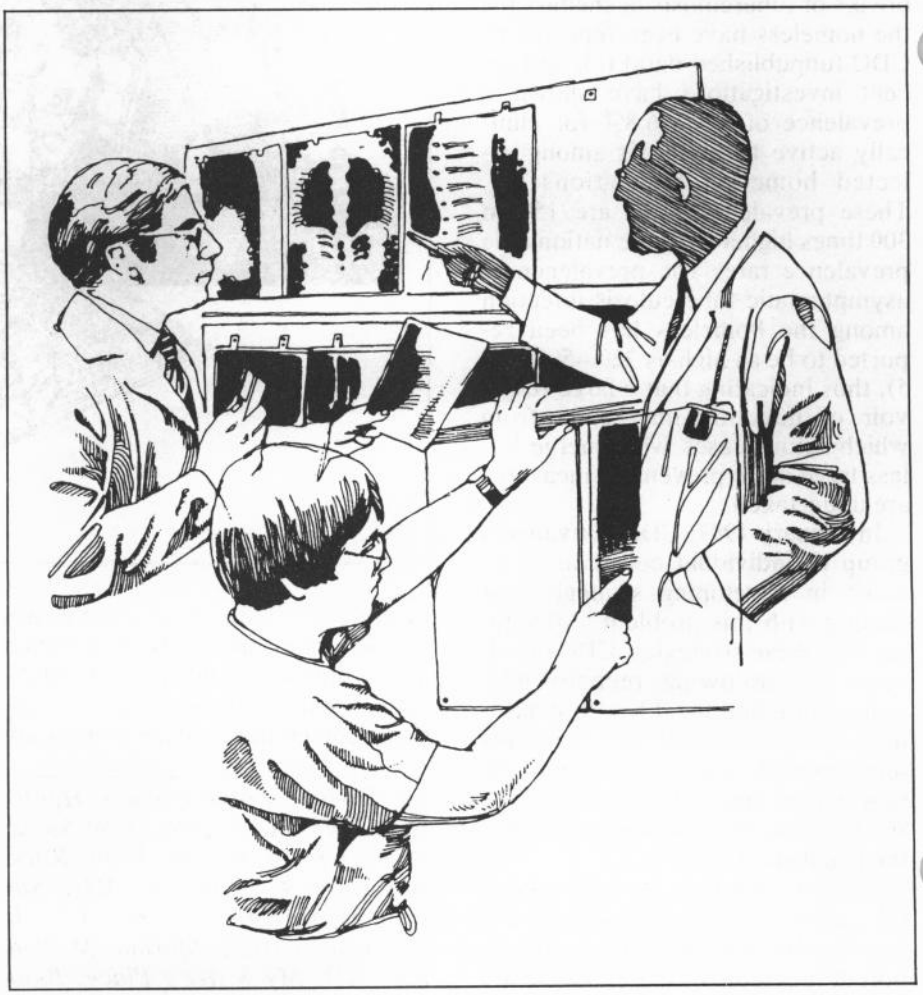
Homeless patients with newly diagnosed tuberculosis should be appropriately housed to allow full supervision of initial therapy and to preclude transmission of infection to their contacts (e.g., other shelter clients and shelter employees). This usually means a period of hospitalization in an isolation room of an acute-care facility until other arrangements can be made. Some communities have developed cost-effective alternatives to hospitalization, such as half-way houses and special shelter areas (Pima County Health Department, unpublished data). If, despite the best efforts of health care providers, an infectious patient refuses treatment, temporary involuntary isolation should be instituted in accordance with state and local public health laws and regulations until the patient has been rendered noninfectious by treatment. This option should be used only in rare instances and after due process.

Rarely, hospitalization or institutionalization throughout the course of therapy may be necessary, but most patients can be effectively managed as outpatients. A staff member of the health department should serve as a liaison between the attending medical team and the patient, interpreting the patient's perspective to the medical team and vice versa and assessing the likelihood of compliance (*3, 6*). The initial visit with the patient should include the development of a long-term treatment plan that the patient understands and can reasonably be expected to follow. Rapport with the patient must be established. A physical description of the patient, and possibly a photograph (with the patient's permission), should be included in the chart.

Clinic schedules should include hours that accommodate patient schedules. Enabling incentives—that is, incentives that allow the patient to overcome barriers to obtaining treatment—should be considered. These might include items such as free meals, special lodging, bus tokens, priority in food lines, assistance in filing for benefits, taxi vouchers, and personally needed articles. In many communities, local merchants and affiliates of the American Lung Association have cooperated to provide incentives to be used by the health department. (*7*).

E. Treatment

With rare exceptions, a patient's medications should be taken while he or she is being observed by a responsible person, thus preventing treatment failure, the emergence of resistant organisms, and continued



transmission. In many instances, treatment can be given and observed by designated persons at the shelter or at some other location convenient for the patient. Treatment should include intensive multidrug, bactericidal regimens for 6 months (*8*).

Although currently recommended regimens specify that medications should be administered daily for the first 1–2 months of treatment, the supervision of daily therapy for homeless outpatients may not be feasible. Therefore, two alternatives should be considered: 1) provide directly observed therapy 5 days per week (asking the patient to take drugs on his/her own the other 2 days) or 2) provide directly observed therapy 3 days per week using higher drug dosages: isoniazid 15 mg/kg, rifampin 600 mg (or 450 mg for persons weighing <50 kg), ethambutol 30 mg/kg, and pyrazinamide 2.5 g (or 2 g for those weighing <50 kg) (*9*). *Mycobacterium tuberculosis* in sputum should be evaluated at 2- to 4-week intervals until sputum smears become negative. Patients with initially positive sputum smears or cultures can return to the shelter when bacteriologic and clinical evidence shows they have responded to therapy and when the health care provider is satisfied that the outpatient treatment plan is being followed.

F. Prevention

Case finding and treatment should be implemented as early as possible, since they are the most important measures for preventing the further spread of infection and disease. Efforts should be made to locate contacts of patients so they also may be evaluated and treated, if necessary.

Because crowding and poor ventilation are conducive to tuberculosis transmission, steps should be taken to improve defective housing conditions. Although the use of ultraviolet (UV) lights is controversial because no epidemiologic evaluations of its effectiveness have been conducted, the consultants felt that consideration should be given to installing UV lights in crowded shelters where transmission of tuberculosis infection is a problem. CDC currently recommends UV lights to reduce transmission of tuberculosis in hospitals (*10*). If UV lights are used, they must be installed and maintained according to accepted guidelines to remain effective and to avoid injury to the skin or eyes of shelter clients and staff (*11*). An updated reference on the rationale and methodology for using UV lights will be published soon (*12*).

Except for special surveys, tuberculin skin testing of homeless populations should be undertaken only if there is a commitment to complete the diagnostic evaluation and prescribed therapy. Priorities for preventive therapy should follow established guidelines (*8*). A poorly implemented preventive therapy program may lead to a worsening of the tuberculosis problem, e.g., if isoniazid preventive therapy is not strictly adhered to, isoniazid-resistant disease may occur. Incentives may improve patients' compliance with preventive treatment. For high-risk individuals who are likely to be noncompliant, directly observed isoniazid preventive therapy given twice a week in a dose of 15 mg/kg should be considered (*8, 13*).

Staff members and persons who work regularly as volunteers in shelters for the homeless should receive a tuberculin skin test, with appropriate follow-up, upon employment and every 6–12 months thereafter (*2*).

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Health Effects of High Voltage Transmission Lines

Initially, opposition to transmission lines was based on scenic and aesthetic considerations. However, recently the question of possible deleterious health effects from exposure to electric and magnetic fields from these lines has emerged and a great deal of attention has been focused on this issue, especially with regard to 765 kilovolt (kV) lines.

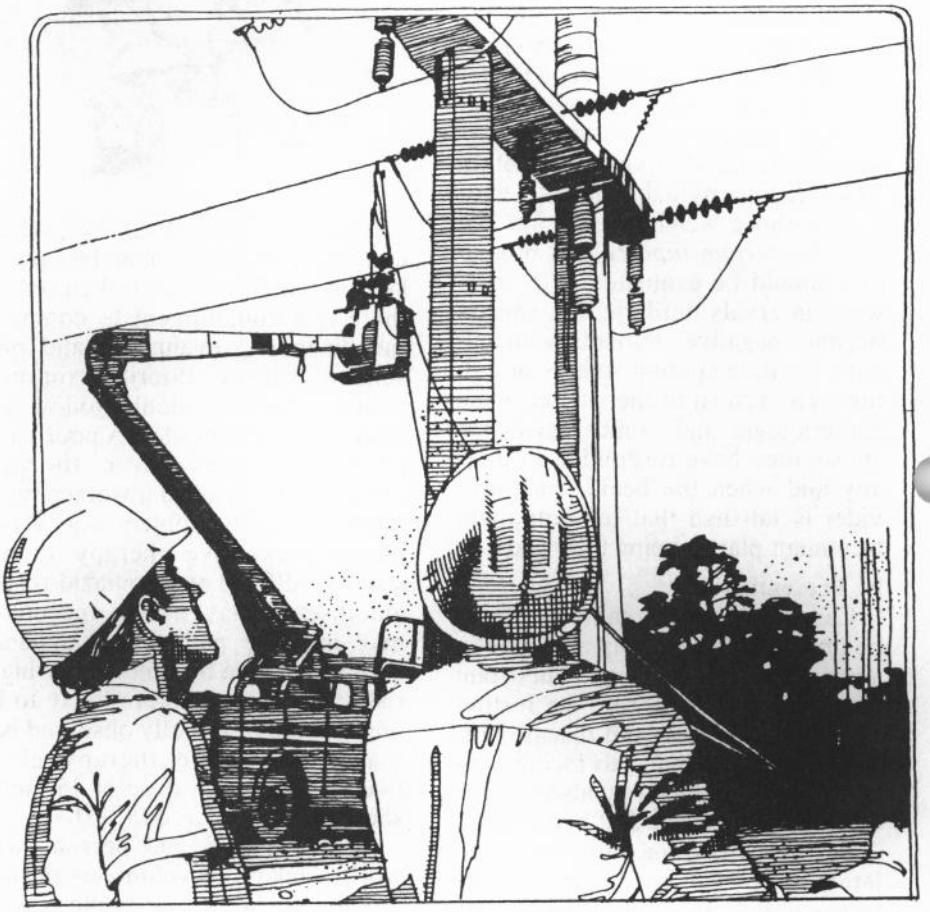
We all live in electric and magnetic fields. There is a stationary natural electric field from the Earth which is about 130 volts per meter (V/m) and a stationary magnetic field of about 0.5 gauss (G). The electric field under thunderclouds is 3,000–20,000 V/m. There are also man-made electric and magnetic fields. A toaster produces about 40 V/m, a stereo produces about 90 V/m, and an electric blanket produces about 240–10,000 V/m electric fields. The maximum electric field directly beneath a 765 kV transmission line is approximately 10,000 V/m when measured 3 feet above the ground. The electric field decreases to 1,000 V/m at approximately 170 feet and to 100 V/m at approximately 360 feet from the center of the transmission line (1–3).

The magnetic field beneath a transmission line is very weak as compared to localized magnetic fields near common household appliances. For example, the magnetic field near a color television, electric shaver, hair dryer, or electric can opener is around 5–10 G, compared to a maximum of 0.5 G under a 765 kV transmission line (1, 2).

The adverse effects on human health as a result of exposure to electric and magnetic fields produced by high voltage transmission lines can be classified follows.

- electric shock as a result of direct contact with the line
- induced electric shock
- spark discharge or transient shock
- surface effects
- cardiac pacemaker interference
- long-term biological effects

Induced shocks occur when a person contacts a conducting object insulated from ground within an electric field. This can also happen when the person is insulated and the object is grounded. A tingling sensation is noted at the point of contact with current of 0.5–2.0 milliamperes (mA) and a startle reaction is felt with currents above 1.5 mA. Currents about 2 or 3 mA are unpleasant and even painful but do not pose a serious health hazard. The "let go" threshold, where a person is unable to release the current source, is 5 mA for a child. High voltage transmission lines are designed to limit current induced in vehicles to less than 5 mA so that even under the worst possible conditions, induced currents will be below safe limits (1).



The transient shock or spark discharge can also occur in the instant before contacting an object under a transmission line, similar to the static discharge shock experienced by a person walking across a rug and touching a doorknob. Although occasionally painful, these shocks are harmless. Induced shocks under the transmission lines are minimized by grounding stationary objects such as fences, metal roofs, and antennas (1).

Apart from the shocks, the only short-term effect known in humans standing directly under the line is a surface effect which has been described as a tingling sensation from the vibration of hair on the exposed skin, similar to a gentle breeze blowing on the skin (2).

In certain synchronous (R-wave inhibited) cardiac pacemakers, the electric field under a high voltage transmission line may cause interference and mask the R-wave which can lead to reversion to the asynchronous mode even though the heart may be functioning normally. Monopolar implants are more likely to transiently revert to the asynchronous operation under a high voltage transmission line as compared to bipolar implants. There is no published report of a case where a transmission line has produced a serious deleterious effect in an individual with a pacemaker implant (1).

The adverse health effects from chronic exposure to electric and magnetic fields were first reported in the late 1960's and early 1970's by Soviet and Spanish investigators (4–6). Switchyard workers were studied and high electric fields incriminated as the cause of symptoms which were subjective in nature and could

have been a result of many other confounding occupational and environmental factors. Contrary to those studies, most other investigations have not found any adverse effects among exposed workers (7–11).

Several recent studies have reported an increased risk of leukemia among certain residential and occupational groups presumably exposed to electric and magnetic fields (12–17). These findings are only suggestive, provide inconsistent results, are inherently limited in their ability to establish a causal relationship due to absence of exposure characterization, and do not repudiate the involvement of other etiological factors and physical and chemical agents that might be responsible for such associations. Although these studies cannot be overlooked entirely, their results should be interpreted with caution until such time that more replicative and conclusive studies become available.

In summary, although determination of a zero risk is scientifically impossible, critical reviews of the literature have not provided any conclusive evidence that chronic exposure to electric and magnetic fields produced by high voltage transmission lines have caused any pathologic effect or organic injury in humans (1, 2, 18–24). The only generally accepted effects of exposure to electric and magnetic fields in humans include perception of the fields, induced shocks, and potential effects, albeit slight, on certain pacemakers.

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Cases of selected notifiable diseases, Virginia, for the period May 1, through May 31, 1987

Disease	State					Regions				
	This Month	Last Month	Total to Date 1986	Total to Date 1987	Mean 5 Year To Date	This Month N.W.	This Month N.	This Month S.W.	This Month C.	This Month E.
Measles	0	0	34	0	18	0	0	0	0	0
Mumps	43	5	18	51	19	41	2	0	0	0
Pertussis	2	3	15	34	13	0	0	2	0	0
Rubella	0	1	0	1	2	0	0	0	0	0
Meningitis—Aseptic	8	14	68	60	54	2	4	0	0	2
*Bacterial	20	22	110	84	111	3	4	7	1	5
Hepatitis A (Infectious)	25	34	48	138	64	1	5	13	2	4
B (Serum)	49	40	175	194	203	2	14	6	15	12
Non-A, Non-B	2	6	28	19	37	0	0	1	1	0
Salmonellosis	203	98	375	519	409	22	41	38	71	31
Shigellosis	9	18	24	57	57	3	3	1	0	2
Campylobacter Infections	52	48	155	187	154	11	11	9	13	8
Tuberculosis	48	29	149	159	177	2	8	3	12	23
Syphilis (Primary & Secondary)	28	19	181	109	200	0	4	0	9	15
Gonorrhea	1106	1037	7320	6104	7707	—	—	—	—	—
Rocky Mountain Spotted Fever	0	0	6	0	6	0	0	0	0	0
Rabies in Animals	35	42	87	161	160	7	9	2	10	7
Meningococcal Infections	3	11	48	39	38	0	0	1	1	1
Influenza	1	25	3892	1198	1402	0	0	0	0	1
Toxic Shock Syndrome	0	0	5	0	4	0	0	0	0	0
Reyes Syndrome	0	0	1	0	3	0	0	0	0	0
Legionellosis	1	0	4	3	8	0	0	1	0	0
Kawasaki's Disease	2	3	14	10	14	0	0	1	1	0
Acquired Immunodeficiency Syndrome	23	14	82	92	—	0	10	0	9	4

Counties Reporting Animal Rabies: Chesterfield 3 raccoons; Clarke 1 raccoon; Essex 2 raccoons; Fairfax 3 raccoons; Fauquier 1 raccoon; Goochland 2 raccoons; Hanover 3 raccoons; King & Queen 1 raccoon; Loudoun 1 fox, 3 raccoons, 1 skunk; Nelson 1 raccoon; New Kent 1 raccoon; Powhatan 1 raccoon; Prince William 1 fox; Richmond County 2 raccoons; Rockingham 1 raccoon; Shenandoah 1 raccoon, 1 skunk; Warren 1 raccoon; Washington 1 cow, 1 fox; Westmoreland 2 raccoons.

Occupational Illnesses: Pneumoconioses 40; Carpal tunnel syndrome 25; Hearing loss 18; Asbestosis 13; Dermatitis 5; Poisoning, Chemical 2; Silicosis 1; Mesothelioma 1.

*other than meningococcal

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