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Tuberculosis and the Homeless: A Population at Risk

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Abstract

At one time, tuberculosis (TB) was considered a disease of the past. But as variant strands of the infectious bacteria evolve, the general population becomes of increasingly greater risk. Select subsets of the population are at an even greater peril. Homeless individuals, without permanent dormancy, living in sometimes-crowded shelters, and with other persons infected, find themselves in one of the highest risk groups. This exposition will explore the complex relationships that exist placing the homeless in a high-risk group. Issues of pathophysiology, prevalence, etiology, emerging drug resistance, and future treatment trends and options will all be examined.

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The Pathophysiology of Tuberculosis

TB is an infectious communicable disease caused by *Mycobacterium tuberculosis*. The aerobic, acid-fast rods include both pathogenic and saprophytic organisms. Several pathogenic mycobacteria exist, but only the bovine and human strains are pathogenic to humans. The TB bacillus is actually smaller than the human erythrocyte (Price & Wilson, 1997).

Most TB infections are contracted by the airborne route, through the inhalation of droplet nuclei containing organisms of the tubercle bacillus from an infected individual. The immune system participates in a delayed hypersensitivity reaction through a cell-mediated immunity response. As the bacillus enters the alveoli, a local inflammatory reaction occurs and macrophages attempt to destroy the organism within the tissue, which becomes consolidated (resulting in pneumonia).

Necrosis of the central portion of the lesion causes a caseous necrosis (cheesy-appearance) and as scar tissue develops, the organisms are encapsulated and the individual becomes a carrier of the bacteria, regardless of symptomatic presentation (Price & Wilson, 1997).

Etiology, Prevalence, and the Homeless: A Population at Risk

It is widely known that the homeless individual is at an increased risk for contracting TB (Rayner, 2000). The rate of TB among US homeless persons may be 20 times that of the general adult population (Brewer, et. al, 2001). Investigating the etiologic and pathophysiologic properties involved in the transmission of the bacteria explain why these individuals are at great jeopardy. "Studies suggest that the majority of urban homeless TB cases are attributable to ongoing transmission of TB" (Brewer, et. al, 2001).

In a 1999 study, Griffin and Hoff attempted to define the prevalence of TB amongst the homeless in Kansas City, Missouri. The researchers conducted skin tests on 856 individuals. 654 of these tests were read and 89 (13.6%) were positive. "Males were nearly four times as likely to have a positive skin test than females."

Comparing similar studies that attempt to enumerate the national prevalence of TB among the homeless yields non-commensurate results. For example, although the Griffin and Hoff study gave an almost 14% prevalence rate for the homeless in Kansas City, the National Survey of Homeless Assistance Providers and Clients (NSHAPC) found only 3% of respondents reporting TB infection (NSHAPC, 1996).

And a study of the homeless in New Orleans found a 22% prevalence rate among those tested (Falchook, et. al, 2000).

Disparity amongst these studies may correlate with the traditional barriers found in defining homeless prevalence in the national population. Finding the precise means to quantify the exact prevalence rate of TB in the homeless may prove to be just as elusive.

Other data have been analyzed to examine which members of the homeless group itself are at an increased risk for contracting TB. When Acevedo-Garcia (2001) used exposure indices (poverty, crowded housing, and dilapidated housing) and segregation indices (contact with immigrants, isolation, and density) to characterize zip codes, she found that for Whites and Asians, risk factors were rare in zip codes with very high TB rates.

"In agreement with the distribution of TB cases by age and foreign-born status, this suggests that cases among Whites may be caused by reactivation, whereas cases among Asians may be imported. In contrast, Hispanics and African Americans were exposed to risk factors that may facilitate TB transmission. Among Hispanics, high contact with immigrants was an important factor. African Americans were the group most frequently exposed to multiple risk factors" (Acevedo-Garcia, 2001).

Barr, et. al (2001) examined the role of poverty in the height of a TB epidemic in New York City. "Neighborhood poverty was strongly associated with TB incidence. Public health interventions should target impoverished areas." Studies such as these attempt to investigate parameters other than literal homelessness that may play a role or help contribute to the

increasingly high prevalence rate of TB infection in the homeless.

Treating Tuberculosis in the Homeless: Current and Future Trends

The recommendations found in the literature related to treating the tuberculosis-infected homeless are widely varied. Current trends are aimed at the primary prevention of the illness instead of the secondary and tertiary treatment of the infection itself. The Advisory Council for the Elimination of Tuberculosis has developed recommendations to assist healthcare providers, health departments, social service agencies, shelter operators and workers, and homeless persons prevent and control TB in this population.

"TB should be suspected in any homeless person with a fever and a productive cough for more than 1-3 weeks in duration, and appropriate diagnostic studies should be undertaken. Confirmed or suspected TB in a homeless person should be immediately reported to the health department so that a treatment plan can be decided upon and potentially exposed persons located and examined. Patients with TB should be counseled and voluntarily tested for HIV infection because TB treatment recommendations are different for HIV-seropositive and HIV-seronegative persons" (MMWR, 1992).

The Council continues in their recommendations to include provisions regarding housing and shelter arrangements, the need and importance of direct observation, and appropriate follow-up care for not only those individuals infected with TB, but those workers also exposed to the bacteria so much in everyday life.

These recommendations are the same Schieffelbein and Snider (1988) identified in their research outlined by the Centers for Disease Control after several breakouts of TB occurred in the late 1980s in America's homeless shelters. Screening is of paramount importance in the prevention of TB transmission (Rayner, 2000).

Brainard, et. al (1997) found through their research that a multi-focused concerted effort is needed to help control TB in the homeless. "Efforts to improve TB control should focus on increasing compliance, particularly among the homeless. Although the expansion of directly observed therapy is essential, raising therapy completion rates to acceptable levels may require additional social services, financial incentives and enforceable legal remedies for noncompliance. More rigorous treatment guidelines are needed to assure consistent management of patients who receive interrupted treatment."

Interrupted and incomplete treatment adds to the disturbing trend of drug resistance. Barry, et. al (1986) found that in 1985, of the 26 cases of TB identified in Boston, Massachusetts, 15 cases were resistant to isoniazid and streptomycin. Five cases without multiple drug resistant organisms occurred in persons with previous positive tuberculin tests who had not received adequate therapy for prophylaxis of infection or treatment of disease. Conclusions of this study were that "detection and therapy of TB in the homeless, a group at particular risk for disease, required intensive intervention and outreach efforts."

Education is an essential part of any health regimen. In the homeless, education regarding TB transmission and treatment may be of even greater salience. In a University of California at San Francisco study authored by Tulskey, et. al (1999), it was found that of 292 homeless persons interviewed (21.6% of whom were PPD positive), over 60% had misconceptions about transmission, in particular confusion with transmission of the human immunodeficiency virus (HIV). Healthcare providers were the main source of information for those studied and over 80% favored controls to ensure adherence, in particular directly observed therapy.

Conclusions of the study were that "health care providers should expand educational messages beyond skin testing. Greater knowledge about tuberculosis may increase acceptance of control measures. Targeted education plus social norms favoring completion of therapy may improve screening and treatment outcomes in this population".

It is of the opinion of this author that all of the recommendations and guidelines found in the literature be followed in order to decrease the prevalence of TB in the homeless. In addition, emphasis must continue to be placed on primary prevention. Employing outreach programs, expanding educational opportunities, and tackling the problem of drug resistance through enforcement of compliance and the encouragement of treatment completion can reach the objective of lowering prevalence.

In conclusion, TB infection doesn't have to remain an upward trend in the homeless. Intensive efforts among the individuals working with the homeless can result in positive contributions to the battle. This review and synthesis of literature has examined the issues of pathophysiology, prevalence, etiology, emerging drug resistance, and future treatment trends and options, all of which play an important role in striving to lower the occurrence of tuberculosis in the homeless population. By addressing these issues, the healthcare provider can make strides in not only treating tuberculosis, but preventing it altogether.

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