Respiratory infections in the homeless

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Many people are affected by homelessness worldwide, in Canada and the U.S. Homelessness is associated with an increased risk of health problems due to overcrowding in shelters and host factors such as substance abuse, HIV co-infection, poor nutrition and hygiene, mental illness and trauma. Respiratory infections are among the most common problems that the homeless may present with and are associated with high morbidity and mortality. Certain respiratory infections are more common among homeless individuals and may be associated with complications unique to this population. Most of the literature in the field focuses on tuberculosis in the homeless or on specific outbreaks of respiratory infections. This article discusses the prevalence, risk factors, complications, treatment and prevention of tuberculous and non-tuberculous respiratory infections such as influenza and pneumonia caused by *S. pneumoniae*, *S. aureus*, *H. influenzae b*, and anaerobes.

**Introduction**

Homelessness is an alarming social problem that affects up to 100 million people worldwide. The 2001 Canadian census counted 14,145 individuals living in shelters, however, this largely underestimates the number as many homeless may not stay in shelters. Homelessness is also a significant health problem. Crowded shelters are favorable environments for infection and host factors such as poor nutrition, obesity, sedentary lifestyle, poor hygiene, alcoholism, drug use, smoking, mental illness, abuse, trauma, or HIV co-infection increase susceptibility to illness and may diminish immune systems. These factors, combined with decreased financial and personal resources, make the seeking out of medical help and compliance with treatment less likely. As a result, homeless people are more likely to suffer from respiratory infections, skin and foot infections, hepatitis, HIV, STI’s, and chronic disease.

Respiratory infections are among the most common medical issue that homeless individuals seek help for and shelters can be sources of outbreaks of tuberculosis and pneumonia. Respiratory infections account for 33-42% of presenting complaints and 20% of total deaths in the homeless. The mortality due to respiratory illness is about seven times greater than expected in the homeless. This is compounded by the increased rate of chronic respiratory illness such as bronchitis (11.4%), asthma (8.6%) and COPD (5%). Several factors specifically predispose this population to respiratory infections including crowding, increased exposure to pathogens, smoking, alcohol and drug abuse, HIV seropositivity and chronic lung disease. This article will examine both tuberculous and non-tuberculous respiratory infections such as pneumonia and influenza in the homeless as they are not only more common but are associated with greater morbidity, mortality and complications.

**Tuberculosis**

Tuberculosis is the most common respiratory infection among the homeless that is discussed in the literature. The estimated annual pulmonary TB rate for Canada and the U.S. is 2 per 100,000. The urban homeless comprise a disproportionate burden of tuberculosis. The prevalence of active tuberculosis among the homeless in the U.S. is 1.6% to 6.8% and 18% to 51% for latent disease.
As with other respiratory infections, poverty, malnutrition and overcrowding are all risk factors for tuberculosis. Larger, more crowded shelters with increased people sharing the same breathing space increases transmission and poor ventilation or recirculation of air compounds this risk. HIV co-infection and alcoholism commonly complicate the course of infection. HIV is the single-most important risk factor for latent disease progressing to active disease and it is recommended that all individuals with TB be tested for HIV. Some studies link multi-drug resistance to homelessness, although contradictory data disputes this. Homelessness is associated with poor adherence, loss to follow-up and is an independent risk factor for no contacts. Contact tracing is accomplished by mass screening in shelters as opposed to searching for named contacts.

Screening and detection in the homeless is important for preventing TB resurgence. The CDC recommends that the detection of tuberculosis be given first priority as opposed to screening asymptomatic individuals. City-wide symptom screening programs have been implemented in Philadelphia shelters on intake to ensure that symptoms such as prolonged cough, night sweats, fever, and weight loss are further investigated. Mass screening in shelters has also been widely used with resulting decreases in tuberculosis transmission. No consensus has been reached about the most effective screening tool. Tuberculin skin testing (TST) is likely the simplest and least expensive to administer, but lacks specificity and results in many false negatives in the immunocompromised. Mandatory skin test screening in one U.S. study resulted in a decreased incidence of TB from 510 to 121 cases per 100,000 per year. Spot sputum is also a fairly rapid screening technique but 50% of smears are negative and subsequent tracing of patients is difficult. Studies in incarcerated individuals show that chest radiography is likely to be the most cost-effective method. Annual snapshot screening for tuberculosis in shelters using combinations of these methods has been undertaken in Los Angeles and Marseille with great effectiveness. Certain shelters, as in Barcelona, imposed mandatory screening with chest radiography, TST and sputum culture upon shelter admission before access to free meal services.

Lack of treatment compliance is a common problem among the homeless. A 48% non-compliance rate was reported in New York in 1991 leading to increased length of treatment (560 versus 324 days) and decreased completion of treatment. Directly observed therapy (DOT) and supervised housing programs are both effective methods used to increase compliance. Other novel solutions include financial or food incentives, transportation assistance and education using a peer health advisor. More dramatically, incarceration has also been evaluated as a method for treating patients refusing treatment.

Pneumonia

Pneumonia affects over 1 million Americans annually and is the 6th leading cause of death with a 14% mortality rate among hospitalized patients. This burden is disproportionally shared by the homeless. An Edmonton-based study from 2000-2002 showed a pneumococcal infection rate among the homeless of 266.7 per 100,000 contrasted with 9.7 per 100,000 in the general population. Outbreaks of pneumococcal pneumonia more commonly occur in crowded shelters with high pneumococcal carriage rates of up to 60%. Shelter outbreaks in Chicago, Boston, Paris and the UK as well as in several provinces of Western Canada have been described in the literature.

In addition to homelessness, risk factors for pneumonia include smoking, drug or alcohol use, HIV, asthma and COPD; all frequent comorbidities in the homeless. It is estimated that 78% of homeless individuals are smokers and 60% abuse alcohol. In two shelter outbreaks in Boston and Paris, the majority of those infected were alcoholics, smokers or had chronic bronchitis. Outbreaks of Hib pneumonia are also mostly found among alcoholic homeless patients.
The most common organisms responsible for community acquired pneumonia in the homeless are *Streptococcus pneumoniae*, *Staphylococcus aureus*, and *H influenzae b*. Aspiration pneumonia is also frequent and organisms include anaerobes like peptostreptococcus, *Fusobacterium nucleatum*, Prevotella and bacteroides species. *Pneumocystis carinii* can be found in HIV positive individuals.\(^{20,21,22}\)

Vaccination against pneumococcal pneumonia is one method of reducing invasive pneumococcal disease in shelters.\(^{25}\) The Canadian National Advisory Committee on Immunization (NACI) recommends the use of 23-valent pneumococcal polysaccharide vaccine (PPV-23) in the homeless, those who use illicit drugs, HIV infected individuals and those with other chronic conditions such as COPD that are disproportionately higher in the homeless. Vaccination of hard to reach populations like the homeless can be challenging and a 1999 vaccination campaign in Edmonton addressed this issue by targeting as many sites as possible including single room occupancy hotels, soup kitchens, community agencies, needle exchanges, pubs, parks and alleys. The year following the campaign, there was a decrease in the amount of emergency department visits for pneumonia (863 compared to 646), and a decrease in admissions for pneumonia.\(^{22}\) Vaccination is also the best way to prevent Hib pneumonia in at-risk persons who are not immune.\(^{23}\)

Special considerations for pneumonia in the homeless include keeping a high index of suspicion for aspiration in those who abuse drugs and alcohol. One must also consider the difficulty of completing antibiotic regimens especially those with frequent dosing. Furthermore, there is often no safe storage for medications or a place to convalesce with closures of shelters during the day. Hospitalization or admission in a medical respite unit is worthwhile to ensure proper treatment.\(^{21}\) Smoking cessation is another important arm of prevention although it is often overlooked in the homeless due to falsely assumed lack of motivation.\(^{6}\)

**Influenza**

Influenza affects millions of Americans per year and results in 100,000 hospitalizations and 36,000 deaths annually. Influenza can result in secondary pneumonia and exacerbations of COPD or asthma.\(^{26}\) Despite the large morbidity and mortality associated with the virus, influenza among the homeless is very poorly studied. A New York-based study of 3 shelters evaluated 4,319 charts for influenza-like illness with 59 recorded cases, less than one fourth of which had been vaccinated. Vaccination against influenza has been advocated for in those at increased risk of influenza and pneumonia including the homeless, HIV-infected and those with COPD.\(^{27}\) Influenza vaccination remains underutilized and organized efforts concentrated over a day or week to vaccinate all shelter residents and staff is suggested.\(^{26}\) Various strategies for improving vaccination rates include educational campaigns, improving patient-provider interactions, broadening the provider base, adoption of standing orders for immunization administration, and promoting wider availability and access to vaccine at the structural level.\(^{28}\)

**Conclusion**

Homeless individuals are at increased risk of respiratory infections such as tuberculosis, influenza and pneumonia due to *S pneumoniae*, *S aureus*, *H influenzae b* and anaerobes. Risk factors include overcrowding, increased pathogen exposure and host factors such as alcoholism, smoking, drug abuse, HIV co-infection and chronic lung disease. Morbidity, mortality and complications are greater in these specific populations and outbreaks are common. Diagnosis and treatment non-compliance are serious challenges. It is important to remember that respiratory infections and their complications in the homeless are largely influenced by social factors. Mindfulness of the unique risks and challenges associated with this population is important. It is only through comprehensive programs that involve initiatives like screening, immunization, low threshold for hospitalization, smoking cessation, and incentives or education to increase compliance, that effective prevention and
treatment of respiratory infections in the homeless can be attained.

References


