Tuberculosis - A Threat to the Elderly

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Older adults are two to three times more likely to develop tuberculosis than their younger counterparts.[1] Respiratory therapists see and treat patients with tuberculosis, but how much do we really know about the disease?

Tuberculosis through the Microscope of Time

Recent archeological findings in East Africa suggest that tuberculosis has an ancient, three million year old progenitor. This would make tuberculosis older than plague, typhoid fever, and malaria, altering the current concept of the disease being a recent affliction killing three million a year.[2, 3]

Tuberculosis taxonomy tables demonstrate another interesting relationship shared by *M. tuberculosis* and *M. leprae*, the bacteria causing leprosy. Bacteria extracted from preserved human remains in the Middle East suggest that tuberculosis and leprosy competitively infected humans, with tuberculosis ultimately winning out. The remains suggest a form of immunity from leprosy appears to have been conveyed by the tuberculosis bacilli.[2]

During antiquity, humans possessed the characteristics required by the tuberculosis bacillus. Poor nutrition reduced protection by the immune system.[3] Living outdoors exposed humans to the weather, further stressing the immune system. Meat was often contaminated by the tuberculosis bacillus and was poorly cooked if at all. Lastly, humans grouped together in small spaces like huts, outcroppings, and caves. Poor nutrition, varying levels of immune response, contamination, and close living quarters permitted easy transmission of TB from person to person.

It is speculated that TB traveled outward from the cradles of life as humans expanded their living range. This human dispersal created varying living conditions and dietary habits, some healthier than others. Separation of uninfected groups by large distances reduced cross-infection and provided isolation protection.

Eventually, more hospitable climatic conditions allowed positive changes in the human immune response and improved nutrition potential. As noted today, a strong immune system and proper nutrition allow infected persons to remain asymptomatic and live more normal lives.[3]

Tuberculosis Patiently Waits

Humans have been at the mercy of their place of birth, local environment, and societal status for much of their existence. Travel was beyond reach except for the wealthy or adventurous, and most people died within 25 miles of their birthplace. Each farmhouse, village or city was a microcosm in itself, visited by the occasional traveler, ship or caravan. Under these conditions, distance and the virulence of a disease created a self-limiting sphere of infection, with infected people often dying long before they could infect the next cluster of humans.

Notable people in the past who have suffered or died from tuberculosis include Fredrick Chopin, composer; Laennec, TB researcher; John Harvard, founder of Harvard University; John Keats, poet; Robert Louis Stevenson, author, and many members of the Bronte Family.[4]

Pure economics and exposure have superseded environmental climate as a major causative factor, resulting in tuberculosis affecting many hundreds of millions of people in the world today. Economics and societal status provide an even greater disparity in living conditions. Great concrete and steel cities abound, as do improvised shelters and shantytowns. Within each of these societal arrangements, stratification of society and classes exists. Nutrition and health are ongoing issues, affecting immune system responses in several billion people worldwide.

One third of the world's population is infected with tuberculosis, with 300 million having active symptomology.[4] The very young, the elderly, minority populations and pregnant women are at increased risk. Crowded living conditions in prisons, homeless shelters, and nursing homes further enhance the risk of infection.[2,5]

Once exposed, the immune system isolates the tuberculosis bacilli to protect the body from further spread. The immune system will continue providing this protection unless it is weakened by other stressors such as HIV, diabetes, alcoholism, age, and declining nutritional status.[5]

The incidence of TB in the United States declined in the 1980s. By the late 80s however the elderly comprised the single largest group of patients with active tuberculosis.[6] A resurgence of TB in the late 1990s and early 21st century was related to inadequate healthcare attainment, poor living conditions, immigration (often to escape even poorer living conditions), and more virulent and immunosuppressive diseases like HIV. Again, the overwhelming affected population is very often the poor and the elderly.

Tuberculosis Comes Full Circle

Nature and life travel in circles. The requirements we need as infants transition into the very same requirements as we age. In effect, we experience Maslow's Pyramid in reverse. We attempt to maintain our ability to share gained knowledge with younger generations while requiring the basic requirements for survival from others, such as nutrition, shelter, support, and companionship.

Baby boomers will soon become the most populous segment of the United States. "Boomers" aged 65 years and older form a huge repository of TB infection, with a TB rate higher than any other age group.[7]

Once infected with TB, most healthy people do not exhibit clinically evident symptoms and are not capable of transmitting the disease. The lifetime risk of developing symptoms of active disease occur in only 10% of the infected population.[4] However, being opportunistic, tuberculosis can become active as an older individuals immune status declines.

We find that many elderly follow the pathway of suppressed immune systems, increased longevity, poor general health, and poor nutrition. More and more, the elderly are congregated at long-term care facilities with other similarly affected individuals.[8]

Such close living arrangements make the elderly more susceptible to primary infection or to conversion from inactive to active tuberculosis. Long-term care facility residents face a two to seven times higher risk of being infected than a similarly aged individual living in the community.[8] An interesting note to healthcare workers is that long term care facility employees also have a three times greater rate of TB infection than do other types of employment.[8]

Prevention is obviously the best treatment for tuberculosis. A strong testing and treatment program is required to reduce its incidence in long-term care facilities. New employees and residents should be screened upon employment or entry into the long-term facility. Follow-up screening is strongly suggested.

Recommended treatment for tuberculosis is very effective, utilizing multiple drugs for approximately 6 – 8 months.[4] Unfortunately many patients, including the elderly, stop taking the medications before the regimen is completed. Reasons attributed included lack of understanding, socioeconomic reasons, and poor support mechanisms. Poor memory, poor eyesight and mental confusion may also be contributing factors.[6]

Often if an individual feels better in a few weeks, they make the assumption they are cured. When the course of treatment is aborted early, tuberculosis mutates and 52% of the relapsed cases show a resistance to one or more of the drugs. [4] Because many TB drugs can cause side effects, most notably in patients with evidence of hepatic or renal failure, the benefits of drug therapy must be weighed against the potential risks.

How can respiratory therapists become involved in reducing the incidence of tuberculosis? Quite simply by an awareness of risk factors, and dissemination of timely information to endangered populations. Respiratory care practitioners need to be well versed in the cause, prevention and treatment of all pulmonary diseases, not just COPD.

1. Rajagopalan S and Moran D. Tuberculosis in older minority adults. Clinical Geriatrics, accessed 9/15/2005.

[http://www.hmpcommunications.com/cg/displayArticle.cfm?articleID=cgac172]

2. Gutierrez MC, Brisse s, Brosch R, Fabre M, Omays B, et al. (2005) Ancient origin and gene mosaicism of the progenitor of Mycobacterium tuberculosis. PloS Pathog 1(1): e5

3. http://www.bol.ucla.edu/~ftaylor/Mycobacteriumtuberculosis.html

4. Tuberculosis: Death Captains, Harms, J. http://www.bact.wisc.edu/Bact330/lecturetb

5. Tuberculosis. http://www.niaid.nih.gov/factsheets/tb.htm

6. Stead WW, Lofgren JP. Does the risk of tuberculosis increase in old age? J Infect Dis 1983; 1`47:951-5.

7. TB: A current public health threat, TB among the Elderly, http://www.molbio.proncton.edu/courses/mb427/2000/projects/0006/public9.htm

8. "Prevention and Control of Tuberculosis in Facilities Providing Long-Term Care to the Elderly: Recommendations of the Advisory Council for Elimination of Tuberculosis," MMWR, July 13, 1990. Published on the CDC website