



Airway Clearance Indications: Emerging Pathogens

Nontuberculous Mycobacteria (MAC, AMI, MAI)

Nontuberculous mycobacteria (NTM) are a class of pathogens (germs) from the same family as the more familiar tuberculosis. There are many strains of NTM in the environment, but not all of them cause human disease. Among the strains that have been implicated in human disease, the most common are *Mycobacterium (M.) avium complex*, *M. kansasii*, *M. abscessus*, *M. chelonae*, *M. fortuitum*, *M. terrae*, *M. xenopi*, and *M. simiae*. It is possible to be infected with more than one strain of NTM simultaneously. It is important to identify the exact strain of NTM causing infection, because the clinical course and treatment requirements vary.

The incidence of NTM infection is conservatively estimated to be 2 in 100,000 persons in the United States. However, recent data indicates the rate of infection is increasing, especially in certain regions of the country, and there is concern that NTM infection may present a growing public health threat. Some experts suggest that undiagnosed pulmonary NTM infection may be 10 times more common than tuberculosis in the United States, affecting as many as 150,000 people. Lack of awareness of the disorder and a scarcity of laboratories with the ability to adequately culture for specific NTM strains and drug susceptibilities are contributing to these concerns.

Unlike tuberculosis and leprosy, closely related pathogens, nontuberculous mycobacterial pathogens are not thought to be contagious person-to-person. However, nontuberculous pathogens are found everywhere in the environment, especially in the soil and water. Documented cases of the acquisition of nontuberculous mycobacterial infections by susceptible individuals from pools, drains and showers lead to the nickname "Hot Tub Lung" for nontuberculous mycobacterial pulmonary infection. It is not entirely clear why some people become infected with these organisms when the vast majority of people do not, but some risk factors have been identified including immunocompromise from drugs or underlying disease and the presence of an existing lung disease like emphysema or bronchitis. Researchers are also trying to identify currently unknown genetic factors or structural defects of the lung which may increase susceptibility to NTM infection.

What Happens in Nontuberculous Mycobacterium Infection?

NTM infections can affect many body systems, but lung infection is the most common manifestation. Frequently patients present with a history of fatigue, fevers, weight loss and a cough that may produce blood-tinged sputum or large amounts of bright red blood. Sometimes the symptoms are mild and may develop over months or even years. Other times, the onset is rapid and debilitating. Radiological examination in NTM reveals areas of bronchiectasis and cavitating (creates cavities or holes) lung abscesses. These areas may be focal (limited to one specific area), multi-focal (still limited in scope, but present in several locations) or diffuse (spread throughout the lungs). In most cases, the lung disease caused by NTM infection is focal or multi-



focal and frequently the affected areas are surgically removed. However, surgery does not remove the organism and, left untreated, bronchiectasis may spread and become diffuse. Bronchiectatic areas of the lung then become reservoirs for excess infected mucus, setting up a vicious cycle of impaired mucociliary clearance, chronic infection and more damage to the airways.

How Airway Clearance Therapy Can Help Nontuberculous mycobacteria

Keeping the airways clear of excess secretions and thereby reduce the incidence of inflammation and/or infection and is crucial to maintaining respiratory health. Airway clearance therapy using High Frequency Chest Wall Oscillation (HFCWO) has been demonstrated by clinical study to promote excess mucus clearance and improve bronchial drainage. Shear forces are created by HFCWO treatment that mechanically releases adhered secretions from the walls of the pulmonary tract. HFCWO has also been shown to reduce the viscosity of secretions which significantly improves mobilization of excess mucus. By replicating cough, HFCWO can effectively mobilize pulmonary secretions from smaller airways to larger airways where they can be coughed out, swallowed or suctioned.

What are the symptoms of an NTM Infection?

- Weight Loss
- Fatigue
- Cough
- Fever
- Lack of appetite
- Night sweats
- Blood in the sputum

For More Information on NTM Infection

1. Nontuberculous Mycobacteria Information and Research (NTMir): <http://ntminfo.org/>
2. National Jewish Medical and Research Center NTM Fact Sheet: <http://www.nationaljewish.org/disease-info/diseases/nts-mycobac/index.aspx>
3. EMedicine Pulmonary NTM Fact Sheet: <http://www.emedicine.com/RADIO/topic413.htm>
4. Centers for Disease Control (CDC) case study on NTM infection and hot tub use: <http://www.cdc.gov/ncidod/eid/vol7no6/mangione.htm>