

2.10 Nontuberculous Mycobacterial Disease

Etiology

Mycobacteria are a family of small, rod-shaped bacilli that can be classified into 3 main groups for the purpose of diagnosis and treatment:

- *Mycobacterium tuberculosis* complex which can cause tuberculosis: *M. tuberculosis*, *M. bovis*, *M. africanum*, *M. microti* and *M. canetti*.
- *M. leprae* which causes Hansen's disease or leprosy.
- Nontuberculous mycobacteria (NTM) are all the other mycobacteria which can cause pulmonary disease resembling tuberculosis, lymphadenitis, skin disease, or disseminated disease.

Case Definition

Confirmed Case

- Cases with mycobacterium other than *Mycobacterium tuberculosis* complex demonstrated on culture such as *Mycobacterium avium intracellulare* complex (MAC), *M. genavense*, *M. abscessus*, *M. gordonae*, *M. kansasii*, and *M. terrae* complex.

Clinical Presentation

One hundred NTM species have been identified, with approximately 40% of them associated with human disease. Thus, symptoms associated with an NTM infection can be very diverse. They include disseminated disease (fever, weight loss, fatigue; commonly found in immunosuppressed individuals); pulmonary disease resembling tuberculosis; lymphadenitis; Crohn's Disease; joint, bone, and soft tissue infections; Buruli ulcer; and sepsis. *M. kansasii* is the most pathogenic bacteria, generally resulting in lung lesions similar to that of tuberculosis.

Diagnosis

Diagnostic tools may be used in consultation with the Public Health Lab, 777-6583 or website www.publichealthlab.ca

Epidemiology

Occurrence

Although NTM is found worldwide, its prevalence is higher in developed countries. The incidence of NTM in Canada has been increasing, due to improved means of detecting and reporting bacteria, but also due to a true increase in the number of infections. Since NTM is not reportable in the United States or Canada, the exact prevalence of infections is unknown. In Newfoundland and Labrador, 37 cases have been reported between 2012 and 2015. The majority of cases of NTM in Newfoundland and Labrador were caused by MAC.

These opportunistic bacteria affect individuals with pre-existing conditions. NTM has been frequently found in HIV/AIDS patients and other immunocompromised groups, such as the elderly and cystic fibrosis patients.

Reservoir

Many species of NTM have been located in water sources, including natural water, tap water, swimming pools, soil, water from showerheads, water in surgical solutions, and plumbing. *M. avium* has been isolated from cigarette components. NTMs have also been located in healthcare settings, including dental practices, dialysis units, and hospital water supplies.

Transmission

There has been no evidence of person-to-person transmission. NTM is acquired through ingestion, aspiration or inoculation of the bacteria from contaminated water sources or soil.

Incubation Period

There is a great deal of variability in incubation period from one NTM to the next. *M. abscessus*, *M. chelonae*, and *M. fortuitum* are among some bacteria that are rapidly growing, with symptoms appearing shortly after infection. However, MAC, *M. genavense*, *M. gordonae*, *M. kansasii*, *M. terrae* complex, and *M. ulcerans* are bacteria that are slow growing with symptoms appearing later. Presentation of symptoms from *M. ulcerans* infection, for example, does not appear until 6-24 weeks after initial infection.

Communicability

Infection with NTM can occur as long as it is active and present in nature. If an individual is immunocompromised, he/she is considered susceptible to infection.

Control Measures

Management of Case

Investigations

- Determine the possible source of the infection taking into consideration the incubation period, reservoir and mode of transmission.
- Determine history of daycare or hospitals.
- Identify potentially contaminated water source. Identify others who may have exposed to the same source.

Treatment

- Cases should be carefully evaluated to determine the significance of an NTM isolate. NTM may be drug resistant, encouraging the organism's growth. Drug susceptibility tests on a bacterial isolate can help determine an effective drug combination.

- The 11th chapter of the 7th Edition of the Canadian Tuberculosis Standards provides comprehensive information regarding different means of pharmacotherapy for different NTM strains, as well as different treatment methods depending on the symptoms one presents. More information on NTM can be found at http://www.respiratoryguidelines.ca/sites/all/files/Canadian_TB_Standards_7th_Edition_ENG.pdf

Management of Contacts

Investigation of contacts is not required.

Management of Outbreaks

An outbreak management team should be established to direct and coordinate the investigation as well as address infection prevention and control measures. If the outbreak is limited to one region the region is responsible to manage the outbreak; if more than one region is involved the outbreak will be managed by the province or in consultation with the province.

Education and Preventive Measures

Acceptable hygiene measures should be encouraged for the general public. However, prevention should be aimed at those most at risk for NTM infections.

Overall, it is difficult to prevent acquisition of NTM if it is prevalent in nature. Precautionary measures can be utilized to reduce likelihood of this event occurring. Many NTMs are resistant to chlorinating and ozonating water, as well as extremely cold and moderately hot temperatures. Baths can be taken instead of showers, and water from public supplies should be boiled before human use. To prevent nosocomial infections, there should be proper sterilization of surgical equipment and frequent testing of water supplies within the hospital setting.

Information regarding water quality is provided at

<http://www.health.gov.nl.ca/health/publichealth/envhealth/drinkingwater.html>

Reporting Requirements and Procedures

- The laboratory (hospital or public health laboratories) report case/s to the attending physician, the Chief Medical Officer of Health and the Medical Officers of Health (MOH)
- The MOH office will notify, as required, local physicians, nurse practitioners, environmental health officers, community health nurses, communicable disease control nurses (CDCNs) and infection control practitioners (ICP), in the particular region as required for follow-up and case investigation.
- EHO will conduct an investigation of the case under the direction of the MOH and provide case details as per the food history.
- CDCN enters the case details into the electronic reporting system and uses the CNPHI tool, if indicated, for alerts or outbreak summaries.

Provincial Disease Control

- Reports the aggregate case data to Public Health Agency of Canada
- Provides an analysis of the case/s with reports in the Quarterly Communicable Disease Report (CDR), also posted on the Public Health website
- Coordinates the response if an outbreak across RHAs (CMOH will likely coordinate an outbreak across RHAs with input from disease control and environmental health.)

References

Grange, J. M. (2007). "Environmental mycobacteria". In Greenwood, David; Slack, Richard; Peitherer, John; & Barer, Mike (Eds.), *Medical Microbiology* (17th ed.), pp. 221-227. Elsevier. ISBN 978-0-443-10209-7. Retrieved May 31st, 2013, from https://en.wikipedia.org/wiki/Nontuberculous_mycobacteria.