

# Extrapulmonary Nontuberculous Mycobacterium (NTM)

## Investigative Guidelines

December 2017

### 1. DISEASE REPORTING

#### 1.1 Purpose of Reporting and Surveillance

1. To identify outbreaks and potential sources of transmission, in order to prevent further exposure.
2. To educate potentially exposed persons about signs and symptoms of disease, thereby facilitating early diagnosis and treatment.
3. To identify epidemiologic trends and predictors of outbreaks.

#### 1.2 Laboratory and Physician Reporting Requirements

Laboratories are to report all test results indicative of and specific for extrapulmonary nontuberculous mycobacteria (NTM) within one working day.

#### 1.3 Local Health Department Reporting and Follow-Up Responsibilities

1. Begin follow-up investigation of extrapulmonary NTM within one working day. (Pulmonary infections are common and not typically associated with outbreaks; they do not require follow-up.) Reports from sputums and bronchial specimens will be filtered out of Electronic Lab Reporting (ELR) and should not come to the local health departments (LHD).
2. Complete case investigation electronically.

### 2. THE DISEASE AND ITS EPIDEMIOLOGY

#### 2.1 Etiologic Agent

There are more than 100 species of NTM, but in the U.S. the most frequently isolated species associated with disease are *M. avium* complex (MAC), *M. marinum* (skin and soft tissue infections), *M. kansasii* (southern states), and *M. xenopi* (states along the Canadian border). The class of rapidly growing mycobacteria including *M. abscessus*, *M. chelonae*, and *M. fortuitum* are also important causes of NTM disease. Distinct from these and other NTM species, *M. gordonae* — a.k.a. the “tap water bacillus” — is frequently isolated but almost always a contaminant and not associated with disease.

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### 2.2 Description of Illness

Clinically, NTM can cause disease similar to that caused by *M. tuberculosis* (TB). Approximately 80–85% of disease is pulmonary, generally chronic, slowly progressive, disabling lung infection.

Extrapulmonary NTM disease manifests as cutaneous, bone, joint, lymph node, or central nervous system (CNS) disease. Cutaneous infections typically result from either direct inoculation during trauma, surgical or medical procedures, exposures to whirlpool baths, or other settings such as nail salons or tattoo procedures. Isolated lymphadenitis occurs in otherwise healthy children, generally <5 years of age. Disseminated extrapulmonary disease generally only occurs in immunocompromised patients (e.g., HIV, transplant, cancer, end-stage renal disease, others) and typically results from infection via the gastrointestinal tract with hematogenous spread of organism.

Localized soft tissue infection, at a surgical site or wound, for example, typically results in purplish nodules that typically drain pus and later can ulcerate or scar. Nodules frequently occur in multiples, and can be connected via subcutaneous fistulous tracts. Lymph node disease results in large, reddened, and tender nodes which also can ulcerate or drain pus. Chains of lymph nodes may become involved. Other NTM infection signs can include cellulitis, papules, osteomyelitis, and lymphadenopathy. Symptoms of disseminated extrapulmonary disease include dyspnea, fatigue, weight loss, fever, failure to thrive in children, night sweats, and sepsis.

### 2.3 Reservoirs

NTM are ubiquitous environmental organisms present in soil and water systems. NTM thrive within drinking water systems and inhabit the biofilm present in water pipes. A variety of natural and man-made aqueous sources serve as reservoirs for NTM including:

- plumbing systems and hot water tanks
- shower heads and faucets
- whirlpool spas and footbaths
- respiratory therapy equipment
- humidifiers

NTM is also present in soil including potting soil and peat moss.

### 2.4 Modes of Transmission

Patients with localized extrapulmonary disease typically acquire disease as a result of trauma or a medical or health-related procedure whereby tap water or other contaminated products are directly inoculated into the skin. Examples would include whirlpool footbaths or hot tubs, contaminated tattoo ink, surgical procedures where tap water or other contaminated solutions inadvertently entered the surgical field, or injections where injectable material was contaminated. These infections occur sporadically (e.g., trauma), but also occur

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as small clusters (e.g., surgical infections) and outbreaks (e.g., tattoo-related infections from contaminated ink products), depending upon the vehicle of contamination. Acquisition of NTM in those with disseminated disease is thought to be through ingestion of the organism.

### 2.5 Incubation Period

Cutaneous disease typically manifests 2–10 weeks (median 3 weeks), but sometimes longer, after exposure or inoculation.

### 2.6 Period of Communicability

NTM is generally not transmissible from person to person.

### 2.7 Treatment

1. Extrapulmonary: Treatment is based upon species and site of disease. In immunocompetent patients, disease is generally curable with a 2–3 drug regimen for 2–6 months depending upon site of infection. Antibiotic treatment is dictated by *in vitro* susceptibility data, and length of therapy is variable, depending upon the immune status of the host.
2. Disseminated: For persons with disseminated infection in the context of immunosuppression, cure is difficult to achieve with restoration of the immune system.

## 3. CASE DEFINITIONS, DIAGNOSIS AND LABORATORY SERVICES

Laboratory diagnosis is based on positive mycobacterial culture or molecular results. *M. gordonae* is considered a contaminant and is not reportable. *M. leprae* is also not reportable as NTM.

### 3.1 Extrapulmonary Confirmed Case Definition

Patients with signs and symptoms referable to the area and NTM species or complex determined by culture or by molecular methods, that is not *M. tuberculosis* complex, *M. gordonae*, or *M. leprae*. Include the following sites:

1. Skin or soft tissue from wound or abscess
2. Lymph node
3. Urine
4. Normally sterile sites including blood, spinal fluid, bone marrow, abdominal or pleural fluid, bone

Exclude cultures from lower respiratory samples such as sputum, bronchial alveolar lavage, tracheal aspirates or lung tissue.

### 3.2 Extrapulmonary Presumptive Case Definitions

Patients with signs and symptoms referable to the area and culture or molecular evidence of infection by a mycobacterial species known **not** to be an *M.*

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*tuberculosis* complex organism but lacking species or complex determination. Include the following sites:

1. Skin or soft tissue from wound or abscess
2. Lymph node
3. Urine
4. Normally sterile sites including blood, spinal fluid, bone marrow, abdominal or pleural fluid, bone

Exclude cultures from lower respiratory samples such as sputum, bronchial alveolar lavage, tracheal aspirates or lung tissue.

### 3.3 Services Available at the Oregon State Public Health Laboratories

The OSPHL can perform AFB smears and culture and implements a laboratory-developed PCR method for culture identification of *M. avium*.

## 4. ROUTINE CASE INVESTIGATION

### 4.1 Extrapulmonary NTM

All patients with extrapulmonary NTM isolates should be contacted. For all patients, investigators should solicit details as to both site(s) infected and potential sources of infection including: recent exposure (within 3 months) to whirlpool footbaths at nail salons, recent surgical or injection procedures, fish tank exposure or fish handling, recent tattoo exposure, intravenous lines or catheters, or other exposures in the preceding three months where water or soil sources could have infiltrated cutaneous tissues.

Unless circumstances suggest a possible outbreak (§ 5 and 6), further investigation is not indicated. Identification of a nosocomial (healthcare-acquired) case warrants additional case finding at the implicated institution as outbreaks have been reported in such institutions associated with environmental sources of exposure (§ 6).

## 5. CONTROLLING FURTHER SPREAD

No prophylaxis is indicated for contacts. If a cluster of cases is identified linked to a common environmental source, further environmental investigation and source control are warranted.

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### **6. MANAGING SPECIAL SITUATIONS-INVESTIGATING A POSSIBLE OUTBREAK**

If a cluster of NTM is suspected, confirmation and investigation are warranted, so reservoirs may be found and eliminated. Contact ACDP epidemiologists to discuss possible outbreaks. Such investigations may involve questionnaires and detailed environmental evaluations.

### **REFERENCES**

Griffith et al. Am J Respir Crit Care Med 2007;175:367–416.

### **UPDATE LOG**

December 2017: Updated description of illness and presumptive and confirmed case definitions. (David Shih and Maureen Cassidy)

December 2015: Placed in new template. (Leslie Byster)

June 2014: Updated presumptive case definition. (Maureen Cassidy)

March 2014: Created by Kevin Winthrop and Maureen Cassidy