



Extrapulmonary Nontuberculous (NTM)

DISEASE REPORTABLE BY NEXT BUSINESS DAY

Cases should be reported to the local health department where the patient resides. If patient residence is unknown, report to your own local health department. Contact information is available at: localhealth.nj.gov.

If the individual does not live in New Jersey, report the case to the New Jersey Department of Health at: (609) 826-5964.

In cases of immediately reportable diseases or other emergencies – if the local health department cannot be reached – the New Jersey Department of Health maintains an emergency after-hours phone number at: (609) 392-2020.

ETIOLOGIC AGENT AND TRANSMISSION

Nontuberculous Mycobacteria (NTM) are Mycobacterial species other than *M. tuberculosis* complex species and *M. leprae*. Over 190 NTM species exist. In the U.S., the species most commonly linked to human disease are *M. avium* complex and *M. kansasii*. Other human-pathogenic NTM species include slow-growing species, such as *M. marinum*, *M. xenopi*, *M. simiae*, *M. malmoense*, and *M. ulcerans*, and rapid-growing species such as *M. abscessus*, *M. fortuitum*, and *M. chelonae*. Disease in humans is thought to be acquired from environmental exposures.

CLINICAL DESCRIPTION

While the most common clinical manifestation of NTM is pulmonary disease (relating to the lungs) and occurs most frequently among those with underlying lung disease, extrapulmonary NTM infections (outside the lungs) are less common and include infections with culture-positive specimens obtained from normally sterile body sites. Clinically, these infections present as lymphadenitis (infection of the lymph nodes primarily in children), disseminated disease (most commonly in severely immunocompromised patients), and skin and soft tissue infection (usually due to direct inoculation). Symptoms of NTM infection are dependent on the site of infection.

Body System	Signs and symptoms	Risk factors and exposures
Cervical lymph nodes	Neck mass; draining sinus	• Dental procedures • Often no exposure identified
Skin and soft tissue	Pain, erythema, nodules, plaques, ulcerations, mass, draining sinus	• Trauma (direct inoculation from environment) • Surgery • Cosmetic surgery • Tattoos • Intramuscular or intradermal injection • Medical tourism (e.g., cosmetic surgery)
Musculoskeletal	Pain, joint stiffness, fever, malaise, weight loss	• Spread of infection from contiguous source (e.g., surgery, injection, injury) • Prosthetic joint surgery • Joint injections
Systemic (disseminated)	Rash or other skin lesions, lymphadenopathy, fever, malaise, weight loss, shortness of breath, liver and spleen lesions	• Immunosuppression • Invasive devices (e.g., central line) • Surgery • Heater cooler devices

INCUBATION PERIOD

In some instances, symptoms may not appear until months or even years after exposure. For public health case investigations, an incubation period ranging from 2-12 weeks prior to symptom onset is generally a reasonable starting point. However, the incubation periods for different NTM species are often poorly defined and can vary significantly. Therefore, during outbreak investigations, it is recommended to tailor the estimated incubation period based on the specific outbreak species, in consultation with subject matter experts.

PATHOGENESIS AND RESERVOIRS

NTM are generally free-living organisms and are naturally occurring in the environment, particularly soil and water. NTM can form difficult-to-eliminate biofilms. Biofilms are collections of microorganisms that stick to each other and adhere to surfaces in moist environments, like the insides of pipes. Potable water in residential buildings and healthcare settings is a common source of exposure to NTMs. Contaminated water can spread through:

- Decorative fountains and water features
- Hot tubs or spas
- Hydrotherapy equipment, such as jetted therapy baths
- Ice machines
- Intravenous infusions or intramuscular or intradermal injections
- Medical equipment such as respiratory machines, bronchoscopes and heater-cooler devices
- Shower heads and sink faucets

Although NTM have historically been considered opportunistic infections, NTM infections are emerging in new settings among immunocompetent individuals. Outbreaks of extrapulmonary NTM infections have been reported in a number of settings. In almost all cases, outbreaks are due to the introduction of water sources. Settings with increased risk of NTM infections include tattoo parlors, nail salons, and hot tubs or spas. Outbreaks have also been reported in the healthcare setting due to contaminated water and the ability of NTM to form biofilms in hospital waterlines and on medical devices. NTM outbreaks have been related to a variety of medical procedures and practices, including:

- Cosmetic surgery
- Dental procedures
- Injection preparation and administration
- Manufacturing of medical products
- Medical tourism
- Medication preparation
- Medication compounding and mixing
- Surgery, such as breast surgery; heart surgery, including the use of [heater-cooler devices](#); eye surgery with exposure to consumer-grade humidifiers

PERIOD OF COMMUNICABILITY OR INFECTIOUS PERIOD

NTM is generally not transmissible from person to person.

SUSCEPTIBILITY

Susceptibility to NTM infections increases for patients who are older, immunocompromised, or have other medical conditions like open wounds.

DIAGNOSIS

Diagnosing an extrapulmonary NTM infection requires a combination of clinical and microbiologic criteria. Laboratory identification of the species of NTM is important as it helps identify infections related to a common source. NTM infections can be difficult to diagnose because nonspecific symptoms are common and routine bacterial cultures are often inadequate.

Providers should order specific laboratory testing when they suspect NTM infection (e.g., acid-fast bacilli (AFB) stain and culture). The laboratory will then perform additional testing to differentiate NTM from *M. tuberculosis*.

Definitive diagnosis requires culture of the site of infection (e.g., AFB culture of sputum or bronchial alveolar lavage for suspected pulmonary infections, AFB culture of wound for suspected skin infection, AFB culture of blood for disseminated infections, or AFB culture of appropriate tissue or body fluid for musculoskeletal infections or lymphadenitis).

It may take several weeks for a laboratory to grow NTM by culture and identify the species. Not all hospital labs have the infrastructure to identify NTM to the species-level. Providers may need to work with their laboratory to ensure testing is done at an appropriate reference laboratory.

TREATMENT

Treatment varies depending on individual patient infection susceptibility and the body site of infection. Treatment frequently requires a combination of 2 to 3 antimicrobial agents for a prolonged period of time (often 6 months to a year). NTM species are intrinsically resistant to many antibiotics. Antibiotic susceptibility testing can be performed at appropriate reference laboratories. Selection of antibiotics are often empirically chosen [based on guidance](#). Surgical or wound care management may also be required, particularly for extrapulmonary disease.

REPORTING

Health care providers and administrators are required to report cases of extrapulmonary NTM infections. This includes any clinician-diagnosed NTM infection or laboratory evidence of

positive NTM culture or PCR results, excluding *M. leprae* and *M. goodii*, from any sterile body site (including pleural fluid), tissue, and wounds, excluding lower respiratory specimens (sputum, BAL, lung tissue).

Report these cases to the local health department where the patient resides by the next business day (N.J.A.C. 8:57 – 1.4). If the patient's residence is unknown, report to your own local health department. Contact information is available at: localhealth.nj.gov.

CASE DEFINITIONS FOR CASE CLASSIFICATION

The following are descriptions of clinical and laboratory criteria needed to determine how a case should be classified (e.g., confirmed, probable). A clinically compatible case must have supporting laboratory evidence to classify the case as confirmed or probable.

Clinical Criteria

Examples of signs and symptoms of clinical disease include (but are not limited to):

- Fever
- Fatigue
- Weight loss
- Lymphadenopathy (swollen lymph nodes)
- Surgical site infections
- Wound Infections
- Cellulitis
- Granulomas
- Sepsis
- Failure to thrive
- Osteomyelitis

Laboratory Criteria

Confirmatory:	• Positive culture and identification to the species or complex level of nontuberculous mycobacteria, or • Positive nucleic acid test (PCR) specific for a given species or complex of nontuberculous mycobacteria.
Probable:	• Positive culture or nucleic acid test (e.g. PCR or 16S) for <i>Mycobacterium</i> genus
Notes:	• <u>Exclude</u> specimens that indicate <i>M. tuberculosis</i> complex (MTBC) organisms (including <i>M. tuberculosis</i>, <i>M. bovis</i>, <i>M. bovis Bacillus Calmette-Guerin</i>, <i>M. africanum</i>, <i>M. canetti</i>, <i>M. microti</i>, and <i>M. pinnepeidi</i>), <i>M. goodii</i>, or <i>M. leprae</i>. • <u>Exclude</u> cultures from lower respiratory samples, including: sputum, bronchial alveolar lavage, tracheal aspirate cultures, or lung tissue.

CASE INVESTIGATIONS

All patients with extrapulmonary NTM infections should be contacted for investigation. After confirming the illness onset date, LHD disease investigators should complete the Disease-Specific Questionnaire (DSQ) within the Communicable Disease Reporting and Surveillance System (CDRSS). Questions are listed below.

Investigators should also ensure that all other relevant information is fully documented in CDRSS, including patient demographics, occupation, hospitalization status, treatment, and outcome. Any potential epidemiologic links to other identified cases should be carefully noted, as these may suggest a possible cluster.

In addition, please submit a Body Art Infection/Injury Report ([EHS-36 Form](#)) to bodyart@doh.nj.gov if the patient reports having received any type of body art procedure during the incubation period, including tattoos, permanent cosmetics, or piercings.

1. Did the individual travel outside of the United States in the 1 year prior to illness onset?
 - a. Dates of travel
 - b. Where (location name and address)
 - c. Did the individual have any healthcare exposures outside of the United States? If yes, describe the exposure including dates and location.
2. Did the individual receive any surgical procedures in the 1 year prior to illness onset?
 - a. When (dates)
 - b. Where (name and address)
 - c. Describe exposure
3. Did the individual have any hospitalizations in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (name and address)
 - c. Reason for hospitalization
4. Did the individual receive healthcare injections or infusions in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (name and address)
 - c. Describe exposure
5. Did the individual receive dental procedures in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (name and address)
 - c. Describe exposure

6. Did the individual receive hemodialysis in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (name and address)
7. Did the individual have any intravenous lines or catheters in place in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Describe exposure
8. Did the individual have complementary and alternative healthcare exposures, including acupuncture, in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (name and address)
 - c. Describe exposure
9. Did the individual have a hot tub or spa exposure in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (facility name and address)
10. Did the individual have a nail salon exposure (manicure, pedicure, or waxing) in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (facility name and address)
11. Did the individual receive a tattoo in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (facility name and address)
12. Did the individual have any cosmetic procedures involving needles in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (name and address)
 - c. Describe exposure
13. Did the individual work with purchased soil products in the 2 to 12 weeks prior to illness onset?
 - a. When (dates)
 - b. Where (name and address)
 - c. Product name and other relevant details

14. Did the individual have a fish tank exposure or handle fish in the 2 to 12 weeks prior to illness onset?
- a. When (dates)
 - b. Where (name and address)
15. Did the individual inject recreational drugs at the infection site in the 2 to 12 weeks prior to illness onset?
16. Did the individual have any bodily trauma/injury in the 2 to 12 weeks prior to illness onset?
- a. When (dates)
 - b. Describe injury
17. What was the extrapulmonary NTM infection type (based on medical records)? Select all that apply:
- a. Abscess, not skin
 - b. Bacteremia
 - c. Catheter site infection
 - d. Disseminated infection
 - e. Empyema/pneumonia
 - f. Internal surgical site infection
 - g. Lymphadenitis (lymph node infection)
 - h. Osteomyelitis (bone infection)
 - i. Peritonitis (inflammation of the abdominal lining)
 - j. Septic arthritis (joint infection)
 - k. Sinusitis (sinus infection)
 - l. Skin and soft tissue infection
 - m. Tenosynovitis/synovitis (inflammation of the synovial membrane or fluid-filled sheath that surrounds a tendon)
 - n. Other, describe:
 - o. No infection (including suspected contaminant)
 - p. Unknown