



Understanding Extrapulmonary NTM: Reporting, Guidelines, and Oregon Trends

Adel Mansour, MBBCh, MSc
NTM Surveillance Epidemiologist



Objectives

- Describe Extrapulmonary Nontuberculous Mycobacteria (E-NTM)
- Review reporting workflow
- Review recent guidelines updates
- Summarize data over surveillance years

What is Mycobacterial infections

- Nontuberculous mycobacteria (NTM), ubiquitous in soil and water, usually infect immunocompromised persons.
- NTM do not include *M. tuberculosis* (the cause of tuberculosis) or *M. leprae* (the cause of Hansen's disease).
- There are more than 200 recognized species of NTM. Some cause disease in humans.
- About three quarters of NTM diseases manifest as primarily pulmonary illnesses, NTM also infect skin, bones, joints, the lymphatic system, and soft tissue.
- NTM infections can have incubation periods that exceed 5 years, often require prolonged treatment, and can lead to sepsis and death.

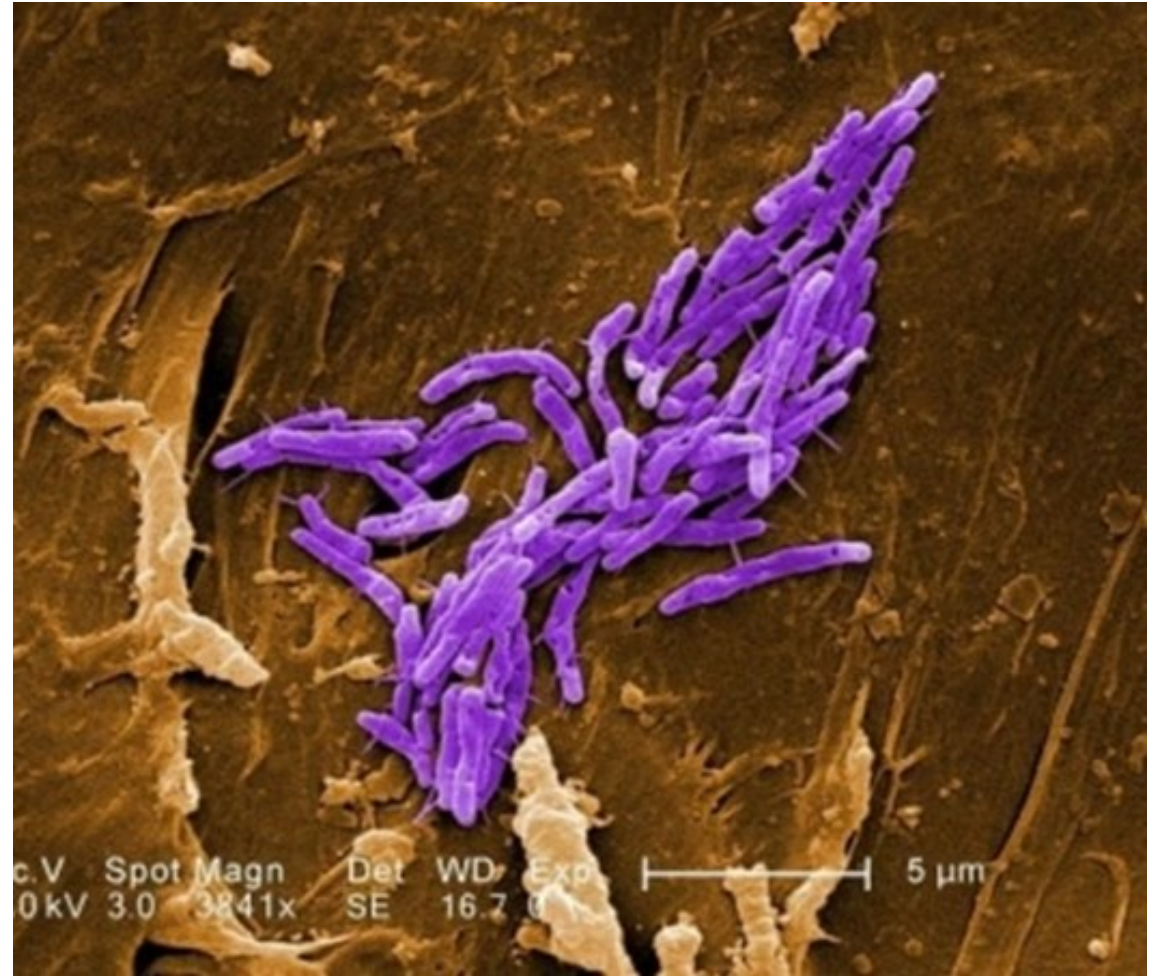
NTM can be divided into two groups based on how long they take to grow in a culture

Rapid-growing species: Usually grow within 7 to 10 days.

- *M. abscessus*
- *M. chelonae*
- *M. fortuitum*
- *M. mucogenicum*

Slow-growing species: May need more than 14 days to grow.

- *M. avium* complex (MAC)
- *M. intracellulare* subsp. *chimaera* (*M. chimaera*)
- *M. kansasii*
- *M. marinum*



NTM and environment



Knowing the species can provide insight into the environmental source



Environmental sources as surface water, tap water, soil, domestic and wild animals, milk and food products.



Biofilm formation on environmental surfaces helps mediate NTM persistence



Genomic sequencing linked the clinical isolates to environmental isolates

NTM and environment

NTM killed at high temperature $>55^{\circ}\text{C}$ (131F).

NTM survive in water despite chlorination.

Species-specific variations in environmental prevalence :

- *M. avium* → Household water
- *M. intracellulare* → soil
- *M. abscessus* → soil, dust, water, hospital environment, contaminated reagents and pharmaceuticals
- *M. Kansasii* → never in soil or natural water supplies but municipal water supplies in cities.

NTM acquisition

- The main source of acquisition for EP-NTM cases is **Direct inoculation** of NTM from trauma with sources from home, healthcare and natural environment.
- Disseminated NTM mainly from **ingested** NTM.
- Person to person transmission is controversial.

EP-NTM

- Oregon became the first state to make EP-NTM reportable in January 2014.
- Surveillance is performed state-wide.
- Many outbreaks had been detected since surveillance started,
- Last E-NTM outbreak detected in Oregon in 2023

Nontuberculous Mycobacterium Skin Infections Associated With One Tattoo Studio—Oregon, January–April 2023 [Get access >](#)

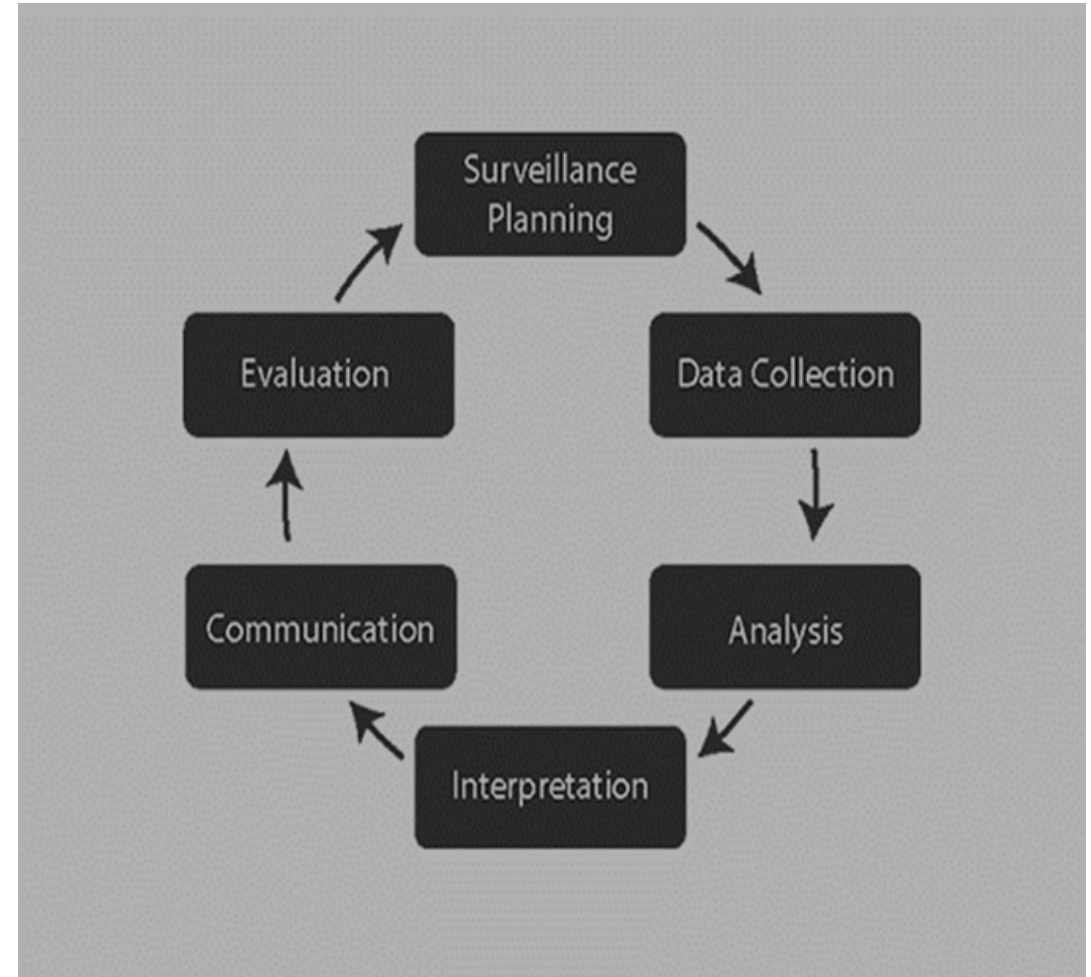
Elizabeth Slocum , Madison G Walton, Siobhan Burns, Kathleen Rees, Paul R Cieslak, Juventila Liko

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<https://doi.org/10.1093/cid/ciaf269>

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Why EP-NTM Surveillance Matters

- Improves detection of Extrapulmonary NTM infections and outbreaks
- Supports antimicrobial susceptibility monitoring
- Provides genomic data to understand emerging species
- Strengthens collaboration between clinical labs and public health



Clinical Criteria

A person with at least one of the following signs or symptoms:

- Fever,
- Fatigue,
- Weight loss,
- Lymphadenopathy*,
- Surgical site infections*,
- Wound infections*,
- Skin infections* (e.g., abscess or cellulitis which may be chronic, persistent, or subacute),
- Granulomas*,
- Sepsis,
- Failure to thrive,
- Osteomyelitis*, or
- Night sweats

**referable to the area from which the specimen was obtained, in which mycobacteria were identified*

Oregon EP-NTM Case Definition

Presumptive NTM case

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. tuberculosis* complex organism but lacking species or complex determination.

Confirmed NTM case

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*.

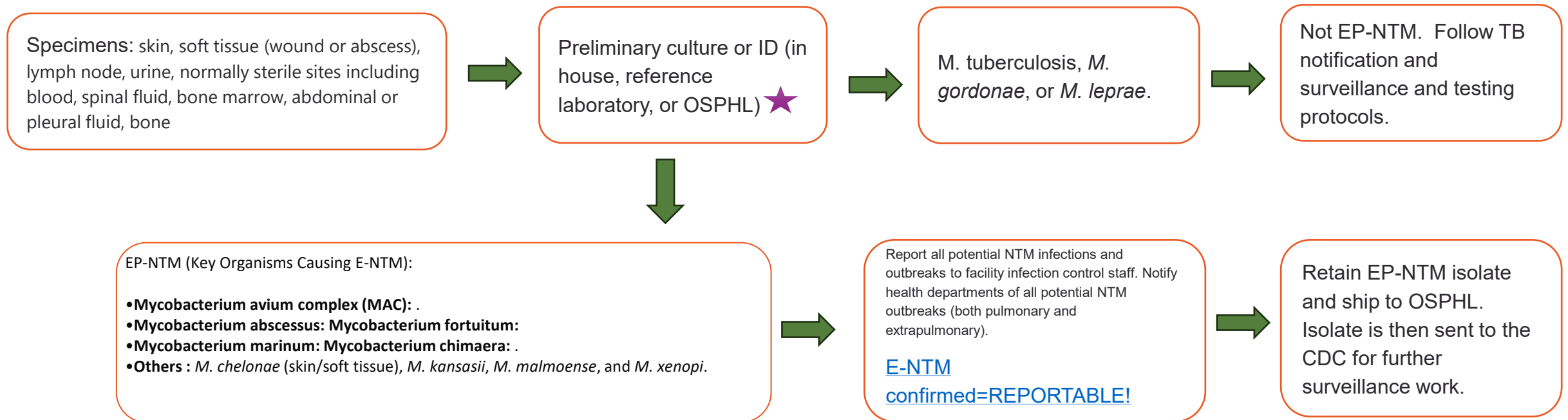
Eligible EP-NTM Specimen Sources

- Skin or soft tissue (wounds or abscesses)
- Lymph nodes
- Urine
- Normally sterile sites (blood, spinal fluid, bone marrow, pleural or abdominal fluid, bone)

Excluded EP-NTM Specimen Sources

- Sputum
- Bronchoalveolar lavage
- Tracheal aspirates
- Lung tissue
- Stool (including rectal swabs)
- Gastric contents

EP-NTM definitive diagnosis requires culture of the site of infection (AFB culture of wound for suspected skin infection, or AFB culture of appropriate tissue or body fluid for musculoskeletal infections or lymphadenitis).



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.

Extrapulmonary Nontuberculous Mycobacterium (NTM)

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.

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 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



Council of State and Territorial Epidemiologists

Submission Date: March 9, 2017 (resubmitted April 19, 2017)

Committee: Infectious Disease

Title: Standardized Case Definition for Extrapulmonary Nontuberculous Mycobacteria Infections

I. Statement of the Problem

Nontuberculous mycobacteria (NTM) are opportunistic pathogens that can be difficult to treat. While pulmonary NTM infection is a well-recognized cause of illness among those with underlying lung disease, extrapulmonary NTM infections appear to be increasing and are often associated with severe disease and poor outcomes. Extrapulmonary NTM infections are a cause of both sporadic and healthcare-associated infections in the United States. Outbreaks have been associated with medical devices, cosmetic procedures, contaminated parenteral medications, and medical tourism, as well as with community exposures such as tattoo parlors and nail salons. The true burden and incidence of NTM infections is unknown. Extrapulmonary NTM infection is not nationally notifiable and is currently reportable in a few jurisdictions, such as Oregon. Given the insidious nature of extrapulmonary NTM infections, i.e. nonspecific symptomatology and prolonged time between exposure and symptom onset, detecting outbreaks of extrapulmonary NTM infections can be challenging, which poses barriers to the identification and elimination of sources of infection. Establishing a case definition for extrapulmonary NTM infections will help to identify populations at risk and detect outbreaks in a timely manner to allow for early public health intervention.

Word Count: 186/300

II. Background and Justification

NTM are Mycobacterial species other than *M. tuberculosis* and *M. leprae*. NTM are generally free-living organisms and are ubiquitous in the environment, particularly soil and water (1). Over 150 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*. NTM are not typically transmitted from human-to-human. Disease in humans is thought to be acquired from environmental exposures (1).

Pulmonary disease is the most common clinical manifestation of NTM and occurs most frequently among those with underlying lung disease such as chronic obstructive pulmonary disease (COPD), bronchiectasis, and cystic fibrosis. Extrapulmonary NTM infections, however, are less common and include infections with culture-positive specimens obtained from normally sterile body sites. Clinically, these infections present as lymphadenitis (primarily in children), disseminated disease (most commonly in severely immunocompromised patients), and skin and soft tissue infection (usually due to direct inoculation) (2). Symptoms of NTM infection are dependent on the site of infection. In many instances, onset of symptoms can occur months to years following exposure. Given the long duration to symptom onset and the nonspecific symptomatology of many extrapulmonary NTM infections, diagnosis and treatment are often delayed. Treatment may involve a combination of surgical intervention and extended antibiotic therapy.

Although NTM have historically been considered opportunistic infections, NTM infections are emerging in new settings among immunocompetent individuals (1). Outbreaks of extrapulmonary NTM infections

Council of State and Territorial Epidemiologists
Position Statement Template: Standardized Surveillance for Diseases or Conditions, Revised 2017

1

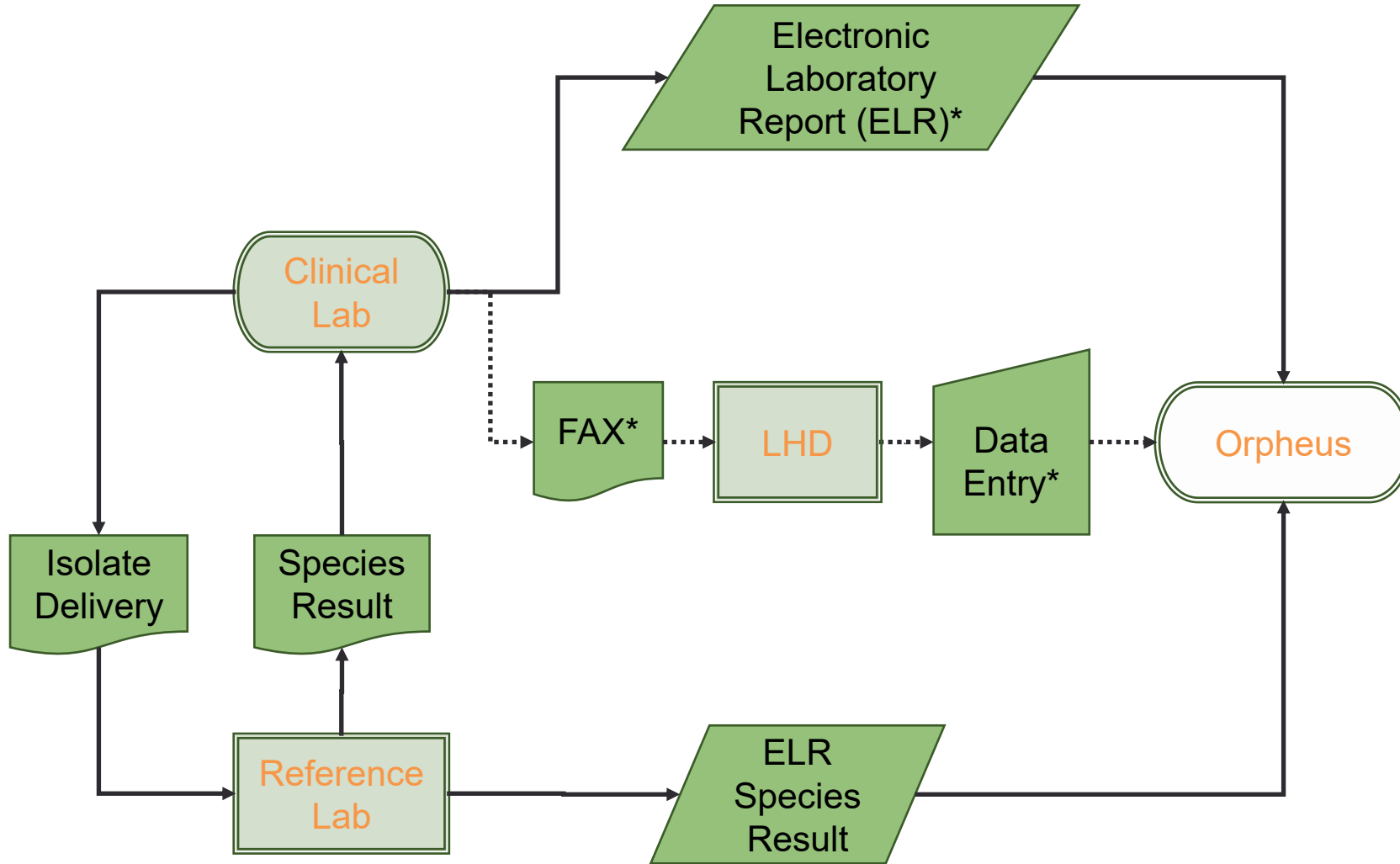
CSTE Guidelines updates

- In June 2026 EP-NTM CSTE guidelines were updated to include
 - Acronym changed to EP-NTM.
 - *Mycobacteria ulcerans* , causes *Buruli ulcer* ,was excluded.
 - The clinical criteria were updated to include night sweats and skin infections not limited to cellulitis (e.g., abscess)
 - Exclude specimens from the gastrointestinal and respiratory tracts (including lung tissue).
 - CSTE guidelines will be published in January 2027

Oregon reporting update

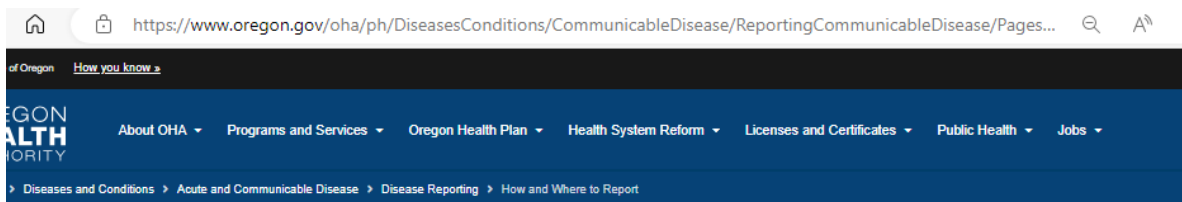
- Oregon reporting rule # 333-018-0015 was updated in June 2026 to include reporting to:
 - Nonrespiratory infection with nontuberculous mycobacteria (excluding *Mycobacterium gordonae*, *M. paragordonae*, *M. leprae*, and *M. lepromatosis*).
 - Reporting within one local public health authority working day.

Information Flow



*1st for initial result and again for species result

How to Report



How and Where to Report

Disease Reporting

Case Report Forms

Investigative Guidelines

What and When to Report

How and Where to Report

Reporting Rules

Collecting REALD

Electronic Laboratory Reporting (ELR)

Electronic Case Reporting (eCR)

Orpheus

Oregon HIV Reporting

CONTACT US

Acute and Communicable Disease Prevention Section

Disease Reporting for Oregonians

Please see the [Electronic Laboratory Reporting](#) and [Electronic Case Reporting](#) pages for information about establishing automated, electronic reporting for reportable acute and communicable diseases.

If unable to report electronically, health care providers are encouraged to manually enter reports using the secure, confidential 'Online Morbidity Report' portal. Case reports entered are automatically routed to the appropriate local health department, provided the patient's residential address is correctly submitted.

A final option is to submit information directly to your local public health authority by faxing the fillable template or calling by telephone.

Confidential Oregon Morbidity Report Portal

[Online Morbidity Report](#)

May 11, 2023: The Oregon Morbidity Report returns to being used for all disease reporting, including MIS-C and MIS-A.

Please only submit report case information for residents of Oregon.

Local Public Health Authority Reporting

- [A fillable PDF](#) reporting form is available if your facility is only able report via fax to your Local Public Health Authority.
- [List of Local Public Health Authorities](#)
- [Communicable disease reporting numbers by county](#) -English
- [Communicable disease reporting numbers by county](#) -Spanish

Oregon Health Authority Confidential Oregon Morbidity Report

Oregon clinicians are required by law to report confirmed or suspect diagnoses of many specified diseases and conditions. Reports should be made to the patient's local health department. You are welcome to call and discuss a report, or you can simply fax the required information using this form or any equivalent that includes all the required information.

Find a list of [confidential fax numbers for Oregon's local health departments](#) and a list of reportable conditions at [www.healthoregon.org/diseasereporting](#). If the patient is an out-of-state resident, fax this directly to the state health department in Portland at (971-673-1100).

Use a separate sheet for each patient. Use dark ink and write legibly. The date and time will be printed automatically by the fax machine. No cover page is necessary.

About The Patient

Name	_____	Parent/Guardian	_____
Sex	☐ M ☐ F	DOB	____/____/____ (m/d/yr) or, if unknown, Age _____
Home address	_____		
County	_____		
City, State, Zip	_____		
Phone number	_____		
	☐ cell ☐ home ☐ other		
Language if not speaking English	☐ Spanish ☐ Russian ☐ Other _____		

About The Disease/Condition

Disease or Condition	_____		
Date of symptom onset	____/____/____ (m/d/yr) or, if unknown, Age _____		
Diagnosis is (choose best one)	☐ confirmed by lab results ☐ supported by lab results		
	Specimen date ____/____/____ Lab Name _____		
	☐ clinical or only suspect at this time		
Has the patient already been notified of the diagnosis lab result?	☐ Yes ☐ No		
Should health department staff contact clinician before attempting to interview patient?	☐ Yes ☐ No		

About The Reporting Physician

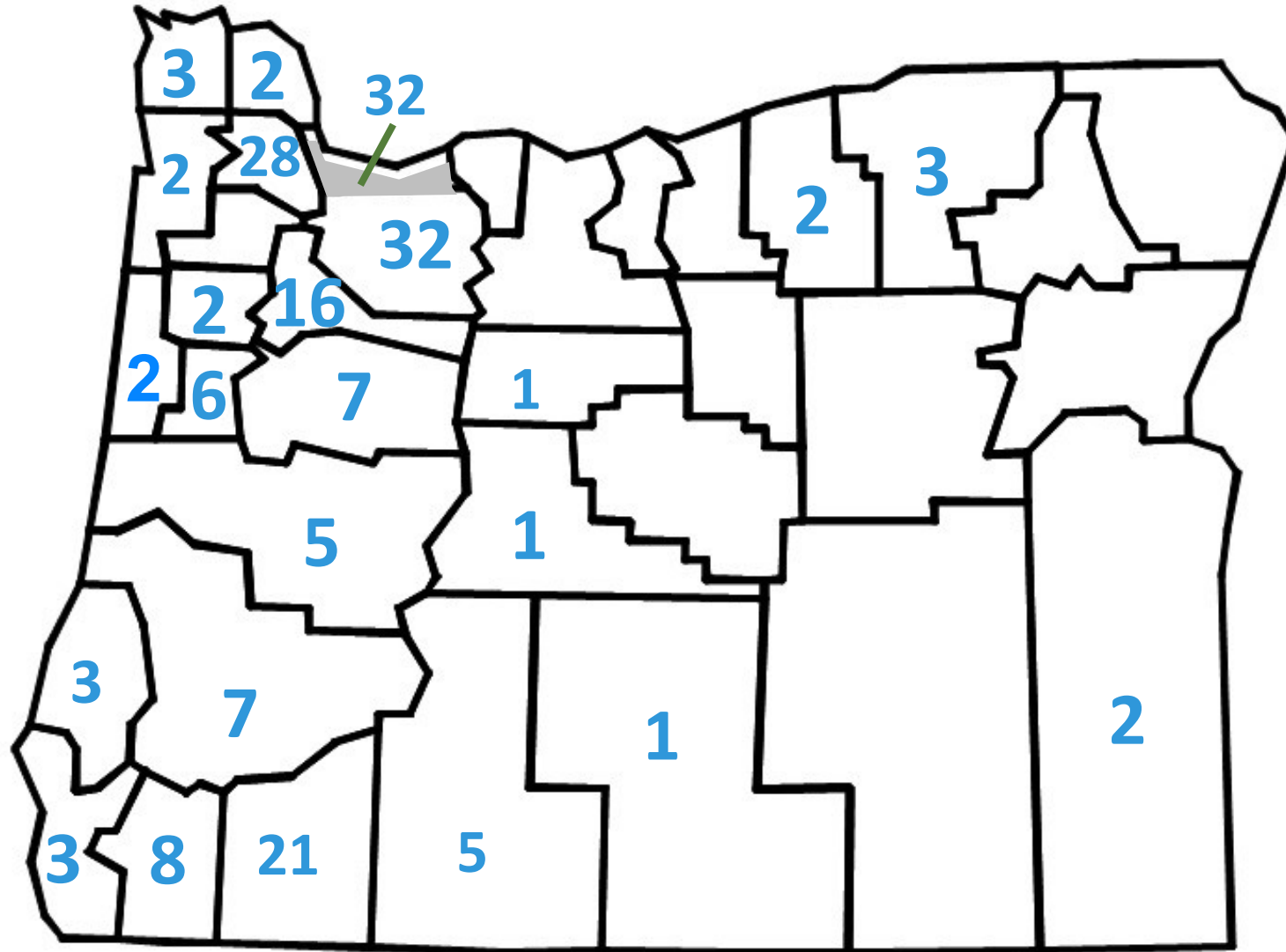
Name	_____
Address	_____
City, State, Zip	_____
Telephone number(s)	_____
Email	_____
Alternate contact (e.g., Nurse)	_____

CASE'S NAME																																		
INFECTION TIMELINE (Enter onset date in heavy box. Count back to figure the probable exposure period.) weeks from onset <table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td style="width: 10%;">10</td> <td style="width: 10%;">9</td> <td style="width: 10%;">8</td> <td style="width: 10%;">7</td> <td style="width: 10%;">6</td> <td style="width: 10%;">5</td> <td style="width: 10%;">4</td> <td style="width: 10%;">3</td> <td style="width: 10%;">2</td> <td style="width: 10%;">1</td> <td style="width: 10%;">0</td> </tr> <tr> <td colspan="11">EXPOSURE PERIOD</td> </tr> </table> calendar dates <table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> <td style="width: 10%;"> </td> </tr> </table> ask about exposures between these dates ← →		10	9	8	7	6	5	4	3	2	1	0	EXPOSURE PERIOD																					
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Interviewed ☐ yes ☐ no Interview date(s) _____ Who ☐ patient ☐ provider ☐ parent ☐ other Interviewed by _____ ☐ case (or family proxy) could not be interviewed ☐ no risk factors identified Interviewees ☐ case ☐ parent ☐ physician ☐ other HCP ☐ _____ Interview date(s) _____																																		
RISKS Questions pertaining to infection timeline POTENTIAL SOURCES yes no refused unk ☐ ☐ ☐ hot tub or spa If yes, when _____ where _____ ☐ ☐ ☐ surgery If yes, when _____ where _____ ☐ ☐ ☐ nail salon If yes, when _____ where _____ ☐ ☐ ☐ tattoo If yes, when _____ where _____ ☐ ☐ ☐ fish tank If yes, when _____ where _____ POTENTIAL SOURCES yes no refused unk ☐ ☐ ☐ acupuncture If yes, when _____ where _____ ☐ ☐ ☐ work with potting soil If yes, when _____ where _____ ☐ ☐ ☐ infusions If yes, when _____ where _____ ☐ ☐ ☐ trauma If yes, when _____ where _____ ☐ ☐ ☐ handle fish If yes, when _____ where _____ UNDERLYING MEDICAL CONDITIONS yes no refused unk ☐ ☐ ☐ immunosuppressive therapy If yes, wait _____ how long _____ ☐ ☐ ☐ immunocompromised how _____																																		
FOLLOW UP SUMMARY OF FOLLOW-UP AND COMMENTS Provide details as appropriate. ☐ is an environmental inspection needed ☐ Y ☐ N ☐ ? ☐ education provided ☐ Y ☐ N ☐ ? Does the case know about anyone else with a similar illness? ☐ Y ☐ N If yes, get contact information, onsets, etc. <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">name</th> <th style="width: 10%;">age</th> <th style="width: 10%;">sex</th> <th style="width: 15%;">relation to case</th> <th style="width: 15%;">onset</th> <th style="width: 35%;">comment</th> </tr> </thead> <tbody> <tr> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table> Other notes _____		name	age	sex	relation to case	onset	comment	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____															
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ADMINISTRATION Remember to copy patient's name to the top of this page. Case report sent to OHA on _____/_____/_____ Investigation number: OHA-# _____																																		

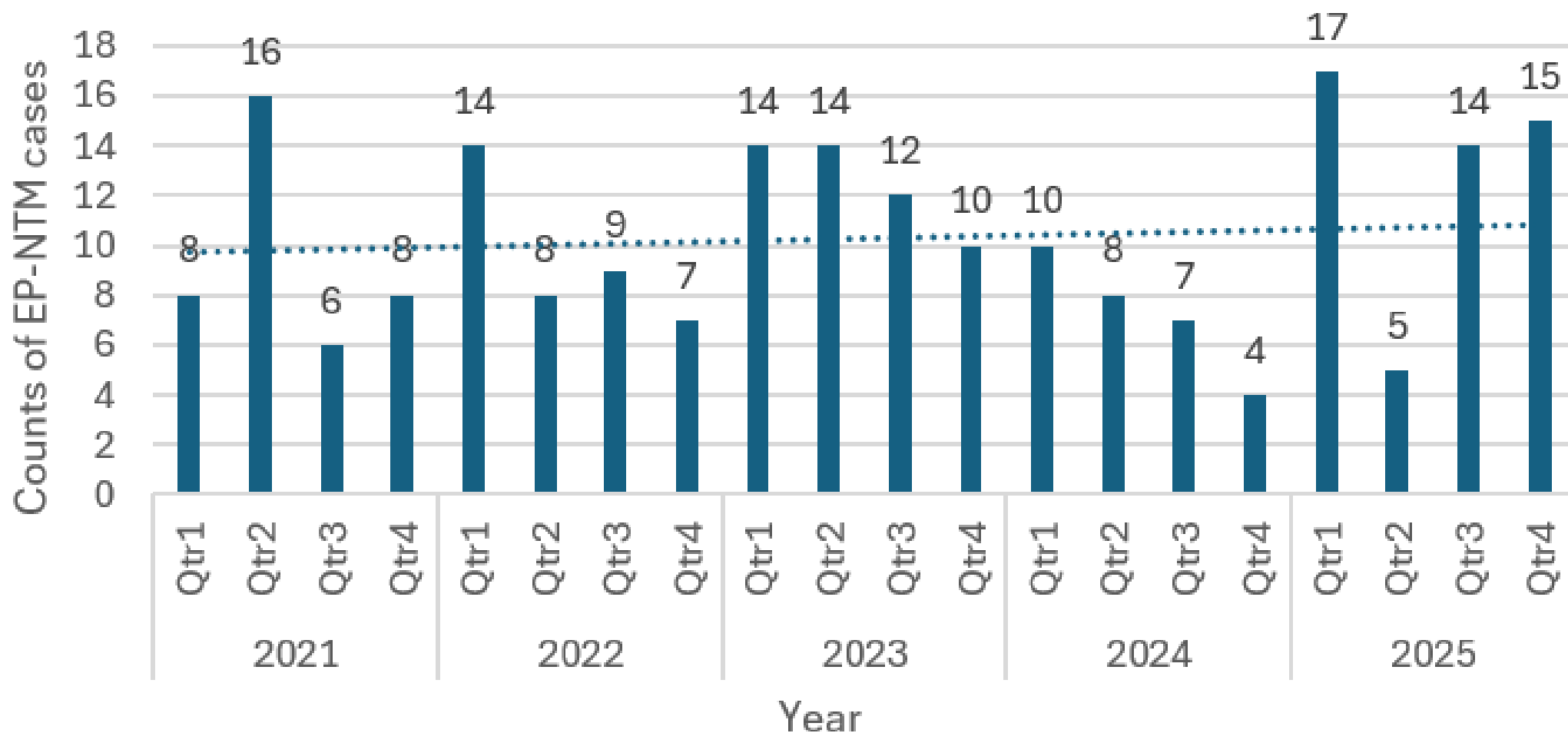
Results

- 2021–2025, 206 confirmed extrapulmonary NTM cases
- 49% females (101/206)
- 91 (44%) were hospitalized
- 22 (11%) were disseminated NTM infections
- 9 case died within 90 days after DISC(4.4%, 9/206)
- ~1 case/100,000 person-years

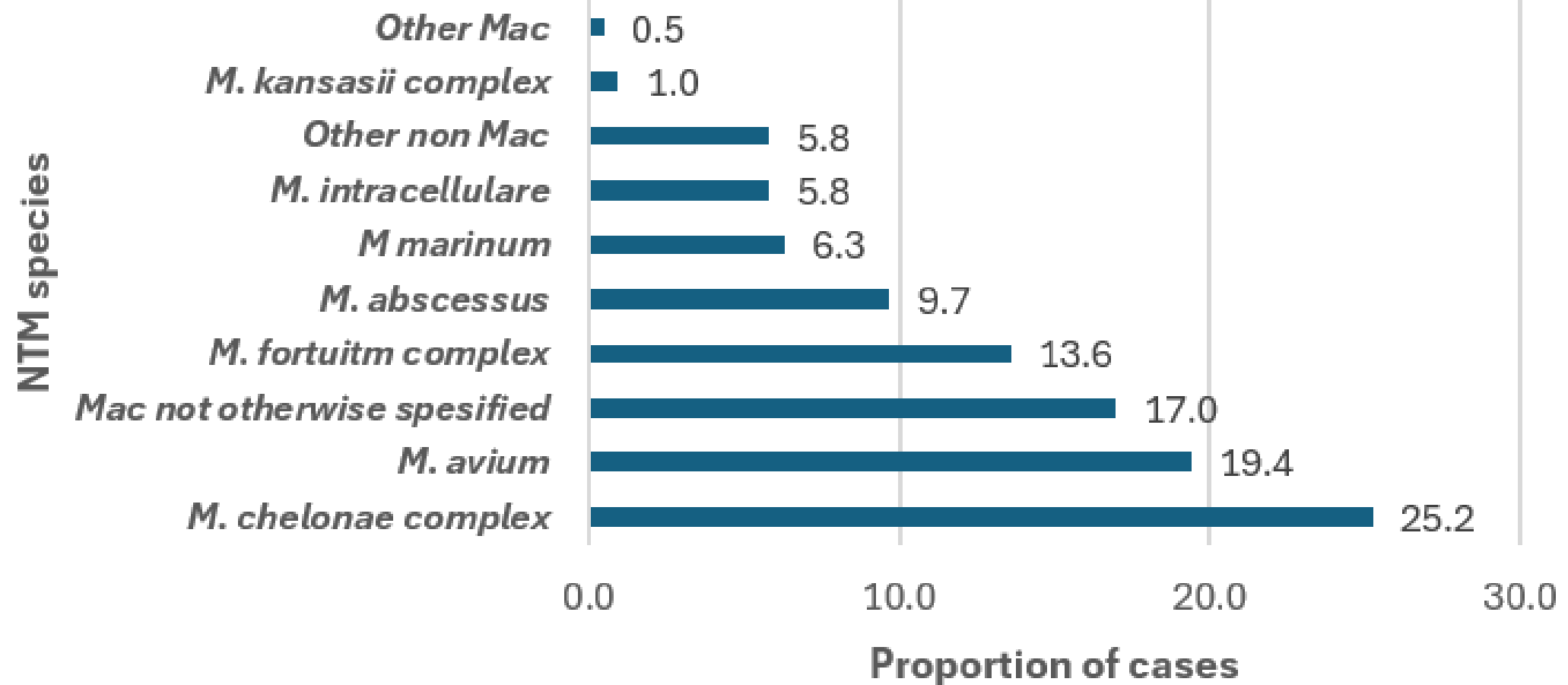
NTM Cases (n = 206) Across OR, 2021-2025



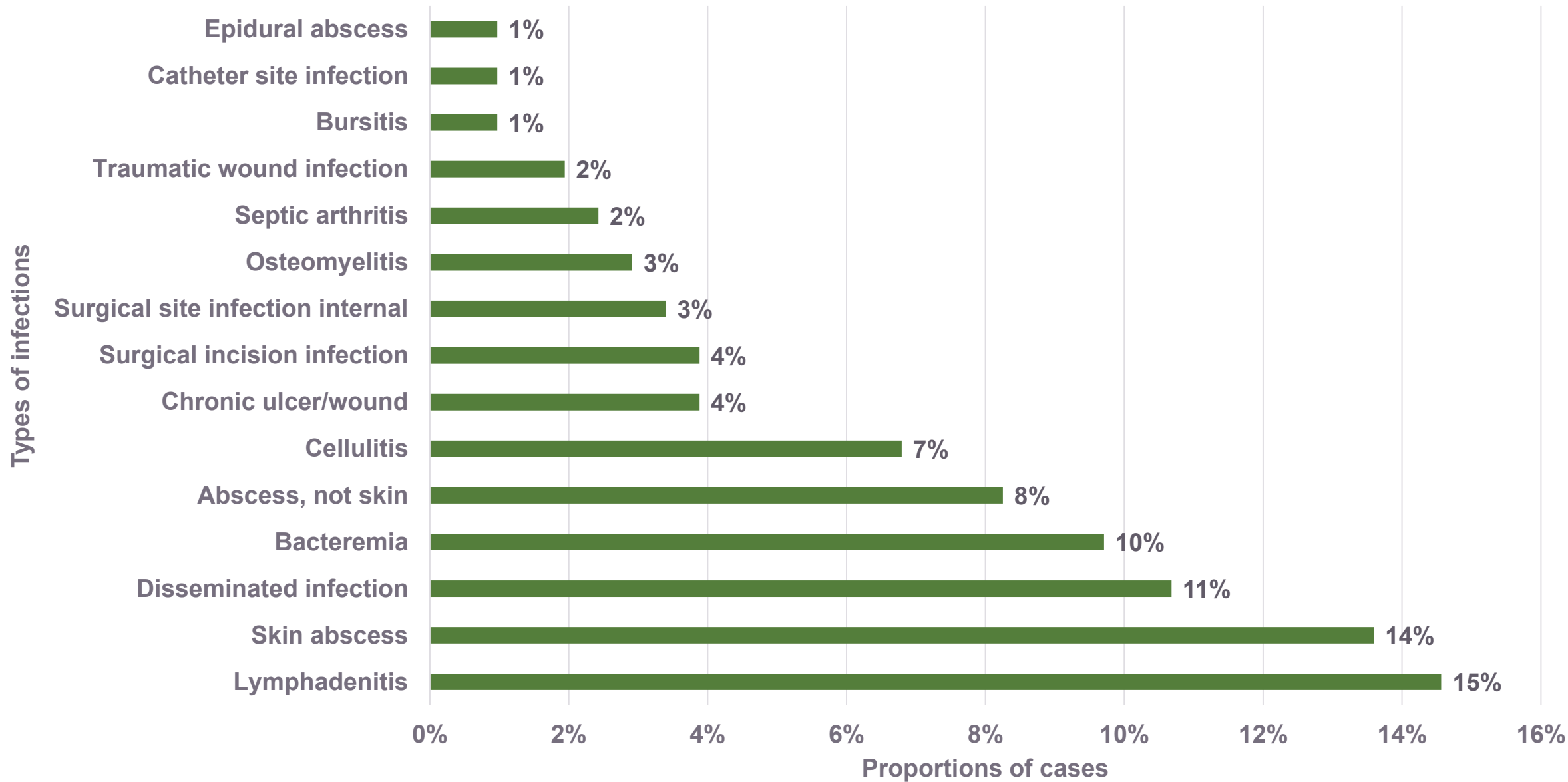
Oregon EP-NTM cases by date of index specimen collection, January 2021-December 2025



Proportions of NTM species isolated from EP-NTM cases, Oregon, January 2021-December 2025



EP-NTM cases per type of infection, Oregon, 2021-2025



Clinical signs and symptoms for EP-NTM cases, Oregon 2021-2025

Signs and symptoms	Count	%
Redness or swelling	117	57%
Pain at site of infection	105	51%
Pus or drainage	62	30%
Fatigue	59	29%
Fever	41	20%
Positive imaging	37	18%
Weight loss	28	14%
Night sweats	12	6%
Cough	11	5%
Chills	8	4%
Other symptoms	61	30%

Underlying conditions associated with EP-NTM infections, Oregon 2021-2025

Underlying condition	Count	%
Malignancy	59	29%
Cardiovascular disease	59	29%
Chronic pulmonary disease	53	26%
Diabetes mellitus	50	24%
Neurologic Conditions	46	22%
Skin condition	33	16%
Immunocompromised Condition	30	15%
Chronic kidney disease	24	12%
HIV Infection	22	11%
Gastrointestinal diseases	18	9%
Liver Disease	7	3%

EP-NTM exposures in the 12 months before the index specimen, Oregon 2021-2025

Exposures	Count	Percent
Surgical procedure	36	17%
Injections/infusions	22	11%
Trauma	28	14%
Gardening or landscaping	17	8%
Medical device/Implant	10	8%
Hot tub	16	5%
Fish Tank	11	5%
Injection drug use	9	4%
Dental procedure	5	2%
Other	3	1%
Bird contact	2	1%
Construction	4	2%
Nursing home residence	5	2%
Tattoo	3	1%
Nail salon	2	1%
Swimming pool	2	1%

Thank you!

Adel Mansour, MBBCh, MSc

NTM Surveillance Epidemiologist

Adel.mansour@oha.oregon.gov

Cell: 971-378-7968

Public Health Division

Center for Public Health Practice

Acute and Communicable Disease Prevention Section

Healthcare-Associated Infections Program

800 NE Oregon Street, Suite 370

Portland, OR 97232

HAI@odhsoha.oregon.gov

(971) 673-1111

