Emerging Infections Program Healthcare-Associated Infections–Community Interface Report: Extrapulmonary Nontuberculous Mycobacteria (ENTM), 2022

Surveillance Catchment Areas:

Colorado (5 county Denver area); Minnesota (statewide); New York (1 Rochester county); Oregon (statewide).

Population:

The surveillance area represents 13,553,545 persons.
Source: U.S. Census Bureau, Population Division, Vintage 2022 Special Tabulation

Case Definition:

An ENTM case was defined as the first identification during 2022 of an NTM species from a non-pulmonary body site (e.g., specimens other than sputum, tracheal aspirate, bronchoalveolar lavage, and lung), excluding stool and rectal swabs, in a resident of the surveillance area. Mycobacterial species excluded from surveillance were: *Mycobacterium tuberculosis* complex (causes tuberculosis); *Mycobacterium leprae* and *Mycobacterium lepromatosis* (cause leprosy); *Mycobacterium ulcerans* (causes Buruli ulcer); and *Mycobacterium gordonae* and *Mycobacterium paragordonae* (most often non-pathogenic).

Cases were considered prevalent if:

- medical records indicated ENTM disease was present in the 12 months prior to ENTM identification in 2022, or
- NTM was detected in at least one extrapulmonary specimen in 2021, within 12 months before the date of initial ENTM specimen collection in 2022.

Cases were otherwise considered incident.

If medical records and specimen information from the 12 months before the date of the initial ENTM specimen collection were not available, the case is not classified as either incident or prevalent.

Methods:

Case finding was conducted through active, laboratory-based, and population-based approaches. Emerging Infections Program (EIP) site personnel routinely contacted microbiology laboratories serving residents of the surveillance area to identify cases.

A standardized case report form was completed for each case through review of medical records. Medical records were reviewed for information on demographic characteristics, clinical features and syndrome, and potentially relevant exposures. Exposures were captured if they occurred in the year before or on the date of index specimen collection. Exposures determined to be related to the diagnosis or management of ENTM disease were excluded. In addition, information about whether the exposure occurred at the site of the NTM infection was also captured.

A convenience sample of ENTM isolates was sent to CDC for characterization. The characterization of isolates from 2022 is in process as of the date of this report.

Rates of ENTM infection among all patients were calculated using special tabulation U.S. Census population estimates for 2022.

ENTM surveillance data undergo regular data cleaning to ensure accuracy and completeness. Cases from 2022 with complete case report form data as of January 31, 2025, were included in this analysis. Because data can be updated as needed, analyses of datasets generated on a different date may yield slightly different results.

Results:

Table 1. ENTM (N=191) Cases by Incident Status, Emerging Infections Program, 2022

Incident Status	No.	Rate[a]
Incident	183	1.4
Prevalent[b]	8	0.06
TOTAL[c]	191	1.4

[a] Cases per 100,000 population for EIP areas (crude rates).
[b] Excluded from further analysis.
[c] Total rate represents overall prevalence.

Table 2. Incident ENTM (N=183) Case Counts by Race/Ethnicity, Sex and Age Group, Emerging Infections Program, 2022

Race/Ethnicity	No.	%
Hispanic or Latino, any race	22	12.0
Not known to be Hispanic or Latino[a] - White[b]	119	65.0
Not known to be Hispanic or Latino[a] - Black or African American[c]	14	7.7
Not known to be Hispanic or Latino[a] - Asian[c]	7	3.8
Not known to be Hispanic or Latino[a] - Other or multiple races[d]	5	2.7
Not known to be Hispanic or Latino[a] - Unknown race[e]	16	8.7

Sex	No.	%
Male	101	55.2
Female	82	44.8

Age Group (years)	No.	%
0-17	33	18.0
18-34	14	7.7
35-49	35	19.1
50-64	40	21.9
65+	61	33.3

[a] Records either indicated ethnicity was non-Hispanic or Latino, or ethnicity was not known.
[b] 5 ENTM cases with unknown ethnicity.
[c] 0 ENTM cases with unknown ethnicity.
[d] American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or ≥2 races reported; 0 cases had unknown ethnicity.
[e] Of cases with unknown race, 11 cases had unknown ethnicity.

Table 3. Incident ENTM (N=183) Case Rates by Race and Ethnicity and Sex, Emerging Infections Program, 2022

Race/Ethnicity[a]	Rate[b]
Hispanic or Latino, any race	1.3
Not known to be Hispanic or Latino[c]- White	1.2
Not known to be Hispanic or Latino[c]- Black or African American	1.8
Not known to be Hispanic or Latino[c]- Asian	1.0
Not known to be Hispanic or Latino[c]- Other or multiple races	0.9

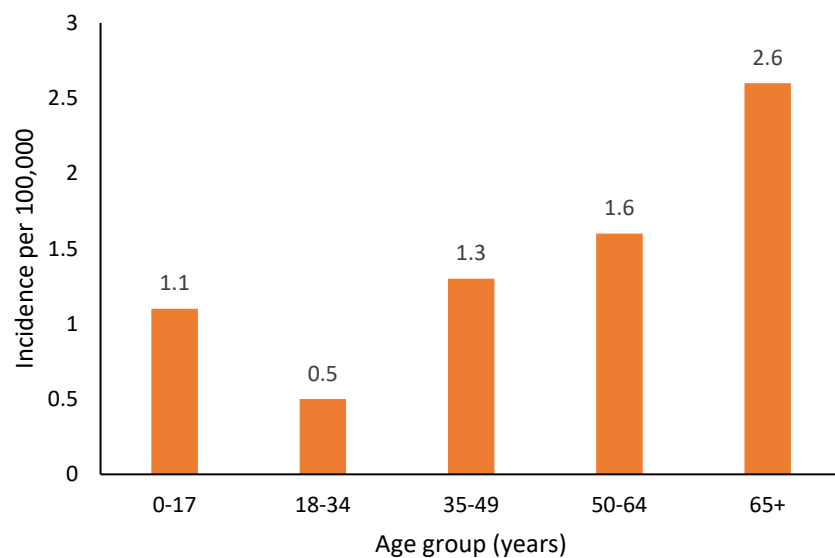| Sex	Rate[b]
Male	1.5
Female	1.2

[a] Cases with unknown race and either non-Hispanic or Latino or unknown ethnicity (16 cases) are excluded from rate calculations in this table.
[b] Cases per 100,000 population for EIP areas.
[c] For calculating rates, the numerator includes both cases with non-Hispanic or Latino ethnicity and unknown ethnicity.

Figure 1. Rate[a] of Incident ENTM (N=183) Cases by Age Group, Emerging Infections Program, 2022

[a] Incidence (no. per 100,000 population per year) calculated using 2022 special tabulation U.S. Census Data.

Table 4. Incident ENTM (N=183) Cases by Species Identified from Index Specimen, Emerging Infections Program, 2022

M. avium complex (MAC) Species[a]	No.	%
M. avium	24	13.1
M. intracellulare subsp. *chimaera*	1	0.5
M. intracellulare subsp. *intracellulare*	7	3.8
Other[b]	2	1.1
Not otherwise specified	31	16.9
Total	64	35.0

Non-*M. avium* complex Species[a]	No.	%
M. abscessus[c]	29	15.9
M. chelonae complex	35	19.1
M. fortuitum complex	33	18.0
M. kansasii complex	2	1.1
M. marinum	6	3.3
M. mucogenicum complex	7	3.8
M. smegmatis	3	1.6
Other[d]	9	6.0
Not otherwise specified	0	0.0
Total	120	65.6

Non-*Tuberculosis* Species	No.	%
Not *M. tuberculosis*, not characterized further	1	0.5

[a] 7 index specimens had >1 species reported: *M. chelonae* complex and *M. fortuitum* complex (3), *M. avium* and *M. abscessus* (1), *M. chimaera* and *M. marseillense* (1), *M. fortuitum* complex and *M. monacense* (1), MAC not otherwise specified and *M. fortuitum* complex (1).

[b] Other MAC species include *M. colombiense* and *M. marseillense.*

[c] Subspecies information for *M. abscessus* was not collected for this report.

[d] Other non-MAC species include *M. alvei, M. arupense, M. hassiacum, M. heraklionense, M. lentiflavum, M. monacense, M. neoaurum, M. obuense, M. szulgai.*

Table 5. Incident ENTM (N=183) Cases by Source of Index Specimen, Emerging Infections Program, 2022

Index Specimen Source[a]	No.	%
Blood	22	12.0
Bone	6	3.3
Joint/Synovial fluid	10	5.5
Lymph node	26	14.2
Non-surgical wound	17	9.3
Pleural fluid	3	1.6
Peritoneal fluid	4	2.2
Skin	19	10.4
Soft tissue	40	21.9
Surgical wound	18	9.8
Other	20	10.9

[a] 2 cases had 2 index specimen sources.

Table 6. Location of Incident ENTM (N=183) Cases at Time of Incident Specimen Collection, Emerging Infections Program, 2022

Location of Incident Specimen Collection	No.	%
Outpatient setting or emergency department	95	51.9
Acute care hospital	88	48.1
Long-term care facility	0	0.0
Long-term acute care hospital	0	0.0
Other	0	0.0
Unknown	0	0.0

Table 7. Selected Clinical Characteristics of Incident ENTM (N=183) Cases, Emerging Infections Program, 2022

Charlson Comorbidity Index[a]	No.	%
0	84	45.9
1	22	12.0
≥2	77	42.1

Underlying Conditions[a]	No.	%
Connective tissue disease[b]	15	8.2
Diabetes mellitus	38	20.8
Immunocompromising condition or immunosuppressive medication[c]	65	35.5
Malignancy	37	20.2
Skin condition[d]	19	10.4

Immunocompromising condition / immunosuppressive medication[c]	No.	%
Immunocompromising condition[e]	28	15.3
Immunosuppressive medication	46	25.1

Infection Type[f]	No.	%
Abscess, not skin	24	13.1
Bacteremia	13	7.1
Catheter site infection	2	1.1
Disseminated infection	14	7.7
Empyema/pneumonia	2	1.1
Internal surgical site infection	11	6.0
Lymphadenitis	25	13.7
Osteomyelitis	2	1.1
Peritonitis	3	1.6
Septic arthritis	4	2.2
Sinusitis	3	1.6
Skin and soft tissue infection[g]	44	24.0
Tenosynovitis/synovitis	7	3.8
Other	7	3.8
No infection[h]	60	32.8
Unknown	3	1.6

[a] Some case patients had more than one underlying condition.

[b] 8 cases with connective tissue disease had rheumatoid arthritis.

[c] Immunocompromising conditions are defined as HIV infection, solid organ transplant, hematopoietic stem cell transplant, and primary immunodeficiency. Immunosuppressive medications are defined as B-cell depletion agents (e.g., rituximab), corticosteroids (intravenous, intramuscular, or oral), Janus kinase (JAK) inhibitors, and tumor necrosis factor (TNF)-α inhibitors.

[d] 6 cases with a skin condition had a surgical wound.

[e] 19 cases had HIV, including 10 with documentation of AIDS or CD4 counts < 200. Ten cases had another immunocompromising condition.

[f] Some case patients had more than one infection type.

[g] Includes cellulitis, chronic ulcer/wound, skin abscess, surgical incision infection, traumatic wound, and other skin/soft tissue infections.

[h] Patients may not have an infection associated with their NTM culture for several reasons, including that the patient had no infection diagnosed and the NTM identified was considered a contaminant, or if the patient's infection was attributed to another organism.

Table 8. Selected Exposures and Risk Factors in the Year Before Index Specimen Collection, Incident ENTM Cases with a Clinically Documented NTM Infection, Emerging Infections Program, 2022

Exposures in the Past Year for Cases with Localized Infections[b] (n=99)	Cases with Exposure No. (%)	Cases with Exposure at the Site of Infection[a] No. (%)
Construction[c]	4 (4.0)	--
Dental procedure	1 (1.0)	0 (0)
Fish tank	6 (6.1)	--
Gardening or landscaping	7 (7.1)	--
Hot tub	3 (3)	--
Injection drug use	3 (3)	0 (0)
Injection or infusion[d]	37 (37.4)	8 (8.1)
Livestock/wildlife	1 (1)	--
Medical device	17 (17.2)	9 (9.1)
Nail salon	0 (0)	0 (0)
Neti pot	0 (0)	0 (0)
Surgical procedure	27 (27.3)	21 (21.2)
Swimming pool	1 (1)	-- (--)
Tattoo	1 (1)	0 (0)
Trauma	15 (15.2)	15 (15.2)
Other	5 (5.1)	2 (2)
None of the above	27 (27.3)	55 (55.6)
Unknown	1 (1)	3 (3)

[a] Cells with "--" indicate fields where exposure at site of infection is not applicable.

[b] Excludes incident cases with no infection type (n=60), unknown infection type (n=3), and cases either with bloodstream infection and no other infection types documented, or with disseminated infection (21).

[c] Persons who work in construction or persons who lived or worked in a building undergoing renovations.

[d] As of the 2022 report this category no longer includes injection drug use, which is now reported separately.

Summary:

Surveillance data from 2022 represent the second full year of population-based surveillance for ENTM infections through the Emerging Infections Program (a surveillance pilot was conducted for six months during 2019–2020)[1]. The crude annual incidence rate of ENTM in 2022 was 1.4 per 100,000 persons, which is similar to the incidence rate in 2021 (1.3 per 100,000 persons). The incidence generally increased with increasing age and ranged from 0.9 among non-Hispanic or Latino persons of multiple or other race to 1.8 per 100,000 in non-Hispanic or Latino Black persons. *M. avium* complex was the most frequently isolated species group, followed by *M. chelonae* complex. Skin and soft tissue infections were the most commonly reported infection type. Among patients with localized ENTM infections, medical record documentation indicated that the most common exposures at the infection site were surgery, trauma, a medical device, or injection/infusion.

References:

[1] Grigg C, Jackson KA, Barter D, et al. Epidemiology of Pulmonary and Extrapulmonary Nontuberculous Mycobacteria Infections Infections at 4 US Emerging Infections Program Sites: A 6-Month Pilot. Clin Infect Dis. 2023 Aug 22; 77(4):629-639. doi: 10.1093/cid/ciad214.

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