Antimicrobial Guidelines For Northern Michigan 2025 – 2026

In vitro antibiotic susceptibility data submitted by the microbiology labs of the following hospitals:

McLaren Northern Michigan, Munson Medical Center and MHC affiliates

Data includes inpatient and outpatient specimens processed through these microbiology labs.
In vitro susceptibility to a drug does not imply a clinically successful outcome.

Guidelines are provided as suggestions only, and are based on local antimicrobial susceptibility patterns in northern Michigan, recommendations of hospital P&T Committees, guidelines promoted by national organizations such as CDC, IDSA, and the expert opinions of:

Jonathan Bott, MD
Chris Ledtke, MD
Dennis Sula, MD
Karen DenBesten, MD
Ryan Miller, DO

Munson Infectious Disease (231) 935-5090
Nicholas Torney, PharmD, BCIDP (231) 935-7469

McLaren Northern MI Hospital (800) 248-6777
Adam Utley, PharmD, BCPS (231) 487-7264

Adult Guideline

Pediatric Guideline

Antibiogram Data from 2024 Common Organisms Percent Susceptible per CLSI Guidelines	# of isolates	Pen VK (PO)	Ampicillin	Amp-sulb	Oxacillin	Pip-tazo	Cefazolin	Cefuroxime	Ceftriaxone	Ceftazidime	Cefepime	Ciprofloxacin	Levofloxacin	Moxifloxacin	Gentamicin	Tobramycin	TMP/SMX	Imipenem	Ertapenem	Azithromycin	Doxycycline	Clindamycin	Vancomycin (IV only)	Nitrofurantoin (urine only)
S. pneumoniae	169	70	+	+	+	+	+	+	98	-	+	NP	99	+	Syn	NP	84	+	+	63	+	84	100	-
Viridans group *streptococcus*	343	+	93	93	+/-	+	-	+	98	-	+	NP	97	+	Syn	NP	-	+	+	-	+/-	86	100	-
Streptococcus, Group B	992	+	100	100	+	+	+	+	100	-	+	NP	98	+	Syn	NP	+	+	+	-	+	41	100	-
S. aureus, MSSA	2373	-	-	+	100	+	100	+	+/-	-	+	NP	93	94	Syn	NP	99	+	+	+/-	98	80	100	100
S. aureus, MRSA	1063	-	-	-	0	-	-	-	-	-	-	NP	48	51	Syn	NP	94	-	-	-	90	70	100	99
Staphylococcus lugdunensis	226	-	-	+	89	+	91	+	+/-	-	+	NP	99	100	Syn	NP	99	+	+	+/-	99	91	100	100
Staphylococcus saprophyticus	466	-	-	+/-	41	+/-	41	+/-	+/-	-	+/-	99	99	100	+	NP	96	+	+	+/-	99	51	100	100
Staphylococcus, Coag Neg	1229	-	-	+/-	48	+/-	48	+/-	+/-	-	+/-	NP	NP	79	+	NP	67	+/-	+/-	+/-	86	66	100	100
Enterococcus faecalis	2438	100	100	100	-	+	-	-	-	-	-	NP	NP	+/-	Syn	NP	-	+	-	-	31	-	99	90
Enterococcus faecium	277	29	26	26	-	-	-	-	-	-	-	NP	NP	-	Syn	NP	-	-	-	-	31	-	54	26
Haemophilus influenzae	194	-	67	95	-	+	-	+	100	+	+	+	+	+	+	+	61	+	+	98	100	-	-	-
Escherichia coli	14677	-	63	73	-	97	93	+	95	95	96	88	88	+	93	95	83	100	100	-	+	-	-	97
Proteus mirabilis	1372	-	77	88	-	100	92	+	96	96	97	75	79	+	93	94	81	94	100	-	-	-	-	0
Klebsiella oxytoca	647	-	-	72	-	94	76	+	95	96	98	99	99	+	99	99	97	100	100	-	+/-	-	-	91
Klebsiella pneumoniae	2331	-	-	87	-	96	94	+	95	95	96	97	97	+	98	98	91	100	100	-	+/-	-	-	41
Enterobacter cloacae complex	709	-	-	-	-	87	-	-	70	83	95	98	98	+	99	98	91	97	91	-	-	-	-	32
Klebsiella aerogenes	302	-	-	-	-	84	-	-	79	83	97	98	98	+	99	100	87	91	95	-	-	-	-	27
Citrobacter freundii	249	-	-	-	-	85	-	-	81	86	100	96	95	+	94	98	88	99	99	-	-	-	-	95
Serratia marcescens	327	-	-	-	-	76	-	-	91	93	100	99	98	+	100	95	99	+	98	-	-	-	-	0
Morganella morganii	256	-	-	20	-	98	-	-	+	90	+	84	84	+	91	97	84	82	99	-	-	-	-	-
Pseudomonas aeruginosa	1525	-	-	-	-	94	-	-	-	93	95	88	83	+	0	98	-	92	0	-	-	-	-	-
Stenotrophomonas maltophilia	85	-	-	-	-	-	-	-	-	-	-	-	86	-	-		93	-	-	-	-	-	-	-

Interpretive Criteria:

(+) >60% susceptible

(+/-) 30–60% susceptible

(-) <30% susceptible

(NP) Not preferred for one of the following reasons:
1. Risk of clinical failure given *in vivo*,
2. Poor *in vitro* susceptibility,
3. Other agents preferred due to risk of adverse events with FQ's

(Syn) Synergy dosing, only in endocarditis

S. aureus,
% MRSA = 30.9%

ESBL rate 3-5%

KPC rate << 1%

Anaerobic bacteria tested PERCENT SUSCEPTIBLE at selected US hospitals according to CLSI Guidelines Jan 2013 – Dec 2016	Pip-tazo	Amp-sulbactam	Penicillin G	Cefoxitin	Ertapenem	Imipenem	Meropenem	Clindamycin	Metronidazole
Bacteroides fragilis	96	84	0	100	82	97	93	26	100
B. thetaiotaomicron	87	82	0	13	–	100	99	28	100
B. distasoinis	95	59	0	25	–	100	97	43	100
B. ovatus	94	80	0	20	84	100	95	46	100
B. vulgatus	92	45	0	73	–	97	96	53	100
Prevotella spp.	100	97	100	97	–	100	98	69	99
Fusobacterium spp.	96	100	–	100	–	95	100	77	95
Anaerobic Gram positive cocci	99	–	100	94	–	99	100	97	100
Cutibacterium acnes (P. acnes)	100	+	+	100	–	94	–	53	0
Clostridium perfringens	100	100	90	99	–	100	100	83	100
Other *Clostridium* spp.	94	–	69		–	99	100	67	100

(–) symbol indicates that data were not available
(+) symbol indicates limited data but likely in vitro susceptibility

Hospital Purchasing Costs of Antimicrobials (as of April 2024)				
Drug / Dose / Frequency (normal kidney function)	Per Dose		Per Day	
	IV	PO	IV	PO
Amp/Sulb 3gm IV q6hr, Amox/clav 875mg PO BID	$	$	$$$	$
Cefazolin 2gm IV q8hr, Cephalexin 500mg PO QID	$	$	$	$
Cefepime 2 gm IV q8hr	$$	-	$$$	-
Cefuroxime 500 mg PO BID	-	$	-	$$
Ciprofloxacin 400 mg IV q12hr, 500 mg PO BID	$	$	$	$
Clindamycin 900 mg IV q8hr, 300 mg PO QID	$$	$	$$$	$
Daptomycin 500 mg IV q24hr	$$$	-	$$$	-
Doxycycline 100 mg IV/PO q12hr	$$$	$	$$$	$
Ertapenem 1 gm IV q24hr	$$$	-	$$$	-
Fidaxomicin 200 mg BID	-	$$$$$	-	$$$$$
Fosfomycin 3 gm PO x 1	-	$$$$	-	$$$$
Levofloxacin 750 mg IV/PO q24hr	$	$	$	$
Linezolid 600 mg IV/PO q12hr	$$	$	$$	$$
Meropenem 1000 mg IV q8hr	$$	-	$$$	-
Nitrofurantoin 100 mg PO BID	-	$	-	$
Piperacillin-tazobactam 4500mg q8hr	$$	-	$$$	-
Vanco 1 gm IV q12hr, 125 mg PO QID (oral soln)	$$	$	$$$	$

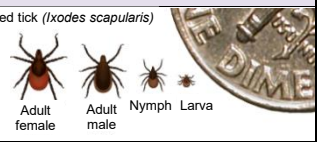
$ = < $5 **$$** = $5-15 **$$$** = $15-40 **$$$$** = $40-80 **$$$$$** = > $80

Guidelines Committee: Jonathan Bott, MD; Chris Ledtke, MD; Dennis Sula, MD; Karen DenBesten, MD; Ryan Miller, DO; Nicholas Torney, PharmD, BCIDP; Adam Utley, PharmD, BCPS

EMPIRIC ADULT ANTIMICROBIAL GUIDELINES – NORTHERN MICHIGAN 2025-2026

Infection	Preferred	Alternatives
Odontogenic Infection • Abx indicated if fever and regional lymphadenopathy are present	• Amp/sulbactam 3gm q6hr • Amox/clav 875/125mg BID x 7-10d	Cefuroxime 500mg BID (or Levofloxacin 500 mg QD) + metronidazole 500 mg BID x 7-10d *Clindamycin alone is not reliable
Dental procedure prophylaxis • Infective endocarditis prevention	Visit ada.org for full list of indications and recommended agents. Prophylaxis is only for select patients undergoing manipulation of gingival or mucosal tissue. For patients with prosthetic joints, prophylaxis is not indicated to prevent joint infection.	
Streptococcal Pharyngitis • Based on strep screen or culture	• Penicillin VK 500mg BID x 10 d, or • Amox 500mg BID or 1gm QD x 10 d	• Cephalexin 500mg BID x 10 d, or • Azithromycin (Zpak)
Acute Bacterial Sinusitis • Symptoms typically > 10 days	• Abx not usually required • Amox/clav 875/125 mg BID x 5 d	Doxycycline 100 mg BID x 5 d
Chronic Sinusitis	Value of antibiotics uncertain. Consider ENT/Allergy consult	
Acute Otitis Media • Abx generally recommended for adults, but not always required for pediatrics – see peds guideline	Amox/clav 875/125 mg BID x 5-10 d* *5-7 d for mild-mod, 10 d for severe	• Cefdinir 300 mg BID x 5-10 d • Cefuroxime 500 mg BID x 5-10 d • Amoxicillin 1 gm TID x 5-10 d
Acute Bronchitis • Usually viral	**No antibiotics** - Consider testing for Pertussis, *Chlamydophila pneumoniae*, *Mycoplasma*, and/or common circulating viruses such as RSV or COVID-19	
Acute Exacerbation COPD Consider antibiotics when ≥ 2 of 3 symptoms are present: 1. Dyspnea, 2. Sputum volume/viscosity, 3. Sputum purulence	Outpatient: • Azithromycin 500mg daily x 3 d or • Cefuroxime 500 mg BID x 5 d Inpatient: • Ceftriaxone 1 gm daily (empiric), de-escalate based on sputum culture & clinical response (5-day duration)	• Amox/clav 875/125 mg BID x 5 d • Levofloxacin 750 mg x 3-5 d Consider stopping antibiotics at 48-72 hrs if rapid clinical response
Community-Acquired Pneumonia (CAP) Duration: 5 days	Outpatient: • Amoxicillin 1 gm TID x 5 d, or Cefuroxime 500 mg BID x 5 d, + Azithromycin or Doxycycline x 5 d Inpatient: • Ceftriaxone 1 gm daily x 5 d + Azithromycin 500mg daily x 3 d	Levofloxacin 750mg daily x 5 d
Hospital-Acquired Pneumonia (HAP) • Antibiotics should target MSSA & *Pseudomonas* • MRSA pneumonia is uncommon • No need for MRSA activity if MRSA nasal swab is negative	Cefepime 2 gm Q8hr x 5-7 d + vancomycin or linezolid x 5-7 d if MRSA risk factors Note: MRSA swab positivity is unlikely to predict MRSA PNA given low PPV (<30%)	Pip-tazo 4.5gm Q8hr x 5-7d + vancomycin or linezolid x 5-7d if MRSA risk factors Procalcitonin WNL may assist in stopping antibiotics early before planned end date in all pneumonia
Aspiration Pneumonia • Anaerobic bacteria are uncommon in the absence of empyema or lung abscess	**Witnessed event does not require antibiotics.** Consider monitoring for 48hr prior to starting antibiotics.	Amp/Sulbactam or Ceftriaxone Stop within 48hr if back to baseline, max 5 days
Diverticulitis – uncomplicated	**No antibiotics** in the absence of sepsis, perforation, obstruction, or abscess	
Peritonitis, intra-abd abscess, pelvic abscess, complicated diverticulitis • If no/inadequate source control, duration depends on response.	• Ceftriaxone 2 gm Q24hr + Metronidazole 500mg Q12hr • Pip-tazo 4.5 gm Q8H 4hr INF Duration: 5 days after adequate source control i.e. OR drainage.	Levofloxacin 750 mg Q24hr + metronidazole 500mg Q12hr Duration: 5 days after adequate source control i.e. OR drainage.

Infection	Preferred	Alternatives
Asymptomatic Bacteriuria (ASB)	**No antibiotics,** unless pregnant or urologic procedure with mucosal bleeding. Encephalopathy in the absence of local or systemic signs/symptoms is not indicative of UTI, regardless of bacterial growth in urine culture. ***Urine culture not indicated in the absence of urinary symptoms***	
UTI, cystitis – uncomplicated • Infection limited to the bladder • Includes men and pregnant women	• Nitrofurantoin 100mg BID x 5 d or • Cephalexin 500mg BID x 7 d • TMP-SMX DS BID x 3 days, or • Ceftriaxone IV/IM or cefazolin	• Fosfomycin 3 gm x 1 dose, or • Gentamicin 5 mg/kg IVPB x 1, or • Cipro 500mg BID x 3d (last line, not in pregnancy)
UTI – complicated • Infection beyond the bladder. • Includes: pyelonephritis, CAUTI, bacteremia, sepsis • Excludes: prostatitis • Duration: 7 days if clinically improving	• Ceftriaxone 2gm Q24hr, stepdown to: • TMP-SMX 1 DS BID x 7d • Cephalexin 1000 mg TID x 7d • Cipro 500 mg BID, or levofloxacin 750mg x 7d	History of MDRO in the last 6 months • Pip-tazo 4.5 gm Q8hr • Cefepime 2gm Q8hr Consider ID consult for *Pseudomonas* bacteremia, Gram positive bacteremia, immunocompromised, or circumstances with abscess or ongoing obstruction.
Clostridioides difficile colitis • Initial episode	• Fidaxomicin 200 mg PO BID x 10 d, OR • Vancomycin 125 mg PO QID x 10 d	
Clostridioides difficile colitis • Recurrence	• 1st recurrence: Fidaxomicin 200 mg BID x 10 d, Alt: Vancomycin pulse/taper • 2nd or subsequent recurrence: ID and/or GI consult	
Clostridioides difficile colitis • Fulminant (hypotension or shock, ileus, megacolon)	Vancomycin 500mg PO QID + Metronidazole 500 mg IVPB Q8H until gut is functioning	ID and/or GI Consult
Purulent Cutaneous Abscess (mild-moderate), I&D, culture	• TMP-SMX DS BID x 7 d or • Doxycycline 100mg PO BID x 7 d	Linezolid 600 mg PO BID x 7 d
Cellulitis – Non-purulent (mild – moderate) • Bilateral erythema more likely stasis dermatitis than cellulitis	• Pen VK 500 mg QID x 5-7 d or • Cephalexin 1gm TID x 5-7 d	Doxycycline 100mg BID x 5-7 d
Diabetic Foot Infection (OP) • Duration: 1 to 2 weeks depending on severity	Amox/clav 875/125 mg BID + (TMP-SMX DS BID or Doxycycline 100mg BID if MRSA suspected)	TMP-SMX DS BID +/- Metronidazole 500 mg BID
Diabetic Foot Infection (IP) • If stable, hold Abx until deep cultures obtained	• Ampicillin/sulbactam 3gm IV Q6hr • Add vancomycin* if MRSA suspected *Duration depends on clinical findings	Ceftriaxone 2gm QD + Metronidazole 500mg BID (Add Vancomycin* if MRSA suspected)
Dog / Cat / Human Bite • High-risk bites may require antibiotic prophylaxis • Assess need for tetanus and Rabies PEP	• Ampicillin/sulbactam 3gm IVPB Q6H x 7 d if soft tissue only • Amox/Clav 875/125 mg BID x 7 d	TMP-SMX DS BID or Doxycycline 100 mg BID + metronidazole 500 mg TID x 7d
Tick Bite • Engorged *Ixodes scapularis*	Doxycycline 200 mg x1 dose if given within 72 hours of removal	



After 48 hours of antimicrobial therapy, reassess for appropriateness and opportunities for de-escalation