Antibiotics Why and Why Not 2025

DALHOUSIE UNIVERSITY FACULTY OF MEDICINE Academic Detailing Service | nova scotia health Drug Evaluation Unit

RESPIRATORY TRACT INFECTIONS

Acute GAS Pharyngitis

Antibiotic	*ADULT* Dose	Cost/day
Penicillin V[a]	600 mg PO BID	$0.97
Amoxicillin[b]	500 mg PO BID	$0.26
Cephalexin	500 mg PO BID	$0.35
Cefuroxime[c]	500 mg PO BID	$1.66
Clarithromycin[d]	250 mg PO BID	$0.82

Antibiotic	*PEDIATRIC* Dose	Cost/day
Penicillin V[a]	≤ 27 kg: 300 mg PO BID > 27 kg: 600 mg PO BID	$0.48 $0.97
Amoxicillin[b]	50 mg/kg/day PO once daily or divided BID (max 1000 mg/day)	$0.05/kg
Cefprozil	20 mg/kg/day divided PO BID (max 1000 mg/day)	$0.08/kg
Cefuroxime[c]	30 mg/kg/day divided PO BID (max 1000 mg/day)	$0.22/kg
Clarithromycin[d]	15 mg/kg/day divided PO BID (max 1000 mg/day)	$0.14/kg

Duration: 10 days

[a] Penicillin V preferred 1st line (narrow spectrum, safe and low cost). No documented GAS resistance. No commercially available suspension.
[b] Amoxicillin broader spectrum than required, but option where palatable liquid preferred.
[c] 1st line option if patient has experienced an IgE mediated amoxicillin reaction.
[d] If patient is unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE mediated hypersensitivity reaction). **Increased GAS resistance to macrolides.**
GAS = Group A Streptococcus

Acute Bacterial Rhinosinusitis *Most cases are VIRAL and DO NOT require antibiotics!*

Antibiotic	*ADULT* Dose	Cost/day
Amoxicillin	500 – 1000 mg PO TID[a]	$0.39 – 0.78
Amox/Clav[b]	875 mg PO BID	$1.11
Cefuroxime[c]	500 mg PO BID	$1.66
Clarithromycin[d]	500 mg PO BID	$1.66
Doxycycline[d]	100 mg PO BID	$0.93
Duration: 5 days in otherwise healthy individuals		

Antibiotic	*PEDIATRIC* Dose	Cost/kg/day
Amoxicillin	45-90 mg/kg/day divided PO TID (max 3000 mg/day)	$0.05 – 0.10
Amox/Clav[b] 80mg/mL, 7:1 formulation	45-60 mg/kg/day divided PO TID (max 1500 mg /day) Dose based on amoxicillin	$0.09 – 0.12
Cefprozil	30 mg/kg/day divided PO BID (max 1000 mg/day)	$0.12
Cefuroxime[c]	30 mg/kg/day divided PO BID (max 1000 mg/day)	$0.22
Clarithromycin[d]	15 mg/kg/day divided PO BID (max 1000 mg/day)	$0.14
Duration: 5-7 days 7-10 days may be considered if fever > 39°C or failure to respond to amoxicillin after 3-5 days.		

[a] Use higher dose if antibiotic use in past 3 months.
[b] *Adults:* Broader spectrum for amoxicillin treatment failure; *Pediatrics:* Broader spectrum if patient presents with fever > 39°C or fails to respond to amoxicillin after 3-5 days.
[c] 1st line option if patient has experienced an IgE mediated amoxicillin reaction.
[d] If patient is unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE mediated hypersensitivity reaction). **Increased *Streptococcus pneumoniae* resistance to macrolides and tetracyclines.**

Expect symptoms to improve but not completely resolve at the end of antibiotic therapy. Some persistence of symptoms is NOT an indication for an immediate second antibiotic.

Treatment Options: Green = 1st line Yellow = 2nd line Orange = 3rd line = May require renal dose adjustment
NS Health Firstline (adults) https://firstline.org/nsha IWK Firstline (pediatrics) https://firstline.org/iwk/

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Acute Otitis Media (AOM) – *PEDIATRIC (age ≥ 6 months)*

Antibiotic	Dose	Cost/kg/day
Amoxicillin	45-60 mg/kg/day divided PO TID (max 3000 mg/day) 75-90 mg/kg/day divided PO BID (max 3000 mg/day) 80-90 mg/kg/day[a] divided PO BID-TID (max 4000mg/day)	$0.05 – 0.06 $0.08 – 0.10 $0.09 – 0.10
Amox/Clav[b] 80mg/mL, 7:1 formulation	45-60 mg/kg/day divided PO TID (max 1500 mg/day) – Dose based on amoxicillin component	$0.09 – 0.12
Cefprozil	30 mg/kg/day divided PO BID (max 1000 mg/day)	$0.12
Cefuroxime[c]	30 mg/kg/day divided PO BID (max 1000 mg/day)	$0.22
Clarithromycin[d]	15 mg/kg/day divided PO BID (max 1000 mg/day)	$0.14
Ceftriaxone[c]	50 mg/kg/day IM or IV once daily x **3 days** – Reserve for emergency department	Variable
Duration: 5 days for age ≥ 2 years if no known complications; **10 days for age 6 months to < 2 years, frequent, recurrent AOM, perforation or failed initial antibiotic**		

[a] Consider higher dose for known/suspected drug-resistant *Streptococcus pneumoniae* (antibiotic use within past 3 months, daycare attendance, and/or unimmunized/incompletely immunized).
[b] Broader spectrum for amoxicillin treatment failure (symptomatic after 2-3 days of treatment).
[c] 1st line option if patient has experienced an IgE mediated amoxicillin reaction.
[d] If patient is unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE mediated hypersensitivity reaction); **Increased *Streptococcus pneumoniae* resistance to macrolides.**

Acute Exacerbation of COPD – *ADULT*

Antibiotic	Dose	Cost/day
< 4 exacerbations in the past year		
Amoxicillin	500 mg PO TID	$0.39
Cefuroxime[a]	500 mg PO BID	$1.66
SMX/TMP[b,c]	800 mg/160 mg (1 DS tablet) PO BID	$0.45
Doxycycline[b]	100 mg PO BID	$0.93
Clarithromycin[b,d]	500 mg PO BID	$1.66
≥ 4 exacerbations in past year, or one of the following: Treatment failure[e], recent antibiotics, home oxygen, or chronic systemic steroid use		
Amox/Clav	875 mg PO BID	$1.11
Ceftriaxone[a]	1 g IV daily	$12.50
Levofloxacin[b,f]	750 mg PO once daily	$6.55
Moxifloxacin[b,f]	400 mg PO once daily	$1.52
Duration: 5 days Expect symptoms to improve but not completely resolve at the end of therapy. Complete resolution may take several weeks.		

[a] 1st line option if patient has experienced an IgE mediated amoxicillin reaction.
[b] If patient is unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE mediated hypersensitivity reaction).
[c] Monitor kidney function and electrolytes if at risk of hyperkalemia (e.g., baseline renal dysfunction, age > 65 years, prolonged duration of SMX/TMP therapy, concomitant therapy with ACE inhibitors, angiotensin receptor blockers, or potassium sparing diuretics).
[d] **Macrolides are less effective** against *Haemophilus influenzae* and *Streptococcus pneumoniae*; Reserve for when unable to use other options.
[e] Treatment failure defined as: Clinical deterioration after 72 hours or no improvement after completion of first line treatment.
[f] **Reserve fluroquinolones** for treatment failure or if unable to take other treatment options and no fluroquinolone use in previous 3 months.

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Community Acquired Pneumonia – *ADULT*

Antibiotic	Dose	Cost/day
CRB-65 score 0 plus O_2 sat > 92% on room air → can be managed in **OUTPATIENT setting**		
Amoxicillin	500 mg to 1000 mg PO TID	$0.39 – 0.78
Cefuroxime[a]	500 mg PO BID	$1.66
Doxycycline[b,c]	100 mg PO BID	$0.93
Levofloxacin[b,d]	750 mg PO once daily	$6.55
Moxifloxacin[b,d]	400 mg PO once daily	$1.52
CRB-65 score 1-2 → *consider* admission to **HOSPITAL (NON-ICU)**		
Amoxicillin	500 mg to 1000 mg PO TID	$0.39-0.78
Ampicillin	2 g IV q6h	$44.92
Cefuroxime[a]	500 mg PO BID or 750 mg IV q8h	$1.66/$78.35
Ceftriaxone[a]	1 g IV once daily	$12.50
Levofloxacin[b,d]	750 mg PO/IV once daily	$6.55/$60.05
Moxifloxacin[b,d]	400 mg PO/IV once daily	$1.52/$43.54
Atypical coverage is NOT routinely required. Consider atypical coverage *with the addition of one of the following* if not receiving a fluoroquinolone and: Strong suspicion of atypical pathogens, not responding to β-lactams, age ≥ 65 years, or comorbidities (e.g., chronic heart, lung, liver, or renal disease, diabetes mellitus, alcohol dependence, or immunosuppression).		
Doxycycline	100 mg PO BID	$0.93
Clarithromycin[e]	500 mg PO BID	$1.66
Duration: 5 days		

[a] 1st line option if patient has experienced an IgE mediated amoxicillin reaction.
[b] If unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE mediated hypersensitivity reaction)
[c] **Increased *Streptococcus pneumoniae* resistance.**
[d] **Reserve fluroquinolones** for treatment failure (worsening after 72 hours or no response after therapy completion) or unable to take other treatment options and no fluoroquinolone use in the previous 3 months.
[e] **Macrolides** <u>*alone are not*</u> a 1st line option due to **poor *Streptococcus pneumoniae* coverage.**

Community Acquired Pneumonia – *PEDIATRIC (age > 3 months)*

Antibiotic	Dose	Cost/kg/day
Amoxicillin[a]	45-90 mg/kg/day divided PO TID (max 4000 mg/day)	$0.05 – 0.10
Cefprozil[b]	30 mg/kg/day divided PO BID (max 1000 mg/day)	$0.12
Cefuroxime[c]	30 mg/kg/day divided PO BID (max 1000 mg/day)	$0.22
Azithromycin[d,e]	10 mg/kg/day on **day 1** (max 500 mg/day), then 5 mg/kg/day PO daily x **4 days** (max 250 mg/day)	$0.15 – 0.30
Duration: 5 days		
ADD one of the following for suspected *Mycoplasma pneumoniae*:		
Azithromycin[e]	10 mg/kg/day on **day 1** (max 500 mg/day), then 5 mg/kg/day PO daily x **4 days** (max 250 mg/day)	$0.15 – 0.30
Doxycycline[f]	4 mg/kg/day divided PO BID x **7 days** (max 200 mg/day)	$0.93 or less

[a] Use higher dose (75-90 mg/kg/day) if patient has any of the following risk factors for resistant *Streptococcus pneumoniae*: Unimmunized or incompletely immunized, daycare attendance, use of antibiotics in the preceding 3 months.
[b] Cefprozil does NOT cover *Streptococcus pneumoniae* as well as amoxicillin and is NOT effective against *Chlamydophila pneumoniae* and *Mycoplasma pneumoniae*.
[c] 1st line option if patient has experienced an IgE mediated amoxicillin reaction.
[d] If patient is unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE mediated hypersensitivity reaction)
[e] **Increased *Streptococcus pneumoniae* resistance but covers *Chlamydophila pneumoniae* and *Mycoplasma pneumoniae*.**
[f] For children with macrolide allergy.

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ACUTE UNCOMPLICATED CYSTITIS

Adult & Post-Pubertal Girls (Empiric)

Antibiotic[a]	Dose	Cost/course
NO host risk factors for complicated infection[f]		
Nitrofurantoin Monohydrate/Macrocrystals[b,e]	100 mg PO BID x **5 days**	$3.98
SMX/TMP[c,e]	800 mg/160 mg (1 DS tablet) PO BID x **3 days**	$1.35
Cephalexin	500 mg PO QID x **5-7 days**	$3.46 – 4.85
Fosfomycin[d,e]	3 g PO x **1 dose**	$15.23
Amox/Clav *If high risk of resistance*	875 mg PO BID x **5-7 days**	$5.55 – 7.77
Host risk factors for complicated infection[f] (excluding pregnancy)		
Nitrofurantoin Monohydrate/Macrocrystals[b,e]	100 mg PO BID x **7 days**	$5.58
SMX/TMP[c.e]	800 mg/160 mg (1 DS tab) PO BID x **7 days**	$3.15
Cephalexin	500 mg PO QID x **7 days**	$4.85
Fosfomycin[d,e]	3 g PO q72h x **2 to 3 doses**	$30.46 – 45.69
Amox/Clav *If high risk of resistance*	875 mg PO BID x **7 days**	$7.77

[a] Other antibiotics are appropriate if culture confirms susceptibility. Moxifloxacin should not be used because it does not attain sufficient concentration in the urine.
[b] Nitrofurantoin should not be used in patients with CrCl < 30 ml/min, or pyelonephritis or prostatitis due to poor distribution into serum and tissue.
[c] Regular monitoring of kidney function and electrolytes are recommended for patients at risk of hyperkalemia, such as those with baseline renal dysfunction, age > 65 years, prolonged duration of SMX/TMP therapy, concomitant therapy with ACE inhibitors, angiotensin receptor blockers, or potassium sparing diuretics.
[d] Fosfomycin should not be used in patients with pyelonephritis due to poor distribution into serum and tissue.
[e] Option if patient has experienced an IgE mediated amoxicillin reaction.
[f] Risk factors: Immunosuppression, poorly controlled diabetes, catheter use, delayed/impaired voiding, structural or functional abnormality of urinary tract, recent urogenital procedure, individuals with a penis.

Pediatric (Empiric) - *Age > 2 months*

Antibiotic	Dose	Cost/kg/day
Cephalexin	50 mg/kg/day divided PO QID (max 2000 mg/day)	$0.26
Cefixime[a]	8 mg/kg/day PO once daily (max 400 mg/day)	$0.16
SMX/TMP[a]	8 mg/kg/day divided PO BID (max 160 mg TMP/dose) - Dose based on TMP component	$0.21
Duration: 5 to 7 days[b]		

[a] Option if patient has experienced an IgE mediated amoxicillin reaction
[b] Recommended duration if afebrile, not systemically ill, not recurrent, normal urinary tract anatomy, normal renal function and no history of resistant pathogens

Pregnancy (Empiric)

Antibiotic	Dose	Cost/course
Cephalexin	500 mg PO QID x **7 days**	$4.85
Nitrofurantoin[a,b] Monohydrate/Macrocrystals	100 mg PO BID x **5 days** *DO NOT USE In Late 3rd Trimester*	$3.98
SMX/TMP[b]	800 mg/160 mg (1 DS tablet) PO BID x **3 days** *DO NOT USE in 1st or 3rd trimester*	$1.35

[a] Nitrofurantoin should not be used in patients with CrCl < 30 ml/min.
[b] Option if patient has experienced an IgE mediated amoxicillin reaction or is unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE mediated hypersensitivity reaction).

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SKIN & SOFT TISSUE INFECTIONS

Mild	No systemic signs of infection
Moderate	Systemic signs of infection, lymphangitis and/or rapidly advancing edge
Severe	SIRS*, immunocompromise, deep infection: bullae, skin sloughing; end organ dysfunction *SIRS (Systemic Inflammatory Response Syndrome) = two or more of temp > 38°C or < 36°C, respiratory rate > 24 breaths per min, heart rate > 90 beats per min, WBC > 12 or < 4 x 10^9/L

Uncomplicated Outpatient Cellulitis – *PEDIATRIC (age > 3 months)*

Antibiotic	Dose	Cost/kg/day
Cephalexin[a]	50 mg/kg/day divided PO QID (max 4000 mg/day)	$0.26
Cefuroxime[a,b]	30 mg/kg/day divided PO q12h (max 1000 mg/day)	$0.22
SMX/TMP[c]	8-12 mg/kg/day divided PO BID (max 320 mg TMP/dose) – Dose based on TMP component	$1.66
Clindamycin[d]	20 mg/kg/day divided PO TID (max 1800 mg/day)	$1.66
Duration: 5 days if mild and quick response, otherwise **7-10 days**		

[a] For GAS (Group A Streptococcus) and MSSA (methicillin-sensitive *Staphylococcus aureus*); does not cover MRSA (methicillin-resistant *Staphylococcus aureus*)
[b] 1st line option if patient has experienced an IgE mediated amoxicillin reaction; does not cover MRSA.
[c] For community acquired MRSA & MSSA (does NOT cover GAS) if experienced IgE mediated amoxicillin reaction or unable to take any β-lactams (history of a delayed, severe, non-IgE-mediated hypersensitivity reaction).
[d] For GAS if unable to take any β-lactam (e.g., history of delayed, severe, non-IgE-mediated hypersensitivity reaction).

Cellulitis/Erysipelas – *ADULT*

Antibiotic	Dose	Cost/day
	MILD	
Cephalexin	500-1000 mg PO QID	$0.69 – 1.38
Cefuroxime[a]	500 mg PO BID	$1.66
Clarithromycin[b]	500 mg PO BID	$1.66
Duration: 5 days if mild and quick response, otherwise **7 days**		
	MODERATE	
Cefazolin[a,c]	Inpatient: 2 g IV q8h Outpatient: 2 g IV q12-24h[d] & 1 g probenecid PO 30 min before	$16.18 $10.78 + probenecid
Cloxacillin[c]	2 g IV q4h	$191.28
Ceftriaxone[c]	1 g IV q24h	$12.50
Daptomycin[b,c]	4-6 mg/kg IV q24h – Dose based on adjusted body weight[e] in people with obesity; round to nearest 50 mg	$97.41 - 146.12/75 kg
Vancomycin[b,c]	15 mg/kg IV Q12h – Round to nearest 250 mg; max 2 g/dose	$219.32/75 kg
Duration: 7 days		

[a] 1st line option if patient has experienced an IgE mediated amoxicillin reaction.
[b] Option if unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE mediated hypersensitivity reaction)
[c] May transition to PO therapy when systemic symptoms are resolved for at least 24 hours (unless *Staphylococcus aureus* bacteremia); NOTE: Oral cloxacillin is poorly tolerated and absorbed and should not be used.
[d] q12h interval preferred for people with obesity or significant inflammation
[e] Adjusted body weight = Ideal body weight (IBW) + 0.4 x (actual body weight – IBW); IBW in men = 50 kg + 2.3 kg x (height in inches – 60) and IBW in women = 45.5 kg + 2.3 kg x (height in inches – 60)

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Purulent Skin & Soft Tissue Infections – *ADULT*

Cutaneous abscesses, furuncles, carbuncles → Incision and drainage (I & D) are the cornerstone of management; antibiotics do not replace the need for I & D.

Antibiotic	Dose	Cost/day
NO MRSA CONCERNS[a]		
MILD with abscess diameter ≤ 2 cm		
No antibiotics required		
MILD with abscess diameter > 2 cm or other indication for antibiotic[b]		
Cephalexin	500 mg – 1000 mg PO QID	$0.69 – 1.38
SMX/TMP[c]	1-2 DS tabs PO BID (1 DS tab = 800mg SMX/160mg TMP) Higher dose preferred if weight > 70 kg & no contraindications	$0.45 – 0.90
Doxycycline[c]	100 mg PO BID	$0.93
Clindamycin[c]	300-450 mg PO QID	$1.88 – 2.82
MODERATE		
Cefazolin[d,e]	Inpatient: 2 g IV q8h Outpatient: 2 g IV q12h & 1 g probenecid PO 30 min before	$16.18 $10.78+ Probenecid
Vancomycin[c,e]	15 mg/kg IV q12h – Round to nearest 250 mg; max 2 g/dose	$42.26/*75 kg*
Daptomycin[b,d]	4-6 mg/kg IV q24h – Dose based on adjusted body weight[g] in people with obesity; round to nearest 50 mg	$97.41-146.12/*75/kg*
MRSA CONCERNS[a]		
MILD with abscess diameter ≤ 2 cm		
No antibiotics required		
MILD with abscess diameter > 2 cm or other indication for antibiotic[b]		
SMX/TMP[c]	1-2 DS tabs PO BID (1 DS tab = 800mg SMX/160mg TMP) Higher dose preferred if weight > 70 kg & no contraindications	$0.45 – 0.90
Doxycycline[c]	100 mg PO BID	$0.93
Clindamycin[c,f]	300-450 mg PO QID	$1.88 – 2.82
MODERATE		
Vancomycin[c,e]	15 mg/kg IV q12hr – Round to nearest 250 mg; max 2 g/dose	$42.26/*75 kg*
Daptomycin[c,e]	4-6 mg/kg IV q24h – Dose based on adjusted body weight[g] in people with obesity; round to nearest 50 mg	$97.41-146.12/*75 kg*
Duration: 7-10 days		

[a] MRSA (methicillin-resistant *Staphylococcus aureus*) risk factors include: History of MRSA colonization or infection, recent hospitalization, injection drug use, poor response to initial antibiotics.
[b] May add antibiotic therapy if: Multiple abscesses, lack of response to I & D alone (current or in past), surrounding cellulitis, located in an area where I & D difficult (face, hands or groin), extremes of age, impaired host defenses, indwelling medical device at a non-contiguous site isolated from infected field (e.g. pacemaker, vascular graft).
[c] Option if unable to take any β-lactams (e.g. history of a delayed, severe, non-IgE-mediated hypersensitivity reaction).
[d] 1st line option if patient experienced an IgE-mediated amoxicillin reaction.
[e] May transition to oral therapy when systemic symptoms are resolved for at least 24 hours (in absence of *Staphylococcus aureus* bacteremia)
[f] Clindamycin remains an option for community-acquired MRSA which is more susceptible than hospital-acquired strains.
[g] Adjusted body weight = ideal body weight (IBW) + 0.4 x (actual body weight - IBW); IBW (men) = 50 kg + 2.3 kg x (height in inches – 60) and IBW (women) = 45.5 kg + 2.3 kg (height in inches – 60)

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INFECTIVE ENDOCARDITIS PROPHYLAXIS BEFORE DENTAL PROCEDURES

× NOT recommended for *most* people with a cardiovascular condition or prosthetic joint.

✓ Recommended for patients undergoing procedures involving manipulation of gingival tissue, dental periapical regions, or perforation of oral mucosa with one of the following:

- Prosthetic cardiac valve or material
- History of endocarditis
- History of cardiac transplantation with subsequent development of cardiac valvulopathy
- Unrepaired cyanotic congenital heart disease (CHD), including palliative shunts/conduits
- Completely repaired CHD with prosthetic material or device during 6 months following procedure
- Repaired CHD with residual defects at site of or adjacent to site of a prosthetic patch or device
- Surgical/transcatheter pulmonary artery valve or conduit placement such as Melody valve and Contegra conduit

Prophylaxis consists of a single dose of antibiotic given 30 to 60 min before the procedure.

Antibiotic	*ADULT* Dose	Cost	*PEDIATRIC* Dose	Cost
ORAL REGIMEN				
Amoxicillin	2 g PO	$0.52	50 mg/kg (max 2000 mg) PO	$0.05/kg
Cefuroxime[a]	500 mg PO	$0.83	10 mg/kg (max 500 mg) PO	$0.07/kg
Doxycycline[b]	100 mg PO	$0.47	2.2 mg/kg (max 100 mg) PO	$0.46 or less
UNABLE TO TAKE ORAL MEDICATION				
Ampicillin	2 g IV	$11.23	50 mg/kg (max 2000 mg) IV	$0.28/kg
Ceftriaxone[a]	1 g IV	$12.50	50 mg/kg (to max 1000 mg) IV	$0.62/kg
Clindamycin[b,c]	600 mg IV	$15.88	20 mg/kg (to max 600 mg) IV	$0.53/kg

[a] 1st line option if patient has experienced an IgE-mediated amoxicillin reaction.
[b] Option if patient is unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE-mediated hypersensitivity reaction).
[c] **Reserve** for when every alternative is contraindicated due to high risk of *C. difficile* infection associated with clindamycin use. **The American Heart Association no longer recommends clindamycin for this use.**

DENTAL ABSCESS with Systemic Symptoms – *ADULT*

Antibiotic	Dose	Cost/day
Amoxicillin	500 mg PO TID	$0.39
Penicillin VK	300-600 mg PO QID	$0.97 – 1.94
Cefuroxime[a]	500 mg PO BID	$1.66
Doxycycline[b,c]	100 mg PO BID	$0.93
If little improvement after 48 hours, consider additional anaerobic coverage		
Metronidazole	500 mg PO BID	$1.86
Duration: 5 days as adjunct to definitive, conservative dental treatment (may discontinue 24 hours after symptoms resolve)		

[a] 1st line option if patient has experienced an IgE-mediated amoxicillin or penicillin reaction.
[b] Option if patient is unable to take any β-lactam (e.g., history of a delayed, severe, non-IgE-mediated hypersensitivity reaction).
[c] Doxycycline has less activity for oral pathogens compared to β-lactams.

× Alternatives of **last resort** include **macrolides** (local high resistance rates to oral pathogens) and **clindamycin** (high risk of *C. difficile* infection).
× **Cephalexin** is **not recommended** by local antimicrobial stewardship experts due to poor Viridans group streptococci coverage.
× Amox/Clav is excessively broad spectrum for this indication. Amoxicillin + metronidazole is preferred.

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TICK BORNE INFECTIONS

Guidance for Primary Care and Emergency Medicine Providers in the Management of Lyme Disease, Human Granulocytic Anaplasmosis, Babesiosis and Powassan virus infection: https://novascotia.ca/dhw/cdpc/infectious-disease-expert-group.asp

LYME DISEASE

ANTIBIOTIC PROPHYLAXIS is recommended when all the following are met:

- ✓ Dose can be given within 72 hours of removal of a high-risk tick
- ✓ Tick was attached for ≥ 36 hours
- ✓ Tick identified as adult or nymphal blacklegged tick (*Ixodes* spp.)
- ✓ Tick bite occurred in an endemic area, which includes all of NS

ANTIBIOTIC PROPHYLAXIS Options

Adults: Doxycycline 200 mg PO as a single dose

Children: Doxycycline 4 mg/kg to max 200 mg PO round to nearest 25 mg (1/4 tablet) as a single dose OR wait-and-watch approach

X *Amoxicillin is **not** recommended due to its short half-life.*

Treatment – *ADULT Lyme Disease*

Syndrome	Dose	Duration	Cost/Course
Erythema migrans Large (> 5cm), painless, non-pruritic, oval, solid or bull's eye erythematous rash	Doxycycline* 100 mg PO BID	10 days	$9.30
	Amoxicillin 500 mg PO TID	14 days	$5.46
	Cefuroxime 500 mg PO BID	14 days	$23.24
	Azithromycin 500 mg PO once daily - Alternative if other antibiotics contraindicated	7 days	$13.17
Cranial Nerve Palsy (e.g., Facial nerve palsy)	Doxycycline* 100 mg PO BID	14-21 days	$13.02 – 19.53
Meningitis or radiculopathy IV therapy for severe disease, including encephalitis	Doxycycline* 100 mg PO BID	14-21 days	$13.02 – 19.53
	Ceftriaxone 2 g IV daily	14-21 days	$482.79 - 724.18
Lyme disease-related parenchymal involvement of the brain or spinal cord	**Consult Infectious Diseases Service**		
Carditis Consider ID consult	Ceftriaxone 2 g IV daily	14-21 days	$482.79 - 724.18
	Doxycycline* 100 mg PO BID	14-21 days	$13.02 – 19.53
	Amoxicillin 500 mg PO TID	14-21 days	$5.46 – 8.19
	Cefuroxime 500 mg PO BID	14-21 days	$23.24 – 34.86
Arthritis (initial)	Doxycycline* 100 mg PO BID	28 days	$26.04
	Amoxicillin 500 mg PO TID	28 days	$10.92
	Cefuroxime 500 mg PO BID	28 days	$46.48
Arthritis (recurrent or refractory) Refer to rheumatology if no improvement after 8 weeks of total treatment including trial of IV therapy	Ceftriaxone 2 g IV once daily	14 days *May extend to 28 days if inflammation not resolving*	$482.79 – 724.18
	Doxycycline* 100 mg PO BID	28 days	$26.04
	Amoxicillin 500 mg PO TID	28 days	$10.92
	Cefuroxime 500 mg PO BID	28 days	$46.48

*A systematic review of doxycycline use in pregnancy found no increased risk of teratogenicity, permanent teeth staining, hepatoxicity or permanent inhibitory effects on bone growth in the developing fetus (Opin Drug Saf. 2016 https://doi.org/10.1517/14740338.2016.1133584).

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Treatment – *PEDIATRIC Lyme Disease*

Syndrome	Age (years)	Dose	Duration	Cost/Course
Erythema migrans Single or multiple, no neurological or cardiac signs or symptoms	≥ 8	Doxycycline 4.4 mg/kg/day PO divided q12h (max 200 mg/day) round to nearest 25 mg = 1/4 tablet	10 days	$9.12 or less
	< 8	Amoxicillin 50 mg/kg/day PO divided q8h (max 1.5 g/day)	14 days	$0.76/kg
	All pediatrics	Cefuroxime 30 mg/kg/day PO divided q12h (max 1 g/day)[a]	14 days	$3.08/kg
Isolated facial palsy[b] Consult ID	All pediatrics	Doxycycline 4.4 mg/kg/day PO divided q12h (max 200 mg/day) round to nearest 25 mg = 1/4 tablet	14 days	$12.77 or less
Meningitis Consult ID	All pediatrics	Doxycycline 4.4 mg/kg/day PO divided q12h (max 200 mg/day) round to nearest 25 mg = 1/4 tablet	14 days	$12.77 or less
	All pediatrics	Ceftriaxone 50-75 mg/kg/day IV q24h (max 2 g/day)	14 days	$8.68 – 13.12/kg
Carditis or Atrioventricular block Consult ID	≥ 8	Doxycycline 4.4 mg/kg/day PO divided q12h (max 200 mg/day) round to nearest 25 mg = 1/4 tablet	14-21 days	$6.38 (or less) – 19.15
	< 8	Amoxicillin 50 mg/kg/day PO divided q8h (max 1.5 g/day)	14-21 days	$0.76 – 1.14/kg
	< 8	Ceftriaxone[c] 50-75 mg/kg/day IV q24h (max 2g/day)	14-21 days	$8.68 – 19.68/kg
	All pediatrics	Cefuroxime 30 mg/kg/day PO divided q12h (max 1 g/day)	14-21 days	$3.01 – 4.52/kg
	All pediatrics	Ceftriaxone[c] 50-75 mg/kg/day IV q24h (max 2 g/day)	14-21 days	$8.68 – 19.68/kg
Lyme Arthritis, Initial Consult ID or Rheumatology	≥ 8	Doxycycline 4.4 mg/kg/day PO divided q12h (max 200 mg/day) round to nearest 25 mg = 1/4 tablet	28 days	$25.52 or less
	< 8[d]	Amoxicillin 50 mg/kg/day PO divided q8h (max 1.5 g/day)	28 days	$1.52/kg
	All pediatrics	Cefuroxime 30 mg/kg/day PO divided q12h (max 1 g/day)	28 days	$6.02/kg
Lyme Arthritis, Persistent Consult ID or Rheumatology	≥ 8	Doxycycline 4.4 mg/kg/day PO divided q12h (max 200 mg/day) round to nearest 25 mg = 1/4 tablet	28 days	$25.52 or less
	< 8[d]	Amoxicillin 50 mg/kg/day PO divided q8h (max 1.5 g/day)	28 days	$1.52/kg
	All pediatrics	Cefuroxime 30 mg/kg/day PO divided q12h (max 1 g/day)	28 days	$6.02/kg
	All pediatrics	For *worsening* arthritis: Ceftriaxone 50-75 mg/day IV q24h (max 2 g/day)	14-28 days	$8.68 – 26.24/kg

[a] 1st line option if patient has experienced an IgE mediated amoxicillin reaction.
[b] Amoxicillin has not been studied for treatment of facial palsy related to Lyme disease.
[c] Once stable and symptoms have resolved, may change to oral therapy to finish the course.
[d] There are limited safety data on the use of doxycycline for more than 21 days in children < 8 years of age

HUMAN GRANULOCYTIC ANAPLASMOSIS (HGA) - 90% of cases have ≥ 1 of the **classic triad** signs: thrombocytopenia, leukopenia, or ↑ aminotransferase levels.

Adult **HGA**

Doxycycline 100 mg PO BID x 10 days

- Expect rapid response within 24-48 hours of treatment
- Alternative (mild cases): Rifampin* 300 mg PO BID x 7 to 10 days
- Consult ID if PO doxycycline contraindicated

Pediatric **HGA** (including age < 8 years)

Doxycycline 4.4 mg/kg/day PO divided BID (max 100 mg/dose) x 10 days

- Alternative (mild cases): Rifampin* 20 mg/kg PO divided BID (max 300 mg/dose) x 7-10 days
- Consider consulting ID

*Limited supporting evidence, significant side-effects and drug interactions, and in cases of co-infection not effective for Lyme disease. × *Beta-lactams are **NOT** effective*

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CLOSTRIDIOIDES DIFFICILE INFECTION (CDI) – *ADULT*

Category	Antibiotic	Dose	Cost/*Course*
First Episode	Vancomycin	125 mg PO QID x **10 days**	$207.20
	Metronidazole	500 mg PO TID x **10 days** For mild-moderate[a] CDI when cost of vancomycin is prohibitive	$27.90
First Recurrence (2nd episode) Mild to moderate[a]	Vancomycin	125 mg PO QID x **14 days**	$290.08
	Fidaxomicin[b]	200 mg PO BID x **10 days** For high risk of recurrence[c] and when cost not prohibitive	$2052.82
	Metronidazole	500 mg PO TID x **14 days** When initial episode was not treated with metronidazole and when cost of vancomycin & fidaxomicin is prohibitive	$39.06
First Recurrence (2nd episode) Severe, uncomplicated[d]	Vancomycin	125 mg PO QID x **14 days**	$290.08
	Fidaxomicin[b]	200 mg PO BID x **10 days** For high risk for recurrence[c] and when cost not prohibitive	$2052.08
Second or Subsequent Recurrence (3rd episode)	Vancomycin Taper	• 125 mg PO QID x 14 days then • 125 mg PO TID x 7 days then • 125 mg PO BID x 7 days then • 125 mg PO daily x 7-14 days then • 125 mg PO every 2 or 3 days x 2-8 weeks	$533.54 – 688.66
	Fidaxomicin[b]	200 mg BID for **10 days**	$2052.82

[a] Mild to moderate CDI = WBC ≤ 15 x 10^9/L and creatinine ≤ 1.5 times baseline and age ≤ 60 years.
[b] There is increased risk of fidaxomicin hypersensitivity with history of macrolide allergy.
[c] Risk factors for recurrent CDI: age > 60 years, significant immunocompromise, hospitalization for severe CDI within previous 3 months, and current use of antibiotics, proton pump inhibitors, antimotility agents & opioids.
[d] Severe, uncomplicated CDI = WBC > 15 x 10^9/L or creatinine > 1.5 times baseline or age > 60 years or hypoalbuminemia.

CDI considerations for children

✕ *"Don't routinely collect or process specimens for C. difficile testing in infants < 1 year of age with diarrhea."* ***Choosing Wisely Canada***

- Up to 36% of infants are asymptomatic carriers; clinical illness rarely reported before age 1-2 years.
- Limit testing to immunosuppressed infants or those with underlying intestinal conditions when other etiologies have been ruled out.
- Refer to IWK Firstline for CDI treatment of older children.

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BETA (β)-LACTAM ALLERGY ASSESSMENT

Appropriate management is based on type of allergic reaction

Reaction	Management
Hypersensitivity IgE mediated (within 2 hours, e.g., anaphylaxis)	• Avoid reaction-provoking drug • Choose β-lactam with different side chain • Consider further evaluation of allergy status when feasible
Hypersensitivity Non-IgE-mediated (delayed > 72 hours)	**Non-serious** (more common) • Choose β-lactam with different side chain • Direct oral challenge (if feasible) • Consider further evaluation of allergy status when feasible
	Serious/life threatening (rare) e.g., Stevens-Johnson syndrome • Avoid all β-lactams
Non-hypersensitivity (adverse drug event)	• Not a contraindication

When to consider referral to an Allergist

- ✓ If unable to rule in/out an IgE mediated allergy.
- ✓ For moderate to high-risk patients, penicillin skin testing may be considered before the challenge.

Adult	Adult & Pediatric	Pediatric
Drug Allergy Clinic Bayer's Lake Community Outpatient Centre f: 902-473-8430	Halifax Allergy and Asthma Associates 5657 Spring Garden Road, Suite 503 Halifax, NS, B3J 3R4 t: 902-425-3927 f: 902-425-3928	IWK Allergy Clinic t: 902-470-6554 f: 902-470-7308 East Coast Allergy Dr. Laura Murphy 4 Forest Hills Parkway, Cole Harbour t: 902-435-5530 (ext. 10) f: 1-833-333-2679

X Do not avoid all β-lactams in all patients reporting penicillin allergies.

- ~10% of the population is labelled as penicillin allergic, but ~98% of these individuals are β-lactam tolerant when assessed appropriately.

Cross-reactivity risk between penicillins and cephalosporins is low and among cephalosporins is rare and dependent on side-chain similarities.

⇩

Probable beta-lactam IgE mediated cross-reactivities based on side chain similarities

	Penicillin	Amoxicillin	Ampicillin	Cloxacillin	Piperacillin	Cephalexin	Cefadroxil	Cefazolin	Cefoxitin	Cefaclor	Cefprozil	Cefuroxime	Cefotaxime	Ceftriaxone	Cefixime	Ceftazidime	Meropenem	Ertapenem
Penicillin		X	X	X	X	X	X		X									
Amoxicillin	X		X	X	X	X	X			X	X							
Ampicillin	X	X		X	X	X	X			X	X							
Cloxacillin	X	X	X		X													
Piperacillin	X	X	X	X		X	X			X	X							
Cephalexin	X	X	X		X		X			X	X							
Cefadroxil	X	X	X		X	X				X	X							
Cefazolin																		
Cefoxitin	X											X						
Cefaclor		X	X		X	X	X				X							
Cefprozil		X	X		X	X	X			X								
Cefuroxime									X				X	X	X	X		
Cefotaxime												X		X	X	X		
Ceftriaxone												X	X		X	X		
Cefixime												X	X	X		X		
Ceftazidime												X	X	X	X			
Meropenem																		X
Ertapenem																	X	

X: Risk of IgE mediated cross reaction, use alternative

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Questions to ask during allergy assessment

- What medication was prescribed and what was the indication and route of administration?
- Has the medication been taken since? If so, was there a reaction?
- How long ago was the reaction?
  - Reactions in childhood or > 10 years in past may be less concerning.
- How many doses were taken prior to onset of reaction?
- How soon after the dose was taken did the reaction occur?
- Was the medication stopped? How was the reaction managed? How long did symptoms last?
- Were other medications taken at the same time?
- What was the nature of the reaction (e.g., onset) and associated signs and symptoms?

Beta-Lactam Allergy Assessment & Penicillin De-Labeling Tools

- Assessment & de-labeling guidance tools are available through:
  - **IWK Firstline** (pediatrics & women's health)
  - **NS Health Firstline** (adults)

**Access Firstline via web-based (links) or mobile download (QR codes)*

- **PEN-FAST** (adults)
  - A point-of-care risk assessment tool to identify *adults at low risk* of penicillin allergy.
  - https://www.mdcalc.com/calc/10422/penicillin-allergy-decision-rule-pen-fast

Direct Oral Challenge

- ✓ Gold standard test to clarify allergy status in **low-risk people** (e.g. history of a non-severe reaction 10 years or more prior) as identified via tools listed above
- ✓ Anaphylaxis management protocol and supplies required

Single Step:

- One full dose followed by 60 minutes observation
  - Adults: Amoxicillin 500mg PO once
  - Children: Amoxicillin 15-30 mg/kg/dose PO once (max 500 mg/dose)
    - May use chewable tablets for convenience and cost

Graded:

- Administer 10% of therapeutic dose + 30 minutes observation.
- If no symptoms occur after 30-minute observation, administer remaining 90% of therapeutic dose and observe for an additional 60 minutes.

This document is not intended to be all-inclusive. Please refer to the Academic Detailing document "Antibiotics Why and Why Not 2025": https://medicine.dal.ca/departments/core-units/cpd/programs/academic-detailing-service/AC-Service-Resources.html for full content and references.

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