

Did you know?

- **Firstline** is a **free, localized, point-of-care** antimicrobial stewardship app / website with guidance for **pediatrics (JPCH)** or adults & penicillin allergy de-labeling (**SHA**).^{1,2} See back page.
- **Analgesics** are sometimes **underdosed** for pain/fever in respiratory tract infections.^{Expert} Advise caregivers to use **weight-based, scheduled dosing** for the first 48 hours while awake and then PRN.
- **Infection-related complications** are **rare even without an antibiotic**:

3 Thompson'09, 4 Peterson'07

- mastoiditis: <3.8 events per 10,000 **acute otitis media** cases.
- peritonsillar abscess (quinsy), 0-15 years: <6 events, ≥16 years: <21 events per 10,000 **pharyngitis** cases.
- pneumonia, <65 years: <126 events per 10,000 **bronchitis** cases.

- **Reserve amox/clav CLAVULIN, g** for AOM or sinusitis **treatment failure**.

⁵ CPS'16, ⁶ CSO-HNS'11 If prescribing, strive for clavulanate ≤10mg/kg/day in pediatrics & 125mg/dose in adults to decrease adverse events e.g. diarrhea.⁷⁻⁹

- **Macrolide *S. pneumoniae* resistance** is increasing **~21%**¹⁰ Saskatoon'23 **~38%**¹¹

^{Regina'23} Reserve use for AOM or sinusitis in those with a **severe penicillin allergy**.^{5,6}

- **>80%** of people **outgrow** their **penicillin allergy after 10 years, even if severe**.¹² Blumenthal'19

- Group A Streptococcus (GAS), the main **pharyngitis** pathogen of concern, is **100%** susceptible to penicillin in SK.^{10,11,13}

^{CPS'21} Prescribe **penicillin V PEN-VK, g** in those able to swallow tablets (scored) as narrower spectrum than amoxicillin.

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In Canada, SK is the jurisdiction with the **third highest** antimicrobial use per capita.¹⁴ PHAC'21

- **~90%** of all antibiotic prescriptions are dispensed in the **community sector** (Canada).¹⁴ PHAC'21
- **~30%** of all outpatient antibiotic prescriptions are **not required** (USA).¹⁵ Fleming-Dutra'16

Overuse leads to harms e.g. by 2050, the UN projects there will be **as many deaths due to antimicrobial resistance** as there are currently deaths due to cancer (> 10 million/year).¹⁶⁻¹⁹

Patient education can provide reassurance on the self-limiting nature & usual course of infections to support **watchful waiting / "wait & see"** strategies.^{20,21} This approach found:²² Cochrane'23, 23 Mas-Dalmau'21

- **similar duration or severity of symptoms** as with antibiotic use
- **maintained parental satisfaction (≥90%)**
- **less antibiotic use** vs immediate antibiotic prescription (↓~65-85%)
- **fewer adverse events** e.g. diarrhea **NNH=17** / 30 days

SEE BACK PAGE
for tools to
support
ANTIMICROBIAL
STEWARDSHIP

Optimize Acute Otitis Media (AOM) Management

~2 out of 3 cases resolve without antibiotics at 72 hrs.²⁴ Marchetti'05 If needed, **amoxicillin AMOXIL, g** remains 1st line & is preferred over amox/clav per local SK antibiogram.^{10,11}

COMMON QUESTIONS RELATED TO AMOXICILLIN DOSING IN ACUTE OTITIS MEDIA:

When to use "high-" vs "standard-dose" amoxicillin?

Penicillin resistant *S. pneumoniae* (PRSP) rates are currently low, SK ~0% to <1.3%.^{10,11} **Recommend high-dose in select patients with PRSP risk factors: received an antibiotic in the previous 3 mos, or attending daycare, or <2 years, or unimmunized/underimmunized.**⁵ CPS'16, Bugs & Drugs'23, JPCH, Expert

What is the maximum dose for amoxicillin in pediatrics?

The usual dose is 4 g/day.²⁹⁻³¹ For adolescents ≤15 years, may use up to 4 grams per day (pediatric max dosing) due to increased renal elimination of amoxicillin.^{Expert}

How frequently should amoxicillin be dosed throughout a 24 hour period?³² Expert

To maintain adequate middle ear drug levels, divide **TID** if prescribing **standard-dose** amoxicillin. If prescribing **high-dose** amoxicillin, may divide **BID** as higher drug levels are achieved.

When should I prescribe amoxicillin 5 days vs 10 days?

Children ≥2 years: **5 days** adequate and fewer AEs **NNH=29** vs 10 days (even if risk factors for PRSP).³³ Cochrane'10
Children <2 years: **10 days** better than 5 days.³⁴ Hoberman'16

Reassess Penicillin/Amoxicillin Allergy

≥90% of individuals reporting a **penicillin allergy** turn out to **actually be beta-lactam tolerant**.³⁵ AAAAI'10
False allergy labels lead to ↑risk of poor outcomes.³⁶⁻³⁹ **Risk-stratify & de-label when possible!**^{40,41}

History of:	If Firstline ⁴² app, or PEN-FAST ⁴³ suggest very-low, or low-risk. e.g. history of non-severe delayed reaction (rash with no systemic or blistering/mucous membrane symptoms), >5-10 years since reaction (childhood rash)	Immediate (vs delayed) Severe (vs non-severe) (e.g. anaphylaxis, angioedema; systemic reaction, blistering of skin/mucous membranes; treatment required) Recent (vs >5-10 years)
a) predictable adverse effects e.g. GI upset, headache, or b) family member with allergy, or c) same drug taken again without reaction.	NO true allergy risk. ⁴⁴ Direct de-labeling suitable. The low hanging fruit! {Avoid false labeling!}	Moderate to high-risk Identify those with history of true IgE allergy or severe reaction. Avoid de-labeling; (may direct challenge, or refer to allergist).

*Systematic review (N=13, n=1202) of direct oral challenge: **~96%** of low-risk individuals were successfully de-labeled; ~4% had a mild immediate or delayed reaction; no reports of serious adverse events.⁴⁵ Cooper'21

Clinical Pearls

- Treat the ear pain. Calculate **weight-based analgesia & schedule for the first 48 hours**.
- **Watchful waiting for up to 48 hours** is recommended for most children **≥6 months old**.
- If antibiotics are required, **amoxicillin** is the empiric drug of choice in most cases.
- In uncomplicated AOM, children **≥2 years** can usually be treated with **5 days of antibiotic therapy**, however, children **<2 years** of age should be treated for **10 days**.
- **Effusion** does not mean tx failure. It is sterile fluid & can take up to 3mos to resolve.
- **Patient Tools:**⁷⁻⁹ Mayo Clinic [interactive tool](#), CDC [handout](#), Choosing Wisely [handout](#).

Overview

- No gold standard for diagnosis & it is especially challenging in young children, leading to overdiagnosis/overtreatment. Often post viral URTI.
- Diagnosis:^{5 CPs'16} ❶ Acute onset (<48hours) of symptoms e.g. otalgia or suspected otalgia (sx may be non-specific in non-verbal children) **AND** ❷ Middle ear effusion **AND** ❸ Inflammation: bulging tympanic membrane **OR** perforated tympanic membrane with discharge (i.e. otorrhea).
- Etiology: viral or bacterial; difficult to distinguish between & both are often present at the same time (up to ~65% of pts). ***S. pneumoniae*** (more virulent, ~20% spontaneously resolve), *H. influenzae* non-typeable or *M. catarrhalis* (less virulent, ~50-75% spontaneously resolve), GAS (uncommon, linked perforation).²⁰⁻²⁴
- Some evidence suggests routine childhood immunizations (e.g. pneumococcal conjugate **PREVNAR-13**, *H. influenzae* type b, influenza vaccine) may ↓ episodes of AOM & alter pathogen prevalence e.g. ↓ *S. pneumoniae* pneumococcal vaccine serotypes & ↑ *H. influenzae* (non-typeable).²⁵⁻²⁸

An Approach to Treatment

Treat the ear pain (whether or not an antibiotic is prescribed, **schedule analgesia for the first 48 hours**)^{29 Cochrane'23 (4 RCTs, 411 children; low quality evidence)} see [RxFiles Pediatric Pain Chart](#) page 139, [caregiver dosing infographic](#)

Acetaminophen TYLENOL , g 10-15mg/kg q4-6h PRN (max=75 mg/kg/d ^{term neonates})	• Either acetaminophen or NSAID provided pain relief at 48hr ± antibiotic (NNT=6-7 /48hr, analgesic ~90% vs placebo ~75%). ^{29 Cochrane'23 (4 RCTs, 411 children; low quality)}
NSAIDs e.g. ibuprofen ADVIL , g 5-10 mg/kg q6-8h PRN (max=40mg/kg/d ^{limited data <6mos})	• Limited evidence of additional benefit when routinely combining or alternating. May lead to confusion/dosing errors ; may suggest select patients. ^{Expert}
Possible benefit: ?topical anaesthetics POLYSPORIN Plus Pain Relief ear drops, ^{OTC >6yrs \$20/15mL; lidocaine, polymyxin (≥3yr: ↓pain for 10-30min; AE not well studied; CI perforation).} ^{30 Cochrane'06, NICE (consider during watchful waiting)} If used, give in addition to po analgesics .	
Anecdotal benefit (only if <u>no</u> eardrum perforation): hot/cold compress; oil instillation e.g. mineral, olive. Some recommend against. If used, give in addition to oral analgesics .	
Not recommended: antihistamines (no benefit, ↑ AE , ↑effusion duration), decongestants (no benefit, ↑ AE), nasal or systemic corticosteroids (largely unstudied, low quality evidence). ^{31,32 Cochrane'08 & '18}	AURALGAN is discontinued.

Determine if watchful waiting / “wait & see” is appropriate (the usual course of AOM is ~3 days, but can last up to 1 week^{3 NICE} and most do not require immediate antibiotic see Table 1 below).^{33 Choosing Wisely - Primary Care, Emerg Medicine}

- **Watchful waiting:** antibiotics are withheld & treatment is limited to analgesia & caregiver observation for **up to 48 hours**^{5 CPs'16}).^{3 NICE'22&'18 / 4 MUMS'19 / 6 AAP'13 up to 72hour} This should be considered in **healthy** children **≥6 months**.
 - Caregiver may be instructed to return for reassessment or given an antibiotic e.g. **“wait & see” / delayed prescription** if the child does not improve or worsens at any time during the watchful waiting period.^{34 Cochrane'23}
- In eligible children, **watchful waiting may ↓ antibiotic use** (n=1277, ~66% recovered without an antibiotic @72hrs & 30 days).^{35 Marchetti'05}
- Whether children receive antibiotic or placebo, ~60% had ear pain resolution at 24hrs. **Most had resolution at 48hrs (NNT=20, ~90% antibiotic vs ~85% placebo)**, but some are more likely to benefit from antibiotics (**<2 years with bilateral AOM, otorrhea: NNT=3-4, 70-76% vs 40-45%**). ↑N/V/rash with antibiotic vs placebo (**NNH=14, 27% vs 20%**).^{36 Cochrane'23 (13 RCTs, 3401 children)}
- **Infection-related complications are rare** (e.g. <3.8 events per 10,000 AOM cases).^{37,38} ↑resistance with ↑antibiotic use.

Table 1. Watchful Waiting is NOT appropriate in the Following Patients¹⁻⁶

- | | |
|--|--|
| <ul style="list-style-type: none">• <6 months• Perforated tympanic membrane• Otorrhea i.e. ear discharge (any age)• Moderate to severe presentation<ul style="list-style-type: none">- Severe otalgia, poor response to antipyretics OR- Symptoms do not improve after ≥48hrs OR- Temperature ≥39°C (with or without antipyretic use) | <ul style="list-style-type: none">• Tympanostomy tubes, cochlear implants• Recurrent AOM (see below)• <2 years with bilateral AOM• Medical co-morbidities (e.g. craniofacial abnormalities, immunodeficiency)• Caregiver unable to support child or follow-up |
|--|--|

Table 2. Empiric Drug Regimens¹⁻⁶ *

see [Antibiotic Formulations Chart](#) page 7 for price, etc.

If watchful waiting is not appropriate (table 1) or no improvement/worsening of signs ± symptoms after >48 hours.

Amoxicillin ☺ AMOXIL, g Moxilen Forte Max total daily dose 4g/day ☺= tastes good	Standard-dose (SD) 40 to 50mg/kg/day ÷ TID High-dose (HD) 80 to 90mg/kg/day ÷ BID (may give TID ^{Sanfords})	• Amoxicillin is the drug of choice for AOM. Rates of penicillin resistant <i>S. pneumoniae</i> (PRSP) are low (SK²⁰²³<0 - 1.3%).^{39,40} • Consider high-dose option if ↑ risk of PRSP e.g. daycare, under or unimmunized, <2 years, or antibiotic within 3 months. - AE: no head-to-head, appear similar;^{36 Cochrane'23} Meta-analysis;⁴¹ diarrhea SD ~9% vs HD ~14%, rash SD ~3% vs HD ~6.5% overlapping CI, ↑heterogeneity.⁴¹ • Amox resistant to beta-lactamase positive <i>H. influenzae</i> (^{20% SK 2023}) & <i>M. catarrhalis</i> (most strains) but these likely to spontaneously resolve.
PENICILLIN ALLERGY: NON-SEVERE (e.g. delayed >72 hours rash) see RxFiles Beta-lactam Allergy Chart page 6, SHA Firstline .		
Cefprozil CEFZIL, g ☺	15 to 30 mg/kg/day ÷ BID-TID	• Broader spectrum vs amox (greater selective pressure on other bacteria). • Cefprozil suspension is ~\$5-10 less compared to cefuroxime. • Cefuroxime: increase bioavailability by dividing total daily dose TID vs BID, or giving with food.⁴²
Cefuroxime CEFTIN, g ☺	20 to 30mg/kg/day ÷ BID-TID (cc preferred)	
PENICILLIN ALLERGY: SEVERE (e.g. anaphylaxis, angioedema) see RxFiles Beta-lactam Allergy Chart page 6, SHA Firstline .		
Clarithromycin BIAXIN, g	15 mg/kg/day ÷ BID	• Avoid use, ↑ <i>S. pneumoniae</i> resistance ~21%^{39 Saskatoon'23} to ~38%^{40 Regina'23}. If used, clarithromycin preferred as potentially less resistance and major D uncommon in pediatrics.^{43,44} • Doxy: lack tooth staining <8yrs, may use ≤21d;^{45 AAP'21, 46 Ravindra'23} admin: no commercially available suspension, see Geri-RxFiles. capsule (may open & mix applesauce) and tablet (may crush). • Other alternative: clindamycin 20-30mg/kg/day ÷ TID.
Azithromycin ZITHROMAX, g	10mg/kg Day 1, then 5mg/kg Days 2-5	
Doxycycline DOXYCIN, g	2 to 5mg/kg/day po ÷ BID	
*potential exceptions i.e. use <u>amoxicillin-clavulanate 1st line</u> or 2nd/3rd generation cephalosporin e.g. cefprozil, ceftriaxone if: amoxicillin in previous 30 days, history of AOM unresponsive to amoxicillin, immunocompromised. ^{2 Bugs & Drugs'23, 5 CPs'16 ('22), 6 AAP'13}		
• Controversy: concurrent purulent conjunctivitis (some suggest more likely to be due to <i>H. influenzae</i> or <i>M. catarrhalis</i> [may produce beta-lactamases → amoxicillin resistance]^{5 CPs} others suggest still likely to be <i>S. pneumoniae</i> and amoxicillin 1st line adequate^{Expert}).		

Treatment Duration: (**N** response to antibiotic **usually within 2-3 days of antibiotic treatment**)^{6 AAP'13}

Antibiotic x 5 days: uncomplicated / healthy children ≥2yrs. ^{1 Sanford'24, 3 NICE'22&'18, 5 CPs'16 ('22), 6 AAP'13, 47 Cochrane'10 (49 RCTs, n=12,045)}

Antibiotic x 10 days: <2 years of age, see [RxFiles Trial Summary: treatment in children \(6-23 months\)](#)^{48 Hoberman'16} or AOM with perforated tympanic membrane, treatment failure, recurrent AOM.^{5 CPs'16 ('22)}

Table 3. Managing Treatment Failure¹⁻⁶

(no symptomatic improvement after ~2-3 days of antibiotics)

Middle ear effusion does not equal treatment failure, ~60-70% of individuals will have persistent middle ear effusion after an episode of acute otitis media and ~90% of all cases will self-resolve by 3 months.^{49,50}

Amoxicillin	High-dose regimen (see left for dosing)	• Use if failure of standard-dose amoxicillin. ^{Expert, SK}
Amoxicillin/Clavulanate CLAVULIN , g ≥3mos: do not use 4:1 product ↑volume, AEs Dose listed as amoxicillin component	If failure of high-dose amoxicillin: Standard-dose: Amox/clav ^{7:1 ratio} 45 mg/kg/day ÷ TID x 10 days cc • Standard-dose amox/clav provides coverage of beta-lactamase positive <i>H. influenzae</i> & <i>M. catarrhalis</i> without excessive clav (associated with ↑diarrhea). ⁵¹	• Reserve when able: broader spectrum & ↑AE vs amox e.g. diarrhea (RR 1.15), yeast infection (RR 1.33).⁵¹ • Some suggest high-dose amox/clav for all failures as high-dose amoxicillin (e.g. 90mg/kg/day) overcomes some PRSP. ^{1 Sanfords'24, 6 AAP'13} In Canada, requires 2 prescriptions to create 14:1 ratio which limits total clav dose (↑diarrhea >10mg/kg/day clavulanate).^{52,53} (USA: 1 prescription as 14:1 ratio commercially available) - {❶ Amox/clav ^{7:1 ratio} 45 mg/kg/day PLUS ❷ Amoxicillin 45mg/kg/day} ÷ BID x 10 days.
Ceftriaxone ROCEPHIN, g x ▼	50mg/kg IM/IV daily x 3 days	• Role: unable to tolerate oral, fail amoxicillin/clav. • If IM: follow local policies e.g. dilute/reconstitute with lidocaine 1% (& may buffer) to ↓pain, ≥1 injection if ↑volume. ^{Expert} • May also consider cefprozil or cefuroxime, see left.

ENT referral: persistent tx failure ?tympanocentesis for culture of middle ear fluid, or middle ear effusion >3 months.

Managing Recurrence AOM incidence decreases with increasing age

- Definition: ≥3 AOM episodes within 6 months or ≥4 episodes in 12 months (with ≥ 1 episode in the past 6 months)^{2 Bugs & Drugs'23, 5 CPs'16 ('22), 6 AAP'13} No indication for prophylactic antibiotic as not effective & ↑resistance.^{1,54,55}

No antibiotic in the past 4-6 weeks	Usually amoxicillin standard or high dose x 10 days (see left for dosing).
Antibiotic in the past 4-6 weeks	Usually amox/clav x 10 days (see managing treatment failure above).

- Consider **ENT referral** as tympanostomy tubes may be explored.
- **Prevention strategies:** handwashing, breastfeeding (exclusively for 6 months), smoke avoidance, vaccination (pneumococcal, annual influenza, *H. influenzae* type b), xylitol (gum, lozenge available **OTC** ~\$10-20/month).⁵⁴

Note: AOM is uncommon in adults, if required, 1st line empiric: amoxicillin 500-1000mg TID x 5 days. ^{2 Bugs & Drugs'23, Expert}



Clinical Pearls

- Most cases **do NOT** require antibiotics as most infections are viral (~98% adult, ≥90% children) and self-limiting.
- Viral and bacterial sinusitis have similar symptoms.
 - Consider **watchful waiting** and advise on **symptomatic treatment**: analgesics, saline nasal drops/rinses, warm facial packs, decongestants, & intranasal corticosteroids.
- Patients should see a healthcare provider if symptoms **worsen after initial improvement** or are **prolonged (take >10 days to improve)** as potential bacterial etiology.
- If required, **amoxicillin** is the antibiotic of choice for **bacterial sinusitis**. Avoid macrolides if possible due to increasing resistance. See RxFiles [Beta-lactam allergy Chart](#) or SHA [Firstline](#).

Definitions / Overview

- Acute uncomplicated**: inflammation of the paranasal sinuses (sinusitis) & nasal mucosa (rhinosinusitis) for <4 weeks usually in the setting of a preceding viral URTI.⁹⁻¹⁴
 - ~12% of adults/yr develop acute sinusitis¹⁵ (females ↑~1.5x vs males; ↑45-64yrs ~15%)¹⁶ and ~7% of pediatrics/yr (more common ≥2yrs, ~50% concurrent AOM).¹⁷⁻¹⁹
 - Most cases are viral e.g. rhinovirus, influenza, adenovirus, RSV, parainfluenza virus; however, some bacterial (adults: ~0.5-2% & peds:^{21,22} ~5-10%) *S. pneumoniae*, non-typeable *H. influenzae*, *M. catarrhalis* (more common in children), other less common: *S. pyogenes* (GAS), *S. aureus*, local anaerobes (associated dental infections).
- Diagnosis** is clinical and imaging is not recommended.^{1-8,23} Distinguish bacterial from viral sinusitis based on **symptoms & their duration**. The colour of mucus should **not** be used to diagnose bacterial sinusitis (indicative of inflammation, but not of bacteria and may be present during viral).²⁴ Shaikh²³, 25 The following suggests **bacterial**:^{1-8,23}
 - Presence of symptoms**: purulent nasal discharge **AND** nasal obstruction **OR** facial pain-pressure-fullness that usually worsens when bending forward **AND**
 - Duration of symptoms**: persistent, without improvement ≥10 days **OR** sudden onset of worsening sx within 10 days after initial improvement "double sickening".
 - Acute viral sinusitis symptoms tend to improve within 7-10 days.^{5,7,8,26} Gwaltney⁶⁷ There is a **60% risk of bacterial sinusitis if symptoms >10 days**.²⁷ Gwaltney⁹²
- Note: some suggest bacterial rhinosinusitis if purulent nasal discharge & severe symptoms e.g. fever ≥39°C x 3-4 days at **beginning of illness**.^{7,10,5A}
- Acute complicated**: symptoms extend outside the paranasal sinuses & nasal cavity e.g. neurologic, ophthalmologic, surrounding soft tissue.^{9-14,23} **Symptoms for Urgent Referral to Emergency** (imaging usually required): systemic toxicity; altered mental status; severe headache; swelling of the orbit or vision changes.^{9-14,23}

An Approach to Treatment (acute uncomplicated)¹⁻⁸

- Watchful waiting** should be considered (**provide education and symptomatic care**, see Table 1 below):
 - Present with symptoms that have not worsened **OR** have had symptoms for less than 10 days, and
 - Confidence in patient's ability for follow-up (e.g. discuss antibiotic if symptoms fail to improve after 7-10d or worsen at any time).
- Patient tools**: Infographic ([RxFiles](#), [Choosing Wisely](#)), Viral Prescription Pad ([adult](#), [pediatric](#), [delayed](#)).
- Most acute bacterial sinusitis cases are **self-limiting (low risk of complications even without an antibiotic) and improve within 2 weeks without antibiotics**. *Whether treated with an antibiotic or not*:
 - Complications e.g. orbital, intracranial or soft tissue infections appear to be rare (<0.1%) in outpatients.^{50,51}
 - ~50% of adults will improve by ~7-10 days & ~70% within 2wks.⁵⁰ Cochrane¹⁸ [antibiotics - clinical improvement: adults 8 RCTs, n=1687: NNT=20/1-2wks (60% antibiotic vs 55% placebo);⁵⁰ peds 4 RCTs, n=382: OR 2 (95% CI 1.16-3.47) vs placebo).⁵¹
- It is unclear whether antibiotics shorten the duration of illness (trials report no reduction up to a 2 day reduction).⁵⁰
- ↑AE with antibiotics: adults, **NNH=9** / 1-2wks (7 RCTs: 27% vs 15% placebo);⁵⁰ peds 4 RCTs ~15% vs ~8% placebo.⁵¹

Table 1. Symptom Management

see [RxFiles OTC Products Chart](#) page 215 for more details**Non-pharmacologic**: Limited or lack of evidence to support use. Anecdotally, may help for some e.g. ↑mucus drainage.

Saline nasal drops/sprays/irrigation X ▼ OTC ²⁹⁻³⁴	- Saline: improve QOL/symptoms & ↓ use OTC meds? Most data in recurrent or chronic sinusitis. Use sterile/bottled H ₂ O.
150mL hypertonic saline nasal irrigation ^{e.g. NETI POT daily}	▪ If used with intranasal corticosteroid, admin saline first.
Steam inhalation, humidifier ²⁸ (ensure cleaning)	- SALINEX X ▼ ^{513/125mL} <2yrs: 4 drops 1-6x/d PRN, Adults: 1 spray 2-6x/d PRN
Warm facial packs	

Analgesics: Limited or lack of evidence to support use. Anecdotally, may provide pain relief for some.

Ibuprofen ADVIL , g ▼ OTC (suspension X ▼)	Acetaminophen TYLENOL , g X ▼ OTC
Peds: 5-10 mg/kg q6-8hr PRN (max 40mg/kg/day)	Peds: 10-15mg/kg q4-6hr PRN (max 75mg/kg/day)
Adults: 400mg q6-8hr PRN (max 2.4-3.2g/day) ^{~510/60tab}	Adult: 1000mg q4-6hr PRN (max 4g/day) ^{~510/120tab}

Intranasal Corticosteroids: Some suggest as an option e.g. mild-moderate and symptoms >7-10d.^{3,4,7,8,38-40} Off-label.

Fluticasone FLOINASE , g X ▼ ^{523/120 sprays} OTC : ≥18yrs	- Some suggest monotherapy ³ MUM, 4 NICE, 8 CSO-HNS or in combo to antibiotics. ³ MUM, 4 NICE, 7 IDSA Expert
≥4yrs: 1 spray (50mcg) in each nostril once daily	- A 2013 Cochrane review of intranasal corticosteroid vs placebo (3 RCTs, n=1792): symptom resolution/improvement
Adults: 2 sprays (100mcg) in each nostril once daily	73% vs 66% NNT=15 /2-3wks. ³⁵ May ↓ symptoms by ~3.5 days
Mometasone NASONEX , g ^{522/140 sprays}	(6 days vs 9.5 days). ³⁶ Dolor ⁰¹ ? dose response. ³⁷ Meltzer ⁰⁵ , 4 NICE
≥3yrs: 1 spray (50mcg) in each nostril once daily	- AE : epistaxis (use contralateral technique), ⁴¹ nasal itching/irritation.
Adults: 2-4 sprays (100-200mcg) in each nostril daily to BID	- Alt: RHINOCORT AQUA ^{522/120 sprays} ; NASACORT X ▼ OTC : ≥12yrs ^{521/120 sprays}
See RxFiles Intranasal Corticosteroid Chart pg 40 for more options.	

Decongestants: Limited / lack of evidence to support use.⁴² Cochrane^{14,43} Some suggest use,^{1-4,8} while others do not.⁷ IDSA

Xylometazoline e.g. OTRIVIN X ▼ OTC ^{58/20mL}	- Some guidelines prefer topical over oral preparations. ^{1,4,44}
≥12yrs, adults: 1-3 drops/sprays per nostril TID PRN	▪ nasal: less systemic absorption and less adverse events.
Pseudoephedrine e.g. ELTOR X ⊗ OTC ^{55/12tab many} ⊗	▪ po: Caution : CVD, BPH, diabetes; AE : insomnia, ↑glucose ↑BP. Phenylephrine nasal/po not recommended. ⁴⁵ FDA ²³
6-11yrs: 30mg po q4-6hr PRN (max 120mg/day)	- Most guidelines recommend short-term use e.g. <3 to 5 days.
≥12yrs, adults: 60mg po q4-6hr PRN (max 240mg/day)	Prolonged nasal use can lead to rebound congestion .

- Oral Corticosteroids**: most guidelines do not address or do not recommend for acute sinusitis.
 - If use, reserve for **severe** sinusitis in adults. Cochrane 2014 po steroid vs placebo/NSAID (5 RCTs, n=1043 acute sinusitis): symptom resolution/improvement 70% vs 54% but limitations e.g. heterogeneity. No benefit without concomitant antibiotic.^{48,49} Dosing e.g. prednisone 30 to 60mg po daily x 3-7 days (then stop, no taper required).
- Not recommended**: antihistamines (unless allergic component),^{1-4,8} mucolytics i.e. guaifenesin.^{2,4}

Table 2. Empiric Drug Regimens^{1-8,50-62}see [RxFiles Oral & IV Antibiotics Chart](#) page 81 for price, etc.**MILD** (symptoms <10 days or no worsening in symptoms)**No antibiotic** Mostly viral. See **Table 1** (left). Tools: [RxFiles](#), [Choosing Wisely](#), Viral Rx Pad ([adult](#), [pediatric](#), [delayed](#)).**MODERATE to SEVERE** (symptoms ≥10 days or symptoms worsens after 5-7 days "double sickening")

Amoxicillin ☺ AMOXIL , g Moxilen Forte	Peds: Standard-dose 40-45mg/kg/day ÷ TID x 7-10 days High-dose 90mg/kg/day ÷ BID x 7-10 days Adults: Standard-dose 500mg TID x 5 - 7 - 10 days* High-dose 1000mg TID x 5 - 7 - 10 days*	- Consider high-dose if ↑ risk of penicillin resistant PRSP e.g. antibiotic within 3 months, daycare, <2 years, under / unimmunized. High-dose covers most PRSP.
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PENICILLIN ALLERGY: NON-SEVERE (e.g. delayed >72 hours rash) see [Beta-lactam Allergy Chart](#) page 86, [SHA Firstline](#).

Cefuroxime CEFTIN , g ☺	Peds: 20-30mg/kg/day ÷ BID-TID x 7-10 days (max 1000mg/day) Adults: 250mg to 500mg BID x 5 - 7 - 10 days* (cc preferred)	- Some no longer recommend (↑resistance ^{2 Bugs&Drugs}), but SK, high susceptibility (~98% <i>S. pneumoniae</i> , ~95% <i>H. influenzae</i>).
Cefprozil CEFZIL , g ☺	Peds: 15-30mg/kg/day ÷ BID-TID x 7-10 days (max 500mg/day) Adults: 250mg to 500mg BID x 5 - 7 - 10 days*	

PENICILLIN ALLERGY: SEVERE (e.g. anaphylaxis, angioedema) see [Beta-lactam Allergy Chart](#) page 86, [SHA Firstline](#).

Doxycycline DOXYCIN , g	Peds: * 4mg/kg/day ÷ BID (max 200mg/day) x 7-10 days ^{*Lack of tooth staining <8yrs. ^{Rovindra²³} May use <8yrs short duration ≤21d. ^{AAP²¹}} ^{No commercial suspension, capsules may be opened & mixed with applesauce.} Adults: 200mg day 1, then 100mg BID x 5 - 7 - 10 days*	- Macrolides: an option e.g. peds, but ↑resistance in SK & other . If required, dosing pg 81.
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Table 3. Managing Treatment Failure^{1-8,50-62} no symptomatic improvement in ~3-5 days of antibiotics.**Amoxicillin** **High-dose** amoxicillin regimen (see above for dosing) **-If failure of standard-dose.** Expert

Amoxicillin / Clavulanate CLAVULIN , g Dose listed as amoxicillin component	If failure of high-dose amoxicillin: Standard-dose Amox/clav ^{7:1 ratio} 45mg/kg/day ÷ TID x 7-10d Adults: Standard-dose 500mg ^{4:1 ratio} TID x 5 - 7 - 10 days* or 875mg ^{7:1 ratio} BID x 5 - 7 - 10 days* Admin : preferred to take with food to ↑ tolerability & ↑ clavulanate absorption. ⁶⁵⁻⁶⁸	- CLAVULIN : broader vs amoxicillin, including beta-lactamase positive <i>H. influenzae</i> & <i>M. catarrhalis</i> . - 1st line empirically (high-dose) immunocompromised. - Some suggest high-dose amox/clav for all failures , pg 82.
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***5 days of therapy should be sufficient in uncomplicated, otherwise healthy, adults with less risk of harm.**

- Meta-analysis (12 RCTs, n=4430) found **no difference** in clinical success (cure or improvement of symptoms) with **short courses (3 to 7 days)** versus longer courses (6 to 10 days) of the same antibiotic. Sensitivity analysis (7 RCTs, n=2715) comparing 5 versus 10 days did not find a difference in clinical success either.⁶³ Falagas⁰⁹
- Older patients** with comorbidities were excluded from the trials, and therefore we do not have evidence to support a shorter course of therapy in this population.⁶³ Falagas⁰⁹

When should patients with sinusitis be referred to a specialist?⁹⁻¹⁴

- Recurrent Sinusitis**: ≥4 episodes of acute bacterial sinusitis/yr. Consider assessment for allergies, immunologic deficiency, or surgery. Neither antibiotics nor intranasal steroids have shown a decrease in recurrent sinusitis.
- Chronic Sinusitis**: ≥12wks of symptoms **and** evidence on physical exam (e.g. anterior rhinoscopy) or radiography. Ask about **OTC** topical nasal decongestants long-term use can lead to rebound congestion.
 - Consider intranasal corticosteroids ± saline irrigation (if used together, do saline irrigation first).⁶⁴ AFP^{17(A)}
 - Antibiotics are not recommended, but may consider if acute exacerbation.⁶⁴ AFP^{17(C)}
 - Consider Ears/Nose/Throat specialist referral if above measures fail after 3 months.

Clinical Pearls

- Pharyngitis is usually self-limiting (4-5d; up to ≤10d); **most cases do NOT require antibiotics as they are viral infections** (80-90% in adults, >70% in children).
- Scoring systems e.g. **modified Centor score**, **FeverPAIN** can help identify low risk patients who do not require diagnostic testing or antibiotics.
- For confirmed Group A Streptococcus (**GAS**) **pharyngitis, penicillin x10d (started within 9 days of symptom onset) is 1st line**. There is no documented GAS resistance to penicillin. Consider stewardship strategies e.g. delayed antibiotic pending throat swab results.
- Advise on treatments for **symptomatic relief**: e.g. NSAIDs, acetaminophen, lozenges, topical anesthetics, warm liquids, saltwater gargle.
- Patients should **see their prescriber if**: ① symptoms worsen, ② symptoms take longer than 4 to 5 days to resolve, &/or ③ unilateral neck swelling, shortness of breath or severe dysphagia develops (r/o abscess).

Overview

- Etiology: **viral 80-90% of adults (>70% of children)**; therefore, the majority do **NOT** require antibiotics; minority bacterial Group A Streptococcus (GAS); rarely other bacteria (e.g. Chlamydia, *F. necrophorum*) or fungal.
- GAS pharyngitis most common in kids 5-11 years and in winter/spring.^{CPS}
- Scoring systems e.g. **modified Centor score** (94% sensitivity; 54% specificity) can help with clinical assessment.
- Exception**: modified Centor score may not accurately predict risk during epidemics or in groups at high-risk for acute rheumatic fever / complications e.g. remote Indigenous communities, history of acute rheumatic fever, valvular heart disease, immunosuppression. Use clinical judgment & consider testing (RADT/throat swab) more broadly.
- Diagnostic tests (RADT, throat swab) and/or antibiotics **not** recommended if: ① Modified Centor score ≤1 (Table 1). ② **symptoms of viral infection** e.g. rhinorrhea, cough, oral ulcers, hoarseness.^{IDSA'12 (strong, high)} ③ **<3 years**, unless risk factors present e.g. sibling with GAS, outbreak.^{IDSA'12 (strong, moderate), CPS} ④ asymptomatic household contacts of patient with GAS pharyngitis.^{IDSA'12 (strong, moderate)}
- Positive RADT confirms diagnosis (high specificity, 88-99%). Throat swabs suggested in kids (e.g. 5-15 years^{IDSA}) & high-risk groups with negative RADT (throat swabs have ↑ sensitivity). Negative RADT acceptable in adults (low GAS incidence).
- GAS pharyngitis is often self-limiting; however, antibiotics recommended to ↓ complications, including**:
 - **Suppurative complications** e.g. peritonsillar abscess (quinsy), sinusitis, otitis media, lymphadenitis, mastoiditis.
 - **Non-suppurative complications** e.g. acute rheumatic fever, rare in Canada (0.3 cases per 100,000 children/year)^{Templeton'07} but higher in resource-poor settings (e.g. lower socioeconomic status, household crowding, limited access to health).
- Antibiotic ↓ acute rheumatic fever (RR ~70%, ARR 1%), but studies outdated & not reflective of current Canadian incidence.^{Spinks'13}

Table 1. Modified Centor (or McIsaac) Score

Criteria		Points
Temp >38°C (>100.5 °F) oral temp		1
Absence of cough		1
Swollen, tender anterior cervical nodes		1
Tonsillar swelling or exudate		1
Age 3 years to 14 years		1
Age 15 to 44 years		0
Age ≥45 years		-1
Score	Risk of GAS	Suggested Management
-1 to 0	1 - 2.5%	Symptomatic tx. No RADT, swab, or antibiotic needed.*
1	5 - 10%	
2	11 - 17%	RADT or throat swab. If GAS positive ⇒ antibiotic. <i>Using a cutoff of 3 is recommended by some to ↓ false positives. Expert</i>
3	28 - 35%	
4+	51 - 53%	

*See exceptions in Overview section

An Approach to Treatment

- Most cases do **NOT** require antibiotics due to viral etiology. Advise on symptomatic management (see Table 2).
- Strategies**: watchful waiting (e.g. 4-5d), delayed ABX (await throat swab results), empiric ABX (stop if throat swab negative).
- Use validated clinical decision tool (see Table 1) to determine risk of GAS infection. **If ≥2, RADT or throat swab**. Patients with a **positive throat swab should receive an antibiotic** (Table 3) to decrease risk of complications.
- The turn-around-time for throat swab results can take a few days. Antibiotics **started within 9 days of symptom onset and given for 10 days** in confirmed GAS will help prevent rheumatic fever (see).^{Casey'05, BMJ'19}

Table 2. Symptom Management

ANALGESICS		see RxFiles OTC Products Chart page 215 for more details
	NSAIDs e.g. Ibuprofen ADVIL, g ▼ OTC Peds: 5-10 mg/kg po q6-8hr PRN (susp X ▼) (max 40mg/kg/day) Adults: 400mg q6-8hr PRN (\$7/50 tabs g) (max 2.4-3.2g/day)	- Reduce fever. - Ibuprofen decreased associated pain more than acetaminophen and placebo. ^{Gehanno'03} - Alternative: Naproxen, g prescription, susp & tab; on SPDP, ▼ ALEVE, g X ▼ OTC : ≥12 years (\$12/100 tab g) -Peds, >2yrs: 5-7mg/kg/dose q8-12hr (max 1g/day) -Adults: 220-500mg BID (max=1-1.5g/day)
	Acetaminophen TYLENOL, g X ▼ OTC Peds: 10-15mg/kg po q4-6hr PRN (max 75 mg/kg/day) Adults: 1g q4-6hr PRN (max 4g/d) (\$8/120 tabs g)	
LOCAL AGENTS	Benzocaine CEPACOL, CHLORASEPTIC X ⊗ OTC 10mg lozenge q2hr PRN (\$6/18 lozenges)	- Alleviates throat pain if used frequently. ^{Chrubasik'12} - Avoid in peds: choking & methemoglobinemia risks. - Alternative: hard candy e.g. HALLS, honey (>1 year)
	Phenol CHLORASEPTIC X ⊗ OTC 5 sprays q2hr PRN (\$15/177 mL)	- No evidence, but anecdotally may provide relief from associated pain.
RINSES	Warm liquids e.g. tea, warm saltwater gargle (recipe: ¼ to ½ tsp salt per 240mL warm water)	- Little evidence, but anecdotally provide relief from associated pain/discomfort.
	Benzylamine, PHARIXIA, g X ⊗ 15mL gargle/rinse q1.5-3hr PRN (\$38/250mL)	

Systemic corticosteroids (dexamethasone 10mg adults or 0.6mg/kg pediatrics oral x 1 dose) **not recommended for symptom management**; ^{NICE'18, IDSA'12 (weak, moderate)} however, **opinions vary**. Shared decision making may be used to consider corticosteroids in select cases. ^{BMJ'17 (weak), AFP'23}

- Oral/IM corticosteroids x1-2 doses have been shown to decrease pain vs placebo (**NNT=5**) but have **no effect on clinical course or days missed from school/work**. No difference in adverse events (but poor reporting).
- Caution**: there is concern that corticosteroids may mask possible underlying complications in children. ^{Cochrane'20 (9 RCTs, n=1319), Chiappini'17}

Management of Chronic GAS Carriage and Recurrent GAS Pharyngitis: antibiotics **not** routinely recommended for chronic GAS carriers (unlikely to transmit infection, low risk for complications).^{CPS}
For high-risk patients, eradication therapy (e.g. amoxicillin-clavulanate, clindamycin) may be considered.

Table 3. Empiric Drug Regimens

see [RxFiles Oral & IV Antibiotics Chart](#) page 81 for available products, price, etc.

FIRST LINE		
No antibiotic	Mostly viral. Antibiotics only in confirmed bacterial pharyngitis. Choosing Wisely See Table 2.	
Penicillin V PEN-VK, g	Peds: ≤27 kg: 300mg po BID or TID x10 days <i>No commercially available suspension</i> ≥27kg or Adults: 300mg TID or 600mg BID x10 days	- 1st line due to narrow spectrum, efficacy, safety & low cost. - No documented resistance to GAS . - Admin: preferred when given on an empty stomach ↑ absorption.
Amoxicillin AMOXIL, g ☺	Peds: 40-50mg/kg/day ÷ BID x10 days (max 1g/day), or 50mg/kg/day daily x10 days (max 1g/day) ^{CPS} Adults: 500mg BID x10 days	- Compared to penicillin: ① broader spectrum ↑ selective pressure, ② as effective, ③ liquid more palatable for peds ④ if mononucleosis, may cause skin rash.
PENICILLIN ALLERGY: NON-SEVERE (e.g. delayed >72h rash) see Beta-lactam Allergy page 86, SHA Firstline . Consider oral penicillin or amoxicillin direct challenge/de-labeling and patient education.		
Cephalexin KEFLEX, g	Peds: 25-50mg/kg/day ÷ BID or QID x10 days (max 1g/day) Adults: 250mg QID x10 days, or 500mg BID x10 days	- 1 st generation (cephalexin, cefadroxil) preferred over 2 nd gen (cefuroxime, cefprozil) due to narrower spectrum. - Alternatives: Cefuroxime CEFTIN, g Peds: 20mg/kg/day cc ÷ BID x10 days (max 500mg/day) Adults: 250mg BID cc x10 days Cefprozil CEFZIL, g Peds: 15mg/kg/day ÷ BID x10 days (max 500mg/day) Adults: 250mg BID x10 days
Cefadroxil DURICEF, g	Peds: 30mg/kg daily or ÷ BID x10 days (max 1g/day) <i>No commercially available suspension</i> Adults: 500mg BID x10 days, or 1000mg daily x10 days	
PENICILLIN ALLERGY: SEVERE (e.g. anaphylaxis, angioedema) see Beta-lactam Allergy page 86, SHA Firstline . Only use in confirmed GAS & serious reaction to penicillin, due to ↑ resistance ^{SK'23 ~7% to 18%} & AE e.g. C. difficile .		
Clindamycin DALACIN C, g	Peds: 20-30mg/kg/day ÷ TID x10 days (max 900mg/day) Adults: 300mg TID x10 days	Macrolide considerations : - Clarithromycin x10 days superior to azithromycin x5 days for bacterial eradication (NNT=9) in adults, but equivalent for clinical cure. ^{Kaplan'01} - Azithromycin : no head-to-head trials of 3d vs 5d; both provide same total dose over course of tx (i.e. 60mg/kg; 1.5g). There is some uncertainty whether 3-5d of azithromycin is sufficient to ↓ ARF risk.
Clarithromycin BIAXIN, g	Peds: 15mg/kg/day ÷ BID x10d (max 500mg/day) Adults: 250mg BID x10 days	
Azithromycin ZITHROMAX, g	Peds: 12mg/kg/day daily x5 days, or 20mg/kg/day daily x3 days (max 500mg/day) Adults: 500mg Day 1, 250mg x Days 2-5, or 500mg daily x3 days	

Clinical Pearls

- **Antibiotics are NOT recommended, as acute bronchitis is predominantly viral.**
 - Advise on therapies that will provide **symptomatic relief**: maintaining hydration, increase humidity; honey may help in those ≥ 1 year. **Antitussive or expectorant** may be considered $\geq 6-12$ years (mixed data, ? ↓ coughing episodes). Role of **inhaled bronchodilators** e.g. beta-2 agonist is mainly in those with underlying airway disease e.g. asthma.
 - Oral or inhaled corticosteroids are not recommended unless concomitant asthma.
- Patients should **see their prescriber** if: ① symptoms worsen, ② new symptoms develop (e.g. dyspnea, fever, vomiting), ③ cough >1 month, or ④ >3 episodes per year.

Overview¹⁻¹²

- Bronchitis is a lower respiratory tract infection of the bronchi consisting of **persistent cough** ± sputum production, mild wheezing or dyspnea. Symptoms typical of a common cold (e.g. headache, nasal congestion, sore throat) may be present if preceding/coinciding upper respiratory tract infection.
- **Acute**: self-limiting, **cough** usually lasts for **1 to 3 weeks (median 18 days)**,¹³ up to **25%** will have a cough **beyond 3 weeks** as airway hyperactivity may last up to **6 weeks**.^{14,15}
 - **Incidence**: ~5% of adults per year will develop acute bronchitis, ~12% of those age <5 yrs per year.¹⁶
 - **Etiology**: **$\geq 90\%$ of cases are viral** e.g. *Influenza A or B*, *Parainfluenza*, *Respiratory Syncytial Virus (RSV)*, *Adenovirus*, *Coronavirus*; minority bacterial e.g. *B. pertussis*, *M. pneumoniae*, *C. pneumoniae*.
- **Chronic**: cough usually lasts ≥ 3 months (note - usually current/former smokers).
- Diagnosis of acute bronchitis is clinical (history and physical exam).¹ Differential diagnosis tips:
 - Rule out **pneumonia** with chest x-ray if the following: heart rate >100 bpm, respiratory rate $>24-30$, oral temp $>38^\circ\text{C}$ (mental status/behavioural changes in those who may not mount a fever e.g. older adults), or findings of local consolidation on physical exam.
 - Also consider pertussis, COVID-19, influenza, or other respiratory viruses. Treat with an antimicrobial if appropriate see RxFiles Charts: [Community Acquired Pneumonia](#) page 116, [Common Infections](#) page 96, [COVID-19](#) page 122, [Influenza](#) page 90. See Q&A (right) for bronchiolitis.
 - Coloured sputum does not reliably differentiate between bacterial / viral origin. [Choosing Wisely](#) Observational study of $n=241$ pts with acute cough found positive likelihood ratio 1.46 (indicating minimal increase in the likelihood of bacterial infection given coloured sputum).¹⁷ Theory: WBC release of peroxidases → coloured sputum.
- Those with complicating factors (e.g. smoking, impaired lung function - COPD, asthma, chronic heart disease, immunocompromised) may require further investigations (e.g. lung function tests, chest x-ray).

An Approach to Treatment¹⁻¹²

- **Reassurance & symptom management** (see Table 1) are the cornerstones of care. **Tools**:
 - RxFiles Viral Prescription: [adult](#), [pediatric](#)
 - RxFiles Clinic Bronchitis Poster "[Gone Viral](#)"
 - CDC Patient Handout "[Preventing & Treating Bronchitis](#)"
 - [Choosing Wisely in Primary Care](#): "don't prescribe antibiotics for bronchitis"
- **Antibiotics are not recommended** for acute bronchitis (no/minimal benefit, ↑ **AE**).^{1-5, [Choosing Wisely](#)}
 - A 2017 Cochrane review (17 RCTs, $n=5099$) of **antibiotic vs placebo** found at 14 days:¹⁸
 - **No difference in clinical improvement** ~73% vs ~66% (RR 1.07, 95% CI 0.99 to 1.15)
 - **↓ mean cough duration by ~0.5 days** (95% CI -0.87 to -0.04 days)
 - **↑ **AE**** e.g. N/V/D, headache, rash, vaginitis ~23% vs ~19% **NNH=25** (RR 1.2, 95% CI 1.05 to 1.36)
 - A prospective cohort study ($n=28,779$) found **low risk of hospital admission/death** in those ≥ 16 years with lower respiratory tract infection after initial assessment whether prescribed immediate antibiotic (0.9%), delayed antibiotic (0.4%), or no antibiotic (0.3%).^{19 Little '17}
 - A retrospective cohort study ($n=749,389$) found the **risk of developing pneumonia** after acute bronchitis was low in those 0-64 years: 0.25% (antibiotic treatment) vs ~1.2% (no antibiotic). However, the risk for those ≥ 65 yrs was higher: 1.5% (antibiotic treatment) vs 4% (no antibiotic) and these individuals may warrant closer follow up post-acute bronchitis episode.^{Petersen '07}

Table 1. Symptom Management¹⁻¹²

Other options: throat lozenges **HALLS**, hot tea, etc

Non-pharmacologic: Limited or lack of evidence to support use. Anecdotal, can help for some.	
Hydration ^{20,21}	- Hydration: caution in heart failure or chronic kidney disease.
Humidity	- e.g. PRN to maintain 30-50% humidity; clean frequently ↓ bacteria/fungi.
Honey 2.5 to 10mL po HS PRN Available in products but likely subtherapeutic dose <1yrs: not recommended (botulism concerns)	- A 2021 Systematic review of people with URTIs (majority peds) found honey superior vs usual care for cough frequency & severity (4-6 RCTs, $n \sim 450-600$) but ?clinical superiority. No difference vs dextromethorphan (2 RCTs, $n=137$). ^{22 BMJ '21, 23, 24}
Antitussive : Limited/mixed evidence. Some suggest may use, ³⁻⁵ others do not. ^{1,2} See OTC chart pg 215.	
Dextromethorphan (DM) BENLYN DM \$11/250mL X OTC ROBITUSSIN DM \$11/250mL; \$11/20 gel caps X OTC Be aware of many combo products	- ?may ↓ coughing episodes, but duration of illness limited data. ²⁵ Cochrane ¹⁴ ?reserve HS if sleep issues. ?↑ AE e.g. GI, dizziness. ^{2 NICE} - CI : <6 yrs, safety & efficacy concerns. ²⁶ Health CDN (check, some only ≥ 12 yrs). - DI : serotonergic, avoid MAOIs. Other antidepressants: monitor for sx given short DM duration RxFiles Antidepressant Dis Chart .
Expectorant : Limited/mixed evidence. Some suggest may use, ² others do not. ¹ See OTC chart page 215.	
Guaifenesin X OTC \$6/100mL "Mucous & Phlegm" Be aware of many combo products	- ?may ↓ number of coughing episodes, other studies found no benefit. ²⁵ Cochrane ¹⁴ ?more beneficial if excess mucus. ²⁷ Albrecht, Expert - CI : <6 yrs, safety & efficacy concerns. ²⁶ Health CDN (check, some only ≥ 12 yrs).
Bronchodilators : Not for routine use, ¹ questionable benefit, potential AE , carbon footprint. Some suggest <i>not offering unless underlying airway disease</i> e.g. asthma. ^{2 NICE} Others indicate <i>may consider</i> e.g. if long-lasting cough, especially if dyspnea or wheezing. ³⁻⁵ See RxFiles Asthma Chart page 206.	
Salbutamol VENTOLIN, g 100mcg 2 puffs TID-QID ^{\$17/device} Terbutaline BRICANYL 500mcg 1 puff TID-QID ^{\$22/device} <i>Clinical trials dosing was scheduled, but may consider PRN</i>	- A 2015 Cochrane review of beta-2 agonist (most po) vs placebo: ²⁸⁻³⁰ ▪ No benefit for cough among adults (3 RCTs) or children (2 RCTs). ▪ AE (1 RCT, $n=73$ adults): ↑ tremor ± palpitations over 7 days (49% inhaled fenoterol vs 0% placebo).³¹ Melbye⁹¹ ▪ Subgroup with wheezing/airflow obstruction (1 RCT, $n=35$ adults): potential benefit; ↓ average total symptom score, days 2-7 (54% fenoterol vs 32% placebo, NNT=5).³¹ Melbye⁹¹
Ipratropium ATROVENT 20mcg 4 puffs QID ^{\$32/device} Ipratropium + Salbutamol COMBIVENT 20/100mcg 1 puff QID ^{\$43/device}	- Limited data . URTI post-infectious cough, ?daytime & nighttime improvement (1 RCT, $n=14$ x 3 weeks using inhaler; ³² Holmes '92 1 RCT, $n=92$ x 10 days using nebulas with concomitant salbutamol ³³ Zanasi ¹⁴).

Not recommended for symptom management:¹

- **Oral or inhaled corticosteroids** are not recommended in patients with acute bronchitis *without asthma*.^{2,5} Post-infectious cough: 2 RCTs, $n=163$ with cough 3-8 weeks, placebo improved cough scores at 2 weeks by ~50% and inhaled corticosteroids improves score by ~2-13% more.³⁴ TFP²²
- **Codeine syrup** 5mg/mL \$40/500mL; 3.3mg/5mL \$10/100mL is not recommended in patients with acute bronchitis.^{2 NICE '19} While reductions in cough have been found, there is **no difference between codeine syrup (120mg/d) vs non-medicated syrup**.³⁵ Eccles^{92,36,37} Anecdotal can help by ↑ drowsiness HS.
- **N-acetylcysteine** is not recommended in patients with acute bronchitis.^{2 NICE '19} 6 RCTs, $n=497$: found a reduction in cough at seven days but questionable clinical benefit and no benefit at 28 days compared to placebo (very low quality evidence).³⁸ Cochrane 2013

Encourage prevention strategies e.g. smoking cessation & avoid secondhand smoke see [RxFiles Smoking Cessation](#) page 212, avoid exposure to chemicals/dust/air pollution, ensure vaccines are up to date, see [RxFiles Vaccines](#) page 91 e.g. influenza, RSV, COVID-19, pertussis, pneumococcal, haemophilus.

Q&A: Is bronchiolitis the same as bronchitis? Bronchiolitis is a lower respiratory tract infection of the bronchioles (more distant, smaller airways) caused by viruses in **children <2 years (and usually <1 year)**. Supportive care is the mainstay of therapy. Antibiotics are not recommended.³⁹ [Choosing Wisely Bronchiolitis: Less is Best](#), 40 Lirette CFP²³, 41 Greenky CFP²²

Clinical Pearls

- Demographics:** ~10% of the population will report a penicillin allergy, but <1% are truly allergic. Over-reporting leads to poor patient outcomes. Thus, there is potential to reassess potential allergies in low-risk patients and de-label when appropriate.
- Avoid classifying common side effects as "allergy"** to proactively prevent incorrect pen allergy labeling.
- β-lactam hypersensitivity (HSR) wanes with time:**^{1,5} ~60% loss of HSR at 5 years for cephalosporins, & ~80% loss of HSR at 10 years for penicillin^{per skin tests}.
- Rashes coinciding with viral infections in childhood**, are often non-allergic in nature e.g. maculopapular.
- Risk Calculator/De-labeling Tools** (see below) are useful for assessing a previously reported β-lactam "allergy", identifying those at low-risk based on risk stratification, & who may be suitable for de-labeling.
 - SHA Firstline Penicillin Allergy De-labeling Tools**⁸
 - PEN-FAST**-adults⁹ c) **1-1-1-Criterion**¹⁰
- Patient Tools:** **JAMA Peds: Allergy De-labeling**¹¹ SHA Poster: **"Do you actually have a pen allergy?"**
- Penicillin-Cephalosporin Cross-reactivity** is now estimated at 1-2%. Agents with dis-similar side chains will be even less likely to cross-react.^{1,12}

Introduction:

Beta-lactams, especially penicillins, are often implicated in hypersensitivity reactions (HSR). **Such allergies are over-reported, resulting in poor outcomes** e.g. treatment failures, ↑ use of less effective 2nd line or broad spectrum antibiotics, ↑ adverse events (~25% ↑ in *C. diff* infections vs those without³⁵), & antibiotic resistance (~18% ↑ VRE, ~40% ↑ MRSA³⁶).^{5,7,13,14,33} **In pen/amox allergy, do not order non beta-lactam without an appropriate evaluation.** [ChoosingWisely20](#)

Definitions, Classifications, and Additional Info:

- Beta-lactams:** antibiotics with a distinctive beta-lactam ring (i.e. penicillins, cephalosporins, carbapenems, & monobactams). Although an allergy may occur to the beta-lactam ring, most true IgE mediated allergies are likely due to the unique side chain (e.g. R1), with cross-allergy only to specific agents (See Table 1).
- IgE:** immunoglobulin type E antibody. After encountering a specific allergen, IgE can trigger an immediate (<1hr) or accelerated (~<6hr) immune response.
- De-labeling:** removal of an allergy label from a patient's medical records (**facilitated by: reaction history +/- direct challenge +/- skin test + patient education**)
 - Direct De-label:** If allergy assessment indicates no true allergy, and no increased risk of a severe reaction, a β-lactam may be given along with de-labeling.¹⁵
 - Direct Challenge:** A drug is administered to determine tolerance (often without prior skin testing).^{1,7,8,26,27} It is **suitable for low-risk patients** and done in a setting where patient can be observed for ~30-60 minutes in case of rare anaphylaxis (i.e. in an office/clinic with access to epinephrine). If there is no IgE-type immediate hypersensitivity reaction during observation, and no delayed reaction on follow-up (e.g. after ~5 days), the allergy label may be removed. For a **1-step challenge**, typically amoxicillin is used [500mg x 1 (adult) or 15-30mg/kg x1 (child; chewable tab 125-250mg option)]. For a cautious **2-step graded challenge**, a small dose of the potential allergen (e.g. 10-25% of a full dose)⁷ is given, followed by the balance of, or full dose, ~20-60 min later.¹⁶ [In the inpatient setting, an inappropriate penicillin allergy label resulting in use of vancomycin or clindamycin may result in suboptimal outcomes, e.g. clinical failure, *C. difficile* infection, acute kidney injury, etc. Often a β-lactam can be used. Take advantage of setting to direct-challenge, monitor, and de-label when possible.^{17,18}]
 - Penicillin skin-testing:** pricking the skin with a minute quantity of penicillin; if a localized reaction not observed, an IgE-mediated allergy is unlikely. It is suggested primarily for patients with history of a possible IgE-mediated Type I reaction (e.g. immediate anaphylaxis, or immediate onset urticaria/hives).

Table 1: Oral beta-lactam groups with identical/? similar R1 side chains & a higher risk of cross-reaction:^{1,12,23} (Immediate cross-reactivity HSR related to R1 sidechain)

Amoxicillin: cefadroxil, & cefprozil; ?cephalexin	Ampicillin: cephalexin; ?cefadroxil, ?cefprozil	See cross-reactivity resource links below.
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Of note: **cefazolin** has a unique side chain dissimilar to all other beta-lactams; it can safely be used in patients reporting a penicillin allergy/anaphylaxis.^{1,12,19}

Table 2: Classification of Adverse Drug Reactions that May Be Reported as "Penicillin/Beta-lactam Allergy":

Adverse Drug Reactions - NON-IMMUNE		Common Features/Presentation		Considerations for Risk Stratification, Management and/or De-labeling
Non-severe, non-immune		Predictable	Side effects: isolated nausea, vomiting, diarrhea, headache	
Adverse Drug Reactions - IMMUNE-MEDIATED		Common Features/Presentation (Use tools, see Firstline or PEN-FAST below and/or guideline recommendations to guide course of action)		
Type I	Immediate; Usually ≤30-60 minutes (up to 6 hrs)	IgE-mediated True Allergy	Urticaria/hives, see photos angioedema, anaphylaxis, bronchospasm; assess for risk of severe anaphylaxis with re-exposure; risk wanes such that ~80% will not react after 10 years Ig ↓ over time	
Type II	Delayed; usually after	IgG-mediated or other (non-IgE); onset >7days T-cell mediated, or other (non-IgE)	Cytotoxic: blood cell dyscrasias (e.g. hemolytic anemia, thrombocytopenia); onset hours-days	Risk stratification guides management: Firstline tool/app helps guide options. If history = high-risk/severe (severe cutaneous SCARs, or organ involvement, often requiring ER visit/ hospitalization, Type II & III) do not administer a β-lactam. See below re "SSLR*..." If history = low-risk reactions (delayed onset, no systemic symptoms; mild, not involving blistering of skin or mucous membranes), may consider a direct challenge.
Type III	several days - weeks		Rare! If suspicion, high risk; not for rechallenge!	
Type IV	> 72hrs		Low-risk: maculopapular exanthema see photos ; High-risk: severe systemic &/or cutaneous symptoms, etc (e.g. DRESS, SJS/TEN; pustular exanthema)	
Other: a) Family Hx of allergy (no association of family hx with individual allergy), or b) Same antibiotic taken again tolerated				Not a true allergy; a β-lactam can be given along with direct de-labeling; ⁷ address fears.

Table 3: Tools to Assess Risk of True Penicillin (Beta-lactam) Allergy and Evaluate for Possible De-labeling:

SHA Firstline: Penicillin Allergy De-labeling App	PEN-FAST: an Allergy Decision Rule (for adults only) ^{9,22,28} PALACE	1-1-1 Criterion in Urticaria for Risk Stratification; β-Lactam Allergy ¹⁰
App/online guideline to aid in assessing & managing patients with suspected or proven beta-lactam allergy. Includes: assessment tool, risk categories, algorithms, oral challenge protocol, what to do with the po challenge result, photo gallery of dermatological reactions, etc. (adult - SHA , children - BC Children's , CHEO)	PEN = Penicillin allergy reported (if yes, continue...) F = ≤ Five years since reaction or interval unknown (2 points) A,S = Anaphylaxis, Angioedema, or Severe cutaneous reaction (2 points) T = Treatment was required for the allergy (1 point) Score: 0=very low risk (<1%), 1-2=low risk (5%), 3=moderate risk (20%), 4-5=high (50%)	1) Did the urticaria develop after the first dose ? 2) Did the urticaria develop ≤ 1 hour of inciting dose? 3) Did the urticaria resolve within 1 day of stopping? If three "yes" answers: patient has a 90% positive predictive value for probable β-lactam allergy (ie. high-risk). ¹⁰ (adult & child)

How likely is a beta-lactam allergy?

10,000	In a given group of 10,000 patients...
<1,000 (<10%)	⇒ will report they have a penicillin allergy, ⁴
<100 (<1%)	⇒ will have a true IgE-mediated penicillin allergy, ⁶
1-3 (<0.03%)	⇒ will have some cephalosporin cross-reactivity, ²⁰
1 (<0.01%)	⇒ will have anaphylaxis when given penicillin. ^{5,21}

***SSLR=serum sickness like reactions:** are more common than the other serious reactions listed; they generally, occur after 7-10 days of therapy and relate to immune complexes of IgG. Symptoms include urticarial vasculitis, and joint pain. Skin testing not helpful. Challenges & desensitization contraindicated!!!
Cephalosporin allergy: similar to penicillins; less studied. **Cross-reactivity Resources:** 1) [Bugs & Drugs](#) 2) [Firstline](#) 3) [Zagursky et al](#)¹² 4) [UNMC](#) 5) [CSACI 2020](#)¹
- Cross-reactivity data: Cephalosporin and penicillin cross-reactivity rate was thought to be up to 10%; however, the true rate is likely 1-2%.^{3,7} In general, a cephalosporin can be given if history of **non-severe (non-anaphylactic) pen-allergy**.⁷ If non-anaphylactic ceph-allergy, consider direct challenge with cephalosporin with dissimilar side chain.⁷ Evidence suggests that **carbapenems** have ~1% cross-reactivity with penicillins, & are appropriate in pen-allergies any time a cephalosporin could be prescribed.¹⁶ **Cefazolin IV: unique side-chain; no cross-allergy**; see above. Aztreonam IV: see [online extras](#).
Skin tests in SK are available via referral (but currently ~2+ year wait, if routine²⁰²⁴). Option for questionable severe IgE allergy history.

In patients with a history of **low-risk reactions** (delayed onset, not accompanied by any systemic symptoms, and not involving blistering of skin or mucous membranes), one may consider treatment with a beta lactam using a test dose direct challenge) approach.

Abbreviations: AAAAI/ACAAI=American Academy of Allergy, Asthma and Immunology; American College of Allergy, Asthma and Immunology **DRESS**=drug reaction with eosinophilia and systemic symptoms **HSR**=hypersensitivity reaction **Ig**=immunoglobulin **SCARs**=severe cutaneous adverse reaction **SHA**=Saskatchewan Health Authority **SJS**=Stevens-Johnson syndrome **SSLR**=serum sickness like reactions **TEN**=toxic epidermal necrolysis **VRE**.

Antibiotic Formulations for AOM & Other Common Respiratory Infections

Marlys LeBras BSP PharmD www.RxFiles.ca/antibiotics Nov 2024

For more information see [RxFiles Oral and IV Antibiotic Drug Chart](#). Dosing recommendation also available via [SK Antimicrobial Stewardship](#) & Firstline (app or [JPCH](#) or [SHA](#)).

Generic/TRADE	Formulations	Comments	Dosing suspension \$: assumes 10kg & 20kg child	\$/5day
Penicillins: Binds to penicillin binding proteins on bacterial cell walls, inhibiting cell wall biosynthesis. Bactericidal. Demonstrates time-dependent killing.				
Penicillin V Potassium  PEN-VK, g	 no commercially available suspension (~\$80 if compounded) tab: 300mg ^c (480,000 unit) <i>(tab scored & may be crushed)</i>	 -Drug of choice for GAS pharyngitis (if antibiotic required)*. ¹ CPS ²¹ ↓ selective pressure on other bacteria vs amox. -Preferred, 1hr before food ↑ absorption. ²	≤27kg: 300mg po BID ac or 300 mg po TID ac ≥27kg: 300mg po TID ac or 600mg po BID ac *for GAS pharyngitis, dose for 10 days to prevent rheumatic fever (\$16-21). ¹ CPS ²¹	\$13-15 ^{tab} \$15-16
Amoxicillin AMOXIL, g  Moxilen Forte amoxicillin = amox	suspension: 25mg/mL, 50mg/mL *  (strawberry, banana, sugar-free, berry) chew tablet: 125mg, 250mg (cherry) capsule: 250mg, 500mg <u>Why standard BID dosing for Group A Streptococcus (GAS) pharyngitis?</u> GAS is an easier bacteria to kill than <i>S. pneumoniae</i> , which is the main AOM/sinusitis pathogen so BID is adequate.	-Drug of choice for AOM or acute sinusitis (if antibiotic required). ³ CPS ^{16, 4} -Narrower spectrum (less selective pressure on other bacteria) & fewer AE e.g. diarrhea, yeast infection than amoxicillin/clavulanate. ⁵ Savage ²³ -Standard dose: for most individuals. -High dose: for those with risk factors <i>S. pneumoniae</i> resistance i.e. daycare, <2 years, under / unimmunized, or antibiotics within previous 3 months.	Peds standard-dose: 40 to 50mg/kg/day po ÷ TID AOM, sinusitis 40 to 50mg/kg/day po ÷ BID-TID GAS pharyngitis 50mg/kg/day po once daily GAS pharyngitis, ¹ CPS ²¹ Peds high-dose: select AOM patients (see left) 80 to 90mg/kg/day ÷ BID-TID (max 4g/day) Adult (≥16 years)^{expert} standard-dose: 500mg po TID AOM, sinusitis 500mg po BID GAS pharyngitis Adult^{≥16yrs} high-dose: 1000mg TID AOM, sinusitis	\$14-17 \$14-17 \$14-17 \$17-22 \$13 \$12 \$15
Amoxicillin / Clavulanate CLAVULIN, g  amoxicillin = amox clav = clavulanate	susp: 25mg / 6.25mg/mL (4:1) * 50mg / 12.5mg/mL (4:1) * 40mg / 5.3mg/mL (7:1) * 80mg / 11.4mg/mL (7:1) * (raspberry-orange) tab: 250mg / 125mg (2:1) 500mg / 125mg (4:1) 875mg / 125mg (7:1) Canada: no commercially available 14:1 USA  commercially available 14:1 AUGMENTIN	-Reserve for treatment failure to 1 st line agent in AOM or acute sinusitis (if antibiotic required). ³ CPS ^{16, 4} CSO-HNS ¹¹ -Broader spectrum & ↑ AE e.g. diarrhea (RR 1.15), yeast infection (RR 1.33) compared to amox. ⁵ Savage ²³ -≤3 months of age: use 4:1 ratio (limited data with 7:1 ratio). ⁶ Expert -Preferred max clav ≤10mg/kg/day ^{peds} & 125mg/dose ^{adults} to ↓ AE diarrhea. ⁶⁻⁹ -Preferred to take with food (cc) ↑ tolerability & ↑ clav absorption. ⁶⁻⁹	Peds standard-dose: Amox/clav ^{7:1 ratio} 45mg/kg/day ÷ TID cc Peds high-dose: requires 2 prescriptions ^{14:1 ratio} { 1 Amox/clav ^{7:1 ratio} 45mg/kg/day PLUS 2 Amoxicillin 45mg/kg/day ÷ BID-TID cc Adult (≥16 years)^{expert} standard-dose: 500/125m ^{4:1 ratio} g po TID cc or 875/125mg po BID cc high-dose: { 1 Amox/clav 875mg ^{7:1 ratio} BID cc PLUS 2 Amoxicillin 1000mg BID } ^{sinusitis}	\$25-40 \$39-57 \$17 \$17 \$30
Sample Prescription⁶ (recurrent AOM, 22 months therefore 10 day duration, high-dose due to patient risk factors for <i>S. pneumoniae</i> resistance e.g. daycare) CLAVULIN 14:1 420mg po BID-TID x 10 days (90mg/kg/day; patient weight 14kg) <u>Please provide:</u> CLAVULIN 7:1 suspension 210mg po BID-TID AND Plain amoxicillin 210mg po BID-TID <i>Give both CLAVULIN and plain amoxicillin together for each dose two to three times daily</i>				
Cephalosporins: Binds to penicillin binding proteins on bacterial cell walls, inhibiting cell wall biosynthesis. Bactericidal. Demonstrates time-dependent killing. Role: Consider in individuals with a non-severe penicillin allergy (e.g. delayed >72 hour rash) when penicillin/amoxicillin allergy de-labelling is not appropriate/feasible. See RxFiles Beta-lactam Allergy Chart page 6, Saskatchewan Health Authority (SHA) Firstline for further information and de-labelling algorithms/tools.				
Cephalexin KEFLEX, g 	suspension: 25mg/mL, 50mg/mL *  (orange-banana) tablet: 250mg, 500mg	-1st-generation cephalosporin. -Alternative for GAS pharyngitis . Both BID & QID dosing approved. ¹⁰ HealthCDN	Peds: 25 to 50mg/kg/day po ÷ BID or QID (max 1g/day) Adult: 250mg po QID or 500mg po BID	\$17-39 \$12
Cefadroxil DURICEF, g 	no commercially available suspension capsule: 500mg	-1st-generation cephalosporin. -Alternative for GAS pharyngitis . Both daily & BID dosing approved. ¹¹ HealthCDN	Peds: 30mg/kg/day po once daily or ÷ BID (max 1g/day) Adult: 500mg BID or 1000mg po once daily	\$15 ^(500mg cap once daily) \$20
Cefuroxime axetil  CEFTIN, g	suspension: 25mg/mL *  tablet: 250, 500mg	-2nd-generation cephalosporin. -Preferred to take with food ↑ absorption (~52% vs ~37% fasting). ¹² -Alternative for AOM or acute sinusitis .	Peds: 20 to 30mg/kg/day po ÷ BID cc (max 500mg/d) Adults: 250mg po BID cc or 500mg po BID cc	\$20-30 \$20 \$28
Cefprozil CEFZIL, g 	suspension: 25mg/mL, 50mg/mL *  (bubblegum) tablet: 250, 500mg	-2nd-generation cephalosporin. -Alternative for AOM or acute sinusitis . -suspension ~\$5-10 less vs cefuroxime.	Peds: 15 to 30mg/kg/day po ÷ BID (max 500mg/d) Adults: 250mg po BID or 500mg po BID	\$14-21 \$29 \$32
Ceftriaxone ROCEPHIN, g 	vials for injection: 1g, 2g	-3rd-generation cephalosporin. -Alt for tx failure AOM / acute sinusitis .	Peds: 50mg/kg IM/IV daily ^{AOM (x3 days), sinusitis (x10 days)} <i>If IM, diluted/reconstituted with lidocaine 1% to ↓ pain. Expert</i>	\$75
Other: Role: Reserve for those with a severe penicillin allergy - Doxycycline: AOM, sinusitis; Clindamycin: GAS pharyngitis ^{↑ resistance 13,14} . Beta-lactam Allergy pg 6, SHA Firstline .				
Doxycycline DOXYCIN, g	no commercially available suspension (~\$60 if compounded, full benefit NIHB & SPDP <15yrs - <\$25) cap: 100mg (may open & mix with applesauce) ¹⁵ tab: 100mg (may crush, see Geri-RxFiles for tips) ¹⁵	-Greater absorption on empty stomach (↑20%), but may take with food to ↑ tolerability. ¹⁶ **<8yrs: lack of tooth staining, may use ≤21d. ¹⁷ Ravindra ²³ , 18 AAP ²¹	Peds: ** 2 to 5mg/kg/day po divided BID Adult: 200mg stat, then 100mg BID or 200mg stat, then 100mg once daily	\$16 \$14
Clindamycin DALACIN C, g 	solution: 15mg/mL (cherry) DO NOT REFRIGERATE (solution will thicken, but stable 2wk room temp) ¹⁹ capsule: 150mg, 300mg	-Take cap with a full glass of water to ↓ esophageal irritation risk. ²⁰	Peds: 20 to 30mg/kg/day po ÷ TID (max 900mg/day) Adult: 300mg po TID	\$24-37 \$18
Macrolides: Inhibits bacterial protein synthesis. Bacteriostatic. Demonstrates concentration-dependent with time-dependence (AUC ₂₄ :MIC, maximize drug concentration to the MIC of the pathogen). Increasing resistance to <i>S. pneumoniae</i> ~21%¹³ Saskatoon²³ to ~38%¹⁴ Regina²³ & Group A Streptococcus (GAS) ≥18% in Saskatchewan (SK). ¹³⁻¹⁴ Role: Reserve for those with a severe penicillin allergy – alternative for AOM, acute sinusitis, or GAS pharyngitis. See RxFiles Beta-lactam Allergy Chart page 6, SHA Firstline .				
Azithromycin ZITHROMAX, g 	suspension: 20mg/mL, 40mg/mL (cherry) <i>After reconstitution, suspension may be stored at room temperature but palatability may be improved if in fridge.</i> tablet: 250mg	-Azithromycin: half-life ~72hr → 5 day treatment ≈ 10 days therapeutic levels. ²⁰ Appears more likely to lead to resistance than clarithromycin , as long half-life results in prolonged sub-inhibitory levels at end of therapy. ²¹ -Clarithromycin more D , but often not an issue in pediatrics . ²²	Peds: 10mg/kg day 1; 5mg/kg days 2-5 ^{AOM, sinusitis} 12mg/kg/day x5d or 20mg/kg/day x3d ^{GAS pharyngitis} Adult: 500mg po Day 1; 250mg po Days 2 to 5 or 500mg po once daily x 3 days	\$18-24 \$16 \$16
Clarithromycin BIAXIN, g 	suspension: 25mg/mL, 50mg/mL (fruity) DO NOT REFRIGERATE tablet: 250mg, 500mg, 500mg XL		Peds: 15mg/kg/day po ÷ BID (max 500mg/day) Adult: 250mg po BID or 500mg po BID 500mg to 1000mg XL po once daily cc	\$18-26 \$15-20 \$18-24

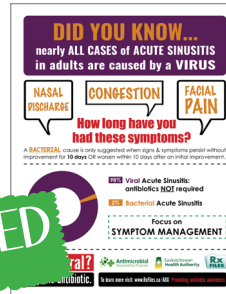
Tools to Support Antimicrobial Stewardship

all resources available @ www.RxFiles.ca/ABX

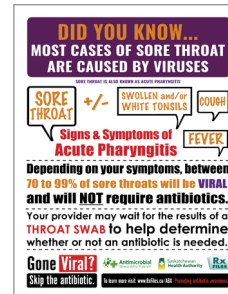
5 Clinic Posters to Raise Antibiotic Awareness



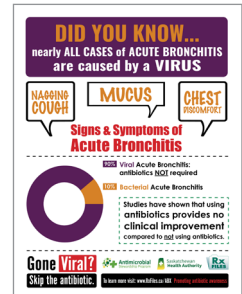
SINUSITIS



PHARYNGITIS



BRONCHITIS



ACUTE OTITIS MEDIA



Firstline

Scan here to download the Firstline app.

Adult & Pediatric Viral Rx

Rx Adult

Patient Name: _____ Date: _____

The symptoms you are presenting with today suggest a viral infection:

- ☐ Common cold (upper respiratory tract infection). Cough can last 3-4 weeks.
- ☐ Acute bronchitis. Cough can last 3-4 weeks.
- ☐ Sore throat (viral pharyngitis).
- ☐ Sinus infection (acute sinusitis).
- ☐ Other viral respiratory infection.

You do not need antibiotics because they do not work on viral infections. Using antibiotics when not needed makes them less effective for potential future bacterial infections. They can cause side effects like diarrhea, rash, and in rare cases, allergic reactions, or kidney injury, or liver injury.

How to help you feel better and manage symptoms:

- When you have a viral infection, it is very important to get plenty of rest and give your body time to fight off the virus.
- Rest as much as possible.
- Drink plenty of fluids.
- Wash your hands frequently and try to stay home to avoid spreading the infection.
- Take over-the-counter medications as advised.
- Use acetaminophen (e.g., Tylenol) for fever and aches.
- Use ibuprofen (e.g., Advil, Motrin) for fever and aches.
- Use decongestants (e.g., Afrin) for nasal congestion.
- Use cough syrup (e.g., Robitussin) for cough.
- Use throat lozenges (e.g., Halls) for throat irritation.
- Use saline nasal spray (e.g., Saline) for nasal congestion.
- Other: _____

Please return to your provider or seek more immediate medical care if:

- Symptoms are not improving in 7-10 days, or worsen at any time.
- You develop persistent fever (above 38°C or 100°F) or are short of breath.
- Other: _____

Prescriber: _____

Rx Pediatrics

Patient Name: _____ Date: _____

The symptoms your child is presenting with today suggest a viral infection:

- ☐ Common cold (upper respiratory tract infection). Cough can last 3-4 weeks.
- ☐ Acute bronchitis. Cough can last 3-4 weeks.
- ☐ Sore throat (viral pharyngitis).
- ☐ Sinus infection (acute sinusitis).
- ☐ Other viral respiratory infection.

Your child does not need antibiotics because they do not work on viral infections. Using antibiotics when not needed makes them less effective for potential future bacterial infections. They can cause side effects like diarrhea, rash, and in rare cases, allergic reactions, or kidney injury, or liver injury.

How to help your child feel better and manage symptoms:

- Encourage them to drink plenty of fluids and get rest.
- Use acetaminophen (e.g., Tylenol) for fever and aches.
- Use ibuprofen (e.g., Advil, Motrin) for fever and aches.
- Use decongestants (e.g., Afrin) for nasal congestion.
- Use cough syrup (e.g., Robitussin) for cough.
- Use throat lozenges (e.g., Halls) for throat irritation.
- Use saline nasal spray (e.g., Saline) for nasal congestion.
- Other: _____

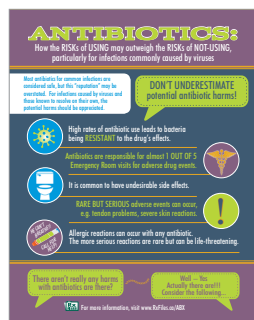
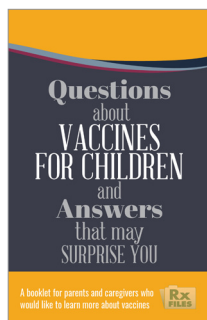
Please return to your provider or seek more immediate medical care if:

- Your child has a persistent fever (above 38°C or 100°F).
- Your child's symptoms do not improve in 7-10 days, or worsen at any time.
- Your child has trouble breathing, persistent vomiting, or is not drinking.
- Other: _____

Prescriber: _____

Previous versions available in multiple languages.

Related Antibiotic Materials



Additional Resources

RxFiles

- Amoxicillin High-Dose Infographic [link](#)
- Penicillin Allergy De-labeling Tool [link](#)
- Penicillin Allergy Q & A [link](#)
- Antibiotic Harms Q & A [link](#)
- Antibiotics Chart [link](#)
- Common Infections Chart [link](#)

SHA Antimicrobial Stewardship

- Firstline App / Online [link](#)
- Ped Amox & Clavulin Dosing [link](#)
- Bugs are Getting Stronger Poster [link](#)

Choosing Wisely

- Delayed Rx [link](#)
- Using Antibiotics Wisely in Primary Care [link](#)

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2024

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Acute Otitis Media & Other Respiratory Tract Infections Newsletter References

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Acute Otitis Media Chart References: see RxFiles Chart

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Acute Rhinosinusitis Chart References: see RxFiles Chart

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Acute Pharyngitis Chart References: see RxFiles Chart <https://www.rxfiles.ca/RxFiles/uploads/documents/ABX-Pharyngitis.pdf>

Acute Bronchitis Chart References: see RxFiles Chart

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Beta-Lactam Allergies Chart References: see RxFiles Chart

<https://www.rxfiles.ca/RxFiles/uploads/documents/members/BETA-lactam-ALLERGY.pdf>

Antibiotic Formulations for AOM & Other Common Respiratory Tract Infections

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