


Patient Characteristics	Likely Pathogens	Recommended Empiric Antibiotics {Canadian-adapted from 1) 2005 Anti-infective Guideline ^{CND} 2) IDSA ²⁰⁰³ Update ^{Mandell} & 3) 2000 CIDS/CTS guidelines}		Specific Agents & Sample Adult Dosages	\$ per 10 d	 Comments
OUTPATIENTS						
No modifying factors	<ul style="list-style-type: none"> ♦Mycoplasma pneum. (not as prevalent in elderly) ♦Chlamydia pneumoniae ♦Strep. pneumoniae 	Canadian ^{2,9(2005)} 1 st – Macrolide 2 nd - Doxycycline (Ketolide: may be option if Tx failures or DRSP)	USA ^{5(2003), 6(2003^{MedLet})} <ul style="list-style-type: none"> ♦Macrolide ^{or} Doxycycline If recent antibiotic Tx: ♦Respiratory FQ alone ♦Macrolide ^{new} & amox^{†dose} or amox-clav^{†dose} 	Erythromycin base 250-500mg po qid Erythromycin PCE 333mg po tid ▣▼ Clarithromycin 500mg po bid 1g XL po od cc ▣▼ Azithromycin 500mg po Day 1 ; then 250mg po Days 2-5 *due to long t½, 5 day tx ≈ 10d ▣ ⊗ Telithromycin 800mg po od Doxycycline 100mg po bid ▣ ⊗ Levofloxacin 500-750mg po od ▣ ⊗ Gatifloxacin 400mg po od ▣ ⊗ Moxifloxacin 400mg po od Amoxicillin 500-1000mg po tid ▣▼ Amox/clav 875-2000mg po bid ▣▼ Cefuroxime axetil 500mg po bid ▣▼ Cefprozil 500mg po bid	13-17 25 80 67 *42 ^{5d} 80 19 49-63 67 69 14-19 37-96 55 81	<ul style="list-style-type: none"> ♦compared to erythromycin, newer macrolides more costly but better GI tolerance, od dosing & better H. influenzae coverage (but S. pneumonia resistance^{~20%}) ♦5 day tx with azithromycin & 7 day tx with clarithromycin or FQs is adequate ^{6,7,8} ♦Doxycycline preferred over TCN due to better GI tolerance and bioavailability & BID (or OD) dosing; covers atypicals ♦Ciprofloxacin not recommended –poor Strep. coverage/treatment failures ♦Cephalosporins lack atypical coverage & show increasing pneumococcal resistance ♦Penicillin for Strep. pneumoniae if MIC ≤2 mg/L; amoxicillin preferred due to better bioavailability, longer t1/2, ↓dosing frequency, & more favorable MICs ♦Telithromycin is an option if Tx failure or DRSP but has DI's, blurry vision & ↑\$.
Comorbidity – no recent antibiotics or oral steroids within past 3 months	Above plus: ♦H. influenzae ♦M. catarrhalis	1 st – New Macrolide (Ketolide: if Tx failures/DRSP; Doxycycline in 2000 CND)	Macrolide ^{new} or FQ ^{Resp.} Aspiration: Amox-clav or clindamycin			
Comorbidity – recent antibiotics or oral steroids within past 3 months	Above plus: ♦H.influ, βlactamase + ♦M. catarrhalis	-(Macrolide or Ketolide) + (Amox/clav or 2 nd G Ceph) {Ketolide: may be option if Tx failures or DRSP}	♦Respiratory FQ alone & Macrolide ^{new} & βlactam (amoxicillin ^{†dose} , amox-clav ^{†dose} , cefprozil or cefuroxime)			
Comorbidity may include: COPD , diabetes, malignancy, renal failure, heart failure, alcoholism, malnutrition, etc.	♦Legionella pneumophila (rare in SK) ♦Gram -ve rods	-Respiratory FQ				
Nursing home resident, outpatient management (if hospitalized, treat as below)	♦Strep. & C. pneumoniae ♦H. influenzae, S. aureus ♦Gram -ve rods ♦aspiration pneumonia	-(Macrolide or Ketolide) + (Amox/clav or 2 nd G Ceph) {Ketolide: if Tx failures/DRSP}	♦Respiratory FQ alone or Macrolide ^{new} & amox-clavulanate			
HOSPITALIZED INPATIENTS (initiation of antimicrobial therapy within 4hours associated with lower mortality) ¹⁰ (Pts in FINE risk class I-III may be treated as outpatients) ¹²						
General Ward admission	♦Strep. & M. pneumoniae ♦Chlamydia pneumoniae ♦H. influenzae ♦gram -ve ♦Legionella pneumophila	-(2 nd or 3 rd or 4 th G Ceph) + (Macrolide or Ketolide) {Ketolide: if Tx failures/DRSP}	♦Respiratory FQ alone & (Macrolide ^{new} or doxy ^{Med Let}) & βlactam (cefotaxime, ceftriaxone, ertapenem; mero or imipenem ^{Med Let if resistance})	Gatifloxacin 400mg IV q24h Levofloxacin 500-750mg IV q24h Moxifloxacin 400mg IV q24h (or po fluoroquinolones as above)	350 350 350 (49-69)	♦Cdn CAP group favor monotherapy with FQs; US IDSA is concerned that misuse & overuse of FQs may ↑↑ resistance rates
ICU	Above plus: ♦Enteric gram – rods (eg. Klebsiella, Enterobacter, Serratia, Acinetobacter) ♦ ♦S. aureus	-3 rd G Ceph IV + Macrolide Or -3 rd G Ceph IV + Respiratory FQ (Using βlactam/lactam Inh or the 3 rd G Ceph in CND ²⁰⁰⁰ guidelines) If beta-lactam allergy: Respiratory FQ + clindamycin	♦βlactam (cefotaxime, ceftriaxone, ertapenem; (pip/taz, mero or imipenem -in Med Let if resistance issues)) & Macrolide ^{new} or FQ ^{Resp.} (if severely ill +AMG ^{Med Let}) ♦If βlactam allergy: Respiratory FQ +/- Clindamycin	Cefuroxime 750mg IV q8h Cefotaxime 1g IV q8h Ceftriaxone 1g IV q24h Cefepime 1g IV q12h Erythromycin 500mg IV q6h Azithromycin 500mg IV q24h x5d Tazocin 3.375g IV q6h (or po as above)	100 225 350 320 500 110 700	♦choice of 2 nd , 3 rd , or 4 th gen cephalosporin dependent on local resistance ♦adjust doses for severity/renal function ♦penicillin 3MU IV q6h or ampicillin 1-2g IV q6h still OK for Strep. pneum if MIC≤2 mg/L, but if MIC >2mg/L a FQ ^{Resp.} or vancomycin 1gm IV q12h or linezolid 600mg IV/PO q12h may be needed ⁶
ICU, risk of Pseudomonas (Cystic Fibrosis, HIV, structural lung disease, bronchiectasis, recent stay in hospital esp. in the ICU)	Above plus: ♦Pseudomonas species	1 st – antiP FQ + antiP βlactam (+/- AMG) 2 nd – triple IV therapy: ♦antiP βlactam + Macrolide (or FQ) + AMG (dose/cost of other agents as above)	♦antiP βlactam + ciprofl. ♦antiP βlactam + AMG + (FQ ^{Resp.} or Macrolide) ♦If βlactam allergy ^{Med Let} : ciprofloxacin & AMG & (clindamycin or vancomycin)	Ciprofloxacin 400mg IV q12h Ceftazidime 2g IV q12h (or 1-2g q8h) Imipenem 500mg IV q6h Meropenem 1gm IV q8-12h Gentamicin 3-7mg/kg IV q24h Tobramycin 3-7mg/kg IV q24h	660 250 999 975 ^{q12h} 50 90	♦Aminoglycoside cost based on 5mg/kg/d x70kg adult, normal renal fx; {lengthen dosing interval if elderly, ↓ renal fx, etc.} 5-7mg/kg if younger, normal CrCl 7mg/kg for more severe infection ♦Tobra better than gent for Pseudomonas
Aspiration Pneumonia	♦Oral anaerobes (dose/cost of other agents as above)	1 st – Amox/clav (+/- Macrolide) 2 nd – Clindamycin or {Metronidazole (+/- FQ)}	♦Amox-clavulanate or clindamycin or (metronidazole ^{Med Let})	Clindamycin 300mg po qid 600mg IV q8h Metronidazole 250mg po tid 500mg IV q12h	54 110 10 25	♦Moxifloxacin & gatifloxacin have anaerobic coverage (~monotherapy ^{2nd line}) ♦po bioavailability: metronidazole~100%; clindamycin~90%

☞ = EDS in Sask X = non-formulary in Sask ⊗=prior approval for NIHB coverage ▼=covered by NIHB ⊗=not NIHB Cost= approximate \$ drug cost per 10 days unless noted otherwise noted ☞ =↓ dose for renal dysfunction
Amox/clav= amoxicillin+clavulanate **CLAVULIN** AMG= aminoglycoside (tobramycin>gentamicin against Pseudomonas) **βlactam/lactam Inh (inhibitor)** = Amox/clavulanate (oral), piperacillin/tazobactam **TAZOCIN**
2ndG Ceph (cephalosporin)= cefuroxime **CEFTIN**, cefprozil **CEFZIL**; **3rdG Ceph**= cefotaxime **CLAFORAN**, ceftriaxone **ROCEPHIN**, cefixime **SUPRAX** (oral); **4thG Ceph**= cefepime **MAXIPIME**
Macrolide= erythromycin, clarithromycin **BIAXIN**, azithromycin **ZITHROMAX** **New macrolide**= clarithromycin, azithromycin **Ketolide**=Telithromycin **KETEK** **PRSP** = penicillin resistant S. pneumoniae (ie MIC ≥4mg/L).
Respiratory fluoroquinolones (FQ ^{Resp.}) = gatifloxacin **TEQUIN**, levofloxacin **LEVAQUIN**, moxifloxacin **AVELOX** (NOT ciprofloxacin unless pseudomonas suspected); **TCN** = tetracycline **DRSP**=drug resistant S. pneumoniae
Antipseudomonal: antiP βlactam = imipenem **PRIMAXIN**, meropenem **MERREM**, ceftazidime **FORTAZ**, cefepime **MAXIPIME**, piperacillin/tazobactam **TAZOCIN**; **antiP FQ** = ciprofloxacin **CIPRO**
Dose –may need adjustment for severity of illness, renal function, etc. **Treatment duration** variable (typically 7-14 days or 4-5 days post-improvement; longer if complicated; 2-3 weeks treatment suggested for Legionella, also for C. pneumoniae & M. pneumoniae due to risk of relapse). **Pregnancy: 'B'** no evidence of risk (in animal studies or uncontrolled human studies) cephalosporins, penicillins, erythromycin, azithromycin, clindamycin & metronidazole.

References:

1. File TM Jr, Tan JS. **International guidelines** for the treatment of community-acquired pneumonia in adults: the role of macrolides. *Drugs*. **2003**;63(2):181-205.
2. Mandell LA et al. Canadian guidelines for initial management of community acquired pneumonia: an evidence-based update by the **Canadian** Infectious Diseases Society and the Canadian Thoracic Society. *Clin Infect Dis* **2000**; 31: 383-421.
3. Bartlett JG et al. **The Infectious Diseases Society of America**. Practice guidelines for management of community acquired pneumonia in adults. *Clin Infect Dis* **2000**; 31: 347-82.
4. Niederman MS, Mandell LA, Anzueto A, Bass JB, Broughton WA, Campbell GD, Dean N, File T, Fine MJ, Gross PA, Martinez F, Marrie TJ, Plouffe JF, Ramirez J, Sarosi GA, Torres A, Wilson R, Yu VL. The Official Statement of the **American** Thoracic Society. Guidelines for the management of adults with community-acquired pneumonia. Diagnosis, assessment of severity, antimicrobial therapy, and prevention. *Am J Respir Crit Care Med*. **2001** Jun;163(7):1730-54.
5. Mandell LA, Bartlett JG, Dowell SF, File TM Jr, Musher DM, Whitney C; **Infectious Diseases Society of America**. Update of practice guidelines for the management of community - acquired pneumonia in immunocompetent adults. *Clin Infect Dis*. **2003** Dec 1;37(11):1405-33.
6. **Treatment Guidelines: Drugs for Pneumonia. The Medical Letter**: September, **2003**; (13) pp. 83-88.
7. Dunbar LM, Khashab MM, Kahn JB, Zadeikis N, Xiang JX, Tennenberg AM. Efficacy of 750-mg, 5-day levofloxacin in the treatment of community-acquired pneumonia caused by atypical pathogens. *Curr Med Res Opin*. 2004 Apr;20(4):555-63. Erratum in: *Curr Med Res Opin*. 2004 Jun;20(6):967.
8. Leophonte P, File T, Feldman C. Gemifloxacin once daily for 7 days compared to amoxicillin/clavulanic acid thrice daily for 10 days for the treatment of community-acquired pneumonia of suspected pneumococcal origin. *Respir Med*. 2004 Aug;98(8):708-20.
9. Rosser W, Pennie R, Pilla N and the Anti-infective Review Panel (**Canadian**). *Anti-infective Guidelines for Community-acquired Infections Toronto: MUMS Guideline Clearinghouse; 2005*.
10. Houck PM, Bratzler DW, Nsa W, Ma A, Bartlett JG. Timing of antibiotic administration and outcomes for Medicare patients hospitalized with community-acquired pneumonia. *Arch Intern Med*. 2004 Mar 22;164(6):637-44.
11. Mills GD, Oehley MR, Arrol B. Effectiveness of {beta} lactam antibiotics compared with antibiotics active against atypical pathogens in non-severe community acquired pneumonia: meta-analysis. *BMJ*. 2005 Jan 31; [Epub ahead of print]
12. Carratala J, Fernandez-Sabe N, Ortega L, et al. Outpatient care compared with hospitalization for community-acquired pneumonia. *Ann Intern Med* 2005; 142:165-72.