

Antimicrobial Therapy for Adult Community Acquired Pneumonia (CAP)

(NB Provincial Health Authorities Anti-Infective Stewardship Committee, May 2018)

Treatment Considerations:

- Having taken antibiotics within the past 3 months significantly increases the risk of resistant *S. pneumoniae*. Choose an antibiotic from a different class, regardless of clinical success.
- **Exclusions:** immunosuppression, acute exacerbation of COPD, bronchitis, macro-aspiration, chronic pneumonia syndrome⁶, cystic fibrosis, bronchiectasis, or MRSA.

Determine severity of pneumonia and assess risk of mortality; calculate DS-CRB65 score by adding one point if any of the following criteria are met:

D	History of any of the following comorbid diseases: heart failure, chronic renal disease, chronic liver disease, cerebrovascular disease (or other chronic neurological diseases), or active malignancy	<input type="checkbox"/>
S	Oxygen saturation (SpO ₂) less than 90% on room air	<input type="checkbox"/>
C	Confusion (new onset)	<input type="checkbox"/>
R	Respiratory rate greater than or equal to 30 breaths/minute	<input type="checkbox"/>
B	Systolic blood pressure less than 90 mmHg OR diastolic blood pressure less than or equal to 60 mmHg	<input type="checkbox"/>
65	Age 65 or older	<input type="checkbox"/>
Total		

Severity	DS-CRB65	Mortality	Site of care	Empiric Therapy ⁶ (start antibiotics as soon as possible)	Comments
Low	0-1	Less than 1%	Home (unless hospitalized for reason other than pneumonia)	<p>amoxicillin 1000 mg PO q8h* OR doxycycline 100 mg PO q12h</p> <p><u>If at risk for Gram-negative bacilli or <i>S. aureus</i> (e.g. post-influenza, alcoholism, COPD, nursing home):</u></p> <p>amoxicillin-clavulanate 875/125 mg PO q12h* OR cefuroxime axetil 500 mg PO q8h* (if true immediate penicillin allergy⁷)</p>	<p>Microbiology Tests: None routinely (unless hospitalized, see below)</p> <p>- Amoxicillin is the oral beta-lactam that offers the best coverage against <i>S. pneumoniae</i>.</p>
Moderate	2-3	3-9%	Hospital	<p>ampicillin 2 g IV q6h* + [doxycycline 100 mg PO q12h OR Macrolide PO (see comments) OR (azithromycin 500 mg IV q24h x 3 days, then STOP)]</p> <p><u>If true immediate penicillin allergy⁸, OR if at risk for Gram-negative bacilli or <i>S. aureus</i> (e.g. post-influenza, alcoholism, COPD, nursing home):</u></p> <p>cefuroxime 1.5 g IV q8h* + [doxycycline 100 mg PO q12h OR Macrolide PO (see comments) OR (azithromycin 500 mg IV q24h x 3 days, then STOP)]</p>	<p>Microbiology Tests: -Blood cultures (2 sets) -Sputum culture -Urine antigen for pneumococcus and legionellosis[†]</p> <p>(Depending on clinical context, consider investigation for atypical pathogens and viruses)</p>
High	4 or higher	15-29%	Hospital (consider ICU)	<p>cefTRIAxone 2 g IV q24h + azithromycin 500 mg IV q24h OR [levofLOxacin 750 mg IV/PO q24h* or moxifloxacin 400 mg IV/PO q24h] +/- ampicillin 2 g IV q6h* (consider adding ampicillin to levofloxacin or moxifloxacin for ICU-based therapy)</p>	<p>- Macrolide PO: clarithromycin 500 mg PO q12h* OR azithromycin 500 mg PO day 1, then 250 mg PO q24h x 4 days</p> <p>- If <i>Legionella</i> strongly suspected, consider levofLOxacin or azithromycin</p> <p>- Exercise caution if using levofLOxacin or moxifloxacin: association with <i>C. difficile</i> and MRSA</p>

Duration of therapy

- **Treat for a minimum of 5 days, and then until the patient meets all clinical stability criteria (see page 2), then STOP antibiotics.**
- Longer treatment duration may be required in certain circumstances (e.g. extrapulmonary infections, empyema, infections caused by *P. aeruginosa* or *S. aureus*, etc.).

(continued on next page)

IV to PO conversion (for more information, please refer to the IV-PO conversion policy and criteria)

- Consider oral antibiotics when patients are able to tolerate PO medications and meet all the clinical stability criteria listed below:

Clinical stability criteria - community acquired pneumonia	Parenteral drug	Suggested oral step-down
<input checked="" type="checkbox"/> Patient is afebrile (e.g. temperature lower than 38°C) for at least 48 hours	ampicillin	amoxicillin (high dose; 1000 mg PO q8h*)
<input checked="" type="checkbox"/> Heart rate lower than or equal to 100 beats/minute	azithromycin	azithromycin or clarithromycin
<input checked="" type="checkbox"/> Respiratory rate lower than or equal to 24 breaths/minute	Cephalosporin (any)	amoxicillin + clavulanic acid (or cefuroxime axetil if true penicillin allergy)
<input checked="" type="checkbox"/> Systolic blood pressure higher than or equal to 90 mmHg	levoFLOxacin or moxifloxacin +/- ampicillin	levoFLOxacin or moxifloxacin alone +/- amoxicillin
<input checked="" type="checkbox"/> Oxygen saturation (SpO2) higher than or equal to 90% on room air (or return to baseline oxygen level for patients receiving long-term oxygen therapy)	Please note: oral monotherapy vs. combined therapy (atypicals) → clinical judgment; see below.	
<input checked="" type="checkbox"/> Normal mental state (compared to baseline)		
<input checked="" type="checkbox"/> Patient is able to tolerate oral intake		

Clinical pearls

- Within the first 3 days of therapy, as many as 2/3 of patients will satisfy all clinical stability criteria. The majority of the remaining 1/3 of patients will satisfy all criteria by day 7 of therapy.
- In low-risk patients, consider adding doxycycline or a macrolide to a beta-lactam regimen if high clinical suspicion of atypical pathogens (beta-lactams DO NOT cover atypicals). Clinical features favouring "atypical" bacteria (*Mycoplasma* or *Chlamydoiphila*): gradual onset and presentation, absence of septic shock, non-lobar pneumonia, family cluster, cough persisting more than 5 days without acute clinical deterioration, absence of sputum production, and normal or minimally elevated white-cell count.
- It is important to note that, although *Legionella* is defined as an "atypical" pathogen, the presentation is similar to "typical" pathogens (i.e. hyperacute and severe presentation).
- Azithromycin dosing and duration of therapy depends on the route of administration and its indication for use: 1) When using 500 mg IV once daily in non-critically ill patients, 3 days of therapy is adequate; 2) When using the PO formulation, or in patients that are critically ill, 5 days of therapy is adequate; 3) In patients with infections caused by *Legionella*, 7 to 10 days of therapy may be required.
- Patients at high risk for pneumonia (e.g. age 65 and older, nursing home residents, COPD, etc.) should receive influenza and pneumococcal vaccines if vaccination not up to date.
- While MRSA is rarely associated with CAP in New Brunswick, consider adding vancomycin empirically if severe pneumonia (i.e. DS-CRB65 score of 4 or higher) **AND** presence of one of the following MRSA risk factors: history of MRSA infection or colonization, IV drug use, homelessness, member of First Nations community, incarcerated person, or recent travel to an MRSA endemic region.
- Recent literature suggests that corticosteroids could be considered in certain patients with a high inflammatory response due to severe CAP. However, it should be noted that preliminary data suggests patients with influenza pneumonia may not benefit, and could be harmed by adding corticosteroids.
- Due to potential QTc prolongation, consider baseline ECG if prescribing macrolides or quinolones to certain patients (e.g. other QTc prolonging drugs, electrolyte abnormalities, etc.).

*Dose adjustment required in renal impairment

†If antigen is positive for *Legionella*, efforts must be made to obtain sputum and advise laboratory that *Legionella* culture is required. This is important for epidemiological purposes in case of an outbreak.

**If microbial cause of infection known, treat accordingly

▲ True, immediate IgE-mediated allergies include, but are not limited to: anaphylaxis, urticaria, angioedema, hypotension, bronchospasm, stridor, and pruritis.

β Chronic pneumonia syndrome: pneumonia symptoms lasting more than 3 weeks