Antimicrobial Therapy for Adult Community Acquired Pneumonia (CAP)
(NB Provincial Health Authorities Anti-Infective Stewardship Committee, May 2018)

Treatement 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 syndrome, cystic fibrosis, bronchiectasis, or MRSA.

<table>
<thead>
<tr>
<th>Severity</th>
<th>DS-CRB65</th>
<th>Mortality</th>
<th>Site of care</th>
<th>Empiric Therapy* (start antibiotics as soon as possible)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0-1</td>
<td>Less than 1%</td>
<td>Home (unless hospitalized for reason other than pneumonia)</td>
<td>amoxicillin 1000 mg PO q8h* OR doxycycline 100 mg PO q12h If at risk for Gram-negative bacilli or <em>S. aureus</em> (e.g. post-influenza, alcoholism, COPD, nursing home): amoxicillin-clavulanate 875/125 mg PO q12h OR cefuroxime axetil 500 mg PO q8h* (if true immediate penicillin allergy*)</td>
<td>Microbiology Tests: None routinely (unless hospitalized, see below) - Amoxicillin is the oral beta-lactam that offers the best coverage against <em>S. pneumoniae</em>.</td>
</tr>
<tr>
<td>Moderate</td>
<td>2-3</td>
<td>3-9%</td>
<td>Hospital</td>
<td>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)] If true immediate penicillin allergy*, OR if at risk for Gram-negative bacilli or <em>S. aureus</em> (e.g. post-influenza, alcoholism, COPD, nursing home): 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)]</td>
<td>Microbiology Tests: -Blood cultures (2 sets) -Sputum culture -Urine antigen for pneumococcus and legionellosis‡ (Depending on clinical context, consider investigation for atypical pathogens and viruses) - Macrolide PO: clarithromycin 500 mg PO q12h* OR azithromycin 500 mg PO day 1, then 250 mg PO q24h x 4 days - If <em>Legionella</em> strongly suspected, consider levoFLOXacin or azithromycin - Exercise caution if using levoFLOXacin or moxifloxacin: association with <em>C. difficile</em> and MRSA</td>
</tr>
<tr>
<td>High</td>
<td>4 or higher</td>
<td>15-29%</td>
<td>Hospital (consider ICU)</td>
<td>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)</td>
<td></td>
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</tbody>
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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.).
**IV to PO conversion** *(for more information, please refer to the IV-PO conversion policy and criteria)*

- **Clinical stability criteria - community acquired pneumonia**
  - Patient is afebrile (e.g. temperature lower than 38°C) for at least 48 hours
  - Heart rate lower than or equal to 100 beats/minute
  - Respiratory rate lower than or equal to 24 breaths/minute
  - Systolic blood pressure higher than or equal to 90 mmHg
  - 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)
  - Normal mental state (compared to baseline)
  - Patient is able to tolerate oral intake

<table>
<thead>
<tr>
<th>Parenteral drug</th>
<th>Suggested oral step-down</th>
</tr>
</thead>
<tbody>
<tr>
<td>ampicillin</td>
<td>amoxicillin (high dose; 1000 mg PO q8h*)</td>
</tr>
<tr>
<td>azithromycin</td>
<td>azithromycin or clarithromycin</td>
</tr>
<tr>
<td>Cephalosporin (any)</td>
<td>amoxicillin + clavulanic acid (or cefuroxime axetil if true penicillin allergy)</td>
</tr>
<tr>
<td>levoFLOXacin or moxifloxacin +/- ampicillin</td>
<td>levoFLOXacin or moxifloxacin alone +/- amoxicillin</td>
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</tbody>
</table>

*Please note: oral monotherapy vs. combined therapy (atypicals) → clinical judgment; see below.*

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**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 favoring “atypical” bacteria (Mycoplasma or Chlamydia): 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 if in the PO presentation, 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, household contact with a MRSA colonized individual, IV drug use, homelessness, incarcerated persons, recent travel to or residing in an MRSA endemic region or community
- 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.

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**References:**

8. Toronto Central LHIN Emergency Department Algorithm. Pneumonia: Community-Acquired. 2013