

## Health PEI Community-Acquired Pneumonia (CAP) Empiric Treatment Guidelines for Adults

Syndrome	<b>Non-SIRS / Pre-SIRS</b> <i>SIRS/Sepsis, Severe Sepsis, Septic Shock treatment options see next page</i>		
<p style="text-align: center;"><b>Community - Acquired Pneumonia (CAP)</b> <b>PAGE 1 of 2</b></p> <p>Healthcare-Associated Pneumonia not covered in these Guidelines</p> <p>Antibiotics are listed in the numerical order of preference.</p> <p>Avoid using the same class of antibiotics if used within the last 90 days</p> <p>CURB-65 score may have utility to determine if hospitalization is required</p>	<b>TRAVEL OUTSIDE OF CANADA AND ANTIBIOTICS IN THE PAST 90 DAYS ARE IMPORTANT QUESTIONS</b>		
	<b>No Abx use in past 90 days and no comorbidities*</b>	<b>Abx use in past 90 days, travel, or comorbidities* (Any age)</b>	<b>Treatment Failure</b>
	<p><u>Age 18-50 &amp; Bilateral Pneumonia:</u> 1. Doxycycline 200 mg PO 1<sup>st</sup> dose then 100 mg PO BID (with food) OR 2. Clarithromycin** 500 mg PO BID or 1000 mg XL PO daily</p> <p><u>Age 18-50 &amp; Unilateral or age greater than 50</u> 1. Amoxicillin 1 g PO TID; (If non-severe PCN allergy substitute Cefuroxime 500 mg PO BID) OR 2. Doxycycline 200 mg PO 1<sup>st</sup> dose then 100 mg PO BID (with food) OR 3. Clarithromycin** 500 mg PO BID or 1000 mg XL PO daily</p>	<p style="text-align: center;">DOUBLE THERAPY:</p> <p><b>A <math>\beta</math>-lactam antibiotic:</b> 1. Amoxicillin 1 g PO TID OR 2. Cefuroxime 500 mg PO BID</p> <p style="text-align: center;">PLUS:</p> <p><b>An antibiotic with atypical activity:</b> 1. Doxycycline 200 mg PO 1<sup>st</sup> dose then 100 mg PO BID (with food) OR 2. Clarithromycin** 500 mg PO BID or 1000 mg XL PO daily</p>	<p>Suggest MRSA Screen, sputum collection, atypical pneumonia testing as appropriate</p> <p>1. Cefuroxime 500 mg PO BID (If not failed before) <b>PLUS</b> a different class of antibiotic with atypical activity (Doxycycline 200 mg PO 1<sup>st</sup> dose then 100 mg PO BID (with food) or Clarithromycin** 500 mg PO BID or 1000 mg XL PO daily) OR 2. Levofloxacin 750 mg PO daily OR 3. Amoxicillin/clavulanate 500/125 mg PO TID <b>PLUS</b> an antibiotic with atypical activity (Doxycycline 200 mg PO 1<sup>st</sup> dose then 100 mg PO BID (with food) or Clarithromycin** 500 mg PO BID or 1000 mg XL PO daily)</p>
	<p><u>If macroaspiration:</u> ADD Metronidazole 500 mg PO BID OR substitute the <math>\beta</math>-lactam with Amoxicillin/clavulanate 500/125 mg PO TID</p>		
	<p>During Flu Season ADD <u>Oseltamivir</u> (not currently on PEI Pharmacare Formulary) 75 mg PO BID x 5 days for patients presenting within 48 hours of symptom onset AND with one of the following: age <math>\geq</math> 65, Obesity (BMI<math>\geq</math>40), Diabetes Mellitus, Asthma or COPD, CHF or unstable Angina, Malignancy, Chronic Renal Insufficiency, Pregnancy including up to 4 weeks post-partum, Immune suppression (HIV, iatrogenic due to medication, hyposplenism). See AMMI Flu App or <a href="http://www.ammi.ca/download/Guidelines/Flu_Algorithm.pdf">www.ammi.ca/download/Guidelines/Flu_Algorithm.pdf</a> for more information.</p>		
	<p><u>Antibiotic Duration:</u> Minimum 5 days. Instruct patient to seek medical attention if not improving in approx. 72 hours after starting. <u>Antibiotic Duration if treatment failure:</u> Minimum 7 days (levofloxacin 750 mg PO daily: 5 days)</p>		
	<p>*Comorbidities: chronic heart, lung, liver or renal disease; uncontrolled DM or DM pt on insulin; alcoholism; malignancy; asplenia; immunosuppression. **Azithromycin (500 mg PO daily x 3 days or 500 mg PO on day 1 then 250 mg PO on days 2-5). Use when the patient has an intolerance to clarithromycin or when the patient is taking medication that would significantly interact with clarithromycin.</p>		

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Syndrome	SIRS / Sepsis	Severe Sepsis	Septic Shock & Refractory Septic Shock
	<b>SIRS Criteria (2 of 4)</b> Temperature >38.3<36.0; HR>90; RR>20 or PaCO <sub>2</sub> <32; WBC <4 >12 or Bands	<b>SIRS + ≥1 of 8+ Severe Sepsis criteria:</b> Mottled; Anuria; Lactate>2; Plt<100; Acute Kidney Injury; DIC; ARDS; fast changing LOC	<b>Septic Shock = Severe Sepsis + vasopressor support</b> <b>Refractory Septic Shock = Above with multiple vasopressors</b>
<b>Community-Acquired Pneumonia (CAP)</b> <b>PAGE 2 of 2</b>  Tailoring of treatment after susceptibilities are known is highly recommended.	Order blood cultures, CRP, lactate  (Amoxicillin 1 g PO TID OR Ampicillin 2 g IV q6h) + (Azithromycin 500 mg PO/IV q24h OR Clarithromycin 500 mg PO BID or 1000 mg XL PO daily)  Severe PCN allergy and no previous fluoroquinolone in 90 days: Levofloxacin 750 mg PO/IV q24h  If macroaspiration: ADD Metronidazole 500 mg PO/IV q12h OR USE Amoxicillin/clavulanate 500/125 mg PO TID (higher risk of Cdiff).	Order blood cultures, CRP, lactate  Ceftriaxone 2 g IV q24h + (Azithromycin 500 mg IV q24h OR Levofloxacin 750 mg IV q24h)  If macroaspiration, antibiotics in past 3 months, preceding URTI or influenza: Piperacillin/Tazobactam 4.5 g IV q6h + (Azithromycin 500 mg IV q24h OR Levofloxacin 750 mg IV q24h)  Severe PCN allergy: Meropenem 1 g IV q8h + (Azithromycin 500 mg IV q24h OR Levofloxacin 750 mg IV q24h) OR Levofloxacin 750 mg IV q24h + Tobramycin 7 mg/kg IV q24h + Metronidazole 500 mg IV q12h (if macroaspiration)	Order blood cultures, CRP, lactate  Meropenem 1 g IV q8h + Levofloxacin 750 mg IV q24h + (ADD Linezolid 600 mg PO/IV q12h OR Vancomycin 25 mg/kg IV load, then 15 mg/kg IV q12h until cultures return)  If fluoroquinolone contraindicated or previous resistance noted: Meropenem 1 g IV q8h + Tobramycin 7 mg/kg IV q24h + Azithromycin 500 mg IV q24h + (ADD Linezolid 600 mg PO/IV q12h OR Vancomycin 25 mg/kg IV load, then 15 mg/kg IV q12h until cultures return)
	MRSA confirmed or suspected: ADD Linezolid 600 mg PO/IV q12h OR Vancomycin 25 mg/kg IV load, then 15 mg/kg IV q12h		
	Depending on travel history: Consider <u>ADDING Oseltamivir</u> 75 mg PO BID Hospital inpatients with respiratory illness during flu season: ADD Oseltamivir 75 mg PO BID immediately even if the interval between symptom onset and initiation of therapy is longer than 48 hours. (Discontinue Oseltamivir if the NP swab comes back negative, yet there maybe exceptions in the ICU) See AMMI Flu App or <a href="http://www.ammi.ca/download/Guidelines/Flu_Algorithm.pdf">www.ammi.ca/download/Guidelines/Flu_Algorithm.pdf</a> for more information		

RE: Penicillin allergy: Avoid Piperacillin/Tazobactam, but Meropenem is reasonable to give in severe sepsis or greater even with history of anaphylaxis. Consult ID if in doubt.

# Health PEI Community-Acquired Pneumonia (CAP) Empiric Treatment Guidelines for Adults

## APPENDIX A: Community-Acquired Pneumonia (CAP) Management Considerations

PREVENTION	MAJOR HURDLES	CONSIDERATIONS
<ul style="list-style-type: none"> <li>Smoking cessation</li> <li>Vaccinations (influenza and Pneumococcal)</li> <li>Hand and cough hygiene</li> <li>Reversing gastric acid suppression if applicable</li> </ul>	<ul style="list-style-type: none"> <li>Antibiotics past 90 days (esp. same class)</li> <li>Travel history outside of Canada</li> <li>Post-influenza or URTI as a Staph aureus risk factor</li> <li>MRSA</li> <li>ETOH</li> <li>Outbreak associated</li> </ul>	<ul style="list-style-type: none"> <li>Differential diagnosis:                             <ul style="list-style-type: none"> <li>Aspiration without infection (no fever or no ↑ WBC)</li> <li>Heart failure</li> <li>Neoplasm</li> <li>Non-Influenza Viral infection</li> <li>COPD exacerbation / Bronchitis</li> <li>Mycoplasma and other atypicals</li> <li>Mycobacterial</li> <li>Pertussis</li> </ul> </li> </ul>

CHEST X-RAY
<ol style="list-style-type: none"> <li><u>Initial Chest X-Ray (upon presentation)</u>: Consider chest x-ray to support the clinical diagnosis of pneumonia for outpatients.</li> <li><u>Follow-up Chest X-Ray</u>: Consider a follow-up chest x-ray 6-8 weeks after initial diagnosis of pneumonia for patients who fit into one or more of the following categories: recurrent pneumonia in the last year, smokers, OR age greater than 50 years.</li> </ol>

Interstitial findings in Ill patients:	
1 <sup>st</sup> Line Tests:	2 <sup>nd</sup> Line Tests for non-responders or immunocompromised:
<ul style="list-style-type: none"> <li>Throat swab for Mycoplasma PCR +/- Mycoplasma serology</li> <li>Viral respiratory screen (Flu and RSV)</li> <li>Legionella (serogroup 1) urine antigen (travel associated or severe disease)</li> </ul>	<ul style="list-style-type: none"> <li>Viral respiratory panel (13 Viruses)</li> <li>Coxiella serology</li> <li>Sputum/induced sputum for mycobacterium, cytology, and Pneumocystis</li> <li>CMV shell vial +/- CMV viral load</li> <li>Legionella serology (rarely used)</li> <li>Fungal: Histoplasmosis Blastomyces testing</li> </ul>

Consider using **CRB-65 score** (may have utility to determine if hospitalization is required).

CRB-65 severity score (1 point for each feature present)	
Symptoms	Points
Confusion*	+1
Respiratory Rate ≥ 30/min	+1
Blood Pressure (SBP < 90 mmHg or DBP ≤ 60 mmHg)	+1
Age ≥ 65 years	+1

CRB-65 Score	Mortality Risk	Treatment Options
0	Mortality low (1.2%)	Likely suitable for home treatment
1 - 2	Mortality intermediate (8.15%)	Likely need hospital referral and assessment
3 - 4	Mortality high (31%)	Urgent hospital admission

\*New disorientation in person, place or time

**CRB-65 Reference:** Lim WS, van der Eerden MM et al. Defining community acquired pneumonia severity on presentation to hospital: an international derivation and validation study. Thorax 2003; 58:377-382

# Health PEI Community-Acquired Pneumonia (CAP) Empiric Treatment Guidelines for Adults

## Logic for guidelines:

1. Pathogens: The Infectious Diseases Society of America's (IDSA) CAP guidelines list the most common etiologies in CAP as (decreasing order of frequency):

<u>Outpatients</u>	<u>Inpatients (non-ICU)</u>	<u>Inpatients (ICU)</u>
<i>Streptococcus pneumoniae</i> <i>Mycoplasma pneumoniae</i> <i>Haemophilus influenzae</i> <i>Chlamydomphila pneumoniae</i> Respiratory viruses (Influenza A and B, adenovirus, respiratory syncytial virus, parainfluenza)	<i>Streptococcus pneumoniae</i> <i>Mycoplasma pneumoniae</i> <i>Chlamydomphila pneumoniae</i> <i>Haemophilus influenzae</i> Legionella species Aspiration Respiratory viruses (Influenza A and B, adenovirus, respiratory syncytial virus, parainfluenza);	<i>Streptococcus pneumoniae</i> <i>Staphylococcus aureus</i> Legionella species Gram-negative bacilli <i>Haemophilus influenzae</i>

However, in a recent study in the US, viruses were the most detected pathogens in CAP in hospitalized adults. In this study, a pathogen was detected in 38% of adults with radiographical evidence of pneumonia (viruses in 23%, bacteria in 11%, both bacterial and viral pathogens in 3%, and fungi or mycobacterial in 1%). The most common pathogens detected were: human rhinovirus (9%), influenza virus (6%), and *Streptococcus pneumoniae* (5%). *Mycoplasma pneumoniae*, *Legionella pneumophila*, and *Chlamydomphila pneumoniae* combined were detected in 4% of the patients. *Haemophilus influenzae* was detected in less than 1% of patients. *Staphylococcus aureus* was detected in 2% of patients. (Jain 2015 NEJM)

2. Atypical pathogens: Patients age > 50 years have a decreased likelihood of pneumonia from *Mycoplasma pneumoniae*, *Chlamydomphila pneumoniae*. (Anti-infective Review Panel guidelines, 2013)
3. *Streptococcus pneumoniae* resistance: There is a low level of resistance of *Streptococcus pneumoniae* to amoxicillin in PEI. In non-central nervous system infections, *Streptococcus pneumoniae* has 100% susceptibility to high dose amoxicillin (1 g PO TID) and is susceptible to low dose amoxicillin in 82% of isolates. Susceptibility of *Streptococcus pneumoniae* to macrolides is only 74%. The antibiogram may over-estimate resistance in the outpatient setting as sputum testing is not frequently done in this setting.
4. Duration of therapy: The IDSA CAP guidelines recommends that patients with CAP should be treated for a minimum of 5 days, should be afebrile for 48-72h, and should have no more than 1 CAP-associated sign of clinical instability before discontinuation of therapy. Longer durations of therapy are usually not necessary since most patients become clinically stable in 3–7 days. Note: criteria for clinical instability = temperature  $\leq 37.8^{\circ}\text{C}$ , heart rate  $\leq 100$  beats/minute, respiratory rate  $\leq 24$  breaths/minute, systolic blood pressure  $\geq 90$  mmHg, arterial oxygen saturation  $\geq 90\%$  or  $\text{pO}_2 \geq 60$  mmHg on room air.
5. Fluoroquinolone use: Fluoroquinolones should be reserved for sicker patients, patients who had treatment failure with an antibiotic from a different class, or those who cannot tolerate first-line therapy due to an antibiotic allergy. Concerns with wide spread use of fluoroquinolones include: unnecessary use of an agent with broad-spectrum of activity, development of fluoroquinolone resistance, and [Clostridium difficile infection](#). Moxifloxacin carries the highest Cdiff risk.
6. Oseltamivir: Recommendations for oseltamivir are adapted from the 2013 Association of Medical Microbiology and Infectious Disease Canada (AMMI Canada) guidelines.

# Health PEI Community-Acquired Pneumonia (CAP) Empiric Treatment Guidelines for Adults

## References:

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21. Atanasković-Marković M. et al. (2008). Tolerability of Meropenem in Children with IgE-mediated Hypersensitivity to Penicillins. *Allergy* 63:237.

**Health PEI Physician Reviewers:** Dr. Nicole Drost, Dr. Nicole Fancy, Dr. Greg German, Dr. Ayodeji Harris-Eze, Dr. Heather Morrison, Dr. Huy Nguyen, Dr. Aaron Sibley; **Pharmacists:** Wendy Cooke (QEH ICU/CCU Clinical Pharmacist), Jennifer Boswell (Antimicrobial Stewardship Pharmacist).

## Provincial Drugs & Therapeutics Antimicrobial Stewardship Subcommittee

To:	All Island Physicians, Nurse Practitioners, and Pharmacists
From:	Provincial Drugs & Therapeutics Antimicrobial Stewardship Subcommittee
Date:	October 29, 2015
Re:	<b>Health PEI Community-Acquired Pneumonia (CAP) Empiric Treatment Guidelines for Adults</b>

The Provincial Drugs & Therapeutics Antimicrobial Stewardship Subcommittee (PD&T ASSC) has developed the attached **Health PEI Community-Acquired Pneumonia (CAP) Empiric Treatment Guidelines for Adults** in conjunction with a number of PEI Physician and Pharmacist reviewers. The guidelines were approved by the Provincial Drugs & Therapeutics Committee on October 6, 2015.

The CAP Empiric Treatment Guidelines follow the same general layout as the previously approved and distributed UTI, *Clostridium difficile* infection, and skin and soft tissue infection guidelines. The CAP guidelines contain two tables separated into the following: treatment options for 1) non-SIRS / pre-SIRS patients stratified by recent antibiotic use, travel, comorbidities, and treatment failure and 2) SIRS / sepsis, severe sepsis, septic shock and refractory septic shock patients. There is also an appendix which contains information on prevention, major hurdles, considerations, use of chest x-ray, and CRB-65 score.

The group of PEI Physician and Pharmacist reviewers include: Dr. Nicole Drost, Dr. Nicole Fancy, Dr. Greg German, Dr. Ayodeji Harris-Eze, Dr. Heather Morrison, Dr. Huy Nguyen, Dr. Aaron Sibley, Wendy Cooke (QEH ICU / CCU Clinical Pharmacist), and Jennifer Boswell. The recommendations in the SIRS / sepsis, severe sepsis, septic shock and refractory septic shock sections of these guidelines come from the document **Health PEI: Provincial Antibiotic Advisory Team Empiric Antibiotic Treatment Guidelines for Sepsis Syndromes in Adults** which was reviewed by Dr. Lenley Adams, Dr. Patrick Bergin, Dr. Greg German, Dr. Michael Irvine, and Dr. Paul Seviour before approval in February 2014.

### Highlights of the CAP guidelines include:

- 1) During Flu season, Tamiflu® (oseltamivir) is recommended for:
  - Outpatients with certain risk factors who present within 48 hours of symptoms onset.
  - Hospital inpatients with respiratory illness, even if symptoms have been present for greater than 48 hours.
  - Regardless of the Flu season, consider oseltamivir in unwell patients returning from outside of Canada.The above recommendations are based on the recommendations from the Association of Medical Microbiology and Infectious Disease of Canada (AMMI Canada). Oseltamivir is not currently available as a benefit on the PEI Pharmacare Formulary; however, we are in the initial steps of requesting a change to oseltamivir's formulary status.
- 2) Fluoroquinolones are reserved for patients in severe sepsis or worse, those with antibiotic allergies, and for non-SIRS / pre-SIRS patients who have failed recent therapy.
- 3) Clarithromycin and cefuroxime are now open benefits on the PEI Pharmacare Formulary. The Pharmacare special authorization criteria for azithromycin and levofloxacin have changed slightly. These changes help to align the antibiotics available on the PEI Pharmacare Formulary with the recommendations in the new CAP guidelines.
- 4) High dose amoxicillin monotherapy is recommended for treatment of CAP in non-SIRS / pre-SIRS cases where non-drug resistant *Streptococcus pneumoniae* is likely to be the cause (antibiotic unexposed patients without specific comorbidities who are either greater than 50 years old or are 18-50 years old with unilateral lung disease). Initial atypical coverage is not necessary in this group as *Mycoplasma pneumoniae* / *Chlamydomphila pneumoniae* are associated with bilateral disease and typically target younger adults.

- 5) Treatment duration for non-SIRS / pre-SIRS: duration of therapy is a minimum of 5 days. If treatment failure, a minimum of 7 days is suggested (see guidelines for more details).

These guidelines can be found on the following website: [www.healthpei.ca/micro](http://www.healthpei.ca/micro) . For CIS users: a reminder that there is a quick link to the website on one of the toolbars at the top of the PowerChart screen.

Please note the CAP guidelines do not include recommendations for healthcare-associated pneumonia (HCAP) or hospital-acquired pneumonia (HAP). There are two reasons for this: there is guidance for HCAP empiric treatment in the sepsis guidelines for patients in SIRS / sepsis or worse; and the Infectious Diseases Society of America (IDSA) is currently revising their HCAP / HAP / ventilator-associated pneumonia guidelines from 2005 with an expected release of Spring 2016.

Please direct questions to the co-chairs of the PD&T ASSC, Dr. Greg German (Medical Microbiologist & Infectious Disease Consultant; 894-2515; [GJGerman@ihis.org](mailto:GJGerman@ihis.org)) and Jennifer Boswell (Antimicrobial Stewardship Pharmacist; 894-2587; [JLBoswell@ihis.org](mailto:JLBoswell@ihis.org)).

**Education events related to the CAP guidelines during Antibiotic Awareness Week**  
**(November 16-22, 2015)**

- 1) Tuesday, November 17, 2015 - A Cough Matters In-Service: An Island-wide approach to optimizing antibiotic use and solving chest infections
  - Dr. Nicole Drost will present the Health PEI CAP Empiric Treatment Guidelines for Adults
  - Dr. Greg German will talk about respiratory tract infections: epidemiology, microbiology, and lab testing
- 2) Thursday, November 19, 2015 – 1) **PCH** Grand Rounds; 2) **KCMH** Grand Rounds
  - Dr. German will speak about antibiotic resistance and will also touch on the new guidelines
- 3) Friday, November 20, 2015 – **QEH** Grand Rounds
  - Dr. German will speak about antibiotic resistance and will also touch on the new guidelines