

December 2019 ~ Resource #351201

## Treatment of Community-Acquired Pneumonia in Adults

The charts below are based on the 2019 guideline for the management of community-acquired pneumonia in adults from the American Thoracic Society (ATS)/Infectious Diseases Society of America (IDSA).<sup>1</sup> Antibiotic dosing is provided for **adults**.

**Abbreviations:** BID = twice daily; BUN = blood urea nitrogen; CAP = community-acquired pneumonia; COPD = chronic obstructive pulmonary disease; h = hour or hours; HCAP = healthcare-associated pneumonia; MRSA = methicillin-resistant *Staphylococcus aureus*; PaO<sub>2</sub>/FiO<sub>2</sub> = arterial oxygen partial pressure/fractional inspired oxygen; PCR = polymerase chain reaction; PSI = pneumonia severity index; TID = three times daily

### Community-Acquired Pneumonia Treatment Basics

- The **need for hospitalization** should be based on clinical judgment plus results of a validated prognostic tool.<sup>1</sup> Use of the PSI is recommended over CURB-65.<sup>1</sup> PSI is better than the CURB-65 at identifying patients who can safely be treated as outpatients, but CURB-65 is easier to use.<sup>1</sup> PSI may underestimate severity in younger patients.<sup>1</sup> The PSI is available at <https://www.mdcalc.com/psi-port-score-pneumonia-severity-index-cap> and the CURB-65 is available at <https://www.mdcalc.com/curb-65-score-pneumonia-severity>.
- Patients with **severe pneumonia** are typically those requiring intensive/critical care. See **footnote b** for guideline criteria for severe pneumonia.
- Patients with CAP should be treated with antibiotics **for at least five days (7 days for MRSA or *Pseudomonas*)**.<sup>1</sup> Antibiotics should not be stopped **until the patient is clinically stable**.<sup>1</sup> This means abnormalities in vitals (heart rate, blood pressure, respiratory rate, oxygen saturation, body temperature) and cognition have resolved, and the patient is eating.<sup>1</sup>
- The most common **bacterial causes** of community-acquired pneumonia in outpatients are *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Mycoplasma pneumoniae*, *Staphylococcus aureus*, *Legionella* species, *Chlamydia pneumoniae*, and *Moraxella cararhalis*.<sup>1</sup>
- It is suggested that anaerobic coverage not be routinely added in cases of **aspiration pneumonia** unless lung abscess or empyema is suspected.<sup>1</sup> Our chart, *Aspiration Pneumonia FAQs*, has more considerations.
- **Blood culture** yield is low in patients with nonsevere CAP.<sup>1</sup> Blood cultures are not recommended in outpatients, and it is suggested that they not be routinely done in the hospital setting in nonsevere CAP.<sup>1</sup> Blood cultures are recommended in severe CAP, and in patients being treated empirically for, or previously infected with, *Pseudomonas aeruginosa* or MRSA, or who had been hospitalized and received parenteral antibiotics within the prior 90 days.<sup>1</sup>
- **Sputum gram stain and culture** is recommended in severe CAP, in patients being treated empirically for, or previously infected with, *Pseudomonas aeruginosa* or MRSA, and perhaps in those hospitalized and treated with antibiotics within the prior 90 days.<sup>1</sup> Collection of lower respiratory tract secretions for *Legionella* culture or nucleic acid amplification testing is suggested in severe CAP.<sup>1</sup>
- **Urine antigen testing** for *Pneumococcus* and *Legionella* is suggested in severe CAP.<sup>1</sup> *Legionella* testing is also suggested if epidemiology indicates exposure (e.g., travel in the previous ten days; outbreak).<sup>1,2</sup>
- If **influenza** is circulating in the community, testing with a rapid molecular assay (preferred over an antigen test) is suggested.<sup>1</sup> Coverage for influenza is suggested for outpatients who test positive, and is recommended for inpatients who test positive.<sup>1</sup>
- **Procalcitonin** is not recommended to determine need for initial, empiric antibiotic treatment (**see footnote g**).<sup>1</sup>
- Guidelines suggest not using **corticosteroids routinely** for severe CAP.<sup>1</sup> See **footnote f** for situations where they might be considered.

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Patient Characteristics (see footnote a)	Outpatient Oral Antibiotic Regimen (see footnote a)
<p>Previously healthy without comorbidities (see below) and without risk factors for <i>Pseudomonas aeruginosa</i> or MRSA (e.g., prior respiratory isolation of MRSA or <i>Pseudomonas aeruginosa</i>, or hospitalization and receipt of parenteral antibiotics within the 90 days prior. See <b>footnote d</b> for additional risk factors).</p>	<ul style="list-style-type: none"> <li>• Amoxicillin 1 g TID (high dose targets resistant <i>Streptococcus pneumoniae</i><sup>3</sup>)</li> <li>OR</li> <li>• Macrolide (if local pneumococcal resistance is &lt;25% [resistance is &gt;30% in most of U.S.])               <ul style="list-style-type: none"> <li>• Azithromycin 500 mg x 1, then 250 mg once daily, or</li> <li>• Clarithromycin 500 mg BID or 1,000 mg once daily (extended-release)</li> </ul> </li> <li>OR</li> <li>• Doxycycline 100 mg BID (less data) (consider a loading dose of 200 mg)</li> </ul> <p>Note: patients with risk factors for MRSA or <i>Pseudomonas</i> are not commonly managed as outpatients, but if they are, they will need coverage for these pathogens as well.</p>
<p>With comorbidities:</p> <ul style="list-style-type: none"> <li>• Heart disease</li> <li>• Lung disease</li> <li>• Liver disease</li> <li>• Kidney disease</li> <li>• Diabetes</li> <li>• Alcoholism</li> <li>• Cancer</li> <li>• Asplenia</li> </ul> <p>Regimens for patients with comorbidities target resistant <i>Streptococcus pneumoniae</i>, atypicals, beta-lactamase-producing <i>Haemophilus influenzae</i> and <i>Moraxella catarrhalis</i>, enteric gram negatives, and methicillin-susceptible <i>Staphylococcus aureus</i>.</p>	<p><b>Beta-lactam</b></p> <ul style="list-style-type: none"> <li>• Amoxicillin/clavulanate (500 mg/125 mg TID or 875 mg/125 mg BID, 2,000 mg/125 mg BID)</li> <li>OR</li> <li>• Cephalosporin (cefepodoxime 200 mg BID or cefuroxime axetil 500 mg BID)</li> </ul> <p><b>PLUS</b></p> <p><b>Macrolide</b></p> <ul style="list-style-type: none"> <li>• Azithromycin 500 mg x 1, then 250 mg once daily, or</li> <li>• Clarithromycin 500 mg BID or 1,000 mg once daily (extended-release)</li> </ul> <p>OR</p> <p><b>Doxycycline</b> 100 mg BID (less data) (consider a loading dose of 200 mg)</p> <p><b>OR</b></p> <p><b>Monotherapy with a Respiratory quinolone:</b> levofloxacin 750 mg once daily, moxifloxacin 400 mg once daily, gemifloxacin 320 mg once daily (U.S.), delafloxacin 450 mg orally every 12 h<sup>5</sup> (U.S.; new indication post-guideline publication<sup>5</sup>). Consider adverse effects.</p> <p>Note: patients with risk factors for MRSA or <i>Pseudomonas</i> are not commonly managed as outpatients, but if they are, they will need coverage for these pathogens as well.</p>

**a.** If the patient has recently received (i.e., within the past 90 days) an antibiotic, pick an option from a different class.<sup>1,3</sup> Dosing is for oral tablets/capsules for **adults** with normal renal/hepatic function. Based on ATS/IDSA guideline unless otherwise referenced. Information may differ from product labeling. Most antibiotics available generically, at lower cost. Brand only available for gemifloxacin (*Factive*, U.S.).

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Patient Characteristics (see footnote c)	Inpatient Antibiotic Regimen (see footnote c)
<p><b>Nonsevere</b> pneumonia without risk factors for <i>Pseudomonas aeruginosa</i> or MRSA (e.g., prior respiratory isolation of MRSA or <i>Pseudomonas aeruginosa</i>, or hospitalization and receipt of parenteral antibiotics within the 90 days prior. <b>See footnote d</b> for additional risk factors.)</p>	<p><b>Beta-lactam</b></p> <ul style="list-style-type: none"> <li>• Amoxicillin/sulbactam (1.5 to 3 g every 6 h) OR</li> <li>• Cephalosporin (cefotaxime 1 to 2 g every 8 h, ceftriaxone 1 to 2 g once daily, or ceftaroline 600 mg every 12 h [U.S.])</li> </ul> <p><b>PLUS</b></p> <p><b>Macrolide</b></p> <ul style="list-style-type: none"> <li>• Azithromycin 500 mg once daily, or</li> <li>• Clarithromycin 500 mg BID</li> </ul> <p>OR</p> <p><b>Doxycycline</b> 100 mg BID (less data)</p> <p><b>OR</b></p> <p><b>Monotherapy with a Respiratory quinolone:</b> levofloxacin 750 mg once daily, moxifloxacin 400 mg once daily, or delafloxacin 300 mg IV every 12 h<sup>5</sup> (U.S.; new indication post-guideline publication<sup>5</sup>). Evidence favors beta-lactam/macrolide combination. Consider adverse effects.</p>
<p><b>Severe</b> pneumonia without risk factors for <i>Pseudomonas aeruginosa</i> or MRSA (e.g., prior respiratory isolation of MRSA or <i>Pseudomonas aeruginosa</i>, or hospitalization and receipt of parenteral antibiotics within the 90 days prior. <b>See footnote d</b> for additional risk factors.)</p>	<p>Beta-lactam plus a macrolide, or a beta-lactam plus a respiratory quinolone. Dosing as above.</p> <p>Use of HCAP criteria (e.g., nursing home residence, recent hospitalization) should no longer be used to broaden coverage for resistant organisms (e.g., MRSA, resistant gram negatives), and use of this term is no longer recommended.<sup>1,4</sup></p>
<p>Prior respiratory isolation of MRSA, or hospitalization and parenteral antibiotics within 90 days prior and locally validated risk factors for MRSA. <b>See footnote d</b> for additional risk factors.</p> <p>MRSA coverage generally not needed if nasal swab is negative, especially for nonsevere CAP. If positive, cover pending culture results.</p>	<p><b>Prior respiratory MRSA isolation:</b> add MRSA coverage* to above inpatient regimen and use cultures/nasal PCR to guide need for continuation/discontinuation of MRSA coverage.</p> <p><b>Recent hospitalization and parenteral antibiotics and locally validated risk factors for MRSA (see footnote e)</b></p> <ul style="list-style-type: none"> <li>• <b>Severe</b> pneumonia: add MRSA coverage* to above inpatient regimen and use cultures/nasal PCR to guide need for continuation/discontinuation of MRSA coverage.</li> <li>• <b>Nonsevere:</b> add MRSA coverage* to above inpatient regimen only if cultures or PCR are positive.</li> </ul> <p>*MRSA coverage = linezolid 600 mg BID, or vancomycin 15 mg/kg every 12 h with dose adjusted per levels.</p>

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Patient Characteristics (see footnote c)	Inpatient Antibiotic Regimen (see footnote c)
<p>Prior respiratory isolation of <i>Pseudomonas aeruginosa</i>, or hospitalization and parenteral antibiotics within 90 days prior and locally validated risk factors for <i>Pseudomonas aeruginosa</i>. See footnote d for additional risk factors to consider.</p>	<p><b>Prior respiratory <i>Pseudomonas aeruginosa</i> isolation:</b> change beta-lactam in above inpatient regimen to one with pseudomonal coverage,** and use cultures/nasal PCR to guide need for continuation/discontinuation of pseudomonal coverage.</p> <p><b>Recent hospitalization and parenteral antibiotics and locally validated risk factors for <i>Pseudomonas aeruginosa</i></b> (see footnote e)</p> <ul style="list-style-type: none"> <li>• <b>Severe</b> pneumonia: change beta-lactam in above inpatient regimen to one with pseudomonal coverage** and use culture to guide need for continuation/discontinuation of pseudomonal coverage.</li> <li>• <b>Nonsevere:</b> change beta-lactam in above inpatient regimen to one with pseudomonal coverage** only if culture-positive.</li> </ul> <p>**Pseudomonal coverage = piperacillin/tazobactam 4.5 g every 6 h, cefepime 2 g every 8 h, ceftazidime 2 g every 8 h, imipenem 500 mg every 6 h, meropenem 1 g every 8 h, aztreonam 2 g every 8 h</p>

- b. ATS/IDSA guideline criteria for **severe pneumonia:** septic shock with need for vasopressors, respiratory failure requiring mechanical ventilation, or three or more minor criteria: respiratory rate  $\geq 30$  breaths/min., PaO<sub>2</sub>/FiO<sub>2</sub> ratio  $\leq 250$ , multilobar infiltrates, confusion or disorientation, BUN  $\geq 20$  mg/dL, white blood cell count  $< 4,000$  cells/mm<sup>3</sup> (not due to chemo), platelets  $< 100,000$ /mm<sup>3</sup>, core temperature  $< 36^\circ\text{C}$ , hypotension requiring aggressive fluid resuscitation<sup>1</sup>
- c. If the patient has recently received (i.e., within the past 90 days) an antibiotic, pick an option from a different class.<sup>1,3</sup> Dosing is for adults with normal renal/hepatic function. Based on ATS/IDSA guideline unless otherwise referenced. Information may differ from product labeling. Most antibiotics available generically, at lower cost. Brand only available for ceftaroline (*Teflaro* [U.S.]).
- d. **Examples of additional risk factors to consider:** COPD with bronchiectasis, chronic renal disease, antibiotic use within the past 30 to 60 days, tube feeding, nursing home residence.<sup>7,11</sup> Nursing home residence is not consistently a risk factor.<sup>7</sup>
- e. **“Local validation”** means using local data to determine the prevalence of MRSA and *Pseudomonas* patients with CAP and identifying risk factors for infection locally (e.g., at your local hospital). If local data are unavailable and empiric coverage for MRSA or *Pseudomonas* is instituted on the basis of published risk factors (e.g., footnote d), continue or deescalate the regimen based on culture results.<sup>1</sup>
- f. Role of **corticosteroids.** Corticosteroids can be considered in refractory septic shock, and of course for steroid-responsive comorbidities (e.g., COPD, asthma, autoimmune disease, etc).<sup>1</sup> Corticosteroids may reduce mortality in severe CAP (NNT = 18), although mortality benefit

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is not consistent across studies.<sup>1,8</sup> Corticosteroids may reduce time to clinical stability and length of stay by about one day, and reduce the need for mechanical ventilation.<sup>6,9</sup> More study is needed to identify which subgroups benefit the most (e.g., patients with high inflammatory response).<sup>10</sup> Consider corticosteroids for patients who are clinically unstable or not responding to treatment, and perhaps those with baseline C-reactive protein.<sup>6,9,10</sup>

- g.** Empiric antibiotics should be started if CAP is clinically suspected and radiographically confirmed, regardless of **procalcitonin** level; new evidence suggests that sensitivity is inadequate to determine when initial antibiotic therapy can be safely deferred in this setting.<sup>1</sup>

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*Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.*





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## Preventing and Treating Community-Acquired Pneumonia

--The toolbox below provides practical tips and resources to help prevent and treat pneumonia, and prevent hospital admission and readmission--

**Abbreviations:** ACIP = Advisory Committee on Immunization Practices; ATS = American Thoracic Society; CAP = Community-Acquired Pneumonia; CDC = Centers for Disease Control and Prevention; COPD = Chronic Obstructive Pulmonary Disease; IDSA= Infectious Diseases Society of America; IV = intravenous; MRSA = methicillin-resistant *Staphylococcus aureus*; PCR = Polymerase Chain Reaction

Goal	Suggested Strategies or Resources
Prevent and treat influenza.	<ul style="list-style-type: none"> <li>• Vaccinate all patients six months and older, including pregnant women, yearly.<sup>1,2</sup></li> <li>• Get vaccinated yourself, to set a good example for patients and coworkers.</li> <li>• Choose the right flu vaccine for the patient. Get our chart, <i>Flu Vaccines</i> (U.S. Subscribers)(Canadian Subscribers) for help sorting out the <b>available vaccines</b>.</li> <li>• The CDC provides flu prevention, diagnosis, and treatment information for healthcare professionals, and surveillance data, at <a href="https://www.cdc.gov/flu/professionals/index.htm">https://www.cdc.gov/flu/professionals/index.htm</a>.</li> <li>• A guide for considering flu testing is available from the CDC at <a href="https://www.cdc.gov/flu/professionals/diagnosis/consider-influenza-testing.htm">https://www.cdc.gov/flu/professionals/diagnosis/consider-influenza-testing.htm</a>.</li> <li>• Canadian healthcare professionals can get information on flu prevention, diagnosis, treatment, and updated surveillance data from the Public Health Agency of Canada at <a href="https://www.canada.ca/en/public-health/services/diseases/flu-influenza/health-professionals.html">https://www.canada.ca/en/public-health/services/diseases/flu-influenza/health-professionals.html</a>.</li> <li>• Provide immunization in your clinic, hospital, or pharmacy.</li> <li>• Encourage use of influenza vaccine standing orders. For help, see <a href="http://www.immunize.org/catg.d/p3067.pdf">http://www.immunize.org/catg.d/p3067.pdf</a>.</li> </ul>
Educate patients about flu prevention.	<ul style="list-style-type: none"> <li>• Get materials to educate patients about flu vaccination and other preventive actions from the CDC at <a href="http://www.cdc.gov/flu/freeresources/index.htm">http://www.cdc.gov/flu/freeresources/index.htm</a>. Includes posters, fact sheets, educational materials for children, sample posts for social media, and more.</li> <li>• Patient education handouts, <i>What to Do If You Get the Flu</i> and <i>No More Excuses... You Need a Flu Vaccine</i>, can be downloaded from our website.</li> <li>• Canadians can get information and materials to educate patients about flu vaccination and other preventive actions from the Public Health Agency of Canada at <a href="http://www.fightflu.ca">http://www.fightflu.ca</a>.</li> </ul>

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Goal	Suggested Strategies or Resources
<p>Vaccinate eligible patients against pneumonia.</p>	<ul style="list-style-type: none"> <li>• Routinely vaccinate healthy infants and children against pneumonia per the childhood vaccination schedule. <ul style="list-style-type: none"> <li>• Immunocompromised children or children with certain chronic conditions may need both <i>Prevnar 13</i> and <i>Pneumovax 23</i>.<sup>5,11</sup></li> </ul> </li> <li>• Give people 65 and over <i>Pneumovax 23</i> and consider the <i>Prevnar 13</i> vaccine (ACIP).<sup>15</sup> (In Canada, <i>Pneumovax 23</i> is recommended for routine use. <i>Prevnar 13</i> can be provided for additional protection on an individual basis.)<sup>5</sup></li> <li>• Check for adults UNDER 65 who need one or both pneumococcal vaccines.<sup>3</sup> <ul style="list-style-type: none"> <li>• Those who smoke (CDC), have certain chronic conditions (CDC, Health Canada), or live under certain conditions (Health Canada) will need <i>Pneumovax 23</i>.<sup>3,5</sup></li> <li>• Immunocompromised patients will need both vaccines.<sup>3,5</sup></li> </ul> </li> <li>• To find out who gets what and when, see our charts of adult pneumococcal vaccination recommendations. (U.S.) (Canada)</li> <li>• Screen for pneumonia vaccine eligibility when adults present for their flu shot. They can be given at the same visit.<sup>1,2</sup></li> <li>• Encourage adults to document their pneumonia vaccination history on their med list to prevent duplication.</li> <li>• Encourage use of pneumonia vaccine standing orders. See <a href="http://www.immunize.org/catg.d/p3066.pdf">http://www.immunize.org/catg.d/p3066.pdf</a> for help.</li> </ul>
<p>Educate patients about pneumonia and pneumonia vaccination.</p>	<ul style="list-style-type: none"> <li>• Get information for patients about pneumonia and pneumonia vaccination from the CDC at <a href="https://www.cdc.gov/pneumococcal/index.html">https://www.cdc.gov/pneumococcal/index.html</a>, and from the Public Health Agency of Canada at <a href="https://www.canada.ca/en/public-health/services/immunization/vaccine-preventable-diseases/invasive-pneumococcal-disease.html">https://www.canada.ca/en/public-health/services/immunization/vaccine-preventable-diseases/invasive-pneumococcal-disease.html</a>.</li> <li>• Get a pneumococcal vaccine waiting room poster and fact sheets about pneumococcal disease and vaccination for patients and parents from the CDC at <a href="http://www.cdc.gov/pneumococcal/resources/print.html">http://www.cdc.gov/pneumococcal/resources/print.html</a>.</li> <li>• For help discussing pneumonia vaccination with U.S. patients age 65 years and older, get our handout, <i>I'm a Senior. Which Pneumonia Vaccine Do I Need?</i></li> </ul>
<p>Help patients quit smoking.</p>	<ul style="list-style-type: none"> <li>• For practical tips and resources to help your patients successfully quit smoking see our toolbox, <i>Smoking Cessation: Helping Patients Who Use Tobacco</i>.</li> </ul>

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Goal	Suggested Strategies or Resources
<b>Control high-risk chronic diseases that put patients at risk for pneumonia.</b>	
Asthma	<ul style="list-style-type: none"> <li>• Dose asthma medications correctly. Get our chart, <i>Comparison of Inhaled Asthma Meds</i> (U.S. Subscribers)(Canadian Subscribers), for help.</li> <li>• Our toolbox, <i>Improving Asthma Care</i>, suggests strategies and resources to educate patients, ensure patients are on the right medications for their disease severity, treat exacerbations, and meet other therapeutic goals.</li> <li>• The Global Initiative for Asthma Management and Prevention is available at <a href="http://www.ginasthma.org">http://www.ginasthma.org</a>.</li> <li>• Canadian asthma guidelines are available from the Canadian Thoracic Society at <a href="https://cts-sct.ca/guideline-library/">https://cts-sct.ca/guideline-library/</a>.</li> <li>• Get the NHLBI's National Asthma Education and Prevention Program available at <a href="http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf">http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf</a>.</li> </ul>
COPD	<ul style="list-style-type: none"> <li>• Get our toolbox, <i>Improving COPD Care</i>, for suggested strategies or resources to educate patients, ensure patients are on the best medications for their disease severity, treat exacerbations, and meet other therapeutic goals.</li> <li>• Get COPD guidelines from the Global Initiative for Chronic Obstructive Lung Disease at <a href="http://www.goldcopd.org">http://www.goldcopd.org</a>.</li> <li>• Guidelines for prevention of acute COPD exacerbations from the American College of Chest Physicians and the Canadian Thoracic Society are available at <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4388124/pdf/chest_147_4_894.pdf">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4388124/pdf/chest_147_4_894.pdf</a>.</li> </ul>
Diabetes	<ul style="list-style-type: none"> <li>• See our toolbox, <i>Improving Diabetes Outcomes</i>, for practical tips and resources to help care for your diabetes patients.</li> <li>• Get our algorithm, <i>Initiation and Adjustment of Insulin Regimens for Type 2 Diabetes</i> (U.S. Subscribers)(Canadian Subscribers).</li> <li>• Get our chart, <i>Comparison of Insulins</i> (U.S. Subscribers)(Canadian Subscribers).</li> </ul>
Heart Failure	<ul style="list-style-type: none"> <li>• Get our toolbox, <i>Improving Heart Failure Care</i>, for target doses of heart failure meds, tools to help educate patients, and other resources to improve patient care and prevent readmissions.</li> </ul>

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Goal	Suggested Strategies or Resources
Empower pneumonia patients for outpatient self-care, help them identify when to seek additional care, and help them prevent future episodes.	<ul style="list-style-type: none"> <li>• Give patients our customizable patient education handout, <i>What I Need to Know About Pneumonia</i>.</li> <li>• Give inpatients, at hospital discharge, a customizable patient handout, <i>Taking Care of Myself, a Guide for When I Leave the Hospital</i>, from the Agency for Healthcare Research and Quality at <a href="http://www.ahrq.gov/patients-consumers/diagnosis-treatment/hospitals-clinics/goinghome/index.html">http://www.ahrq.gov/patients-consumers/diagnosis-treatment/hospitals-clinics/goinghome/index.html</a>.</li> <li>• Get patient information about pneumococcal disease from the CDC at <a href="http://www.cdc.gov/pneumococcal/about/index.html">http://www.cdc.gov/pneumococcal/about/index.html</a>.</li> <li>• Get patient information about community-acquired pneumonia from the National Library of Medicine at <a href="http://www.nlm.nih.gov/medlineplus/ency/article/000145.htm">http://www.nlm.nih.gov/medlineplus/ency/article/000145.htm</a>.</li> </ul>
Triage patients for possible hospital admission.	<ul style="list-style-type: none"> <li>• Utilize pneumonia severity tools to help determine if outpatient treatment is appropriate: <ul style="list-style-type: none"> <li>• Get the Pneumonia Severity Index (PSI) at <a href="https://www.mdcalc.com/psi-port-score-pneumonia-severity-index-cap">https://www.mdcalc.com/psi-port-score-pneumonia-severity-index-cap</a>. The PSI is recommended over CURB-65 by the ATS/IDSA pneumonia guidelines.<sup>6</sup></li> <li>• Get the CURB-65 Score for Pneumonia Severity at <a href="https://www.mdcalc.com/curb-65-score-pneumonia-severity">https://www.mdcalc.com/curb-65-score-pneumonia-severity</a>.</li> </ul> </li> <li>• Get <i>Community-Acquired Pneumonia Clinical Decision Support Implementation Toolkit</i> from the Agency for Healthcare Research and Quality at <a href="https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/ambulatory-care/cap-toolkit.html">https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/ambulatory-care/cap-toolkit.html</a>.</li> </ul>
Choose appropriate antibiotics.	<ul style="list-style-type: none"> <li>• Get our chart, <i>Treatment of Community-Acquired Pneumonia in Adults</i>, for a review of the 2019 ATS/IDSA community-acquired pneumonia guidelines.</li> <li>• Omadacycline (<i>Nuzyra</i>) and lefamulin (<i>Xenleta</i>) are not superior to older options, their safety is not as well-established, and their role in outpatient pneumonia needs further study.<sup>6</sup> <i>Baxdela</i> (delafloxacin [U.S.]) has not been proven superior to older options, and has similar warnings as other quinolones.<sup>4</sup> (<i>Baxdela</i> is not addressed in the 2019 ATS/IDSA guidelines. <i>Baxdela</i> was approved for CAP after guideline publication.)</li> </ul>
Fine-tune the treatment spectrum as soon as possible.	<ul style="list-style-type: none"> <li>• Get our chart, <i>Treatment of Community-Acquired Pneumonia in Adults</i>, for guidance on <b>urinary antigen testing</b> (<i>Legionella</i>, Pneumococcus), sputum culture, and the role of procalcitonin. This guidance is from the 2019 ATS/IDSA guidelines, which do not address immunocompromised patients. The CDC recommends checking a urinary antigen test and culturing a lower respiratory specimen for <i>Legionella</i> in patients who are immunocompromised.<sup>14</sup> For more information from the CDC on testing for <i>Legionella</i>, see <a href="https://www.cdc.gov/legionella/clinicians/diagnostic-testing.html">https://www.cdc.gov/legionella/clinicians/diagnostic-testing.html</a>. <ul style="list-style-type: none"> <li>• The urinary antigen test is 95% to 100% specific for <i>L. pneumophila</i> serogroup 1 (Lp1), which may account for over 80% of <i>Legionella</i> cases.<sup>14</sup></li> </ul> </li> <li>• In patients with a positive influenza test, no evidence of a bacterial pathogen, and early clinical stability, consideration could be given to discontinuation of antibiotic treatment at 48 to 72 hours.<sup>6</sup></li> </ul>

More . . .

Goal	Suggested Strategies or Resources
Prevent interactions with antibiotics.	<ul style="list-style-type: none"><li>• See our chart, <i>Antimicrobial Drug Interactions and Warfarin</i>, for help preventing and managing warfarin interactions.</li><li>• Our charts, <i>Cytochrome P450 Drug Interactions</i> and <i>P-glycoprotein Drug Interactions</i>, can help you check for interactions.</li><li>• For help identifying drugs or combos that may increase torsades risk, see our chart, <i>Drug-Induced Long QT Interval</i>.</li></ul>
Ensure patients stay on their medications.	<ul style="list-style-type: none"><li>• See our toolbox, <i>Medication Adherence Strategies</i>.</li><li>• See our patient education handout, <i>Tips for Sticking With Your Meds</i>.</li></ul>
Restrict use of meds associated with increased pneumonia risk.	<ul style="list-style-type: none"><li>• Use medications associated with increased pneumonia risk (e.g., proton pump inhibitors, inhaled corticosteroids, benzodiazepines, antipsychotics, anticholinergics) only when clearly needed.<sup>7-10,12</sup></li></ul>
Prevent avoidable hospital readmissions.	<ul style="list-style-type: none"><li>• See our toolbox, <i>Reducing Hospital Readmissions</i>. This document includes information about providing and billing for transitional care and chronic care management services.</li><li>• Call the patient within two business days of discharge, and see patient within a week of discharge from the hospital.</li><li>• Ensure patient’s chronic illnesses are tuned up.</li><li>• Review current med list and assess adherence.</li></ul>

*Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.*





*More . . .*

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## What I Need to Know About Pneumonia

Pneumonia is a lung infection. Symptoms include fever, chills, sweats, cough, pain with breathing or coughing, and shortness of breath. You might also have a headache or feel tired. You might not feel like eating. Contact your prescriber right away if you have these symptoms.

If you have pneumonia, you will take one or two antibiotics. Your prescriber or pharmacist can fill in the antibiotic names, doses, and directions for you below. You will be taking:

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Start taking the antibiotic as soon as possible. Don't miss doses. Ask what to do if you miss a dose.

Take the antibiotic until it is gone, even if you feel better. Your prescriber will probably want you to take your other medications as usual. If you have a chronic disease like diabetes, or lung or heart disease, keep it under good control.

Your prescriber might also want you to:

- Drink fluids to avoid dehydration.
- Avoid alcohol and cough and cold medicines.
- Take deep breaths and cough at least each hour.
- Use a humidifier to make warm, moist air.
- Avoid smoking.
- Rest. If resting in bed, turn over or get up at least every hour while awake.
- Take acetaminophen (*Tylenol*, others), ibuprofen (*Motrin IB*, others), or naproxen (*Aleve*, others) for fever or pain.

If any of these things happen, call your prescriber at \_\_\_\_\_. If you cannot reach him or her, get medical attention right away.

- New or worsening shortness of breath.
- New or worsening pain with breathing or coughing.
- Chest pain.
- Confusion.
- Blue lips.
- You cough up bloody or rust-colored mucus.
- Shaking chills, night sweats, or fever that is new, worsens, or doesn't improve.

Follow up with your prescriber on \_\_\_\_\_.

To prevent future episodes of pneumonia, you should:

- Get a flu shot every year.
- Ask your prescriber if a pneumonia shot is right for you.
- If you smoke, quit.
- Stay healthy. Get lung disease, heart disease, and diabetes under control.
- Wash your hands often. Practice good hygiene.

*[This handout may not cover all possible information. It does not replace the need for professional medical care. Always follow the instructions from your healthcare provider.]* [November 2013 (last reviewed November 2019); 291205]