Diagnosis

Pneumonia is lung inflammation described as infiltrates on chest x-ray.

Signs and symptoms of pneumonia include:
- New or worsening shortness of breath or cough, often with sputum production
- Fever (temperature >100°F or repeated temperatures above resident’s baseline)
- Decreased room air pulse oximetry (or increased oxygen requirements)
- Pleuritic chest pain (pain with breathing) in the chest, upper abdomen, or back

In adults, about 75% of pneumonia is caused by bacteria and 25% is caused by viruses.
- A positive test for a respiratory virus (e.g., influenza, COVID-19) in a resident with infiltrates on chest x-ray usually indicates viral pneumonia.
- Fewer than 15% of nursing home residents have bacterial and viral pneumonia at the same time.

Evaluation for Suspected Pneumonia

- Pulse oximetry to evaluate for decreased oxygenation
- CBC to evaluate for increased white blood cell count or presence of bands
- Chest x-ray; a new infiltrate suggests pneumonia; helpful to compare to prior imaging
- Sputum Gram stain and culture
- Test for influenza (particularly during peak influenza season, October–March) and COVID-19 or can send a respiratory viral panel if available
- *Streptococcus pneumoniae* urinary antigen, *Legionella* urinary antigen (if available)

Treatment for Bacterial Pneumonia

- Supportive care: cough suppressants, fluids, supplemental oxygen, nebulizer treatments, chest physical therapy
- Residents with influenza should receive oseltamivir
- Residents who are generally in reasonable health and who have not been hospitalized or exposed to broad-spectrum antibiotics in the previous 90 days, consider:
  - Amoxicillin-clavulanic acid or a second or third generation oral cephalosporin for 5–7 days PLUS doxycycline (for 5–7 days) or azithromycin (for 3 days)
  - If severe penicillin allergy: moxifloxacin or levofloxacin for 5–7 days
- Residents with risk factors for resistant Gram-negative bacteria (hospitalized or broad-spectrum antibiotics in the previous 90 days, history of *Pseudomonas*, immunocompromised, bronchiectasis, or tracheostomy), consider:
  - Cefepime or piperacillin-tazobactam for 7 days PLUS doxycycline (for 7 days) or azithromycin (for 3 days)
  - If severe penicillin allergy: levofloxacin
- If severe illness, consider adding vancomycin OR linezolid to either of the above regimens (for coverage of methicillin-resistant *Staphylococcus aureus*)
- Longer treatment courses than those recommended do not improve outcomes
- Modify therapy if microbiology results indicate a narrower-spectrum agent can be used
- Consider hospital transfer if no clinical improvement within 24 hours of starting antibiotics or clinical instability (e.g., unable to maintain O2 saturation, hypotension, tachycardia)

*Recommend determining allergy risk and prescribing beta-lactam antibiotics if low risk. Fluoroquinolones may cause several serious side effects such as *Clostridioides difficile* infections, prolonged QTc intervals, tendinopathy and tendon rupture, aortic dissections, seizures, or peripheral neuropathy.


