

Pneumonia: IDSA/ATS Guideline on the Management of Adults with Hospital-Acquired and Ventilator-Associated Pneumonia (2016)

About the Guidelines

- These guidelines are intended for use by healthcare professionals who care for patients at risk for hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP).
- While patients with HAP and VAP belong to two distinct groups, both HAP and VAP are considered pneumonia. HAP is hospital-acquired but not ventilator-associated pneumonia.
- A total of 20 subject matter experts comprised the full panel. The guideline makes 18 strong and 25 weak (conditional) recommendations.
- Proper care and course of action are necessary with patients who develop HAP/VAP, especially in the intensive care unit (ICU), where mortality rates can climb.

Key Clinical Considerations

Become familiar with the recommendations and best-practice statements provided in this guideline, especially if you work in an acute care setting.

- Antibiotic dosing should be determined by the patient's weight and blood concentration data.
- A 7-day course of antibiotic therapy for both HAP and VAP is recommended.
- For treatment of both HAP and VAP, it is recommended that all hospitals regularly develop a local antibiogram (resistance pattern of commonly seen organisms in their area) and base empiric treatment on those findings as opposed to treating patients empirically without consideration for those findings.
- Evaluate daily for de-escalation, or narrowing, of antibiotics based on pathogen identification and clinical improvement.
- For patients with ventilator-associated tracheobronchitis, antibiotic therapy is not recommended.

Diagnosis

- The preferred method to diagnose HAP and VAP is noninvasive sampling (endotracheal aspiration [as opposed to acquiring samples by bronchoscopy]) with cultures.
- Hold antibiotics for patients whose sputum cultures were obtained invasively but whose cultures do not display the threshold number of pathogens to warrant antibiotic treatment.
- When deciding whether to initiate antibiotic therapy for HAP/VAP, clinical criteria alone is preferred over the use of clinical criteria *plus* the modified clinical pulmonary infection score (CPIS) or biomarkers such as serum procalcitonin (PCT), soluble triggering receptor expressed on myeloid cells (sTREM-1), or C-reactive protein (CRP).

Antibiotic therapy for suspected ventilator-associated pneumonia (VAP)

- For suspected methicillin-sensitive *Staphylococcus aureus* (MSSA) VAP, empiric treatment should include coverage for *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and other gram-negative bacilli.
- In patients at risk for antimicrobial resistance, ensure they have two prescribed antipseudomonal antibiotics from different classes.
- For *P. aeruginosa*, use only one pathogen-specific antibiotic-based susceptibility test.

- For patients in septic shock, combination therapy may be used.
- Avoid aminoglycosides and colistin if other agents with adequate gram-negative activity are available.

Antibiotic therapy for gram-positive microbes with MRSA activity

Choose one of the following:

- Vancomycin 15 mg/kg IV every 8-12 hours (consider a loading dose of 25-30 mg/kg × 1 for severe illness)
- Linezolid 600 mg IV every 12 hours

Antibiotic therapy for gram-negative microbes with antipseudomonal activity: β -lactam-based agents

Use one of the following agents as monotherapy with antibiotic susceptibility testing, and use two for dual therapy when there is no antibiotic testing or treatment is used for septic shock:

- Piperacillin-tazobactam 4.5 g IV every 6 hours
OR
- Cefepime 2 g IV every 8 hours; or ceftazidime 2 g IV every 8 hours
OR
- Imipenem 500 mg IV every 6 hours; or meropenem 1 g IV every 8 hours
OR
- Aztreonam 2 g IV every 8 hours

Antibiotic therapy for gram-negative microbes with antipseudomonal activity: Non- β -lactam-based agents

Use one of the following agents as monotherapy:

- Ciprofloxacin 400 mg IV every 8 hours; or levofloxacin 750 mg IV every 24 hours
OR
- Amikacin 15-20 mg/kg IV every 24 hours; or gentamicin 5-7 mg/kg IV every 24 hours; or tobramycin 5-7 mg/kg IV every 24 hours
OR
- Colistin 5 mg/kg IV × 1 (loading dose), followed by 2.5 mg × (1.5 × CrCl + 30) IV every 12 hours (maintenance dose); or polymyxin B 2.5-3 mg/kg/d divided into 2 daily IV doses

Inhaled antibiotic therapy

- Use a combination of both inhaled and systemic antibiotics when patients with VAP have gram-negative bacilli that are susceptible only to aminoglycosides or polymyxins.
- Colistin for inhalation should be administered promptly after being mixed with sterile water.

Antibiotic pathogen-specific therapy for hospital-acquired pneumonia (HAP)

- Therapy needs to be selected based on the results of antimicrobial susceptibility of the respiratory specimen as opposed to empiric coverage alone.
- If the patient has a severe penicillin allergy and aztreonam will be used instead of any β -lactam-based antibiotic, make sure to include coverage for MSSA.

No high risk of mortality and no factors increasing the likelihood of MRSA

Use one of the following:

- Piperacillin-tazobactam 4.5 g IV every 6 hours
- Cefepime 2 g IV every 8 hours

- Levofloxacin 750 mg IV daily
- Imipenem 500 mg IV every 6 hours
- Meropenem 1 g IV every 8 hours

No high risk of mortality but with factors increasing the likelihood of MRSA

Use one of the following:

- Piperacillin-tazobactam 4.5 g IV every 6 hours
- Cefepime 2 g IV every 8 hours
- Ceftazidime 2 g IV every 8 hours
- Levofloxacin 750 mg IV daily
- Ciprofloxacin 400 mg IV every 8 hours
- Imipenem 500 mg IV every 6 hours
- Meropenem 1 g IV every 8 hours
- Aztreonam 2g IV every 8 hours

Plus one of the following:

- Vancomycin 15 mg/kg IV every 8-12 hours, with goal to target 15-20 mg /mL trough level (consider a loading dose of 25-30 mg/kg × 1 for severe illness)
- Linezolid 600 mg IV every 12 hours

High risk of mortality or patient received intravenous antibiotics in the past 90 days

Use two of the following, but avoid two β-lactams:

- Piperacillin-tazobactam 4.5 g IV every 6 hours
- Cefepime or ceftazidime 2 g IV every 8 hours
- Levofloxacin 750 mg IV daily
- Ciprofloxacin 400 mg IV every 8 hours
- Imipenem 500 mg IV every 6 hours
- Meropenem 1 g IV every 8 hours
- Amikacin 15-20 mg/kg IV daily
- Gentamicin 5-7 mg/kg IV daily
- Tobramycin 5-7 mg/kg IV daily
- Aztreonam 2 g IV every 8 hours

Plus one of the following:

- Vancomycin 15 mg /kg IV every 8-12 hours, with goal to target 15-20 mg /mL trough level (consider a loading dose of 25-30 mg/kg IV × 1 for severe illness)
- Linezolid 600 mg IV every 12 hours

If MRSA coverage is not used, include coverage for MSSA. Piperacillin-tazobactam, cefepime, levofloxacin, imipenem, meropenem, oxacillin, nafcillin, and cefazolin are preferred, but ordinarily would not be used for empiric treatment of HAP.

Reference

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