THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

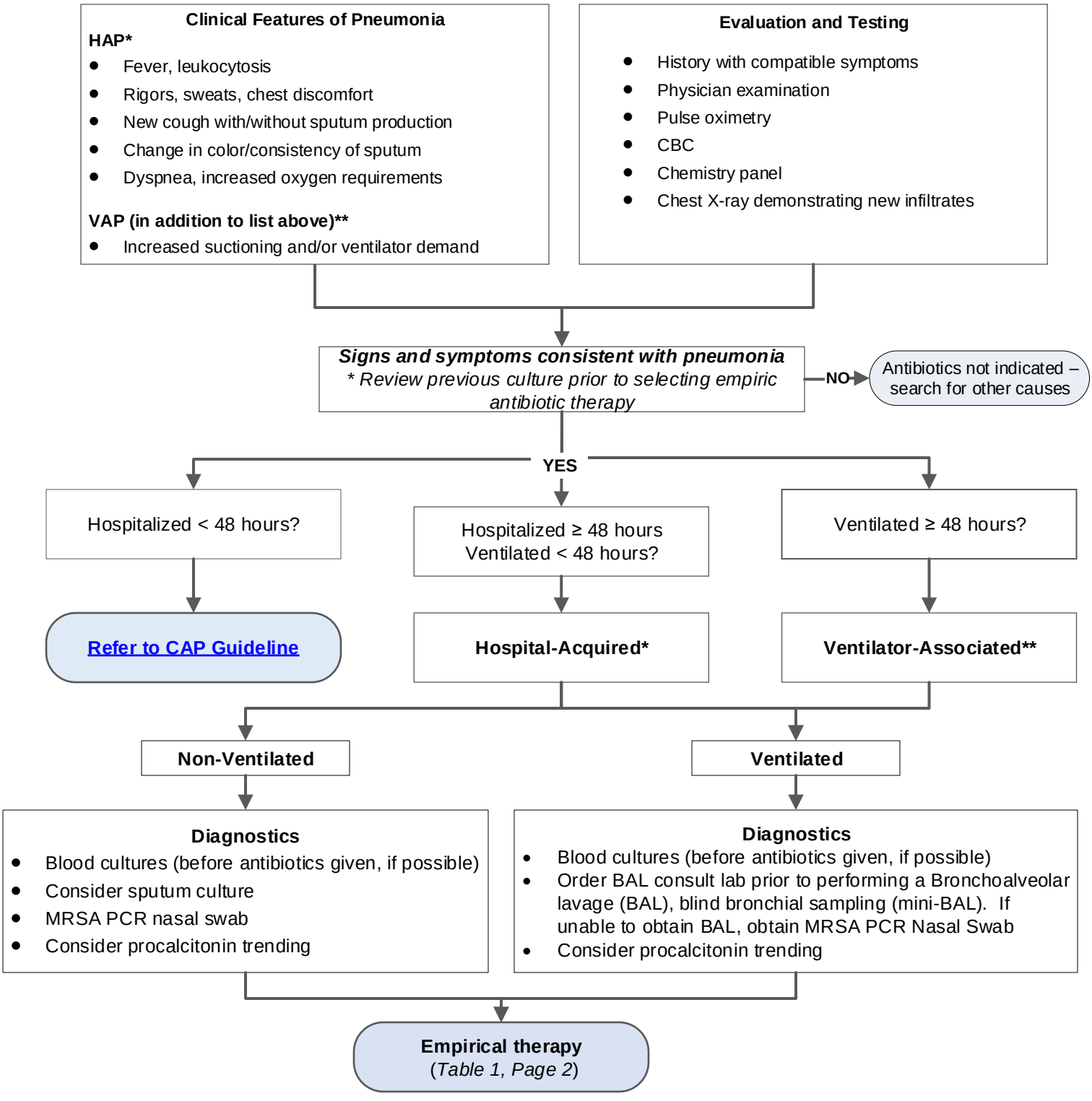
# Evaluation and Initial Management of Hospital-Acquired and Ventilator-Associated Pneumonia (HAP/VAP)

## Purpose of Guideline

- To assist in guiding appropriate diagnostic workup, initial antibiotic selection, and follow-up treatment for patients with HAP or VAP.
- This guideline is for **hospital-acquired** infection. Patients with healthcare-associated pneumonia, including those admitted from a long term care or skilled nursing facility may require alternative management.

## Key Points

- Triple antibiotic coverage should be used for patients at risk for multi-drug resistant Gram Negative infection (Page 2).
- Seven days is the recommended treatment duration in most cases (Page 3).
- **Do not** delay antimicrobial administration if cultures cannot be obtained.



# Empiric Antibiotic Selection for Hospital-Acquired and Ventilator-Associated Pneumonia

*Dosing guidance can be found within the Adult Antimicrobial Dosing Guideline.*

**Table 1: Hospital-Acquired and Ventilator-Associated Pneumonia Therapy**
All patients should receive coverage against **MRSA** and ***Pseudomonas***.
**Note: Review previous cultures prior to selecting therapy.**

| STEP 1 | FIRST Antibiotic | Notes |
|---|---|---|
| **Order MRSA-Directed / Gram Positive Therapy** | Vancomycin | A loading dose may be needed. |
| **STEP 2** | **SECOND Antibiotic** | **Notes** |
| **Order ONE Pseudomonas-Directed/ Gram Negative Therapy** | Piperacillin/Tazobactam<br>OR | |
| | Cefepime<br>OR | **Indication:**<br>▪ If non-anaphylactic penicillin allergy or febrile neutropenia, use cefepime.<br>▪ If aspiration suspected, add anaerobic coverage with metronidazole or clindamycin. |
| | Aztreonam<br>OR | **Indication:**<br>▪ If anaphylactic penicillin allergy and/or cephalosporin allergy, use Aztreonam*.<br>▪ If aspiration suspected, add anaerobic coverage with metronidazole or clindamycin. |
| **STEP 3** | **THIRD Antibiotic** | **Notes** |
| **Order Third Agent ONLY if patient is at risk for multi-drug resistant (MDR) gram negative infection based on indications below** | Tobramycin<br>OR<br>Polymyxin B | ▪ Polymyxin B therapy should be considered over Tobramycin in patients with a history of multidrug-resistant (MDR) gram negative respiratory infections or residence at a long-term care or extended-care facility. |

**Indications for Third Antibiotic**
(If patient meets one or more indication below add a third antibiotic)

| Hospital-Associated | Ventilator-Associated |
|---|---|
| ▪ Septic shock<br>▪ Prior broad-spectrum IV antibiotic use within 90 days (e.g. cefepime, piperacillin/tazobactam)<br>▪ History of *Pseudomonas* or MDR gram negative pathogen<br>▪ Respiratory failure requiring ventilator support<br>▪ Structural lung disease: e.g. bronchiectasis, cystic Fibrosis<br>▪ If Aztreonam* selected due to penicillin allergy add second gram negative agent. (See Step 3) | ▪ Septic shock<br>▪ Prior broad-spectrum IV antibiotic use within 90 days (e.g. cefepime, piperacillin/tazobactam)<br>▪ History of *Pseudomonas* or MDR gram negative pathogen<br>▪ Acute respiratory distress syndrome (ARDS) preceding VAP<br>▪ ≥ 5 days of hospitalization prior to VAP<br>▪ Acute renal replacement therapy prior to VAP<br>▪ If Aztreonam* selected due to penicillin allergy add second gram negative agent. (See Step 3) |

## De-escalation and Duration of Therapy

- **De-escalate and direct therapy based on the following culture results:**
  - If a quantitative BAL is obtained, therapy should be reserved for organisms with >$10^4$ colony-forming units.
  - If MRSA PCR Nasal Swab is negative consider discontinuing empiric MRSA coverage.
- **Indications for transition to oral antibiotic therapy (see IV to PO Conversion Policy).**
  - Attention should be given to interactions with food and tube feedings. The following criteria are proposed based on national and institutional guidelines:
    - Eating solid/oral food or tolerating tube feedings at goal
    - Absence of intractable nausea/vomiting, malabsorption syndrome, or significant vasopressor support which may impact enteral absorption
    - Hemodynamically stable
- **Seven days is the recommended duration for most patients**. Longer therapy should be considered in the following situations:
  - Delayed clinical response
  - Empiric therapy resistance
  - Empyema
  - Recurrence
  - Extrapulmonary manifestations
  - Severely immunocompromised

## Clinical Considerations

- **Review previous cultures prior to selecting therapy**. Patients with a recent history of respiratory infections secondary to *Stenotrophomonas, Acinetobacter, Burkholderia,* ESBL-producing organisms, or pathogens otherwise resistant to one or more of the options listed should have their empiric treatment tailored to known susceptible agents.
- **Consider Infectious Diseases consult** if lack of clinical response or evidence or history of resistant pathogen(s) (e.g. MDR *Pseudomonas*), or Immunocompromised patients.
  - Refer to the MDRO Treatment Table for further guidance on resistant pathogens.
- **Administer appropriate antibiotics within one hour, particularly for patients in septic shock**. See Initial Sepsis Management Guideline and Infection by Site Antibiotic Grid. Evaluate response to antibiotics after 48 hours and tailor accordingly.

## References


- Management of Adults with Hospital-Acquired and Ventilator-Associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society. *CID* 2016;63(5):e61-111.


## Quality Measures

- Percentage of HAP/VAP patients with respiratory cultures
- Percentage of HAP/VAP patients without respiratory cultures with MRSA Nasal Swab
- Orderset use

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## Order Sets and Resources

- OSU IP MED: Nosocomial Pneumonia (HAP/VAP) [2557], *order set under revision*
- Initial Sepsis Management Guideline
- Blood Culture Indication Guideline (pending)
- OSUMC Drug Formulary
- Hospital Antibiogram
- Antimicrobial Stewardship Resources: Infection by Site, MDRO Treatment Table

## Guideline Approved

April 25, 2018. First Edition.