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## Select Recommendations for Patients With HAP/VAP

Recommendation	Recommendation strength	Quality of evidence
Antibiotic dosing should be determined using PK/PD data.	Weak	Very low
MRSA HAP/VAP should be treated with vancomycin or linezolid.	Strong	Moderate
Antibiotic therapy should be de-escalated rather than fixed.	Weak	Very low
Use PCT levels plus clinical criteria to guide discontinuation of antibiotic therapy.	Weak	Low
<b>HAP/VAP due to <i>P. aeruginosa</i></b>		
Antibiotic choice for definitive therapy should be based upon results of antimicrobial susceptibility testing.	Strong	Low
Prescribe monotherapy using an antibiotic to which the isolate is susceptible for patients not in septic shock or at high risk for death.	Strong	Low
Prescribe combination therapy using two antibiotics to which the isolate is susceptible for patients who remain in septic shock or at high risk for death when the results of antibiotic susceptibility testing are known.	Weak	Very low
Do not use aminoglycoside monotherapy.	Strong	Very low
<b>HAP/VAP due to ESBL-producing gram-negative bacilli</b>		
The choice of an antibiotic for definitive therapy should be based upon the results of antimicrobial susceptibility testing and patient-specific factors.	Strong	Very low
<b>HAP/VAP caused by Acinetobacter species</b>		
Use either carbapenem or ampicillin/sulbactam if the isolate is susceptible to these agents.	Weak	Low
Use IV polymyxin (colistin or polymyxin B) if the infection is sensitive only to polymyxins.	Strong	Low
Use adjunctive inhaled colistin.	Weak	Low
Do not use adjunctive rifampicin if the infection is sensitive only to colistin.	Weak	Moderate
Do not use tigecycline.	Strong	Low

**Abbreviations:** ESBL, extended-spectrum  $\beta$ -lactamase; HAP/VAP, hospital-acquired pneumonia/ventilator-associated pneumonia; PK/PD, pharmacokinetic/pharmacodynamic.

**Source:** Adapted from: Kalil A, et al. *Clin Infect Dis*. 2016;63:e61-e111.

# Diagnosing VAP

- **VAP is a Nosocomial Pneumonia = Hospital acquired**
- **Diagnosis is imprecise and usually based on a Combination of:**
  - Clinical factors - fever or hypothermia; change in secretions; cough; apnea/bradycardia; tachypnea
  - Microbiological factors - positive cultures of blood/sputum/tracheal aspirate/pleural fluids
  - CXR factors - new or changing infiltrates

### Controversies over HCAP Status

- The rationale for inclusion (2005) - both the patients (HAP & HCAP) contact with the healthcare system and the presumed high risk of MDR pathogens, guidelines for these patients were included with guidelines for HAP and VAP.
- There is increasing evidence from a growing number of studies that many patients defined as having HCAP are not at high risk for MDR pathogens

Chalmers et al. 2005. The rationale for inclusion (2005) - both the patients (HAP & HCAP) contact with the healthcare system and the presumed high risk of MDR pathogens, guidelines for these patients were included with guidelines for HAP and VAP. There is increasing evidence from a growing number of studies that many patients defined as having HCAP are not at high risk for MDR pathogens.

**Table 1. Recommended Initial Empiric Antibiotic Therapy for Hospital-Acquired Pneumonia (HAP) and Ventilator-Associated Pneumonia (VAP)**

Site of Infection	Empiric Therapy	Duration
HAP	Vancomycin 15 mg/kg q12h + Piperacillin-tazobactam 4.5 g q6h	7-10 days
VAP	Vancomycin 15 mg/kg q12h + Piperacillin-tazobactam 4.5 g q6h	7-10 days
MRSA HAP/VAP	Vancomycin 15 mg/kg q12h + Linezolid 600 mg q12h	7-10 days
ESBL-producing HAP/VAP	Meropenem 1 g q8h + Ceftazidime 2 g q8h	7-10 days
Acinetobacter HAP/VAP	Meropenem 1 g q8h + Polymyxin B 4 mg/kg q8h	7-10 days
Colistin HAP/VAP	Colistin 9 million IU q12h	7-10 days
Respiratory tract cultures	None	None
Antimicrob Agents Chemother 2014; 58:5262-8. • Yap V, Datta D, Mettersky ML. Is the present definition of health care-associated pneumonia the best way to define risk of infection with antibiotic-resistant pathogens? Infect Dis Clin North Am 2013; 27:1-18. • Jones BE, Jones MM, Huttner B, et al. Trends in antibiotic use and nosocomial pathogens in hospitalized veterans with pneumonia at 128 medical centers, 2006-2010. Clin Infect Dis 2015; 61:1403-10. 19. Valles J, Martin-Loeches I, Torres A, et al. Epidemiology, antibiotic therapy and clinical outcomes of healthcare-associated pneumonia in critically ill patients: a Spanish cohort study. Intensive Care Med 2014; 40:572-81. 15-19. 9. HCAP Controversies 2 - Although interaction with the healthcare system is potentially a risk for MDR pathogens, underlying patient characteristics are also important independent determinants of risk for MDR pathogens • Chalmers JD, Rother C, Salih W, Ewig S. Healthcare-associated pneumonia does not accurately identify potentially resistant pathogens: a systematic review and meta-analysis. Clin Infect Dis 2014; 58:330-9. • Gross AE, Van Schooneveld TC, Olsen KM, et al. Epidemiology and predictors of multidrug-resistant community-acquired and health care-associated pneumonia. Antimicrob Agents Chemother 2014; 58:5262-8. • 17. Yap V, Datta D, Mettersky ML. Is the present definition of health care-associated pneumonia the best way to define risk of infection with antibiotic-resistant pathogens? Infect Dis Clin North Am 2013; 27:1-18. 10. HCAP to be included in upcoming CAP guidelines [ATS/IDSA 2016] Finally, in light of the more recent data regarding the HCAP population, the panel anticipated that recommendations regarding coverage for MDR pathogens among community-defining patients who develop pneumonia would likely be based on validated risk factors for MDR pathogens, not solely on whether or not the patient had previous contacts with the healthcare system. For these reasons, the panel unanimously decided that HCAP should not be included in the HAP/VAP guidelines. 11. HAP/VAP/ATS/IDSA 2016 Practice guidelines. Definition - not amended. Same as 2005 guideline. All recommendations were labelled as either "strong" or "weak" (conditional) according to the GRADE approach. The words "we recommend" indicate strong recommendations and "we suggest" indicate weak recommendations. 12. MICROBIOLOGIC METHODS TO DIAGNOSE VAP/ANDHAP 13. Threshold values for cultured specimens used in the diagnosis of pneumonia Specimen collection/technique Values* Lung tissue >104 CFU/g tissue Bronchoscopically (B) obtained specimens Bronchoalveolar lavage (B-BAL) >104 CFU/ml Protected BAL (B-PBAL) >104 CFU/ml Protected specimen brushing (B-PSB) >103 CFU/ml Nonbronchoscopically (NB) obtained (blind) specimens Mini-BAL >104 CFU/ml Sputum Mild/mod, Severe growth CDC/NHSN Pneumonia (Ventilator-associated [VAP] and non-ventilator-associated Pneumonia [PNEU]) Event, January 2015, modified April 2015. 14. Should Patients With Suspected VAP Be Treated Based on the Results of Invasive Sampling (i.e., Bronchoscopy, Blind Bronchial Sampling) With Quantitative Culture Results, Non-invasive Sampling (i.e., Endotracheal Aspiration) With Quantitative Culture Results, or Non-invasive Sampling With Semi-quantitative Culture Results? Non-invasive sampling with semi-quantitative cultures to diagnose VAP. (weak recommendation, low-quality evidence). Remarks: Invasive respiratory sampling includes bronchoscopic techniques (ie, bronchoalveolar lavage [BAL], protected specimen brush [PSB]) and blind bronchial sampling (ie, mini-BAL). Noninvasive respiratory sampling refers to endotracheal aspiration. 15. If Invasive Quantitative Cultures Are Performed, Should Patients With Suspected VAP Whose Culture Results Are Below the Diagnostic Threshold for VAP (PSB With		

## IDSA HAP Guidelines

Consider de-escalation of antibiotic based on:

- 1) Results of lower respiratory tract cultures are available
- 2) Patient's clinical response

### How do you de-escalate in absence of adequate lower-respiratory cultures?

Niederman MS et al. *Am J Respir Crit Care Med*. 2005;171:388-416.

Vap idsa guidelines. Hap/vap idsa guidelines.

1. DR TINKU JOSEPH DM Resident Department of Pulmonary Medicine AIMS, Kochi 2. Introduction HAP and VAP continue to be frequent complications of hospital care. Together, they are among the most common hospital-acquired infections (HAIs), accounting for 22% of all HAIs in a multistate point-prevalence survey. [Magill SS, Edwards JR, Fridkin SK; Emerging Infections Program Healthcare-Associated Infections Antimicrobial Use Prevalence Survey Team. Survey of healthcare-associated infections. *N Engl J Med* 2014; 370:2542-3.] 3. 10% of patients who required mechanical ventilation were diagnosed with VAP. While all-cause mortality associated with VAP has been reported to range from 20% to 50%, the mortality directly related to VAP is debated. VAP prolongs length of mechanical ventilation by 7.6 to 11.5 days and prolongs hospitalization by 11.5 to 13.1 days compared to similar patients without VAP introduction 4. Top 10 causes of death 5. Ventilator-associated pneumonia (VAP) is a type of HAP that develops more than 48 to 72 hours after endotracheal intubation. Hospital-acquired (or nosocomial) pneumonia (HAP) is pneumonia that occurs 48 hours or more after admission and did not appear to be incubating at the time of admission. Definition (ATS/IDSA) guidelines 2005 6. Healthcare-associated pneumonia (HCAP) is defined as pneumonia that occurs in a non-hospitalized patient with extensive healthcare contact, as defined by one or more of the following: Intravenous therapy, wound care, or intravenous chemotherapy within the prior 30 days Residence in a nursing home or other long-term care facility Hospitalization in an acute care hospital for two or more days within the prior 90 days Attendance at a hospital or hemodialysis clinic within the prior 30 days Definition (ATS/IDSA) guidelines 2005 7. Definition Typically in studies, patients are only included if intubated greater than 48 hours Early onset= less than 4 days Late onset= greater than 4 days Endotracheal intubation increases risk of developing pneumonia by 6 to 21 fold Accounts for 90% of infections in mechanically ventilated patients American Thoracic Society, Infectious Diseases Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. 8. Controversies over HCAP Status The rationale for inclusion (2005) - both the patients (HAP & HCAP) contact with the healthcare system and the presumed high risk of MDR pathogens, guidelines for these patients were included with guidelines for HAP and VAP. 1 - There is increasing evidence from a growing number of studies that many patients defined as having HCAP are not at high risk for MDR pathogens Chalmers JD, Rother C, Salih W, Ewig S. 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