



# Effective Health Care

## Pharmacokinetic/Pharmacodynamic Measures for Guiding Antibiotic Treatment for Nosocomial Pneumonia Nomination Summary Document

### Results of Topic Selection Process & Next Steps

- Pharmacokinetic/pharmacodynamic measures for guiding antibiotic treatment for nosocomial pneumonia will go forward for refinement as a systematic review. The scope of this topic, including populations, interventions, comparators, and outcomes, will be further developed in the refinement phase.
- When key questions have been drafted, they will be posted on the AHRQ Web site and open for public comment. To sign up for notification when this and other Effective Health Care (EHC) Program topics are posted for public comment, please go to <http://effectivehealthcare.ahrq.gov/index.cfm/join-the-email-list1/>.

### Topic Description

**Nominators:** Health care professional association and an organization

**Nomination Summary:** This nomination is concerned with the growing problem of treatment failure and antibiotic resistance in persons with hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP). It addresses the use of pharmacokinetics and pharmacodynamics (PK/PD) principles for treating HAP.

**Staff-Generated PICO:**

**Population(s):** Adult patients with HAP or VAP, shock or sepsis of any severity caused by any gram-negative or gram-positive pathogen

**Intervention(s):** Higher PK/PD values of an FDA-approved antibiotic, which may include various methods of infusion as well as dosages

**Comparator(s):** Lower PK/PD values of an FDA-approved antibiotic, which may include alternative methods of infusion as well as dosages; no consideration of PK/PD measures

**Outcome(s):** Clinical response (e.g., clinical pulmonary infection score, clinical cure rate, Acute Physiology and Chronic Health Evaluation II [APACHE II] score), duration of therapy, time to clinical response, bacterial eradication, time to bacterial eradication, renal function, relapse after discontinuation of antibiotic, rate of MDR pathogens, rate of superinfection, mortality (e.g., 30-day or in-hospital mortality), rate of mechanical ventilation, length of stay.

**Key Questions from Nominator:**

1. For persons with nosocomial pneumonia (HAP, VAP, or health-care associated pneumonia) does optimization of antibiotic pharmacokinetic/pharmacodynamic parameters improve mortality and other clinical outcomes?

## Considerations

- The topic meets all EHC Program selection criteria. (For more information, see <http://effectivehealthcare.ahrq.gov/index.cfm/submit-a-suggestion-for-research/how-are-research-topics-chosen/>.)
- Hospital-acquired pneumonia (HAP) is one of the most common hospital-acquired infections and the leading cause of infection and reason for antibiotic use in the intensive care unit. HAP is associated with increased morbidity and mortality, length of stay, and costs of care despite advances in antimicrobial therapy, supportive care, and prevention. The prevalence of antibiotic-resistant bacteria continues to increase and be of concern. The optimal therapeutic regimen is essential to minimize the risk of drug resistance and treatment failure. Optimizing pharmacokinetics/pharmacodynamics (PK/PD) can increase the likelihood of obtaining adequate concentrations of the appropriate drug and enhancing outcomes for patients with HAP.
- Determining the most effective regimen and administration of initial empiric antibiotic therapy may reduce the morbidity and mortality associated with suboptimal antibiotic therapy, leading to improved outcomes and quality of life for patients with HAP, lower healthcare costs, and more standardized care in clinical areas for which substantial variability exists. A comprehensive systematic review at this time would inform clinical decision-making for patients, payers, and providers.