

HOSPITAL PHYSICIAN®

INTERNAL MEDICINE BOARD REVIEW MANUAL

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The *Hospital Physician Internal Medicine Board Review Manual* is a peer-reviewed study guide for residents and practicing physicians preparing for board examinations in internal medicine. Each manual reviews a topic essential to the current practice of internal medicine.

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Nosocomial Infections

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Nosocomial Infections

Danielle Scheurer, MD

INTRODUCTION

Nosocomial infections are a substantial cause of morbidity and mortality in the United States. According to the National Nosocomial Infections Surveillance system (NNIS), nosocomial infections rates increased 36% between 1975 and 1995 (from 7.2 to 9.8 per 1000 patient days).¹ In 1995 alone, these infections resulted in 88,000 deaths (approximately 1 death every 6 minutes) at a cost of \$4.5 billion. The rise in nosocomial infection rates has been attributed to an aging population, an increase in the number of immunocompromised patients, and the greater number of invasive interventions being used. These factors, combined with overuse of antibiotics and underutilization of infection control strategies, have resulted in a burgeoning of the number and severity of nosocomial infections.¹ Urinary tract infections, surgical site infections, pneumonia, and bloodstream infections account for 80% of nosocomial infections, a statistic that has not changed substantially in the past 25 years.¹ *Clostridium difficile* infection has also become a major nosocomial problem in the last 10 years, with a substantial recent rise in associated morbidity and mortality. In addition, the emergence of multidrug-resistant (MDR) organisms has compounded the complexity of treating these patients.

NOSOCOMIAL PNEUMONIA

CASE PRESENTATION

A 72-year-old male nursing home resident with a history of chronic obstructive pulmonary disease (COPD) and gastroesophageal reflux disease was admitted with diarrhea and weight loss. He was unable to maintain an adequate intake, so nasogastric feeds were initiated on hospital day 3. Over the next few days, he was tolerating his feeds and maintaining his weight, but on hospital day 8 he developed a new fever. On examination, he was confused and combative, with tachypnea, diffuse wheezing, and coarse rhonchi.

• What is the epidemiology of nosocomial pneumonia?

Nosocomial pneumonia is the second most common nosocomial infection in the United States. It occurs in 5 to 10 per 1000 admissions and has the highest nosocomial infection mortality rate, ranging from 20% to 70%. Patients afflicted with nosocomial pneumonia have a mean increase in length of stay of 7 to 9 days at a cost of approximately \$40,000 per episode.² The spectrum of nosocomial pneumonia includes hospital-acquired pneumonia (HAP), occurring more than 48 hours after admission, ventilator-associated pneumonia (VAP), occurring more than 48 hours after intubation, and health care-associated pneumonia, a recently recognized entity that includes patients with at least 1 of the risk factors listed in Part E of **Table 1**.²⁻⁴ These patients were previously classified as having community-acquired pneumonia, but it has been shown that their disease has epidemiologic characteristics more consistent with nosocomial pathogens.⁵ The case patient meets criteria for both HAP and health care-associated pneumonia since he has been hospitalized for more than 48 hours and he is a resident of a nursing home.

The organisms implicated in nosocomial pneumonia are listed in **Table 2**. The majority of cases are bacterial with very few anaerobes. Cases of fungi (usually *Candida*) and viruses (usually influenza) are rare in immunocompetent patients. Data published from 1991 showed the most common organism implicated in nosocomial pneumonia was *Pseudomonas aeruginosa* followed closely by *Staphylococcus aureus*, together of which accounted for about one third of cases.^{3,6} Data from a more recent study, depicted in **Table 2**, documents a rise in gram-positive organisms (primarily *S. aureus*). Although this study likely underestimated atypical organisms (due to the sole reliance on microbiologic and not serologic diagnostics), approximately half of nosocomial pneumonias were due to gram-positive organisms (primarily *S. aureus*), and the other half were due to gram-negative organisms (half of which were *P. aeruginosa*).⁵ Of note, methicillin-resistant *S. aureus* (MRSA) accounted for between 34% and 57% of all *S. aureus* isolates in nosocomial infections.⁵