

Nosocomial Pneumonia

Lessons Learned

Girish B. Nair, MD^a, Michael S. Niederman, MD^{b,c,*}

KEYWORDS

- Nosocomial pneumonia • Hospital-acquired pneumonia
- Ventilator-associated pneumonia • Health care-associated pneumonia
- Ventilator-associated complications • Prevention • Antimicrobial treatment

KEY POINTS

- Nosocomial pneumonia is the leading cause of death from hospital-acquired infection.
- Mechanical ventilation is the most important risk factor for the development of nosocomial pneumonia.
- Health care-associated pneumonia (HCAP) affects a heterogeneous population, and not all patients require empiric broad-spectrum antibiotic therapy directed at multidrug-resistant pathogens.
- There is no gold-standard test for the diagnosis of ventilator-associated pneumonia (VAP), but use of the Clinical Pulmonary Infection Score and procalcitonin can assist in antibiotic de-escalation.
- New Centers for Disease Control and Prevention “streamlined” surveillance definitions of VAP may be useful in the diagnosis of sick patients with ventilator-associated complications, but are not specific for the diagnosis of pneumonia.
- Patients with risk factors for multidrug-resistant pathogens and diagnosed with hospital-acquired pneumonia/VAP require combination therapy with broad-spectrum antimicrobials.
- Patients should be reassessed 72 hours after initiation of treatment for VAP and HCAP, and antibiotics should be de-escalated, based on available culture and clinical data.
- Nonresponders should be evaluated for treatment failure or complications from infection.
- Use of “ventilator bundles” in the intensive care unit is associated with a significant reduction in the incidence of VAP.

^a Pulmonary and Critical Care Medicine, Winthrop-University Hospital, Mineola, NY 11501, USA; ^b Department of Medicine, Winthrop-University Hospital, 222 Station Plaza North, Suite 400, Mineola, NY 11501, USA; ^c Department of Medicine, SUNY at Stony Brook, Stony Brook, NY 11794, USA

* Corresponding author. Department of Medicine, Winthrop-University Hospital, 222 Station Plaza North, Suite 400, Mineola, NY 11501.

E-mail address: mniederman@winthrop.org

BACKGROUND

Nosocomial pneumonia (NP) is the second most common cause of nosocomial infections.¹ NP is defined as lower respiratory infection that develops in a hospitalized patient after 48 hours of admission, and was not present or incubating at the time of admission (**Table 1**).² NP includes hospital-acquired pneumonia (HAP), ventilator-associated pneumonia (VAP), and health care-associated pneumonia (HCAP). VAP is a subset of HAP, which develops at least 48 hours after endotracheal intubation. HCAP is pneumonia that develops in patients with exposure to the health care environment, such as dialysis patients and nursing home patients, and was included in the 2005 American Thoracic Society/Infectious Diseases Society of America (ATS/IDSA) guidelines as part of NP, because these patients may harbor multidrug-resistant (MDR) microorganisms. However, it has been recently appreciated that such patients represent a very heterogeneous population, and that some can be treated with antimicrobials targeted at community-acquired pathogens.³

NP imposes significant economic costs and has the highest mortality among all nosocomial infections (ranging from 20% to 50%). There are significant additional hospital costs of US\$10,019 to \$40,000 in patients who develop VAP.^{4,5} In 2010, The National Healthcare Safety Network (NHSN) reported the incidence of VAP to range from 0.0 to 5.8 per 1000 ventilator days in various hospital settings.⁶ The reported incidence is lower in comparison with previous years, possibly reflecting the use of various preventive strategies, particularly “ventilator bundles,” a set of daily interventions for intubated patients. The lower incidence may also be influenced by the recent initiatives of the Center for Medicare and Medicaid services to set up a national benchmark of “Zero VAP” and to consider VAP as a “non-reimbursable event.” However, health care institutions in many instances are underreporting episodes of VAP, even though antibiotic prescription and clinical diagnosis remains prevalent.⁷ Emerging “streamlined” surveillance definitions were introduced by the Centers for Disease Control and Prevention (CDC), and may help narrow the discrepancy that currently exists between clinical and surveillance definitions.⁸

This review discusses various issues pertaining to diagnosis, as well as newer understandings, in the treatment and prevention of NP.

Table 1

Definitions of various terms associated with nosocomial pneumonia

Hospital-acquired pneumonia	Alveolar infection that occurs 48 h or more after admission and that was not incubating at the time of admission
Ventilator-associated pneumonia	Alveolar infection that occurs more than 48 h after endotracheal intubation
Health care-associated pneumonia	Alveolar infection in patients who were hospitalized in an acute care hospital for more than 2 d within 90 d of the pneumonia; those who resided in a long-term care facility; those who had home infusion therapy, chemotherapy, or wound care within the past 30 d; those who attended a hospital or hemodialysis clinic; those with family member harboring multidrug-resistant organism

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