

Ventilator associated pneumonia

Introduction

- ICU acquired infections account for > 20% of all nosocomial infections
- ICU acquired infections account for substantial morbidity, mortality and expense

Reasons

- patients have more chronic **co-morbid illnesses**
- patients have more severe acute **physiologic derangements**
- higher frequency of **indwelling catheters**
- more **multi-resistant organisms** are isolated

Ventilator associated pneumonia (VAP)

- Defined as infection of lung tissue that develops **48 hours** or more after intubation in mechanically ventilated patients

VAP - 2 groups

- **Early onset** ---- occurring on or before day 5 after intubation
- **Late onset** ---- occurring after day 5 of intubation

VAP - Incidence

- The **most common** hospital acquired infection among patients requiring mechanical ventilation

Richards MJ et al. Nosocomial infections in medical intensive care units in the US. Crit Care Med 1999;27:887-892

Vincent JL et al. The prevalence of nosocomial infection in ICU in Europe: results of EPIC study. JAMA 1995; 274:639-644

VAP - Incidence

- Accounts for approximately 90% of infections in patients requiring assisted ventilation

Chevret S et al. Incidence and risk factors of pneumonia acquired in ICUs. Results from a multicenter prospective study on 996 patients. European Cooperative Group on Nosocomial Pneumonia. Intensive Care Med 1993;19:256-64

Alvarez-Lerma F, Palmoar M, Martinez-Pellus AE et al. Aetiology and diagnostic techniques in intensive care acquired pneumonia: a Spanish multicenter study. Clin Intensive Care 1997;8:164-70

VAP – Incidence

Types of ICU	Cases per 1000 ventilator days
Respiratory	4.2
Medical	7.4
Neurosurgical	15
Burn	15.5
Trauma	16.3

Data from the Centers for Disease Control and Prevention

VAP – Effect on mortality

- The direct contribution of VAP to mortality is controversial
- Conflicting results: negligible attributable mortality vs attributable mortality rates as high as 27%

Rello J et al. Epidemiology and outcomes of VAP in a large US database. Chest 2002; 122:2115

Kollef MH et al. Epidemiology and risk factors fro nosocomial pneumonia. Emphasis on prevention. Clin Chest Med 1999; 20:653

Heyland DK et al. The effect of acidified enteral feeds on gastric colonization in critically ill patients: results of a multicenter randomized trial. Crit Care Med 1999; 27:2399

VAP – Other effects

- Associated with increased length of hospital stay and costs
- VAP increases hospital stay by four to nine days

Tablan OC et al. Am J Infect Control 1994; 22:247

- Nosocomial pneumonia increases hospital costs by up to \$40,000 per episode

Rello J et al. Chest 2002; 122:2115

- In US, VAP accounts for yearly expenditures in the range of \$1.5 billion and 1.75 million additional hospital days per year

Wiblin R. Williams and Wilkins, Baltimore 1997 p807

VAP – Risk factors

- VAP develops in approximately 10-25% of patients undergoing mechanical ventilation

Rello J et al. Epidemiology and outcomes of VAP in a large US database. Chest 2002; 122:2115

Craven DE et al. Nosocomial pneumonia in mechanically ventilated adult patients: epidemiology and prevention in 1996. Semin Respir Infect 1996;11:32

VAP – Risk factors

- The risk of developing VAP
 - 3% per day of MV in the 1st week
 - 2% per day of MV in the 2nd week
 - 1% per day of MV in the 3rd week

Cook DJ et al. Incidence of and risk factors for ventilator-associated pneumonia in critically ill patients. Ann Intern Med 1998; 129-433

VAP – Risk factors

- Age >60 years
- Male gender
- Traumatic injuries
- Chronic lung disease, esp COPD
- ARDS
- Increased severity of illness

VAP – Risk factors

- Increased duration of MV
- Aspiration
- Sinusitis
- Supine head position

VAP – Risk factors

- Paralytics
- Nasogastric tube
- Low endotracheal cuff pressure <20 cm H₂O
- Temporary transport out of the ICU
- Delay in extubation of patients who meet standard weaning criteria

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Rouby, JJ, Laurent, P, Gosnach, M, et al. Risk factors and clinical relevance of nosocomial maxillary sinusitis in the critically ill. *Am J Respir Crit Care Med* 1994; 150:776.

Craven, DE, Kunches, LM, Kilinsky, V, et al. Risk factors for pneumonia and fatality in patients receiving continuous mechanical ventilation. *Am Rev Respir Dis* 1986; 133:792.

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VAP – Risk factors

- Risk factors specifically for early onset VAP include CPR and continuous sedation

Rello, J, Diaz, E, Roque, M, Valles, J. Risk factors for developing pneumonia within 48 hours of intubation. Am J Respir Crit Care Med 1999; 159:1742.

- **Thank you**