



Ventilator-Associated Pneumonia

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Ventilator-Associated Pneumonia

Ventilator-associated pneumonia (VAP), defined as **pneumonia** (infection of the lung) occurring in a person who has been assisted by **mechanical ventilation** (a breathing machine) within the past 48 hours, is a serious and life-threatening infection. Because individuals who contract ventilator-associated pneumonia are already critically ill (requiring mechanical ventilation), the death rate from ventilator-associated pneumonia is high. The April 11, 2007, issue of *JAMA* includes an article on ventilator-associated pneumonia.

RISK FACTORS

- Mechanical ventilation and **endotracheal intubation** (breathing tube in the throat)
- Longer duration of mechanical ventilation
- Advanced age
- Depressed level of consciousness
- Preexisting lung disease
- Immune suppression from disease or medication
- Malnutrition

PREVENTION

- Hand-washing procedures before and after any patient contact
- Avoiding endotracheal intubation if possible
- Maintaining the bed in a 30-degree head-up position
- Use of oral, rather than nasal, endotracheal tubes
- Minimizing the duration of mechanical ventilation
- Conversion to **tracheostomy** (hole in the throat) tube when ventilation is needed for a longer term
- Proper endotracheal tube cuff pressures to prevent regurgitation of stomach contents
- **Enteral** (through the intestinal tract) feedings, instead of **parenteral** (through the veins) nutrition
- Careful blood sugar control in patients with diabetes

DIAGNOSIS AND TESTING

Development of fever, increased white blood cell count, and new or changing lung infiltrate on chest x-ray are all signs of ventilator-associated pneumonia. Diagnosis can be challenging because other lung diseases can have similar signs. Cultures of tracheal **aspirate** (samples from the windpipe) show which bacteria (or fungus) are responsible for VAP. Sometimes **bronchoscopy** (looking directly at the trachea and bronchi with a special flexible lighted instrument) is necessary to get better samples. In rare cases, open lung biopsy to obtain lung tissue is required.

TREATMENT

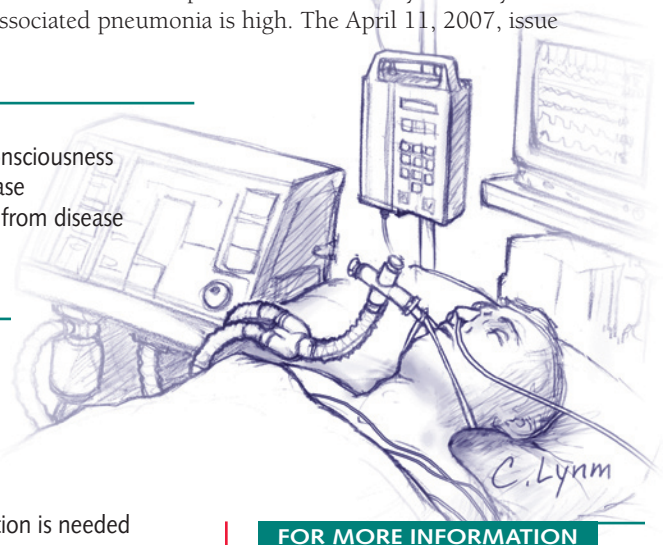
- Antibiotics remain the cornerstone of therapy for VAP. Choice of antibiotic is guided by bacteria culture results.
- Because VAP occurs in hospitalized persons, it may be caused by bacteria that are resistant to multiple antibiotics. Treatment may require specialized antibiotics.
- Supportive care, including prolonged mechanical ventilation and intensive care, may be necessary.

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FOR MORE INFORMATION

- National Heart, Lung, and Blood Institute
www.nhlbi.nih.gov
- Centers for Disease Control and Prevention
www.cdc.gov
- American Lung Association
www.lungusa.org

INFORM YOURSELF

To find this and previous JAMA Patient Pages, go to the Patient Page Index on JAMA's Web site at www.jama.com. Many are available in English and Spanish. A Patient Page on diagnosing and treating pneumonia was published in the February 9, 2000, issue.

Sources: National Heart, Lung, and Blood Institute; Centers for Disease Control and Prevention; Society of Critical Care Medicine; American Lung Association

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