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Janet M. Torpy; Cassio Lynm; Richard M. Glass

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Ventilator-Associated Pneumonia

Ventilator-associated pneumonia, defined as pneumonia (infection of the lung) occurring in a person who is being assisted by mechanical ventilation (a breathing machine), 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 August 20, 2008, issue of *JAMA* includes an article reporting that silver-coated **endotracheal** (breathing) tubes may help prevent ventilator-associated pneumonia. This Patient Page is based on one published in the April 11, 2007, issue of *JAMA*.

RISK FACTORS

- 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 at a 30-degree head-up position
- 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 and chest x-rays may not be conclusive. Cultures of **tracheal aspirate** (samples from the windpipe) show which bacteria (or fungus) are responsible for ventilator-associated pneumonia. 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 may be done.

TREATMENT

- Antibiotics remain the cornerstone of therapy for ventilator-associated pneumonia. Choice of antibiotic is guided by bacteria culture results.
- Because ventilator-associated pneumonia 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.

Janet M. Torpy, MD, Writer

Cassio Lynn, MA, Illustrator

Richard M. Glass, MD, Editor

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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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