Ventilator-Associated Pneumonia

# Diagnosis

* Defined as pneumonia occurring more than 48 hours after endotracheal intubation
  + Clinical symptoms include purulent tracheal secretions, new infiltrate on chest imaging, worsening oxygenation (usually in association with leukocytosis and/or fever/hypothermia)
* Microbiology: *Staphyloccocus aureus*, *Enterobacteriaceae*, *Pseudomonas aeruginosa*
* *Enterococcus* species and *Candida* species that grow in sputum cultures are highly likely to be colonizers and do not require treatment
* Obtain endotracheal aspirate and send for Gram stain and culture
* Ventilator-associated pneumonia (VAP) is unlikely with bacterial burdens below the following thresholds:
* Protected specimen brush <1,000 CFU/mL
* Bronchoscopic alveolar lavage fluid <10,000 CFU/mL
* Endotracheal aspirate <100,000 CFU/mL
* Obtain blood cultures; may be positive in up to 15% of patients
* Consider obtaining *Legionella* urine antigen in patients with immunocompromise, risk factors
* Consider obtaining viral respiratory testing during respiratory virus season
* If pneumonia develops within 48 hours of intubation, common organisms are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *S. aureus;* treat as community-acquired pneumonia

# Treatment

* **Empiric therapy**
* Coverage for *Enterobacteriaceae*, *P. aeruginosa*, streptococci, and *S. aureus* with an anti-pseudomonal beta-lactam; consider combination therapy if severely ill
* Coverage for methicillin-resistant *S. aureus* (MRSA) should be considered if the MRSA prevalence in the hospital is high or the patient has known history of MRSA colonization or infection, intravenous drug use, necrotizing pneumonia, recent stay in a skilled nursing facility, or prolonged hospitalization with unknown MRSA colonization status
* [Place local treatment recommendations here]
* [Place local treatment recommendations here]
* **Narrowing and oral therapy**
* If an alternate diagnosis is identified, stop VAP-targeted therapy
* If patient is able to be weaned from a ventilator within 1–2 days of diagnosis, VAP is less likely; consider stopping therapy
* Use respiratory culture results to narrow therapy
* Stop antibiotics directed at MRSA and *Pseudomonas* spp. if not recovered
* Stop the non-beta-lactam agent if combination therapy was started and the beta-lactam is active against respiratory pathogen recovered
* After clinical improvement is observed and oral medications can be tolerated, consider conversion from intravenous to oral therapy
* [Place local treatment recommendations here]
* [Place local treatment recommendations here]

# Duration

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* Seven days if clincial response by day 3

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