

Ventilator-associated pneumonia (VAP)

Definition

Ventilator-associated pneumonia (VAP): pneumonia that occurs 48 hours after endotracheal intubation.

Microbiology

A review of respiratory cultures from Fraser Health ICU's showed the following distribution:

Organism(s)	Frequency
<i>S. aureus</i> (including MSSA and MRSA)	30%
Gram-negative enteric bacilli (primarily <i>Klebsiella</i> , <i>E. coli</i> , <i>Enterobacter</i>)	30%
<i>Pseudomonas aeruginosa</i>	12%
<i>Acinetobacter</i>	<5%

- *Enterococcus* and *Candida* are commonly isolated in sputum cultures of hospitalized patients. They are generally considered colonizers and do not warrant antimicrobial therapy.
- Viruses (rhinovirus, influenza, parainfluenza) are increasingly recognized as a cause of VAP.

EMPIRIC THERAPY

Classification		Duration (days)
Non-Severe VAP	piperacillin-tazobactam 4.5 g IV q6h <i>If severe beta-lactam allergy:</i> levofloxacin 750 mg PO/IV q24h <i>If known/suspected MRSA: ADD vancomycin¹</i>	7
Severe VAP <i>e.g., ARDS or Septic Shock</i>	meropenem 500 mg IV q6h AND vancomycin ¹ <i>If severe meropenem allergy:</i> levofloxacin 750 mg PO q24h AND vancomycin ¹ <i>Consider adding 2nd anti-pseudomonal agent from a different class:</i> ADD tobramycin 7 mg/kg IV q24h ² OR ciprofloxacin 400 mg IV q8h	7

Doses may require adjustment for renal insufficiency

¹. For vancomycin dosing, refer to "Vancomycin Dosing and Therapeutic Monitoring" in the ASP Handbook

². For aminoglycoside dosing, refer to dosing reference (such as Lexicomp) or discuss with clinical pharmacist

De-Escalation

- Guided by microbiology results (See "Pathogen-Directed Therapy for Pneumonia")
- Negative culture from endotracheal tube or bronchoscopy makes VAP unlikely. Consider stopping therapy unless sampling error or false negative result is suspected.

Duration

- 7 days sufficient for the vast majority of VAP, including *Pseudomonas*.
- For HAP due to *S. aureus*:

Without <i>S. aureus</i> bacteremia	7 days
With <i>S. aureus</i> bacteremia	<u>Minimum</u> 14 days (ID Consult recommended)