

## Ventilator-Associated Pneumonia (VAP)

### DEFINITION

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

### MICROBIOLOGY

Organism(s)	Frequency
Gram-negative enteric bacilli (primarily <i>Klebsiella</i> , <i>E. coli</i> , <i>Enterobacter</i> )	36%
<i>S. aureus</i> (including MSSA and MRSA)	31%
<i>Pseudomonas aeruginosa</i>	13%
<i>Acinetobacter</i>	<5%

Data from endotracheal or bronchoscopy cultures collected 48 hours or more after critical care admission in 2022.

- *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, SARS-CoV-2) are increasingly recognized as a cause of VAP.

### EMPIRIC THERAPY

Classification		Duration (days)
<b>Non-Severe VAP</b>	piperacillin-tazobactam 4.5 g IV Q6H  <i>If severe penicillin allergy:</i> meropenem 500 mg IV q6h <b>OR</b> levofloxacin 750 mg PO/IV Q24H  <i>If known/suspected MRSA: ADD vancomycin<sup>1</sup></i>	<b>3-7</b>
<b>Severe VAP</b> <i>e.g., ARDS or Septic Shock</i>	meropenem 500 mg IV Q6H <b>AND</b> vancomycin <sup>1</sup>  <i>If severe meropenem allergy:</i> levofloxacin 750 mg PO Q24H <b>AND</b> vancomycin <sup>1</sup>	<b>3-7</b>

Doses may require adjustment for renal insufficiency

<sup>1</sup> For vancomycin dosing, refer to “Vancomycin Dosing and Therapeutic Monitoring” in the ASP Handbook

### DEESCALATION

- 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

- 3-7 days sufficient for the vast majority of VAP
- 7 days likely sufficient for most *Pseudomonas* VAP
  - While clinical trials suggest higher recurrence with 7 vs 14 days for *Pseudomonas* VAP, recurrence as defined in trials is of uncertain clinical significance. Short-course therapy has similar mortality, mechanical ventilation, and critical care unit length of stay compared to long-course therapy.
- 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)

**REFERENCES**

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