

## ZSFG 2023 Updated Hospital Acquired and Ventilator Associated Pneumonia Empiric Antibiotic Guidelines

HAP/VAP Category	Antibiotic Regimens	Comments	Expected Therapy Duration
Ventilator-associated pneumonia (VAP) AND hospital-acquired pneumonia (HAP)  <b><u>With gram stain available within 72 hours</u></b>	<p><u>What to start:</u> cefepime OR ceftriaxone +/- vancomycin</p> <p><i>Consider ceftriaxone: no risk factors for Pseudomonas, short duration of intubation (i.e., &lt; 5 days), hemodynamically stable</i></p> <p><b>Respiratory culture (tracheal aspirate) should be collected for ALL patients with suspected VAP (and intubated pts with suspected HAP) prior to starting antibiotics.</b></p> <p><u>Antibiotics should be tailored based on tracheal aspirate gram stain findings:</u></p> <ul style="list-style-type: none"> <li>• Gram positive rods: ceftriaxone</li> <li>• Gram positive cocci (GPC) in pairs/chains: ceftriaxone</li> <li>• GPC in clusters: vancomycin</li> <li>• Gram negative rods (GNRs): ceftriaxone or cefepime<sup>Δ</sup></li> <li>• No organisms: ceftriaxone. Stop antibiotics if concern for pneumonia is low.</li> </ul> <p>-----</p> <p><b><u>Severe beta-lactam allergy precluding use of a cephalosporin</u></b></p> <p><u>What to start:</u> Aztreonam* + vancomycin OR Levofloxacin +/- vancomycin</p> <p><u>Antibiotics based on tracheal aspirate gram stain findings for patients with severe allergy precluding use of a cephalosporin:</u></p> <ul style="list-style-type: none"> <li>• GP rods: vancomycin</li> <li>• GPC in pairs/chains: levofloxacin</li> <li>• GPC in clusters: vancomycin</li> <li>• GNRs: aztreonam* or levofloxacin</li> <li>• No orgs: vancomycin + aztreonam* or levofloxacin. Stop antibiotics if concern for pneumonia is low.</li> </ul> <p><sup>Δ</sup>If ceftriaxone was chosen based on considerations above, continue ceftriaxone. Broaden to cefepime if patient is hemodynamically unstable or clinically worsening.</p> <p>*Aztreonam requires ID pharmacy/consult approval.</p>	<p>Consider withholding empiric vancomycin in patients with neg MRSA nares culture within prior <b>7</b> days.</p> <p>Stop vancomycin at 48 hours if MRSA nares culture/PCR is negative and/or no MRSA isolated from clinical cultures.</p> <p>A positive MRSA nares culture/PCR indicates that the patient is colonized with MRSA. Patients with a positive MRSA nares culture/PCR should be initiated on empiric anti-MRSA therapy (vancomycin). However, antibiotics should be tailored to respiratory gram stain &amp; culture results. Stop vancomycin at 48 hours if no MRSA isolated from clinical cultures.</p> <p>Antibiotic use at the time of respiratory culture collection may decrease gram stain yield. Contact ID pharmacy/ID consult with questions.</p> <p>For patients with known respiratory colonization with multidrug resistant organisms (MDRO), consider empiric coverage of these organisms pending culture results.</p>	7 days

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<p>Hospital Acquired Pneumonia (HAP)  <u>[ICU level of care / High-Flow Nasal Cannula]</u>  AND VAP</p> <p><b>With NO respiratory gram stain available</b></p>	<p><u>What to start:</u> Cefepime +/- vancomycin</p> <p><i>Consider ceftriaxone: no risk factors for pseudomonas, short duration of hospitalization (i.e., &lt; 5 days), hemodynamically stable</i></p> <p><u>Severe beta-lactam allergy precluding use of a cephalosporin:</u> Aztreonam* + vancomycin OR levofloxacin +/- vancomycin</p> <p>*Aztreonam requires ID pharmacy/consult approval.</p>	<p>Consider withholding empiric vancomycin in patients with neg MRSA nares culture within prior <b>7</b> days.</p> <p>Consider coverage for MRSA and/or <i>Pseudomonas aeruginosa</i> in patients with respiratory isolation of these organisms or receipt of parenteral antibiotics within 90 days, admitted from skilled nursing or other long term care facility after at least one week stay. If these organisms are not isolated from clinical cultures (e.g., blood cultures), deescalate antibiotics.</p> <p>Stop vancomycin at 48 hours if admission MRSA nares is negative and/or no MRSA isolated from clinical cultures</p>	<p>7 days</p>
<p>Hospital Acquired Pneumonia (HAP)  <u>Hemodynamically stable, floor patient NOT on high-flow nasal cannula</u></p> <p><b>With NO respiratory gram stain available</b></p> <p>Including patients with HAP due to aspiration</p>	<p><u>What to start:</u> Ceftriaxone</p> <p><i>Risk factors for Pseudomonas/resistant GNRs: cefepime</i></p> <p><u>Severe beta-lactam allergy precluding use of a cephalosporin:</u> Levofloxacin</p>	<p>Consider empiric vancomycin if clinical concern for MRSA pneumonia (e.g., necrotizing pneumonia on imaging). If starting vancomycin, collect MRSA nares culture/PCR.</p> <p>Consider coverage for MRSA and/or <i>Pseudomonas aeruginosa</i> in patients with respiratory isolation of these organisms or receipt of parenteral antibiotics within 90 days, admitted from skilled nursing or other long term care facility after at least one week stay. If these organisms are not isolated from clinical cultures (e.g. blood cultures), deescalate antibiotics.</p>	<p>7 days</p>

## Role and Interpretation of Methicillin-Resistant *S. aureus* (MRSA) Nares Results in Context of Hospital-Acquired and Ventilator-Associated Pneumonia (HAP/VAP)

Collecting a MRSA nares culture/PCR is recommended for all patients initiating anti-MRSA therapy (e.g. vancomycin) for suspected HAP or VAP.

- How to interpret a **negative** MRSA nares result in patient with possible HAP/VAP

A negative MRSA nares culture or PCR indicates the patient is less likely to be colonized with MRSA. Multiple studies indicate that a negative MRSA nares culture or PCR carries a high negative predictive value for MRSA pneumonia (> 95%),<sup>2-5</sup> even when collected prior to onset of pneumonia.<sup>2,4</sup> If a patient's MRSA nares is negative, their likelihood of having MRSA pneumonia is exceedingly low and anti-MRSA therapy (e.g. vancomycin) can reasonably be discontinued or withheld.

- How to interpret a **positive** MRSA nares result in patient with possible HAP/VAP

A positive MRSA nares culture or PCR indicates that the patient is colonized with MRSA. Patients with a known positive MRSA nares culture/PCR who develop a HAP or VAP should be initiated on antibiotics including empiric anti-MRSA therapy (e.g. vancomycin). However, antibiotics should be tailored to respiratory gram stain & culture results. Stop vancomycin at 48 hours if no MRSA isolated from clinical cultures.

If a patient's MRSA nares culture or PCR results positive *after* the patient has been started on antibiotics to treat HAP/VAP, no change in therapy is recommended (in other words – no need to add empiric anti-MRSA therapy) provided the patient is stable and clinically improving.

## References

1. Yoshimura J, Yamakawa K, Ohta Y, et al. Effect of Gram Stain-Guided Initial Antibiotic Therapy on Clinical Response in Patients With Ventilator-Associated Pneumonia: The GRACE-VAP Randomized Clinical Trial. *JAMA Netw Open*. 2022;5(4):e226136. doi:[10.1001/jamanetworkopen.2022.6136](https://doi.org/10.1001/jamanetworkopen.2022.6136)
2. Parente DM, Cunha CB, Mylonakis E, Timbrook TT. The Clinical Utility of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Nasal Screening to Rule Out MRSA Pneumonia: A Diagnostic Meta-analysis With Antimicrobial Stewardship Implications. *Clin Infect Dis*. 2018;67(1):1-7. doi:[10.1093/cid/ciy024](https://doi.org/10.1093/cid/ciy024)
3. Smith MN, Brotherton AL, Lusardi K, Tan CA, Hammond DA. Systematic Review of the Clinical Utility of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Nasal Screening for MRSA Pneumonia. *Ann Pharmacother*. 2019;53(6):627-638. doi:[10.1177/1060028018823027](https://doi.org/10.1177/1060028018823027)
4. Mallidi MG, Slocum GW, Peksa GD, DeMott JM. Impact of Prior-to-Admission Methicillin-Resistant *Staphylococcus aureus* Nares Screening in Critically Ill Adults With Pneumonia. *Ann Pharmacother*. Published online June 6, 2021:10600280211023208. doi:[10.1177/10600280211023209](https://doi.org/10.1177/10600280211023209)
5. Mergenhagen KA, Starr KE, Wattengel BA, Lesse AJ, Sumon Z, Sellick JA. Determining the Utility of Methicillin-Resistant *Staphylococcus aureus* Nares Screening in Antimicrobial Stewardship. *Clinical Infectious Diseases*. 2020;71(5):1142-1148. doi:[10.1093/cid/ciz974](https://doi.org/10.1093/cid/ciz974)

## Committee Reviews

ZSFG Antimicrobial Subcommittee: 2/2023

Infectious Diseases Management Program: 7/2023