**Empiric Antibiotic Guidelines for Ventilator-Associated Pneumonia**

**and Ventilator-Associated Tracheitis**

**I. Ventilator-Associated Pneumonia**

For clinical purposes, an acceptable definition of probable VAP that would necessitate treatment would include all of the following:

* Worsening in oxygenation as defined in appendix
* Temp or WBC criteria as defined in appendix
* Purulent respiratory secretions OR positive culture OR positive viral testing as defined in appendix
* Presence of a new infiltrate or other change in the Chest X-ray

Note, CXR appearance of a pneumonia may lag. A negative CXR, if all of the other criteria are present, should not delay empiric antimicrobial therapy in a critically ill patient, though Ventilator-Associated Tracheitis (VAT) may then be a more likely diagnosis (see below).

Workup for suspected VAP

This workup should include, but would not be limited to:

1. CBC with diff
2. Procalcitonin
3. ABG/lactate
4. Sputum GS and cx (ET aspirate)
5. Sputum sent for RVP
6. MRSA PCR Surveillance swab from anterior nares
7. CXR

The resident and/or PICU team should, if relevant, try to review past year (or less if not all available) of microbiology records for sputum cultures to guide empiric therapy more precisely. The hospital antibiogram can also be used as a guide, though the empiric therapy listed here takes that more general information into account.

Antibiotic Therapy

Empiric antibiotic therapy would be guided by the presence or absence of any multi-drug-resistant organisms (MDRO) risk factors, which include the following:

* Receipt of antibiotics within the preceding 90 days
* Current hospitalization of ≥ 5 days
* High frequency of antibiotic resistance in the patient’s community or in the specific hospital unit
* Immunosuppressive disease and/or therapy
* Septic shock
* Patients at increased risk for healthcare-associated infections
  + Patients who reside in a chronic care facility
  + hospitalization for ≥2 days during the preceding 90 days
  + chronic dialysis within 30 days
  + home/residential facility wound care
  + severe chronic illness with poor functional status as defined by activities of daily living score
  + antibiotic therapy in the past six months
  + close contact with MDR pathogen

Based on prior cultures, can also determine if a history of a known MDRO pathogen is actually present or not.

If risk or history of MDRO is **not** present:

Antibiotic options include:

1. Ceftriaxone IV 50-75 mg/kg/dose q24h (2 gm q24h adult)
2. If concern for aspiration:
   1. Unasyn IV 100-200mg/kg/day div q6 (2 gm q6h adult) based on ampicillin component
   2. Clindamycin IV [added to ceftriaxone if concern for aspiration] 20-40 mg/kg/day div q8 (600 mg q8h adult); PO dose same.
3. If high level beta-lactam allergy
   1. Levofloxacin IV 10 mg/kg/dose q12h (750 mg q12h adult); PO dose same.

Ifrisk or history of MDRO **is** present:

Antibiotic options include:

1. Zosyn IV 100 mg/kg/dose q6-q8 (4.5 gm q8h or 3.375 gm q6h adult)
2. Cefepime IV 50 mg/kg/dose q8h (2 gm q8h adult)
3. Levofloxacin as to left
4. If MRSA coverage is desired:
   1. Vancomycin IV 15 mg/kg/dose q6h (1 gm q6h adult)
   2. Linezolid IV 10 mg/kg/dose q8h <12; 12 and over, including adult, 600 mg q12h; PO dose same; consider ID consult
5. If carbapenem use is warranted, peds ID consult would be recommended

**Overall length of therapy for uncomplicated VAP would be 5-7 days.**

**II. Ventilator-Associated Tracheitis (VAT)**

For clinical purposes, an acceptable definition of probable VAT that would necessitate treatment would include all of the following:

* Temp or WBC criteria as defined in appendix for VAP
* Purulent respiratory secretions OR positive culture as defined in appendix for VAP
* NO radiographic evidence of a new lung infiltrate

As the presentation of VAT and VAP can sometimes be similar and vary based on CXR appearance or sputum production, and as the organisms that cause these in ICU-bound patients are similar, the workup and treatment are not significantly different.

Labs and antibiotics for VAT are recommended as above, utilizing the same rubric as for VAP

**Overall, length of therapy for uncomplicated VAT should be 5 days.**

**Appendix**

Definitions (per CDC/NHSN)

1. **Ventilator-Associated Condition (VAC)**
   1. After a period of stability or improvement on the ventilator (defined as ≥ 2 calendar days of stable or decreasing FiO2 or PEEP), the patient has at least one of the following indicators of worsening oxygenation:
      1. Increase in the daily minimum FiO2 of ≥ 0.2 over the daily minimum during the baseline period, sustained for ≥ 2 calendar days
      2. Increase in the daily minimum PEEP values of ≥ 3 cm H2O over the daily minimum during the baseline period, sustained for ≥ 2 calendar days
2. **Infection-related Ventilator-Associated Complication (IVAC)**
   1. Meets criteria for VAC **AND** on or after day 3 of mechanical ventilation and within 2 days pre- or post-worsening oxygenation as above, the patient meets **BOTH** of the following criteria:
      1. Temp > 38C or <36C **OR** WBC count ≥ 12,000 or ≤ 4,000.
      2. A new antimicrobial agent is started and continued for ≥ 4 calendar days
3. **Possible Ventilator-Associated Pneumonia (VAP)**
   1. Meets criteria for VAC **AND** IVAC **AND** on or after day 3 of mechanical ventilation and within 2 days pre- or post-worsening oxygenation as above, **ONE** of the following criteria is met:
      1. Purulent respiratory secretions
         1. Defined as secretions from the lungs, bronchi or trachea that contain ≥ 25 neutrophils and ≤ 10 epithelial cells per low power field (LPF)
         2. If reported semiquantitatively, the equivalent to the above (moderate WBC’s or greater and few to no epithelial cells), **OR**
      2. Positive culture of sputum, ET aspirate, BAL, lung tissue, or protected specimen brushing
4. **Probable Ventilator-Associated Pneumonia (VAP)**
   1. Meets criteria for VAC **AND** IVAC **AND** on or after day 3 of mechanical ventilation and within 2 days pre- or post-worsening oxygenation as above, **ONE** of the following criteria is met:
      1. Purulent respiratory secretions as above **AND** positive culture as above, **OR**
      2. Positive culture of pleural fluid, + lung histopathology, diagnostic test for Legionella, or + viral test on respiratory secretions, all without requirement for purulent secretions