Ventilator-Associated Pneumonia (VAP)

DIAGNOSTIC PEARLS

- VAP diagnosis is supported by clinical, radiographic and microbiological data
  - Clinical: ↑ WBC, ↑/↓ temperature, ↓PaO_2, ↓tidal volume, ↑inspiratory pressures and ↑ or change in sputum production or purulence
  - Radiographic: New or progressive infiltrate on chest x-ray or CT
    - Chest x-rays have a low positive predictive value due to high prevalence of atelectasis or pre-existing opacities
    - Alternatively, chest x-rays may be negative in immunocompromised & dehydrated patients
  - Microbiological: Obtain respiratory specimens and blood cultures **before** starting antibiotics whenever possible
    - Invasive sampling is discouraged for most patients during the COVID-19 outbreak (consider in immunocompromised patients)
      - When indicated, endotracheal aspirates are preferred over bronchial wash / BAL to minimize healthcare worker exposure
    - Consider TB, fungal pathogens & *Nocardia* if cavitary lesions on chest imaging
    - Consider CMV, PJP & fungi in immunocompromised patients (see - febrile neutropenia, solid organ transplant algorithms)

COMMON ORGANISMS (in order of decreasing prevalence)

- *Staphylococcus aureus*
- *Pseudomonas aeruginosa*
- *Enterobacterales (Klebsiella spp, Escherichia coli, Enterobacter spp.)*
- *Acinetobacter spp.*

EMPIRIC THERAPY

- Piperacillin-tazobactam 4.5 g IV Q6H **PLUS** tobramycin 5 mg/kg IV Q24H (see Aminoglycoside dosing)
  OR
- Meropenem 1 g IV Q8H

(***If*** *colonized with MRSA or previous MRSA infection*)
ADD

- Vancomycin (see Vancomycin Dosing)

ALTERNATIVES FOR ALLERGIES

- See β-lactam allergies
- Meropenem 1 g IV Q8H (cross-reactivity is 1% with penicillin allergy)
- Ciprofloxacin 400 mg IV Q8H **PLUS** tobramycin 5 mg/kg IV Q24H (see Aminoglycoside dosing) **PLUS** vancomycin (see Vancomycin Dosing)

DURATION

- 7 days

IMMUNOCOMPROMISED HOST CONSIDERATION

- Treat for 7 - 10 days

ADDITIONAL THERAPEUTIC PEARLS

- Tailor antibiotic therapy based on microbiological results
  - Stop vancomycin if MRSA is not isolated on culture or screening swabs
  - Narrow coverage if *P. aeruginosa* is not isolated
- Do not repeat cultures if patient is improving
  - Cultures may continue to be positive in ventilated patients despite successful treatment
- Candida pneumonia is very rare; do not treat unless suspecting systemic Candidiasis (i.e. immune compromised patient, worsening clinical status after initial improvement)

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