

## COPD exacerbations (COPDE)

### MICROBIOLOGY

- Respiratory viruses, *Moraxella catarrhalis*, *Haemophilus influenza*, *Streptococcus pneumoniae*
- *Pseudomonas* is more common in very severe COPD, or in those with recent broad-spectrum antibiotic exposure. However, *Pseudomonas* may be a non-pathogenic colonizer in COPD and does not always warrant therapy.

### DIAGNOSIS

- Acute change in one or more of:
  - Increased cough frequency or severity
  - Increased sputum amount or purulence
  - Increased dyspnea
- If chest x-ray opacities are present consistent with infection, patient is considered to have pneumonia (see “Community-acquired pneumonia”).
- When to do sputum cultures?
  - Lack of response to initial empiric antibiotic regimen (after 2-3 days)
  - Exacerbations requiring mechanical ventilation
  - Frequent exacerbations (4 or more per year)
  - Very severe airflow limitation (postbronchodilator FEV1 of less than 30% predicted)
- Consider respiratory virus testing during influenza season
  - If positive → consider discontinuation of antibacterial agents
  - If negative → discontinue antiviral agent (if started)

### Procalcitonin:

- Procalcitonin-guided therapy is effective in reducing unnecessary antibiotic use for non-bacterial COPDE, with no adverse impact on mortality, length-of-stay, or readmission rates.
- Falsely elevated procalcitonin levels occur in severe trauma, cardiac arrest, surgery, burns, pancreatitis, and intracranial hemorrhage. Other potential causes include immunomodulatory agents, neoplasms, and certain autoimmune diseases.
- Procalcitonin is a tool to support, not supplant, clinician judgment. Interpretation should be made in light of the clinical picture and severity of illness. Procalcitonin can be used in those on corticosteroids, but has not been validated in patients with higher degrees of immunosuppression.

Procalcitonin Level	Diagnostic Implications	Antimicrobial Guidance
>0.5 µg/L	Bacterial COPDE very likely	Antibiotics strongly encouraged
0.25-0.5 µg/L	Bacterial COPDE likely	Antibiotics encouraged
0.1-0.25 µg/L	Bacterial COPDE unlikely	Antibiotics discouraged
<0.1 µg/L	Bacterial COPDE very unlikely	Antibiotics strongly discouraged

- Follow-up testing: antibiotic therapy can be discontinued when procalcitonin drops to below 0.25 µg/L **OR** ≥80% decrease.

### C-Reactive Protein (CRP):

- The role of CRP to guide use of antibiotics in COPDE is less well established than procalcitonin. However, CRP is readily available with short lab turnaround time. Several recent studies have provided insight into the role of CRP-guided therapy.
- If CRP-guided therapy is used, the following cutoffs are recommended:
  - COPDE managed as an outpatient – antibiotics can be withheld if CRP <20 mg/L
  - COPDE managed as an inpatient – antibiotics can be withheld if CRP <50 mg/L

**EMPIRIC THERAPY**

<b>Who needs antimicrobials?</b>	
Patients with any of the following: <ul style="list-style-type: none"> <li>Increased dyspnea + sputum volume + sputum purulence</li> <li>Increased sputum purulence + <i>either</i> increased dyspnea or sputum volume</li> <li>Severe exacerbation requiring mechanical ventilation</li> </ul>	
<b>Risk Stratification</b>	<b>Duration (days)</b>
<b>Uncomplicated COPDE</b> <ul style="list-style-type: none"> <li>Without factors below</li> </ul>	<b>3-5</b>
<b>Complicated COPDE</b> <ul style="list-style-type: none"> <li>≥4 exacerbations per year</li> <li>Failure of first line therapy</li> <li>Antibiotics in last 3 months</li> </ul>	<b>5</b>
<b>COPDE with <i>Community Acquired Pneumonia</i></b>	<b>CRB-65 Scoring – One point for each of:</b> Confusion (new disorientation in person, place, or time) Respiratory rate ≥ 30 breaths/minute Blood pressure (systolic <90 mmHg or diastolic ≤60 mmHg) Age ≥65 years  <b>Non-Severe CAP (CRB-65 score 0-2):</b> Antibiotics per <u>Complicated COPDE</u> above. <b>Severe CAP (CRB-65 score 3-4):</b> See <u>Community Acquired Pneumonia</u> chapter.

*Doses may require adjustment for renal insufficiency*

**ORAL STEP-DOWN**

Patients started on intravenous therapy can be switched to oral therapy once clinically stable and able to take oral medications.

In the absence of positive microbiology, recommended oral step-down if on initial intravenous therapy:

<b>Intravenous</b>	<b>Oral Step-Down Option</b>
azithromycin	same
ceftriaxone	amoxicillin-clavulanate 875 mg PO BID <i>If penicillin allergy: cefuroxime 500 mg PO BID</i>
moxifloxacin	same

**DURATION**

- 5 days is appropriate for most antimicrobial regimens
- Azithromycin dosing (due to long tissue half-life):
  - azithromycin 500 mg daily x 3 days  
**OR** azithromycin 500 mg once, then 250 mg daily x 4 days