

Managing Pulmonary Issues in the Primary Care Setting: COPD and Community Acquired Pneumonia

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Disclosures

- Speaker has no financial relationships with commercial interests to disclose
- Any unlabeled/unapproved uses of drugs or products referenced will be disclosed



Learning Objectives

1. Review pathophysiology, diagnosis, diagnostic testing, and related interpretation of studies as they relate to patients with COPD and CAP.
2. Review the updates and application of the diagnosis and management of COPD based on the 2021 GOLD guidelines.
3. Review the updates and application of ATS/IDSA 2019 guidelines for the management of CAP in primary care setting.

GOLD Guidelines

- Global Initiative for Chronic Lung Disease (GOLD) initiated in 1998
- Goal: produce recommendations for the management of COPD, based on latest guidelines
- First report was issued in 2001

https://goldcopd.org/wp-content/uploads/2020/11/GOLD-REPORT-2021-v1.1-25Nov20_WMV.pdf

COPD

- *COPD is common and preventable*
 - Persistent respiratory symptoms
 - Airflow limitations due to airway/alveolar abnormalities
- *Emphysema* is a radiographic finding
- *Chronic Bronchitis* is mucus hyper secretion

Prevalence

- COPD is the *3rd leading cause of death in the United States*
- 90% of deaths occur in low and middle income countries
- COPD equates to *\$49.4 billion* in health care costs annually and is the *number one* reason for hospital admissions in the world

GOLD, 2021

Chronic Obstructive Lung Disease

- Individual plan based on risk of exacerbations
- Objective data (spirometry)
- Severity of symptoms
- Drug availability
- Patients response
- Socio-economic status

GOLD, 2021

COPD

Method of administration is key to success

- Recent Systematic Review of meter dosed inhaler (MDI) use concluded technique has not improved over the past 40 years
- Dry Powder Inhaler (DPI)
- Soft Mist Inhaler (SMI)

MAXIMIZE TREATMENT PLAN

Sanchis, J. et al., 2016

What does the literature tell us...

- *Goal is to slow progression of symptoms and reduce risk*
- The goal is treat exacerbations early and prevent future exacerbations

Exacerbations equate to:

- Further debilitation
- Increased cost
- Further decline in lung function
- Increased morbidity and mortality

GOLD, 2021

Differential Diagnosis

<p>COPD</p> <ul style="list-style-type: none"> ▪ Mid-life ▪ Slow symptom progression ▪ Tobacco/exposure history <p>Asthma</p> <ul style="list-style-type: none"> ▪ Early in life ▪ Variable symptoms ▪ Other allergic features ▪ Family history 	<p>HF</p> <ul style="list-style-type: none"> ▪ PFTs=volume restriction NOT limited airflow ▪ CXR=pulmonary edema <p>TB</p> <ul style="list-style-type: none"> ▪ Onset all ages ▪ CXR=infiltrate ▪ TB risk exposure ▪ Microbiological confirmation
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Differential Diagnosis

<p>Diffuse Panbronchiolitis</p> <ul style="list-style-type: none"> ▪ Asian descent ▪ Males, non-smokers ▪ Chronic sinusitis ▪ CXR/HRCT=diffuse opacities & hyperinflation <p>Bronchiectasis</p> <ul style="list-style-type: none"> ▪ Older age ▪ Copious amounts of sputum ▪ Recurrent pseudomonas ▪ CXR/CT=bronchial dilation and wall thickening 	<p>Asthma COPD Overlap</p> <ul style="list-style-type: none"> ▪ Mid-life ▪ Consider when concurrent symptoms and exacerbations <p>Obliterative Bronchiolitis</p> <ul style="list-style-type: none"> ▪ Younger age, non-smoker ▪ May have rheumatoid arthritis ▪ Post transplant ▪ CT=expiration hypodensity
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Differential Diagnosis

The following may be helpful in ruling out alternative diagnosis:

- Full spirometry (VCD, COPD, restrictive process)
- Bronchoprovacation with methacholine, histamine, cold air or exercise
- ✓ Especially useful if spirometry is normal or near normal
- Chest radiography
- Allergy testing
- Biomarkers ***
- GI symptoms
- Sleep disorders

COPD Signs and Symptoms

- Dyspnea-cardinal symptom
- Cough-often 1st symptom to develop
- Sputum production
- Chest tightness and wheezing

LET'S INTERVENE BEFORE WE GET HERE

- Severe disease-weight loss, fatigue, anorexia, cough syncope rib fractures, ankle swelling

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What can we do to improve early diagnosis?

- **Consider a clinical diagnosis and spirometry in any patient age 40 or older with:**
 - Dyspnea that is progressive
 - Chronic cough intermittent/may be non-productive
 - Chronic sputum production
 - History risk factor exposure (tobacco smoke, occupational, fumes or air)
 - Family history of COPD

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What can we do to improve early diagnosis?

- **Spirometry is the gold standard and is required to make the diagnosis**
 - Post-bronchodilator FEV1/FVC <0.70 confirms the presence of COPD
 - FEV1 measurement pre and post bronchodilator is no longer recommended to make the diagnosis
 - Smoking status-assess as a vital sign every time-owe it to our patients to find their disease early

GOLD, 2021

**Table 1: Stable COPD
How to apply the GOLD criteria**

Stage	Severity	FEV1	Exac. History	CAT <10	CAT >10
GOLD 1	Mild	≥80%	0-1 exac./year 0 hospitalizations	A	B
GOLD 2	Moderate	50-79%	0-1 exac./year 0 hospitalizations	A	B
GOLD 3	Severe	30-49%	2 + exac./year 1 hospitalizations	C	D
GOLD 4	Very Severe	<30%	2 + exac./year 1 hospitalizations	C	D

Note: Adapted from "Global Initiative for Obstructive Lung Disease (GOLD): Chronic Obstructive Pulmonary Disease Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease". (2021).

Tools for Assessment

- COPD Assessment Test (CAT) 8 items
Retrieved from: <http://www.catestonline.org>
- COPD Control Questionnaire (CCQ) 10 items
Retrieved from: <http://www.ccq.nl>

COPD Assessment

- Smoking history ****smoking cessation**
- Family history
- Exposure history
- PMH (co-morbidities)
- Pattern of symptom development
- Impact on life
- Social/family support

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Pharmacologic Treatment

- **Bronchodilators**-alter smooth muscle tone in airway
- **Beta2-agonists**-relax smooth muscle by stimulating the beta2-adrenergic receptors>functional antagonist to bronchoconstriction
- **Anticholinergics**-blockage of acetylcholine's effect on the MU receptors (M2 and M3-short acting) (M1 long acting)
- **Methylxanthines**-unclear non-selective phosphodiesterase inhibitors versus non-bronchodilator actions

Pharmacologic Treatment

- **Antitussives**-Not recommended in stable COPD
- **Vasodilators**-Not recommended in patients with pulmonary HTN associated with COPD (ventilation-perfusion mismatch versus non-cardiogenic pulmonary edema)
- **Narcotics**-Effective in treating dyspnea with GOLD Stage 4

Pharmacologic Treatment

- **Phosphodiesterase-4 inhibitors (PDE4)**
 - Add on therapy
 - GI and depression important clinical symptoms
- **Antibiotics**
 - Long-term azithromycin and erythromycin reduces exacerbations
 - Q-T changes, hearing changes
- **Inhaled Corticosteroids (ICS)**
 - Combined with LABA more effective
 - Increased risk of pneumonia-prolonged use

Table 2: Stable COPD
How to apply the GOLD criteria

Patient Group	Stage/Number of Exacerbations	First Line Recommendations	Alternative Recommendations
A-low risk	GOLD 1 or 2	<i>long acting anticholinergic prn</i>	<i>long acting anticholinergic</i> OR <i>LABA</i>
Less symptoms	0-1 exacerbations per year No hospitalizations	<i>long acting beta2 agonist (LABA) prn</i>	<i>short acting beta2 agonist (SABA)</i> AND <i>short acting anticholinergic</i>

Note: Adapted from "Global Initiative for Obstructive Lung Disease (GOLD): Chronic Obstructive Pulmonary Disease Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease". (2021).

Table 3: Stable COPD
How to apply the GOLD criteria

Patient Group	Stage/Number of Exacerbations	First Line Recommendations	Alternative Recommendations
B-low risk	GOLD 1 or 2 CAT Score 10 or higher	<i>long acting anticholinergic</i>	<i>long acting anticholinergic</i> OR <i>LABA</i>
More symptoms	0-1 exacerbations per year No hospitalizations	<i>LABA</i>	<i>SABA</i> AND <i>short acting anticholinergic</i>

Note: Adapted from "Global Initiative for Obstructive Lung Disease (GOLD): Chronic Obstructive Pulmonary Disease Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease". (2021).

Table 4: Stable COPD
How to apply the GOLD criteria

Patient Group	Stage/Number of Exacerbations	First Line Recommendations	Alternative Recommendations
C-high risk	GOLD 3 or 4 CAT Score less than 10	<i>inhaled corticosteroid (ICS) + LABA</i>	<i>long acting anticholinergic</i> AND <i>phosphodiesterase-4 inhibitor (PDE4)</i>
Less symptoms	2 or more exacerbations per year 1 hospitalization	<i>long acting anticholinergic</i>	<i>LABA</i> AND <i>PDE4</i>

Note: Adapted from "Global Initiative for Obstructive Lung Disease (GOLD): Chronic Obstructive Pulmonary Disease Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease". (2021).

Table 5: Stable COPD
 How to apply the GOLD criteria

Patient Group	Stage/Number of Exacerbations	First Line Recommendations	Alternative Recommendations
D-high risk	GOLD 3 or 4	<i>ICS + LABA</i>	<i>ICS + LABA</i>
	CAT Score 10 or higher	AND/OR	AND <i>long acting anticholinergic</i>
More symptoms	2 or more exacerbations per year 1 hospitalization	<i>long acting anticholinergic</i>	<i>ICS + LABA</i> AND <i>PDE4</i>

Note: Adapted from "Global Initiative for Obstructive Lung Disease (GOLD): Chronic Obstructive Pulmonary Disease Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease", (2021).

Considerations with ICS Therapy

- **Add ICS**
 - History of or concomitant asthma (ACO)
 - ≥ 2 moderate COPD exacerbations per year **OR** hospitalization
 - Blood eosinophils >300 cells/uL
- **Consider ICS**
 - 1 moderate COPD exacerbation per year
 - Blood eosinophils 100-300 cells/u/L
- **Don't start ICS**
 - Recurrent pneumonia
 - Blood eosinophils <100 cells/u/L
 - History of mycobacterial infection

Leung, J. M. & Sin, D. D, 2019

COPD Exacerbation

- Acute event-worsening symptoms (dyspnea, sputum, cough) and leads to a change in meds/treatment
- Most common cause viral respiratory tract infection
- Cause for 1/3 of severe exacerbations not identifiable
- Reduce risk-smoking cessation, vaccine, patient self-treatment plan, and compliance

GOLD, 2021

COPD Exacerbation

- **Steroids + antibiotics** can improve lung function, decrease recovery time, improve hypoxemia, and reduce risk of relapse, treatment failure, or prolonged hospitalization
- Consider azithromycin daily for prevention
- **OR** roflumilast (Daliresp) PDE4

GOLD, 2021

Eosinophils and COPD

COPD is an inflammatory disease

- Some patients exhibit raised airway eosinophilic inflammation
 - Increased exacerbations
 - Often challenging to stabilize
 - Response quickly to oral corticosteroids
- Promising marker for response to ICS

Harries et al., 2020

Eosinophils and COPD

- Strong correlation between peripheral eosinophil count (absolute and relative) and sputum eosinophils
- GOLD guidelines recommend use of absolute blood eosinophils of ≥ 300 cells u/liter
- In those with absolute blood eosinophils of ≥ 100 cells u/liter **AND** ≥ 2 exacerbations **OR** 1 severe exacerbation
 - Use to escalate from LABA/LAMA to LABA/ICS
 - Also consider azithromycin or PDEA

Harries et al., 2020

When to Refer

- **Not** responding to therapy
- GOLD Stage 3 or 4 COPD
- Complex Mixed Disease (COPD/Asthma)
- **Unable** to confirm diagnosis

Goals for Treatment

- **Reduce Symptoms**
 - Relieve symptoms
 - Improve exercise tolerance
 - Improve health status
- **Reduce Risk**
 - Prevent disease progression
 - Prevent and treat exacerbations
 - Reduce mortality

Pharmacological Treatment

If response is appropriate=maintain

- **If increased dyspnea**
 - Consider switching inhaler device
 - Step up therapy
 - Blood eosinophil count
- **If increased exacerbations**
 - Eosinophils < 100 LABA/LAMA
 - Roflumilast (FEV1 <50% & chronic bronchitis)
 - Azithromycin (former smokers)
 - Eosinophils >= 100 LABA/ICS OR LABA/LAMA/ICS

Non-pharmacologic Treatment

- Structured exercise plan
- Self-care
- Exacerbation plan
- Relaxation techniques
- **ALL** pulmonary patients need influenza, 23-valent pneumococcal vaccine (PPSV23), 13-valent conjugated pneumococcal vaccine (PCV13), and Tdap
- Pulmonary Rehab-for those with dyspnea while walking (level ground)

Case Study 1

- 64 year old female with COPD has progressive dyspnea and cough despite addition of ICS/LABA.
 - *What else do you want to know?*
 - *What patient group?*
 - *What are your next steps?*

Case Study 2

- 67 year old man with worsening shortness of breath. He follows up with multiple providers.
 - Diagnosed with asthma, chronic bronchitis and allergies
 - He has a 40 year pack smoking history and quit about six months ago
 - His PFTs show an FEV1/FVC of 45% with a positive bronchodilator response
 - His labs show increased immunoglobulin E levels

CAP Guidelines

- ATS/IDSA came together in 2007 create joint recommendations/consensus guidelines
- Latest updates released in 2019
- ATS/IDSA has moved to a series of questions
- Focus on studies that include radiographic criteria
- Focus on patients that are **NOT** immunocompromised

<https://www.atsjournals.org/doi/full/10.1164/rccm.201908-1581ST>

CAP

- CAP is by definition, pneumonia that occurs outside the hospital or other healthcare entity
- *Streptococcus pneumoniae* responsible for approximately 50% of these cases
- One of the leading causes of hospitalization due to an infectious agent

Metley et al., 2019

CAP Prevalence

- CAP remains a major cause of death for all age groups
- Affecting approximately 450 million people in the world annually
- *4th leading cause of death in the world*
- Rates are highest in children less 5 years of age and adults older than 75 years of age

Metley et al., 2019

CAP Signs and Symptoms

- Malaise
- Rigor
- Chills
- Fever
- Cough
- Dyspnea
- Sputum production
- Pleuritic chest pain
- Dyspnea
- Tachypnea
- Tachycardia

Assessment

- Crackles
- Dullness to percussion
- Egophony

Differential Diagnosis

Hypersensitive Pneumonitis

- Cough
- Dyspnea
- Fatigue

AECOPD

- Acute onset
- Tobacco/exposure history
- No infiltrate on CXR

Acute Bronchitis

- Acute onset
- Often prompted by URI
- No infiltrate on CXR

HF

- Peripheral edema
- Bilateral crackles
- CXR=pulmonary edema
- Elevated BNP

PE

- Acute onset dyspnea
- Minimal sputum production
- No underlying respiratory infection
- Risk factors for DVT

ATS/IDSA Guidelines 2019

Recommendation	2019 ATS/IDSA Guideline
Sputum culture Blood culture	Only recommended for those with severe disease/inpatients empirically treated MRSA and pseudomonas aeruginosa
Use of procalcitonin	Not recommended for initial determination of antimicrobial therapy
Standard empiric antibiotic therapy	B-lactam/macrolide versus B-lactam/fluoroquinolone; both accepted stronger evidence for B-lactam/macrolide
Macrolide monotherapy	Conditional based on resistance levels
Use of corticosteroids	Recommended not to use in outpatient settings

Routine use of follow up CXR Recommend not to obtain
Note: Adapted from "Diagnosis and Treatment of Adults with Community-acquired Pneumonia: An Official Clinical Practice Guideline of the American Thoracic Society and of Infectious Disease Society of America". (2019).

Radiographic Findings

Presence clinical features + imaging

1. Focal non-segmental or lobar
2. Multi-focal or lobar
3. Focal or diffuse "interstitial"
4. HRCT better depiction, rarely required

Franquet, 2018

Risk Stratification

- Confusion
- Uremia (BUN \geq 19 mg/dl)
- Respiratory rate >30
- Blood pressure (systolic < 90 mm Hg or diastolic <60 mm Hg)
- Age > 65

Metley et al., 2019

Antibiotic Therapy

- Mainstay of therapy
- *Intervene early* goal within 4 hours of presentation
- With empiric therapy 90% of patients with bacterial pneumonia improve

Antibiotic Therapy

Healthy outpatients with no co-morbidities

- amoxicillin 1 gram TID
- doxycycline 100 MG BID
- macrolide
 - only use with resistance $<25\%$ select one
 - azithromycin 500 mg day one then 250 mg
 - clarithromycin 500 mg BID
 - clarithromycin ER 1000 mg Q day

Metley et al., 2019

Antibiotic Therapy

Outpatients with co-morbidities

Combination therapy (amoxicillin/clavulanate AND macrolide)

- amoxicillin/clavulanate
 - 500/125 mg TID
 - 875/125 mg BID
 - 1000/125 mg BID
- macrolide (select one)
 - azithromycin 500 mg day one then 250 mg
 - clarithromycin 500 mg BID
 - clarithromycin ER 1000 mg Q day
 - doxycycline 500 mg BID

Metley et al., 2019

Antibiotic Therapy

Outpatients with co-morbidities

Monotherapy respiratory fluoroquinolone

- levofloxacin 750 mg Q day
- moxifloxacin 400 mg Q day
- gemifloxacin 320 mg Q day

Metley et al., 2019

Supportive Care

- Fluids
- Antipyretics
- Analgesics
- Oxygen
- Mobilization
- DVT prophylaxis
- Smoking Cessation

If not improving then what?

- Unusual organism or resistance
- Empyema
- Co-infection or super infection
- Obstructive endobronchial lesion
- Immunosuppression
- Non-compliance
- Wrong diagnosis
- Referral to pulmonary specialist

CAP Prevention

- **23-valent pneumococcal polysaccharide vaccine (PPSV23)**
 - Age >65
 - For those with COPD <65 also recommended
- **13-valent conjugated pneumococcal vaccine (PCV13)**
 - Shared decision making versus giving both

CDC, 2021

Additional Considerations

- *Legionella* –not routinely recommended unless indicated by epidemiological factors
- *Influenza*-test when circulating in the community with rapid *influenza* molecular assay
- Advanced Age-may not mount a fever often present confused

Metley et al., 2019

Case Study 3

- 56 year old female presents with 2 day onset of cough, sputum production, dyspnea, and malaise.
- Last night onset of fever and chills
- PMH: HTN VS: BP 150/80 P 104 RR 22

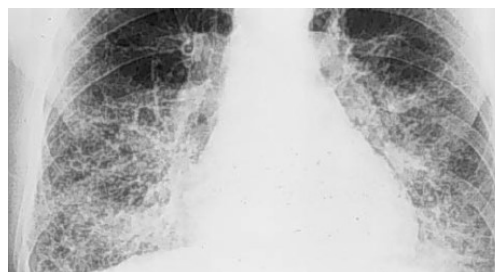
What antibiotics would you order? (PCN Allergy)

What would change if patient also had COPD, CKD and a history of pseudomonas pneumonia?

Case Study 4

- 65 year old Hispanic male presents with 3 day onset of dyspnea, pleuritic chest pain, cough with sputum, fever and rigors that began last night.
- PMH: HTN, CKD-3, HF-EF 40%, COPD
- *What else would you want to know?*
- *What other tests?*
- *What is your treatment plan?*

CXR



www.researchgate.net

CAP

- **Identify** early
- **Antibiotics** are the mainstay
- **CURB-65**
- **Supportive** care
- Consider **influenza** or other **underlying issues** if not improving

Metley et al., 2019

COPD

REVIEW ASSESS ADJUST

- **Review**
 - Symptoms, dyspnea, exacerbations, smoking
- **Assess**
 - Inhaler technique and adherence
 - Non-pharmacologic
- **Adjust**
 - Escalate or de-escalate
 - Switch device or medication

GOLD, 2021

Conclusion

- Diagnose early
- Let patient story guide the diagnosis
- *Spirometry is the gold standard COPD*
- *Antibiotics early for CAP*
- Maximize individualized treatment plan which patient can afford
- Know when to refer
- You don't have to know it all, but rather where to find the guidelines

Thank you for your time!



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