

# Updates in Managing COPD

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AAPA 2021



## Disclosure

- NONE
- Disclaimers – case studies are fictional

## Topics to discuss / Objectives

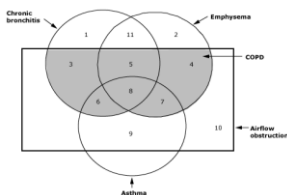
- Review the use of spirometry in diagnosing COPD
- Discuss the staging workup using the GOLD Guidelines
- How to select the best inhaler for your patient
- Discuss the role of pharmacological and nonpharmacological treatment for COPD
- Recognize signs and symptoms of COPD AE
- Review the role of Endobronchial valve placement for COPD patients
- COPD and COVID-19
- *By the end of this lecture you should be able to:*
  - Diagnosis and stage COPD using the GOLD Guidelines
  - Select the best inhaler for each patient / Treatment regimen
  - Determine when to admit vs treat as an outpatient for AECOPD
  - Understand the role of endobronchial valve placement for COPD patients
  - Understand the risks of COPD patients with COVID-19

## Facts about COPD

- Affects > 5% of the population
- 4<sup>th</sup> leading cause of death in the USA, killing more than 120,000 people each year
- 3<sup>rd</sup> leading cause of death worldwide
- 80% of patients in the USA with COPD have a history cigarette smoke
- Women have a higher risk of AECOPD in comparison to men
- COPD led to 3.2 million deaths in 2017 worldwide and is expected to reach 4.4 million per year by 2040

Cobb, et al. *Haltman Clinical Journal of Chronic Obstructive Pulmonary Disease*. 2020; 18(1):11-20

## COPD



- Emphysema
  - Structural changes
- Chronic Bronchitis
  - Chronic prod cough x 3 months for 2 consecutive years (excluding other causes)
- Asthma
  - VARIABLE airflow obstruction commonly with reversibility
- Phenotypes of COPD
  - More precise management of COPD

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## COPD and Spirometry

- How to make the diagnosis – symptoms, risk factors, spirometry
- What is spirometry?
  - Measurement of lung function – amount / volume and speed / flow of air
  - Inhalation / Exhalation
  - Most common in PFTs
  - Assess breathing patterns to assist in the diagnosis of:
    - Asthma
    - COPD
    - Pulmonary Fibrosis
    - ACO



## Role of Spirometry with COPD

Required to make the diagnosis

Must have FEV1/FVC < 0.7 (obstruction on spirometry)

Assess the severity of airflow obstruction by the FEV1

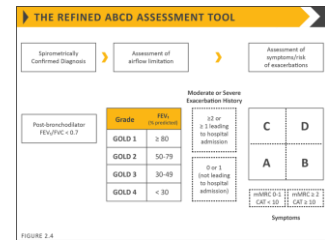
Follow up Assessment of the patient:

To determine appropriate therapy

To evaluation for rapid decline

## GOLD Guidelines

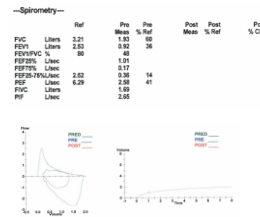
- Spirometry
  - Grade based on FEV1
- Exacerbation History
- Symptoms
  - Cardinal Three
    - Dyspnea
    - Chronic cough
    - Sputum production
- Staging:
  - GOLD Grade 1-4
  - And
  - Group A / B / C / D



## Case Study

- 54 y/o female with PMH significant for HFpEF, CAD, HTN, obesity, and chronic respiratory failure with PFTs below. She has a 40 py history of smoking and unfortunately continues to smoke 1/2 ppd despite measures to quit with Chantix, Wellbutrin, and nicotine replacement therapy.
- She was diagnosed with "asthma" years ago but never followed up.
- She complains of daily significant dyspnea on exertion, wheeze and chronic cough, mostly productive when she first wakes up in the morning of white sputum. She has tried albuterol HFA in the past with only minimal relief of these symptoms. She states she can't even walk to the bathroom without being out of breath.
- She admits to being on steroids for one week several months ago for a "flare up of her breathing"
- Using the GOLD Guidelines how would you classify her COPD?

## Case Study



## Case Study

- FEV1: 36% (GOLD 3)
- FEV1 / FVC (ratio): 48% (confirms COPD <0.7)
- Exacerbation history: one AE not leading to hosp (Group A or B)
- S/sx using mMRC: 3 (Group B or D)
- Patient's spirometry reveals. . . .
- Treatment plan. . . .

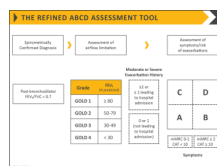


Figure 6. The Modified Medical Research Council Dyspnea Scale

Score	Description of Dyspnea Scale
1	Only get breathless with unusual exertion
2	Get out of breath when hurrying on level ground or walking up a slight hill
3	On level ground, walk slower than people of the same age because of breathlessness or have to stop for breath more often than the average person
4	Stop for breath after walking about 100 yards or after a few minutes on level ground
5	Can't walk breathless to home or to work or can't walk when dressing

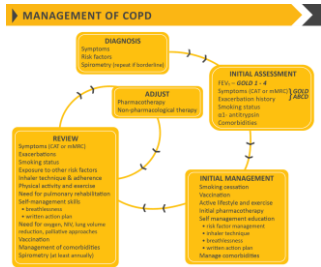
mMRC—modified Medical Research Council

## Case Study

- FEV1: 36% (GOLD 3)
- FEV1 / FVC (ratio): 48% (confirms COPD <0.7)
- Exacerbation history: one AE not leading to hosp (Group A or B)
- S/sx using mMRC: 3 (Group B or D)
- GOLD Grade 3 Group B
- Patient's spirometry reveals severe obstruction. Her flow volume loop shows concavity, which is consistent with obstruction. In patients with COPD that is severe with significant symptoms. However she has only had one AE this past year
- Consider LAMA or LAMA/LABA as treatment
- Referral Pulmonary Rehabilitation
- If she develops frequent exacerbations, consider adding ICS as it has been proven to reduce exacerbations. Caution recurrent pneumonia, which is an increased risk while using ICS



## GOLD Guideline Recommendations



## Pharmacological Treatment

Based on GOLD Guideline staging

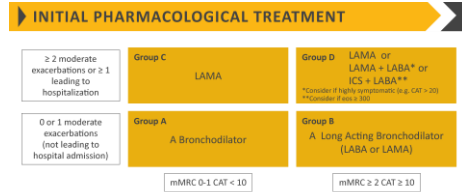


FIGURE 4.1

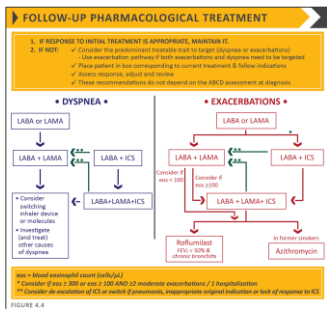


FIGURE 4.4

## Outpatient Management - MESSI

- Measurement: Spirometry should be done at least ONCE a year to monitor FEV1
- Exacerbations: monitor exacerbation history (frequency / severity)
- Smoking status: – discuss at each visit
- Symptoms: determine any changes in signs / symptoms
- Imaging: if worsening of s/sx



## Non-Pharmacological Treatment

- Pulmonary Rehabilitation (PR)
- Vaccinations
  - PFSV23 (< 65 yo with FEV1 < 40)
  - PCV13 (>= 65 yo)
  - Influenza vaccine
  - Pertussis vaccination
- Inhaler education / Oxygen assessment
- Nutritional supplementation
- Palliative Care
- Interventional Bronchoscopy / Surgery
- Tobacco cessation education / counseling



## Inhaler Education / Selection

- In Check Dial
  - Tool used to education patients on how to correctly use their inhaler
  - Measures Peak Inspiratory Flow Rate (PIFR)
    - Simulates resistance of specific inhaler
    - DPI vs pMDI
  - Goal for patients – PIFR >= 60 L/min **IDEAL** for DPI
  - PIFR < 60 L/min
    - Consider pMDI / soft mist inhaler / nebulizer
- Goal is to select the best bronchodilator therapy for each individual patient



## Pulmonary Rehabilitation / Role of Chest CT

- Long-Term Benefits of Pulmonary Rehabilitation in Patients with COPD
  - A 2 year follow up
  - CHEST October 21, 2020
- 8 week PR program showed short term improvements in dyspnea, depression, stress
- 2 year follow up after PR showed sustained improvements in anxiety and quality of life
- NEJM Update on Clinical Aspects of Chronic Obstructive Pulmonary Disease
  - September 2019
  - Role of CT with COPD
    - "even without evidence from controlled trials, we think a chest CT should be obtained in most, if not ALL, patients with COPD."

## COPD Acute Exacerbations (AECOPD)

- Acute change of one or more of the cardinal three symptoms:
  - Cough with increase in severity / frequency
  - Change in sputum production (amount / color / characteristics)
  - Worsening dyspnea
- Risk factors for COPD AE
  - Age
  - Severity of COPD
  - Profound cough
  - Recent antibiotic use
  - Peripheral blood eosinophilia
  - Theophylline use
  - Other comorbidities



## AECOPD

- Wheezing / Tachypnea
- Conversational Dyspnea
- Use of accessory muscles
- Altered mental status – concern for hypercapnia / hypoxemia
- Bronchospasms / coughing

## AECOPD Evaluation / Diagnosis

- Pulse oximetry
- CXR
- Labs: CBC / BMP / BNP
- ABG
- Sputum – typically not helpful\*
- Use of PCT / CRP is not recommended to determine use of antibiotics with AECOPD
- To admit or not to admit . . . That is the question!

## AECOPD Treatment at home

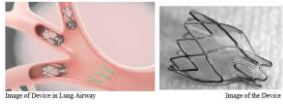
- Treatment Regimen:
  - SABA (nebulizer vs MDI with spacer) + Short acting anticholinergic agent
    - Transition to LABA once more stable
  - Oral Glucocorticoids (limited to 5-7 days)
  - Antibiotics
    - Recommended for moderate/ severely ill patients with COPD AE with increase in cough / sputum
    - GOLD Guidelines recommendations: give antibiotics for suspected bacterial infection, duration 5-7 days
  - Acute Hypoxemia – typically treated in the hospital

## Antibiotics for AECOPD Outpatient

- Determine risk factors for Poor Outcomes:
  - FEV1 <50% / >= 2 COPD AE past year
  - Hospitalization for COPD past year
  - Needing continuous oxygen
  - Comorbidities
  - Age >= 65
- Risk for pseudomonas / Dx within past year?
- YES -> Ciprofloxacin or levofloxacin / obtain sputum culture
- NO -> amoxicillin-clavulanate or resp fluoroquinolone



## Endobronchial Valve



## Zephyr Valve



- Patient Workup
- complete PFTs
- HRCT chest / perfusion scan
- ABG on RA to rule out severe hypercapnia / hypoxemia
- 6MW
- Echo to rule out LVEF < 40% / RVSP > 45 mmHg
- #1 Risk – Pneumothorax

## Case Study

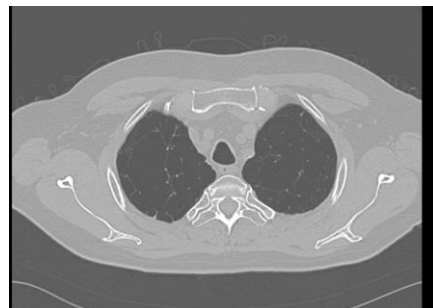
- Elderly male presents with progressive shortness of breath and decrease in ADL. He was diagnosed with emphysema several years ago but despite inhaler therapy his s/sx have progressed. He is very short of breath even just walking to the bathroom and he has been hospitalized 2x in the past 6 months for AECOPD.
- Spirometry showed FEV1 26% and Ratio 36%
  - COPD Stage: GOLD Grade 4
  - Group D
- Remote hx of tobacco abuse
- Home pulmonary meds:
  - Trelegy (LABA / LAMA / ICS)
  - Albuterol nebulizer as needed
- Home oxygen 2 L continuous via NC

## Complete PFTs

--- SPIROMETRY ---		Pre-	Actual	Spinal	LLN	Post-		
		Pre-	Actual	Spinal	LLN	Actual	Spinal	Change
FVC (L)	3.72	1.99	53	2.82				
FEV1 (L)	2.75	0.71	25	2.07				
FEV1/FVC (%)	74	36		66				
FEF 25% (L/sec)		0.59						
FEF 75% (L/sec)		0.18						
PEF 25-75% (L/sec)		2.17	0.27	13	0.80			
PEF Max (L/sec)		7.06	1.82	25	5.96			
PVC (L)		2.12						
PP Max (L/sec)		3.90						
--- LUNG VOLUMES ---		Pre-	Actual	Spinal	LLN - ULN			
SVC (L)	3.72	2.52	68	2.82				
IC (L)	2.52	1.33	53	1.78				
ERV (L)	1.20	1.21	98	0.89				
TGV (L)	5.10	7.54	243	1.64				
RV (Pne) (L)	2.11	6.33	300	1.35 - 2.87				
TLC (Pne) (L)	6.00	8.86	148	4.26 - 7.81				
RV TLC (Pne) (L)	35	72		26 - 44				
Trapped Gas (L)								
--- DIFFUSION ---		Pre-	Actual	Spinal	LLN			
DLCO <sub>adj</sub> (ml/min/mmHg)	27.6	8.3	30	19.4				
DLCO <sub>adj</sub> (ml/min/mmHg)	27.6	8.3	30	19.4				
DL <sub>VA</sub> (ml/min/mmHg)	4.80	1.84	38	3.40				
VA (L)	6.00	4.51	75	4.39				

## Quantitative VQ scan

- **Right lung:**
  - 3.9 % to the right upper lung zone
  - 23.2 % to the right mid lung zone
  - 23.0 % to the right lower lung zone
- **Left lung**
  - 3.5 % to the left upper lung zone
  - 23.8 % to the left mid lung zone
  - 22.6 % to the left lower lung zone
- IMPRESSION:
  - Diminished upper lung zone perfusion due to severe emphysema.





## Summary / Take home points:

- COPD is a disease made up of a combination of several obstructive lung diseases (asthma, chronic bronchitis, emphysema)
  - Phenotype is important to formulate a treatment plan an individualized treatment plan
- Spirometry is required in making the diagnosis of COPD
- Spirometry, AE history , Symptoms are ALL needed to classify the severity of COPD
- Inhaler selection is important because some patients do not have the strength to use DPI
- AECOPD – steroids are typically given for 5 days only as OP
- Endobronchial Valve – procedure used in patients with severe air trapping / COPD
- Those with COPD are at an INCREASE RISK of severe illness from COVID-19 (CDC)

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THE END

