Breathe Easy:
An Overview of COPD Diagnosis and Management

Family Medicine Residency Program

Educational Half Day

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Division of Pulmonary, Critical Care, and Sleep Medicine

March 3, 2021

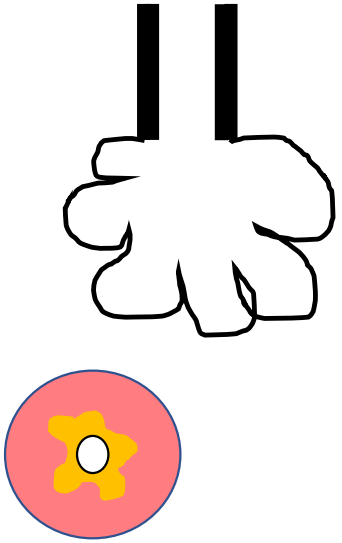
Agenda

- What is COPD? Pathophysiology
- Diagnosis and severity of COPD
- Management of COPD
- Non-medical management of COPD
- Treatment of COPD exacerbation
- Summary

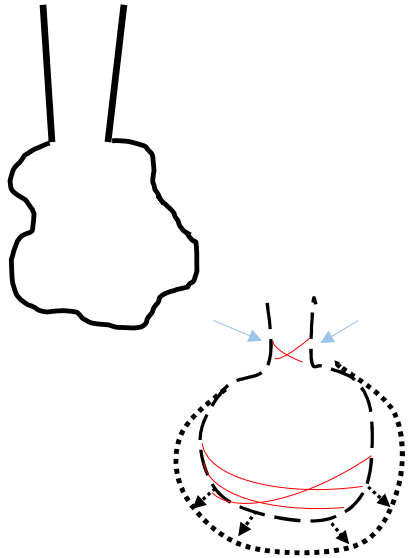
What is COPD?

- Group of diseases that lead to obstruction of airflow (airflow limitation)

Chronic Bronchitis



Emphysema



Why is COPD important?

Prevalence

- Over 16 million people dx
- 3.5 million w/emphysema
- 8.5 million w/chronic bronchitis

Mortality

- Third leading cause of death from disease
- >160,000 died from COPD in 2017

Costs

- 2010: $32.1 Billion
- 2020: projected $49 Billion
- $3.9 Billion in absentee days

CDC.gov/copd/index.html. Accessed Feb 28, 2021.

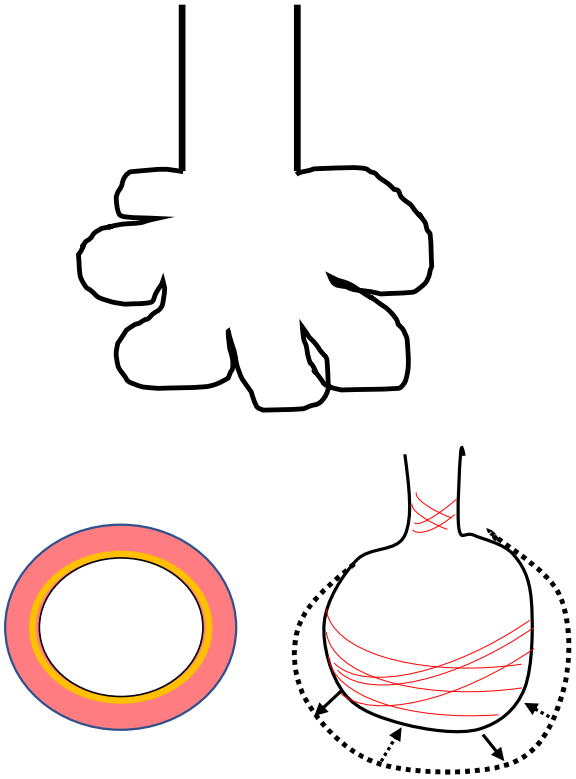
COPD Dx and Management Among PCPs

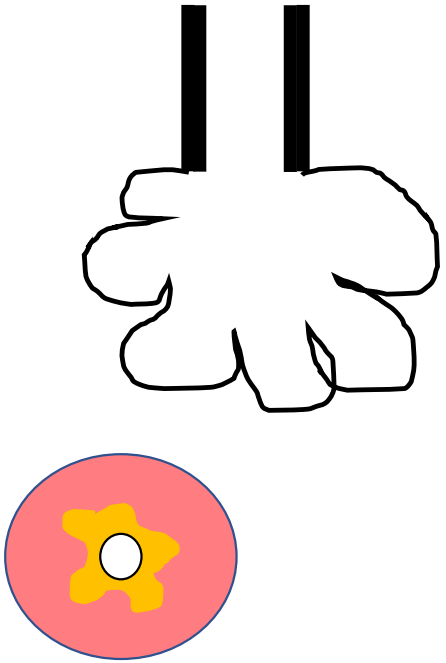
- Yawn and Wollan study:
  - 22% physician respondents noted lack of knowledge as barrier to care
  - 31% used GOLD or ATS guidelines
  - 33% used no guidelines or didn't know
- Mapel et al:
  - Disease severity underestimated in 41% patients
  - Recommended treatment changes for 37% patients
- Surani et al:
  - 21% pts had formal PFTs
  - 42% pts not on LAMA

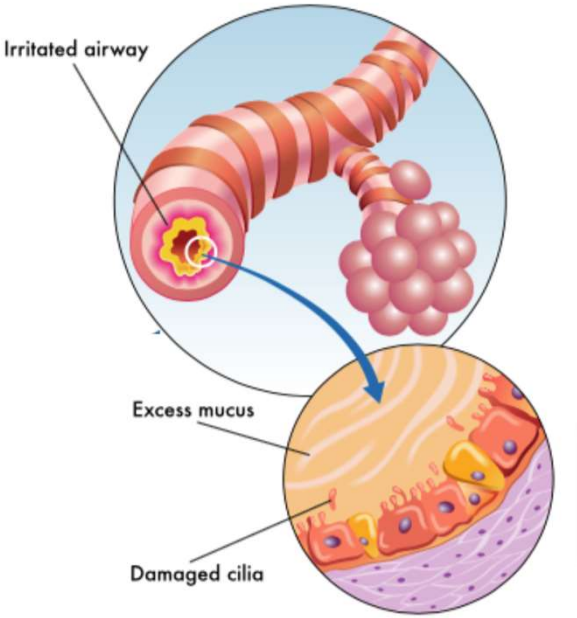
Mapel, Douglas W et al. "A clinical study of COPD severity assessment by primary care physicians and their patients compared with spirometry." *The American journal of medicine* vol. 128,6 (2015): 629-37.
Surani, Salim et al. "Adoption and adherence to chronic obstructive pulmonary disease GOLD guidelines in a primary care setting." *SAGE open medicine* vol. 7 2050312119842221. 4 Apr. 2019.
Yawn, Barbara P, and Peter C Wollan. "Knowledge and attitudes of family physicians coming to COPD continuing medical education." *International journal of chronic obstructive pulmonary disease* vol 3,2 (2008):311-7.

Types of COPD

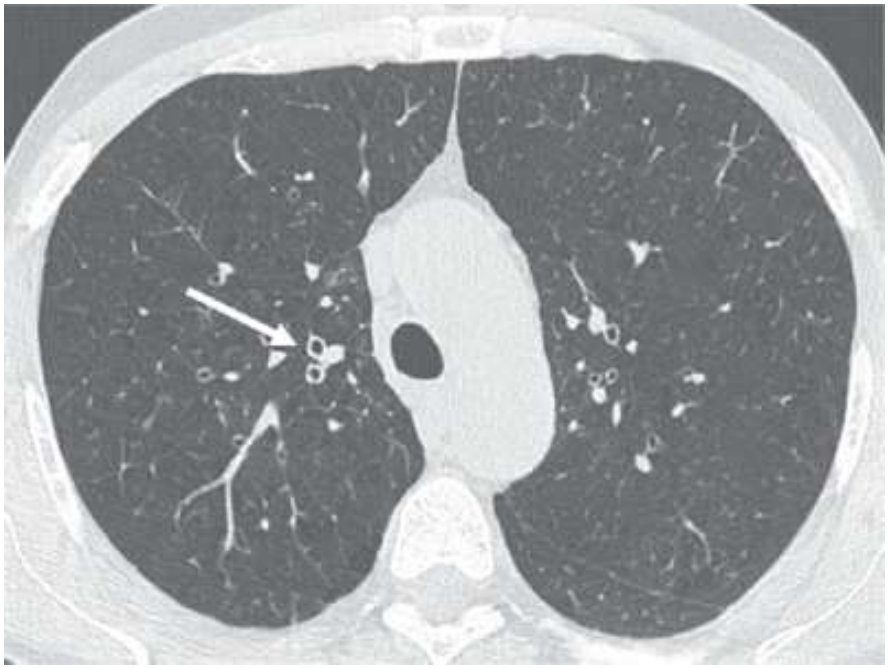
Chronic Bronchitis

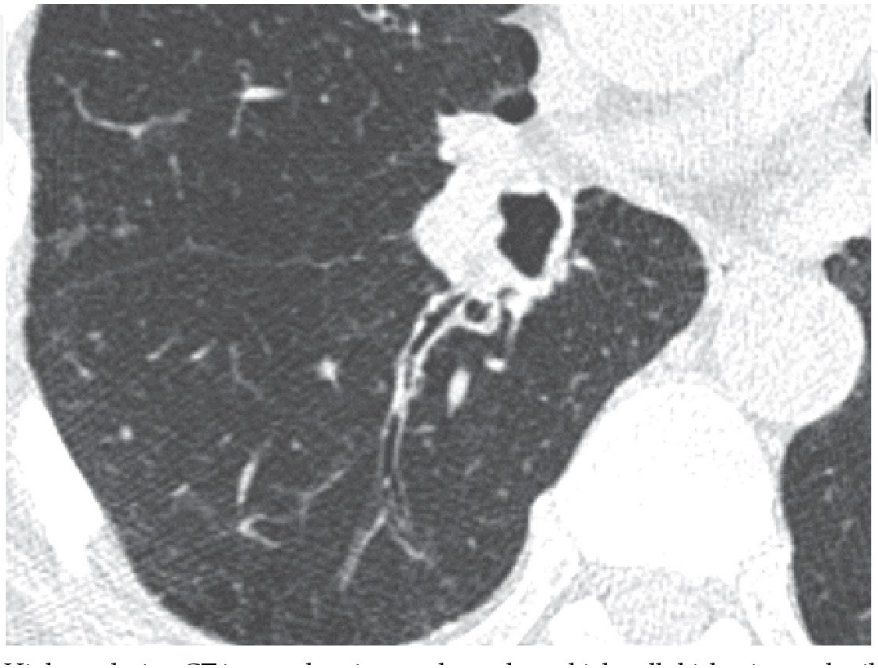






Types of COPD – Chronic Bronchitis

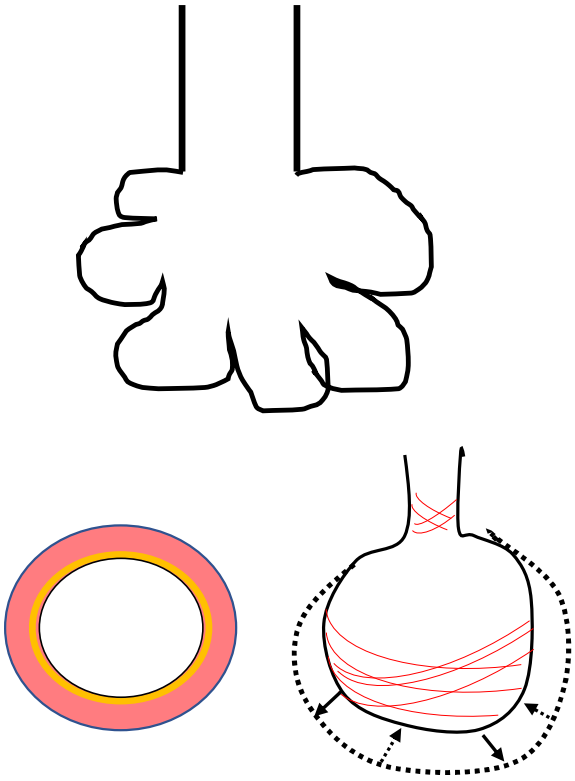


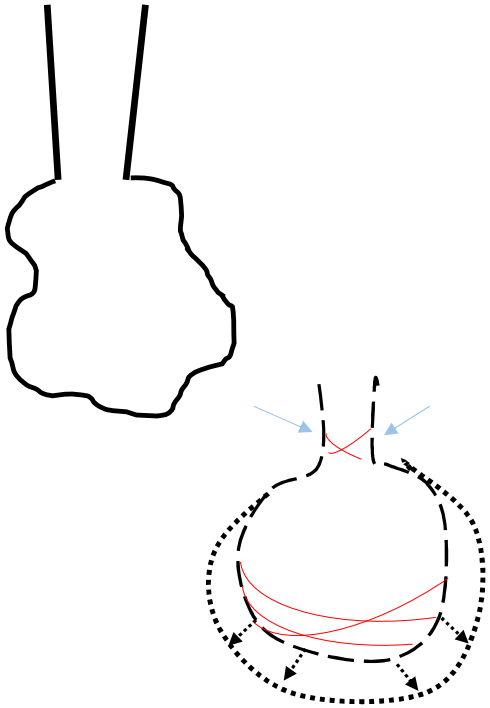


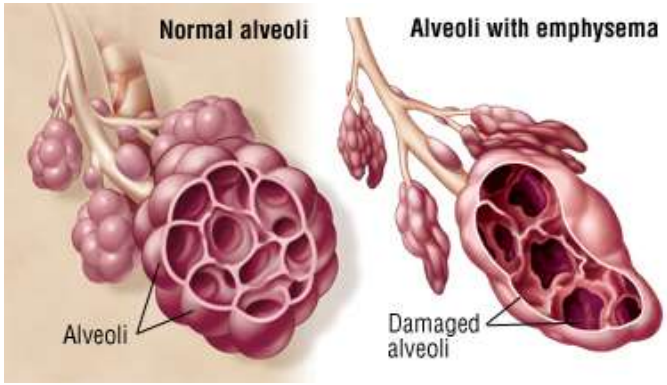
Sverzellati, et al. “New insights on COPD imaging via CT and MRI.” International journal of chronic obstructive pulmonary disease.” (2007).
Sapey, E. and R. Stockley. “The Importance of Chronic Bronchitis in Chronic Obstructive Pulmonary Disease.” (2011).

Types of COPD

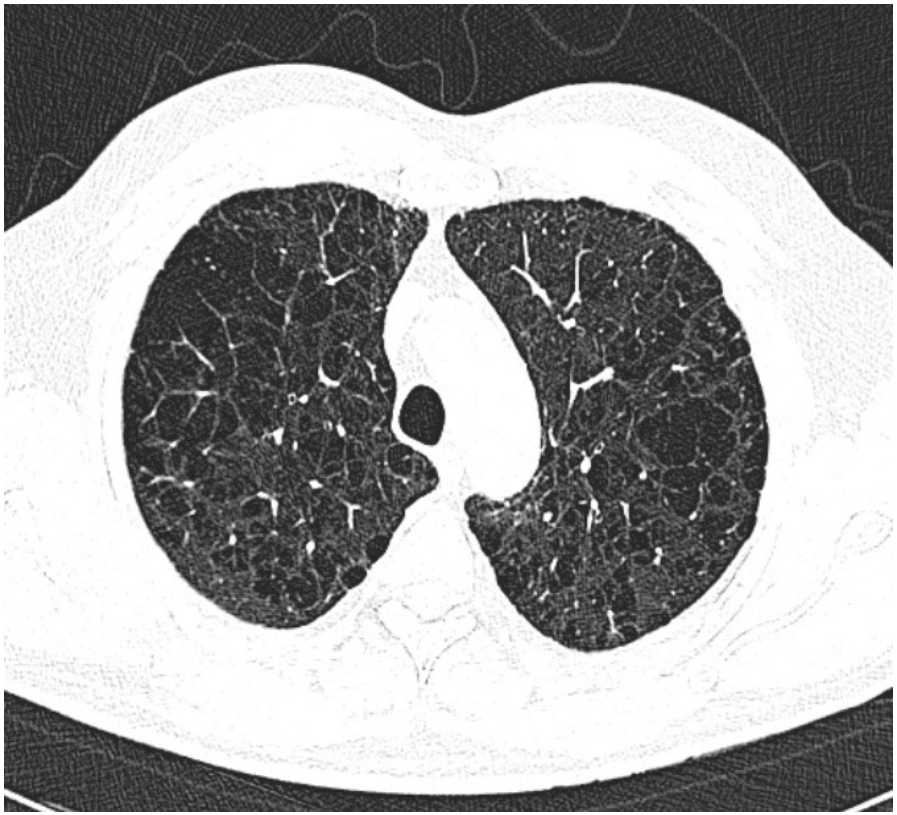
Emphysema

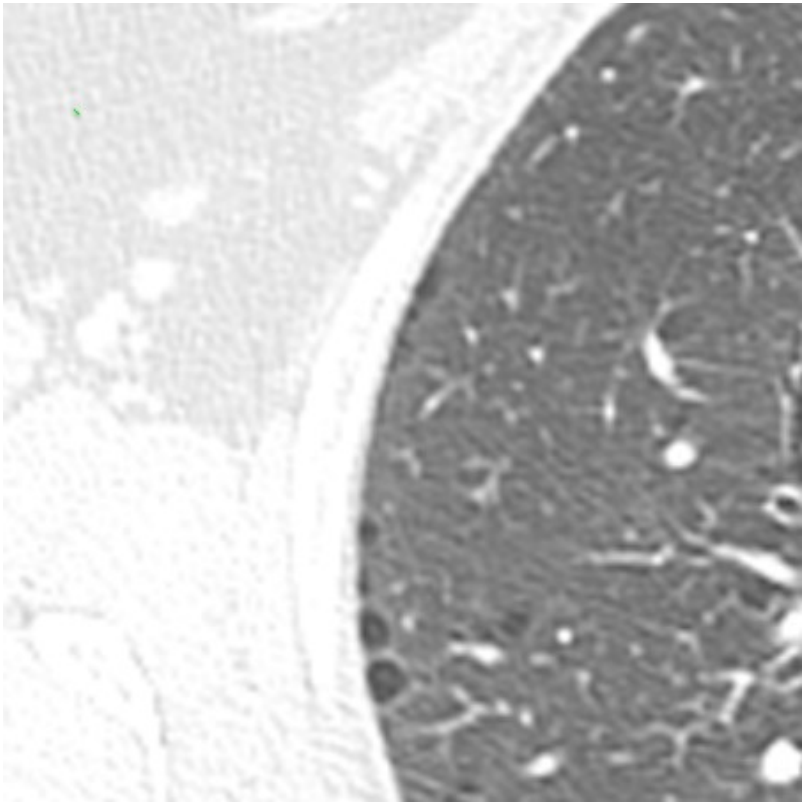






Types of COPD - Emphysema





1) Case courtesy of Dr David Cuete, Radiopaedia.org, rID: 26808. 2) Case courtesy of Dr Natalie Yang, Radiopaedia.org, rID: 9254.

Diagnosing COPD

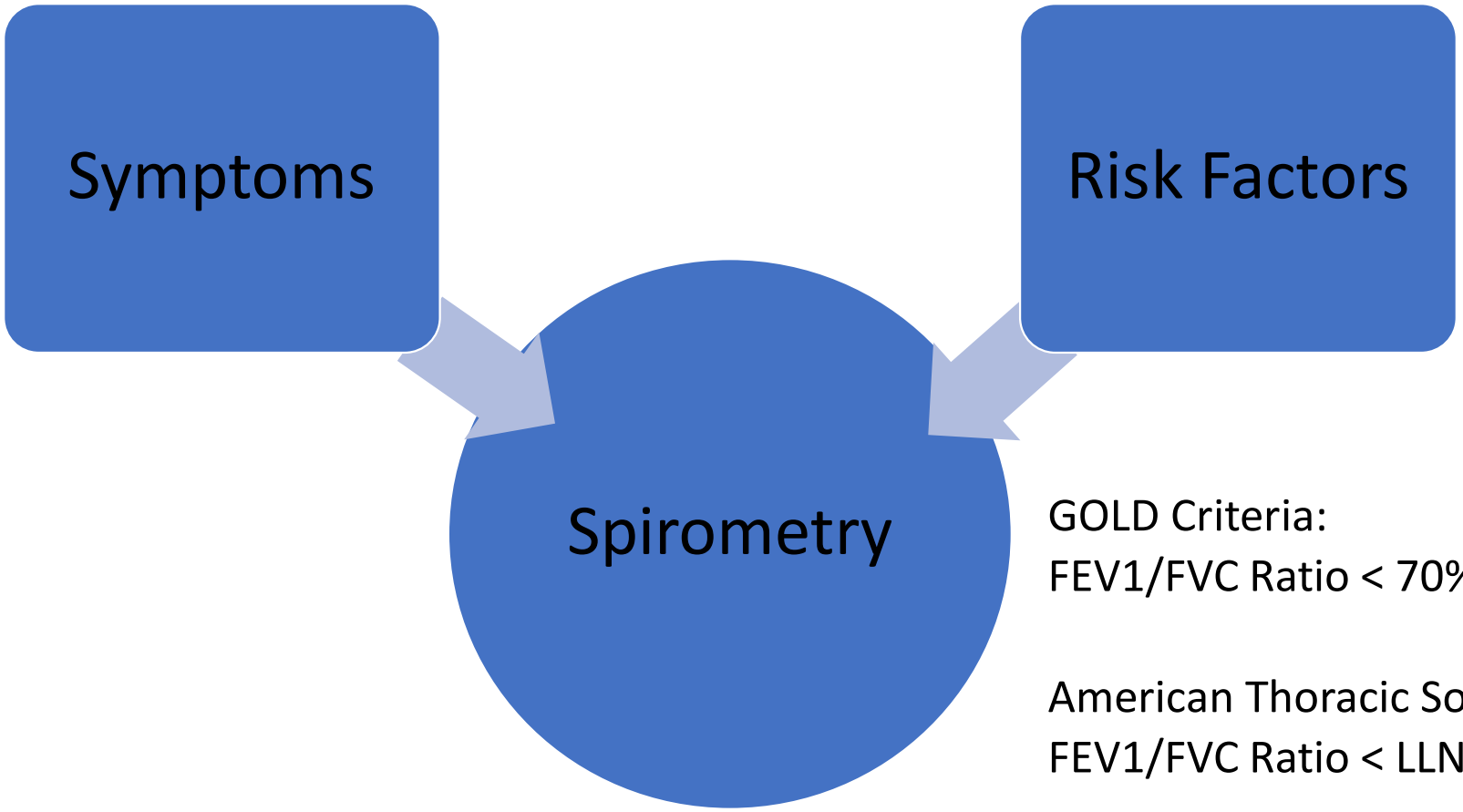
Symptoms

- Cough
- Mucus production
- Shortness of breath
- Recurrent LRTIs

Risk Factors

- Smoking
- Air pollution
- Biomass fuels
- Host factors
- Occupational dusts/vapors/fumes

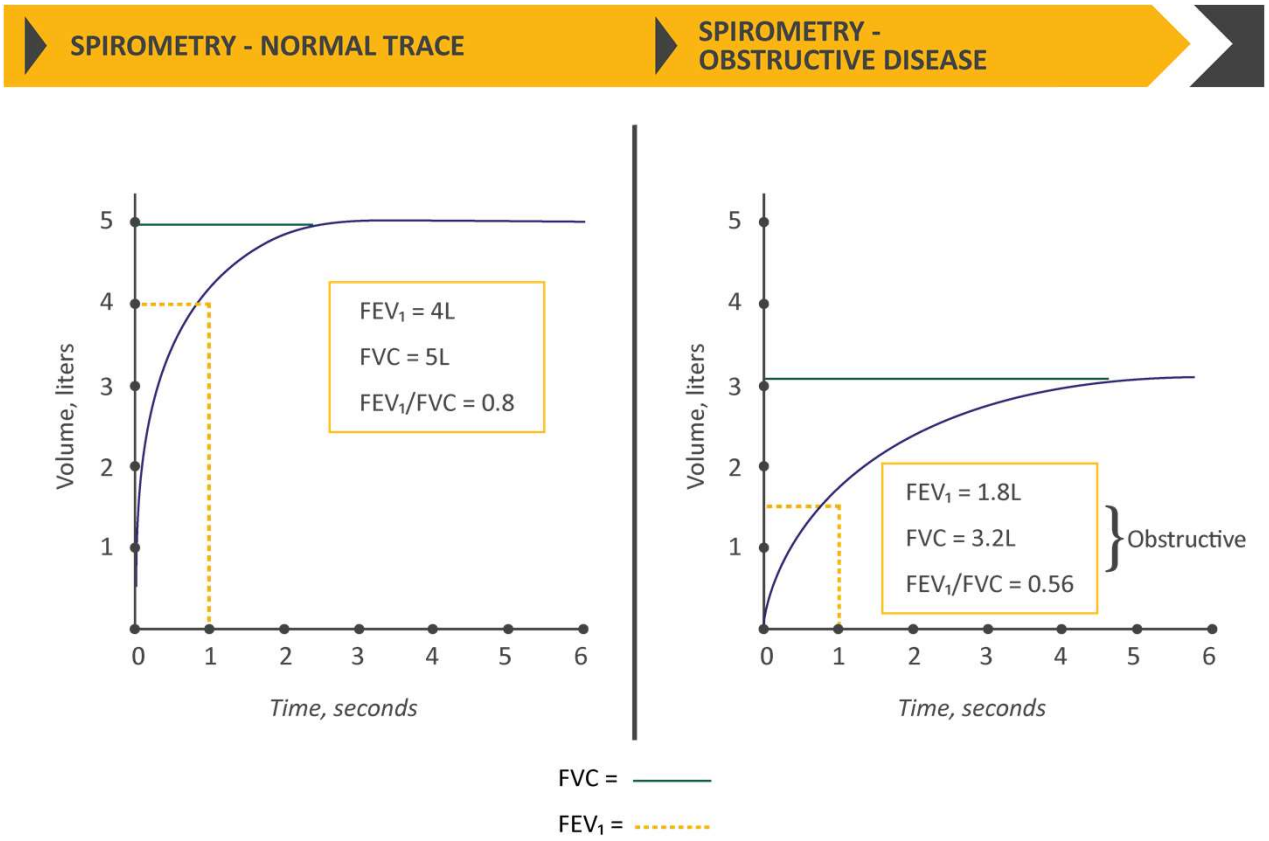
Diagnosing COPD



GOLD Criteria:
FEV1/FVC Ratio < 70%

American Thoracic Society:
FEV1/FVC Ratio < LLN

Diagnosing COPD



Global Strategy for the Diagnosis, Management and Prevention of COPD, Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2020. Available from: https://goldcopd.org.

Classifying COPD Severity (ATS)

Severity	FEV1 %
Mild	> 70
Moderate	60 – 69
Moderately severe	50 – 59
Severe	35 – 49
Very severe	< 35

American Thoracic Society:

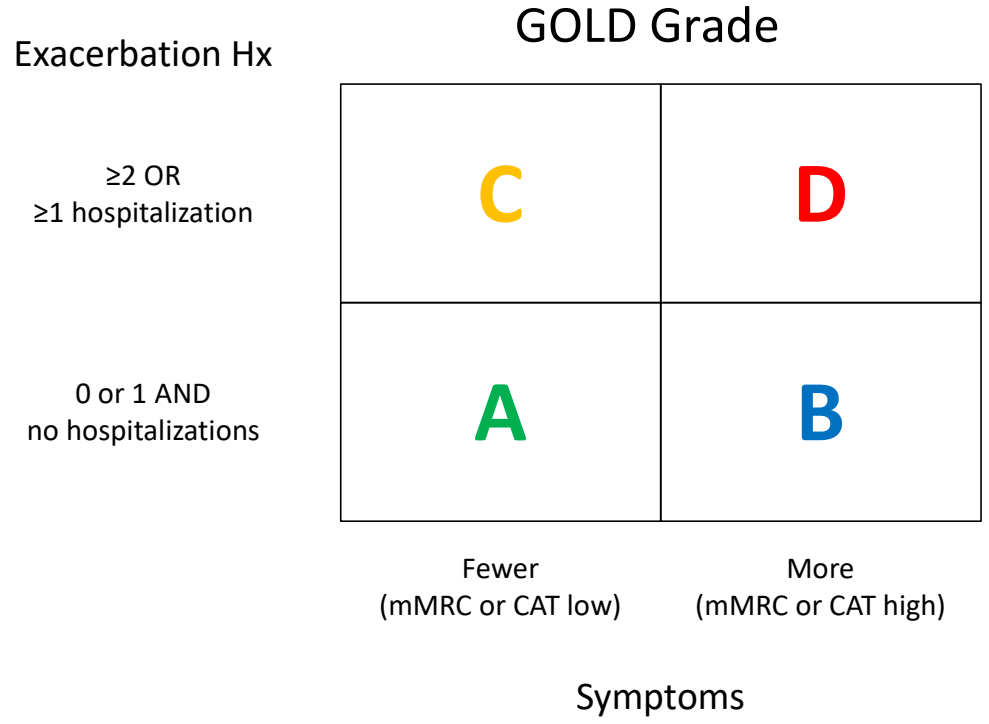
FEV1/FVC Ratio < LLN

Classifying COPD Severity (GOLD)

Grade	FEV1 (%)
GOLD 1	≥80
GOLD 2	50 – 79
GOLD 3	30 – 49
GOLD 4	< 30

GOLD Criteria:

FEV1/FVC Ratio < 70%



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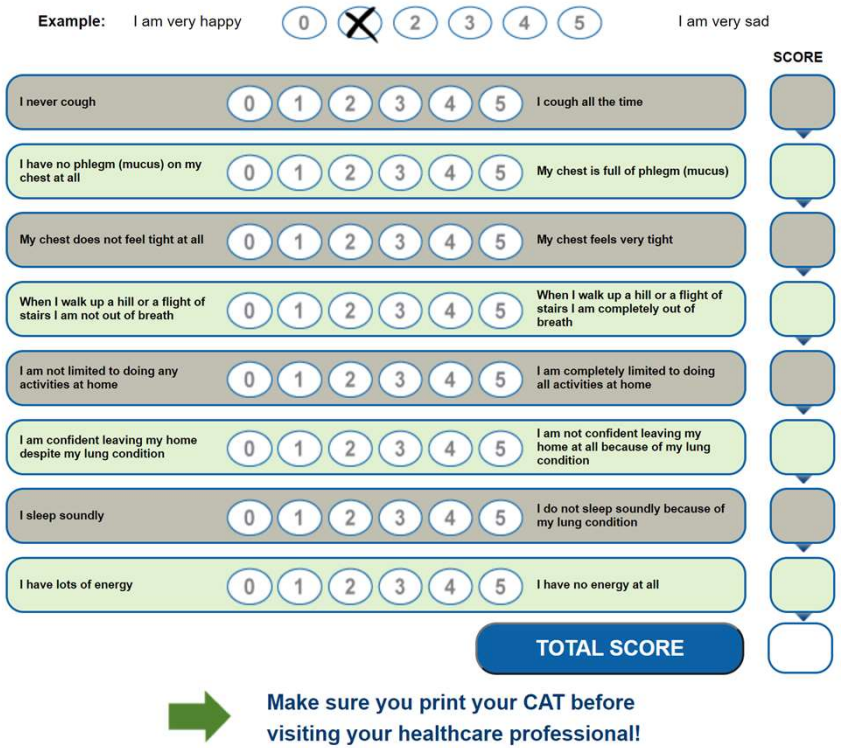
Classifying COPD Severity

Grade	Description of Breathlessness
0	Only with strenuous exercise
1	When hurrying on level ground or walking up slight hill
2	On level ground, walk slower than people of same age, or have to stop when walking at own pace
3	Stop for breath after walking 100 yards or a few minutes on level ground
4	Too breathless to leave the house, or breathless when dressing

mMRC Dyspnea Scale



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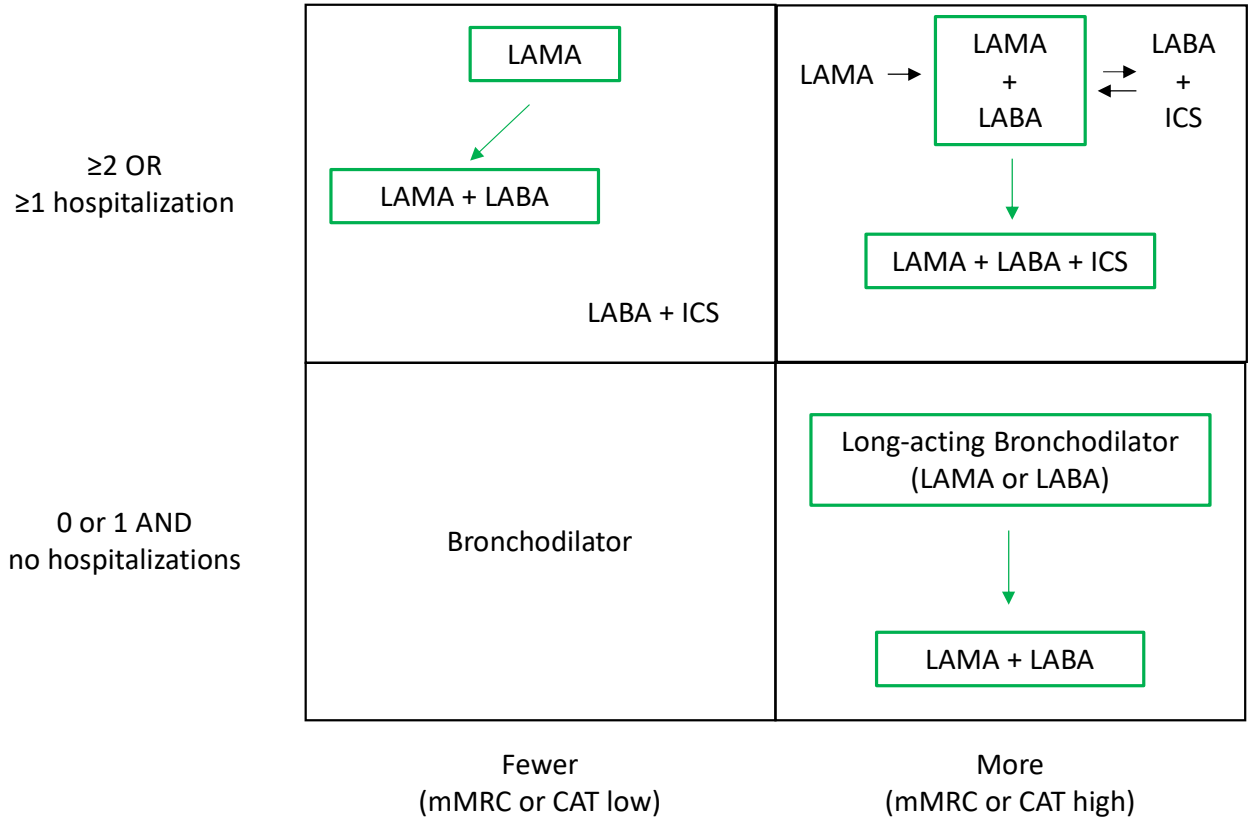
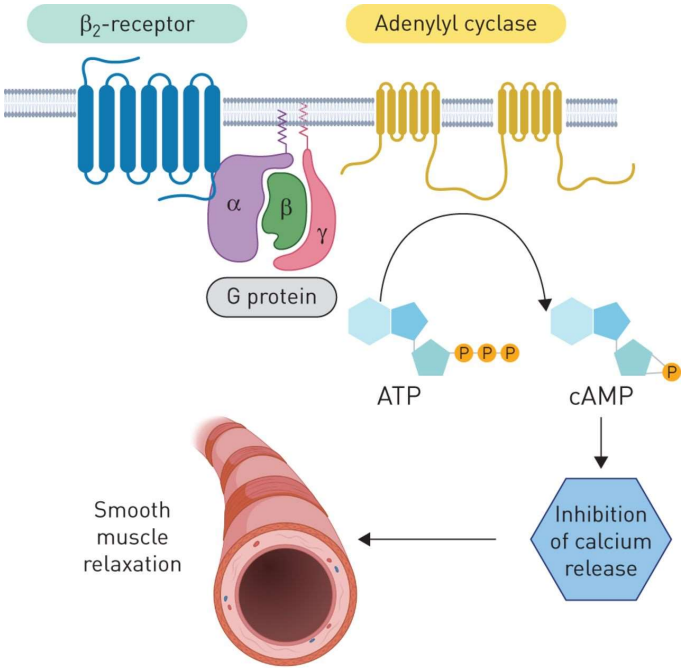
Outpatient COPD Management



Global Strategy for the Diagnosis, Management and Prevention of COPD, Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2017. Available from: https://goldcopd.org.

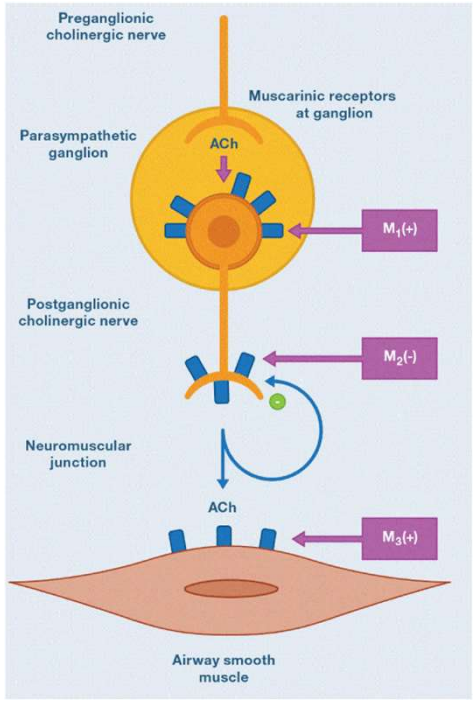
Inhaler Therapy



Beta agonists

SABA:
Albuterol (Proair, Proventil, Ventolin)
Levalbuterol (Xopenex)

LABA:
Formoterol (neb)
Salmeterol
Olodaterol
Indacaterol (Ellipta)
Arformoterol (neb)



Anti-muscarinics

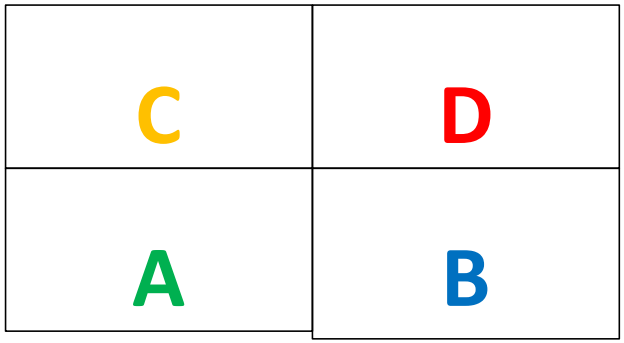
SAMA:
Ipratropium (Atrovent)

LAMA:
Tiotropium (Spiriva)
Umeclidium (Incruse)
Aclidinium (Tudorza)

Yusuf F, Prayle A, Yanney M. "β_2-agonists do not work in children under 2 years of age: myth or maxim?". (2019).
Alvarado, A. "Dual Bronchodilator Therapy: a Review." (2017).

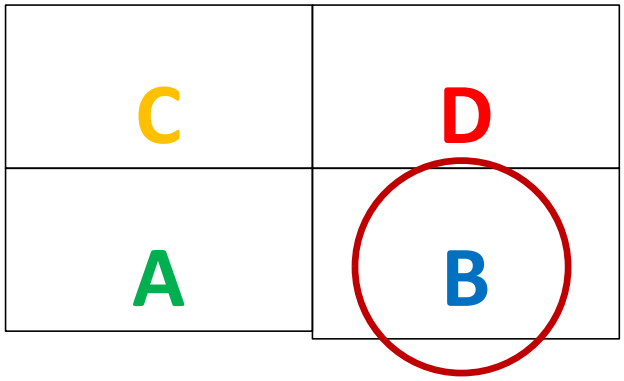
Inhaler Therapy

- Mild to moderate COPD:
  - LAMA slows down annual decline in FEV1
  - Significant increase in time to first AECOPD
  - Improvement in symptoms



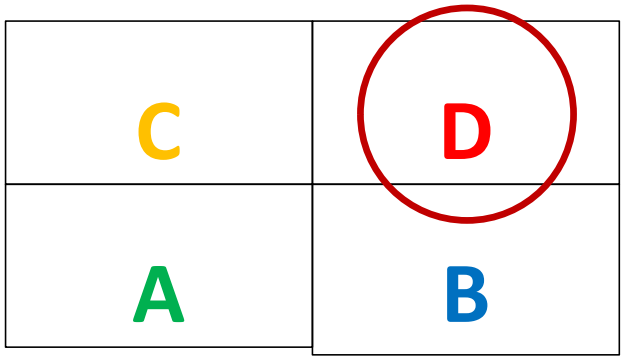
Inhaler Therapy

- Moderate to severe COPD w/o acute exacerbations:
  - Mono- or dual therapy with long-acting bronchodilators
  - LABA/LAMA superior to ICS/LABA
  - Decreasing LAMA/LABA/ICS -> LAMA/LABA



Inhaler Therapy

- Severe COPD w/frequent exacerbations:
  - LAMA/LABA/ICS combination
  - Decreases AECOPD
  - Improves QoL, lung function, and survival



Non-pharma Treatment: Oxygen!

- Pts w/severe resting hypoxemia:
  - Resting RA $PaO_2 \leq 55$ or $SpO_2 \leq 88\%$
  - Resting RA PaO_2 56-59 or $SpO_2 \leq 89\%$ with evidence of:
    - Edema
    - Cor pulmonale/pulm HTN
    - Erythrocythemia >56%

- Exercise desat $SpO_2 \leq 88\%$ and improvement w/supplemental O_2

Non-pharma Treatment: Oxygen!

- NOTT (1970s)
  - Patients with severe hypoxemia
  - Compared nocturnal only O2 vs continuous O2
  - LTOT given for ≥15 hrs/d improved survival

- LOTT (2016):
  - Pts w/stable COPD and less severe hypoxemia
    - SpO2 89-93% at rest, or
    - <90% for >10 secs during 6MWT but ≥ 80% for ≥ 5 mins
  - No improvement in time to death or first hospitalization
  - No improvement in QoL, lung function, or distance walked

Non-pharma Treatment: NIV

- Admitted for AECOPD requiring acute NIV:
  - Remain hypoxemic and hypercarbic ($PaCO_2 \geq 52$ mmHg) two weeks after discharge
  - Add goal-directed nocturnal NIV to supplemental O_2

Non-pharma Treatment: Other

- Pulmonary Rehab
  - Improves dyspnea, health status, and exercise tolerance
  - Decreased anxiety and depression

- Lung volume reduction surgery
- Interventional pulmonary/bronchoscopic interventions
- Lung transplant referral

Acute Exacerbation of COPD

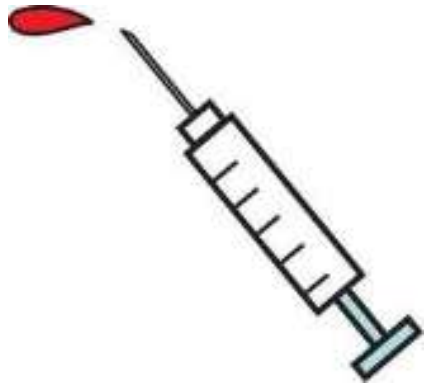
- SABA +/- short-acting anticholinergics initial BD
- Maintenance therapy with LA bronchodilator initiated ASAP
- Steroids:
  - Prednisone 40 mg daily x5d (no more than 7d)
- Antibiotics:
  - No more than 5-7 days (azithromycin, doxycycline, fluoroquinolone)
- NIV first mode of ventilation in COPD pts w/o contraindications

Acute Exacerbation of COPD

- NIV indications:
  - Resp acidosis ($PaCO_2 \geq 45$ mm Hg or pH < 7.35)
  - Severe dyspnea w/signs suggesting resp muscle fatigue, increased WOB
  - Persistent hypoxemia despite supplemental O_2
- ICU Admission:
  - Severe dyspnea that doesn't respond initially
  - Changes in mental status
  - Persistent or worsening hypoxemia (PaO_2 <40 mm Hg) and/or severe/worsening resp acidosis (pH <7.25) despite O_2 and NIV
  - Hypotension

Acute Exacerbation of COPD

- Blood gas, please!



Summary

- COPD is a disease of irreversible airflow limitation
- Significant burden in US and worldwide
- Dx of COPD requires sx + spirometry
- Severity of COPD is based on FEV1 and sx
- Treat with long-acting bronchodilators
- Oxygen, vaccines, and non-invasive ventilation are important
- Acute exacerbation: SABA + steroids + abx. Don’t forget ABG!

Thank You!