# COPD

## Registrar Education Series

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ZAMBIA

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# Quick reference

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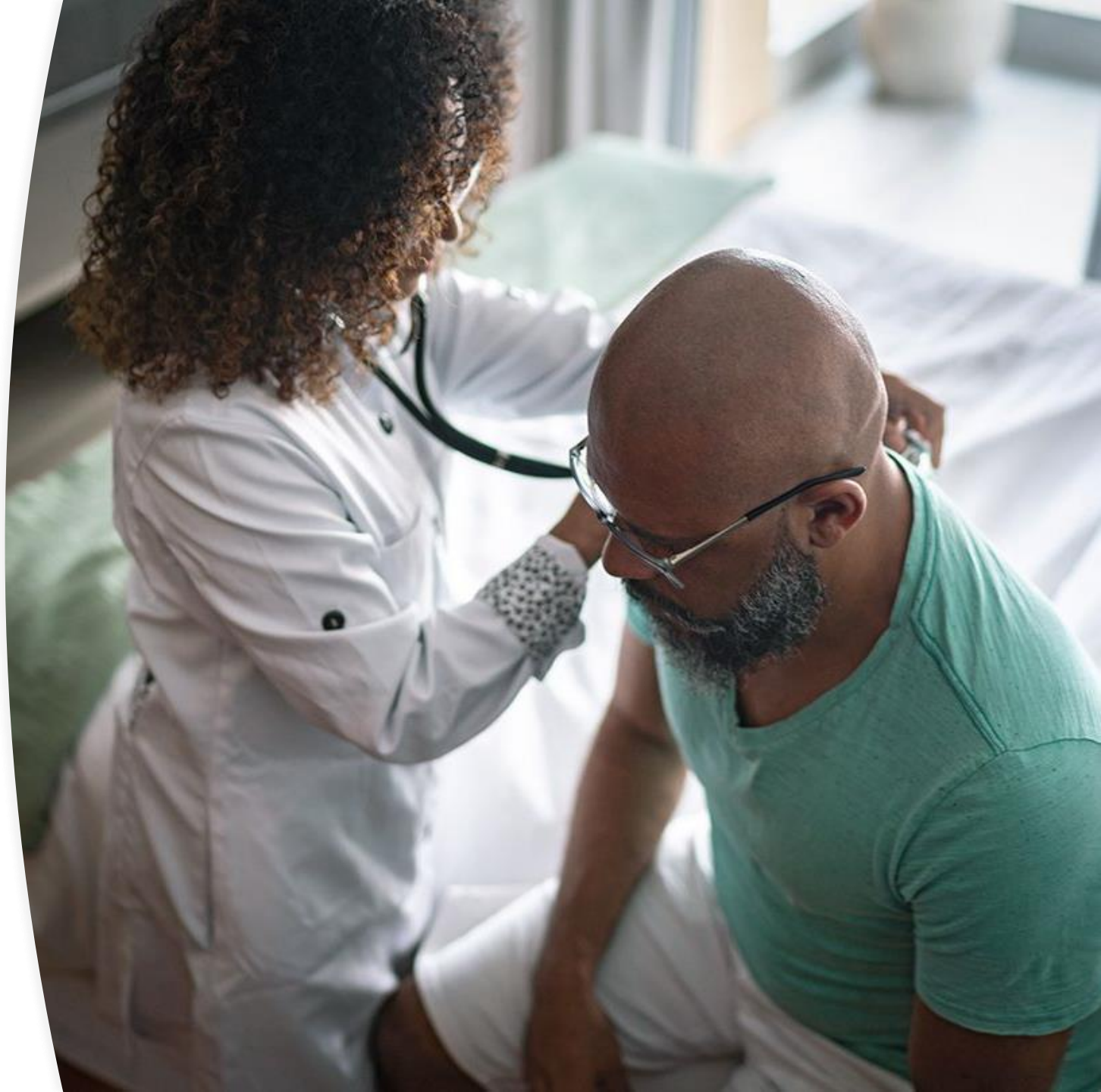
# Suspect COPD

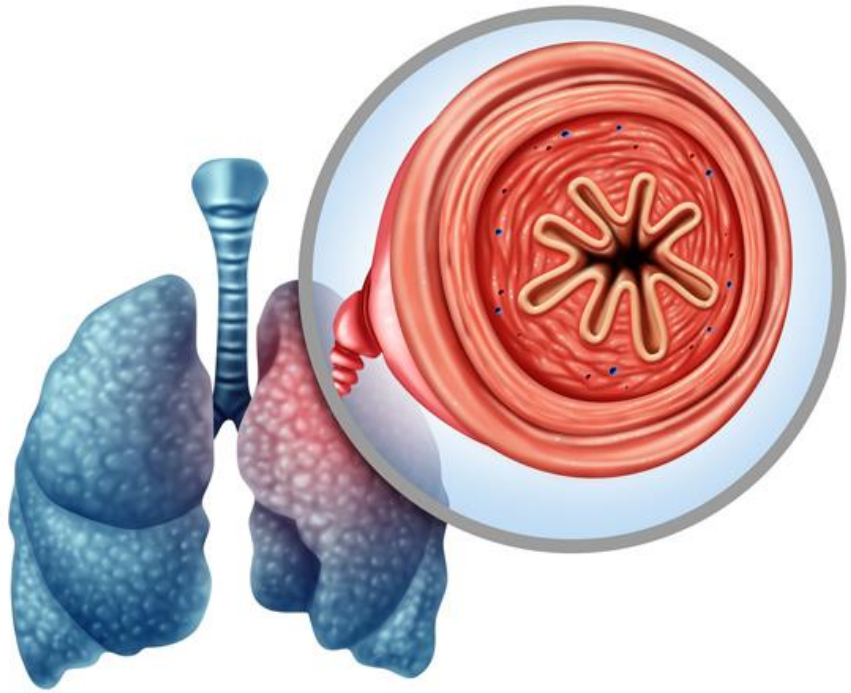
- What are risk factors for developing COPD?
- What are common signs and symptoms of COPD?
- What are co-morbidities that are likely to occur with COPD?

# Diagnosis

- Who should be screened for COPD?
- How is the diagnosis made?
- How is airflow limitation classified?
- What other studies are needed?



# Initial Management



- What are the goals of treatment
- How is initial management of COPD decided?
  - What is the preferred treatment for each category?
- What are the main types of treatment for COPD?

# Pharmacologic

- What are the different classes of medications used for COPD.
- What POEMs does each affect?
- What are common adverse reactions of each?

# Non-Pharmacologic

- What are the different non-pharmacologic methods?
- What POEMs does each affect?

# Follow-up care

- What should be reviewed at follow up visits?
- How is therapy escalation or de-escalation decided?

# Suspect COPD

## Risk factors

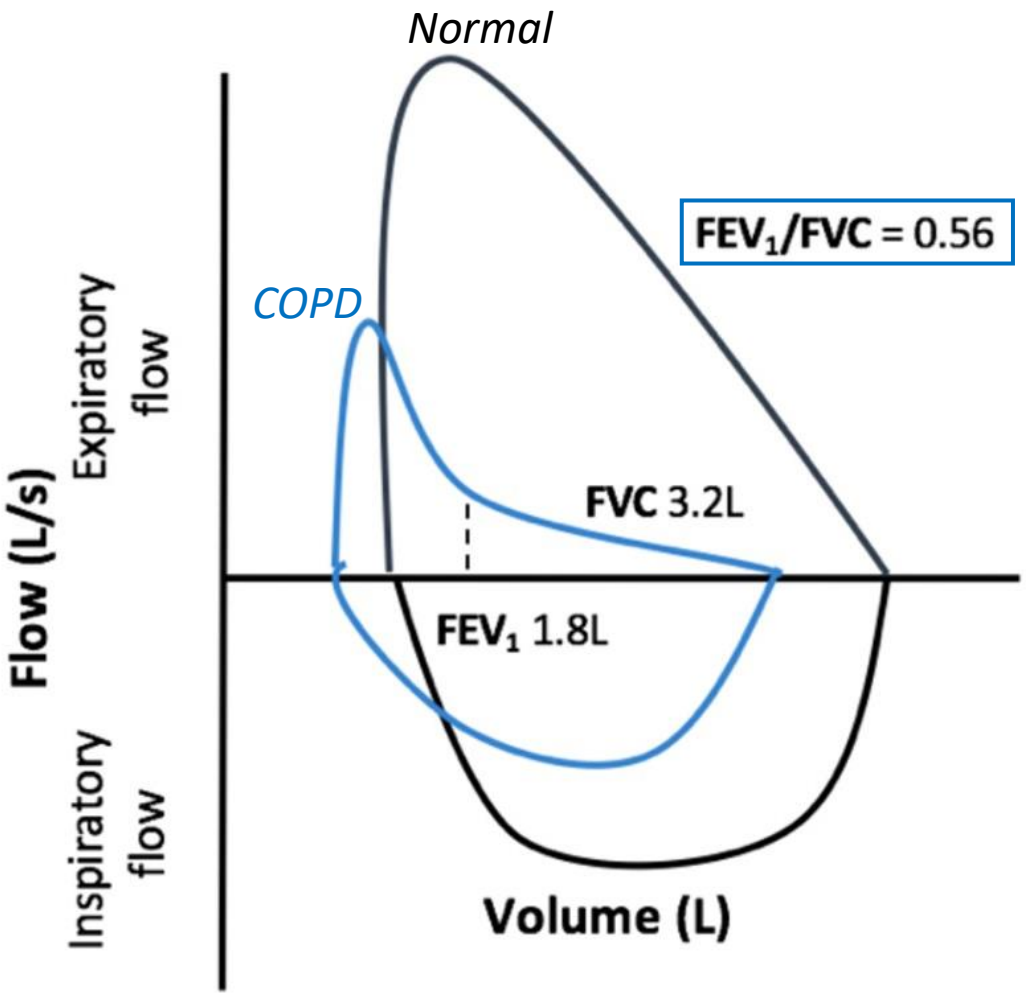
- Adult, >40 years old, male, significant exposure to tobacco smoke (40pack/years), HIV, TB, occupational exposure, pesticides, air pollution

## Signs and symptoms

- Persistent progressive dyspnea worse with exertion, chronic cough, intermittent cough, productive/nonproductive cough, recurrent lower respiratory infections, chest tightness, fatigue

## Co-morbidities

- Heart failure, ischemic heart disease, A-fib, skeletal muscle dysfunction, diabetes, osteoporosis, depression, anxiety, lung cancer, GERD, OSA, bronchiectasis, anemia, vitamin D deficiency




# Diagnosis

Screening for COPD is not recommended

Diagnosis is based on high suspicion in a person with risk factors, signs and symptoms and spirometry consistent with obstructive disease

- Dyspnea, chronic cough or sputum production, history of recurrent lower respiratory tract infections
- Postbronchodilator FEV1/FVC < 0.7

Airflow limitation is based on postbronchodilator percent predicted FEV1

- GOLD1 mild: ≥ 80%
- GOLD2 moderate: 50-79%
- GOLD3 severe: 30-49%
- GOLD4 very severe: < 30 %

No additional testing is needed for the diagnosis of COPD but can be used to detect co-morbidities or alternate diagnoses

# Spirometry

- Performed at diagnosis then yearly
- 400mcg of SABA wait 10-15 min
- 160mcg of LAMA wait 30-45 min
- Combined 400/160mcg wait 30-45min
- If spirometry is not available peak flow can be used
  - < 80% predicted
    - *91%SEN, 82%SPEC, 30%PPV*

# Additional testing

**Pulse ox**

- If suspected respiratory failure/right heart failure to guide supplemental O2

**CBC with eosinophil count**

**Assess COPD severity**

- Symptom questionnaire and spirometry

**CXR/CT are not useful for making the diagnosis of COPD**

- Can be used to detect comorbidities like CHF and lung cancer as well as alternate diagnoses

**ECG/ECHO**

- If cor pulmonale is suspected

**AAT deficiency**

- Should be tested in areas of high prevalence, young age, low smoking history

**Diffusing capacity of the lung for carbon monoxide (DCLO)**

- For symptoms that are disproportionate to airflow obstruction

# Initial management

Goals of management are to:

- Decrease symptoms (symptoms, exercise tolerance, health status)
- Decrease risk (prevent disease progression, prevent/treat exacerbations, reduce mortality)

Initial management is based on severity and health status:

- Health status questionnaires: mMRC and CAT

Pharmacologic

- Long-acting bronchodilators

Non-pharmacologic

- Smoking cessation, pulmonary rehab, self-management

Vaccines

Oxygen if needed

Lung reduction surgery if indicated

# Initial management

| Group | Exacerbations Hospitalizations | mMRC | CAT | Pharmacologic | Non-Pharmacologic | Pulmonary rehab |
|---|---|---|---|---|---|---|
| A | 0 - 1 exacerbations<br>Without hospitalizations | 0 – 1 | < 10 | SABA or LABA or LAMA | Self-management<br>Physical activity<br>Smoking cessation | Not indicated |
| B | 0 - 1 exacerbations<br>Without hospitalizations | ≥ 2 | ≥ 10 | LABA or LAMA | | Indicated |
| C | ≥ 2 exacerbations<br>> 1hospitalizations | 0 - 1 | < 10 | LAMA | | |
| D | ≥ 2 exacerbations<br>> 1 hospitalizations | ≥ 2 | ≥ 10 | LAMA or<br>LAMA+LABA (severe symptoms)<br>LABA+ICS if EOS ≥ 300 | | |

# Pharmacologic

- Long-acting beta agonist (LABA)
- Long-acting muscarinic agonist (LAMA)
- Inhaled corticosteroids (ICS)
- Methylxanthines
- Phosphodiesterace-4 inhibitors
- Antibiotics
- Mucolytics
- Oxygen

Click on the class for more information

# Long-acting beta agonist (LABA)

- 12 hours
- Improve FEV1, lung volume, dyspnea, health status, exacerbation rate and hospitalizations.
- Adverse events: tachycardia, cardiac rhythm disturbance, tremor
- No change in mortality or rate of decline


| MEDICATION | Brand Name | Dose |
|---|---|---|
| Formoterol | Perforomist | 20mcg (1 puff) bid |
| Salmeterol | Serevent | 50mcg (1 puff) bid |

# Long-acting muscarinic antagonist (LAMA)

- Anticholinergic
- 24 hours
- Improve symptoms, health status, exacerbations, hospitalizations, rate of decline
- Adverse events: dry mouth


| MEDICATION | Brand Name | Dose |
|---|---|---|
| Tiotropium | Spiriva | 2 puffs once daily |
| Aclidinium bromide | Tudorza Pressair | 1 puff bid |
| Glycopyrrolate inhaled | Lonhala Magnair | 1 inh bid |
| Umeclidinium inhaled | Incruse Ellipta | 1 puff daily |

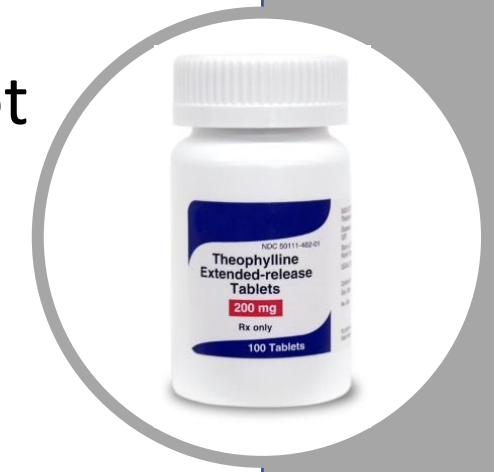
# Inhaled corticosteroids

- Limited role in COPD unless there is a history of asthma or EOs are elevated.
- Never to be used as monotherapy. Combine with a LABA to improve lung function, health status and reduce exacerbations
- Indications:
  - EOs >300 has the greatest likelihood of benefit
  - EOs ≥ 100 with ≥2 hospitalization(s) and/or 1 exacerbations in previous year
- Adverse Events: pneumonia, oral candidiasis, bruising, hoarse voice

| MEDICATION | Brand Name | Dose |
|---|---|---|
| Fluticasone | Flovent | Variable, dosed bid |
| Budesonide | Pulmicort | Variable, dosed bid |
| Beclomethasone | Qvar | Variable, dosed bid |

# Methylxanthines

- Sustained released theophylline
- Modest bronchodilator effect
- Not recommended unless other bronchodilators are not available
- Narrow therapeutic window leading to significant toxicities
- Adverse events: palpitations, convulsions, headache, nausea, heartburn, insomnia and high drug interactions




| MEDICATION | Brand Name | Dose |
|---|---|---|
| Theophylline | Elixophyllin (and others) | 300-600mg/d po divided qd-bid |

# Phosphodiesterase-4 inhibitor

- For severe-very severe COPD uncontrolled on LABA/ICS
- Used to decrease moderate to severe exacerbations needing systemic corticosteroids
- A.E. diarrhea, nausea, decreased appetite, decreased weight, abdominal pain, sleep disturbance, headache


| MEDICATION | Brand Name | Dose |
|---|---|---|
| Roflumilast | Daliresp | Start 250mcg po qd x 4wk<br>Then 500mcg po qd |

# Antibiotics

- Use if indicated during an exacerbation if high suspicion of bacterial infection by increased sputum purulence, dyspnea and sputum volume.
- Can be given for 1 year for former smokers with exacerbations despite appropriate therapy.
- A.E. increased resistance, prolonged QTc, impaired hearing test


| MEDICATION | Dose | Frequency |
|---|---|---|
| Azithromycin | 250mg | Daily |
| Azithromycin | 500mg | 3x per week |
| Erythromycin | 250mg | Bid |

# Mucolytics

- (Mostly) not for patients on ICS
- May decrease exacerbations and modestly improve health status
- Target population/dosing is not specified


| MEDICATION | Brand Name | Dosing/Route |
|---|---|---|
| N-acetylcysteine | Mucomyst | 3-5mL 20% soln or 6-10mL 10% soln NEB tid-qid |
| Carbocysteine | Mucodyne | 375mg, 2 capsules tid then 1 capsule qid once |
| Erdosteine | Esteclin (and others) | 300mg bid or tid |

# Oxygen

- Increases survival with severe chronic resting arterial hypoxemia
  - Indicated if O2 saturation <88%
- Needed for >15 hours/day in order to increase survival
- Once started, reevaluate for need after 60-90 days.
- Does not help stable COPD with moderate resting/exercise induced arterial desaturations.
- CPAP for co-occurring OSA increases survival and decreases risk of hospitalization.
- Air Travel – no oxygen is needed if O2 sats are >95% and 6 minute walk Ox sat > 84%.  If needed 3L for mod-severe COPD to maintain a PaO2 of ≥6.7KPa (50mmHg).

# Non-Pharmacologic

- Inhaler technique
- Pulmonary Rehab
- Self-management
- Palliative care
- End of life
- Surgical

# Inhaler technique

2/3 of patients make at least one error when using an inhalation device which reflects symptom control.

Risk factors for improper technique include:

- Older age, multiple devices, lack of previous education

Teach proper technique

Use teach back method

Recheck at each visit

Inhaler technique and adherence to therapy should be assessed before escalating medications

# Pulmonary rehab

- Consists of exercise training, smoking cessation, nutritional counseling and self-management education.
- Improves dyspnea, health status, and exercise tolerance in stable patients
- Decreases hospitalizations if the patient had an exacerbation ≤ 4 weeks
- Decreases symptoms of anxiety and depression


# Self-management

When combined with communication with a health professional it decreases ED/hospitalizations and improves health status

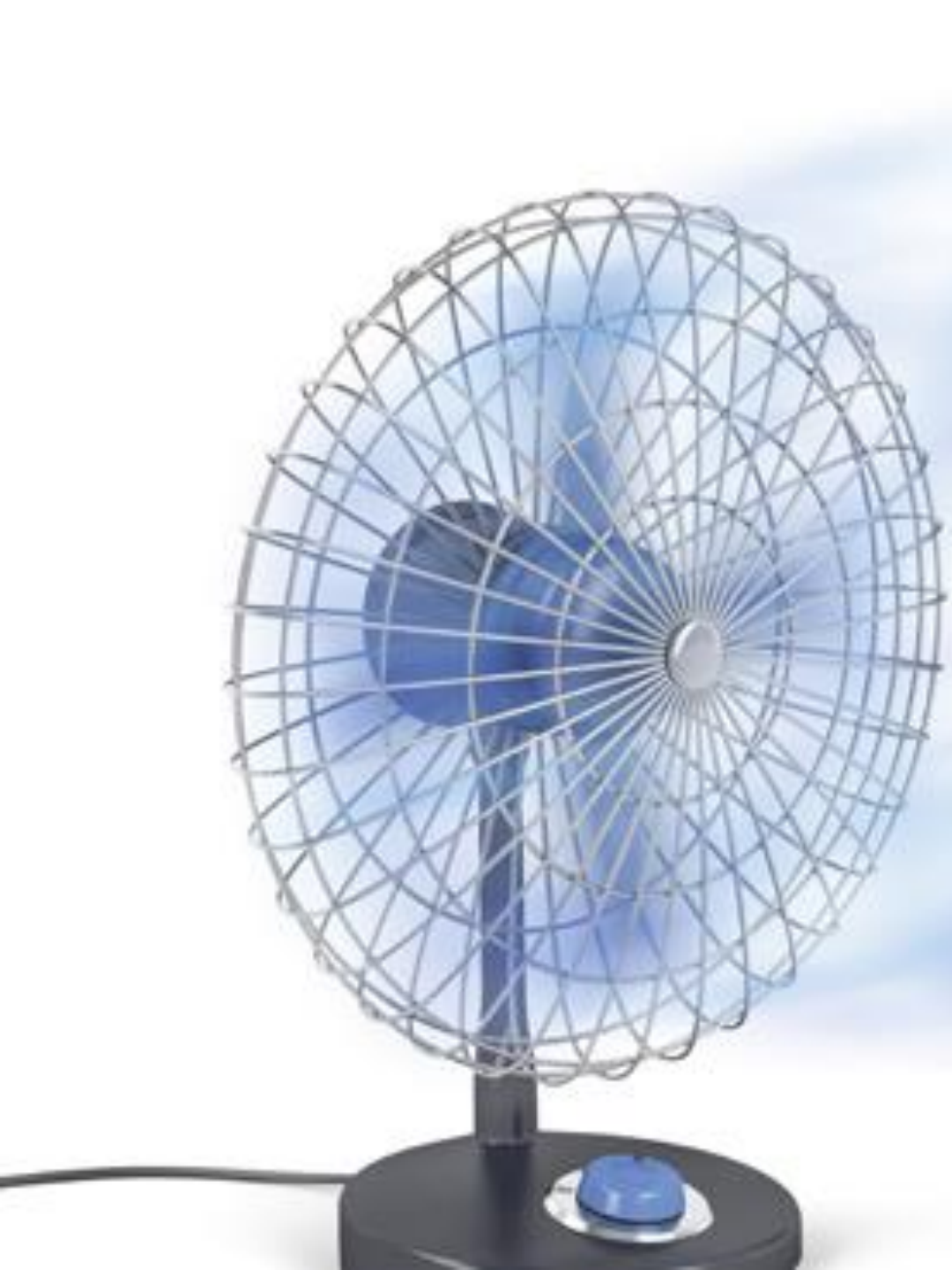
Structured self-management consists of:

- Smoking cessation
- Current inhaler use
- Early recognition of exacerbations
- Advanced directives
- Decision making and taking action
- When to seek help
- Surgical interventions

# Palliative care

- Can improve dyspnea, fatigue, depression, anxiety and insomnia
- Is underutilized

- Dyspnea
- Nutritional support
- Panic/Anxiety/Depression
- Fatigue



# Palliative care - Dyspnea

Immediate release morphine, neuromuscular electrical stimulation (NMES), chest wall vibration, fans blowing into the face, oxygen, pulmonary rehab, acupuncture, acupressure.

Do not use benzos, insufficient evidence for music, relaxation, counseling/support, psychotherapy

# Palliative care – Nutritional support

Antioxidant supplementation with Vit C, E, zinc, selenium for malnourished patients

Increase:

- BMI
- Respiratory muscle strength
- Health related QOL
- 6 minute walk test.

# Palliative care – Panic/Anxiety/Depression

## Pulmonary rehab, CBT, mind-body interventions

- Decrease anxiety and depression.

## Mind-body interventions (mindfulness, yoga, relaxation)

- Improve lung function, dyspnea, exercise capacity and fatigue in people with COPD and psychological issues.

# Palliative care – Fatigue

- Self-management education
- Pulmonary rehab
- Nutritional support
- Mind-body interventions

# End of life

## Discuss

- Resuscitation
- Advance directives
- Place of death preferences

# Surgery

## *Lung volume reduction surgery*

- Increases survival in people with severe emphysema with upper lobe emphysema and low post-rehab capacity

## *Bullectomy*

- Indicated for large bulla
- Decreases dyspnea, improves lung function and exercise tolerance.

## *Transplantation*

- Very severe COPD and not a candidate for bullectomy, BLVR, LVR.
- Improves QOL and functional capacity.

## *Bronchoscopic Interventions*

- Endobronchial valves, lung coils, vapor ablation.
- Decrease end expiratory lung, improves exercise tolerance, health status and lung function

# EXACERBATIONS

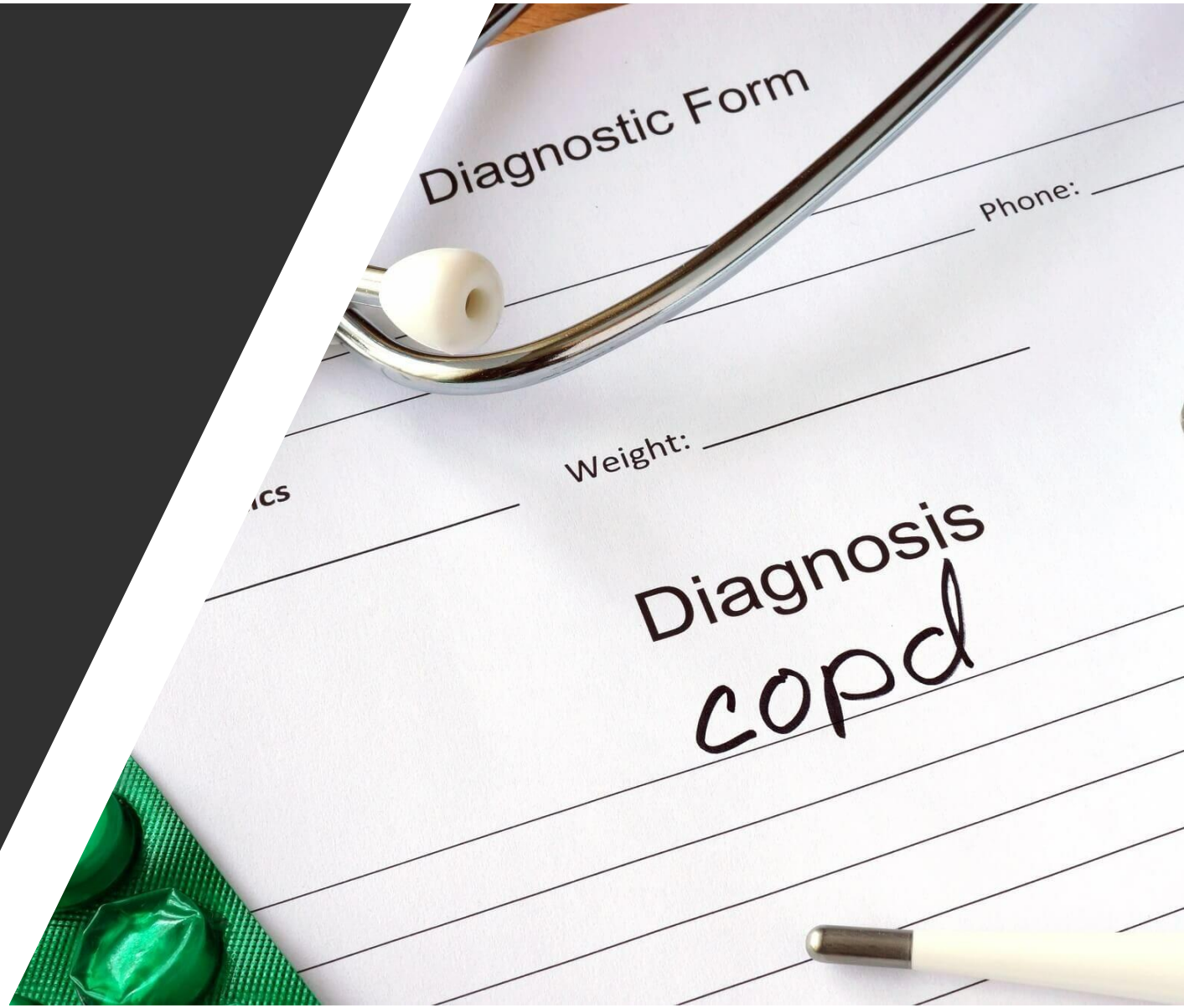
Background

Core Treatment

Adjunctive Treatment

# Exacerbations

- How long does a COPD exacerbation typically last?
- What is the usual precipitating event?
- What is on the differential when a COPD exacerbation is suspected?



# Exacerbation Core Treatment

- When should SABA be utilized?
- When should long acting bronchodilators be started?
- What are the benefits of steroids? What dose and duration?
- What are the benefits of antibiotics? What are the indications?


# Exacerbation Adjunctive Treatment

- When and how should oxygen be delivered?
- What is the first line mode of ventilation in patients with respiratory failure?
- When is intubation indicated?
- What other adjunctive therapies should be considered?

# Exacerbations

Exacerbations typically last 7-10 days

80% are managed in the outpatient setting

Each exacerbation increases progression of disease and 20% of people with an exacerbation will not recover to their pre-exacerbation state by 8 weeks

Usually precipitated by a URI

- Viral URIs tend to be more severe, longer lasting, increase in hospitalizations and occur in the winter

Differential: pneumonia, pneumothorax, pleural effusion, pulmonary embolism, cardiac arrythmia

# Exacerbation Core Treatment

All patients should be given a SABA with or without a short acting anticholinergic.

- No preference over an inhaler or nebulized.

Once stable start a long-acting bronchodilator prior to discharge

Systemic steroids with prednisone 40mg for 5-7 days

- Improves FEV, oxygenation, recovery time and shortens length of stay

Antibiotics with Augmentin, macrolide or tetracycline for 5-7 days if there is increased sputum purulence, increased dyspnea, increased sputum volume

- Improves recovery time, reduce risk of early relapse and treatment failure and LOS

Methylxanthines are not recommended

# Exacerbation Adjunct Treatment

Oxygen if needed and titrated to 88 - 92%

Noninvasive mechanical ventilation is the first mode of ventilation in patients with respiratory failure.

- Improves gas exchange, work of breathing, need to intubate, hospital duration and survival.

Intubate if unable to tolerate NIV or NIV fails

- Post respiratory/cardiac arrest. Decreased consciousness. Massive aspiration. Persistent vomiting. Severe hemodynamic instability, severe supraventricular or ventricular

Consider low molecular weight heparin

Identify and treat associated conditions

- Use cardio-selective beta blockers metoprolol or bisoprolol

# Follow up care

At each visit review

- History
- Review of symptoms (CAT)
- Exacerbations
- Inhaler technique/adherence
- Non-pharmacologic approaches
- Smoking status

Vaccines: influenza, PPV20, COVID, TDaP

If therapy is appropriate then maintain.

Otherwise escalate or de-escalate based on dyspnea and exacerbations


# History

## Exacerbations

- Cause, severity, frequency, medications/interventions needed, location of treatment

## Hospitalizations

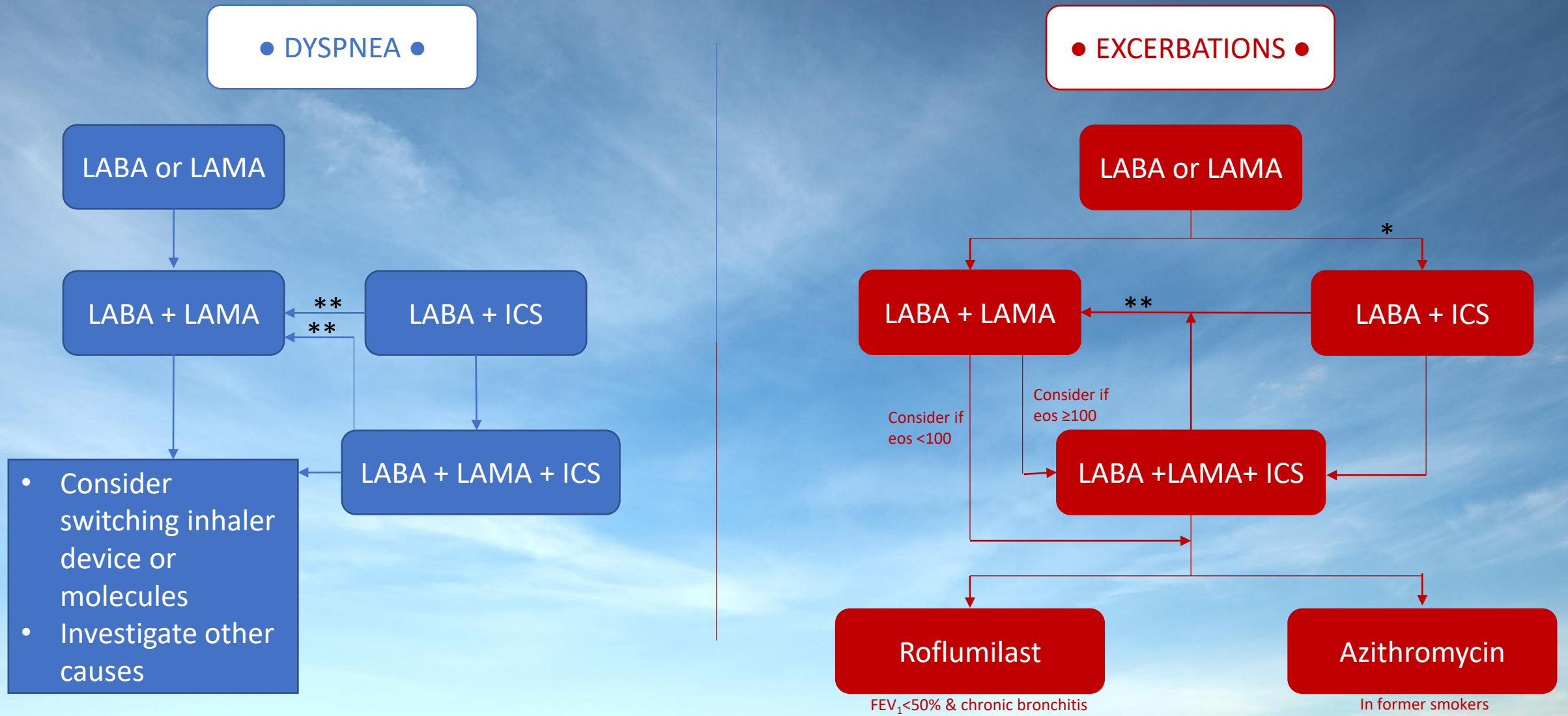
- Cause, severity, frequency, medications /interventions needed, location of treatment

## Allergies

## History of

- Asthma
- Anxiety/depression
- Heart disease
- Smoking
- Musculoskeletal dysfunction
- Osteoporosis

# Follow up escalation/de-escalation




*Consider if eos > 300 or eos >100 AND >2 moderate exacerbations/1 hospitalization

**Consider de-escalation of ICS or switch if pneumonia, inappropriately started or lack of response