# Obstructive Lung Disease: 2020 Update

Sarah Roark, MD
Assistant Professor
University of Colorado School of Medicine
Pulmonary and Critical Care Medicine
Denver Health

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- No Disclosures
- No Conflicts of Interest

# Objectives

1. Accurately diagnose COPD and asthma based on current definitions and recognize COPD/Asthma Overlap syndrome.
2. Compare/contrast current therapies for initiation of treatment and acknowledge the change in strategy as compared to past.
3. Recognize new medications and the role these play for COPD and asthma independently.
4. Implement treatment strategies that limit hospital admissions and particularly AE-COPD
5. Determine when to refer to a pulmonologist and what to expect from that referral.

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# Case 1

P. Morris is a 62 y/o M with 2 years of SOB. Symptoms are worst when walking upstairs, carrying objects like a full laundry basket and when putting on his seatbelt. He has a chronic cough productive of clear sputum. Medical history is significant for diabetes. He is an active smoker with a 60 pack year history.

- On physical exam, the patient is afebrile, BP 125/78, HR 85bpm, RR 16. BMI 21. O2S 93% RA. Exam is remarkable for prolonged expiratory phase and diminished breath sounds throughout. Remainder of exam is unremarkable.

# Case 1

Based on the clinical presentation and information, what is the most likely diagnosis?

a. Asthma
b. Emphysema
c. Chronic bronchitis
d. Idiopathic pulmonary fibrosis
e. Can't say as at least spirometry is needed for further diagnosis.

Adapted from MKSAP 17

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# Case 1

- Spirometry findings:
  - FEV1/FVC 65%
  - FEV1 1.75 (52% pred)
  - FVC 2.10 (80% pred)
  - Positive bronchodilator response
  - TLC 120% pred
  - RV 139% pred
  - DLCO 62% pred

# COPD

COPD is a common preventable and treatable disease, characterized by persistent airflow limitation that is usually progressive and associated with enhanced chronic inflammatory responses in the airways and the lungs to noxious particles and gases. Exacerbations and comorbidities contribute to the overall severity in individual patients.

--- GOLD 2015

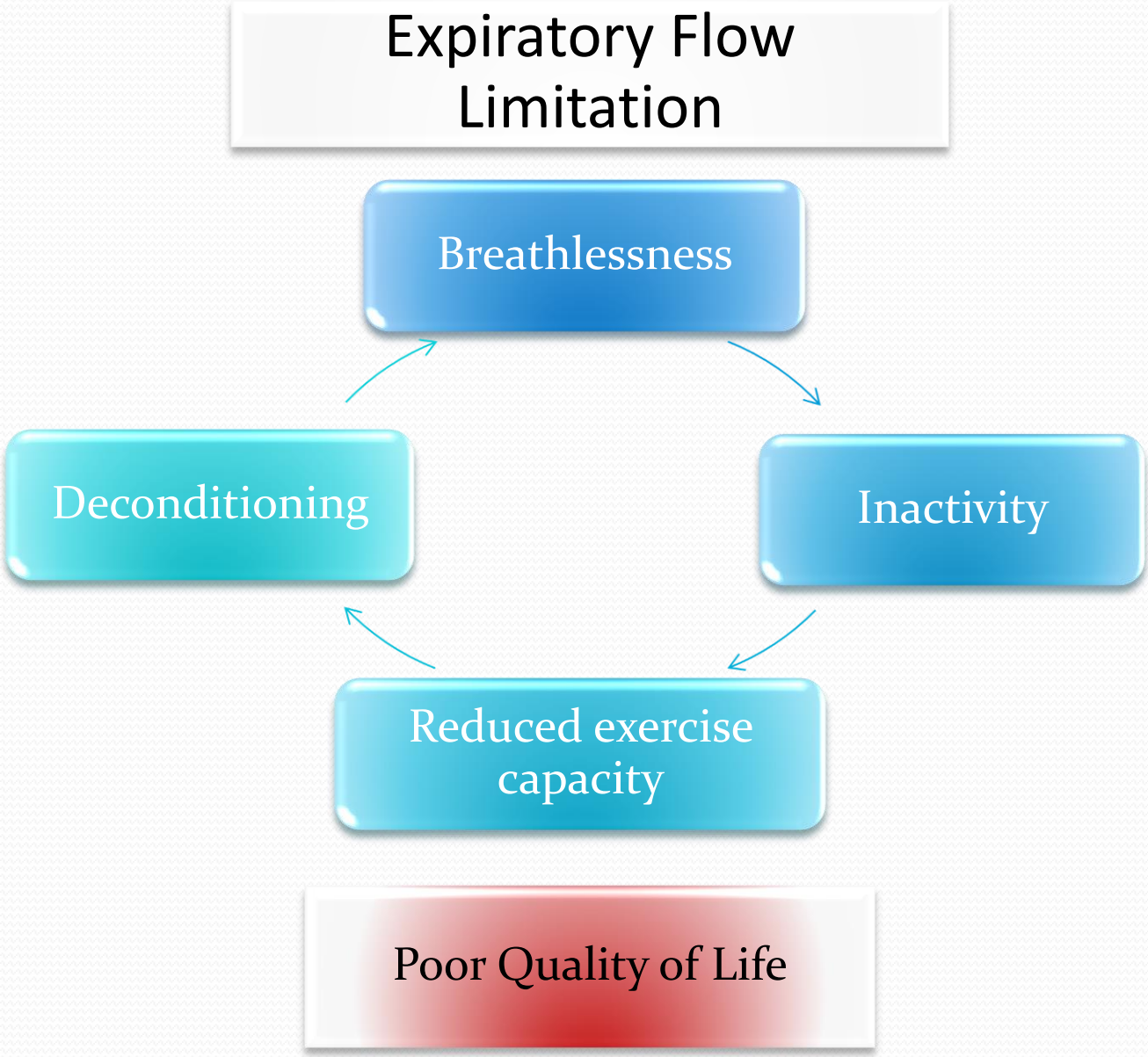
# COPD Diagnosis

1. Risk Factors: tobacco smoking, household air pollution, noxious exposures

2. Symptoms consistent with COPD such as dyspnea, dyspnea on exertion, chronic cough or sputum production.

3. Spirometry required for diagnosis.
   - Consistent with fixed airflow obstruction
     - Post-bronchodilator FEV1/FVC <0.7

# Symptoms in COPD



# Severity based on post-bronchodilator FEV1

In patients with FEV1/FVC <70:

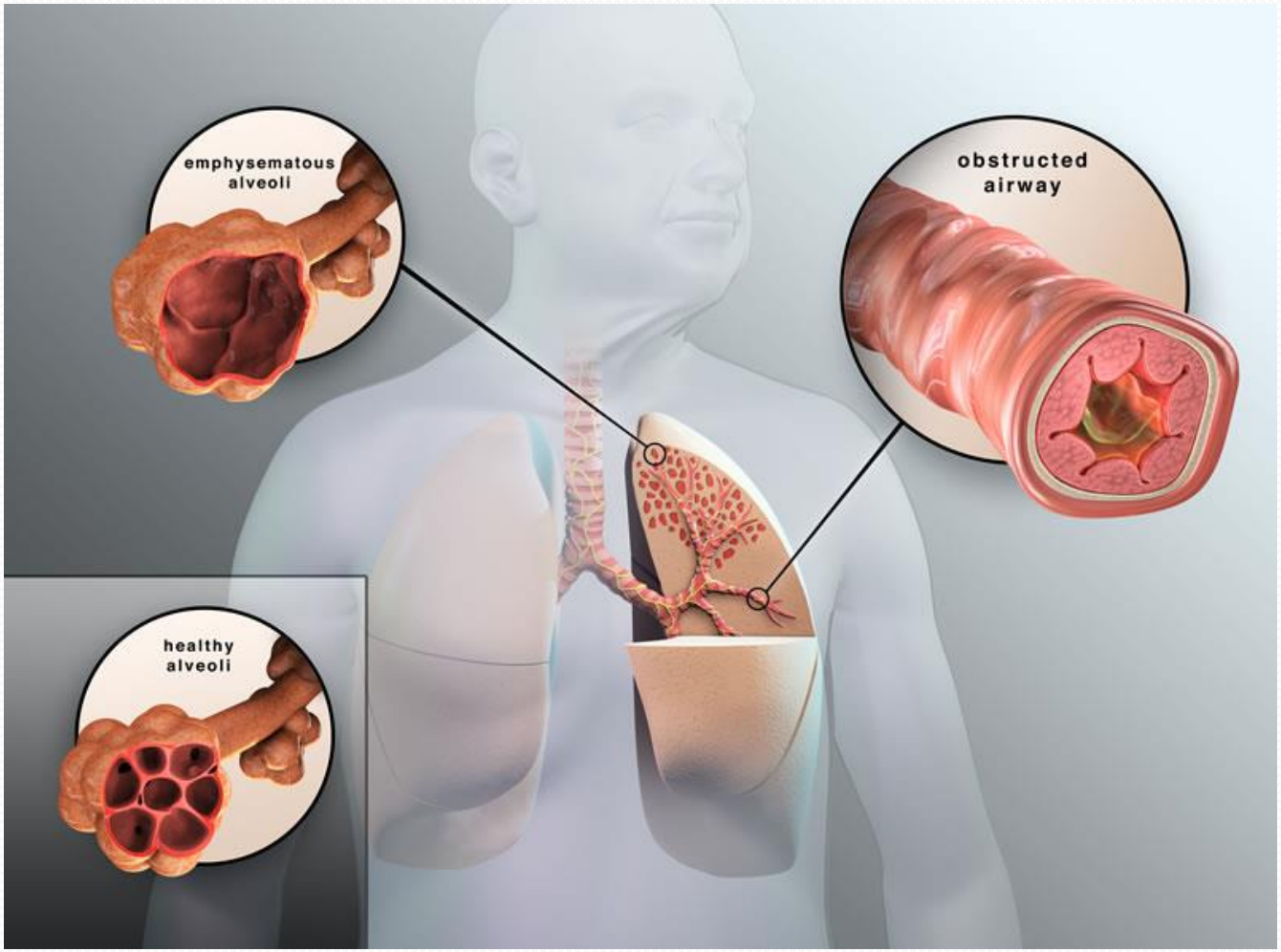
| | | |
|---|---|---|
| **GOLD 1** | **Mild** | **FEV1 >_80% pred** |
| GOLD 2 | Moderate | 50%<FEV1<80% pred |
| GOLD 3 | Severe | 30%<FEV1<50% pred |
| GOLD 4 | Very Severe | FEV1<30% pred |

Adapted from GOLD 2019

# COPD Subtypes

- Emphysema
  - Alveolar wall destruction that is irreversible enlargement of the air spaces distal to terminal bronchioles but without fibrosis

- Chronic bronchitis
  - Productive cough that has been present for ≥ 3 months in each of 2 consecutive years without another identified etiology.


emphysematous alveoli
obstructed airway
healthy alveoli

# Asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation.

–GINA 2015

# Asthma Diagnosis

1. History of respiratory symptoms such as shortness of breath, cough, wheezing and chest tightness that varies.

**AND**

2. Variable airflow obstruction

PFTs: bronchodilator response of FEV1 or FVC >200ml and >12% change.

- Reversibility may not be present during exacerbation.
- Other diagnostics: bronchial challenge, expired NO

# Case 2

Mrs. Jul is a 56 y/o F who is establishing care with you after your senior partner has retired. She is treated for COPD with tiotropium. She tells you about her symptoms which wax and wane, worsened in the winter and spring. She uses her albuterol nearly daily at those times. She has a 20 pack year smoking history but quit 10 years ago. You know she carries a diagnosis of COPD but since her diagnosis was only clinical, you wisely order PFTs and plan to see her again in a month.

# Case 2

The patient returns to you for follow-up. She is congested and sniffling when you say hello.

PFTs: FEV1/FVC 68%,

FEV1 60% pred

FVC 92% pred

+ bronchodilator with FEV1 improved to 80% predicted and 200cc.

TLC 130% pred

TV 120% pred

DLCO 90%

# Case 2

You review the patient's medications of tiotropium and albuterol for rescue. Based on her symptoms and PFTs you:

a. Continue current medications
b. Switch patient to LAMA/LABA
c. Start ICS/LABA
d. Obtain methacholine challenge

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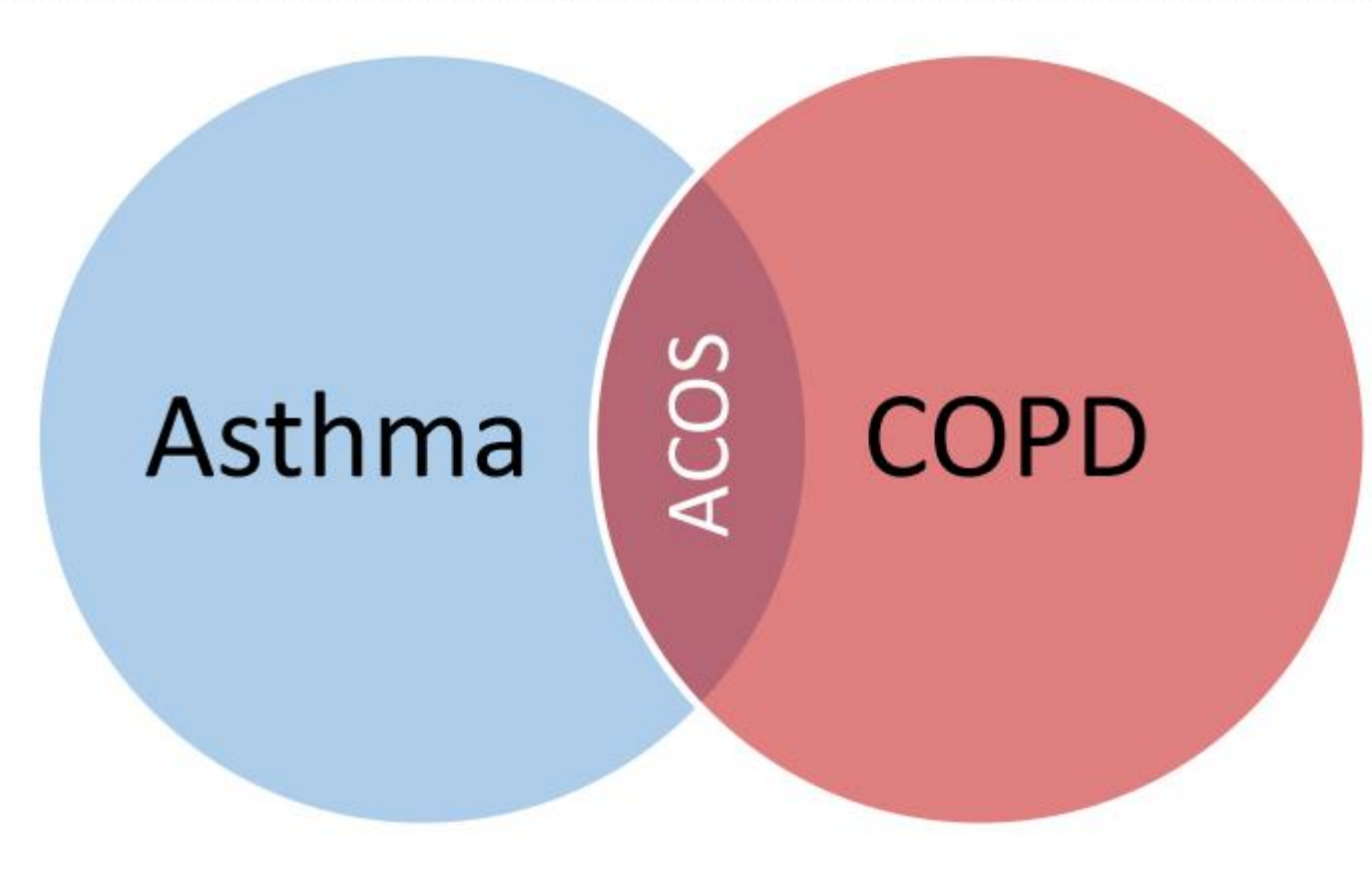
# Asthma-COPD Overlap Syndrome (ACOS)

ACOS is characterized by persistent airflow limitation with several features usually associated with asthma and several features usually associated with COPD.

--Joint project of GINA and GOLD 2012: Diagnosis of Disease of Chronic Airflow Limitation: Asthma, COPD and Asthma-COPD Overlap Syndrome (ACOS)

| | Asthma | COPD |
|---|---|---|
| Airways | Large and small | Small |
| Smooth Muscle | Spasm | Contraction |
| Cell type | Eosinophils, Type 2 helper | Neutrophils, CD8 Lymphocytes |
| *Typical* Demographic | Younger | Middle age-older |
| Etiology | Triggers, Allergies | Smoking, small particles |
| Symptoms | Improve or resolves between bouts | Persistent to varying degrees, progressive |
| Reversibility | Yes | Maybe-No |




Graphic from Ontario Lung Association www.lungontario.ca

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# GOLD 2019

## THE REFINED ABCD ASSESSMENT TOOL

Spirometrically Confirmed Diagnosis › Assessment of airflow limitation › Assessment of symptoms/risk of exacerbations

Post-bronchodilator $FEV_1/FVC < 0.7$

| Grade | $FEV_1$ (% predicted) |
|---|---|
| GOLD 1 | ≥ 80 |
| GOLD 2 | 50-79 |
| GOLD 3 | 30-49 |
| GOLD 4 | < 30 |

**Moderate or Severe Exacerbation History**

≥2 or ≥ 1 leading to hospital admission

0 or 1 (not leading to hospital admission)

| | |
|---|---|
| C | D |
| A | B |
| mMRC 0-1 CAT < 10 | mMRC ≥ 2 CAT ≥ 10 |

**Symptoms**

FIGURE 2.4

# mMRC

**The Modified Medical Research Council (MMRC) Dyspnoea Scale**

| Grade of dyspnoea | Description |
|---|---|
| 0 | Not troubled by breathlessness except on strenuous exercise |
| 1 | Shortness of breath when hurrying on the level *or* walking up a slight hill |
| 2 | Walks slower than people of the same age on the level because of breathlessness *or* has to stop for breath when walking at own pace on the level |
| 3 | Stops for breath after walking about 100 m *or* after a few minutes on the level |
| 4 | Too breathless to leave the house *or* breathless when dressing or undressing |

# CAT™ ASSESSMENT

*For each item below, place a mark (x) in the box that best describes you currently.*
*Be sure to only select one response for each question.*

| | | | |
|---|---|---|---|
| **EXAMPLE: I am very happy** | 0 (X) 2 3 4 5 | **I am very sad** | **SCORE** |
| I never cough | 0 1 2 3 4 5 | I cough all the time | |
| I have no phlegm (mucus) in my chest at all | 0 1 2 3 4 5 | My chest is completely full of phlegm (mucus) | |
| My chest does not feel tight at all | 0 1 2 3 4 5 | My chest feels very tight | |
| When I walk up a hill or one flight of stairs I am not breathless | 0 1 2 3 4 5 | When I walk up a hill or one flight of stairs I am very breathless | |
| I am not limited doing any activities at home | 0 1 2 3 4 5 | I am very limited doing activities at home | |
| I am confident leaving my home despite my lung condition | 0 1 2 3 4 5 | I am not at all confident leaving my home because of my lung condition | |
| I sleep soundly | 0 1 2 3 4 5 | I don't sleep soundly because of my lung condition | |
| I have lots of energy | 0 1 2 3 4 5 | I have no energy at all | |

**TOTAL SCORE:** ◯

Reference: Jones et al. ERJ 2009; 34 (3); 648-54.

FIGURE 2.3

# Non-Medication Therapies

- Smoking Cessation recommended for all COPD patients
  - E-cigarettes have no data to support usefulness in smoking cessation
    - Vaping and E-cigarette risk
- Vaccines
  - Annual Influenza
  - PPSV23
  - Prevnar 13

# Non-Medication Therapies

- Pulmonary Rehabilitation
  - Improves dyspnea, exercise tolerance and health status
  - Reduces hospitalization among patients with recent exacerbation (<4 weeks)
  - Referral Requirements
    - Varies by program, state and insurance
    - Pulmonary diagnosis and PFTs
      - Can include OSA
      - Refer to AACVPR.org for certified programs in your area

# Case 3

Mr. Lott is a 70 y/o M new to your practice since he moved to Colorado. In clinic, O2S is 94% at rest and 87% with ambulation. Your nurse astutely notes this and performs a hall walk in clinic. She tells you the patient's O2S improved to 94% during exertion with 2LPM oxygen. Upon review of his prior records, you see he is diagnosed with COPD and managed on LABA/LAMA and SABA. He has no change in symptoms and no AE-COPD within the last year.

Spirometry shows FEV1/FVC 45%, FEV1 1.64 (50% pred) FVC 3.36 (84%pred).

# Case 3

The patient asks you about ambulatory oxygen as he notes his O2S are lower since moving to Colorado from Illinois. You take the following action:

a. Order 2L oxygen with exertion
b. Order 2L oxygen with exertion and at night (exertional hypoxemia and nocturnal hypoxemia coexist frequently)
c. Order oxygen and have the respiratory therapist titrate. A 6 minute walk is required for home oxygen.
d. Do not prescribe oxygen

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c. Order oxygen in EPIC and have the respiratory therapist titrate. A 6 minute walk is required for home oxygen.
d. Do not prescribe oxygen

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 OCTOBER 27, 2016 VOL. 375 NO. 17

# A Randomized Trial of Long-Term Oxygen for COPD with Moderate Desaturation

The Long-Term Oxygen Treatment Trial Research Group*

738 patients with:

- Moderate resting desaturation (89-93%) and/or moderate exercise-induced desaturation (>80% for >5 min and <90% for >10sec)
- Randomized to supplemental oxygen.
- Primary end-point: death or first hospitalization
- Did not benefit from LTOT in measures of time to death, time to first hospitalization or any other secondary outcomes.

# Which COPD patients benefit from long-term oxygen therapy?

Mortality Benefit:

- *Resting* hypoxemia: PaO2 ≤55, SpO2 ≤88%
- Moderate resting hypoxemia (SpO2 88-90%) with signs of heart failure or polycythemia

  Annals Intern Med, 1980. Lancet, 1981

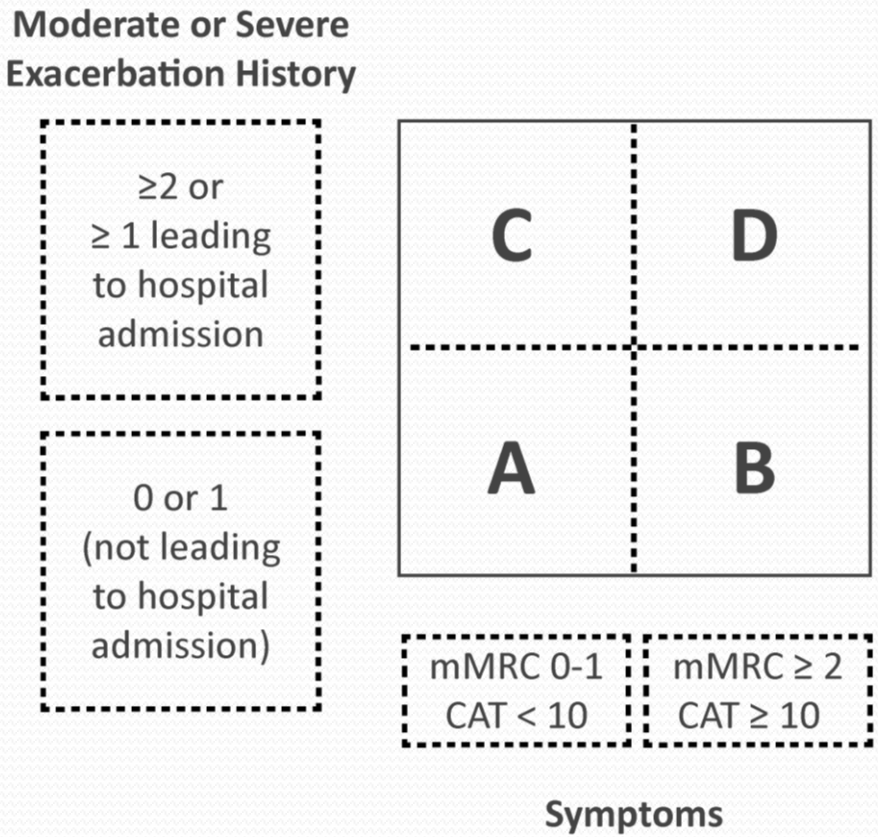
- Intractable breathlessness? Symptom management?

# Therapy Initiation for Stable COPD

| | mMRC≤2 CAT ≤10 | mMRC≥2 CAT ≥10 |
|---|---|---|
| ≥2 moderate AE-COPD or ≥+1 leading to hospitalization | **Group C**<br>LAMA | **Group D**<br>LAMA or ICS/LABA or LABA/LAMA |
| 0-1 moderate AE-COPD (not needing hospitalization) | Group A<br>SABA | Group B<br>LAMA |

Adapted from GOLD 2020.

# New-ish Medication Therapies

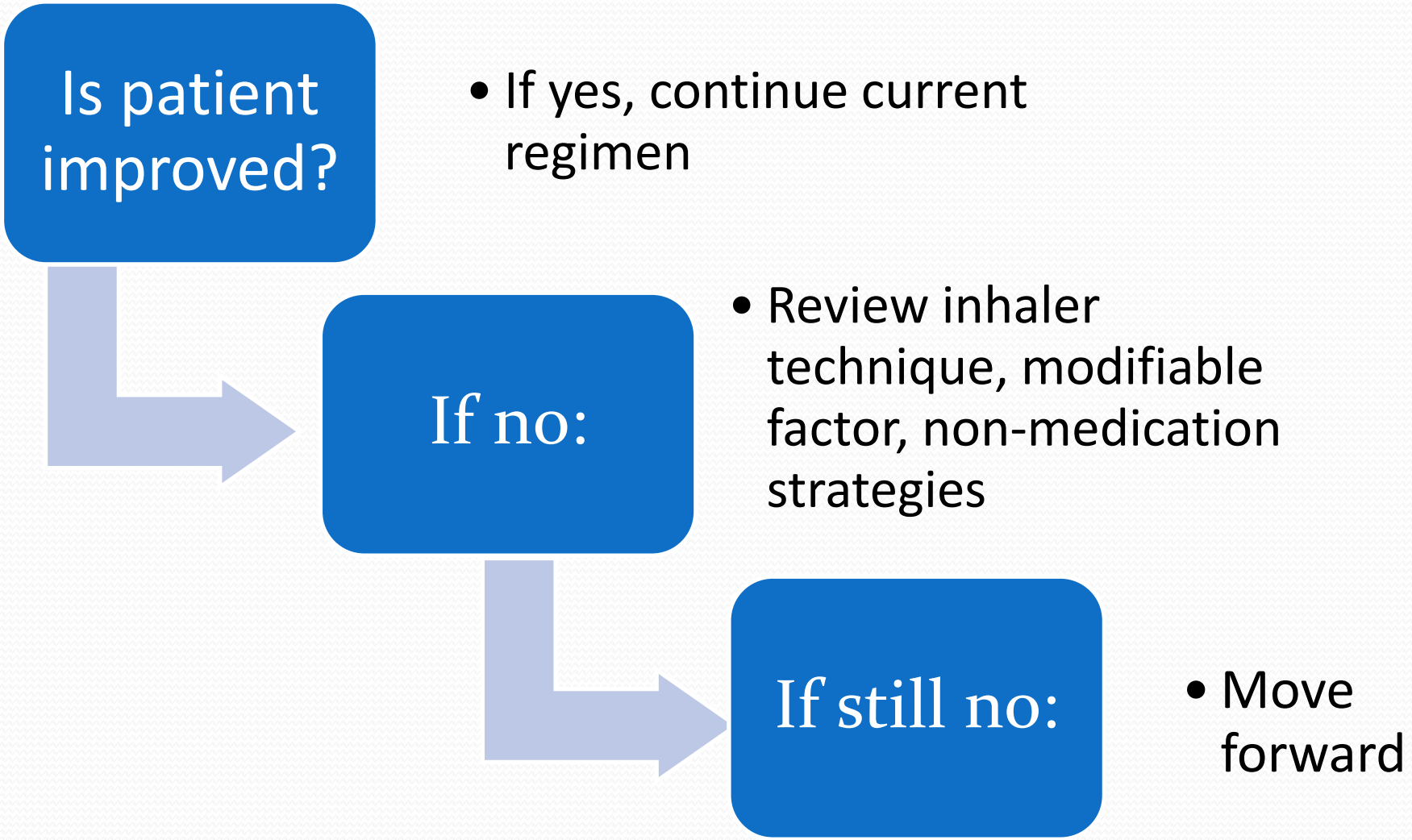


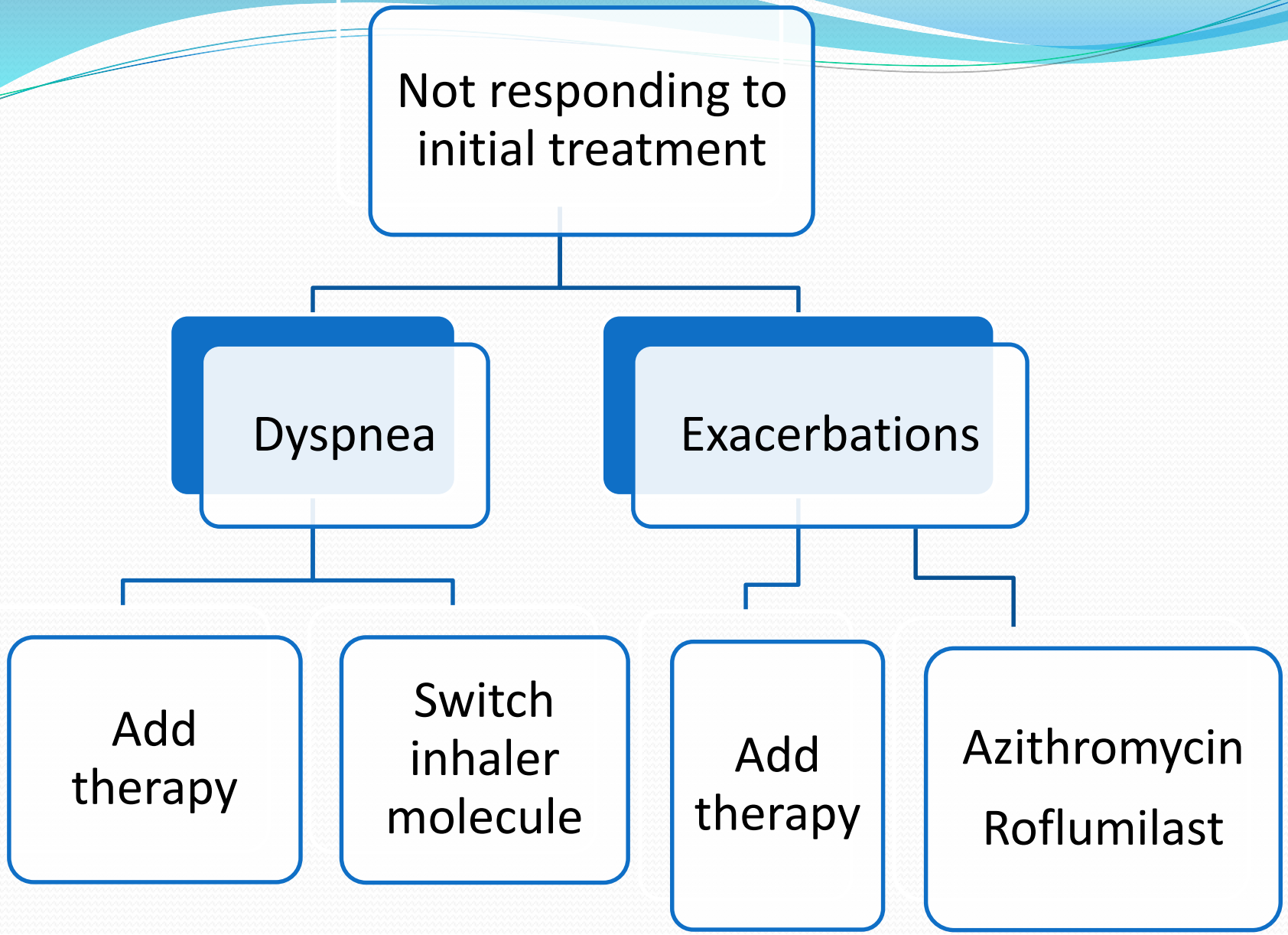

Groups C and D:

- Roflumilast (PDE4 Inhibitor)
- Azithromycin or Erythromycin

- Long term use of oral glucocorticoids has *no* benefit and many side effects.

# Management

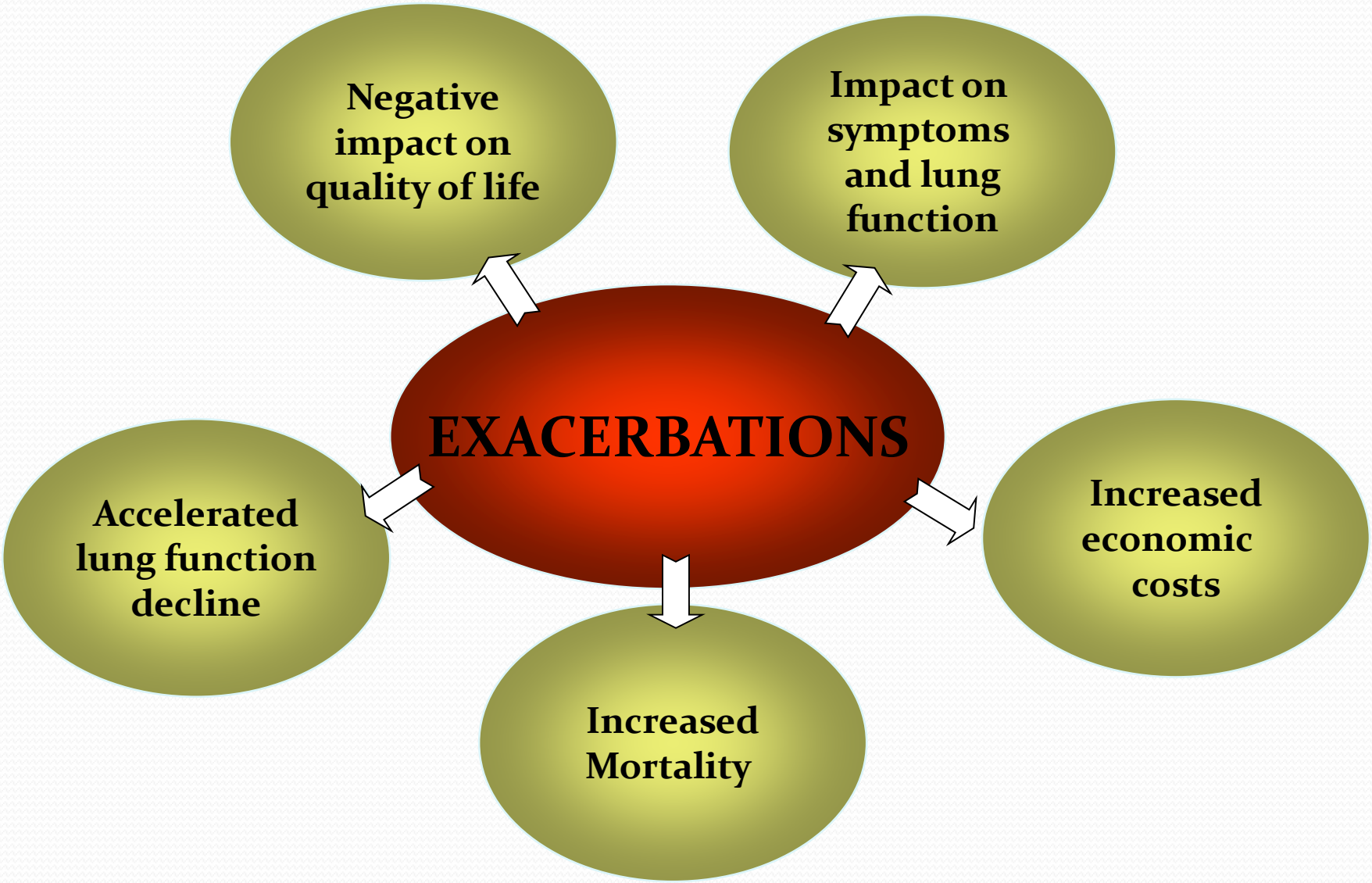

Is patient improved?
• If yes, continue current regimen
If no:
• Review inhaler technique, modifiable factor, non-medication strategies
If still no:
• Move forward


Not responding to initial treatment
Dyspnea
Exacerbations
Add therapy
Switch inhaler molecule
Add therapy
Azithromycin
Roflumilast

# An exacerbation of COPD is:

" An acute worsening of respiratory symptoms that results in additional therapy."

- Most common cause: Viral URI or bronchitis
- Goal of treatment is to minimize the impact of the exacerbation and prevent future exacerbations.
  - Each AE-COPD may lead to a loss of FEV1 (find site- Han) in addition to possible complications from medications and hospitalizations.
- Treatment:
  - Systemic steroids (duration 5-7 days)
  - Antibiotics (duration 5-7 days)
  - Ventilatory support with non-invasive ventilation (NIV) being the initial mode used


Negative impact on quality of life
Impact on symptoms and lung function
EXACERBATIONS
Accelerated lung function decline
Increased economic costs
Increased Mortality

# Case 4

Ms. Reynolds is a 47 y/o F with shortness of breath and dry cough which started after a URI 4 months ago. Symptoms are worsened by cold air and smoking. She has been to the ER once in the last month for wheezing and uses albuterol twice a week for relief. Patient is G1P1 with pre-term birth. She was ill frequently as a child herself. She quit smoking 5 years ago but has a 20 pack year history.

- On physical exam, the patient is afebrile, BP135/78, HR 90bpm, RR 14. BMI 28. O2S 93% RA. Exam is remarkable for prolonged expiratory phase, scattered wheezes. Remainder of exam is unremarkable.

# Case 4

- Spirometry
  - FEV1/FVC 66%
  - FEV1 2.16 (75% pred)
  - FVC 3.23 (95% pred)
  - + bronchodilator response
  - TLC 110% pred
  - RV 105%
  - DLCO 100%

# Case 4

What is the appropriate step in medication management?

a. Start short-acting beta-agonist (SABA)
b. Start long-acting beta-agonist (LABA)
c. Start low-dose inhaled corticosteroid (ICS) twice daily
d. Start ICS-salmeterol combination as needed

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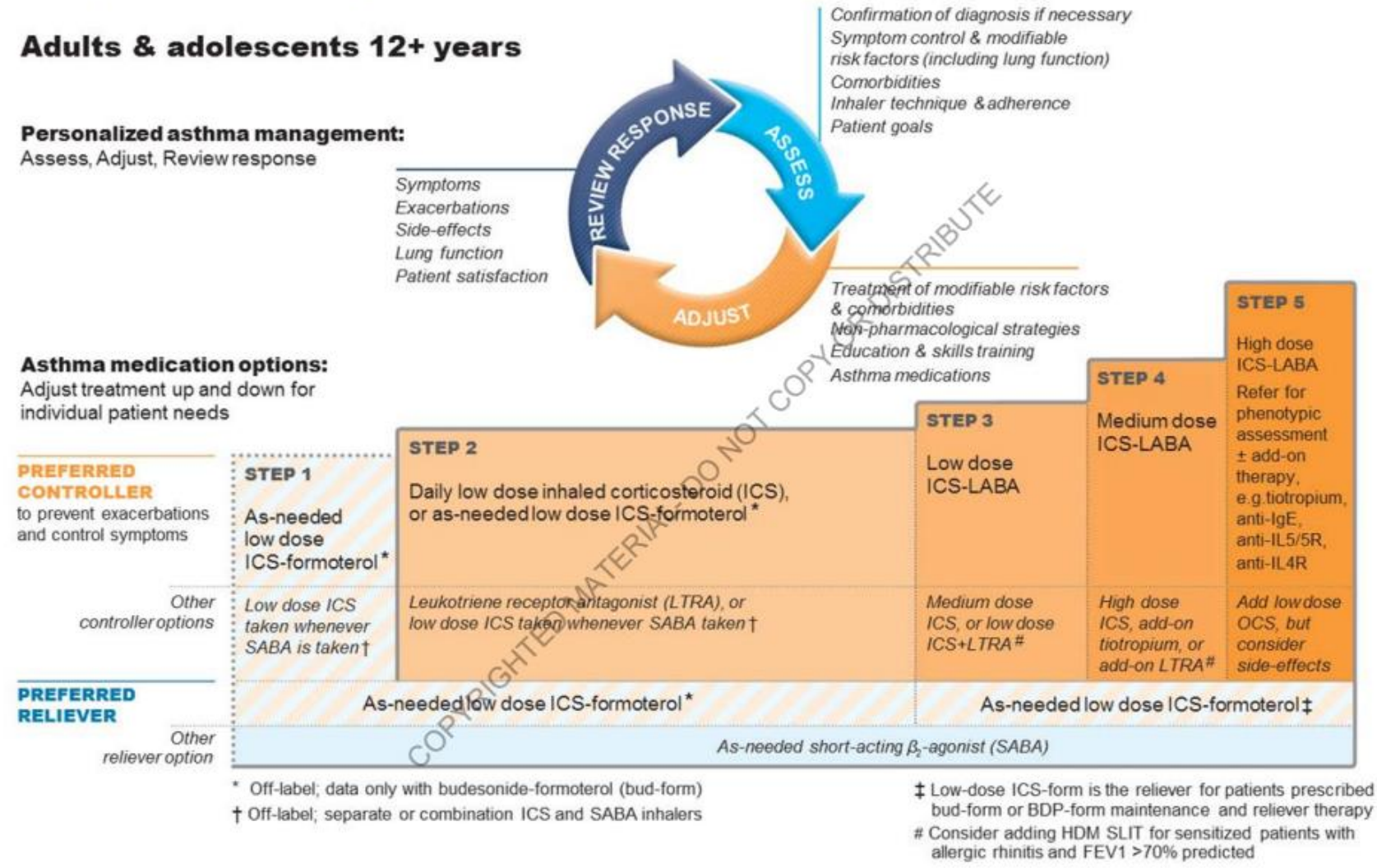
**Box 7. The GINA asthma treatment strategy**






For children 6–11 years, the preferred Step 3 treatment is low dose ICS-LABA or medium dose ICS.

For more details about treatment recommendations including in children, supporting evidence, and clinical advice about implementation in different populations see the full GINA 2019 report (www.ginasthma.org). For more details about Step 5 add-on therapies, see GINA 2019 Pocket Guide on Difficult to Treat and Severe Asthma, and check eligibility criteria with local payers.



Global Initiative for Asthma https://ginasthma.org/

# Asthma Therapy- Change in Approach

- **GINA no longer recommends short acting beta-2 agonists (SABA) bronchodilator alone.**
  - Strong evidence to support that while symptomatic relief may be obtained, this is not protective for severe exacerbations and frequent use of SABAs may increase risk of exacerbations and increase morbidity and mortality.
  - Adults and adolescents with asthma should receive symptoms driven (mild asthma) treatment with daily low dose ICS treatment to reduce the risk of exacerbations.

ORIGINAL ARTICLE

# Inhaled Combined Budesonide–Formoterol as Needed in Mild Asthma

Paul M. O'Byrne, M.B., J. Mark FitzGerald, M.D., Eric D. Bateman, M.D., Peter J. Barnes, M.D., Nanshan Zhong, Ph.D., Christina Keen, M.D., Carin Jorup, M.D., Rosa Lamarca, Ph.D., Stefan Ivanov, M.D., Ph.D., and Helen K. Reddel, M.B., B.S., Ph.D.

3849 randomized

Results

- Annual rate of severe exacerbations for budesonide-formoterol as needed 0.07 as compared to 0.2 terbutaline group and 0.09 in budesonide maintenance.
- Relatively similar but with lower glucocorticoid exposure as compared to budesonide group
- Why ICS-Formoterol?
  - Formoterol has faster onset of action as compared to salmeterol.
  - Lower lipophilicity and more potent

# ACOS treatment

- If symptoms favor asthma
  - Initiate therapy for asthma per GINA guidelines with ICS
    - May add on LABA and/or LAMA
- If symptoms favor COPD
  - Initiate therapy per GOLD with LABA and/or LAMA
  - If equally balanced symptoms

# ACOS treatment

- If equally balanced symptoms
  - Initiate therapy with ICS or ICS-formoterol
  - Add on therapy of LABA and/or LAMA
  - Consider additional components such as GERD, allergen control

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# Case 5

Miss V. Slim is a 35 y/o F presenting for follow-up of an ER visit for asthma exacerbation. She was diagnosed as a child and controlled through her teens and twenties. However, in the last 2 years she was treated for exacerbations 4 times with systemic steroids. Current medications include fluticasone/salmeterol, montelukast, loratadine, ranitidine and albuterol for rescue use which she uses 3 times per week.

On physical exam, the patient is afebrile, BP is 120/80, HR 75, RR 18, O2S 94% RA. Physical exam is remarkable for scattered expiratory wheezing throughout the lung fields.

# Case 5

Which of the following is the next best step?

a. Add additional ICS
b. Give patient peak-flow meter and educate on use
c. Tell the patient to find a new job where she isn't exposed to children and their germs
d. Refer to pulmonologist for further investigation

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# Referral: Disease Centered Reasons

- Clarification in diagnosis
  - Further investigation into the obstructive lung disease
    - Obtaining neutrophil count, IgE etc.
- Inability to taper off high dose inhaled steroids or systemic steroids.
- Increase of exacerbations despite step-up on treatment
- Lack of response to optimal inhaler and management treatments

# Referral: Disease Centered Reasons

- Lung Volume Reduction Surgery (LVRS)
- Bronchoscopic lung volume reduction (valves)
- Bullectomy
- Lung Transplant

# Referral- Patient Centered Reasons

Patient Centered Reasons

- Poor medication compliance
- Education in life-style choices including smoking cessation
- Significant reduction in quality of life
- Predictive needs
  - BODE index- can be found in UptoDate

**Table 2** BODE index scoring to estimate mortality (21)

| BODE index score | 12-month mortality (%) | 24-month mortality (%) | 52-month mortality (%) |
|---|---|---|---|
| 0-2 | 2 | 6 | 19 |
| 3-4 | 2 | 8 | 32 |
| 4-6 | 2 | 14 | 40 |
| 7-10 | 5 | 31 | 80 |

Index score is utilized to predict 12-, 24- and 52-month mortality. Index score obtained via *Table 1*.

# Summary

1. COPD and asthma, while separate entities have overlap.
    - The main symptom constellation guides therapy.

2. Resources for initiating therapy: GOLD and GINA
    - Notable change to asthma therapy: SABA alone is no longer considered adequate therapy for mild asthma. Low dose ICS is the recommended medication.

# Summary

3. Prevention of recurrent exacerbations includes inhaled and oral therapies as well as pillars of vaccinations, smoking cessation and pulmonary rehabilitation.

4. Patient who do not respond to appropriate therapies should be referred to pulmonologist for further counseling and investigation.

# Sources


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