

# **Asthma & COPD Learning Series**

Module 1: Building the foundation to support patients with asthma and COPD



#### **Today's Presenter**

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Content expert, faculty member, and participant in practice transformation initiatives. Dr. Nolan has experience in community, specialty, and ambulatory pharmacy.

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# Disclosure

MI-CCSI, or the presenter, does not have any financial interest, relationships, or other potential conflicts, with respect to the material which will be covered in this presentation.



# **OBJECTIVES**

At the conclusion of this presentation, the participant will be able to:

• Describe the epidemiology, pathophysiology, clinical manifestations, risk factors, and general treatment strategies for asthma and chronic obstructive pulmonary disorder (COPD).



### Asthma National Statistics

- 25 million people (1 in 13)
- Adults
  - 20 million
  - Highest rates in Black adults
  - Female > male
- Children
  - 5.1 million
  - Leading chronic disease in children.
  - Black children 3x more likely to have asthma than white children
  - Male > female

Asthma Facts and Figures. Asthma and Allergy Foundation of America. Available from: https://www.aafa.org/asthma-facts/. Last updated April 2022. Accessed June 27, 2022.





### Asthma - Pathophysiology Brief Overview



- Usually characterized by airway hyper-responsiveness and chronic airway inflammation
- Defined by the history of respiratory symptoms that vary over time and in intensity
  - Wheeze
  - Shortness of breath
  - Chest tightness and cough
  - Variable expiratory airflow limitation
- Variations often triggered by factors such as exercise, allergen or irritant exposure, change in weather, or viral respiratory infections
- Airflow limitation may become persistent later in the course of the disease.

### Asthma - Pathophysiology Asthma Phenotypes

- Allergic asthma
- Non-allergic asthma
- Adult-onset (late-onset) asthma
- Asthma with persistent airflow limitation
- Asthma with obesity





### Asthma Exacerbations General Overview



- Represent a change from the patient's usual status
- Change is sufficient to require a change in treatment
- Episodes characterized by a progressive increase in symptoms of:
  - Shortness of breath
  - Cough
  - Wheezing
  - Chest tightness
  - Progressive decrease in lung function
- Symptoms can be non-specific and may be indicative of other pathologies acute bronchitis, heart failure, etc – so a thorough evaluation is necessary

Global Strategy for Asthma Management and Prevention (2022 update). Global Initiative for Asthma. Fanta CH and Cahill KN. Acute exacerbations of asthma in adults: Home and office management. In: UpToDate, Dieffenbach P (Ed), UpToDate, Waltham, MA, 2022.

### **Spirometry** Brief Overview

- Most common and readily available type of pulmonary function / breathing test
- FVC = forced vital capacity
- FEV<sub>1</sub> = forced expiratory volume in one second
  - Declines over time in COPD (see table to right)
- FEV<sub>1</sub>/FVC ratio may also be considered



#### FEV<sub>1</sub> PROGRESSION OVER TIME



Note: This is a simplified diagram of FEV<sub>1</sub> progression over time. In reality, there is tremendous heterogeneity in the rate of decline in FEV<sub>1</sub> owing to the complex interactions of genes with environmental exposures and risk factors over an individual's lifetime [adapted from Lange et al. NEJM 2015;373:111-22].

What Is Spirometry and Why It Is Done. American Lung Association. Available from: https://www.lung.org/lung-health-diseases/lung-procedures-and-tests/spirometry. Accessed June 29, 2022. Global Initiative for Chronic Obstructive Lung Disease (GOLD): Teach Slide Set 2022. Available from: https://goldcopd.org/2022-gold-reports-2/. Accessed June 29, 2022. Kaminsky DA. Overview of pulmonary function testing in adults. In: UpToDate, Deffenbach P (Ed), UpToDate, Waltham, MA, 2022



# Asthma Diagnosis



Global Initiative for Asthma (GINA) What's new in GINA 2022? GINA Global Strategy for Asthma Management and Prevention. Available from: https://ginasthma.org/gina-slide-set/. Accessed June 29, 2022. Global Strategy for Asthma Management and Prevention (2022 update). Global Initiative for Asthma.

### Asthma Treatment Goals of Therapy

- Symptom control
- Minimize future risk
  - Asthma-related mortality
  - Exacerbations
  - Persistent airflow limitation
  - Medication side effects







### Asthma Treatment Approach to Therapy



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### **Treatment of Asthma** Medication Treatment Options



Controller Medications	<ul> <li>Contain inhaled corticosteroids (ICSs)</li> <li>Reduce airway inflammation, control symptoms, and reduce future risks (e.g., exacerbation and lung function decline)</li> </ul>
Reliever Medications	<ul> <li>Provided to all patients</li> <li>As-needed relief of breakthrough symptoms</li> <li>Short-acting and long-acting beta agonists (SABAs and LABAs)</li> </ul>
Add-On Therapies	<ul> <li>Considered when patients have persistent symptoms and/or exacerbations despite optimized treatment with high dose controller medications and treatment of modifiable risk factors</li> </ul>

Global Strategy for Asthma Management and Prevention (2022 update). Global Initiative for Asthma. Kaminsky DA. Overview of pulmonary function testing in adults. In: UpToDate, Deffenbach P (Ed), UpToDate, Waltham, MA, 2022

# Adults & adolescents 12+ years **Personalized asthma**



Symptoms Exacerbations Side-effects Lung function Patient satisfaction



Treatment of modifiable risk factors and comorbidities. Non-pharmacological strategies Asthma medications (adjust down/up/between tracks) Education & skills training **STEP 5** 

Confirmation of diagnosis if necessary.

risk factors (see Box 2-2B) Comorbidities

Inhaler technique & adherence Patient

Symptom control & modifiable

preferences and goals

**STEP 4** 

Add LAMA or LTRA or

HDM SLIT, or switch to

high dose ICS

#### **CONTROLLER** and **PREFERRED** RELIEVER

management

(Track 1). Using ICS-formoterol as reliever reduces the risk of exacerbations compared with using a SABA reliever

<b>STEPS 1 – 2</b> As-needed low dose ICS-formoterol	Low dose maintenance ICS-formoterol	ICS-formoterol	phenotype. Consider hig dose maintenance ICS- formoterol, ± anti-IgE, anti-IL5/5R, a II 4R, anti-TSLP		
RELIEVER: As-needed low-dose ICS-formoterol					

See GINA severe asthma

<b>CONTROLLER</b> and <b>ALTERNATIVE RELIEVER</b> (Track 2). Before considering a regimen with SABA reliever, check if the patient is likely to be adherent with daily controller				STEP 5	juid	
		STEP 3	STEP 4 Medium/high	Add-on LAMA Refer for assessment of		
	<b>STEP 1</b> Take ICS whenever SABA taken	<b>STEP 2</b> Low dose maintenance ICS	Low dose maintenance ICS- LABA	dose maintenance ICS-LABA	phenotype. Consider high dose maintenance ICS-LABA, ± anti-IgE, anti-IL5/5R, anti- IL4R, anti-TSLP	
		DELL	EVED. As presided short activ	a hoto occupiet		

RELIEVER: As-needed short-acting beta<sub>2</sub>-agonist

Other controller options for either track (limited indications, or less evidence for efficacy or safety)

Low dose ICS whenever SABA taken, or daily LTRA, or add HDM SLIT

Medium dose ICS. or add LTRA, or add HDM SLIT

Add azithromycin (adults) or LTRA. As last resort consider adding low dose OCS but consider side-effects

Add-on LAMA

Refer for assessment of

nsider high

-IL5/5R, anti-

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### Starting Treatment General Approach

#### STARTING TREATMENT

in adults and adolescents 12+ years with a diagnosis of asthma







# **As-Needed ICS-formoterol**

- Budesonide = corticosteroid
- Formoterol = rapid onset, LABA
- 80 OR 160 mcg-4.5 mcg/inhalation, as needed
  - 1 to 2 inhalations, as needed, every 4 hours
  - Maximum dose: 12 inhalations/day
- Use of a spacer or valved holding chamber is recommended
- Note: off-label use





Rx only

Fanta CH and Barrett NA. An overview of asthma management. . In: UpToDate, Deffenbach P and TePas E (Ed), UpToDate, Waltham, MA, 2022 Image available from: https://www.empr.com/drug/symbicort-160-4-5/. Accessed June 29, 2022. Global Strategy for Asthma Management and Prevention (2022 update). Global Initiative for Asthma. Hess D et al. The use of inhaler devices in adults. In: UpToDate, Deffenbach P and TePas E (Ed), UpToDate, Waltham, MA, 2022. Budesonide-formoterol: Drug Information. In: Lexi-drugs online. Hudson (OH): Lexicomp, Inc.; 2022. Available from: http://online.lexi.com. Accessed June 29, 2022.

# **Maintenance ICS-Formoterol**

### • Budesonide 80 mcg/formoterol 4.5 mcg

- 2 inhalations twice daily
- If adequate response is not seen after 1 to 2 weeks, consider the higher dose combination
- Budesonide 160 mcg/formoterol 4.5 mcg
  - 2 inhalations twice daily
- Use of a spacer or valved holding chamber is recommended



Budesonide-formoterol: Drug Information. In: Lexi-drugs online. Hudson (OH): Lexicomp, Inc.; 2022. Available from: http://online.lexi.com. Accessed June 29, 2022.

# A Note on SABAs

### **No Longer Recommended as Monotherapy**

- SABA-only regimens no longer recommended
  - Highly effective for symptom relief
  - Increased risk of asthma related death
  - As use increases, so too does risk of exacerbation and mortality
  - Worse outcomes and reduced lung function compared to those prescribed inhaled corticosteroids from the start





Images available from: https://www.koala.health/products/Ventolin%20HFA%20Inhaler-381?gclid=CjwKCAjww8mWBhABEiwAl6-2RYqvtdmfCzBDrW3dNX9SO9WasixbFSRjRpfal83dKPFTxrBxsoYHxoCX2sQAvD\_BwE. Accessed July 16, 2022. Global Strategy for Asthma Management and Prevention (2022 update). Global Initiative for Asthma.

### **Leukotriene Receptor Antagonists LTRA**

enter for Clinical Systems Improv

- Inhibit the actions of proinflammatory leukotriene
  - Mediate bronchoconstriction, mucous secretion, and airway edema
- 1–2-month trial recommended to assess impact
- Less effective than ICS, particularly for exacerbations
- Boxed warning risk of serious mental health adverse effects (e.g., depression, insomnia)



Rx Only

30 Tablets

ACCOLATE

Montelukast: Drug Information. In: Lexi-drugs online. Hudson (OH): Lexicomp, Inc.; 2022. Available from: http://online.lexi.com. Accessed July 16, 2022. Zafirlukast: Drug Information. In: Lexi-drugs online. Hudson (OH): Lexicomp, Inc.; 2022. Available from: http://online.lexi.com. Accessed July 16, 2022. prmation. In: Lexi-drugs online. Hudson (OH): Lexicomp. Inc.: 2022. Available from: http://online.lexi.com. Accessed July

### **Biologics for Asthma** Brief Overview



- Biologics are complex medications that can be made up of sugars, proteins, nucleic acids, or living cells or tissues
  - Not as easily identifiable or characterizable as "conventional" drugs
- Several options available for patients with persistently uncontrolled asthma
- Example: Nucala<sup>®</sup> (mepolizumab)
  - IL-5 antagonist approved for add-on maintenance treatment of severe eosinophilic asthma in patients ≥ 6 years of age
  - Administered subcutaneously every 4 weeks

What are "Biologics" Questions and Answers. Food and Drug Administration. Available from: https://www.fda.gov/about-fda/center-biologics-evaluation-and-research-cber/what-are-biologics-questions-and-answers. Accessed June 29, 2022.

Mepolizumab: Drug Information. In: Lexi-drugs online. Hudson (OH): Lexicomp, Inc.; 2022. Available from: http://online.lexi.com. Accessed June 29, 2022.

# **Assessing Symptom Control**



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#### Box 2-2. GINA assessment of asthma control in adults, adolescents and children 6–11 years

A. Asthma symptom control		Level of asthma symptom control		
In the past 4 weeks, has the patient had:		Well controlled	Partly controlled	Uncontrolled
<ul> <li>Daytime asthma symptoms more than twice/week?</li> </ul>	Yes□ No□	]		
<ul> <li>Any night waking due to asthma?</li> </ul>	Yes□ No□	- None	1–2	3–4
<ul> <li>SABA reliever for symptoms more than twice/week?*</li> </ul>	Yes□ No□	of these	of these	of these
<ul> <li>Any activity limitation due to asthma?</li> </ul>	Yes□ No□	]		

# **Assessing Asthma Severity**



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**Assess Based on Level of Treatment Required for Control** 

Severity can only be defined retrospectively – based on level of treatment required to control symptoms and exacerbations.

#### Mild Asthma

- Well controlled with:
  - As-needed ICSformoterol OR
  - Low dose ICS + asneeded SABA.

#### Moderate Asthma

- Well controlled with:
  - Step 3 or Step 4 treatment (e.g., low or medium dose ICS-LABA in either treatment track)

#### Severe Asthma

- Remains uncontrolled despite optimized treatment with high dose ICS-LABA OR
- Requires high dose ICS-LABA to prevent it from becoming uncontrolled

# **Stepping Up/Down**



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- Stepping up is guided by response to current therapy
- Stepping down can be considered when
  - Symptoms well controlled and lung function stable for  $\geq$  3 months
- Approach all steps as a therapeutic trial



### **Monitoring** Frequency and Logistics

- Every visit
  - Asthma control
  - Adherence and inhaler technique
- Follow-up
  - 1–3 months after starting treatment
    - Every 3–12 months thereafter
  - After an exacerbation  $\rightarrow$  review visit within 1 week



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### **COPD** Statistics & Pathophysiology



### **Statistics**

### • Worldwide

- 10% of individuals  $\geq$  40 years of age
- Prevalence varies by country and increases with age
- United States
  - 4th-ranked cause of death

### Pathophysiology

- Characterized by persistent respiratory symptoms and airflow limitation
- Symptoms result from airway and/or alveolar abnormalities
- Usually caused by significant exposure to noxious particles or gases

Han MK et al. Chronic obstructive pulmonary disease: Definition, clinical manifestations, diagnosis, and staging. In: UpToDate, Dieffenbach P(Ed), UpToDate, Waltham, MA, 2022. Pocket Guide to COPD Diagnosis, Management, and Prevention. A Guide for Health Care Professionals. 2022 Report. Global Initiative for Chronic Obstructive Lung Disease.



# Clinical Risk Factors -COPD

**Tobacco Smoke**	Indoo Pollu	Indoor Air Pollution		oational osures
Outdoor Air Pollution	Gene	Genetics		and Sex
Lung Growth and Development	Socioec Sta	Socioeconomic Status		ma and / Higher- ctivity
Chronic Bronchitis		Infec	tions	

Pocket Guide to COPD Diagnosis, Management, and Prevention. A Guide for Health Care Professionals. 2022 Report. Global Initiative for Chronic Obstructive Lung Disease.

Weiss ST. Chronic obstructive pulmonary disease: Risk factors and risk reduction. In: UpToDate, Mulder JE (Ed), UpToDate, Waltham, MA, 2022



Alpha-1 Antitrypsin (AAT) Deficiency

- Inherited disorder
- May cause lung disease and liver disease
- Affects 1 in 1,500-3,500 individuals with European ancestry
- First signs and symptoms usually develop between the ages of 25 and 50
- Often missed as the cause of symptoms in patients diagnosed with COPD
- Testing recommended for all symptomatic adults

Alpha-1 antitrypsin deficiency. Medline Plus. Available from: https://medlineplus.gov/genetics/condition/alpha-1-antitrypsin-deficiency/#frequency. Updated September 15, 2021. Accessed August 6, 2022.

Han MK. Chronic obstructive pulmonary disease: Definition, clinical manifestations, diagnosis, and staging. In: UpToDate, Dieffenbach P (Ed), UpToDate, Waltham, MA, 2022.

### Diagnosis of COPD Brief Overview





Global Initiative for Chronic Obstructive Lung Disease (GOLD): Teach Slide Set 2022. Available from: https://goldcopd.org/2022-gold-reports-2/. Accessed June 29, 2022. Pocket Guide to COPD Diagnosis, Management, and Prevention. A Guide for Health Care Professionals. 2022 Report. Global Initiative for Chronic Obstructive Lung Disease.

### **COPD Treatment** Approach to Therapy



- Goals
  - Reduce symptoms and risk
  - Improve function and quality of life
- Treatment will vary depending on if COPD is stable, unstable, or the patient is having an acute exacerbation
- Non-pharmacologic management in addition to medications
  - Supplemental oxygen
  - Pulmonary rehabilitation is recommended for symptomatic COPD

Global Initiative for Chronic Obstructive Lung Disease (GOLD): Teaching Slide Set 2022. Available from: https://goldcopd.org/2022-gold-reports-2/. Accessed June 29, 2022. Ferguson GT and Make B. Stable COPD: Overview of management.. In: UpToDate, Deffenbach P (Ed), UpToDate, Waltham, MA, 2022

### **Treatment of COPD** Medication Therapy Options

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- Beta agonists
  - SABAs
  - LABAs
- Antimuscarinic
  - Short-acting antimuscarinics (SAMAs)
  - Long-acting antimuscarinics (LAMAs)
- Inhaled corticosteroids

### Supplemental Oxygen Therapy Oxygen



- Patients with stable severe COPD experience chronic hypoxemia
  - For these patients, long-term administration of oxygen has been shown to increase survival
- Decision to prescribe supplemental oxygen is based on:
  - Severity of hypoxemia at rest
  - Whether or not exertional hypoxemia limits activity
- Not recommended for patients with less severe disease

Ferguson GT and Make B. Stable COPD: Overview of Management. In: UpToDate, Dieffenbach P (Ed), UpToDate, Waltham, MA, 2022. Pocket Guide to COPD Diagnosis, Management, and Prevention. A Guide for Health Care Professionals. 2022 Report. Global Initiative for Chronic Obstructive Lung Disease.

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INITIAL PHA	RMACOLOGICAL TREA	ATMENT
≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization	Group C LAMA	Group D LAMA or LAMA + LABA* or ICS + LABA** *Consider if highly symptomatic (e.g. CAT > 20) **Consider if eos ≥ 300
0 or 1 moderate exacerbations (not leading to hospital admission)	Group A A Bronchodilator	Group B A Long Acting Bronchodilator (LABA or LAMA)
FIGURE 4.2	mMRC 0-1, CAT < 10	mMRC ≥ 2, CAT ≥ 10





# Assessing Breathless -ness

### **MODIFIED MRC DYSPNEA SCALE<sup>a</sup>**

#### PLEASE TICK IN THE BOX THAT APPLIES TO YOU | ONE BOX ONLY | Grades 0 - 4

mMRC Grade 0.	I only get breathless with strenuous exercise.	
mMRC Grade 1.	I get short of breath when hurrying on the level or walking up a slight hill.	
mMRC Grade 2.	I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level.	
mMRC Grade 3.	I stop for breath after walking about 100 meters or after a few minutes on the level.	
mMRC Grade 4.	I am too breathless to leave the house or I am breathless when dressing or undressing.	
<sup>a</sup> Fletcher CM. BMJ 1960; 2: 1662. TABLE 2.5		



# Assessing Symptoms

#### **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 2 3 4 5	l am very sad	SCORE
l never cough	012345	I cough all the time	
I have no phlegm (mucus) in my chest at all	012345	My chest is completely full of phlegm (mucus)	
My chest does not feel tight at all	012345	My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	012345	When I walk up a hill or one flight of stairs I am very breathless	
l am not limited doing any activities at home	012345	I am very limited doing activities at home	
I am confident leaving my home despite my lung condition	012345	I am not at all confident leaving my home because of my lung condition	
l sleep soundly	012345	I don't sleep soundly because of my lung condition	
I have lots of energy	012345	I have no energy at all	
Reference: Jones et al. ERJ 2009; 3 FIGURE 2.3	4 (3); 648-54.	TOTAL SCORE	:

### **COPD Treatment** Brief Overview





### **COPD Exacerbations** Brief Overview

- Acute worsening of respiratory symptoms that results in additional therapy.
- Most common cause = respiratory tract infections
- Goals for treatment of COPD exacerbations:
  - Minimize the negative impact of the current exacerbation
  - Prevent subsequent events.

Pocket Guide to COPD Diagnosis, Management, and Prevention. A Guide for Health Care Professionals. 2022 Report. Global Initiative for Chronic Obstructive Lung Disease.







# Beyond Initial Therapy

#### FOLLOW-UP PHARMACOLOGICAL TREATMENT



### **COPD Treatment** Continuous Evaluation







# Thank You

Please email <u>Sue.Vos@miccsi.org</u> with any questions.

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