Asthma and COPD Guideline Update
AAPA Family 2024

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Disclosures

INDUSTRY AFFILIATIONS
Grifols Pharmaceutical - speaker, consultant
AstraZeneca – advisory board, consultant

Brian Bizik does not intend to discuss the use of any off-label use/unapproved use of drugs or devices with the exception of GINA Asthma Guideline based therapy that is not currently FDA approved.

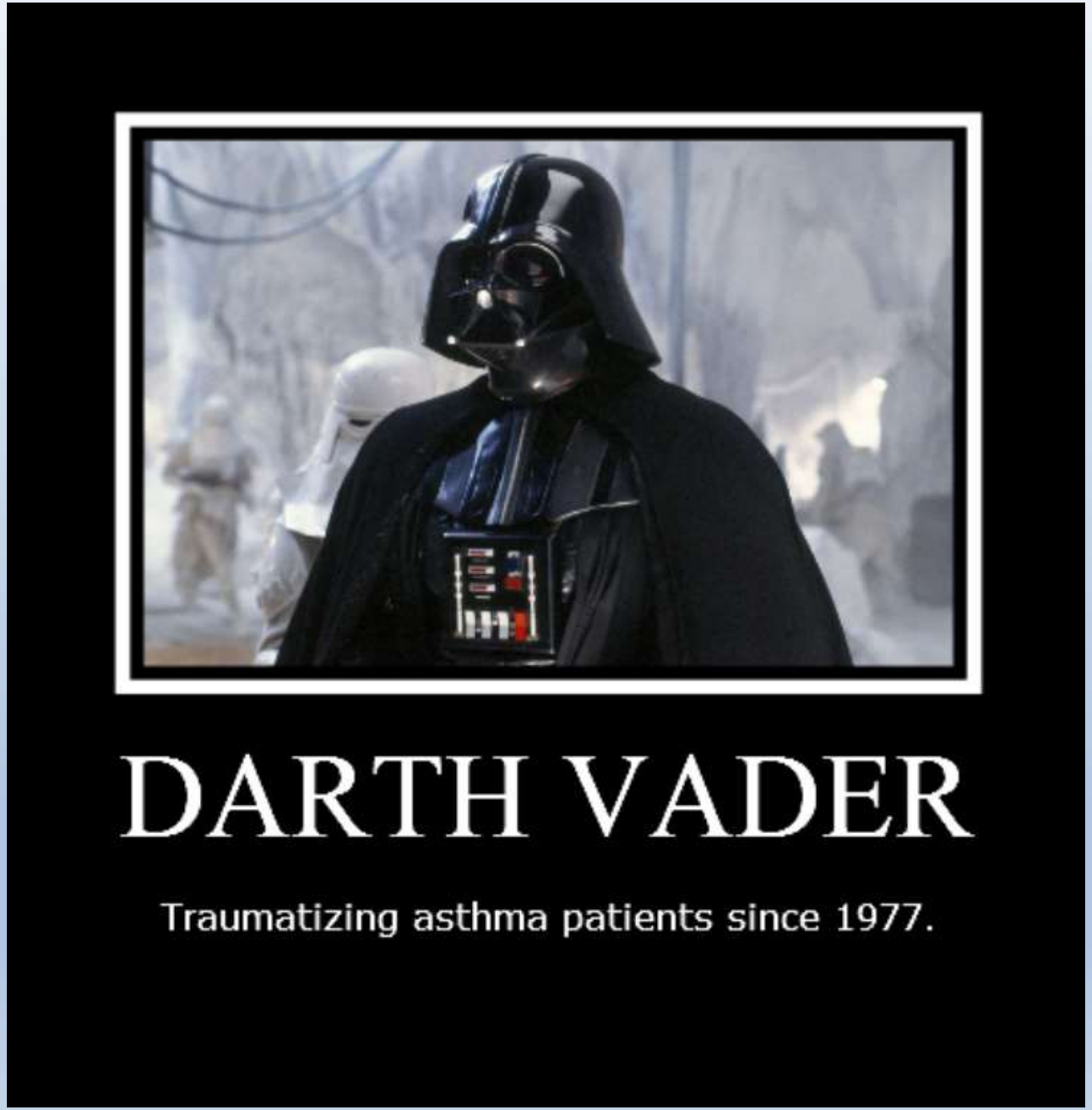
**All of the relevant financial relationships listed for this individual have been mitigated.*

Plan Today

Review medication classes, they are the same for both disease states

Talk over the guidelines, focus on the changes

Some tips for personalized respiratory care



Asthma and COPD

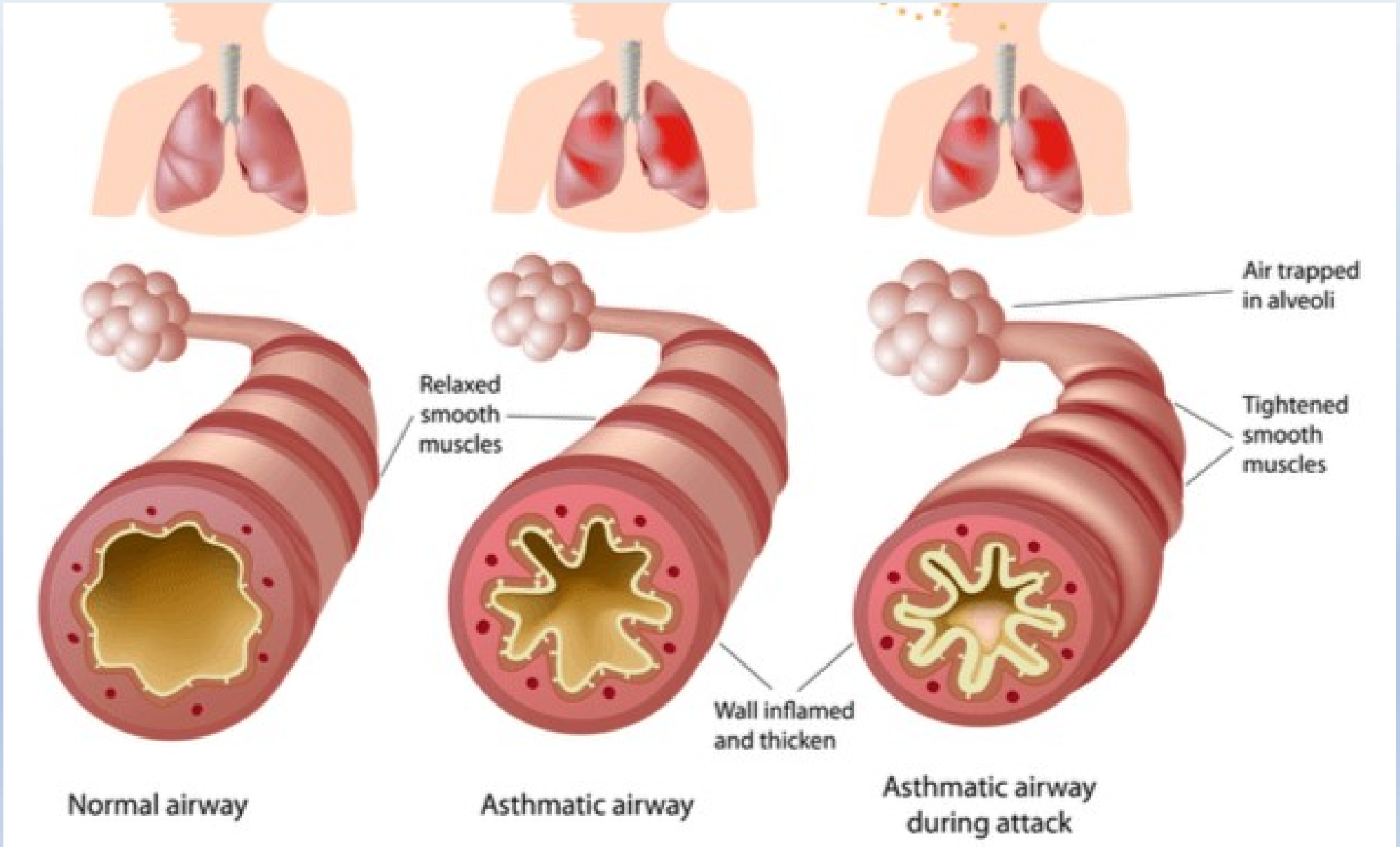
BB3

Asthma – bronchoconstriction, airway inflammation, mucous production

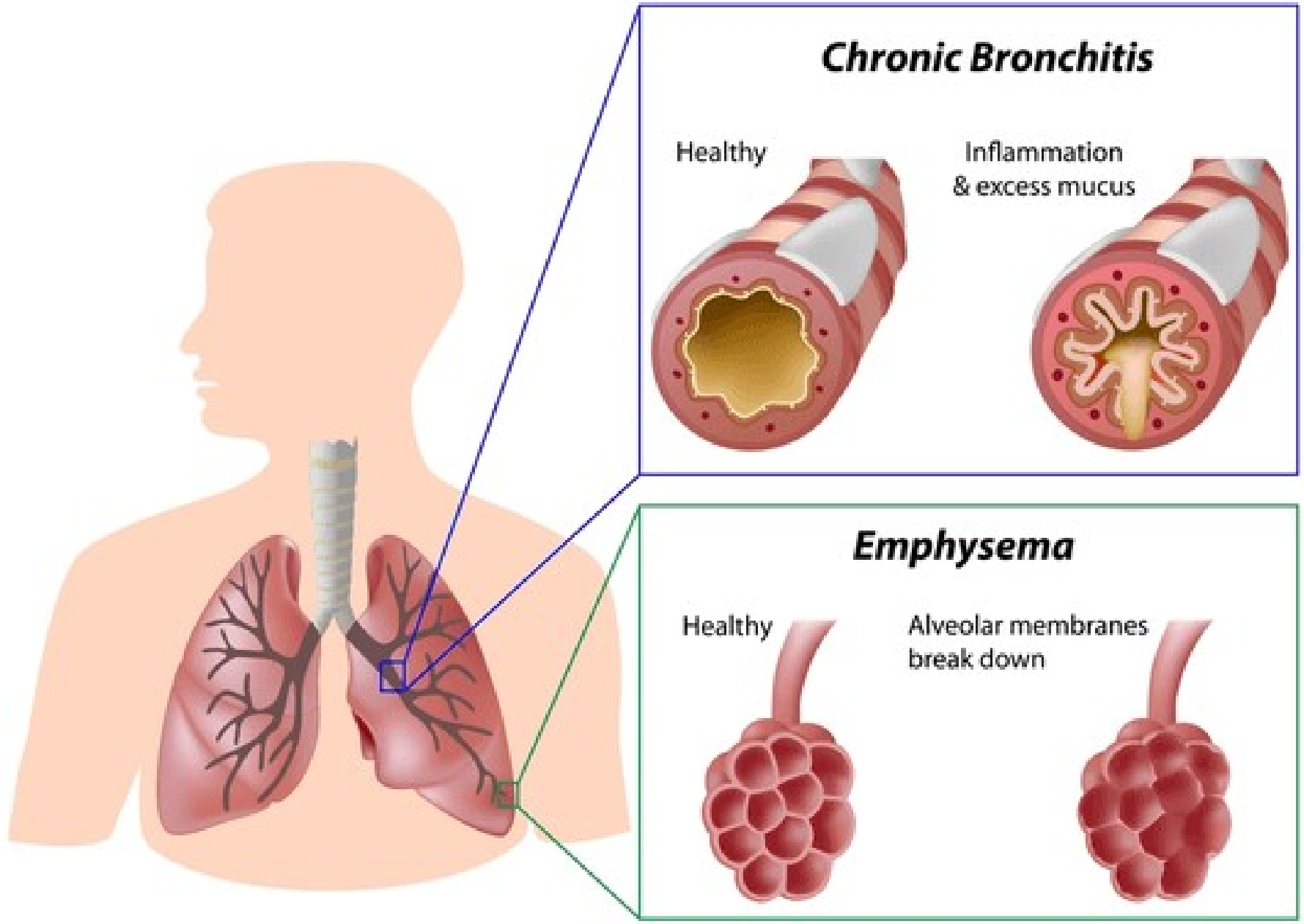
COPD – Tissue destruction, chronic cough, due to exposure

BB3 Brian Bizik, 12/11/2023

Asthma – Three key features: bronchoconstriction, airway inflammation and mucous production.



COPD – Think of the name. . Any thing chronic, that is obstructive, in the lungs and is terrible



Asthma Terms/Actions/Inhaler Types

- SABA = Short Acting Beta-Agonist = Albuterol = rescue inhaler = puffer, Proair, Ventolin, Proventil
- LABA = Long Acting Beta-Agonist, Serevent, Salmeterol
- ICS = Inhaled Corticosteroid, Flovent, fluticasone, QVAR, Pulmicort
- LAMA = Long Acting Muscarinic Antagonist, Spiriva, tiotropium
- MDI = Metered Dose Inhaler
- DPI = Dry Powdered Inhaler – Advair, Breo, Trelegy

Asthma: Part 1

We have three categories of medications

Albuterol

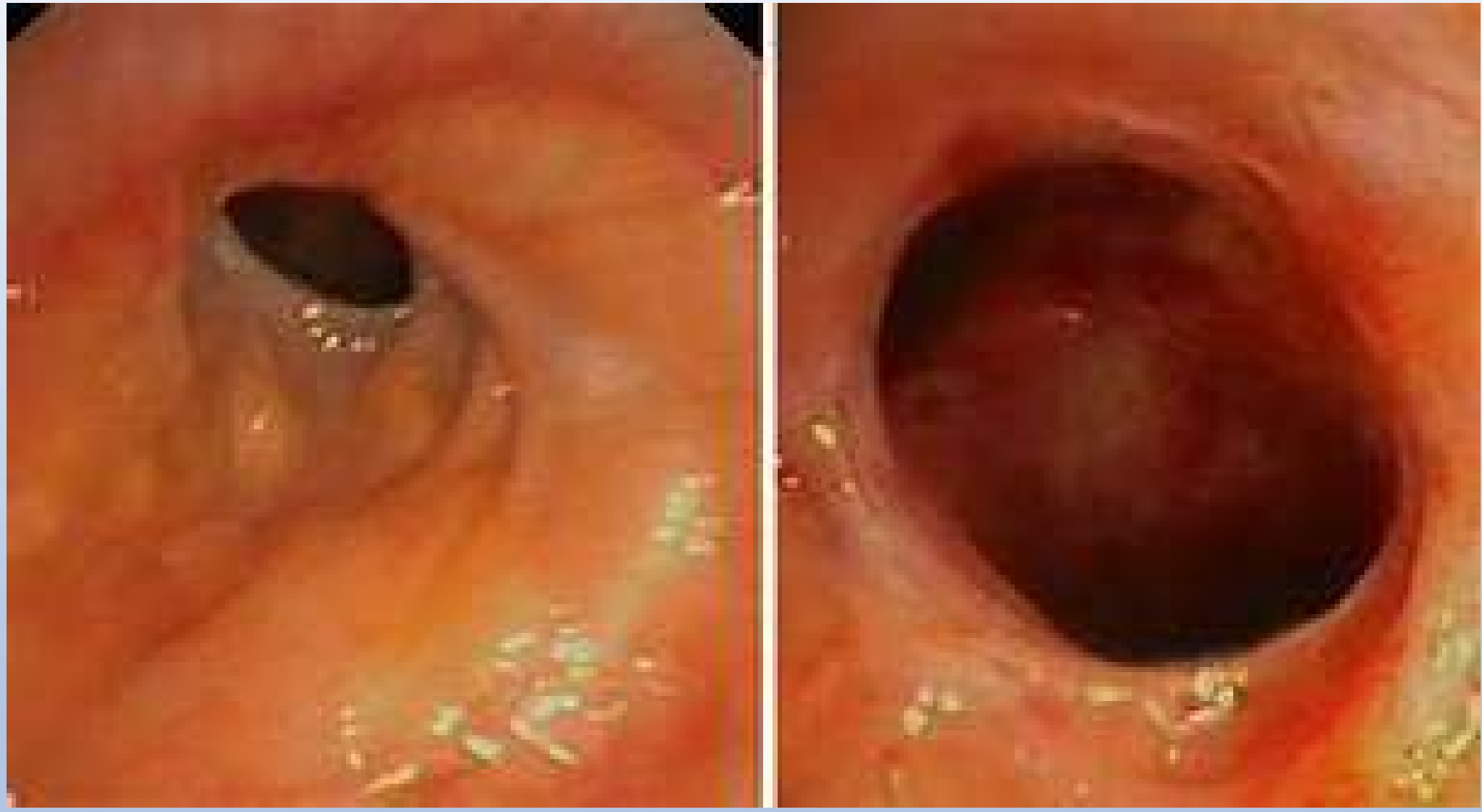
Short – SABA
Long – LABA

Bronchodilators

Medication Categories

Albuterol – short acting bronchodilator, relaxes smooth muscle. Binds to beta receptors on smooth muscle, causing about a billion things to happen that drop the calcium in the cell and it relaxes.

Salmeterol/formoterol/vilanterol – Same thing as above but lasts 12 or 24 hours



Respiratory Treatments

Allergy & Asthma Network

American College of Allergy, Asthma & Immunology

CHEST FOUNDATION

AllergyAsthmaNetwork.org
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SHORT-ACTING BETA$_2$-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

- **ProAir® Digihaler™** 90 mcg albuterol sulfate inhalation powder — DSB A
- **ProAir® HFA** 90 mcg albuterol sulfate — DSB A G
- **ProAir RespiClick®** 90 mcg albuterol sulfate inhalation powder — DSB A
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- **Xopenex HFA®** 45 mcg levalbuterol tartrate — A G

LONG-ACTING BETA$_2$-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

- **Serevent® Diskus®** 50 mcg salmeterol xinafoate inhalation powder — DSB A C
- **Striverdi® Respimat®** 2.5 mcg olodaterol hydrochloride — DSB C

INHALED CORTICOSTEROIDS

reduce and prevent swelling of airway tissue; they do not relieve sudden symptoms of coughing, wheezing or shortness of breath

- **Alvesco® HFA** 80, 160 mcg ciclesonide — DSB A
- **ArmonAir® Digihaler™** 55, 113, 232 mcg fluticasone propionate inhalation powder — DSB A
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MUSCARINIC ANTAGONISTS (ANTICHOLINERGIC)

relieve cough, sputum production, wheeze and chest tightness associated with chronic lung diseases

Short-acting

- **Atrovent® HFA** 17 mcg ipratropium bromide — DSB C

Long-acting

- **Incruse® Ellipta®** 62.5 mcg umeclidinium inhalation powder — DSB C
- **Spiriva® HandiHaler®** 18 mcg tiotropium bromide inhalation powder — C
- **Spiriva® Respimat®** 1.25, 2.5 mcg tiotropium bromide — DSB A C
- **Tudorza™ Pressair™** 400 mcg aclidinium bromide inhalation powder — DSB C

COMBINATION MEDICATIONS

contain both short-acting beta$_2$-agonist and short-acting muscarinic antagonist

- **Combivent® Respimat®** 20/100 mcg ipratropium bromide and albuterol — DSB C

COMBINATION MEDICATIONS

contain both inhaled corticosteroid and long-acting beta$_2$-agonist (LABA)

- **Advair Diskus®** 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol inhalation powder — DSB A C G
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- **Symbicort®** 80/4.5, 160/4.5 mcg budesonide and formoterol fumarate dihydrate — DSB A C G
- **Wixela™ Inhub™** 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol inhalation powder — DSB A C

COMBINATION MEDICATIONS

contain both long-acting beta$_2$-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

- **Anoro® Ellipta®** 62.5/25 mcg umeclidinium and vilanterol inhalation powder — DSB C
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- **Breztri Aerosphere™** 160/9/4.8 mcg budesonide, glycopyrrolate and formoterol fumarate — C

BIOLOGICS

target cells and pathways that cause airway inflammation; delivered by injection or IV

- **Cinqair®** reslizumab — A
- **Dupixent®** dupilumab — A
- **Fasenra™** benralizumab — A
- mepolizumab — A
- omalizumab — A

BRONCHIAL THERMOPLASTY

A minimally invasive procedure that uses heat to reduce airway smooth muscle, leading to fewer severe asthma flares, ER visits, and days lost from activities. www.btxasthma.com — A

PDE4 INHIBITORS

ease lung inflammation and reduce

- **Daliresp®** 250, 500 mcg roflumilast — C

Reviewed by Dennis Williams, PharmD

Asthma Part 1

We have three categories of medications

Steroids

All long acting

Reduce most every aspect of inflammation

Medication Categories: Steroids

Corticosteroids bind to the glucocorticoid receptor and mediate changes in gene expression that lead to multiple downstream effects over hours to days.

Almost every inflammation mediator is reduced

Many actions, all with a central goal of reducing inflammation at the source

Most aspects of inflammation are affected

Respiratory Treatments

2021

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CHEST FOUNDATION

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LONG-ACTING BETA$_2$-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

- **Serevent® Diskus®** 50 mcg salmeterol xinafoate inhalation powder — A C
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INHALED CORTICOSTEROIDS

reduce and prevent swelling

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Long-acting

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- **Spiriva® Respimat®** 1.25, 2.5 mcg tiotropium bromide — A C
- **Tudorza™ Pressair™** 400 mcg aclidinium bromide inhalation powder — C

COMBINATION MEDICATIONS

short-acting muscarinic antagonist and beta$_2$-agonist

- **Combivent® Respimat®** 20/100 mcg ipratropium bromide and albuterol — C

COMBINATION MEDICATIONS

contain both inhaled corticosteroid and long-acting beta$_2$-agonist (LABA)

- **Advair Diskus®** 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol inhalation powder — A C G
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PDE4 INHIBITORS

ease lung inflammation and reduce exacerbations

- **Daliresp®** 250, 500 mcg roflumilast — C

Reviewed by Dennis Williams, PharmD

Asthma: Part 1

We have three categories of medications

SAMA/LAMA

Short – SAMA
Long – LAMA

Anticholinergic and constriction prevention

Medication Categories: SAMA/LAMA

Ipratropium bromide (and long-acting muscarinic antagonists) are often listed as bronchodilators?

Are they? They don't directly relax smooth muscle. . . .

COPD Medication Categories: SAMA/LAMA

Ipratropium bromide

1. Made from the combination of Isopropyl alcohol and atropine. The name comes from these two words. Isopropyl alcohol and atropine
2. Works by INCREASING the degradation of cGMP and by DECREASING Ca2+ in the cells, thus blocking contraction. They don't dilate anything really.
3. Onset of action . . . 20 minutes or so. Ipratropium half life is 2 hours.

Respiratory Treatments

2021

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CHEST FOUNDATION

DOSE INDICATOR · G = GENERIC AVAILABLE · DISEASE STATES: A = ASTHMA · C = COPD

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COMBINATION MEDICATIONS

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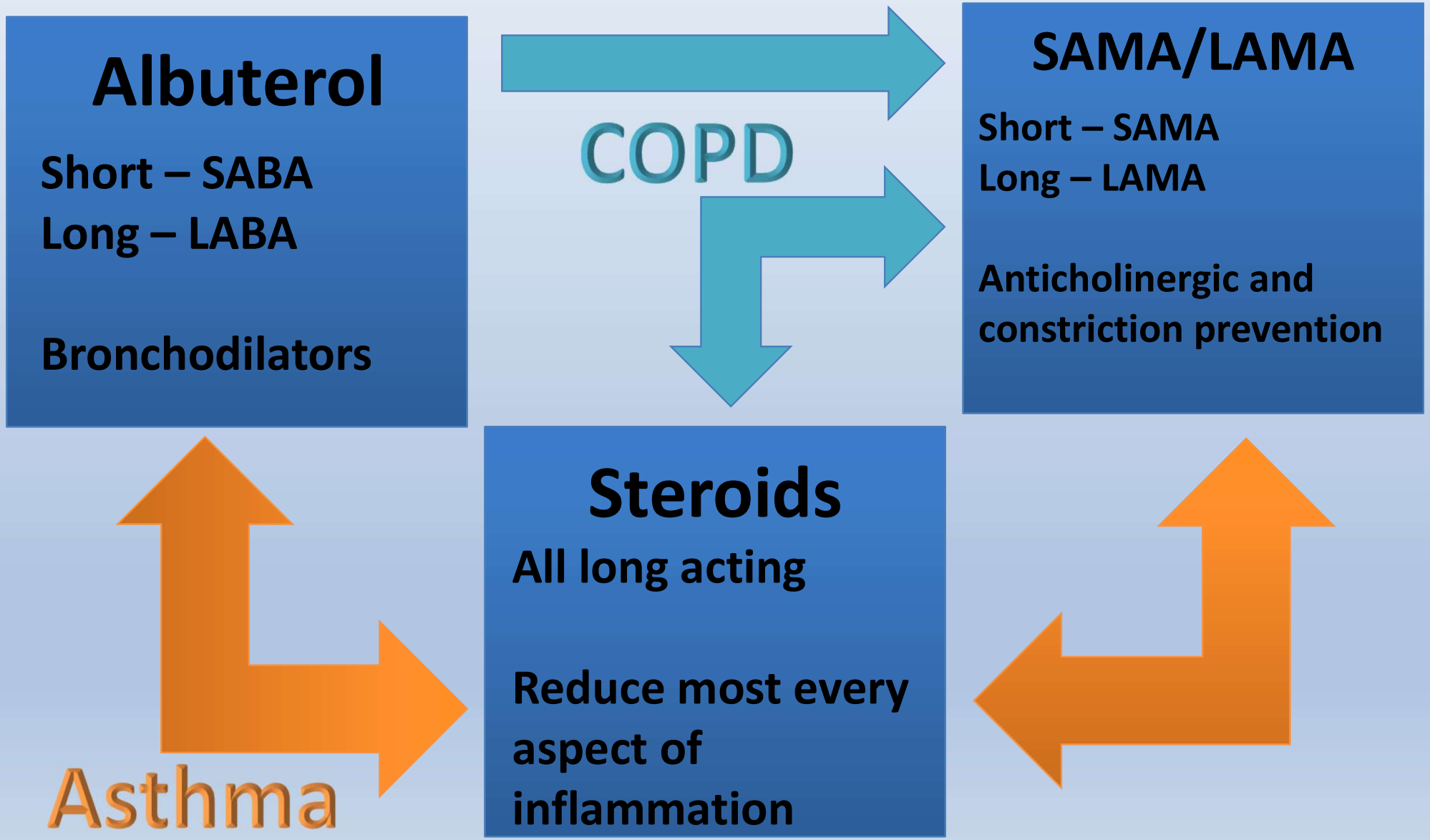
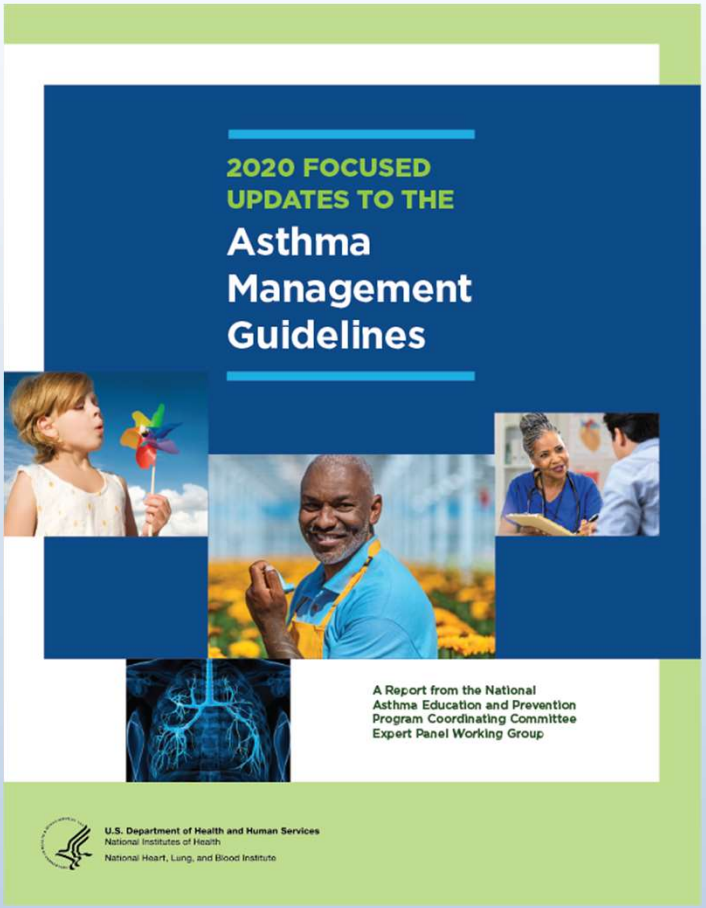
We have three categories of medications



Asthma Guidelines

2020 US Guidelines get a partial "focused" update



GLOBAL INITIATIVE FOR ASTHMA
1993-2023

• *Proud to be celebrating the 30th year of GINA* •

GINA – the rest of the world has GINA, the Global Initiative for Asthma, updated every year

Definition of asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation, bronchoconstriction and increased mucous production.

It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and intensity, together with variable expiratory airflow limitation.

Key change #1 – *Albuterol use*

Inhaled SABA has been first-line treatment for asthma for 50 years

This dates from an era when asthma was thought to be a disease of bronchoconstriction

- Patients rely on albuterol, it's fast, it's what they can feel working
- But albuterol just RELAXES constriction
- Over reliance on albuterol is dangerous and far from good asthma control. Albuterol does not CONTROL asthma
- Over use of albuterol reduces receptors, increases how allergens and smoke effects the lungs.
- Over prescription of albuterol is the single most consistent factor when looking at asthma admissions and death.

Key change #1 – *Albuterol use*

- For safety, GINA no longer recommends SABA-only treatment for Step 1
  - This decision was based on evidence that SABA-only treatment increases the risk of severe exacerbations, and that adding any ICS significantly reduces the risk
- GINA now recommends that all adults and adolescents with asthma should receive symptom-driven or regular low dose ICS-containing controller treatment, to reduce the risk of serious exacerbations
- US Guidelines recommend this in STEP 2

Key change #1 – *Albuterol use*

- In response we now have a combination inhaler on the market.

- Albuterol with a steroid – in this case it's budesonide.

Key change #2 – *PRN long-acting beta agonist and steroid*

- Single Maintenance And Reliever Therapy
- Remember, albuterol is fast – on fast, off fast
- There is one LABA that is fast as well, formoterol
- So it's fast and long acting
- Combine this with the best inhaled steroid, budesonide and you have an excellent controller – long acting asthma control
- But what about using this PRN?
- It's as fast as albuterol, lasts 12 hours?
- Can this be a CONTROLLER and RESCUE?

Meta-Analysis > Eur Respir J. 2020 Sep 10;56(3):2000625. doi: 10.1183/13993003.00625-2020. Print 2020 Sep.

SMART and as-needed therapies in mild-to-severe asthma: a network meta-analysis

Paola Rogliani [1] [2], Beatrice Ludovica Ritondo [1], Josuel Ora [2], Mario Cazzola [1], Luigino Calzetta [1]

Affiliations + expand

PMID: 32430423 DOI: 10.1183/13993003.00625-2020

Free article

Abstract

To date, there are no network meta-analyses comparing the impact of as-needed treatments in asthma, including the single maintenance and reliever therapy (known as "SMART" or "MART"; for simplicity, SMART will be used hereafter) and the use of inhaled corticosteroid (ICS)/long-acting β_2-agonist (LABA) combination exclusively on an as-needed basis. Therefore, we performed a systematic review and network meta-analysis concerning the efficacy and safety of SMART and as-needed therapies in asthma. Data from 32 096 asthmatic patients were extracted from 21 studies, lasting from 6 to 12 months. In adult mild-to-moderate asthmatic patients low-dose SMART and as-needed low-dose ICS/LABA combination were significantly (relative effect <0.78; $p<0.05$) more effective than the other as-needed therapies in reducing the risk of exacerbation, and both were ranked as the first treatment option reaching the first quartile of the surface under the cumulative ranking curve analysis (SUCRA). In adult moderate-to-severe asthmatic patients, low-dose to medium-dose SMART and high-dose ICS/LABA+as-needed short-acting β_2-agonist were equally effective in reducing the risk of severe asthma exacerbation ($p>0.05$), although only low- to medium-dose SMART was ranked as the first treatment option (first SUCRA quartile). Overall, these treatments were well tolerated, and effective also on lung function and disease control. This study supports SMART and as-needed therapies as a suitable therapeutic option for asthma, by providing the most effective positioning of each specific treatment according to the disease severity.

Key changes – *SMART THERAPY*

Single Maintenance And Reliever Therapy

This is NOT FDA approved but is recommended in all guideline based therapy

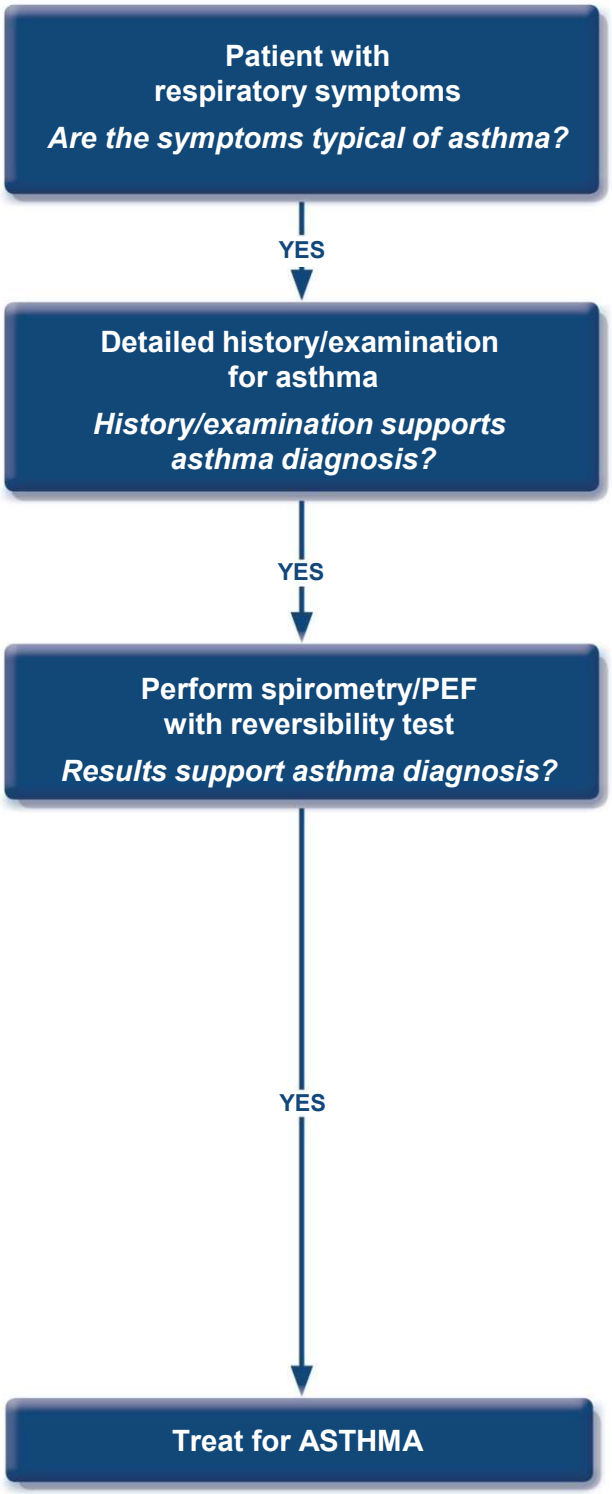
Very reasonable to try this, just document the medical decision making and that the patient has not had severe acute exacerbations, MILD TO MODERATE ASTHMA

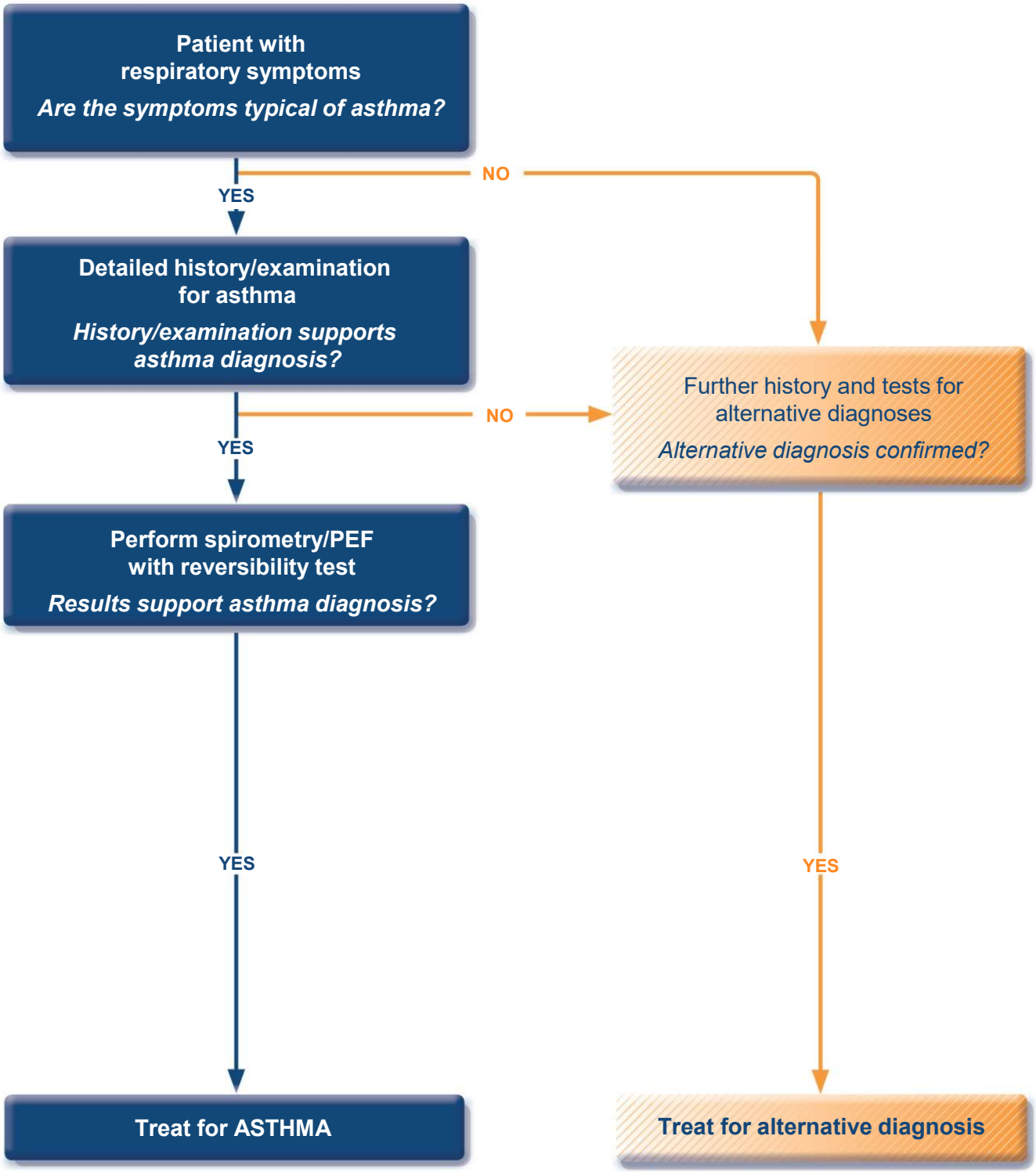
Dose – 2 puffs anytime, up to 12 a day.

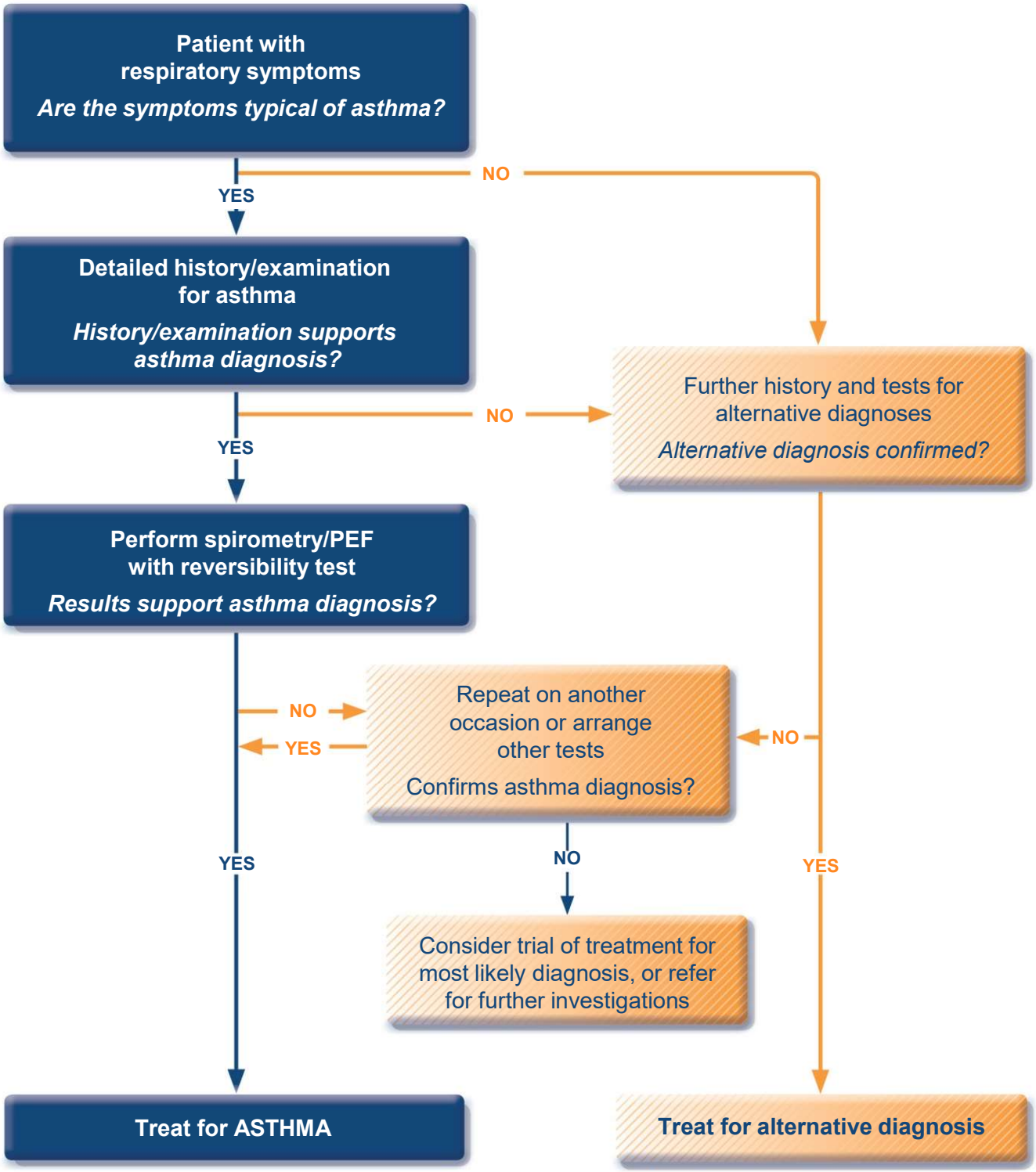
Look at the GINA Guidelines

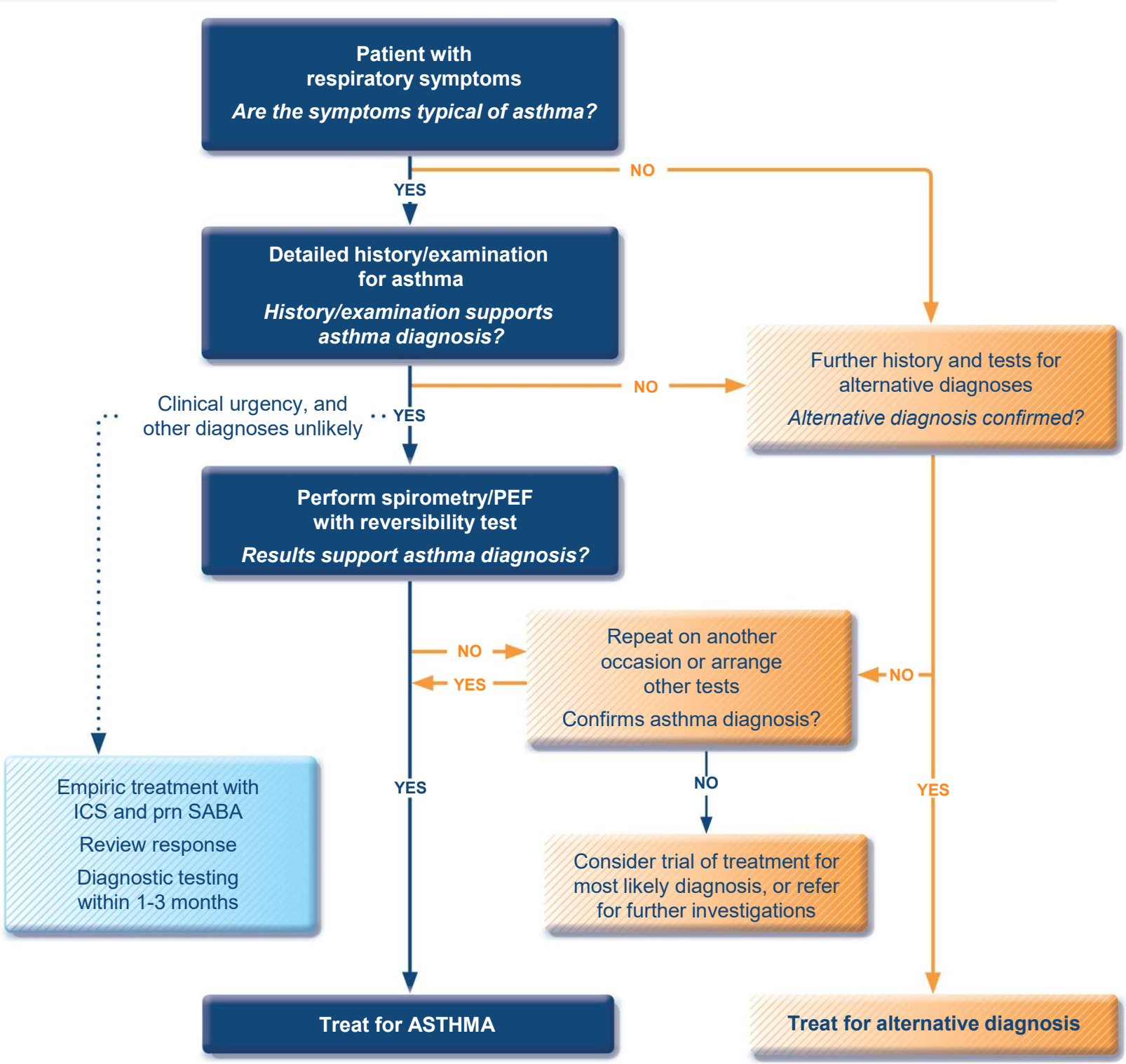
- Using GINA Guidelines – they are the best
- Updated twice a year if needed
- International
- Non-asthma specialist focus but good for specialty as well
- https://ginasthma.org/

Diagnosis of asthma (be brave!)









Diagnosis of asthma – variable airflow limitation

- Confirm presence of airflow limitation
  - Document that FEV_1/FVC is reduced (at least once, when FEV_1 is low)
  - FEV_1/ FVC ratio is normally >0.75 – 0.80 in healthy adults, and >0.90 in children
- Confirm variation in lung function is greater than in healthy individuals
  - The greater the variation, or the more times variation is seen, the greater probability that the diagnosis is asthma
  - **Excessive bronchodilator reversibility (adults: increase in FEV_1 >12% and >200mL; children: increase >12% predicted)**
  - Excessive diurnal variability from 1-2 weeks' twice-daily PEF monitoring (daily amplitude x 100/daily mean, averaged)
  - **Significant increase in FEV_1 or PEF after 4 weeks of controller treatment**
  - If initial testing is negative:
    - Repeat when patient is symptomatic, or after withholding bronchodilators
    - Refer for additional tests (especially children ≤5 years, or the elderly)

Keep it simple!

Determine if they are in control or not. . . .
(if appt for asthma or COPD exacerbation – ask them how they are when NOT sick)

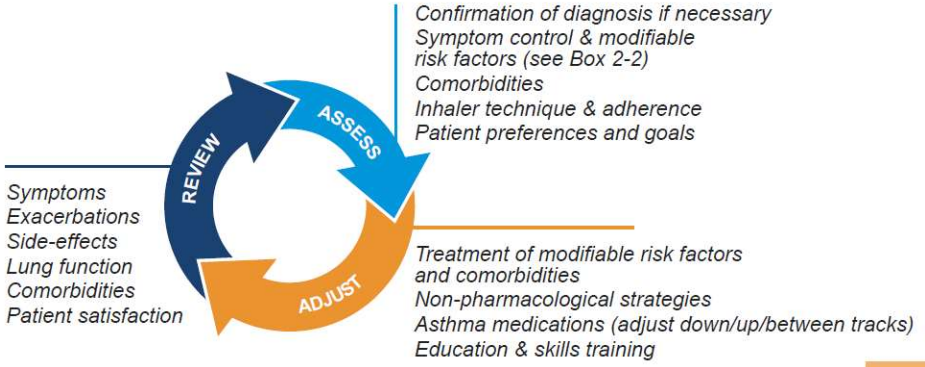
What is good asthma control?

- Minimal daytime and night time symptoms
- Can do what they want to
- No severe flares
- Minimal SABA use, ask about this
  - WHY do they reach for the inhaler
  - WHAT makes them think “I need my puffer”

Rule of 2s – no more than twice a week and no more than 2 inhalers a year

GINA 2023 – Adults & adolescents 12+ years

Personalized asthma management
Assess, Adjust, Review
for individual patient needs



TRACK 1: PREFERRED CONTROLLER and RELIEVER
Using ICS-formoterol as the reliever* reduces the risk of exacerbations compared with using a SABA reliever, and is a simpler regimen

STEPS 1 – 2	STEP 3	STEP 4	STEP 5
As-needed-only low dose ICS-formoterol	Low dose maintenance ICS-formoterol	Medium dose maintenance ICS-formoterol	Add-on LAMA Refer for assessment of phenotype. Consider high dose maintenance ICS-formoterol, ± anti-IgE, anti-IL5/5R, anti-IL4Rα, anti-TSLP
RELIEVER: As-needed low-dose ICS-formoterol*			

See GINA severe asthma guide

TRACK 2: Alternative CONTROLLER and RELIEVER
Before considering a regimen with SABA reliever, check if the patient is likely to adhere to daily controller treatment

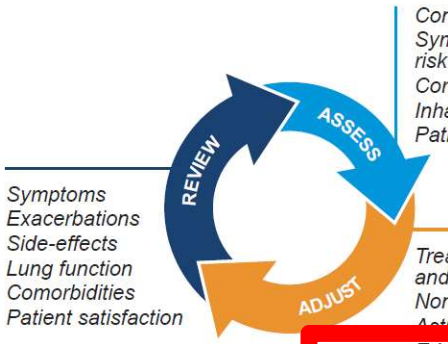
STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Take ICS whenever SABA taken*	Low dose maintenance ICS	Low dose maintenance ICS-LABA	Medium/high dose maintenance ICS-LABA	Add-on LAMA Refer for assessment of phenotype. Consider high dose maintenance ICS-LABA, ± anti-IgE, anti-IL5/5R, anti-IL4Rα, anti-TSLP
RELIEVER: as-needed ICS-SABA*, or as-needed SABA				
Other controller options (limited indications, or less evidence for efficacy or safety – see text)	*Low dose ICS whenever SABA taken*, or daily LTRA, or add HDM SLIT*	*Medium dose ICS, or add LTRA, or add HDM SLIT*	*Add LAMA or LTRA or HDM SLIT, or switch to high dose ICS*	*Add azithromycin (adults) or LTRA. As last resort consider adding low dose OCS but consider side-effects*

*Anti-inflammatory reliever (AIR)

Box 3-12

GINA 2023 – Adults & adolescents 12+ years

Personalized asthma management
Assess, Adjust, Review
for individual patient needs



Confirmation of diagnosis if necessary
Symptom control & modifiable risk factors (see Box 2-2)
Comorbidities
Inhaler technique & adherence
Patient preferences and goals

Symptoms
Exacerbations
Side-effects
Lung function
Comorbidities
Patient satisfaction

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

TRACK 1: PREFERRED CONTROLLER and RELIEVER
Using ICS-formoterol as the reliever* reduces the risk of exacerbations compared with using a SABA reliever, and is a simpler regimen

STEPS 1 – 2	STEP 3	STEP 4	STEP 5
As-needed-only low dose ICS-formoterol	Low dose maintenance ICS-formoterol	Medium dose maintenance ICS-formoterol	Add-on LAMA Refer for assessment of phenotype. Consider high dose maintenance ICS-formoterol, ± anti-IgE, anti-IL5/5R, anti-IL4Rα, anti-TSLP

RELIEVER: As-needed low-dose ICS-formoterol*

See GINA severe asthma guide

TRACK 2: Alternative CONTROLLER and RELIEVER
Before considering a regimen with SABA reliever, check if the patient is likely to adhere to daily controller treatment

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Take ICS whenever SABA taken*	Low dose maintenance ICS	Low dose maintenance ICS-LABA	Medium/high dose maintenance ICS-LABA	Add-on LAMA Refer for assessment of phenotype. Consider high dose maintenance ICS-LABA, ± anti-IgE, anti-IL5/5R, anti-IL4Rα, anti-TSLP

RELIEVER: as-needed ICS-SABA* or as-needed SABA

Other controller options (limited indications, or less evidence for efficacy or safety – see text)	*Low dose ICS whenever SABA taken*, or daily LTRA, or add HDM SLIT*	*Medium dose ICS, or add LTRA, or add HDM SLIT*	*Add LAMA or LTRA or HDM SLIT, or switch to high dose ICS*	*Add azithromycin (adults) or LTRA. As last resort consider adding low dose OCS but consider side-effects*

*Anti-inflammatory reliever (AIR)

Box 3-12

Tiotropium/ Spiriva

STEP 5

Add-on LAMA

Refer for assessment of phenotype. Consider high dose maintenance ICS-LABA, ± anti-IgE, anti-IL5/5R, anti-IL4Rα, anti-TSLP

Biologics

Antibiotic

Anti-inflammatory

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

FDA requires Boxed Warning about serious mental health side effects for asthma and allergy drug montelukast (Singulair); advises restricting use for allergic rhinitis

Risks may include suicidal thoughts or actions

3-4-2020 FDA Drug Safety Communication

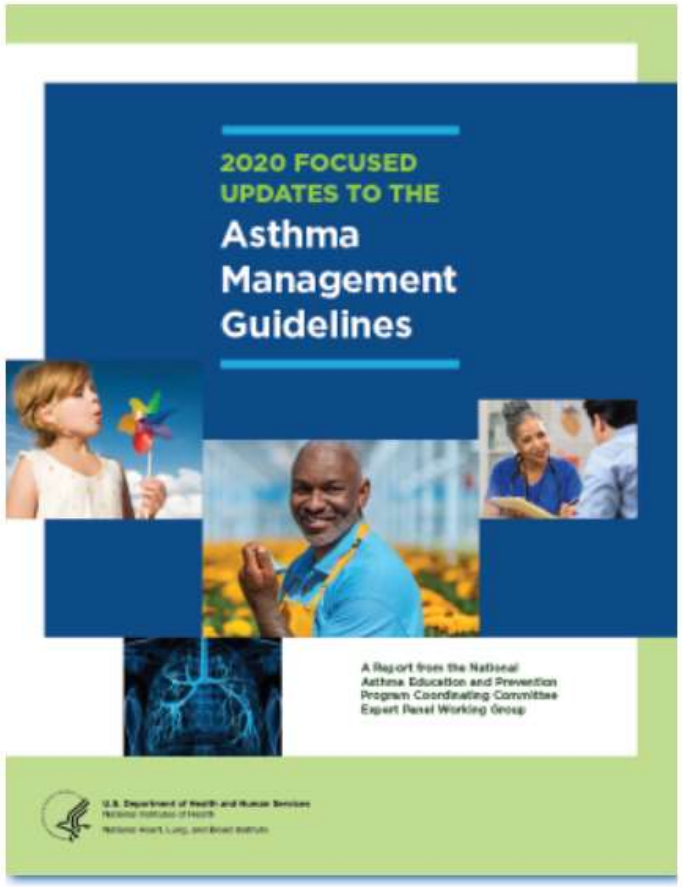
What safety concern is FDA announcing?

The U.S. Food and Drug Administration (FDA) is strengthening existing warnings about serious behavior and mood-related changes with montelukast (Singulair and generics), which is a prescription medicine for asthma and allergy.

We are taking this action after a review of available information led us to reevaluate the benefits and risks of montelukast use. Montelukast prescribing information already includes warnings about mental health side effects, including suicidal thoughts or actions; however, many health care professionals and patients/caregivers are not aware of the risk. We decided a stronger warning is needed after conducting an extensive review of available information and convening a panel of outside experts, and therefore determined that a *Boxed Warning* was appropriate.

Because of the risk of mental health side effects, the benefits of montelukast may not outweigh the risks in some patients, particularly when the symptoms of disease may be mild and adequately treated with other medicines. For allergic rhinitis, also known as hay fever, we have determined that montelukast should be reserved for those who are not treated effectively with or cannot tolerate other allergy medicines. For patients with asthma, we recommend that health care professionals consider the benefits and risks of mental health side effects before prescribing montelukast.

U.S. Guidelines
Very similar to GINA



NHLBI PUBLICATIONS AND RESOURCES

2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group

DOWNLOAD

PDF

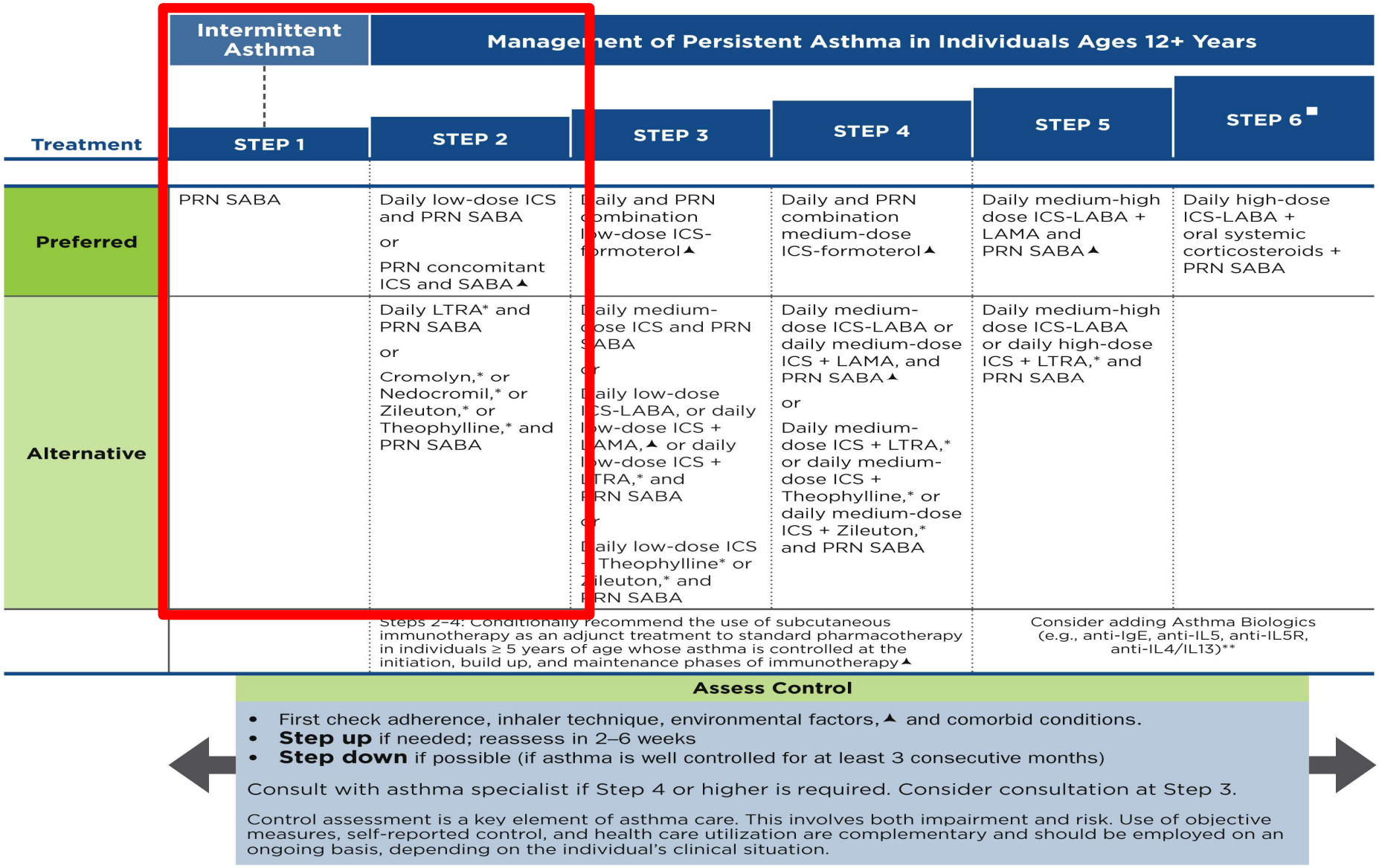
Web-only

Question about formats, printing, or ordering?

Learn more about web-only publications.

This 2020 report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group presents focused updates to the previous 2007 asthma management guidelines on six priority topics. **Note: The ages 0-4 stepwise approach table was updated in February 2021, and the reprints of the 2020 Focused Updates to the Asthma Management Guidelines from the Journal of Allergy and Clinical Immunology do not reflect the updated table.*

AGES 12+ YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA



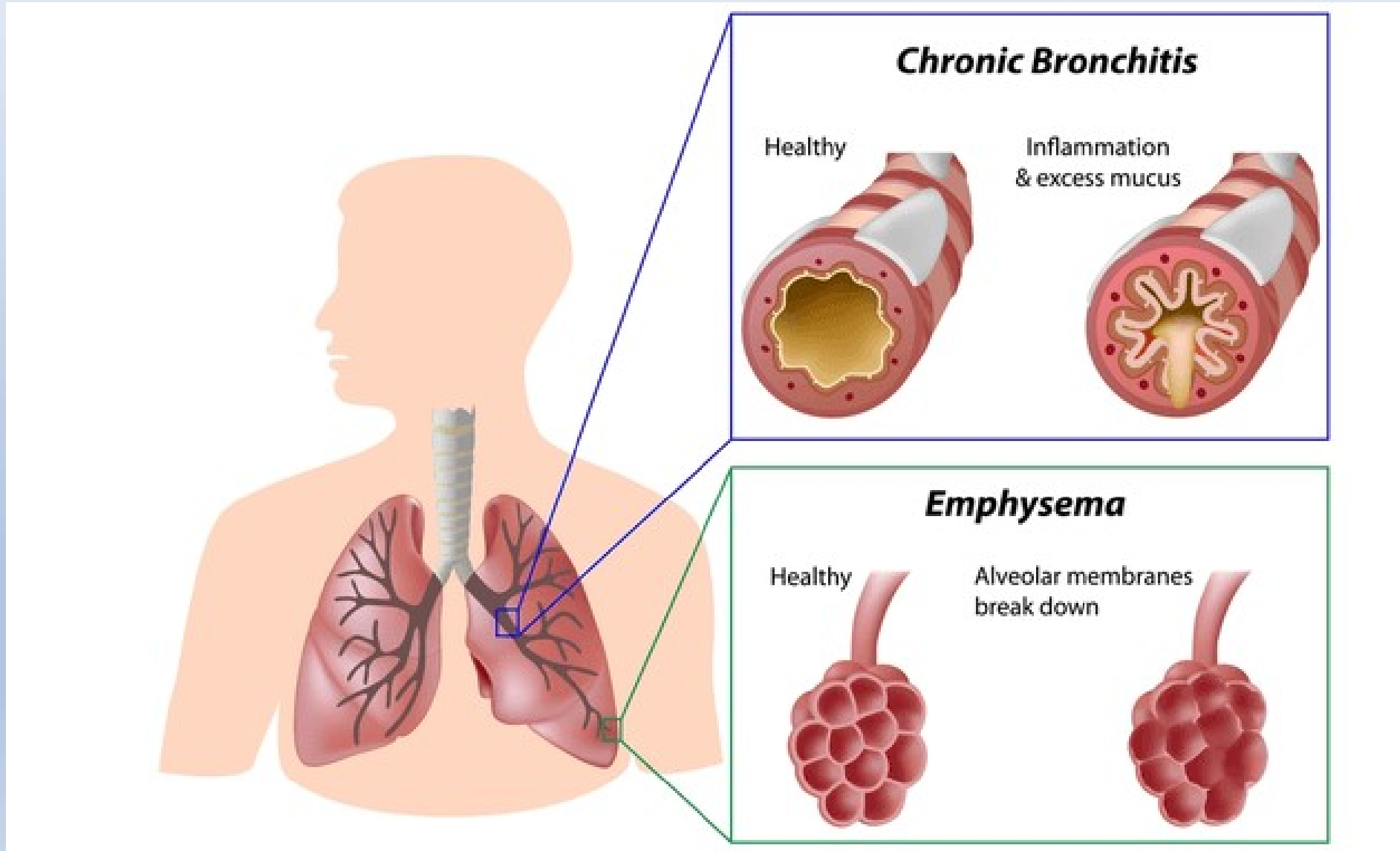
Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; LAMA, long-acting muscarinic antagonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta$_2$-agonist

Treatment	STEP 1	STEP 2
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA or PRN concomitant ICS and SABA▲
Alternative		Daily LTRA* and PRN SABA or Cromolyn,* or Nedocromil,* or Zileuton,* or Theophylline,* and PRN SABA

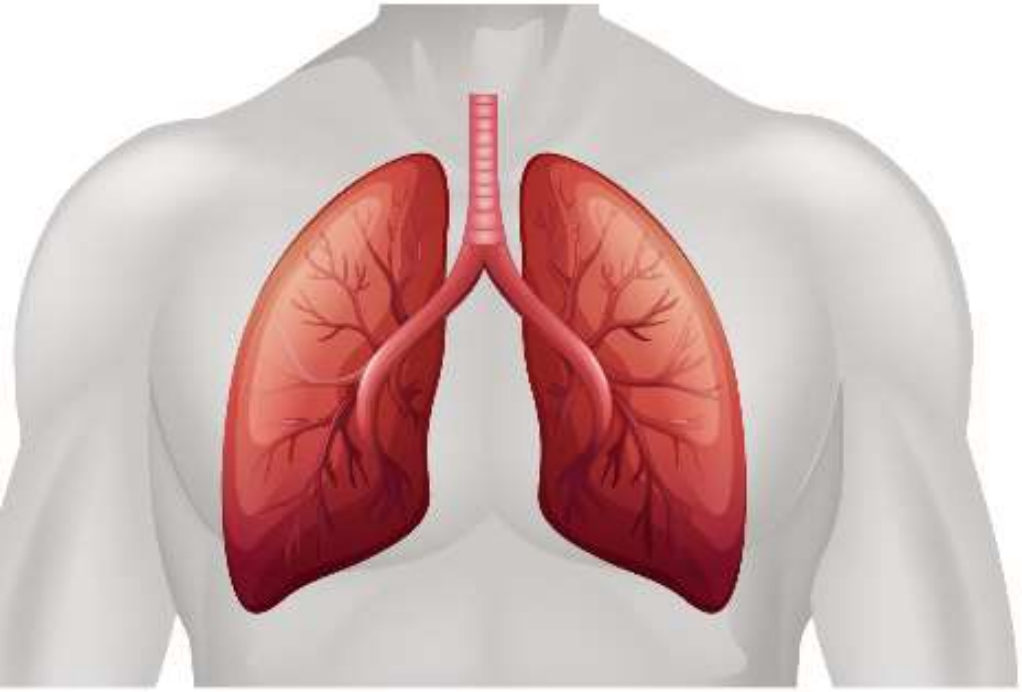
Biologics -

- **Often are life changing**
  - **Patients with high eosinophils or IgE do especially well**
  - **Refer patients early if they are struggling and on high dose daily inhalers**

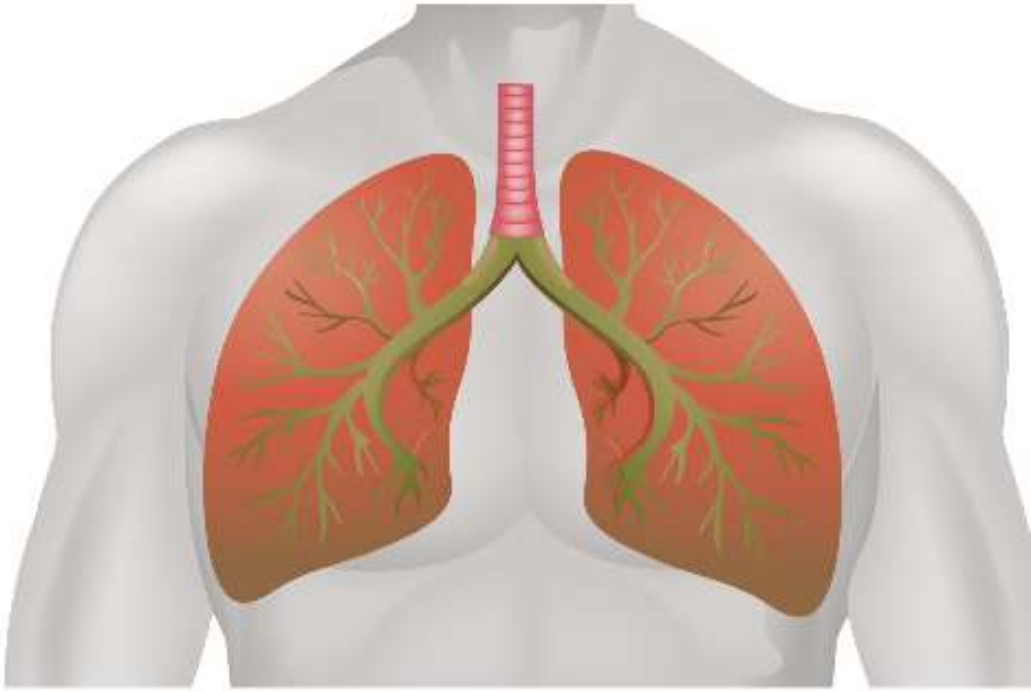
COPD – Chronic (long term, you get this over time), Obstructive (elasticity is gone, things get floppy and weak, alveoli break down)



COPD – Big, floppy lungs. Flattened diaphragm. Harder to inhaler but MUCH hard to exhale, air is trapped, stale.



Normal Lungs



Hyperinflated Lungs

COPD: Part 2

We have three categories of medications

Albuterol

Short – SABA
Long – LABA

Bronchodilators

COPD

SAMA/LAMA

Short – SAMA
Long – LAMA

Anticholinergic and constriction prevention

Steroids

All long acting

Reduce most every aspect of inflammation

Asthma

RESPTREC®
RESPIRATORY TRAINING & EDUCATOR COURSE

COPD MEDICATIONS

www.resptrec.org
www.lungsask.ca

Short-Acting Bronchodilators

SAMA
(Short-Acting Muscarinic Antagonist)
USE REGULARLY or PRN

Atrovent® MDI
(ipratropium bromide)
20 mcg/dose

Duration: 4-6h
Company: BI
*nebules also available

Company Key
AZ – AstraZeneca Canada Inc.
BI – Boehringer Ingelheim Canada Ltd.
GSK – GlaxoSmithKline Inc.
Novartis – Novartis Pharmaceuticals Canada Inc.
Valeant – Valeant Canada
Viatris – Viatris

SABA
(Short-Acting Beta2-Agonist)
USE REGULARLY or PRN

Airomir™ MDI
(salbutamol sulphate)
100 mcg/dose

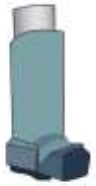
Duration: 4-6h
Company: Valeant

Bricanyl® Turbuhaler®
(terbutaline sulphate)
0.5 mg/dose

Duration: 4-6h
Company: AZ

Ventolin® Diskus®
(salbutamol sulphate)
200 mcg/dose

Duration: 4-6h
Company: GSK



Ventolin® MDI
(salbutamol sulphate)
100 mcg/dose

Duration: 4-6h
Company: GSK
*nebules and generic brands available

Long-Acting Bronchodilators

LAMA
(Long-Acting Muscarinic Antagonist)
USE REGULARLY

Incruse™ Ellipta®
(umeclidinium bromide)
62.5 mcg/dose

Duration: 24h
Company: GSK

Seebri® Breezhaler®
(glycopyrronium bromide)
50 mcg/dose

Duration: 24h
Company: Novartis

Spiriva® Handihaler®
(tiotropium bromide monohydrate)
18 mcg/dose

Duration: 24h
Company: BI

Spiriva® Respimat®
(tiotropium bromide monohydrate)
2.5 mcg/dose

Duration: 24h
Company: BI

Tudorza® Genuair®
(aclidinium bromide)
400 mcg/dose

Duration: 12h
Company: AZ

LABA
(Long-Acting Beta2-Agonist)
USE REGULARLY

Foradil® Aerolizer®
(formoterol fumarate)
12 mcg/dose

Duration: 12h
Company: Novartis

Onbrez® Breezhaler®
(indacaterol maleate)
75 mcg/dose

Duration: 24h
Company: Novartis

Serevent® Diskus®
(salmeterol xinafoate)
50 mcg/dose

Duration: 12h
Company: GSK

Striverdi® Respimat®
(olodaterol hydrochloride)
2.5 mcg/dose

Duration: 24h
Company: BI
*Approved by Health Canada but may not be available yet

Combination Inhalers

ICS/LABA
(Inhaled Corticosteroid/Long-Acting Beta2-Agonist)
USE REGULARLY

*only the Advair® Diskus® has been approved for COPD use.

Advair® Diskus®
(fluticasone propionate/ salmeterol xinafoate
100/50; 250/50; 500/50 mcg doses

Duration: 12h
Company: GSK

Breo™ Ellipta®
(fluticasone furoate/ vilanterol trifenatate)
100/25 mcg/dose

Duration: 24h
Company: GSK

Symbicort® Turbuhaler®
(budesonide/formoterol fumarate)
100/6; 200/6; 400/12 FORTE mcg doses

Duration: 12h
Company: AZ

Wixela® Inhub®
(fluticasone propionate/ salmeterol xinafoate)
100/50; 250/50; 500/50 mcg doses

Duration: 12h
Company: Viatris

ICS/LAMA/LABA
USE REGULARLY

Breztri™ Aerosphere®
(budesonide/glycopyronium/ formoterol fumarate)
182/8.2/5.8 mcg/dose

Duration: 12h
Company: AZ

Trelegy™ Ellipta®
(fluticasone furoate/ umeclidinium bromide/ vilanterol trifenatate)
100/62.5/25 mcg/dose

Duration: 24h
Company: GSK

SAMA and SABA
USE REGULARLY

Combivent® Respimat®
(ipratropium bromide/ salbutamol sulphate)
20/100 mcg/dose

Duration: 4-6h
Company: BI
*nebules also available

LAMA and LABA
USE REGULARLY

Anoro™ Ellipta®
(umeclidinium bromide/ vilanterol trifenatate)
62.5/25 mcg/dose

Duration: 24h
Company: GSK

Duaklir® Genuair®
(aclidinium bromide/ formoterol fumarate dehydrate)
400/12 mcg/dose

Duration: 12h
Company: AZ

Inspiolto® Respimat®
(tiotropium bromide monohydrate/olodaterol hydrochloride)
2.5/2.5 mcg dose

Duration: 24h
Company: BI

Ultibro® Breezhaler®
(glycopyrronium bromide/ indacaterol maleate)
50/110 mcg/dose

Duration: 24h
Company: Novartis

GLOBAL INITIATIVE FOR CHRONIC OBSTRUCTIVE LUNG DISEASE (GOLD):

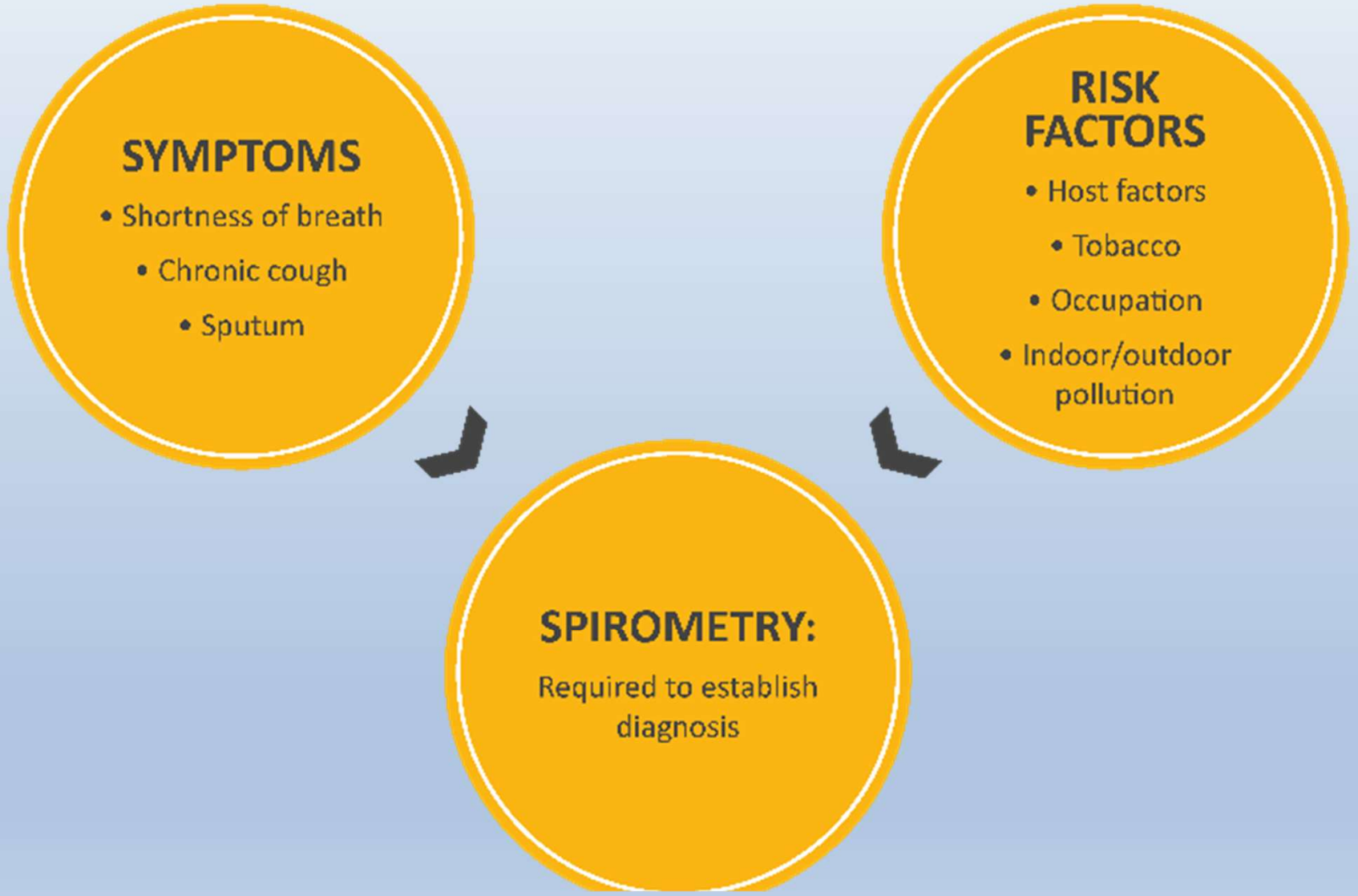
www.goldcopd.org

https://goldcopd.org/wp-content/uploads/2023/12/GOLD-2024_v1.1-1Dec2023_WMV.pdf

COPD Defined

'A **common preventable** and treatable disease, is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patients.'

PATHWAYS TO THE DIAGNOSIS OF COPD



COPD Diagnosis and Treatment

In a patient with the right history and symptoms (or a previous assumed dx of COPD) get the testing done.

Role of Spirometry in COPD

- **Diagnosis**
- **Assessment of severity of airflow obstruction (for prognosis)**
- **Follow-up assessment**
  - Therapeutic decisions
    - Pharmacological in selected circumstances (e.g., discrepancy between spirometry and level of symptoms)
    - Consider alternative diagnoses when symptoms are disproportionate to degree of airflow obstruction
    - Non-pharmacological (e.g., interventional procedures)
  - Identification of rapid decline

CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)

In patients with FEV1/FVC < 0.70:

GOLD 1:	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

In patients with FEV1/FVC < 0.70:

This is comparing the patient to themselves

CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)

In patients with FEV1/FVC < 0.70:

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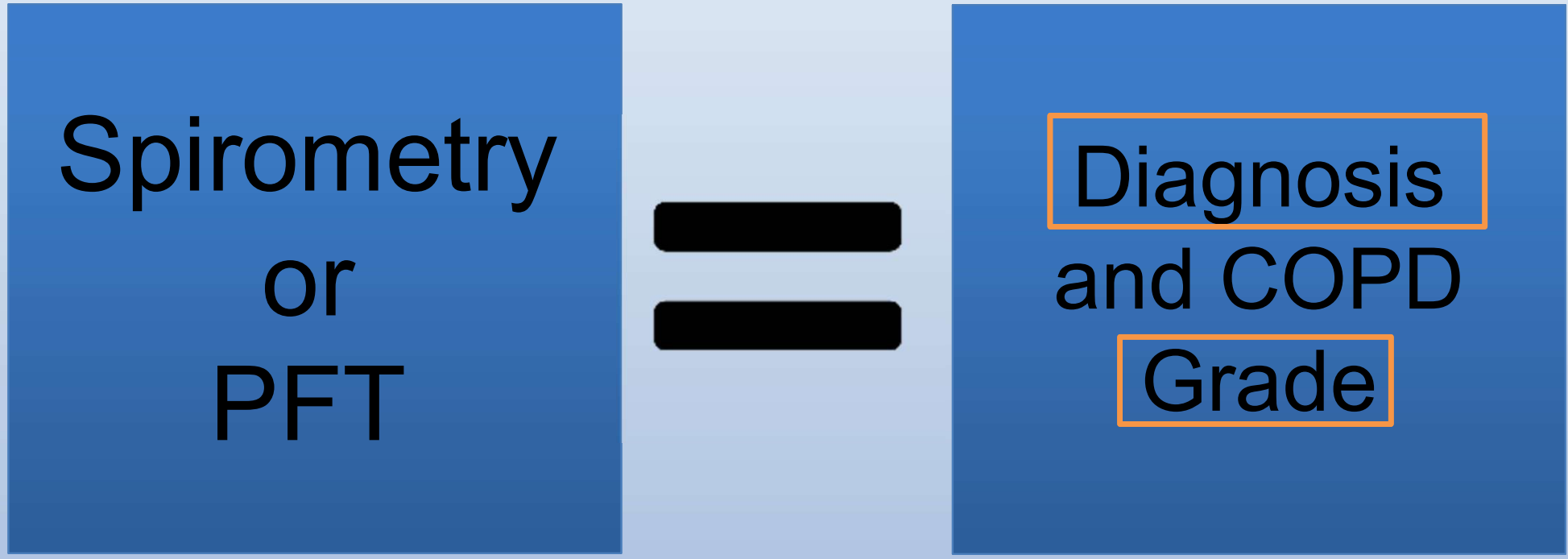
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

This is comparing the patient to a peer based on height, weight, age, gender and ethnicity.

COPD Diagnosis and Treatment



So do this once,
then, the good news . . .

COPD Diagnosis and Treatment

COPD Diagnosis and Treatment

Spirometry
or
PFT

Category
or
Treatment

CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)

In patients with FEV1/FVC < 0.70:

GOLD 1:	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

Set this aside and ask them how they are doing

CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)

In patients with FEV1/FVC < 0.70:

GOLD 1:	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

Just like with asthma, every visit needs to start with an assessment of symptoms, exacerbations and overall condition

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:

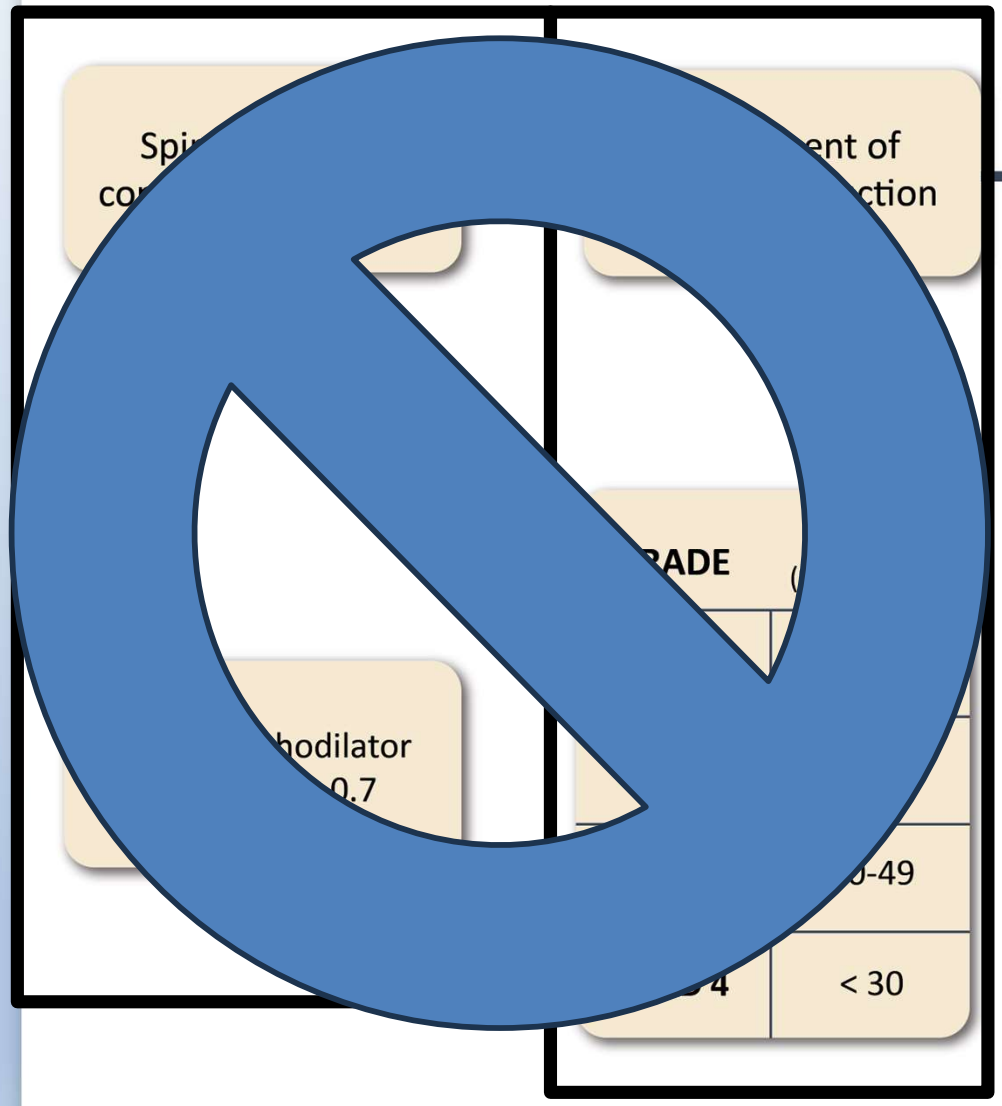
Reference: Jones et al. ERJ 2009; 34 (3); 648-54.

MODIFIED MRC DYSPNEA SCALE[a]

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.	☐

GOLD ABE Assessment Tool



Assessment of symptoms/risk of exacerbations

EXACERBATION HISTORY

≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization	**E**	
0 or 1 moderate exacerbations (not leading to hospitalization)	**A**	**B**
	mMRC 0-1 CAT < 10	mMRC ≥ 2 CAT ≥ 10

SYMPTOMS

0 or 1 moderate exacerbations (not leading to hospital admission)

GROUP A

A bronchodilator

mMRC 0-1, CAT < 10

0 or 1 moderate exacerbations (not leading to hospital admission)

GROUP B

LABA + LAMA*

mMRC ≥ 2, CAT ≥ 10

≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization

GROUP E

LABA + LAMA*

consider LABA+LAMA+ICS if blood eos ≥ 300*

mMRC 0-1, CAT < 10

mMRC ≥ 2, CAT ≥ 10

Initial Pharmacological Treatment

Figure 4.2

≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization

GROUP E

LABA + LAMA*

consider LABA+LAMA+ICS if blood eos ≥ 300*

0 or 1 moderate exacerbations (not leading to hospital admission)

GROUP A

A bronchodilator

mMRC 0-1, CAT < 10

GROUP B

LABA + LAMA*

mMRC ≥ 2, CAT ≥ 10

*single inhaler therapy may be more convenient and effective than multiple inhalers

Inhaled Steroids (ICS)

If not needed don't use them!

Increased risk of all URIs and increased risk of pneumonia and exacerbations

Fluticasone is the worst

GROUP E

LABA + LAMA*

consider LABA+LAMA+ICS if blood eos ≥ 300*

Meta-Analysis > Int Immunopharmacol. 2019 Dec;77:105950. doi: 10.1016/j.intimp.2019.105950. Epub 2019 Oct 17.

Inhaled corticosteroids and risk of pneumonia in patients with chronic obstructive pulmonary disease: A meta-analysis of randomized controlled trials

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Affiliations + expand

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Abstract

Objective: Inhaled corticosteroids (ICS) are generally used to treat patients with chronic obstructive pulmonary disease (COPD) who suffer from repeated exacerbations. Recently, it was reported that ICS treatment increased the risk of pneumonia in COPD patients. But it is controversial.The objective of this paper is to clarify the associations between ICS treatment and the risk of pneumonia in COPD patients.

Methods: PubMed, Cochrane Library, Clinical Trials.gov, and Embase were searched from February 2019 to June 2019. Randomized clinical trials (RCTs) were incorporatedthat compared ICS with non-ICS treatment on the risk of pneumonia in COPD patients. Meta-analyses were conducted by the Peto and Mantel-Haenszel approaches with corresponding 95% CIs.

Results: Twenty-five trials (N = 49,982 subjects) were included. Pooled results demonstrated a significantly increased risk of pneumonia with ICS use in COPD patients (RR, 1.59, 95% CI, 1.33-1.90; I^2 = 51%). ICS treatment also increased the risk of severe pneumonia (RR, 2.17, 95% CI, 1.47-3.22; I^2 = 29%). The results of subgroup analysis based on doses of ICS were consistent with the above. However, subgroup analyses based on types of ICS revealed that fluticasone therapy was associated with an increased risk of pneumonia but not budesonide. In addition, medium- and low-doses of budesonide treatment also did not increase the risk of pneumonia.

Conclusions: Use of ICS increases the risk of pneumonia in patients with COPD. The above is prominent for fluticasone-containing ICSs but not for budesonide-containing ICSs.

Factors to Consider when Initiating ICS Treatment

Factors to consider when adding ICS to long-acting bronchodilators:

(note the scenario is different when considering ICS withdrawal)

STRONGLY FAVORS USE	**History of hospitalization(s) for exacerbations of COPD[#]**
	≥ 2 moderate exacerbations of COPD per year[#]
	Blood eosinophils ≥ 300 cells/µL
	History of, or concomitant asthma
FAVORS USE	1 moderate exacerbation of COPD per year[#]
	Blood eosinophils 100 to < 300 cells/µL
AGAINST USE	**Repeated pneumonia events**
	Blood eosinophils < 100 cells/µL
	History of mycobacterial infection

[#]despite appropriate long-acting bronchodilator maintenance therapy (see Table 3.4 and Figure 4.3 for recommendations);
*note that blood eosinophils should be seen as a continuum; quoted values represent approximate cut-points; eosinophil counts are likely to fluctuate.

COPD Best Practices

Diagnose with Spirometry or PFT

Once this is done set aside the numbers and focus on symptoms and exacerbations/hospitalizations

Use the CAT and figure out what category (A-D) and corresponding medication type, make changes

Questions on this so far?

COPD Exacerbations

Exacerbations are not “bumps” in the road like they are for asthma

Moderate to severe exacerbations are life altering, patients never recover fully.

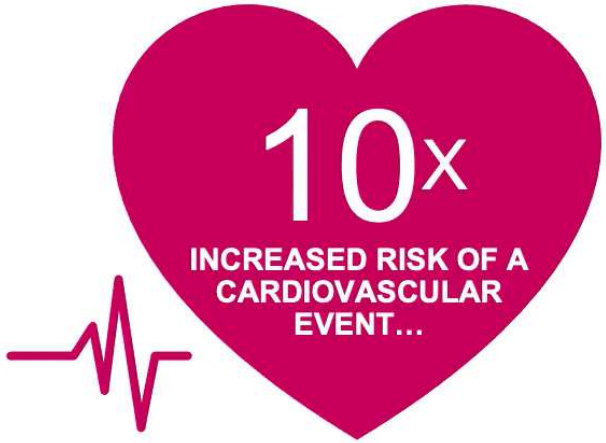
How bad is an exacerbation?

COPD Exacerbations Increase Risk of Poor Outcomes[1]

for severe COPD exacerbation after just 1 moderate exacerbation[1,a]

Comparing patients with 1 moderate acute exacerbation of COPD with those who had none

In patients with COPD who had CVD or multiple risk factors for CVD



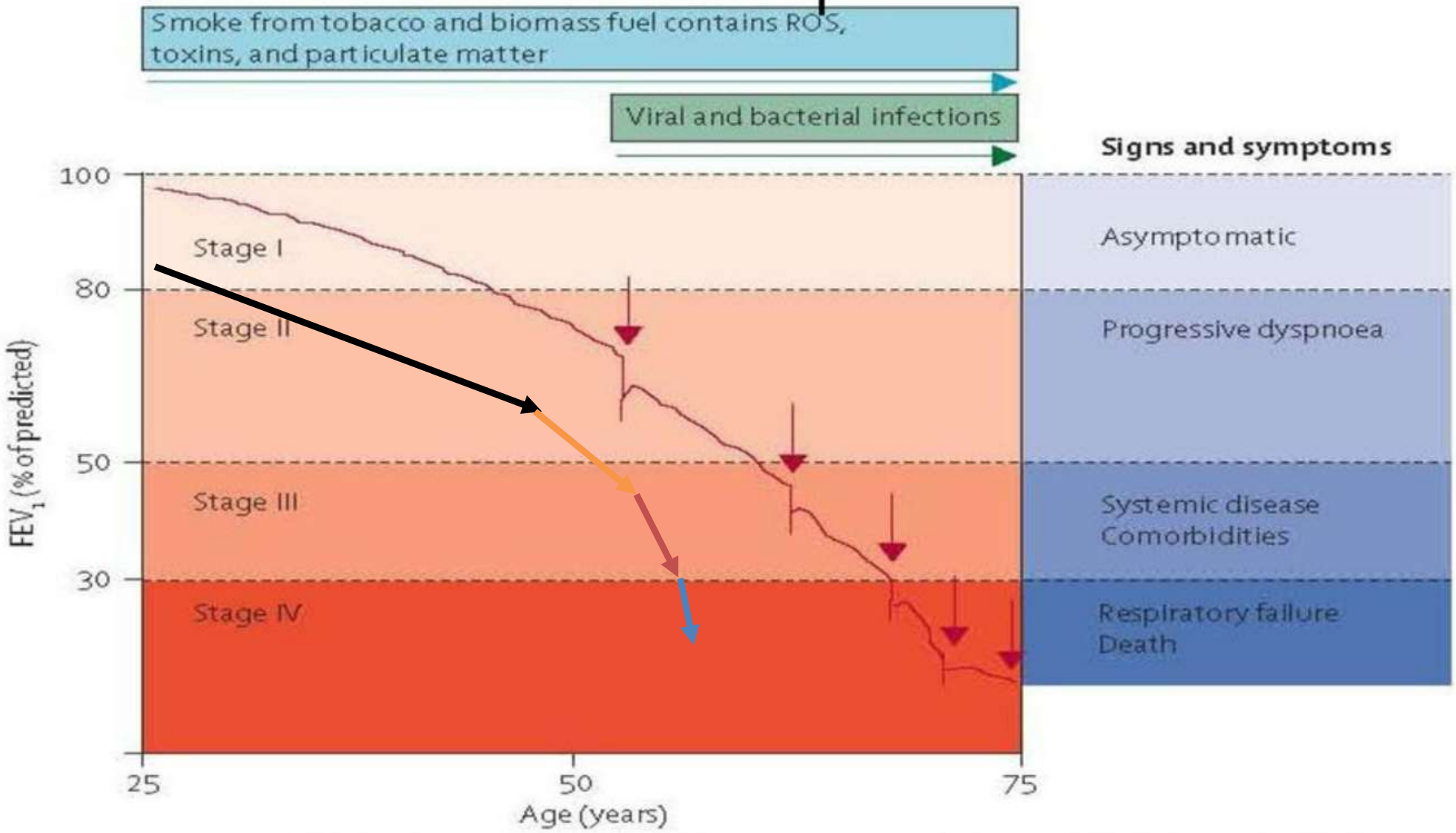
following hospitalization for a severe COPD exacerbation[2,b]

In the first 30 days following the onset of an acute exacerbation

[a]Data from a UK population-based study of ≈100,000 patients with COPD (up to 10 years of follow-up). [b]A post hoc analysis of the multinational SUMMIT trial (N=16,485) was performed to determine whether the risk for cardiovascular events increases after a moderate/severe COPD exacerbation.
COPD, chronic obstructive pulmonary disease; CVD, cardiovascular disease.

1. Rothnie KJ, et al. *Am J Respir Crit Care Med*. 2018;198(4):464-471. 2. Kunisaki KM, et al. *Am J Respir Crit Care Med*. 2018;198(1):51-57.

COPD exacerbations & Effect on FEV_1



Lancet, Vol. 374, Hansel TT, Barnes PJ, New drugs for exacerbations of COPD, Pages 744-55, 2009

COPD Exacerbations

Causes – viral make up about 80% of flares in a standard COPD population.

Bacterial infections, increased BLM smoke or toxin exposure

Ran out of meds/noncompliance

COPD Exacerbations

Generally, PO steroids are used:

Consider shorter and lower

40 mg for 3 days and 20 mg for 3 days

Patient controlled taper - 40 mg till they are 50% better then 20 mg till they are close to normal

COPD Exacerbations

Macrolides (or other) should be used for moderate or worse exacerbations.

If you'd like to avoid steroids try Azithromycin 250 mg daily for 10 days.

Have them do their rescue medication Q4H or Q6H for a couple days then move back to PRN.

COPD Best Practices

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Review article

The role of inspiratory flow in selection and use of inhaled therapy for patients with chronic obstructive pulmonary disease

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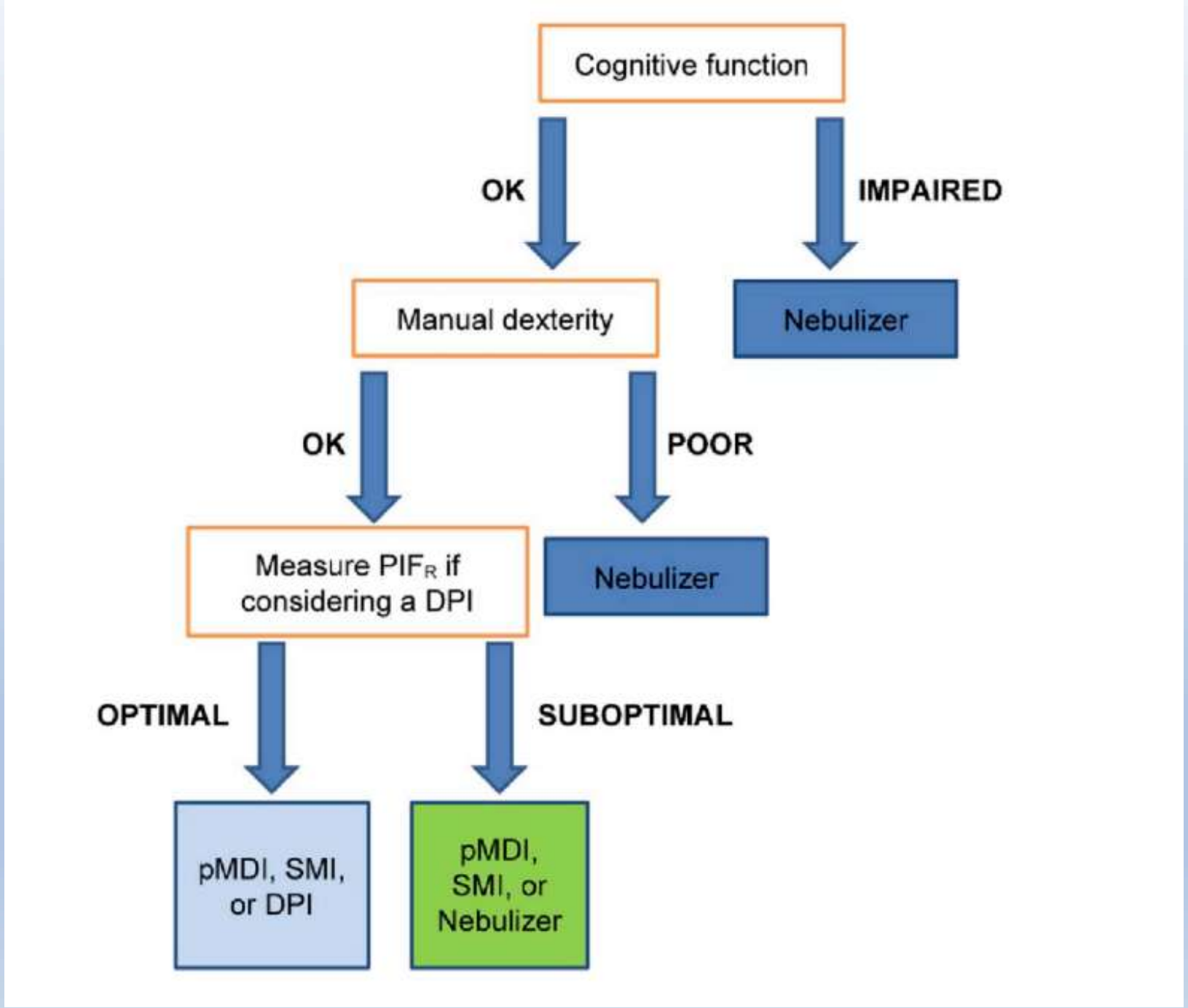
ABSTRACT

Inhalation therapy is the mainstay of chronic obstructive pulmonary disease management, and inhaler selection can have a profound impact on drug delivery and medication adherence, as well as on treatment outcomes. Although multiple delivery systems, such as pressurized metered-dose inhalers, dry powder inhalers, slow-mist inhalers, and nebulizers, are available, clinical benefits achieved by patients rely on effective delivery of the inhaled medication to the airways. Among several factors influencing drug deposition, inspiratory flow is one of the most important. Inspiratory flow impacts drug delivery and subsequent clinical efficacy, making it necessary to adequately train patients to ensure correct inhaler use. Peak inspiratory flow is the maximal airflow generated during a forced inspiratory maneuver. Health care professionals need to select the appropriate delivery system after carefully considering patient characteristics, including lung function, optimal inspiratory flow, manual dexterity, and cognitive function. Herein, the role of inspiratory flow in the selection and use of inhaled therapy in patients with COPD is reviewed.

COPD Best Practices



COPD Best Practices

Measure this with an In-Check Device (below)

Can also see if they can “make noise” with their inhaler

Can they hold a Post-it note to their lips?

Do they feel nebulized medication is sig better?

COPD Best Practices

Consider moving patients over to nebulized medications, can be life altering. All three categories have options now
(list next slide)

For Reference

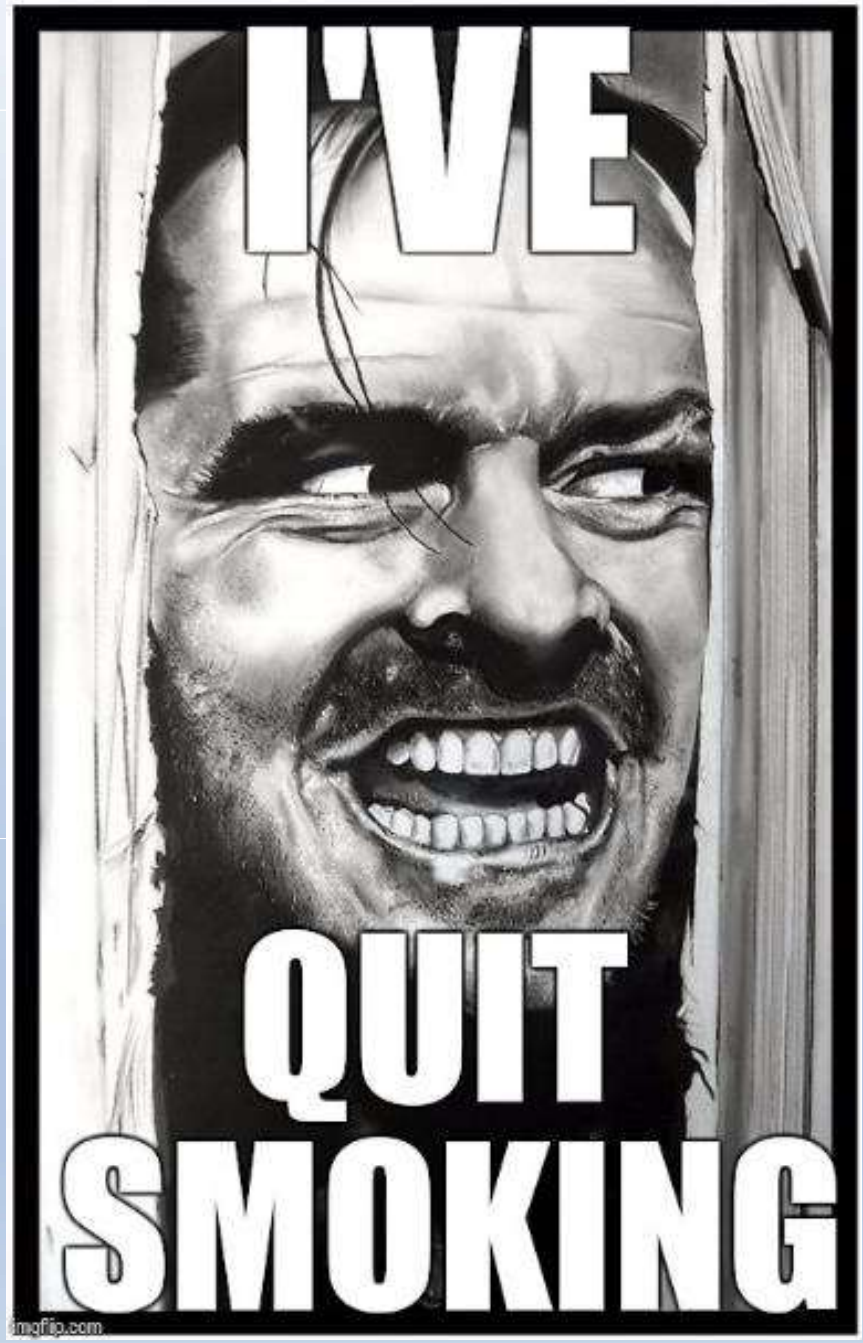
Commonly Used Maintenance Medications in COPD*

Generic Drug Name	Inhaler Type	DELIVERY OPTIONS			Duration of Action
		Nebulizer	Oral	Injection	
$BETA_2$-Agonists					
Short-acting (SABA)					
Fenoterol	MDI	✓	pill, syrup		4-6 hours
Levalbuterol	MDI	✓			6-8 hours
Salbutamol (albuterol)	MDI & DPI	✓	pill, syrup, extended release tablet	✓	4-6 hours 12 hours (ext. release)
Terbutaline	DPI		pill	✓	4-6 hours
Long-acting (LABA)					
Arformoterol		✓			12 hours
Formoterol	DPI	✓			12 hours
Indacaterol	DPI				24 hours
Olodaterol	SMI				24 hours
Salmeterol	MDI & DPI				12 hours
Anticholinergics					
Short-acting (SAMA)					
Ipratropium bromide	MDI	✓			6-8 hours
Oxitropium bromide	MDI				7-9 hours
Long-acting (LAMA)					
Aclidinium bromide	DPI,				MDI 12 hours
Glycopyrronium bromide	DPI		solution	✓	12-24 hours
Tiotropium	DPI, SMI, MDI				24 hours
Umeclidinium	DPI				24 hours
Glycopyrrolate		✓			12 hours
Revefenacin		✓			24 hours
Combination Short-Acting $Beta_2$-Agonist Plus Anticholinergic in One Device (SABA+SAMA)					
Fenoterol/ipratropium	SMI	✓			6-8 hours
Salbutamol/ipratropium	SMI, MDI	✓			6-8 hours
Combination Long-Acting $Beta_2$-Agonist Plus Anticholinergic in One Device (LABA+LAMA)					
Formoterol/aclidinium	DPI				12 hours
Formoterol/glycopyrronium	MDI				12 hours
Indacaterol/glycopyrronium	DPI				12-24 hours
Vilanterol/umeclidinium	DPI				24 hours
Olodaterol/tiotropium	SMI				24 hours
Methylxanthines					
Aminophylline			solution	✓	Variable, up to 24 hours
Theophylline (SR)			pill	✓	Variable, up to 24 hours
Combination of Long-Acting $Beta_2$-Agonist Plus Corticosteroid in One Device (LABA+ICS)					
Formoterol/beclometasone	MDI, DPI				12 hours
Formoterol/budesonide	MDI, DPI				12 hours
Formoterol/mometasone	MDI				12 hours
Salmeterol/fluticasone propionate	MDI, DPI				12 hours
Vilanterol/fluticasone furoate	DPI				24 hours
Triple Combination in One Device (LABA+LAMA+ICS)					
Fluticasone/umeclidinium/vilanterol	DPI				24 hours
Beclometasone/formoterol/glycopyrronium	MDI, DPI				12 hours
Budesonide/formoterol/glycopyrrolate	MDI				12 hours
Phosphodiesterase-4 Inhibitors					
Roflumilast			pill		24 hours
Mucolytic Agents					
Erdosteine			pill		12 hours
Carbocysteine†			pill		
N-acetylcysteine†			pill		

*Not all formulations are available in all countries. In some countries other formulations and dosages may be available. †Dosing regimens are under discussion.
MDI = metered dose inhaler; DPI = dry powder inhaler; SMI = soft mist inhaler. Note that glycopyrrolate & glycopyrronium are the same compound.

COPD Best Practices

Smoking Cessation



Practice Guidelines

Medications for Smoking Cessation: Guidelines from the American Thoracic Society

Am Fam Physician. 2021 Mar 15;103(6):380-381.

Author disclosure: No relevant financial affiliations.

Key Points for Practice

- Varenicline is more effective than nicotine patches and bupropion with similar or fewer adverse events, even with comorbid psychiatric or substance abuse conditions.
- Combining varenicline with nicotine patches appears to be more effective than using varenicline alone based on limited evidence.
- For people who smoke and are not ready to quit, prescribing varenicline increases six-month abstinence with an NNT of 6 compared with waiting for readiness.
- Extending treatment beyond 12 weeks increases abstinence, with an NNT of 19 compared with shorter treatment durations.

From the *AFP* Editors

https://www.lung.org/getmedia/c7657648-a30f-4465-af92-fc762411922e/copd-action-plan.pdf.pdf

American Lung Association.

My COPD Action Plan

Patients and healthcare providers should complete this action plan together.
This plan should be discussed at each visit and updated as needed.

The green, yellow and red zones show symptoms of COPD. The list of symptoms is not complete. You may experience other symptoms. In the "Actions" column, your healthcare provider will recommend actions for you to take. Your healthcare provider may write down other actions in addition to those listed here.

Green Zone: I am doing well today	Actions
• Usual activity and exercise level • Usual amounts of cough and phlegm/mucus • Sleep well at night • Appetite is good	☐ Take daily medicines ☐ Use oxygen as prescribed ☐ Continue regular exercise/diet plan ☐ Avoid tobacco product use and other inhaled irritants ☐ _____

Yellow Zone: I am having a bad day or a COPD flare	Actions
• More breathless than usual • I have less energy for my daily activities • Increased or thicker phlegm/mucus • Using quick relief inhaler/nebulizer more often • More swelling in ankles • More coughing than usual • I feel like I have a "chest cold" • Poor sleep and my symptoms woke me up • My appetite is not good • My medicine is not helping	☐ Continue daily medication ☐ Use quick relief inhaler every _____ hours ☐ Start an oral corticosteroid (specify name, dose, and duration) _____ ☐ Start an antibiotic (specify name, dose, and duration) _____ ☐ Use oxygen as prescribed ☐ Get plenty of rest ☐ Use pursed lip breathing ☐ Avoid secondhand smoke, e-cigarette aerosol, and other inhaled irritants ☐ Call provider immediately if symptoms do not improve ☐ _____

Red Zone: I need urgent medical care	Actions
• Severe shortness of breath even at rest • Not able to do any activity because of breathing • Not able to sleep because of breathing • Fever or shaking chills • Feeling confused or very drowsy • Chest pains • Coughing up blood	☐ Call 911 or seek medical care immediately ☐ While getting help, immediately do the following: ☐ _____

Asthma Action Plan for Home & School

Allergy & Asthma NETWORK

Name: Birthdate:

Asthma Severity: ☐ Intermittent ☐ Mild Persistent ☐ Moderate Persistent ☐ Severe Persistent
☐ He/she has had many or severe asthma attacks/exacerbations

☺ Green Zone

Have the child take these medicines every day, even when the child feels well.

Always use a spacer with inhalers as directed.

Controller Medicine(s): _____

_____

Controller Medicine(s) Given in School: _____

Rescue Medicine: Albuterol/Levalbuterol _____ puffs every four hours as needed

Exercise Medicine: Albuterol/Levalbuterol _____ puffs 15 minutes before activity as needed

😐 Yellow Zone

Begin the sick treatment plan if the child has a cough, wheeze, shortness of breath, or tight chest. Have the child take all of these medicines when sick.

Rescue Medicine: Albuterol/Levalbuterol _____ puffs every 4 hours as needed

Controller Medicine(s):

☐ Continue Green Zone medicines: _____

☐ Add: _____

_____

☐ Change: _____

If the child is in the **yellow** zone more than **24** hours or is getting worse, follow **red** zone and call the doctor right away!

☹ Red Zone

If breathing is hard and fast, ribs sticking out, trouble walking, talking, or sleeping.
Get Help Now

Take rescue medicine(s) now

Rescue Medicine: Albuterol/Levalbuterol _____ puffs every _____

Take: _____

_____

If the child is not better right away, call 911
Please call the doctor any time the child is in the red zone.

Asthma Triggers: (List)

School Staff: Follow the Yellow and Red Zone plans for rescue medicines according to asthma symptoms.
Unless otherwise noted, the only controllers to be administered in school are those listed as "given in school" in the green zone.

☐ Both the asthma provider and the parent feel that the child may carry and self-administer their inhalers
☐ School nurse agrees with student self-administering the inhalers

Asthma Provider Printed Name and Contact Information:	Asthma Provider Signature: Date:

Parent/Guardian: I give written authorization for the medications listed in the action plan to be administered in school by the nurse or other school members as appropriate. I consent to communication between the prescribing health care provider/clinic, the school nurse, the school medical advisor and school-based health clinic providers necessary for asthma management and administration of this medication.

Parent/guardian signature:	School Nurse Reviewed:

Thank you for attending, reach out to me if you have questions!

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