Respiratory Medicine in General Practice

Airway Disease

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- 36-year-old immigrant from Kenya working as a personal trainer.
- Non smoker
- Moved to Dubai 7 years ago
- Married with 3 active primary school-age boys.
- Diagnosed as an asthmatic 3 years ago however he is not on any current regular asthma medication for the past 8 months and has only been prescribed a reliever medication for his symptoms.

- Presents today because he is now suffering from asthmatic symptom affecting his everyday life.
- Cough , sob, and chest tightness for more than a month
- Symptoms aggravated by exercise and change in weather climate

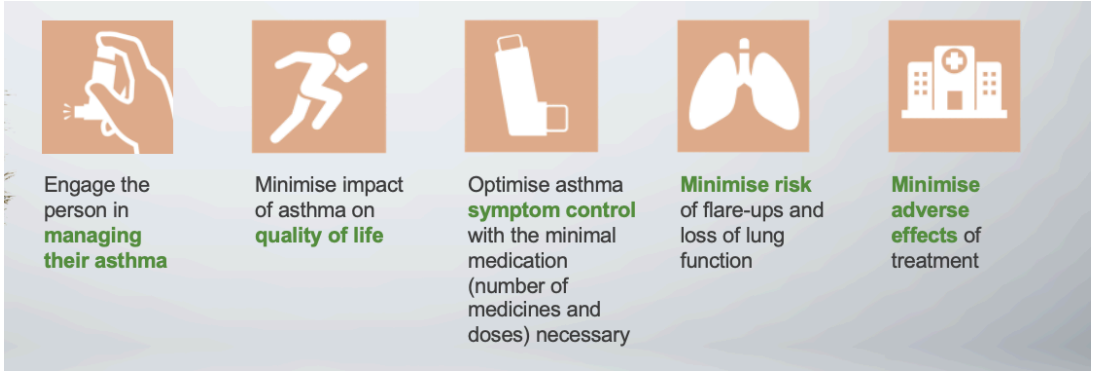
- No drug allergy
- No exposure to pets or birds
- O/E : Vitally stable
- Chest: reduced air entry bil + expiratory wheezes

On further discussion with the patient, he revealed:

- He is suffering from nocturnal symptoms several times a week
- He gets breathless when playing with his kids on the weekends
- He is not able to exercise every day like he used to because of coughing associated with wheezing on most days of the week
- He is using his reliever medication daily

Identifying Management Goals for Adults:

Aim to



Question 1

- What is your initial approach to this patient?

A. Start ICS/LABA inhaler
B. Resume a reliever medication
C. Order Spirometry
D. Perform Skin prick test
E. Order a chest Xray


Spirometry

The results of spirometry can be used to determine the following:

- Determine whether baseline airflow limitation (obstruction) is present (reduced FEV1/FVC ratio)

- Assess the reversibility of the obstructive abnormality by repeating spirometry after administration of a bronchodilator

- Characterize the severity of airflow limitation (based on the FEV1 as a percentage of the normal predicted value)

- For patients with normal airflow (normal FEV1/FVC ratio), identify a restrictive pattern as an alternate explanation for dyspnea (eg, FVC <80 percent predicted)

Initial spirometry is normal ?

Patients with asthma who are asymptomatic at the time of evaluation often have normal lung function. For these patients, the following strategies can be used to confirm the clinical diagnosis:

- Repeat spirometry at subsequent office visits when the patient is symptomatic
- Patient-recorded serial measurements of PEF over time (eg, morning and evening, with symptoms, and after administration of bronchodilator)
- Bronchoprovocation testing, such as methacholine, mannitol, or exercise challenge

CLINICAL FEATURES

- Asthma may develop at any age
- 75% < 7 years
- Many children experience a remission of asthma symptoms around the time of puberty, with potential recurrence years later

Classic Symptoms of Asthma

- Wheeze
- Cough (often worse at night)

- Dry or productive of clear mucoid or pale yellow sputum
- Asthma is a potential cause of unexplained chronic cough

- Shortness of breath or difficulty breathing
- Chest tightness

Certain historical features heighten the probability of asthma:

1) **Episodic symptoms** –

Symptoms come and go
Occur or worsen at night

2) **Characteristic triggers** _

Symptoms triggered by exercise, cold air, and exposure to inhaled allergens (aeroallergens)

3) **Work-related exposures**

_ 10% of new onset Asthma

_ Diagnosis can be confirmed by demonstration of variable airflow obstruction before and after a work shift

_ In some cases the diagnosis is supported by identification of IgE-specific antibodies in the blood to the offending sensitizer

Personal or family history of atopy

- A strong family history of asthma and allergies
- Personal history of atopic diseases (eg, atopic dermatitis, seasonal allergic rhinitis and conjunctivitis)

favors a diagnosis of asthma in a patient with suggestive respiratory symptoms.

Other Tests to Diagnose Asthma

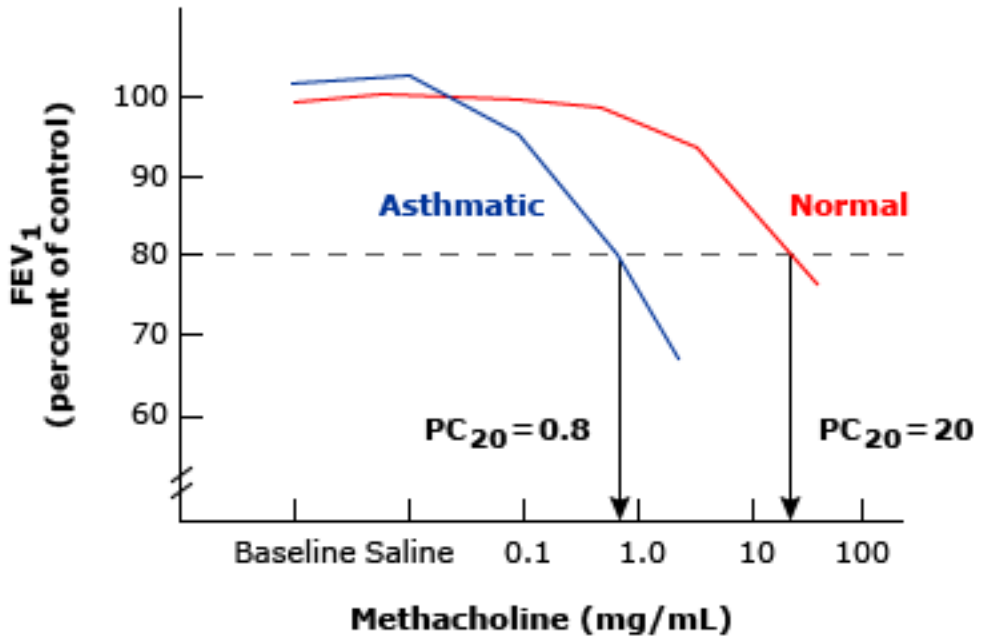
- Bronchoprovocation testing
- Peak expiratory flow
- Exhaled nitric oxide
- Tests for allergy

Bronchoprovocation Testing

- Useful tool for diagnosing asthma in patients with normal baseline airflow.

- Can be used to identify or exclude airway hyperresponsiveness in patients with atypical presentations (eg, normal baseline spirometry, no variability in airflow limitation with serial spirometry or peak flow) or isolated symptoms of asthma, especially cough.

Bronchoprovocation testing



The effect of increasing the inhaled dose of methacholine in a healthy subject (red) and an asthmatic patient (blue). The provocative concentration is the amount of inhaled agonist required to drop the FEV_1 by 20 percent from the baseline (PC_{20} FEV_1) and is much less in the asthmatic than in the normal subject: 0.8 mg/mL versus 20 mg/mL. In general, a PC_{20} ≤8 mg/mL is consistent with asthma; and a PC_{20} >16 mg/mL is considered a negative test. Thus, an increase in airway responsiveness is characterized by a decrease in the PC_{20}.

DIFFERENTIAL DIAGNOSIS

- **Adolescents and young to middle-aged adults:**

Bronchitis, bronchiolitis, bronchiectasis, paradoxical vocal cord motion, pulmonary embolism, GERD, panic disorder, and sarcoidosis, HP.

- **In older-aged patients :**

COPD, left-ventricular heart failure, interstitial lung disease, tumors involving central airways, and recurrent oropharyngeal aspiration.

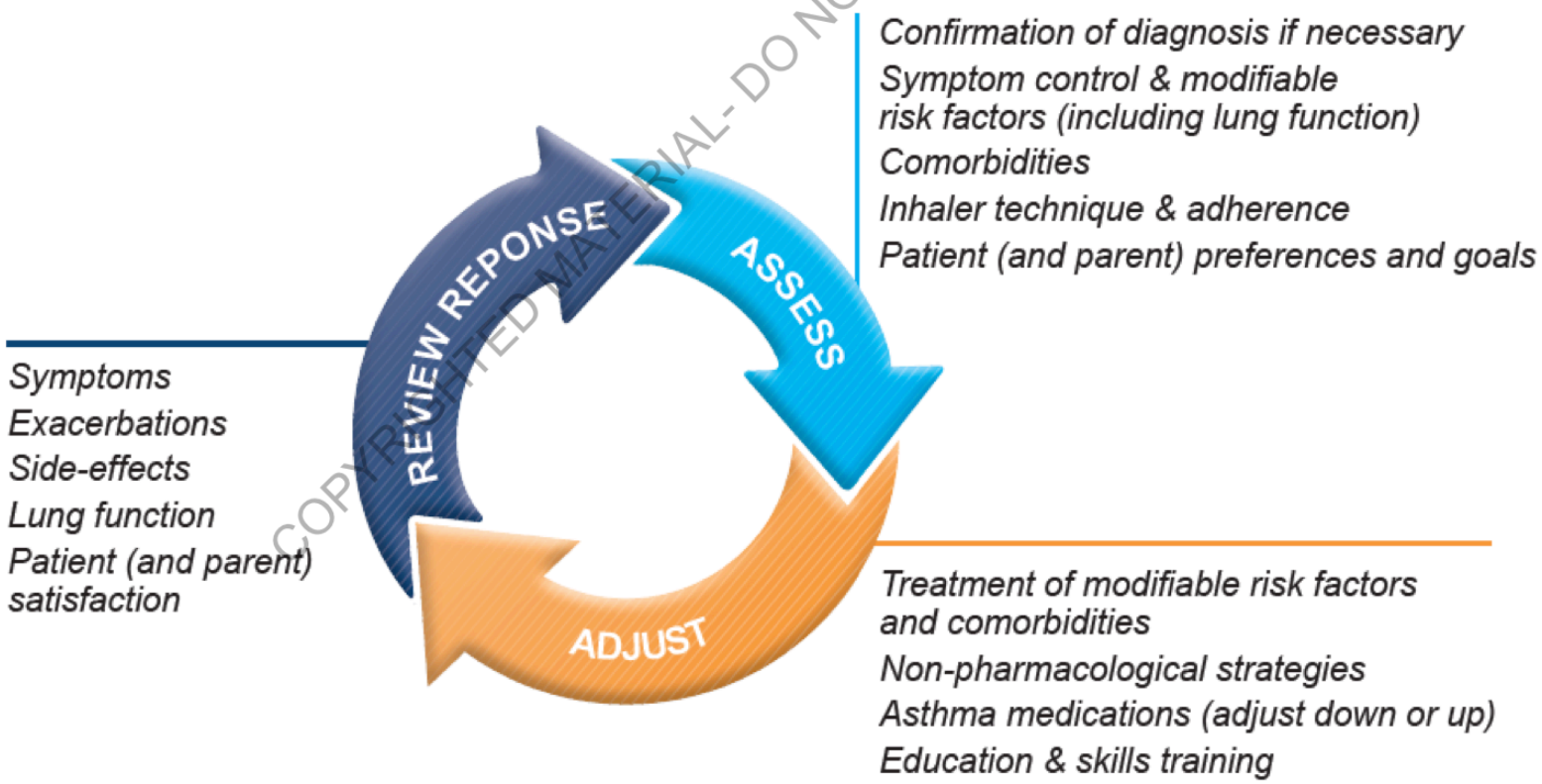
Identifying Management Goals for Adults

Aim to:

- Engage the person in **managing their asthma**
- Minimise impact of asthma on **quality of life**
- Optimise asthma **symptom control** with the minimal medication (number of medicines and doses) necessary
- **Minimise risk** of flare-ups and loss of lung function
- **Minimise adverse effects** of treatment

National Asthma Council Australia. Australian Asthma Handbook, Version 2.0. https://www.asthmahandbook.org.au/management/adults/initial-assessments/managementgoals (accessed 10 March 2019).

The aim of asthma management is to prevent exacerbations and asthma deaths, and to relieve and control symptoms



ginasthma.org

Good control of asthma means reducing the intensity and frequency of asthma symptoms and maintaining normal or near normal activity levels. Specific goals for asthma control include:

- Freedom from frequent or troublesome symptoms of asthma (cough, chest tightness, wheezing, or shortness of breath)
- Few night-time awakenings (≤2 nights per month) due to asthma
- Minimal need (≤2 days per week) for medication for acute relief of asthma symptoms
- Optimized lung function
- Maintenance of normal daily activities, including work or school attendance and participation in athletics and exercise
- Satisfaction with asthma care on the part of patients and families

Specific goals for reducing risk include:

- Prevention of recurrent exacerbations and need for emergency department or hospital care

- Prevention of reduced lung growth in children and loss of lung function in adults (due to poor asthma control)

- Optimization of pharmacotherapy with minimal or no adverse effects

PATIENT EDUCATION

- What is asthma and what are its symptoms?
- What are the asthma triggers for the individual patient?
- Which medications should be used for quick relief of asthma symptoms and which are used for asthma control?
- What is the correct technique for each inhaler that the patient uses
- Are there barriers that prevent the patient from taking medications regularly? If so, what methods would help improve adherence?

Asthma action plan

My Asthma Action Plan

Age ≥5 years

Patient Name: _____

Medical Record #: _____

Clinician's Name: _____ DOB: _____

Clinician's Phone #: _____ Completed by: _____ Date: _____

Long-Term Control Medicines	How Much To Take	How Often	Other Instructions
		_____ times per day EVERY DAY!	
		_____ times per day EVERY DAY!	
		_____ times per day EVERY DAY!	
		_____ times per day EVERY DAY!	

Quick-Relief Medicines	How Much To Take	How Often	Other Instructions
		Take ONLY as needed	NOTE: If this medicine is needed frequently, call clinician to consider increasing long-term control medications.

Special instructions when I feel ● *good*, ● *not good*, and ● *awful*.

GREEN ZONE

I feel *good*.

{My peak flow is in the GREEN zone.}

My Personal Best Peak Flow

PREVENT asthma symptoms everyday:

- ☐ Take my long-term control medicines (above) every day.
- ☐ Before exercise, take _____ puffs of _____
- ☐ Avoid things that make my asthma worse like: _____

YELLOW ZONE

I do *not* feel *good*.

{My peak flow is in the YELLOW zone.}

My symptoms may include one or more of the following:

- Wheeze
- Tight chest
- Cough
- Shortness of breath
- Waking up at night with asthma symptoms
- Decreased ability to do usual activities
- _____

80% Personal Best

CAUTION. I should continue taking my long-term control asthma medicines every day AND:

- ☐ Take _____

If I still do not feel good, or my peak flow is not back in the *Green Zone* within one hour, then I should:

- ☐ Increase _____
- ☐ Add _____
- ☐ Call _____

RED ZONE

I feel *awful*.

{My peak flow is in the RED zone.}

Warning signs may include one or more of the following:

- It is getting harder and harder to breathe
- Unable to sleep or do usual activities because of trouble breathing

50% Personal Best

Unable

Peak Flow Meter

MEDICAL ALERT! Get help!

- ☐ Take _____ until I get help immediately.
- ☐ Take _____
- ☐ Call _____

Danger! Get help immediately! Call 9-1-1 if you have trouble walking or talking due to shortness of breath or lips or fingernails are gray or blue.

Reproduced from: National Heart, Blood, and Lung Institute Expert Panel Report 3 (EPR 3): Guidelines for the Diagnosis and Management of Asthma. NIH Publication no. 08-4051, 2007.

Assessment of asthma symptom control and risk of exacerbations

A. Level of asthma symptom control

In the past 4 weeks, has the patient had:			Well controlled	Partly controlled	Uncontrolled
Daytime symptoms more than twice/week?	☐ Yes	☐ No	None of these	1 to 2 of these	3 to 4 of these
Any night waking due to asthma?	☐ Yes	☐ No			
Reliever needed more than twice/week?	☐ Yes	☐ No			
Any activity limitation due to asthma?	☐ Yes	☐ No			

Assessment of asthma symptom control and risk of exacerbations

A. Level of asthma symptom control

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Reliever needed more than twice/week?	☐ Yes	☐ No			
Any activity limitation due to asthma?	☐ Yes	☐ No			

B. Risk factors for poor asthma outcomes

Assess risk factors at diagnosis and periodically, at least every 1 to 2 years, particularly for patients experiencing exacerbations.

Measure FEV_1 at start of treatment, after 3 to 6 months of controller treatment to record personal best lung function, then periodically for ongoing risk assessment.

Having uncontrolled asthma symptoms is an important risk factor for exacerbations.

Additional potentially modifiable risk factors for exacerbations, even in patients with few asthma symptoms, include:

- **Medications:** ICS not prescribed; poor adherence; incorrect inhaler technique; high SABA use (with increased mortality if >1×200-dose canister/month)
- **Comorbidities:** obesity; chronic rhinosinusitis; gastroesophageal reflux disease; confirmed food allergy; anxiety; depression; pregnancy
- **Exposures:** smoking; allergen exposure if sensitized; air pollution
- **Setting:** major socioeconomic problems
- **Lung function:** low FEV_1, especially if <60% predicted; higher reversibility
- **Other tests:** sputum/blood eosinophilia; elevated FE_{NO} in allergic adults on ICS

Other major independent risk factors for flare-ups (exacerbations) include:

- Ever being intubated or in intensive care for asthma
- Having 1 or more severe exacerbations in the last 12 months

Having any of these risk factors increases the patient's risk of exacerbations **even if they have few asthma symptoms.**

Risk factors for developing fixed airflow limitation include preterm birth, low birth weight, and greater infant weight gain; lack of ICS treatment; exposure to tobacco smoke, noxious chemicals, or occupational exposures; low FEV_1; chronic mucus hypersecretion; and sputum or blood eosinophilia

Risk factors for medication side-effects include:

- **Systemic:** frequent OCS; long-term, high dose and/or potent ICS; also taking cytochrome P450 inhibitors
- **Local:** high-dose or potent ICS; poor inhaler technique

Asthma control has two domains: symptom control and risk of future exacerbations. Assess the symptom control domain by patient's recall of previous 4 weeks; assess risk of future exacerbations by the presence of risk factors and by spirometry/or peak flow measures.

FEV_1: forced expiratory volume in one second; ICS: inhaled corticosteroids; SABA: short-acting beta-2 agonist; FE_{NO}: fraction of expired nitric oxide; OCS: oral corticosteroid.

Question ?

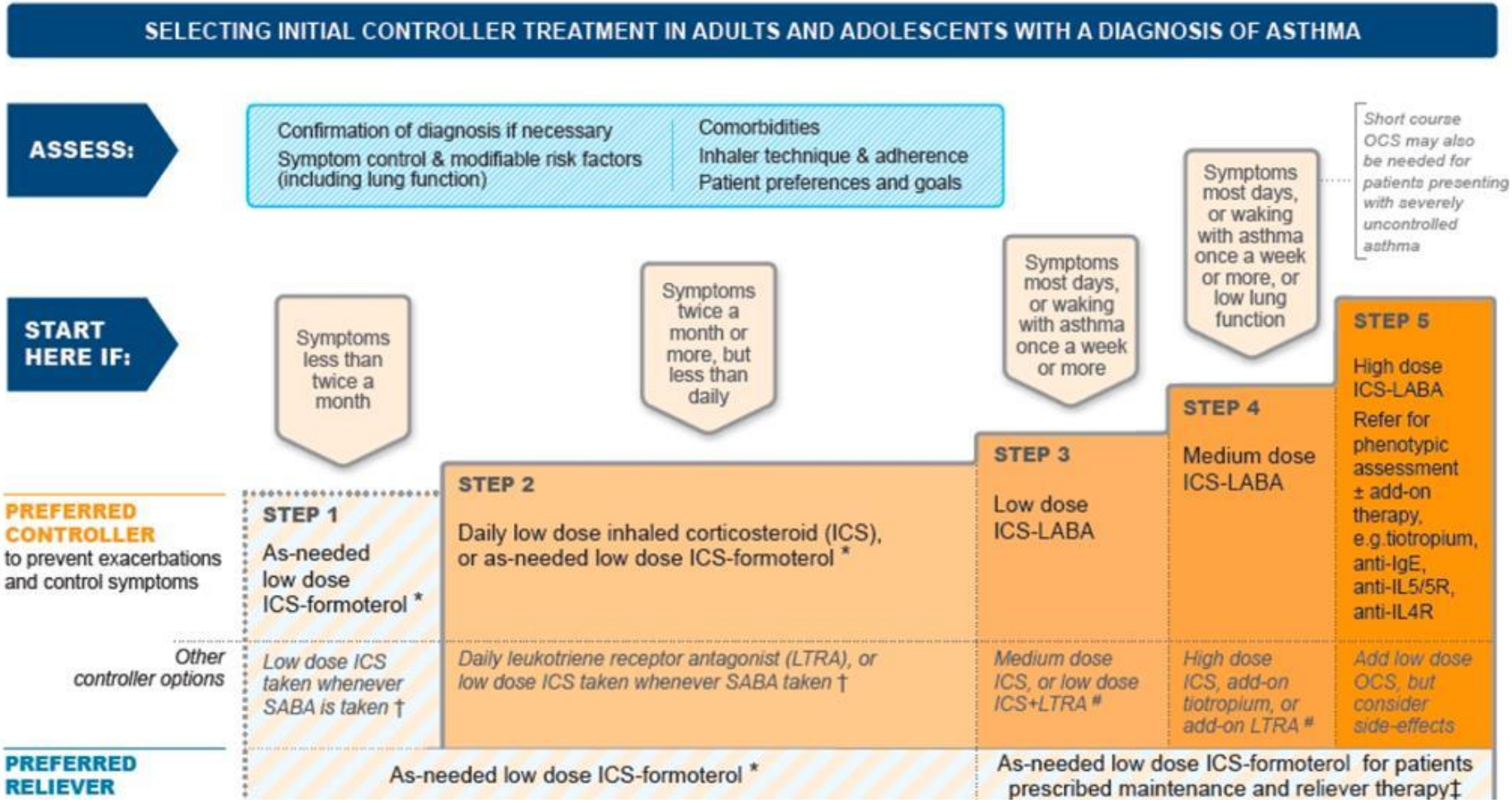
- Based on Adam's current symptoms, what treatment would you recommend to start for him?

A. ICS/LABA PRN

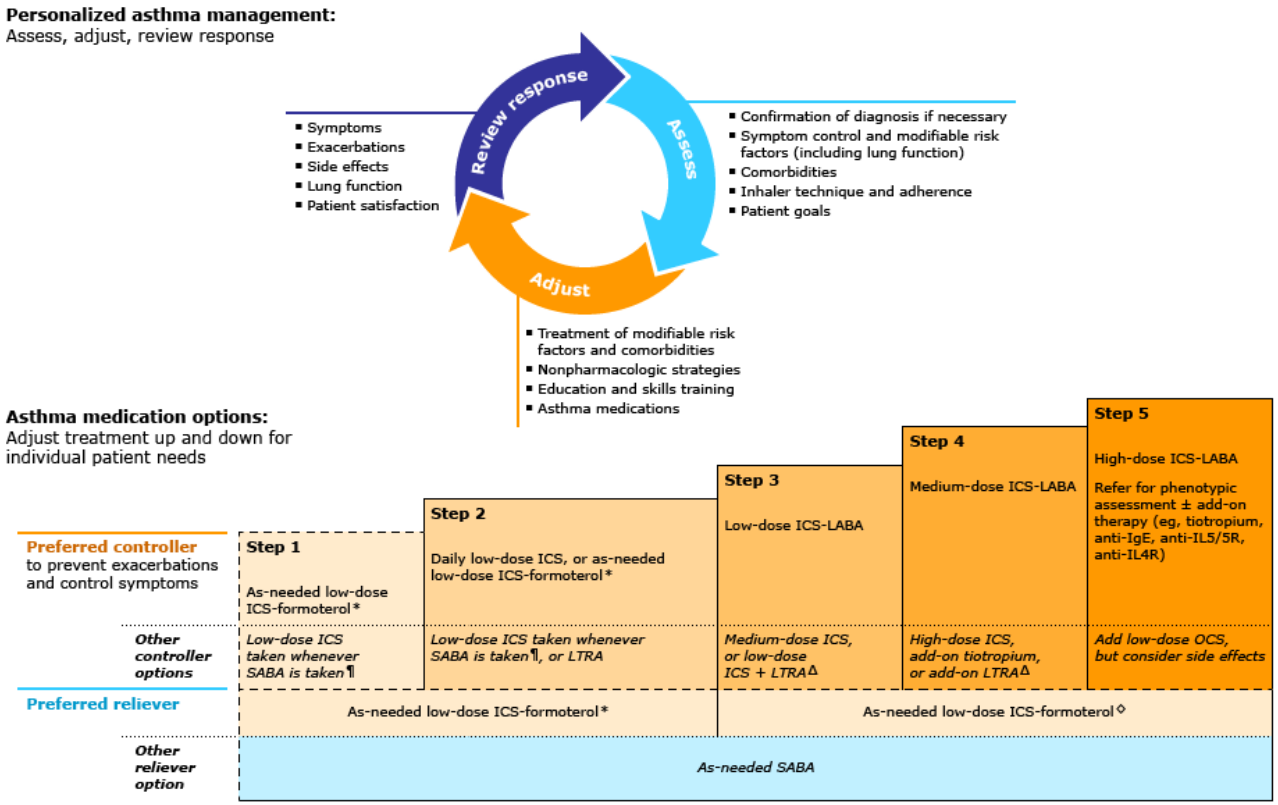
B. Low-dose ICS daily, with SABA as needed

C. Medium-dose ICS-LABA daily and SABA as needed

D. Start Tiotropium (LAMA) and LTRA


SELECTING INITIAL CONTROLLER TREATMENT IN ADULTS AND ADOLESCENTS WITH A DIAGNOSIS OF ASTHMA
ASSESS:
Confirmation of diagnosis if necessary
Symptom control & modifiable risk factors (including lung function)
Comorbidities
Inhaler technique & adherence
Patient preferences and goals
Short course OCS may also be needed for patients presenting with severely uncontrolled asthma
START HERE IF:
Symptoms less than twice a month
Symptoms twice a month or more, but less than daily
Symptoms most days, or waking with asthma once a week or more
Symptoms most days, or waking with asthma once a week or more, or low lung function
PREFERRED CONTROLLER
to prevent exacerbations and control symptoms
STEP 1
As-needed low dose ICS-formoterol *
STEP 2
Daily low dose inhaled corticosteroid (ICS), or as-needed low dose ICS-formoterol *
STEP 3
Low dose ICS-LABA
STEP 4
Medium dose ICS-LABA
STEP 5
High dose ICS-LABA
Refer for phenotypic assessment ± add-on therapy, e.g tiotropium, anti-IgE, anti-IL5/5R, anti-IL4R
Other controller options
Low dose ICS taken whenever SABA is taken †
Daily leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken †
Medium dose ICS, or low dose ICS+LTRA #
High dose ICS, add-on tiotropium, or add-on LTRA #
Add low dose OCS, but consider side-effects
PREFERRED RELIEVER
As-needed low dose ICS-formoterol *
As-needed low dose ICS-formoterol for patients prescribed maintenance and reliever therapy‡

GINA strategy for asthma treatment in adults and adolescents



The stepwise approach is meant to assist, not replace, the clinical decision-making required to meet individual patient needs. If alternative treatment is used and response is inadequate, change to the preferred treatment before stepping up. Refer to UpToDate content on asthma management for more information about the decision-making that supports the various treatment options.

Alphabetical order is used when more than one treatment option is listed within either preferred or alternative therapy.

ICS: inhaled corticosteroid (glucocorticoid); SABA: inhaled short-acting beta$_2$-agonist; LTRA: leukotriene receptor antagonist; LABA: long-acting inhaled beta$_2$-agonist; IgE: immunoglobulin E; IL-5: interleukin 5; IL-5R: interleukin 5 receptor; IL-4R: interleukin 4 receptor; OCS: oral corticosteroid (glucocorticoid); BDP: beclomethasone dipropionate; HDM: house dust mite; SLIT: sublingual immunotherapy; FEV$_1$: forced expiratory volume in one second.

* Off-label; data only with budesonide-formoterol (bud-form).

¶ Off-label; separate or combination ICS and SABA inhalers.

Δ Consider adding HDM SLIT for sensitized patients with allergic rhinitis and FEV$_1$ >70% predicted.

◇ Low-dose ICS-formoterol is the reliever for patients prescribed budesonide-formoterol or beclomethasone-formoterol maintenance and reliever therapy.

Reproduced with permission from: Global Initiative for Asthma. Asthma Management and Prevention (for Adults and Children Older than 5 Years): A Pocket Guide for Health Professionals, Updated 2019. Available at: https://ginasthma.org/pocket-guide-for-asthma-management-and-prevention/ (Accessed on July 19, 2019).

UpToDate®

Estimated comparative daily doses for inhaled glucocorticoids in adolescents and adults

Drug	Low dose	Medium dose	High dose
Beclomethasone HFA (Qvar and Qvar RediHaler products available in United States)"	80 to 160 mcg	>160 to 320 mcg	>320 mcg
40 mcg per puff	2 to 4 puffs	¶	¶
80 mcg per puff	1 to 2 puffs	3 to 4 puffs	>4 puffs
Beclomethasone HFAΔ (Qvar product available in Canada, Europe, and elsewhere)	100 to 200 mcg	>200 to 400 mcg	>400 mcg
50 mcg per puff	2 to 4 puffs	¶	¶
100 mcg per puff	1 to 2 puffs	3 to 4 puffs	>4 puffs
Budesonide DPI (Pulmicort Flexhaler product available in United States)"	180 to 360 mcg	>360 to 720 mcg	>720 mcg
90 mcg per inhalation	2 to 4 inhalations	¶	¶
180 mcg per inhalation	1 to 2 inhalations	3 to 4 inhalations	>4 inhalations
Budesonide DPIΔ (Pulmicort Turbuhaler product available in Canada, Europe, and elsewhere)	200 to 400 mcg	>400 to 800 mcg	>800 mcg
100 mcg per inhalation	2 to 4 inhalations	¶	¶
200 mcg per inhalation	1 to 2 inhalations	3 to 4 inhalations	¶
400 mcg per inhalation	1 inhalation	2 inhalations	>2 inhalations
Ciclesonide HFA (Alvesco product available in United States, Europe, and elsewhere)"	80 to 160 mcg	>160 to 320 mcg	>320 mcg
80 mcg per puff	1 to 2 puffs	3 to 4 puffs	¶
160 mcg per puff	1 puff	2 puffs	>2 puffs
Ciclesonide HFAΔ (Alvesco product available in Canada)	100 to 200 mcg	>200 to 400 mcg	>400 mcg
100 mcg per puff	1 to 2 puffs	3 to 4 puffs	¶
200 mcg per puff	1 puff	2 puffs	>2 puffs
Flunisolide MDI (Aerospan product available in United States)"	320 mcg	>320 to 640 mcg	Insufficient data
80 mcg per puff	4 puffs	5 to 8 puffs	Insufficient data
Fluticasone propionate HFA (Flovent HFA product available in United States)"	88 to 220 mcg	>220 to 440 mcg	>440 mcg
44 mcg per puff	2 to 5 puffs	¶	¶
110 mcg per puff	1 to 2 puffs	3 to 4 puffs	¶
220 mcg per puff	◇	2 puffs	>2 puffs
Fluticasone propionate HFAΔ (Flovent HFA product available in Canada, Europe, and elsewhere)	100 to 250 mcg	>250 to 500 mcg	>500 mcg
50 mcg per puff	2 to 5 puffs	¶	¶
125 mcg per puff	1 to 2 puffs	3 to 4 puffs	¶
250 mcg per puff	◇	2 puffs	>2 puffs
Fluticasone propionate DPI (Flovent Diskus product available in United States and Canada)"	100 to 250 mcg	>250 to 500 mcg	>500 mcg
50 mcg per inhalation	2 to 5 inhalations	¶	¶
100 mcg per inhalation	1 to 2 inhalations	3 to 5 inhalations	¶
250 mcg per inhalation	1 inhalation	2 inhalations	>2 inhalations
500 mcg per inhalation (strength not available in United States)	◇	1 inhalation	>1 inhalation
Fluticasone propionate DPI (Armonair Respiclick product available in United States)"	100 to 250 mcg	>250 to 500 mcg	>500 mcg
55 mcg per inhalation	2 to 4 inhalations	¶	¶
113 mcg per inhalation	1 to 2 inhalations	3 to 4 inhalations	>4 inhalations
232 mcg per inhalation	1 inhalation	2 inhalation	>2 inhalations
Fluticasone furoate DPI (Arnuity Ellipta product available in United States)" **NOTE:** Inhaled fluticasone furoate has a greater anti-inflammatory potency per microgram than fluticasone propionate inhalers. Thus, fluticasone furoate is administered at a lower daily dose and used only once daily.	50 mcg (by use of pediatric DPI, which is off-label in adolescents and adults)	100 mcg	200 mcg
50 mcg per inhalation	1 inhalation	¶	¶
100 mcg per inhalation	◇	1 inhalation	2 inhalations
200 mcg per actuation	◇	◇	1 inhalation
Mometasone DPI§ (Asmanex Twisthaler product available in United States)"	110 to 220 mcg	>220 to 440 mcg	>440 mcg
110 mcg per inhalation	1 to 2 inhalations	¶	¶
220 mcg per inhalation	1 inhalation	2 inhalations	>2 inhalations
Mometasone HFA§ (Asmanex HFA product available in United States)"	100 to 200 mcg	>200 to 400 mcg	>400 mcg
100 mcg per actuation	1 to 2 inhalations	¶	¶
200 mcg per actuation	1 inhalation	2 inhalations	>2 inhalations
Mometasone DPIΔ§ (Asmanex Twisthaler product available in Canada, Europe, and elsewhere)	200 mcg	>200 to 400 mcg	>400 mcg
200 mcg per inhalation	1 inhalation	2 inhalations	>2 inhalations
400 mcg per inhalation	◇	1 inhalation	>1 inhalation

- **The most important determinant of appropriate dosing is the clinician's judgment of the patient's response to therapy.** The clinician must monitor the patient's response on several clinical parameters and adjust the dose accordingly. The stepwise approach to therapy emphasizes that once control of asthma is achieved, the dose of medication should be carefully titrated to the minimum dose required to maintain control, thus reducing the potential for adverse effects.
- Depending on the specific product, total daily doses are administered once or twice daily.
- Some doses are outside the approved product information recommendations.

DPI: dry powder inhaler; HFA: hydrofluoroalkane propellant metered dose inhaler.
" Doses shown and strengths (ie, mcg per puff or inhalation) are based upon product descriptions approved in the United States which may differ from how strengths are described for products available in other countries. Consult local product information before use.
¶ Select alternate preparation with higher mcg/puff to improve convenience.
Δ Products shaded in light blue color are not available in the United States but are available widely elsewhere.
◇ Select preparation with fewer mcg/puff.
§ Approved for once-daily dosing in mild asthma in some countries.

National Heart, Blood, and Lung Institute Expert Panel Report 3 (EPR 3): Guidelines for the Diagnosis and Management of Asthma; 2007. NIH Publication 08-4051 available at http://www.nhlbi.nih.gov/health-pro/guidelines/current/asthma-guidelines/full-report; updated with additional data from Global Initiative for Asthma (GINA); Global Strategy for Asthma Management and Prevention; 2017. Available at www.ginasthma.org

WHEN TO REFER

Difficulty confirming a diagnosis of asthma

History of a life-threatening asthma exacerbation (eg, intensive care unit admission, mechanical ventilation for asthma)

Hospitalization for asthma, more than two courses of oral glucocorticoids in a year, or inability to discontinue oral glucocorticoids

Need for step 5 care or higher

Poor asthma control after three to six months of active therapy and appropriate monitoring

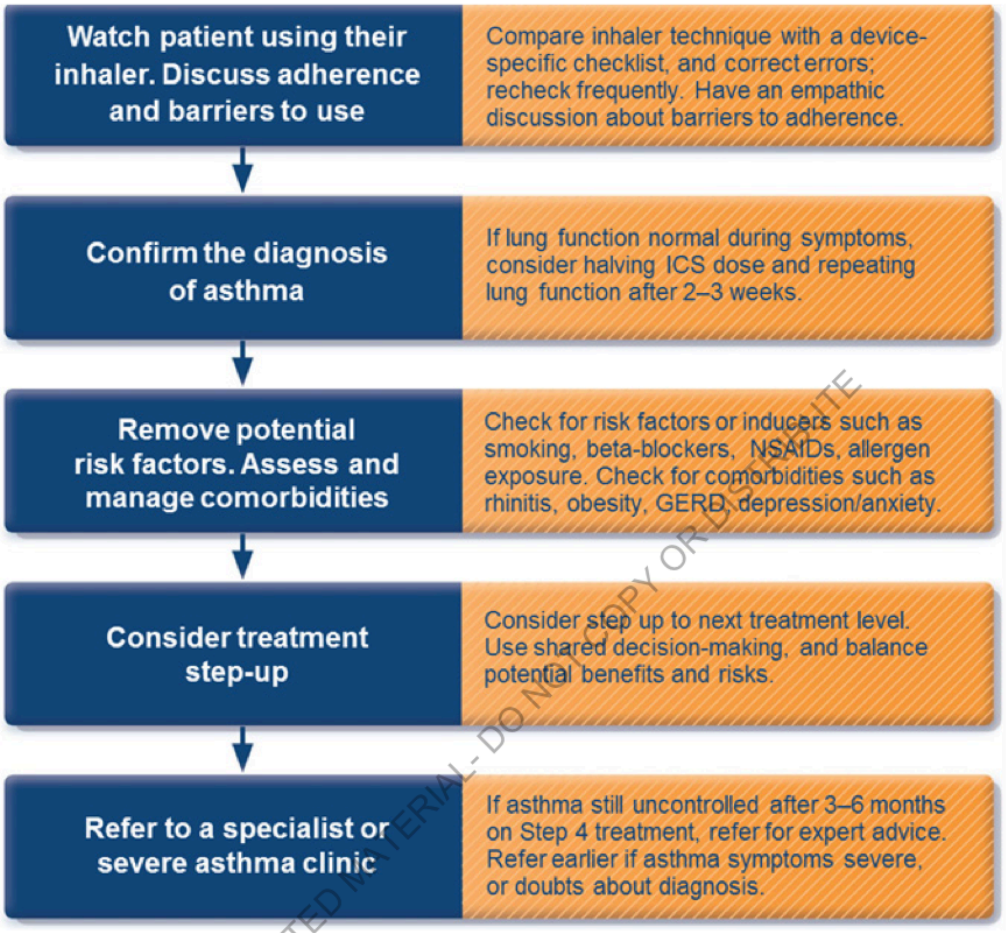
●

- Anaphylaxis or confirmed food allergy in a patient with asthma
- Presence of complicating comorbidity (eg, aspirin-exacerbated respiratory disease (AERD), nasal polyposis, chronic rhinosinusitis, allergic bronchopulmonary aspergillosis (ABPA), chronic obstructive pulmonary disease (COPD), inducible laryngeal obstruction [also called vocal cord dysfunction])
- Need for additional diagnostic tests (eg, allergy skin testing, bronchoscopy complete pulmonary function tests)
- Patient may be a candidate for allergen immunotherapy
- Patient is a potential candidate for therapy with biologics (benralizumab, dupilumab, mepolizumab, omalizumab, reslizumab)

HOW TO INVESTIGATE UNCONTROLLED ASTHMA

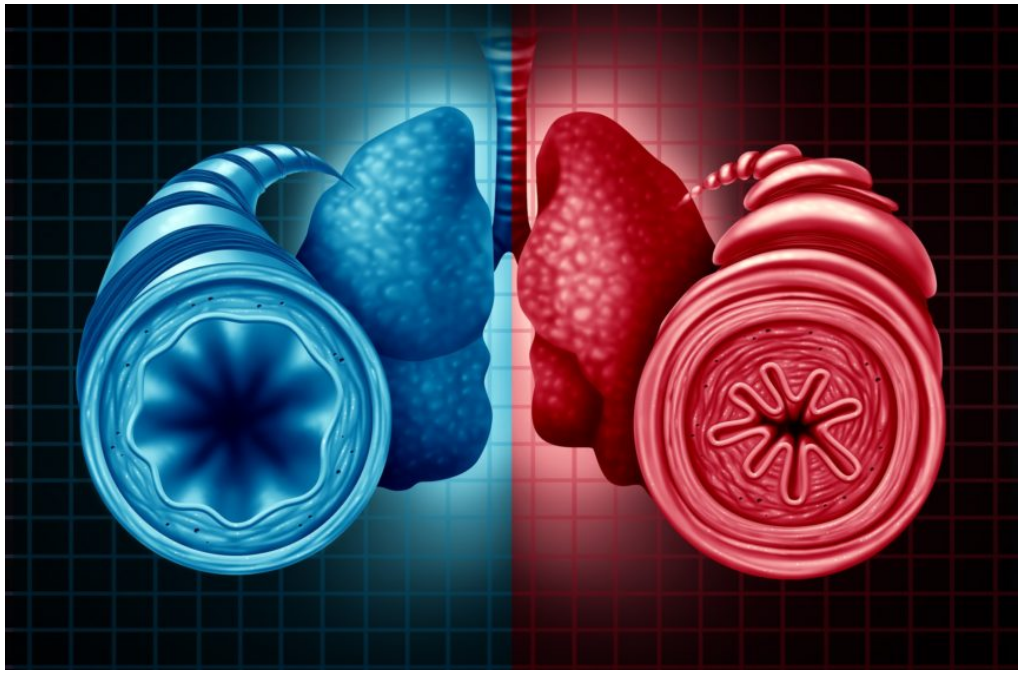
Most patients can achieve good asthma control with regular controller treatment, but some patients do not, and further investigation is needed.

Box 5. How to investigate uncontrolled asthma in primary care

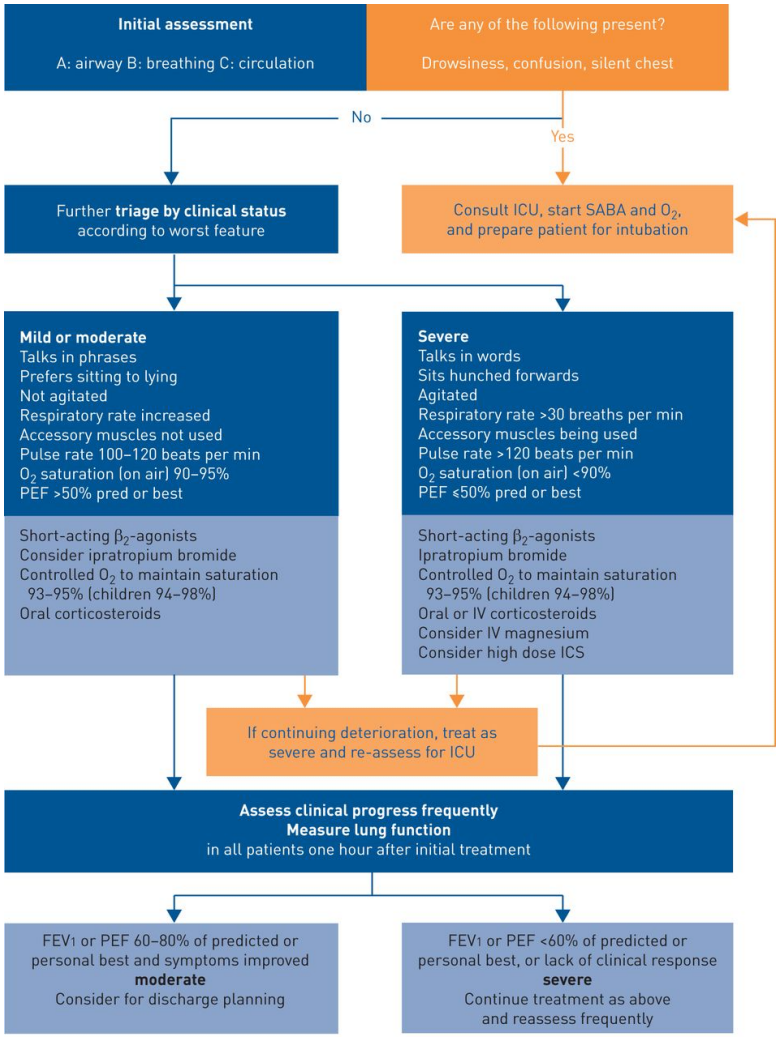


This flowchart shows the most common problems first, but the steps can be carried out in a different order, depending on resources and clinical context.

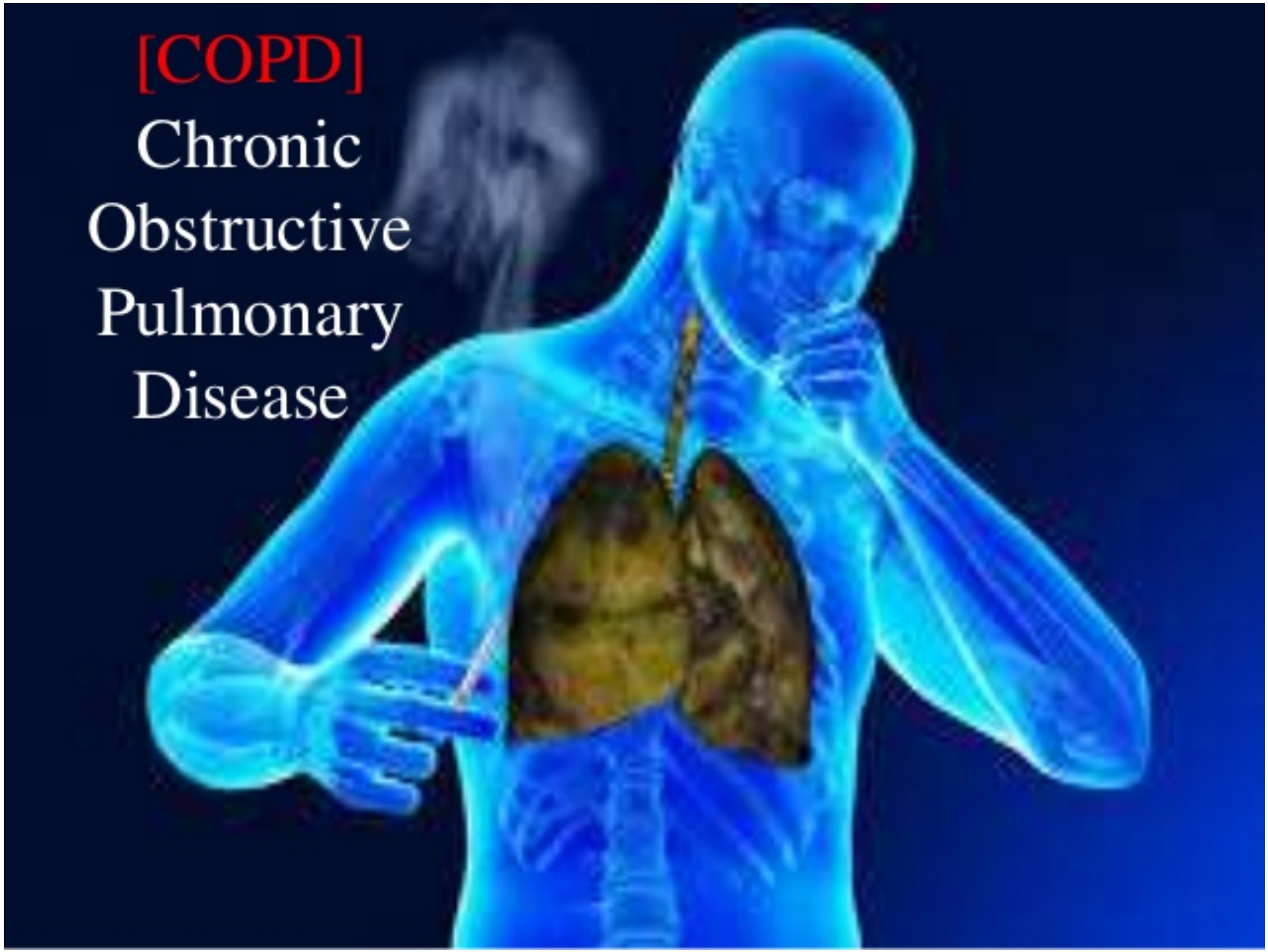
Acute Asthma exacterbation Management



Assessment of exacerbation severity based physical signs and objective measurements.



Arnaud Bourdin et al. Eur Respir J 2019;54:1900900


[COPD]
Chronic
Obstructive
Pulmonary
Disease

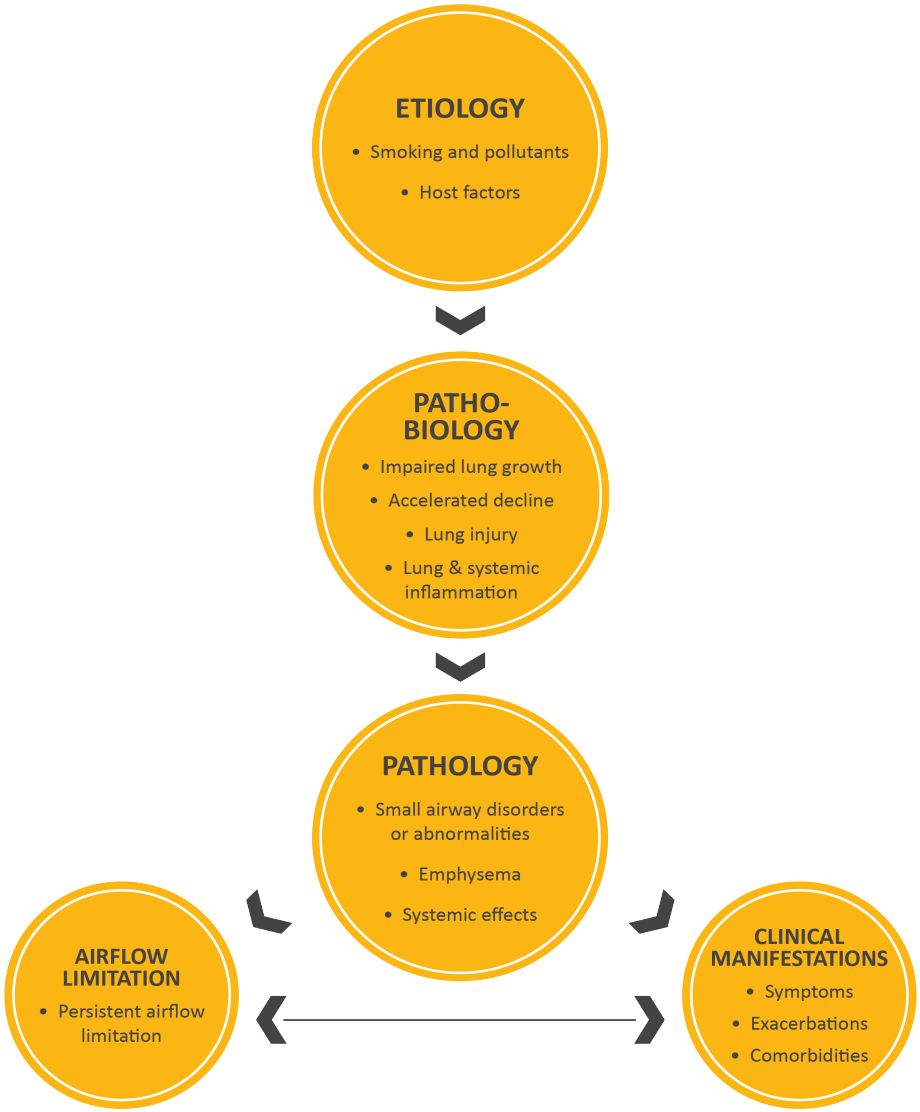
- 74 year old man came to you complaining of shortness of breath that was associated with productive cough (white sputum). He gets SOB when climbing stairs in a hurry
- SR : negative

- Past Medical/Surgical History
  - Heart failure following myocardial infarction at age 68 years
  - COPD since 10 years, last Spirometry with FEV1 35% predicted that does not change significantly after inhaled bronchodilator, had one COPD exacerbation that required admission.
  - Hypertension

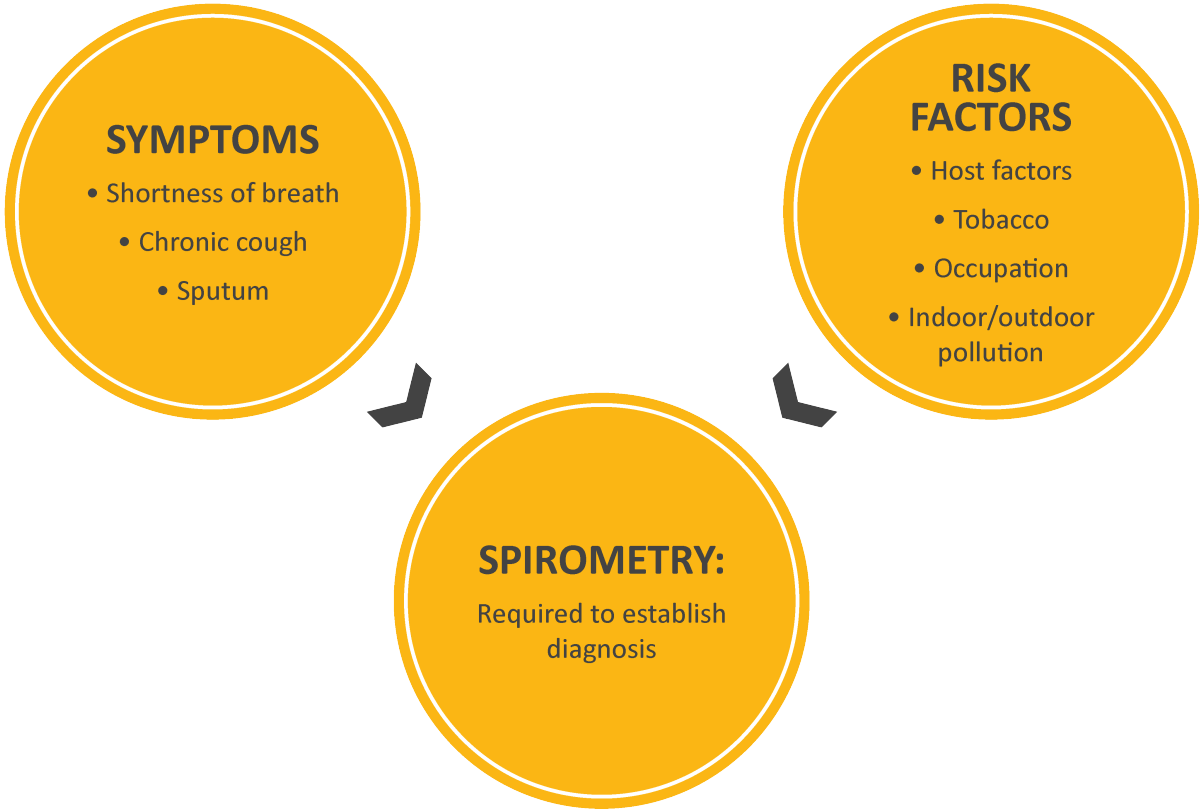
- Social History
  - –Married, 3 children
  - –30 pack year smoking history (quit after MI)
  - –Worked as a farmer
  - –No alcohol or illicit drug use

- No known allergies

ETIOLOGY, PATHOBIOLOGY AND PATHOLOGY OF COPD LEADING TO AIRFLOW LIMITATION AND CLINICAL MANIFESTATIONS



PATHWAYS TO THE DIAGNOSIS OF COPD



KEY INDICATORS FOR CONSIDERING A DIAGNOSIS OF COPD

Consider COPD, and perform spirometry, if any of these indicators are present in an individual over age 40. These indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of a diagnosis of COPD. Spirometry is required to establish a diagnosis of COPD.

Dyspnea that is:	Progressive over time. Characteristically worse with exercise. Persistent.
Chronic Cough:	May be intermittent and may be unproductive. Recurrent wheeze.
Chronic Sputum Production:	Any pattern of chronic sputum production may indicate COPD.
Recurrent Lower Respiratory Tract Infections	
History of Risk Factors:	Host factors (such as genetic factors, congenital/developmental abnormalities etc.). Tobacco smoke (including popular local preparations). Smoke from home cooking and heating fuels. Occupational dusts, vapors, fumes, gases and other chemicals.
Family History of COPD and/or Childhood Factors:	For example low birthweight, childhood respiratory infections etc.

Question?

What Stage of COPD using the GOLD criteria?

A. GOLD stage 1
B. GOLD stage 2
C. GOLD stage 3
D. GOLD stage 4

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

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.	☐

[a] Fletcher CM. BMJ 1960; 2: 1662.

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	

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

TOTAL SCORE: ( )

Question?

- According to the above history, which class risk of assessment of COPD does Mr Js fall in?

A. A

B. B

C. C

D. D

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

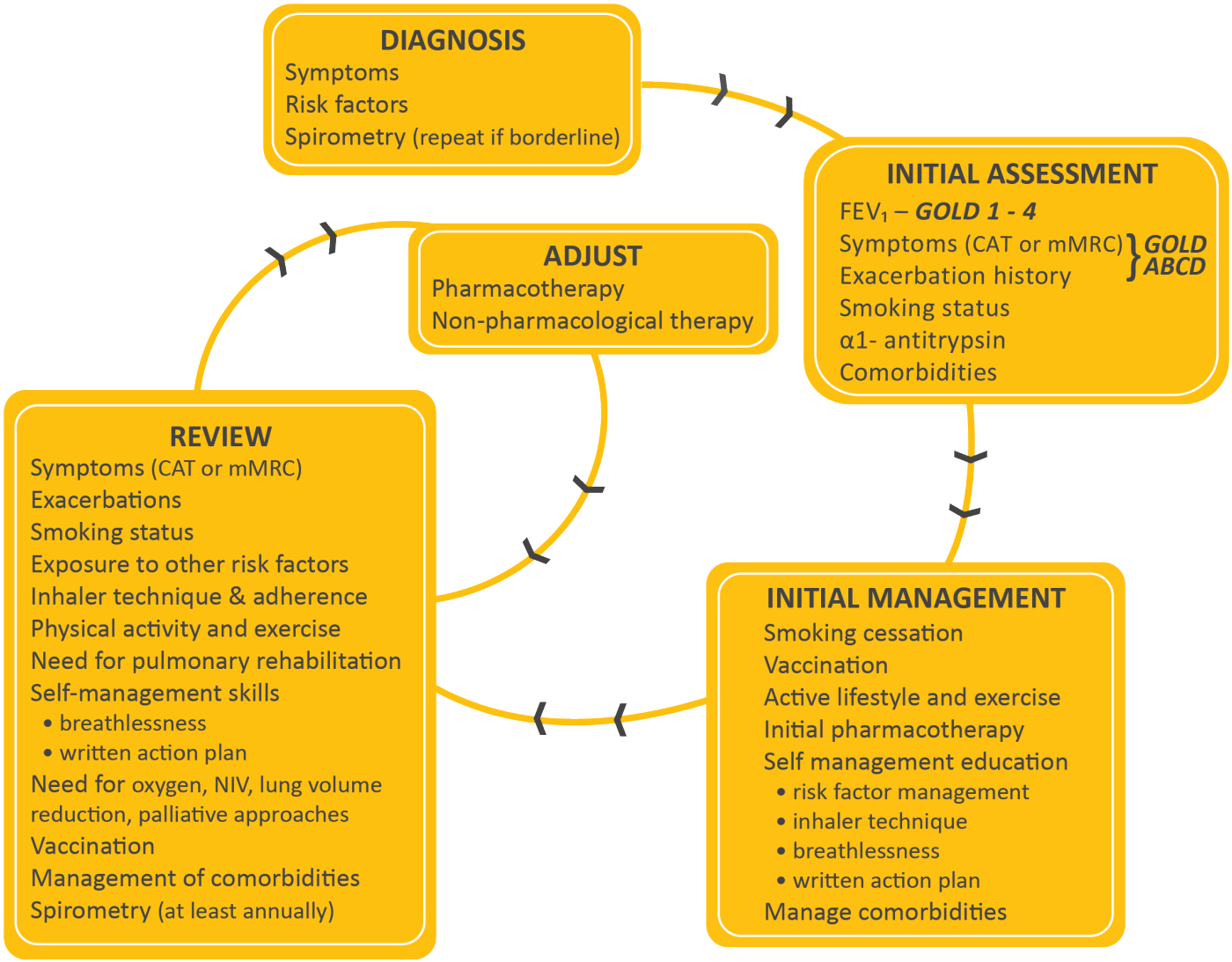
mMRC 0-1 CAT < 10 | mMRC ≥ 2 CAT ≥ 10

Symptoms

ROLE OF SPIROMETRY

- **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.

MANAGEMENT OF COPD



GOALS FOR TREATMENT OF STABLE COPD

- Relieve Symptoms
- Improve Exercise Tolerance
- Improve Health Status

→ REDUCE SYMPTOMS

and

- Prevent Disease Progression
- Prevent and Treat Exacerbations
- Reduce Mortality

→ REDUCE RISK

TREATING TOBACCO USE AND DEPENDENCE: A CLINICAL PRACTICE GUIDELINE — MAJOR FINDINGS & RECOMMENDATIONS

- Tobacco dependence is a chronic condition that warrants repeated treatment until long-term or permanent abstinence is achieved.
- Effective treatments for tobacco dependence exist and all tobacco users should be offered these treatments.
- Clinicians and health care delivery systems must operationalize the consistent identification, documentation, and treatment of every tobacco user at every visit.
- Brief smoking cessation counseling is effective and every tobacco user should be offered such advice at every contact with health care providers.
- There is a strong dose-response relation between the intensity of tobacco dependence counseling and its effectiveness.
- Three types of counseling have been found to be especially effective: practical counseling, social support of family and friends as part of treatment, and social support arranged outside of treatment.
- First-line pharmacotherapies for tobacco dependence — varenicline, bupropion sustained release, nicotine gum, nicotine inhaler, nicotine nasal spray, and nicotine patch—are effective and at least one of these medications should be prescribed in the absence of contraindications.
- Financial incentive programs for smoking cessation may facilitate smoking cessation.
- Tobacco dependence treatments are cost effective interventions.

KEY POINTS FOR INHALATION OF DRUGS

- The choice of inhaler device has to be individually tailored and will depend on access, cost, prescriber, and most importantly, patient's ability and preference.
- It is essential to provide instructions and to demonstrate the proper inhalation technique when prescribing a device, to ensure that inhaler technique is adequate and re-check at each visit that patients continue to use their inhaler correctly.
- Inhaler technique (and adherence to therapy) should be assessed before concluding that the current therapy requires modification.

KEY POINTS FOR THE USE OF BRONCHODILATORS

- LABAs and LAMAs are preferred over short-acting agents except for patients with only occasional dyspnea **(Evidence A)**, and for immediate relief of symptoms in patients already on long-acting bronchodilators for maintenance therapy.

- Patients may be started on single long-acting bronchodilator therapy or dual long-acting bronchodilator therapy. In patients with persistent dyspnea on one bronchodilator treatment should be escalated to two **(Evidence A)**.

- Inhaled bronchodilators are recommended over oral bronchodilators **(Evidence A)**.

- Theophylline is not recommended unless other long-term treatment bronchodilators are unavailable or unaffordable **(Evidence B)**.

KEY POINTS FOR THE USE OF ANTI-INFLAMMATORY AGENTS

- Long-term monotherapy with ICS is not recommended **(Evidence A)**.
- Long-term treatment with ICS may be considered in association with LABAs for patients with a history of exacerbations despite appropriate treatment with long-acting bronchodilators **(Evidence A)**.
- Long-term therapy with oral corticosteroids is not recommended **(Evidence A)**.
- In patients with severe to very severe airflow limitation, chronic bronchitis and exacerbations the addition of a PDE4 inhibitor to a treatment with long acting bronchodilators with/without ICS can be considered **(Evidence B)**.
- Preferentially, but not only in former smokers with exacerbations despite appropriate therapy, macrolides, in particular azithromycin, can be considered **(Evidence B)**.
- Statin therapy is not recommended for prevention of exacerbations **(Evidence A)**.
- Antioxidant mucolytics are recommended only in selected patients **(Evidence A)**.

KEY POINTS FOR THE USE OF OTHER PHARMACOLOGICAL TREATMENTS

- Patients with severe hereditary alpha-1 antitrypsin deficiency and established emphysema may be candidates for alpha-1 antitrypsin augmentation therapy **(Evidence B)**.
- Antitussives cannot be recommended **(Evidence C)**.
- Drugs approved for primary pulmonary hypertension are not recommended for patients with a pulmonary hypertension secondary to COPD **(Evidence B)**.
- Low-dose long acting oral and parenteral opioids may be considered for treating dyspnea in COPD patients with severe disease **(Evidence B)**.

Question?

- What class/classes of inhalers or medication will you start the patient ?

A. Salbutamol 2 puffs TDS and SOS

B. LAMA

C. ICS/LABA and LAMA

D. ICS/LABA

INITIAL PHARMACOLOGICAL TREATMENT

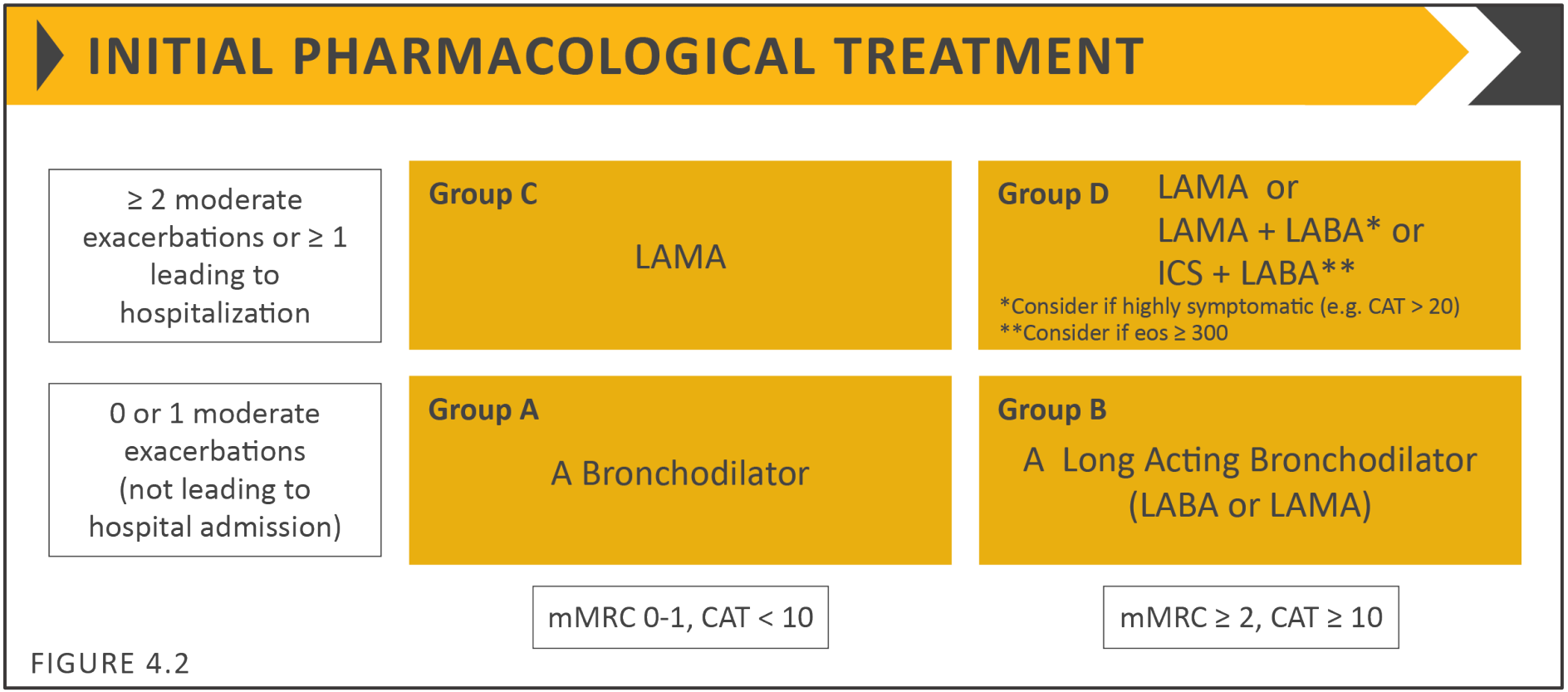


FIGURE 4.2

FACTORS TO CONSIDER WHEN INITIATING ICS TREATMENT

Factors to consider when initiating ICS treatment in combination with one or two long-acting bronchodilators (note the scenario is different when considering ICS withdrawal):

· STRONG SUPPORT ·	· CONSIDER USE ·	· AGAINST USE ·
• History of hospitalization(s) for exacerbations of COPD#	• 1 moderate exacerbation of COPD per year#	• Repeated pneumonia events
• ≥ 2 moderate exacerbations of COPD per year#	• Blood eosinophils 100-300 cells/µL	• Blood eosinophils <100 cells/µL
• Blood eosinophils >300 cells/µL		• History of mycobacterial infection
• History of, or concomitant, asthma		

#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.

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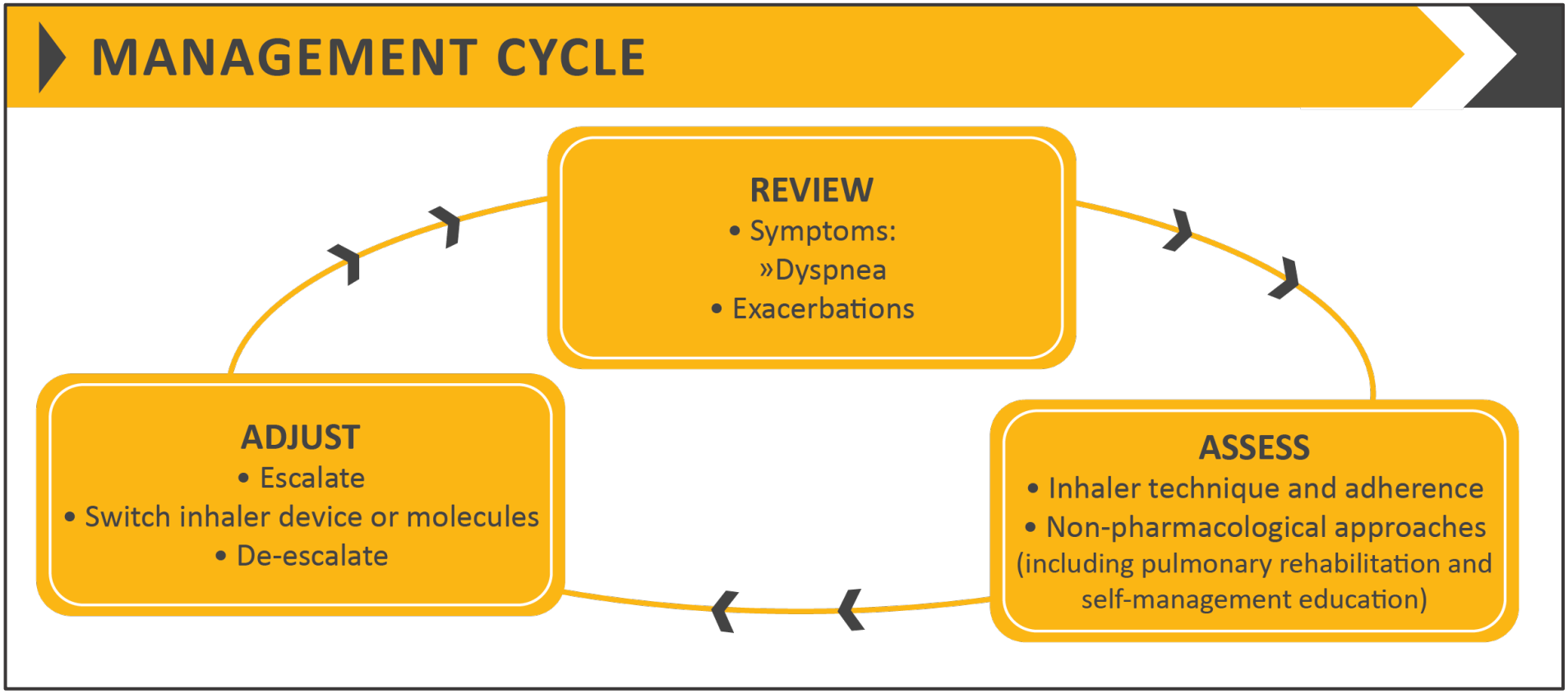
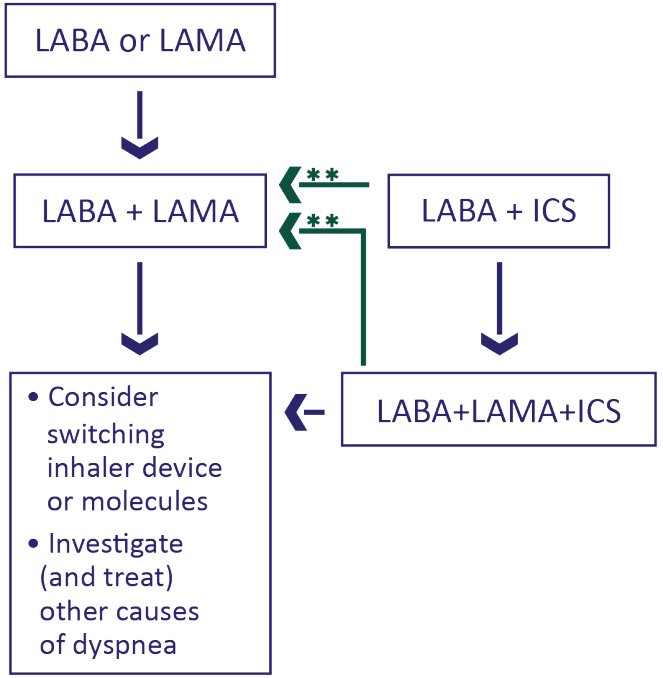


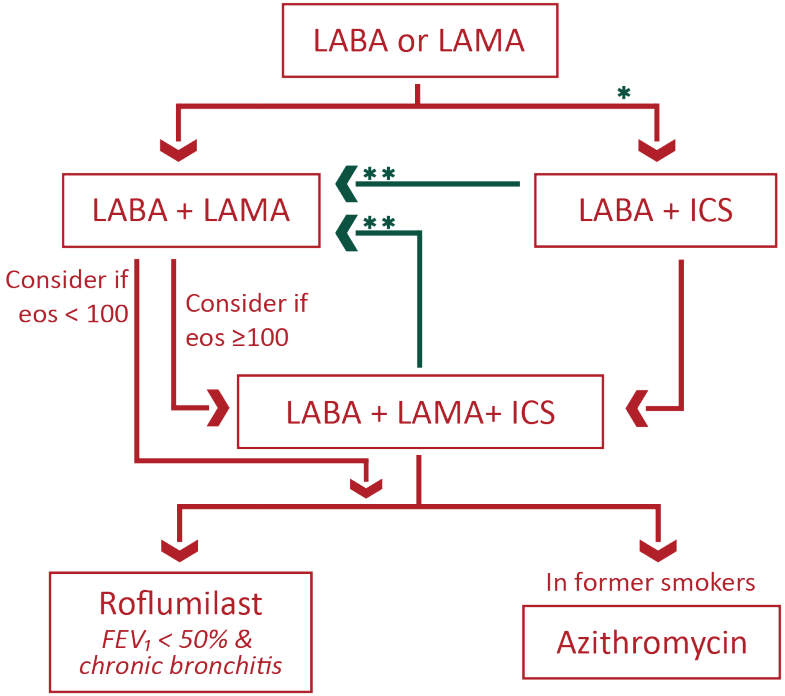
FOLLOW-UP PHARMACOLOGICAL TREATMENT

1. **IF RESPONSE TO INITIAL TREATMENT IS APPROPRIATE, MAINTAIN IT.**
2. **IF NOT:**
   - ✓ Consider the predominant treatable trait to target (dyspnea or exacerbations)
     - Use exacerbation pathway if both exacerbations and dyspnea need to be targeted
   - ✓ Place patient in box corresponding to current treatment & follow indications
   - ✓ Assess response, adjust and review
   - ✓ These recommendations do not depend on the ABCD assessment at diagnosis

• DYSPNEA •



• EXACERBATIONS •



eos = blood eosinophil count (cells/µL)

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

***** Consider de-escalation of ICS or switch if pneumonia, inappropriate original indication or lack of response to ICS***

Non-Pharmacological Treatment

- Education and self-management
- Physical activity
- Pulmonary rehabilitation programs
- Exercise training
- Self-management education
- End of life and palliative care
- Nutritional support
- Vaccination
- Oxygen therapy

NON-PHARMACOLOGIC MANAGEMENT OF COPD*

PATIENT GROUP	ESSENTIAL	RECOMMENDED	DEPENDING ON LOCAL GUIDELINES
A	Smoking Cessation (can include pharmacologic treatment)	Physical Activity	Flu Vaccination Pneumococcal Vaccination Pertussis Vaccination
B, C and D	Smoking Cessation (can include pharmacologic treatment) Pulmonary Rehabilitation	Physical Activity	Flu Vaccination Pneumococcal Vaccination Pertussis Vaccination

*Can include pharmacologic treatment.

TABLE 4.8

FOLLOW-UP OF NON-PHARMACOLOGICAL TREATMENT

1. IF RESPONSE TO INITIAL TREATMENT IS APPROPRIATE, MAINTAIN IT AND OFFER:

- Flu vaccination every year and other recommended vaccinations according to guidelines
- Self-management education
- Assessment of behavioral risk factors such as smoking cessation (if applicable) and environmental exposures

Ensure

- Maintenance of exercise program and physical activity
- Adequate sleep and a healthy diet

2. IF NOT, CONSIDER THE PREDOMINANT TREATABLE TRAIT TO TARGET

• DYSPNEA •

- Self-management education (written action plan) with integrated self-management regarding:
  - Pulmonary rehabilitation (PR) program and/or maintenance exercise program post PR
  - Breathlessness and energy conservation techniques, and stress management strategies

• EXACERBATIONS •

- Self-management education (written action plan) that is personalized with respect to:
  - Avoidance of aggravating factors
  - How to monitor/manage worsening of symptoms
  - Contact information in the event of an exacerbation

All patients with advanced COPD should be considered for end of life and palliative care support to optimize symptom control and allow patients and their families to make informed choices about future management

PULMONARY REHABILITATION, SELF-MANAGEMENT AND INTEGRATIVE CARE IN COPD

PULMONARY REHABILITATION

- Pulmonary rehabilitation improves dyspnea, health status and exercise tolerance in stable patients **(Evidence A)**.
- Pulmonary rehabilitation reduces hospitalization among patients who have had a recent exacerbation (≤4 weeks from prior hospitalization) **(Evidence B)**.
- Pulmonary rehabilitation leads to a reduction in symptoms of anxiety and depression **(Evidence A)**.

OXYGEN THERAPY AND VENTILATORY SUPPORT IN STABLE COPD

OXYGEN THERAPY

- The long-term administration of oxygen increases survival in patients with severe chronic resting arterial hypoxemia **(Evidence A)**.

- In patients with stable COPD and moderate resting or exercise-induced arterial desaturation, prescription of long-term oxygen does not lengthen time to death or first hospitalization or provide sustained benefit in health status, lung function and 6-minute walk distance **(Evidence A)**.

- Resting oxygenation at sea level does not exclude the development of severe hypoxemia when traveling by air **(Evidence C)**.

VENTILATORY SUPPORT

- NPPV may improve hospitalization-free survival in selected patients after recent hospitalization, particularly in those with pronounced daytime persistent hypercapnia ($PaCO_2 \geq 52$ mmHg) **(Evidence B)**.

INTERVENTIONAL THERAPY IN STABLE COPD

LUNG VOLUME REDUCTION SURGERY

- Lung volume reduction surgery improves survival in severe emphysema patients with an upper–lobe emphysema and low post–rehabilitation exercise capacity **(Evidence A)**.

BULLECTOMY

- In selected patients, bullectomy is associated with decreased dyspnea, improved lung function and exercise tolerance **(Evidence C)**.

TRANSPLANTATION

- In appropriately selected patients with very severe COPD, lung transplantation has been shown to improve quality of life and functional capacity **(Evidence C)**.

BRONCHOSCOPIC INTERVENTIONS

- In select patients with advanced emphysema, bronchoscopic interventions reduce end-expiratory lung volume and improve exercise tolerance, health status and lung function at 6-12 months following treatment. Endobronchial valves **(Evidence A)**; Lung coils **(Evidence B)**; Vapor ablation **(Evidence B)**.

Monitoring and Follow-up

Monitoring disease progression and development of complications and/or comorbidities

- ***Measurements.*** Decline in FEV_1 can be tracked by spirometry performed at least once a year.
- ***Symptoms.*** At each visit, information on symptoms since the last visit should be collected, including cough and sputum, breathlessness, fatigue, activity limitation, and sleep disturbances.
- ***Exacerbations.*** The frequency, severity, type and likely causes of all exacerbations should be monitored.
- ***Imaging.*** If there is a clear worsening of symptoms, imaging may be indicated.
- ***Smoking status.*** At each visit, the current smoking status and smoke exposure should be determined followed by appropriate action.

Monitoring and Follow-up

Pharmacotherapy and other medical treatment

In order to adjust therapy appropriately as the disease progresses, each follow-up visit should include a discussion of the current therapeutic regimen.

Monitoring should focus on:

- Dosages of prescribed medications.
- Adherence to the regimen.
- Inhaler technique.
- Effectiveness of the current regime.
- Side effects.

Treatment modifications should be recommended.

Management of Exacerbations

OVERALL KEY POINTS (1 of 3):

- An exacerbation of COPD is defined as an acute worsening of respiratory symptoms that results in additional therapy.
- Exacerbations of COPD can be precipitated by several factors. The most common causes are respiratory tract infections.
- The goal for treatment of COPD exacerbations is to minimize the negative impact of the current exacerbation and to prevent subsequent events.
- Short-acting inhaled beta$_2$-agonists, with or without short-acting anticholinergics, are recommended as the initial bronchodilators to treat an acute exacerbation.

Management of Exacerbations

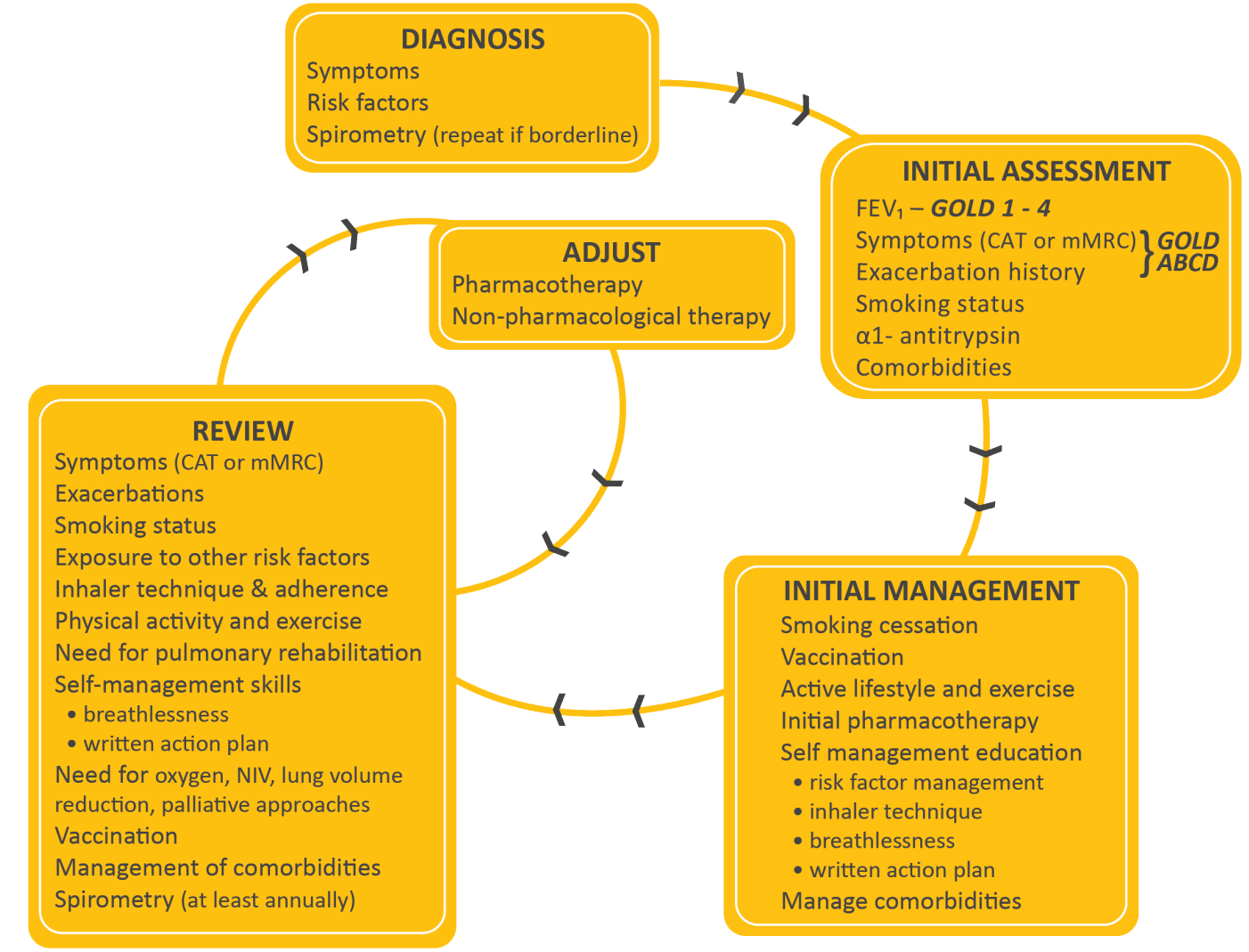
OVERALL KEY POINTS (2 of 3):

- Maintenance therapy with long-acting bronchodilators should be initiated as soon as possible before hospital discharge.
- Systemic corticosteroids can improve lung function (FEV_1), oxygenation and shorten recovery time and hospitalization duration. Duration of therapy should not be more than 5-7 days.
- Antibiotics, when indicated, can shorten recovery time, reduce the risk of early relapse, treatment failure, and hospitalization duration. Duration of therapy should be 5-7 days.
- Methylxanthines are not recommended due to increased side effect profiles.

COMMON RISK FACTORS FOR DEVELOPMENT OF LUNG CANCER

- Age > 55
- Smoking history > 30 pack years
- Presence of emphysema by CT scan
- Presence of airflow limitation $FEV_1/FVC < 0.7$
- BMI < 25 kg/m^2
- Family history of lung cancer

MANAGEMENT OF COPD



Breathing well is the greatest pleasure in life.