Treatment Update for COPD

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GOLD Definition

- Chronic respiratory symptoms due to chronic airways abnormalities leading to persistent or progressive airways obstruction
- Diagnosis: Clinical Context + risk factors + non fully reversible airway obstruction FEV1/FVC <0.7 post bronchodilation

Clinical Indicators for Considering a Diagnosis of COPD

Figure 2.1

Consider the diagnosis of COPD, and perform spirometry, if any of these clinical indicators are present:
(these indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of the presence of COPD; in any case, spirometry is required to establish a diagnosis of COPD)

Dyspnea that is	Progressive over time Worse with exercise Persistent
Recurrent wheeze	
Chronic cough	May be intermittent and may be non-productive
Recurrent lower respiratory tract infections	
History of risk factors	Tobacco smoke (including popular local preparations) Smoke from home cooking and heating fuels Occupational dusts, vapors, fumes, gases and other chemicals Host factors (e.g., genetic factors, developmental abnormalities, low birthweight, prematurity, childhood respiratory infections etc.)

Role of Spirometry in COPD

Figure 2.6

- **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

Diagnosis of COPD

- Presence of symptoms
- Presence of risk factors
- Spirometry: Post bronchodilator FEV1/FVC <0.7
- Pre-COPD
- Pre DM, Prehypertension, pre cancer, pre Eclampsia
- Respiratory symptoms + exposure to risk factors +normal spirometry
- Presence of structural or functional abnormalities such as airway obstruction, emphysema on HRCT, increased total lung capacity and reduced DLCO
  - Any age, may or may not develop COPD over time

Preserved Ration Impaired spirometry PRISm

- Relevance in population based studies caries form 7-20%/ 10% of smokers
- FEV1 < 80% of reference after bronchodilation
- High in former smokers
- High in those with higher BMI
- 40-50% develop COPD over 5 years
- Increase risk of all cause mortality especially cardiovascular

Risk Factors for COPD

- 55% of COPD globally is due to non smoking risk factors*
- Genetically determined COPD, COPD-G
- Abnormal Lung Development COPD-D
- Environmental : Smoking COPD-C, Biomass and pollution COPD-P
- COPD due to infection COPD-I
- COPD and asthma COPD-A
- COPD of unknown cause COPD-U

Common, preventable, treatable and underdiagnosed

Clinical Presentation

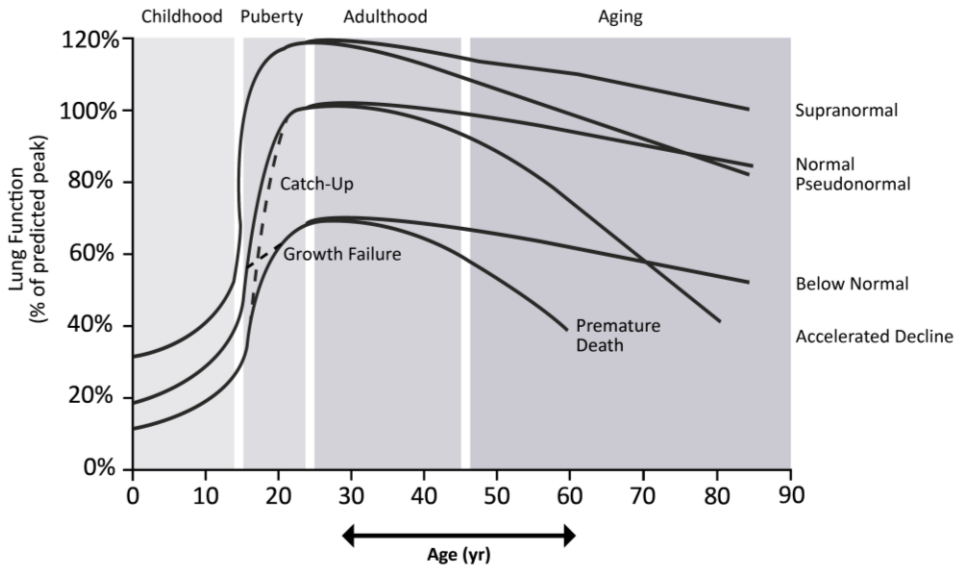
- SOB, activity limitation, cough productive or not
- Exacerbations
- Common, preventable, treatable and underdiagnosed

Risk factors

- Cigarette smoking g
- Indoor pollution/ biomass exposure
- Air pollution
- Occupational exposure
- Age
- Genetics
- Deprivation
- infection

FEV1 Trajectories (TR) Over the Life Course

Figure 1.1



Modified from: Agusti A, Hogg JC. Update on the Pathogenesis of Chronic Obstructive Pulmonary Disease. N Engl J Med. 2019;381:1248-56.

Multimorbidity and COPD

- Multimorbidity affects hospitalisation and mortality independently of the COPD severity
- Should be looked for routinely 15% will have 5 or more
- This includes cardiovascular disease , metabolic syndrome, osteoporosis, depression, anxiety
- COPD is a risk factor for lung cancer
- Look for the presence of congestive heart failure, IHD and hypertension in all your patients with COPD

Other investigations

- CXR
- Blood eosinophils
- ECG and serum natriuretic peptides
- Sputum culture
- Echocardiogram
- CT scan of the thorax
- Serum alpha-1 antitrypsin
- Transfer factor for carbon monoxide (TLCO):
  - symptoms that seem disproportionate to the spirometric impairment
  - To assess suitability for lung volume reduction procedures

GOLD Grades and Severity of Airflow Obstruction in COPD (based on post-bronchodilator FEV1)

Figure 2.7

In COPD patients (FEV1/FVC < 0.7):

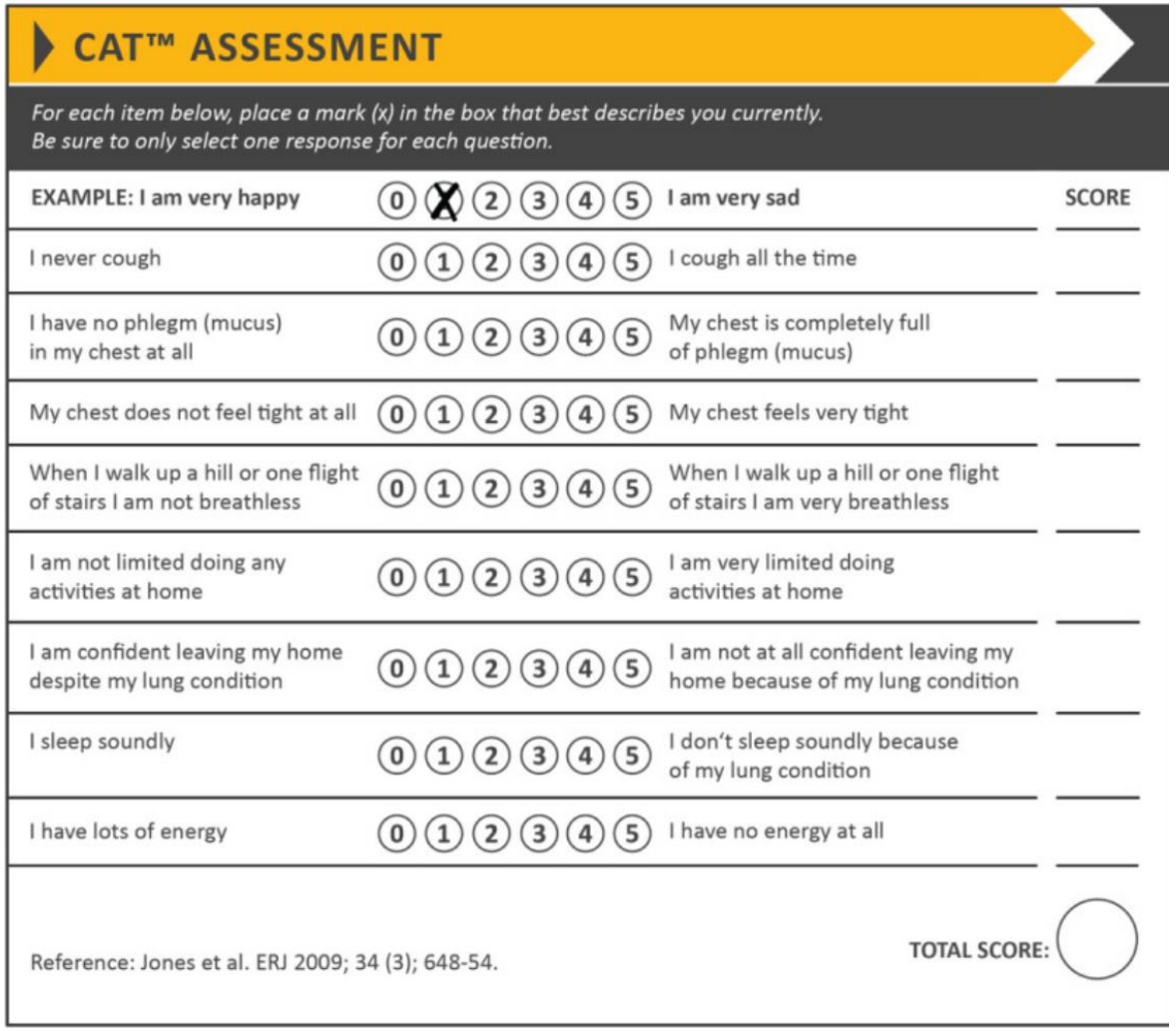
GOLD 1:	Mild	FEV1 ≥ 80% predicted
GOLD 2:	Moderate	50% ≤ FEV1 < 80% predicted
GOLD 3:	Severe	30% ≤ FEV1 < 50% predicted
GOLD 4:	Very Severe	FEV1 < 30% predicted

Table 1 MRC dyspnoea scale

Grade	Degree of breathlessness related to activities
1	Not troubled by breathlessness except on strenuous exercise
2	Short of breath when hurrying or walking up a slight hill
3	Walks slower than contemporaries on level ground because of breathlessness, or has to stop for breath when walking at own pace
4	Stops for breath after walking about 100 metres or after a few minutes on level ground
5	Too breathless to leave the house, or breathless when dressing or undressing

COPD Assessment Test

- Multidimensional assessment as not just dyspnoea
- A score from 0-40
- 10 requires regular treatment



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: ◯

Initial Pharmacological Treatment

Figure 3.7

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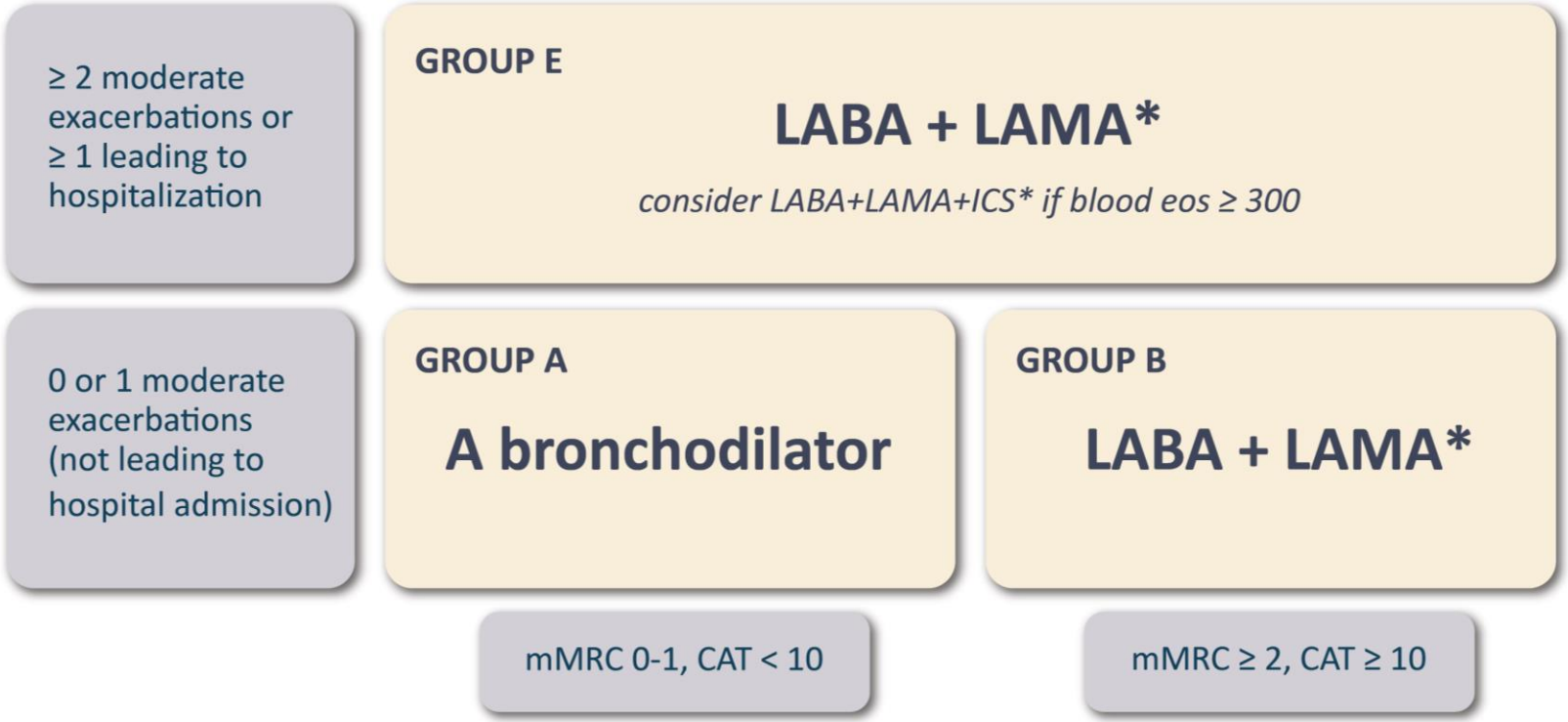
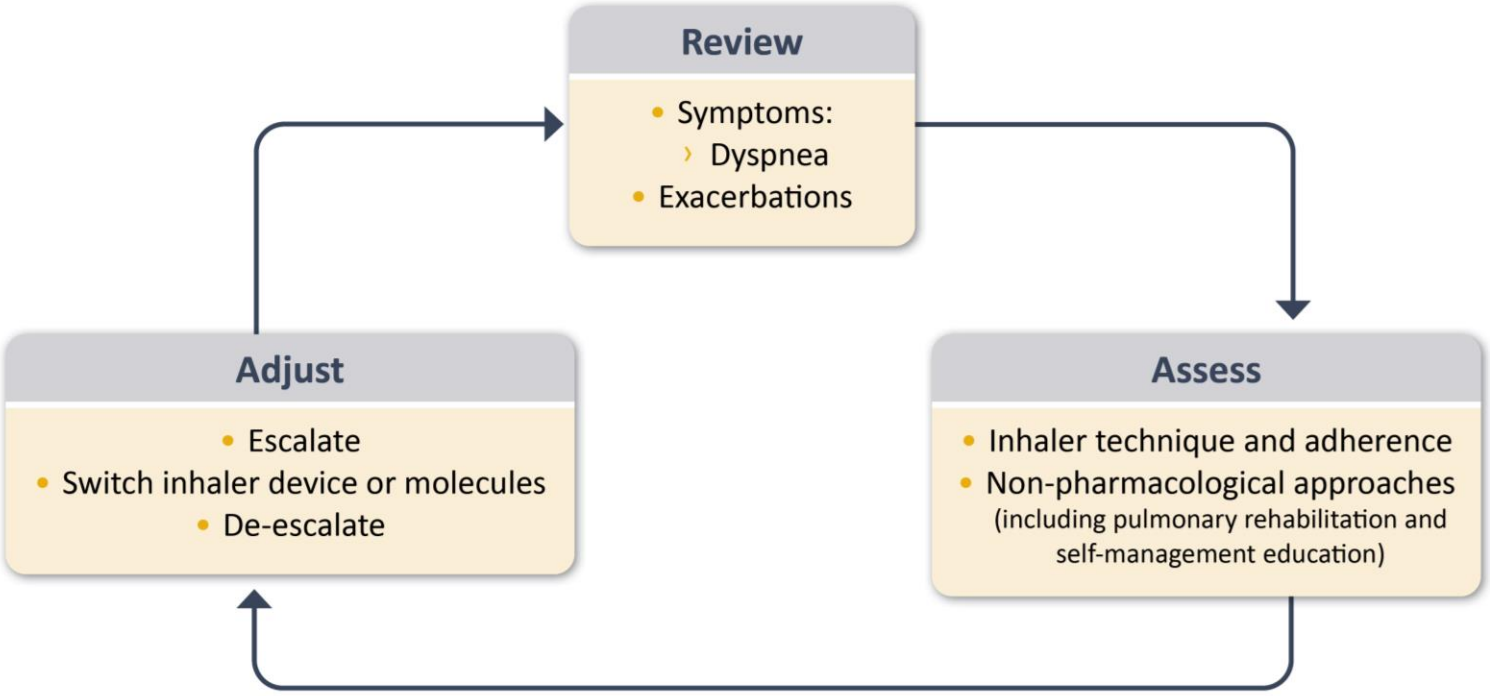


*Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment

Exacerbations refers to the number of exacerbations per year; eos: blood eosinophil count in cells per microliter; mMRC: modified Medical Research Council dyspnea questionnaire; CAT™: COPD Assessment Test™.

Management Cycle

Figure 3.8



Follow-up Pharmacological Treatment

Figure 3.9

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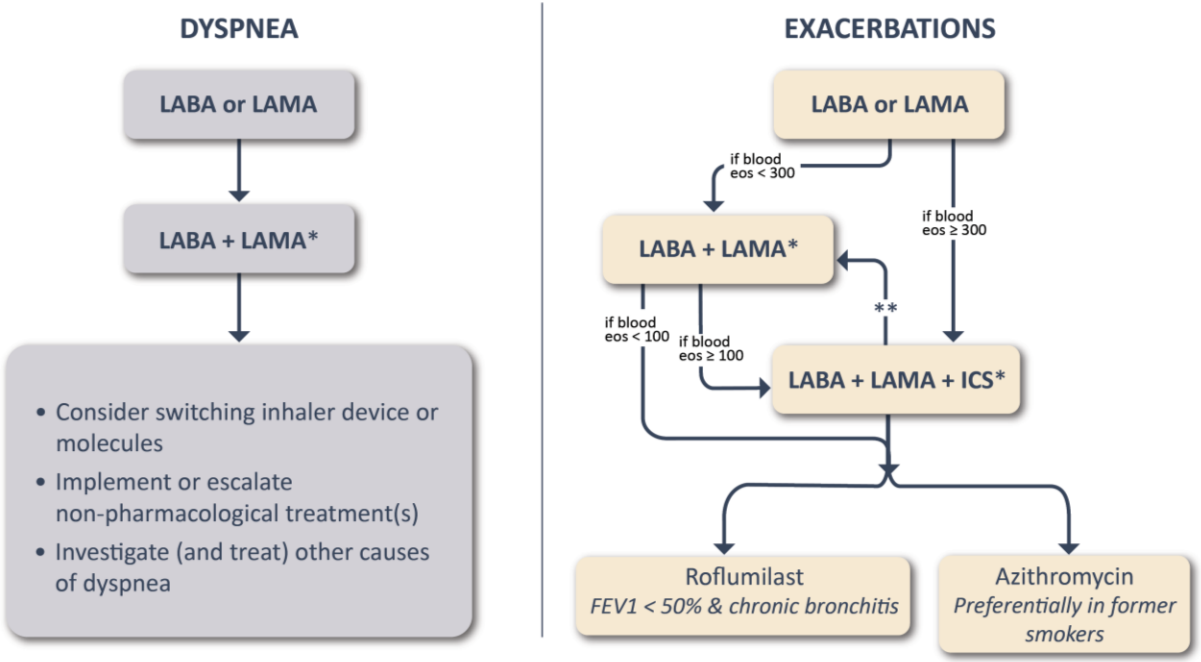
1. **IF RESPONSE TO INITIAL TREATMENT IS APPROPRIATE, MAINTAIN IT.**
2. **IF NOT:**
   - Check adherence, inhaler technique and possible interfering comorbidities
   - Consider the predominant treatable trait to target (dyspnea or exacerbations)
     - Use exacerbation pathway if both exacerbations and 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 ABE assessment at diagnosis



*Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment

**Consider de-escalation of ICS if pneumonia or other considerable side-effects. In case of blood eos ≥ 300 cells/µl de-escalation is more likely to be associated with the development of exacerbations

Exacerbations refers to the number of exacerbations per year

Factors to Consider when Initiating ICS Treatment

Figure 3.21

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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 Figures 3.7 & 3.18 for recommendations); *note that blood eosinophils should be seen as a continuum; quoted values represent approximate cut-points; eosinophil counts are likely to fluctuate.

Adapted from & reproduced with permission of the © ERS 2019: *European Respiratory Journal 52 (6) 1801219; DOI: 10.1183/13993003.01219-2018 Published 13 December 2018*

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Key Points for Inhalation of Drugs

Figure 3.10

- When a treatment is given by the inhaled route, the importance of education and training in inhaler device technique cannot be over-emphasized
- 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 to 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 is insufficient

GLOBAL INITIATIVE FOR CHRONIC OBSTRUCTIVE LUNG DISEASE™

Basic Principles for Appropriate Inhalation Device Choice

Figure 3.11

- Availability of the drug in the device
- Patients' beliefs, satisfaction with current and previous devices and preferences need to be assessed and considered
- The number of different device types should be minimized for each patient. Ideally, only one device type should be used
- Device type should not be switched in the absence of clinical justification nor without proper information, education and medical follow-up
- Shared decision-making is the most appropriate strategy for inhalation device choice
- Patient's cognition, dexterity and strength must be taken into account
- Patient's ability to perform the correct specific inhalation maneuver for the device must be assessed:
  - Dry powder inhalers are appropriate only if the patient can make a forceful and deep inhalation. Check visually that the patient can inhale forcefully through the device - if there is doubt assess objectively or choose alternative device
  - Metered-dose inhalers and, to a lesser extent, soft mist inhalers require coordination between device triggering and inhalation and patients need to be able to perform a slow and deep inhalation. Check visually that the patient can inhale slowly and deeply from the device - if there is doubt consider adding a spacer/VHC or choose an alternative device
  - For patients unable to use an MDI (with or without spacer/VHC), SMI or DPI a nebulizer should be considered
- Other factors to consider include size, portability, cost
- Smart inhalers may be useful if there are issues with adherence/persistence or inhalation technique (for devices that can check it)
- Physicians should prescribe only devices they (and the other members of the caring team) know how to use

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Choosing the right inhaler device for your COPD patient

- ACT: Assess, Choose, Train
- Assess: Can the patient take a slow and Steady or Quick and Deep Beath
- Choose :
  - Slow and steady can have Pmdi, SMI or BAI
  - Quick and Deep consider DPI
  - The greenest inhaler is the inhaler that the patient can and will use
- Teach: Teach the inhaler technique or refer to the HCP who can, you can use a video tutorial meanwhile

When to refer to secondary care?

There is diagnostic uncertainty	Confirm diagnosis and optimise therapy
Suspected severe COPD	Confirm diagnosis and optimise therapy
The person with COPD requests a second opinion	Confirm diagnosis and optimise therapy
Onset of cor pulmonale	Confirm diagnosis and optimise therapy
Assessment for oxygen therapy	Optimise therapy and measure blood gases
Assessment for long-term nebuliser therapy	Optimise therapy and exclude inappropriate prescriptions
Assessment for oral corticosteroid therapy	Justify need for continued treatment or supervise withdrawal

When to refer to secondary care

bullous lung disease	Identify candidates for lung volume reduction procedures
A rapid decline in FEV1	Encourage early intervention
Assessment for pulmonary rehabilitation	Identify candidates for pulmonary rehabilitation
Assessment for a lung volume reduction procedure	Identify candidates for surgical or bronchoscopic lung volume reduction
Assessment for lung transplantation	Identify candidates for surgery
Dysfunctional breathing	Confirm diagnosis, optimise pharmacotherapy and access other therapists
Onset of symptoms under 40 years or a family history of alpha-1 antitrypsin deficiency	Identify alpha-1 antitrypsin deficiency, consider therapy and screen family
Symptoms disproportionate to lung function deficit	Look for other explanations including cardiac impairment, pulmonary hypertension, depression and hyperventilation
Frequent infections	Exclude bronchiectasis
Haemoptysis	Exclude carcinoma of the bronchus

Non-Pharmacological Management of COPD*

Figure 3.12

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Patient Group	Essential	Recommended	Depending on Local Guidelines
A	Smoking cessation (can include pharmacological treatment)	Physical activity	Influenza vaccination COVID-19 vaccinations Pneumococcal vaccination Pertussis vaccination Shingles vaccination RSV vaccination
B and E	Smoking cessation (can include pharmacological treatment) Pulmonary rehabilitation	Physical activity	Influenza vaccination COVID-19 vaccinations Pneumococcal vaccination Pertussis vaccination Shingles vaccination RSV vaccination

*Can include pharmacological treatment

Follow-up of Non-Pharmacological Treatment

Figure 3.13

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1. If response to initial treatment is appropriate, maintain it and offer:

- Influenza 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:
  - Breathlessness, energy conservation techniques, and stress management strategies
- Pulmonary rehabilitation (PR) program and/or maintenance exercise program post PR

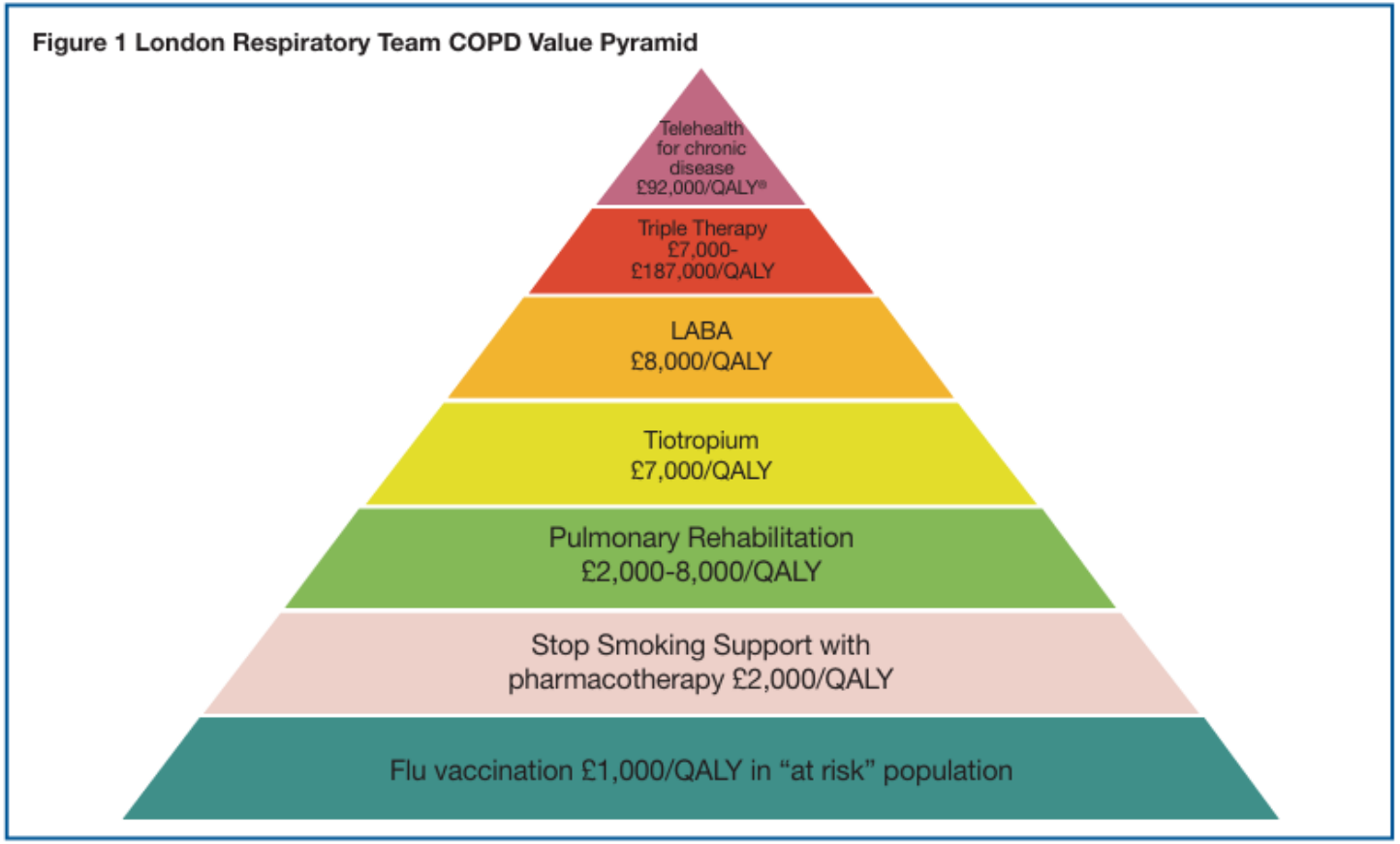
EXACERBATIONS

- 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
- Pulmonary rehabilitation (PR) program and/or maintenance exercise program post PR

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.

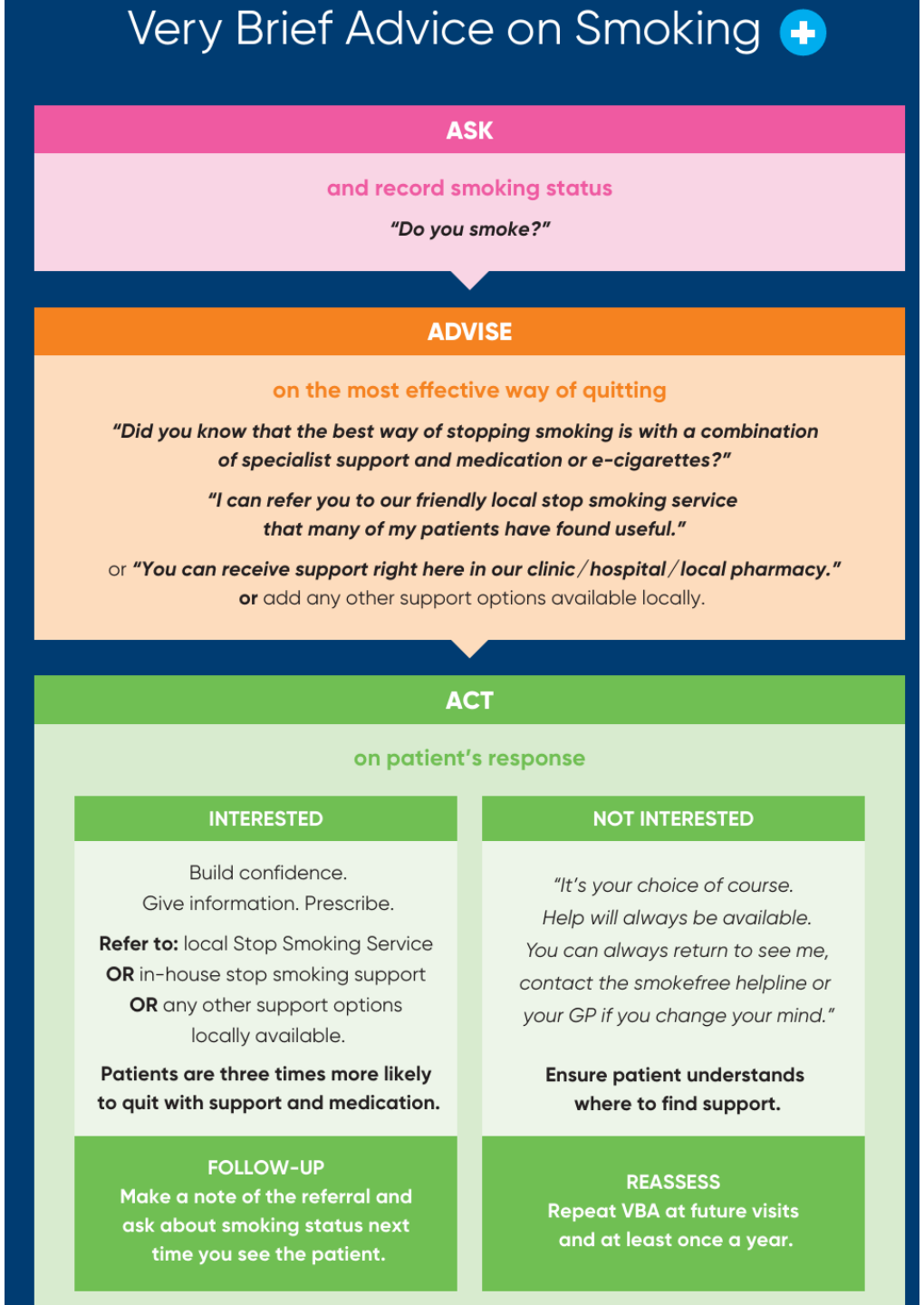
Management

- Smoking cessation
- Vaccination
- Active lifestyle and exercise
- Initial Pharmacotherapy
- Self management education
  - Risk factor management
  - Inhaler technique
  - Breathlessness
  - Written action place
- Manage comorbidities



Smoking cessation Advice

- the most influential on the natural COPD history
- Decreases exacerbations frequency
- Improves daily symptoms



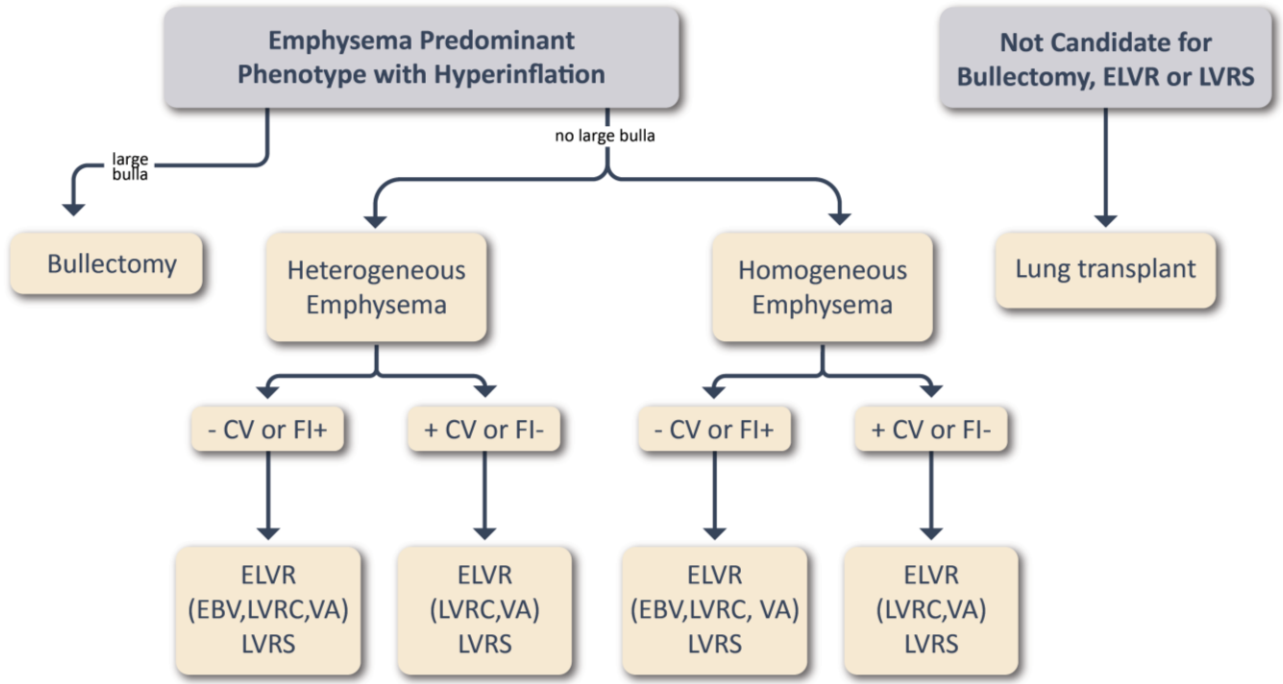
Oxygen Therapy and Ventilatory Support in Stable COPD

Figure 3.14

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 ($PaCO_2$ > 53 mmHg) **(Evidence B)** • In patients with severe chronic hypercapnia and a history of hospitalization for acute respiratory failure, long-term noninvasive ventilation may be considered **(Evidence B)**

Surgical and Interventional Therapies in Advanced Emphysema

Figure 3.25

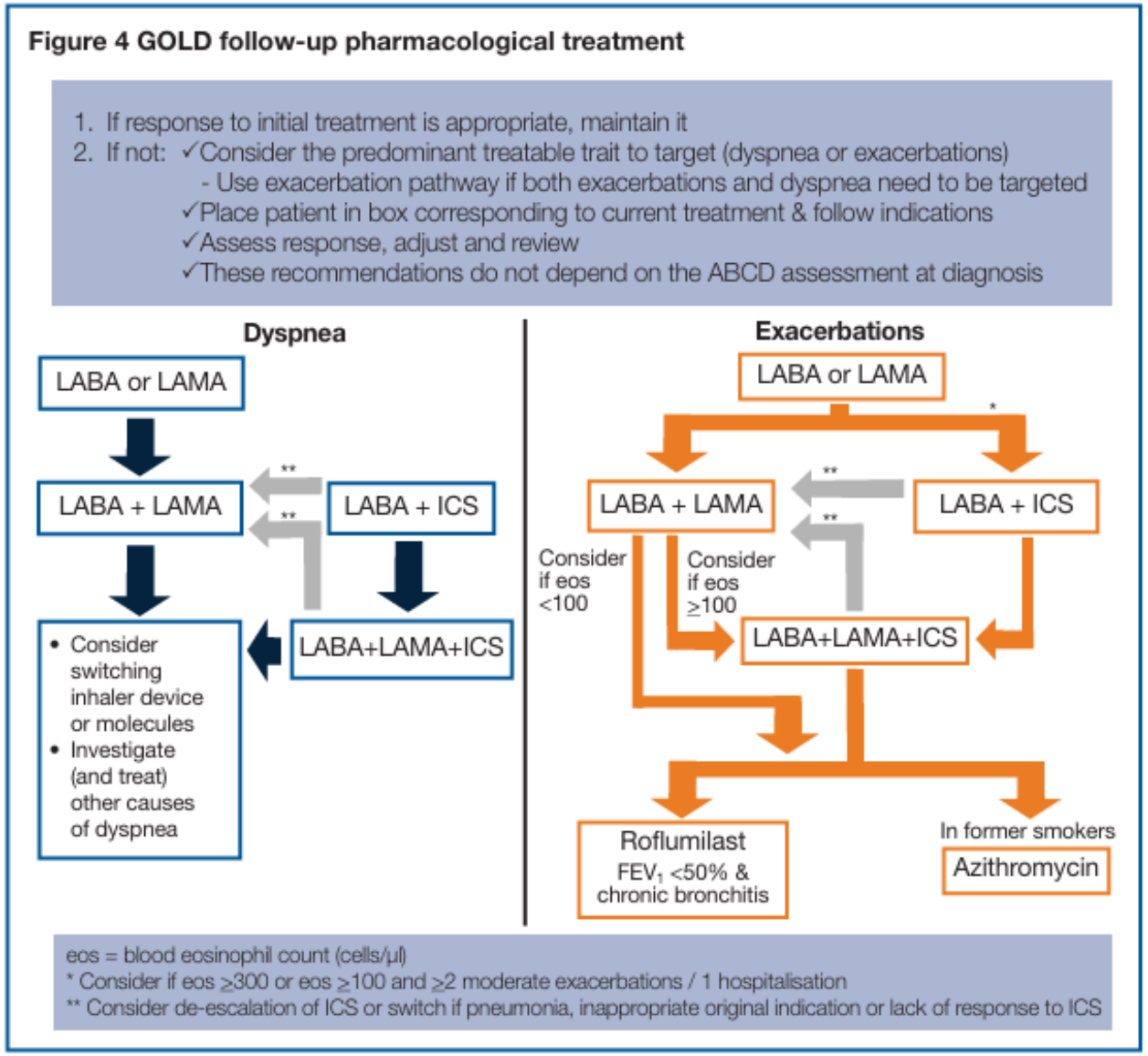


Note: not all therapies are clinically available in all countries. Long term ELVR outcomes or direct comparisons to LVRS are unknown.

Definition of abbreviations: CV, collateral ventilation measure by Chartis; FI + fissure integrity > 90% by HRCT; FI-, fissure integrity < 90% by HRCT; ELVR, Endoscopic Lung Volume Reduction, EBV, Endobronchial Valve; VA, Vapor Ablation; LVRC, Lung Volume Reduction Coil; LVRS, Lung Volume Reduction Surgery. Modified from Vogelmeier, AJRCCM, 2017.

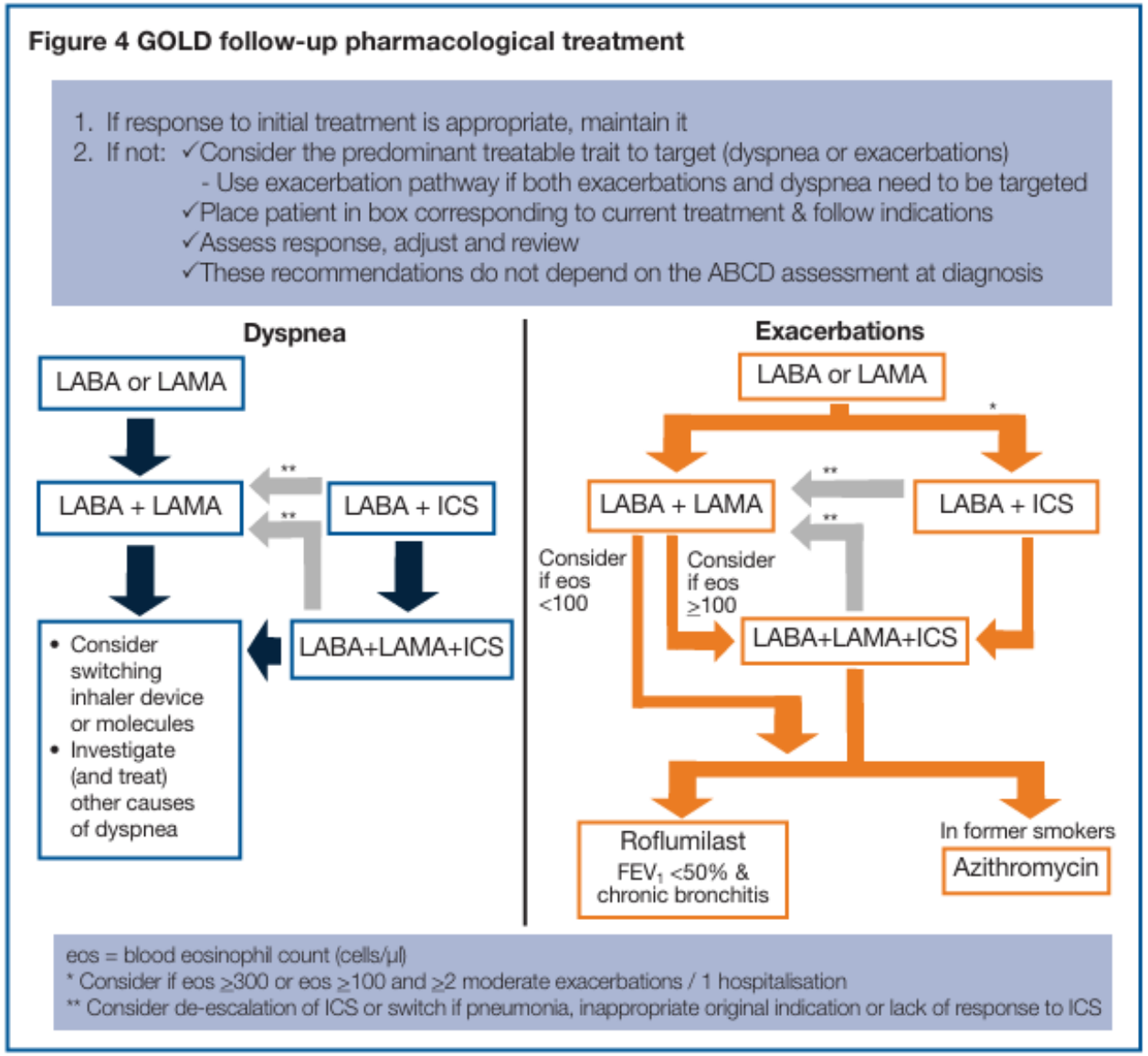
Dyspnoea

- If not improving :
- Consider changing the inhaler device or molecule
- Implement or escalate nonpharmacological treatment
- Consider other diagnoses/ comorbidities



Exacerbtions

- Inhalers including triple therapy if indicated
- Roflumilast FEV1< 50% + chronic bronchitis
- Azithromycin preferably in former smokers
- Withdraw ICS



ICS and COPD

- Strongly recommended :
  - History of hospitalisation for COPD exacerbaiotn
  - ≥ 2 moderate exacerbations of COPD per year
  - Blood eosinophils ≥ 300 cells/μL
  - History of concomitant Asthma
- Favour Use :
  - 1 moderate exacerbation of COPD per year
  - Blood eosinophils 100 to < 300
- Against Use
  - Repeated pneumonia events
  - Blood eosinophils < 100
  - History of mycobacterial infection

Non pharmacological Intervention

- If good response to initial treatment, maintain and offer:
- Flu vaccine
- Self management education
- Assess behavioural risk factors such as smoking cessation
- Ensure:
- Maintain exercise programme
- Adequate sleep and healthy diet

Pulmonary Rehabilitation, education and self-management

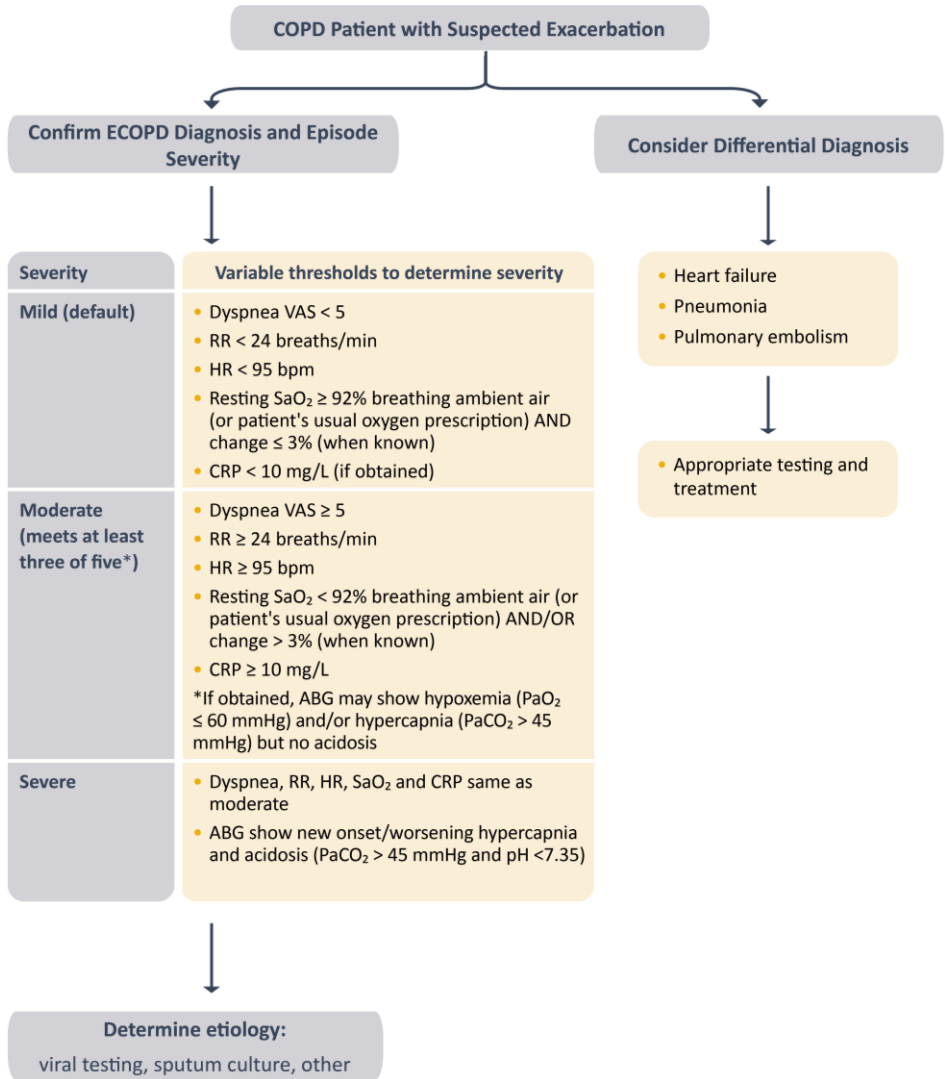
- PR: comprehensive intervention based on pt assessment and pt tailored therapy. This includes exercise training , education and self management intervention aiming at behavioural change to improve physical and psychological state of pts with COPD to promote long term adherence to health enhancing behaviours
- MMRC 3 or above
- Take into accounts other comorbidities: DM, asthma,
- 6-8 weeks programme

Education

- Smoking cessation
- Basic copd info
- Resp meds and inhalation devices
- Managing dyspnoea
- Managing exacerbations
- Advance directives, EOL

Classification of the Severity of COPD Exacerbations

Figure 4.3



Adapted from: The ROME Proposal, Celli et al. (2021) Am J Respir Crit Care Med. 204(11): 1251-8.

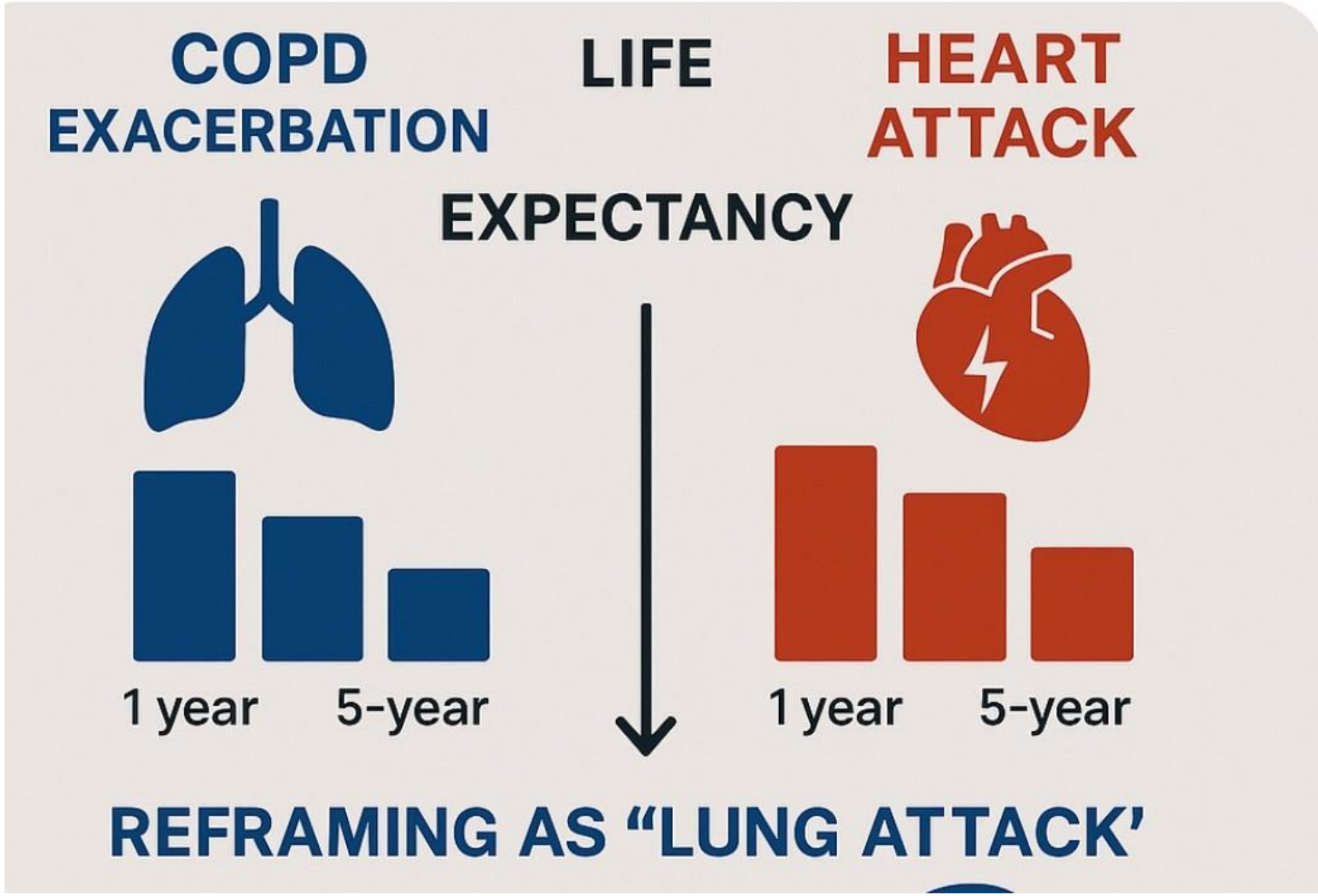
Abbreviations: VAS visual analog dyspnea scale; RR respiratory rate; HR heart rate; SaO_2 oxygen saturation; CRP C-reactive protein; ABG arterial blood gases; PaO_2 Arterial pressure of oxygen.

COPD exacerbation

- Bronchodilation therapy
- Prednisolone 30mg for 5 days
- Home, hospital based or Telehealth according to overall condition
- non-pharmacological interventions to manage breathlessness
- Think COPD complications

Impact of AE COPD

- Greater decline in lung function
- Increased symptoms and worse quality of like
- Increases mortality



Clinical Comparison: COPD Exacerbation vs Heart Attack

Feature	COPD Exacerbation	Heart Attack (MI)
Immediate mortality risk	Moderate to high (hospital mortality ~4–12%)	High (hospital mortality ~5–15%, varies with severity)
1-year mortality	~20–40%, especially if hospitalized	~10–20%, varies by age and comorbidities
5-year mortality	Can exceed 50% after severe exacerbation	~25–40%, depending on secondary prevention & rehab
Progression	Chronic, progressive disease with recurrent exacerbations	Often stable post-event if managed with secondary care
Predictability	Often unpredictable, triggered by infections/pollution	More associated with identifiable risk factors
Rehospitalization	High; ~30–50% within 6 months	Moderate; ~15–25% within 6 months

Interventions that Reduce the Frequency of COPD Exacerbations

Figure 4.11

Intervention Class	Intervention
Bronchodilators	LABAs LAMAs LABA + LAMA
Corticosteroid-containing regimens	LABA + ICS LABA + LAMA + ICS
Anti-inflammatory (non-steroid)	Roflumilast
Anti-infectives	Vaccines Long Term Macrolides
Mucoregulators	N-acetylcysteine Carbocysteine Erdosteine
Various others	Smoking Cessation Rehabilitation Lung Volume Reduction Vitamin D Shielding measures (e.g., mask wearing, minimizing social contact, frequent hand washing)

Improving the management of multimorbid COPD patients in primary care

- Optimise the treatment regimen according to GOLD classification (GOLD 2020) and assess and treat comorbidities

- For patients with multimorbidities undertake a review of COPD treatment with a focus on the interface between symptoms of comorbid disease and side effects of medication

- Think carefully about the indications for ICS use before prescribing.

Health Inequality

- Socioeconomic status
- Ethnicity
- Discrepancy in access to health , research and outcomes
- Inclusion groups
- Air quality and housing in deprived areas
- People in deprived area may delay seeking care, leading to late diagnosis

REDUCING HEALTHCARE INEQUALITIES

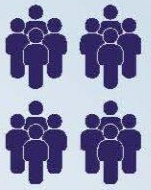
NHS

The **Core20PLUS5** approach is designed to support Integrated Care Systems to drive targeted action in healthcare inequalities improvement

Target population

CORE20
The most deprived **20%** of the national population as identified by the Index of Multiple Deprivation

PLUS
ICS-chosen population groups experiencing poorer-than-average health access, experience and/or outcomes, who may not be captured within the Core20 alone and would benefit from a tailored healthcare approach e.g. inclusion health groups



CORE20PLUS5

Key clinical areas of health inequalities

1. **MATERNITY**
ensuring continuity of care for women from Black, Asian and minority ethnic communities and from the most deprived groups

2. **SEVERE MENTAL ILLNESS (SMI)**
ensure annual Physical Health Checks for people with SMI to at least, nationally set targets

3. **CHRONIC RESPIRATORY DISEASE**
a clear focus on Chronic Obstructive Pulmonary Disease (COPD), driving up uptake of Covid, Flu and Pneumonia vaccines to reduce infective exacerbations and emergency hospital admissions due to those exacerbations

4. **EARLY CANCER DIAGNOSIS**
75% of cases diagnosed at stage 1 or 2 by 2028

5. **HYPERTENSION CASE-FINDING**
and optimal management and lipid optimal management

SMOKING CESSATION
positively impacts all 5 key clinical areas

Guidelines

From differential diagnosis and point of care testing through to pulmonary rehabilitation and supported self management, our resources cover everything you need to support your patients with COPD.

Podcasts

Listen to the advice of our clinical experts in our exclusive series of podcasts.

Webinars and videos

Our latest webinar series on challenging COPD is coming this fall.

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