



Breathless...

Current concepts in managing chronic obstructive pulmonary disease

COPD is one of the most common problems in primary care, and a major cause of disability and death. These evidence-based recommendations can help optimize functional status.

The root of most evil:

Smoking is by far the most common cause of COPD.¹ About 80% of smokers develop COPD, and 20% do so rapidly.² A small percentage of COPD cases are caused by occupational dust and fumes.³ The amount of tobacco smoked generally predicts the rate of pulmonary damage. Quitting can slow the loss of respiratory function, even in long-time smokers (see below).

Figure 1. Smoking and decline of lung function in COPD.⁴

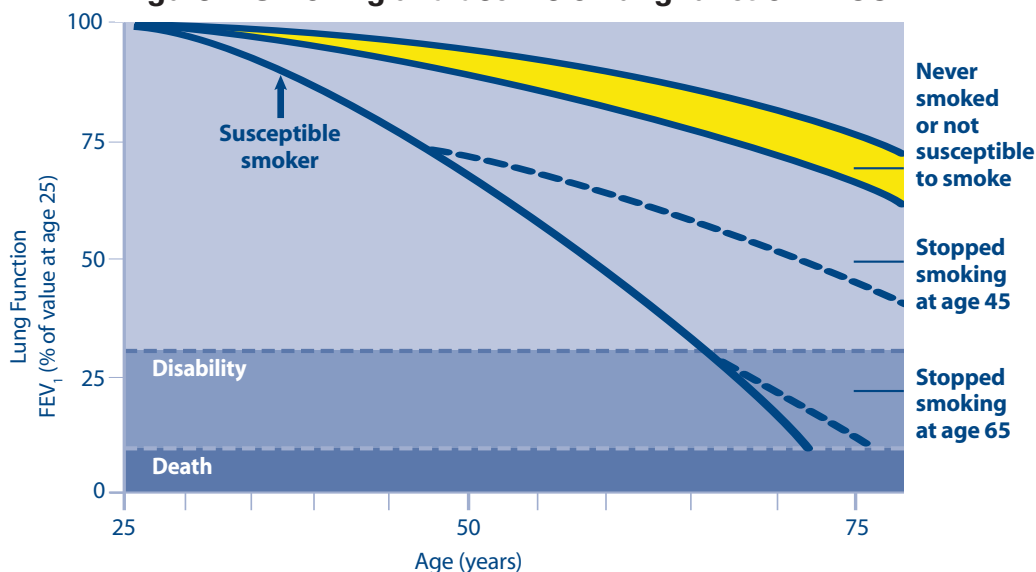
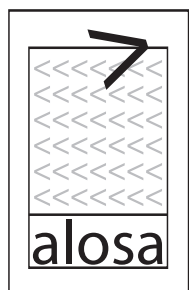


Figure adapted from: Fletcher C and Peto R. The natural history of chronic airflow obstruction. *BMJ* 1977;1:1645-1648.



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Balanced data about medications



Diagnosis

COPD should be considered in any patient with dyspnea, chronic cough, or chronic sputum production and/or a history of exposure to COPD risk factors (especially tobacco).^{1,3,5}

Spirometry is used to diagnose COPD by measuring Forced Expiratory Volume in 1 second (FEV₁) and Forced Vital Capacity (FVC). **An FEV₁/FVC less than 0.7 combined with a post-bronchodilator FEV₁ less than 80% of the predicted value confirm the presence of airflow limitation that is not fully reversible.**^{3,6,7} Follow-up spirometry can also be useful as a means of assessing treatment response. However, spirometry results don't always correlate exactly with changes in the patient's functional status; there's still a role for a careful history.

Managing stable disease

Aggressive treatment can alter the natural history of the disease, and non-drug approaches are a vital foundation of therapy.^{8,9}

Smoking cessation

Stopping tobacco use is the most effective single intervention to delay the development of COPD, slow the rate of decline in lung function, reduce the risk of exacerbations, and delay the onset of disability and mortality.^{10,11} It should be the cornerstone of management in smokers.¹²

Even a brief intervention by a clinician can be effective for many patients. The key steps for brief intervention are the “5 As”:

- **Ask:** Identify tobacco users at every visit.
- **Advise:** Strongly urge all smokers to quit, using a clear, personalized message.
- **Assess:** Determine willingness to make a quit attempt.
- **Assist:** Help the patient develop a quit plan, including counseling, social supports, pharmacotherapy, and supplementary materials.
- **Arrange:** Schedule follow-up contact, in person or by telephone.



Pharmacological options to assist with smoking cessation include nicotine replacement therapy (gum, lozenges, patches, inhaled), bupropion (generic, Zyban, Budeprion, Buproban), and varenicline (Chantix). Smoking cessation is more likely to succeed when drug therapy is combined with other interventions such as education and behavior modification.

A clinical guideline, “*Treating Tobacco Use and Dependence: 2008 Update*”, sponsored by the Department of Health and Human Services, describes treatments for tobacco dependence and provides information on quitting. It includes materials for clinicians and patients, and is available at <http://www.surgeongeneral.gov/tobacco/default.htm>.

Pulmonary rehabilitation

Pulmonary rehabilitation programs can increase exercise capacity, reduce dyspnea, improve health-related quality of life, help control anxiety and depression, prevent exacerbations and hospitalization, and possibly reduce mortality.^{1, 3, 13, 14}

Drug therapy

Inhaled bronchodilators form the cornerstone of pharmacotherapy in stable COPD, supplemented when necessary with inhaled corticosteroids (ICS). Drug therapy can significantly improve symptoms, quality of life, lung function, and exercise performance, and reduce the frequency of exacerbations.

Inhaled bronchodilators (β -agonists and anticholinergics) are available as short- and long-acting agents. Combining bronchodilators of different pharmacologic classes may be more effective than increasing the dose of a single agent.



Drug Class	Generic Name	Brand Names
Short acting β -agonist	albuterol**	ProAir HFA, Proventil HFA, Ventolin, , Accuneb
	levalbuterol	Xopenex, Xopenex HFA
Long-acting β -agonist (LABA)	salmeterol	Serevent
	formoterol	Foradil, Perforomist
	arformoterol	Brovana
Short-acting anticholinergic	ipratropium‡	Atrovent
Long-acting anticholinergic	tiotropium	Spiriva
Inhaled corticosteroids (ICS)	fluticasone	Flovent
	budesonide	Pulmicort
	beclomethasone	Qvar
Combined short-acting agents	albuterol/ipratropium‡	Combivent, Duoneb
Combined ICS/LABA	fluticasone/salmeterol	Advair
	budesonide/formoterol	Symbicort

*Available as generic by metered dose inhaler (MDI)
 ‡Available as generic for use in a nebulizer

The benefit of therapy is best assessed by asking the patient:¹

- Is your treatment helping you?
- Is your breathing easier in any way?
- Can you do some things now that you couldn't do before or do the same things faster?
- Do you get less breathless when you are doing the things you did before?
- Has your sleep improved?

Always ensure the patient knows how to use the inhaler device effectively and understands its purpose

Management at various stages of disease

COPD is progressive, characterized by a steady decline in lung function and functional status that can be accelerated by acute exacerbations. The flow chart below presents a graded approach to management:



Stage I. Mild COPD ($FEV_1/FVC < 0.7$; $FEV_1 \geq 80\%$ predicted)

- Smoking cessation in those who smoke
- Reduce risk factors (e.g. occupational exposure to dusts and fumes, exposure to pollution)
- Education
- Exercise
- Good nutrition
- Influenza and pneumococcal vaccination
- Short-acting inhaled bronchodilator (β -agonist or anticholinergic or both)

Stage II. Moderate COPD ($FEV_1/FVC < 0.7$; FEV_1 50-80% predicted)

As above, plus

- Regular treatment with one or more long-acting inhaled bronchodilators (β -agonist or anticholinergic)
- Pulmonary rehabilitation

Stage III. Severe COPD ($FEV_1/FVC < 0.7$; FEV_1 30-50% predicted)

As above, plus

- Inhaled corticosteroid if symptom control is inadequate or frequent exacerbations occur
- Long-term home oxygen therapy if hypoxemia present
- Consider oral theophylline for patients who have inadequate symptom control despite optimal therapy with inhaled bronchodilators and inhaled corticosteroids
- Consider referral to maximize medical therapy

Stage IV. Very severe COPD ($FEV_1/FVC < 0.7$; $FEV_1 < 30\%$ predicted or $< 50\%$ predicted plus chronic respiratory failure)

(Respiratory failure = $PaO_2 < 60\text{mmHg}$ with or without $PaCO_2 > 50\text{mmHg}$ while breathing air at sea level.)

As above, plus

- Consider referral to a pulmonologist for assessing surgical intervention (bullectomy, lung volume reduction, lung transplantation)
- Engage in communication about care preferences and planning, including patient preferences concerning palliative care and hospice if appropriate



Efficacy, adverse effects, and cost of inhaled medications

Figure 2. Medications used in COPD.

Drug	Efficacy						Adverse events				Cost	Overall value
	Acute symptom relief	Improve FEV ₁	Reduce frequency of exacerbations	Improve exercise capacity	Slow progression of COPD	Reduce mortality	Pneumonia	CV	Oral thrush	Headache		
Short-acting β-agonists	Best	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Unknown	Unknown	Unknown	Intermediate	Intermediate	Intermediate
Long-acting β-agonists	Unknown	Intermediate	Intermediate	Intermediate	Problem	Intermediate	Unknown	Unknown	Unknown	Intermediate	Intermediate	Intermediate
Ipratropium	Best	Intermediate	Intermediate	Intermediate	Intermediate	Problem	Unknown	Problem	Unknown	Intermediate	Intermediate	Intermediate
Tiotropium	Unknown	Intermediate	Intermediate	Intermediate	Intermediate	Problem	Unknown	Problem	Unknown	Problem	Intermediate	Intermediate
Inhaled corticosteroids	Unknown	Intermediate	Intermediate	Intermediate	Problem	Intermediate	Problem	Unknown	Problem	Intermediate	Intermediate	Intermediate
Fluticasone/salmeterol	Unknown	Best	Best	Intermediate	Problem	Problem	Problem	Problem	Problem	Problem	Problem	Problem
Budesonide/formoterol	Unknown	Best	Best	Intermediate	Intermediate	Intermediate	Problem	Unknown	Problem	Problem	Problem	Problem

CV = cardiovascular

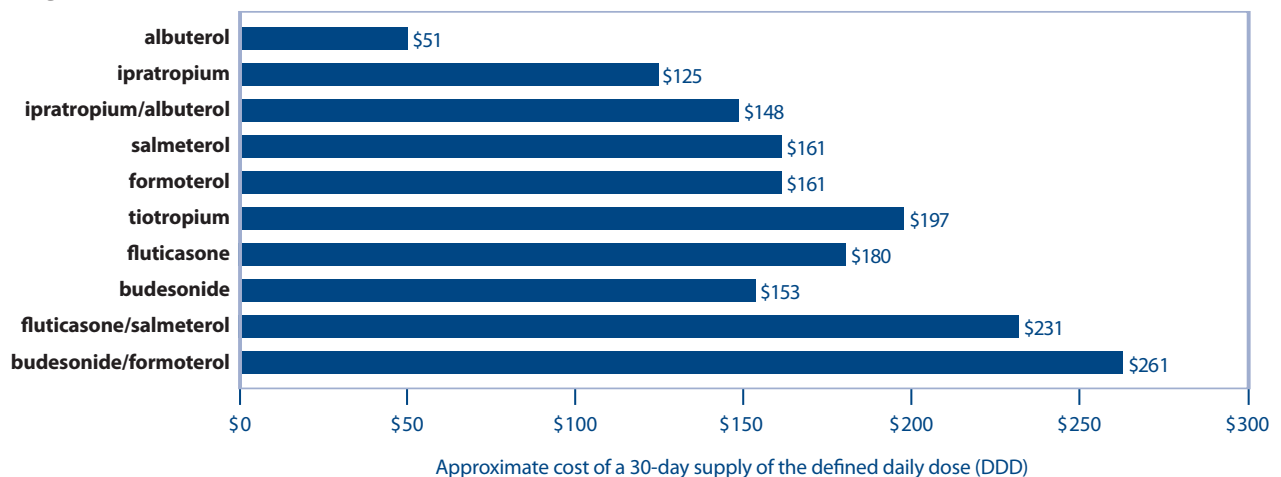
Best outcome	Intermediate	Problem	Unknown or nil effect shown
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Short-acting β-agonists = albuterol, levalbuterol
 Long-acting β-agonists = salmeterol, formoterol, arformoterol
 Inhaled corticosteroids = fluticasone, budesonide, beclomethasone

** Results from post-hoc analysis of TORCH study
 †, †† A meta-analysis showed a significantly increased risk of cardiovascular death, MI, or stroke (but not all-cause mortality) in COPD patients using inhaled anticholinergics.¹⁵
 †† Not demonstrated in all trials; reduced mortality shown in a meta-analysis of trials including TORCH.¹⁶

The costs of inhaled medications for COPD vary very widely. The figure below presents the cost of 30 days of treatment at the standard defined daily dose for each drug or combination product in a non-nebulized form.

Figure 3. Cost of medications used in COPD.

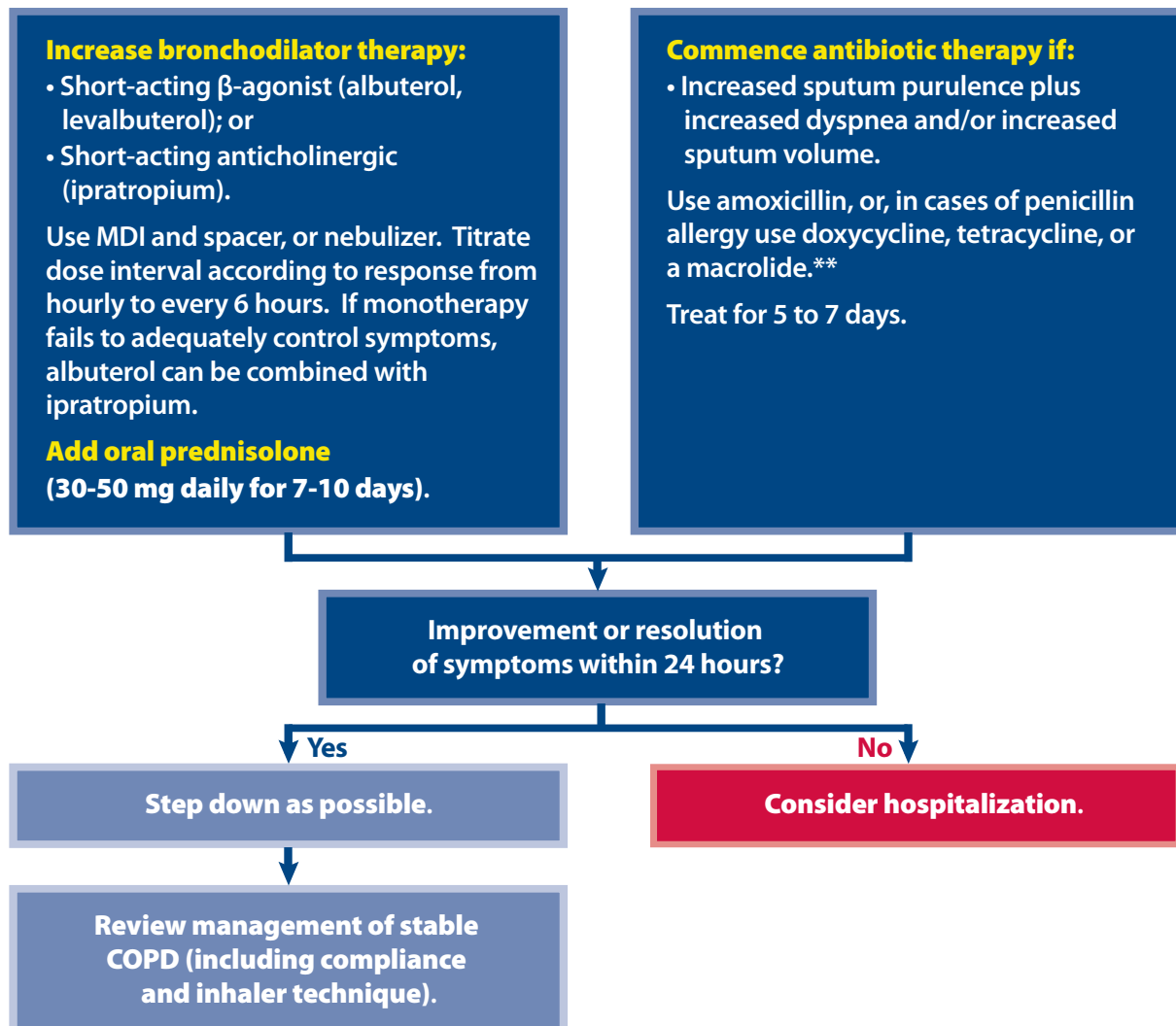




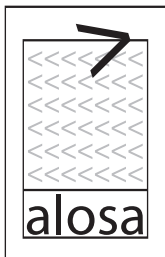
Managing exacerbations

The downward progression in respiratory status for most COPD patients is often punctuated by acute decompensations requiring additional treatment. These should be addressed promptly and aggressively.¹⁷⁻¹⁹

Figure 4. Managing a moderate to severe COPD exacerbation.



** Macrolide antibiotic = azithromycin or clarithromycin



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Additional references documenting these recommendations are provided in the evidence document accompanying this material.

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This material was produced by Leslie Jackowski, B.Sc. (Hon.), MBBS, Research Fellow, Harvard University; Nitesh K. Choudhry, M.D., Ph.D., Assistant Professor of Medicine, Harvard Medical School; Michael A. Fischer, M.D., M.S., Assistant Professor of Medicine, Harvard Medical School and William H. Shrank, M.D., M.S.H.S., Assistant Professor of Medicine, Harvard Medical School. Series editor: Jerry Avorn, M.D., Professor of Medicine, Harvard Medical School. Drs Avorn, Choudhry, Fischer, and Shrank are all physicians at the Brigham and Women's Hospital in Boston. None of the authors receives any personal compensation from any drug company.

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These are general recommendations only; specific clinical decisions should be made by the treating physician based on an individual patient's clinical condition.