

COPD

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Overview

COPD is a common respiratory disease, which affects >700,000 adults in Canada, and is the fourth most common cause of death. However, it remains underdiagnosed – index of suspicion must be high, and although chest X-ray findings may suggest it, diagnosis is formally made by spirometry only. Early diagnosis of high-risk patients is paramount.

Risk Factors²

May be grouped into Exposure-based and Host-based:⁵

Exposure – smoking, occupation/environment, perinatal or childhood illness, atopy, social factors

Host – genetics (e.g. alpha-1-antitrypsin deficiency), gender, airway (e.g. severe asthma)

Definition¹

COPD is characterised by progressive, partially reversible airflow limitation, which leads to air-trapping and hyperinflation

Complications

Ischemic heart disease, metabolic syndrome, cor pulmonale, anemia, pulmonary hypertension, lung cancer, cachexia, malnutrition, peripheral muscle dysfunction, osteopenia/osteoporosis, glaucoma, cataracts, anxiety, depression

Diagnostic Considerations

Key is suspecting the diagnosis – 5 screening questions can suggest:¹

- Do you cough regularly?
 - Do you cough up phlegm regularly?
 - Do even simple chores make you short of breath?
 - Do you wheeze when you exert yourself, or at night?
 - Do you get frequent colds that last longer than other people?
- if > 1 positive answer, proceed to Spirometry

Differential Diagnosis and Approach¹

Respiratory

Asthma – see chart to right
 Bronchiectasis – daily purulent sputum, CT findings
 Tuberculosis – risk factors on Hx, Mantoux, granuloma on CXR
 Diffuse panbronchiolitis – non-smoker, Asian, sinusitis; CT signs
 Bronchiolitis obliterans – inhalation, transplant, rheum; CT signs
 Pulmonary fibrosis – CXR or CT

Cardiac

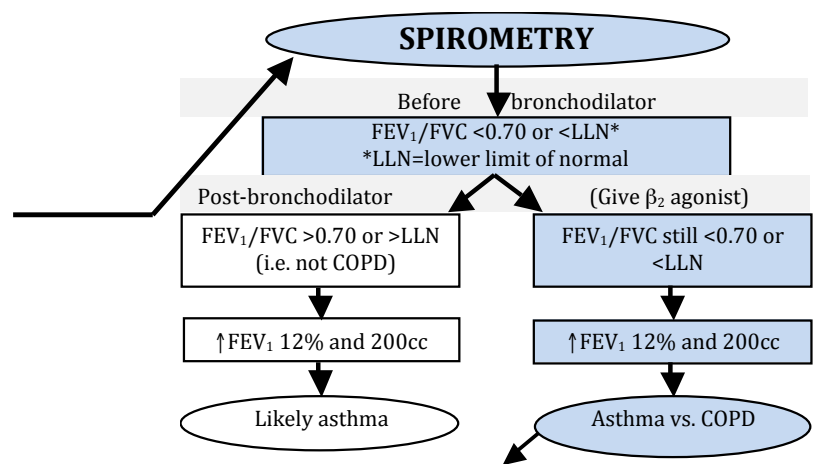
Heart failure – basilar crackles, CXR + echocardiogram findings
 Pulmonary vascular disease – echocardiogram findings
 Anemia – bloodwork

Other

Alpha-1-antitrypsin deficiency – young, non-smoker, liver disease
 Severe deconditioning
 Obesity

When to Refer^{1,2}

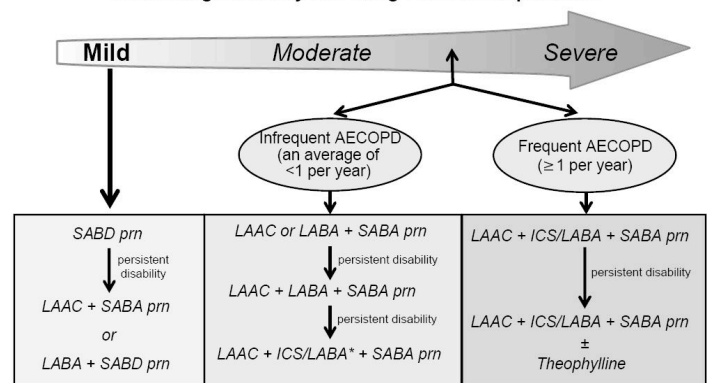
Uncertain diagnosis	Onset <40-years-old
Suspected α-1-AT deficiency	Rapid decline
FEV1 < 50%	Unintentional weight loss
>2 exacerbations/year	Need for O2 therapy
Onset of comorbidities	For surgery



Asthma		COPD
Usually <40 years	Age of onset	Usually >40 years
Not casual	Smoking history	Usually >10 pack-years
Infrequent	Sputum amount	Often
Often	Allergies	Infrequent
Stable	Disease course	Progressively worse
Often normalises	Spirometry	Improves somewhat
Intermittent, variable	Symptoms	Persistent

Modified: O'Donnell et al 2008. Can Respir J Vol 15 Suppl A, 1A.

Increasing Disability and Lung Function Impairment



From O'Donnell et al 2008. Can Respir J Vol 15 Suppl A, 1A.
 SABD=short-acting bronchodilator, SABA=short-acting beta agonist. LABA=long-acting beta agonist. LAAC=long-acting

The Medical Research Council Dyspnea Scale	
Grade	Description
1	Only short of breath (SOB) with strenuous exercise
2	SOB going up slight hill or hurrying on level
3	Walks slower than people of same age due to SOB, or have to stop for breath when walking on level
4	Stop for breath after walking 100yd (90m) or few minutes level
5	Too SOB to leave the house, or SOB when dressing

Management^{1,2,3}

Smoking cessation is the **most effective** intervention to decrease the risk of developing COPD, and to slow its progression.

All patients should be encouraged to remain active, despite experiencing dyspnea (except when outdoor air quality is poor).

Pulmonary rehabilitation for stable, symptomatic patients. Treat comorbidities and complications.

Educate patients re: self-management – smoking, exacerbations, inhaler use, community resources, end-of-life preparation.

Vaccination: annual flu shot, pneumococcal vaccine at onset (repeat in 5 – 10 years).

Consider surgery: bullectomy, lung volume reduction, transplant.

Bronchodilators are mainstay of pharmacotherapy - reduce air trapping, improve dyspnea and QoL, even if no obvious better spirometry.

Oxygen therapy – may increase survival and function in patients with hypoxemia → if PaO₂ <55, or <60 + cor pulmonale, or HCT >56%.

Medication	Usual dose/cost	Indication/Efficacy	Caution/Adverse effects
SHORT ACTING BRONCHODILATORS (SABD) – 1st line PRN in mild COPD and always available as PRN rescue medication⁴			
Short Acting Beta-2 Agonist (SABA)			
Salbutamol MDI: 100 mcg/inh Diskus: 200 mcg/inh	1-2 puffs q 4-6h prn ⁵ Max: 800 mcg/day ⁵	Improves lung function, dyspnea, exercise endurance in moderate to severe COPD. No consistent effect on quality of life. ² Duration of action 4-6 hours. ⁵	Tremor, nervousness, headache, dizziness, ↑ HR, palpitations, ↑ QT, ↓ K+, Tachyphylaxis ^{4,5} Hyperglycemia in diabetes mellitus
Terbutaline Turbuhaler: 0.5mg/inh	1 puffs q 4-6h prn ⁵ Max: 6 puffs/day ⁵		
Short Acting Anti-cholinergic (SAAC)			
Ipratropium bromide MDI 20 mcg/inh	2-4 puffs q 6-8h ⁵ Max: 12 puffs/day ⁵	Improves lung function, dyspnea, exercise endurance in moderate to severe COPD. No consistent effect on quality of life. ⁴ Duration of action 4-8 hours ⁵	Dry mouth, metallic, headache, more than SABA in elderly Caution: glaucoma/urine retention ^{4,5}
LONG ACTING BRONCHODILATORS (LABD) – 1st line moderate COPD, or alternate for symptomatic mild COPD not responsive to SABA prn⁵			
Long acting Beta-2 Agonist (LABA)			
Formoterol \$\$ onset 5min Turbuhaler: 6, 12mcg/inh	1-2 puffs q12h ⁵ Max 48 mcg/day ⁵	Improves lung function, chronic dyspnea, and health status ⁴ Reduced frequency and severity of exacerbations (TORCH). ⁶ Duration of action 8-12 hours. ⁵	Generally well tolerated Tremor, nervousness, headache, dizziness, palpitations, ↑ QT, ↓ K+, CNS irritability, insomnia, ^{4,5} muscle cramps See SABA section Indacaterol: minor CYP 2D6/3A4 and P-gp inhibitor
Salmeterol \$\$ onset 1 hr Diskus: 50 mcg/ing Diskhaler: 50 mcg/blister	1 puff q12h ⁵ Max 50 mcg Q12h ⁵		
Indacaterol \$ onset 5 min Neohaler: 75 mcg/capsule	1 puff/day (75 mcg)		
Long acting Anticholinergics (LAAC)			
Tiotropium \$\$\$\$ Handi-Haler: 18 mcg/cap for inhalation	18 mcg (1 capsule) inhaled once daily ⁵	1st line moderate COPD or adjunct for symptomatic mild COPD failing PRN short acting bronchodilator. ² Improves lung function, exercise tolerance, dyspnea. ⁴ Chronic use may ↑ quality of life, ↓ exacerbations, ↓ hospitalizations, ⁷ No change in rate of decline in FEV ₁ , and no increased risk CV event or death. ⁴ Duration of action 24h. ⁵	Dry mouth, bitter taste ^{4,5} Rare: urine retention, prostatic symptoms, glaucoma if dispersed into eyes ^{4,5} Glycopyrronium: caution with hiatus hernia, hyperthyroidism, ulcerative colitis
Glycopyrronium \$ Breezhaler 50 mcg/cap	1 puff/day (50 mcg)		
INHALED CORTICOSTEROIDS (ICS)			
Fluticasone \$\$\$ MDI 50, 125, 250 mcg/inh Diskus 50, 100, 250, 500 mcg/inh	Lower steroid dose if less exacerbations 100-500mcg BID ¹ Max 1000mcg/day ⁵	ICS should never be used alone → add to LABA for those with moderate-severe COPD with ≥ 1 exacerbations per year. ⁴	Oral thrush 5-6%, dysphonia, skin bruising ^{4,5} Long-term, high-dose may cause: adrenal suppression ↑ pneumonia rates 3.5%/year ↑ intraocular pressure Monitor bone density in those with ≥ 1 risk factor for osteoporosis ^{4,5}
Beclomethasone \$ MDI 50, 100 mcg/inh	50-400mcg BID ⁵ Max 800mcg/day ⁵		
Budesonide \$ Turbuhaler: 100, 200, 400 mcg/inh	200-400mcg BID ⁵ Max 2400mcg/day ⁵		

METHYLXANTHINES			
Theophyllines: \$. "Can half SR tabs" Brandname: Uniphyll® 400, 600mg SR tab Generics: *dose q12h* - Novo-Theophyl SR 100, 200, 300mg SR tab - Apo Theo LA 100, 200, 300mg SR tab Elixir: *dose q6-8h" 5.3mg/mL oral liquid	300mg-900mg/d Uniphyll (q24h): Start 400-600mg/d ^{5,9} Generics: start 150mg BID, up to 200 then 300mg BID q3d ^{5,9} Elixir (q6-8h): Initial 300mg/d div TID-QID, up to 400 then 600mg QID q3d ^{5,9}	3rd line = last resort add on oral therapy for severe COPD (if dyspnea persists despite maximal combined therapy) ⁴ Modest benefits: ↑ lung function, ↓ symptoms/dyspnea, ↑ endurance/exercise capacity ⁴	GI nausea, vomiting, abdominal cramps, insomnia, tremor, hyperactivity, headache, tachycardia ^{5,9} Potential systemic toxicities → monitor and adjust dose based on clinical response and serum drug levels (55-85 umol/L). Toxic >110 umol/L ^{5,9} Toxicity: life threatening arrhythmias, seizures ^{5,9} CAUTION: Possible drug interactions with cyp1A2 drugs (eg. macrolides. quinolones, etc.) ^{5,9}
Aminophylline \$ 225, 350mg SR dose BID			
Daxas® (roflumilast)			
New drug Anti-inflammatory action	500 mcg po daily ⁵	Add-on therapy to bronchodilators for the maintenance treatment of severe COPD associated with chronic bronchitis ⁵ Modest benefit in airway function, FEV1, and ↓ frequency and severity of exacerbations ¹⁰	GI (nausea/diarrhea, abdominal pain), weight loss ^{5,10} Caution if immunosuppressed, cancer, neuropsychiatric ⁵ Rare: depression/suicide, ↑AST Drug interactions: carbamazepine, phenobarb, phenytoin

Acute Exacerbation¹

Defined as sustained increased dyspnea, cough, or sputum, more use of maintenance medication. Treat with SABA, SAAC, oral steroids. If Winnipeg criteria met (more cough, more sputum, change sputum quality) → then antibiotics.

Patient Resources

- Canadian Thoracic Society action plan – http://copdguidelines.ca/pdf/1408_THOR_ActionPlan_v3.pdf
- COPD Slim Jim – <http://copdguidelines.ca/pdf/Brochure-COPD.pdf>
- Smoking cessation guidelines (US) - <http://www.surgeongeneral.gov/tobacco/index.html>
- Living Well – <http://www.livingwellwithcopd.com> (password=COPD), patient learning modules, flip charts, posters
- Making Choices: decision aid for patients regarding respiratory treatment – <http://decisionaid.ohri.ca/docs/das/COPD.pdf>
- CLA breathworks – http://www.lung.ca/diseases-maladies/copd-mpoc/breathworks-actionair/index_e.php#fact_sheets

References can be found online at http://www.dfcu.utoronto.ca/programs/postgraduateprogramme/One_Pager_Project_References.htm