Maximizing Chronic Obstructive Pulmonary Disease (COPD) Outcomes

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Disclosures

- There are no financial conflicts of interest to disclose.

Maximizing COPD Outcomes Objectives

At the conclusion of this program, pharmacist participants should be able to:

- Review the basics of COPD including incidence, definition, diagnosis, and staging
- Discuss smoking cessation consulting for patients with COPD
- Review vaccination schedule recommended for patients with COPD
- Describe treatment recommendations for patients with COPD
- Evaluate device selection and proper inhaler technique when counseling patients with COPD

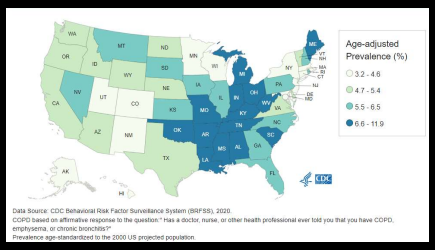
At the conclusion of this program, pharmacy technician participants should be able to:

- Define COPD
- List one reason why smoking cessation may be beneficial for a patient with COPD
- Recall two vaccines recommended for patient with COPD
- Recognize common treatments for patients with COPD

COPD: Incidence

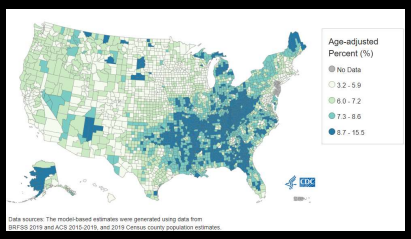
Worldwide	US
250 million living with COPD	16 million living with COPD
> 3 million annual deaths	> 150 thousand annual deaths
3rd leading cause of death	4th leading cause of death

https://foundation.chestnet.org/wp-content/uploads/2021/04/GSK_COPD_patient-infographic.pdf



https://www.cdc.gov/copd/data-and-statistics/state-estimates.html

COPD: Incidence by County



https://www.cdc.gov/copd/data-and-statistics/county-estimates.html

COPD is the _____ leading cause of death worldwide.

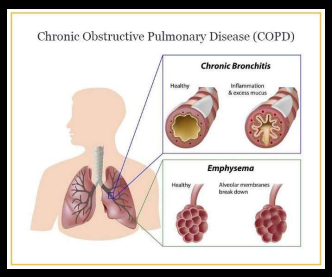
- 1. First
- 2. Second
- 3. Third
- 4. Fourth

COPD Basics: Definition

Definition: A preventable and treatable heterogeneous lung condition characterized by chronic respiratory symptoms

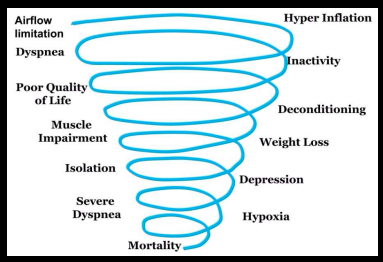
- **dyspnea**
- **cough**
- **sputum production**
- **and/or exacerbations**

due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction



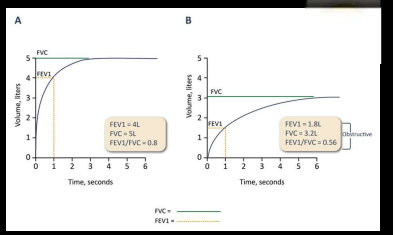
https://www.halodx.com/lung/copd/

The Dyspnea Spiral



COPD: RISK FACTORS AND DIAGNOSIS

- Causes and Risk Factors
  - Gene-Environmental exposures over the lifetime that damage lungs
  - Main exposure is **tobacco** smoking, followed by never-smokers and workplace exposures in US and toxic particles and gases from household and outdoor air pollution worldwide
  - Rare gene mutation in SERPINA1 gene leading to α-1 antitrypsin deficiency
  - Other: asthma, severe childhood respiratory infections, low socioeconomic status
- Diagnosis
  - Extremely under-diagnosed
  - Non-fully reversible airflow obstruction confirmed with spirometry:
    FEV1/FVC <0.7
    post-bronchodilation



Proposed Taxonomy (Etiotypes) for COPD

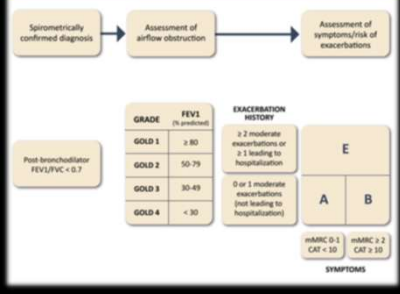
Table 1.1

Classification	Description
Genetically determined COPD (COPD-G)	Alpha-1 antitrypsin deficiency (AATD) Other genetic variants with smaller effects acting in combination
COPD due to abnormal lung development (COPD-D)	Early life events, including premature birth and low birthweight, among others
Environmental COPD	
Cigarette smoking COPD (COPD-C)	• Exposure to tobacco smoke, including *in utero* or via passive smoking • Vaping or e-cigarette use • Cannabis
Biomass and pollution exposure COPD (COPD-P)	Exposure to household pollution, ambient air pollution, wildfire smoke, occupational hazards
COPD due to infections (COPD-I)	Childhood infections, tuberculosis-associated COPD, WHIV-associated COPD
COPD & asthma (COPD-A)	Particularly childhood asthma
COPD of unknown cause (COPD-U)	

*Adapted from Celli et al. (2022) and Stolz et al. (2022)

GOLD ABE Assessment Tool

Figure 2.3



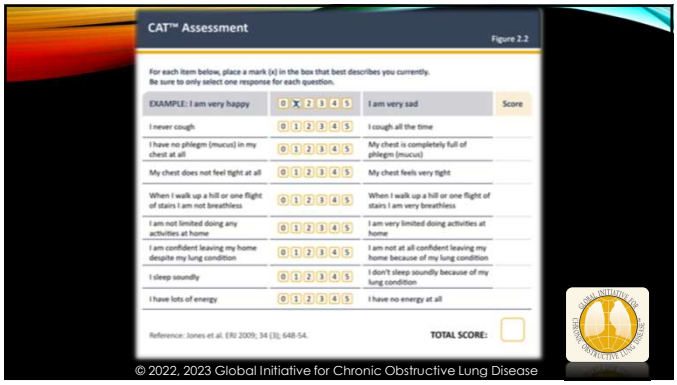
Modified MRC Dyspnea Scale

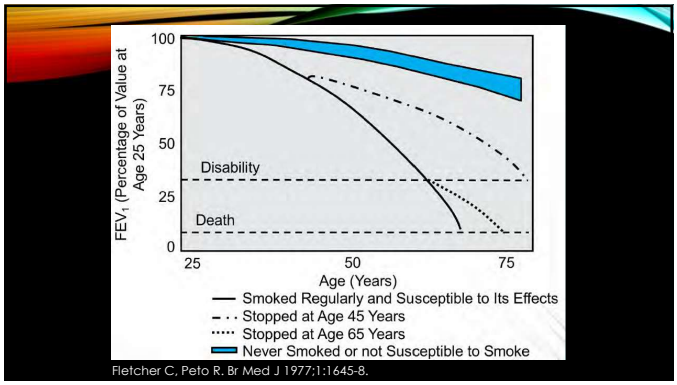
Table 2.7

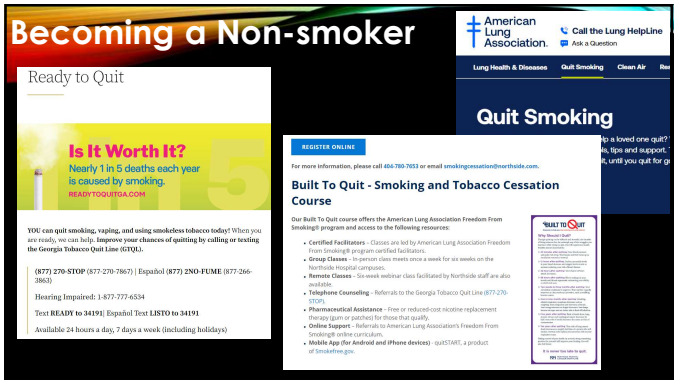
PLEASE TICK IN THE BOX THAT APPLIES TO YOU | ONE BOX ONLY | Grades 0 - 4

mMRC Grade 0	mMRC Grade 1	mMRC Grade 2	mMRC Grade 3	mMRC Grade 4
I only get breathless with strenuous exercise	I get short of breath when hurrying on the level or walking up a slight hill	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	I stop for breath after walking about 100 meters or after a few minutes on the level	I am too breathless to leave the house or I am breathless when dressing or undressing
☐	☐	☐	☐	☐

Reference: Fletcher CM. BMJ 1960; 2: 1662.


CAT™ Assessment
Figure 2.2
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:
© 2022, 2023 Global Initiative for Chronic Obstructive Lung Disease


FEV1 (Percentage of Value at Age 25 Years)
100
75
50
25
0
Disability
Death
25
50
75
Age (Years)
Smoked Regularly and Susceptible to Its Effects
Stopped at Age 45 Years
Stopped at Age 65 Years
Never Smoked or not Susceptible to Smoke
Fletcher C, Peto R. Br Med J 1977;1:1645-8.


Becoming a Non-smoker
Ready to Quit
Is It Worth It?
Nearly 1 in 5 deaths each year is caused by smoking.
READYTOQUITGA.COM
YOU can quit smoking, vaping, and using smokeless tobacco today! When you are ready, we can help. Improve your chances of quitting by calling or texting the Georgia Tobacco Quit Line (GTQL).
(877) 270-STOP (877-270-7867) | Español (877) 2NO-FUME (877-266-3863)
Hearing Impaired: 1-877-777-6534
Text READY to 34191| Español Text LISTO to 34191
Available 24 hours a day, 7 days a week (including holidays)
American Lung Association.
Call the Lung HelpLine
Ask a Question
Lung Health & Diseases
Quit Smoking
Clean Air
Quit Smoking
REGISTER ONLINE
For more information, please call 404-780-7653 or email smokingcessation@northside.com.
Built To Quit - Smoking and Tobacco Cessation Course
Our Built To Quit course offers the American Lung Association Freedom From Smoking® program and access to the following resources:
Certified Facilitators - Classes are led by American Lung Association Freedom From Smoking® program certified facilitators.
Group Classes - In-person class meets once a week for six weeks on the Northside Hospital campuses.
Remote Classes - Six-week webinar class facilitated by Northside staff are also available.
Telephone Counseling - Referrals to the Georgia Tobacco Quit Line (877-270-STOP).
Pharmaceutical Assistance - Free or reduced-cost nicotine replacement therapy (gum or patches) for those that qualify.
Online Support - Referrals to American Lung Association's Freedom From Smoking® online curriculum.
Mobile App (for Android and iPhone devices) - quitSTART, a product of SmokeFree.gov.

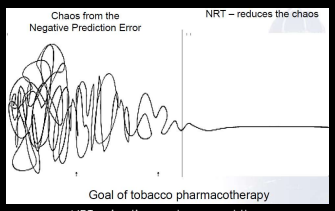
Brief Strategies to Help the Patient Willing to Quit

Table 3.1

ASK	Systematically identify all tobacco users at every visit *Implement an office-wide system that ensures that, for EVERY patient at EVERY clinic visit, tobacco-use status is queried and documented*
ADVISE	Strongly urge all tobacco users to quit *In a clear, strong, and personalized manner, urge every tobacco user to quit*
ASSESS	Determine willingness and rationale of patient's desire to make a quit attempt. *Ask every tobacco user if he or she is willing to make a quit attempt at this time (e.g., within the next 30 days)*
ASSIST	Aid the patient in quitting *Help the patient with a quit plan; provide practical counseling; provide intra-treatment social support; help the patient obtain extra-treatment social support; recommend use of approved pharmacotherapy except in special circumstances; provide supplementary materials*
ARRANGE	Schedule follow-up contact *Schedule follow-up contact, either in person or via telephone*

Tobacco Dependence and Treatment

- **Smoking Topography:**
  - Nicotine yield of cigarette x
  - Number of puffs x
  - Frequency of puffs x
  - Volume of puffs x
  - Puff Depth x
  - Duration of Hold
- Predicts level of dependence, ability to quit, risk of relapse, risk for disease
- Pack per day is LESS useful in clinical setting in individualizing treatment plans



NRT= nicotine replacement therapy

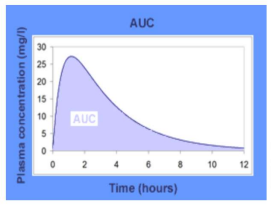
From the work of Dr. Panagis Galiatsatos Johns Hopkins
Jarvis MJ etal. J Natl Cancer Inst 2001;93:134
Kim S. Int J Environ Res Public Health 2018;15:pii:E1024

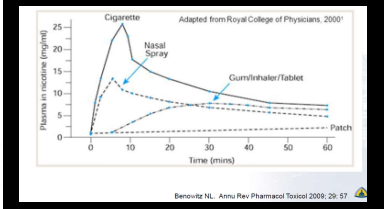
What is the best predictor of smoking dependence?

- 1. Age when started smoking
- 2. Number of ears smoking
- 3. Pack year history
- 4. Smoking topography

Nicotine Delivery Rates

Pharmacokinetics of the cigarette



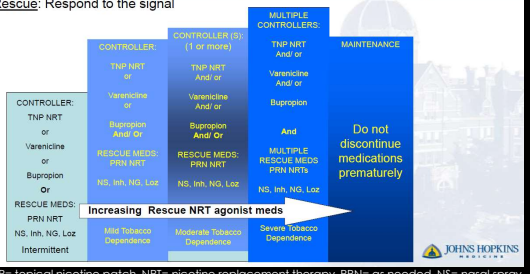


From the work of Dr. Panagis Galiatsatos

Tobacco Dependence and Treatment

Controller: Controls intensity and frequency of negative prediction error signal

Rescue: Respond to the signal



TNP= topical nicotine patch, NRT= nicotine replacement therapy, PRN= as needed, NS= nasal spray, Inh= inhaler, NG= nicotine gum, Loz= lozenge

From the work of Dr. Panagis Galiatsatos

Vaccinations

Vaccine	Recommended by
Influenza	CDC
SARS-CoV-2	WHO and CDC
20-valent pneumococcal conjugate (PCV20) x1 **OR** 15-valent pneumococcal conjugate (PCV15) x1 followed by 23-valent pneumococcal polysaccharide (PPSV23)	CDC
Tdap (dTaP/dTPa) who were not vaccinated in adolescence	CDC
Zoster for patients >50 years old	CDC

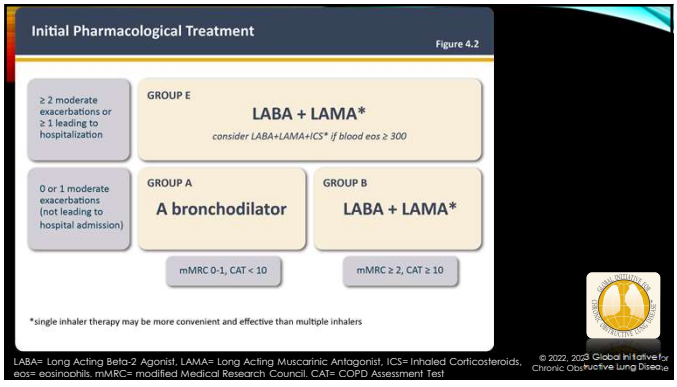
Which 2 vaccines are recommended by the CDC for patients with COPD?

- 1. Influenza
- 2. Pneumococcal PCV 20
- 3. Hepatitis A
- 4. A and B

Pharmacological Therapy for Stable COPD

Goals of therapy:

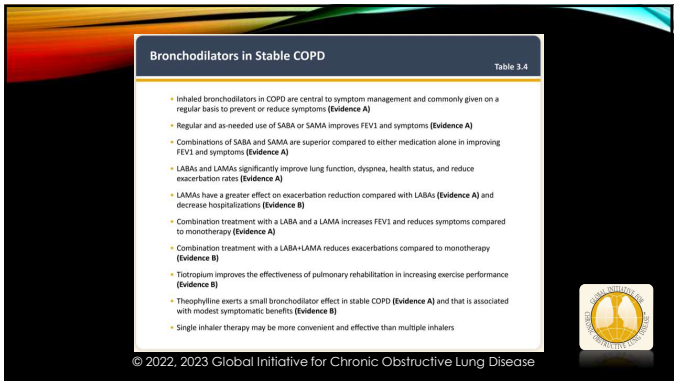
- Reduce symptoms
- Reduce frequency and severity of exacerbations
- Improve exercise tolerance and health status

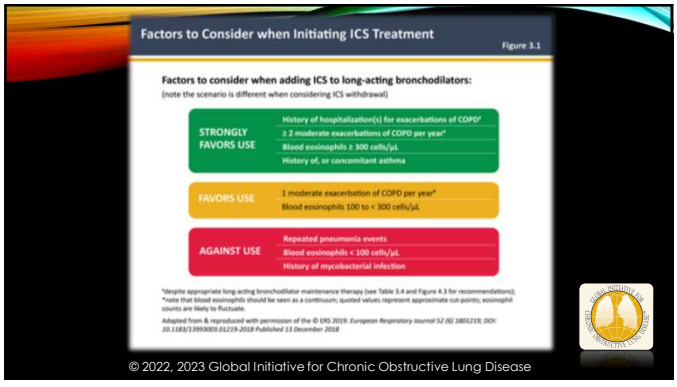


Pharmacologic Therapy

Medication Class	Mechanism	Adverse Effects	Examples
Beta-2 agonist	Relax airway smooth muscle	Resting sinus tachycardia, cardiac rhythm disturbances, somatic tremor, hypokalemia	**SABA:** albuterol, levalbuterol **LABA:** formoterol, salmeterol, olodaterol, vilanterol, arformoterol
Muscarinic antagonist	Block broncho-constrictor effects in airway smooth muscle	Dry mouth, urinary retention	**SAMA:** ipratropium **LAMA:** tiotropium, aclidinium, glycopyrrolate, umeclidinium, revefenacin
Inhaled corticosteroid	anti-inflammatory effects	Oral candidiasis, hoarse voice, skin bruising and pneumonia	**ICS:** budesonide, fluticasone

LABA= Long Acting Beta-2 Agonist, SABA= Short Acting Beta-2 Agonist, LAMA= Long Acting Muscarinic Antagonist, SAMA= Short Acting Muscarinic Antagonist, ICS= Inhaled Corticosteroid





Combination Maintenance Pharmacologic Therapy

LABA + LAMA	LABA + ICS	LABA + LAMA + ICS
Umeclidinium/vilanterol (Anoro) Glycopyrrolate/formoterol (Bevespi) Tiotropium/olodaterol (Stiolto)	Fluticasone/salmeterol (Advair) Fluticasone/vilanterol (Breo) Budesonide/formoterol (Symbicort)	Fluticasone/umeclidinium/vilanterol (Trelegy) Budesonide/glycopyrrolate/formoterol (Breztri)
Increase FEV1 and reduces dyspnea and exacerbations compared to monotherapy	Combination is more effective than individual component in improving lung function and health status and reducing exacerbation in patients with exacerbations and moderate to very severe COPD. Not encouraged due to lack of impact on mortality, benefit with addition of LAMA (triple therapy)	Reduced mortality compared to LABA + LAMA in symptomatic people with history of frequent and/or severe exacerbations. Improves lung function, symptoms and health status, and reduces exacerbations compared to LABA + ICS, LABA + LAMA or LAMA monotherapy.

LABA= Long Acting Beta-2 Agonist, LAMA= Long Acting Muscarinic Antagonist, ICS= Inhaled Corticosteroid

Exacerbation: an event characterized by increased **dyspnea** and/or **cough** and **sputum** that worsens in < 14 days. Usually associated with airway inflammation and gas trapping.

Management of Severe but not Life-threatening Exacerbations*

Table 5.4

- **Assess severity of symptoms, blood gases, chest radiograph**
- **Administer supplemental oxygen therapy, obtain serial arterial blood gas, venous blood gas and pulse oximetry measurements**
- **Bronchodilators:**
  - Increase doses and/or frequency of short-acting bronchodilators
  - Combine short-acting beta$_2$-agonists and anticholinergics
  - Consider use of long-acting bronchodilators when patient becomes stable
  - Use spacers or air-driven nebulizers when appropriate
- **Consider oral corticosteroids**
- **Consider antibiotics (oral) when signs of bacterial infection are present**
- **Consider noninvasive mechanical ventilation (NIV)**
- **At all times:**
  - Monitor fluid balance
  - Consider subcutaneous heparin or low molecular weight heparin for thromboembolism prophylaxis
  - Identify and treat associated conditions (e.g., heart failure, arrhythmias, pulmonary embolism etc.)

*Local resources need to be considered

Follow-up Pharmacological Treatment

Figure 4.4

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

DYSPNEA

LABA or LAMA → LABA + LAMA*

- Consider switching inhaler device or molecules
- Implement or escalate non-pharmacologic treatment(s)
- Investigate (and treat) other causes of dyspnea

EXACERBATIONS

LABA or LAMA → LABA + LAMA* → LABA + LAMA + ICS*

Roflumilast *FEV1 < 50% & chronic bronchitis*

Azithromycin *Preferentially in former smokers*

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

**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

Add-on Pharmacologic Therapy

Medication class	Use	Adverse Effects	Example
Phosphodiesterase-4 Inhibitor	Indicated in patients with FEV1 <50% (severe-very severe COPD), with chronic bronchitis and a history of exacerbations in patients treated with controller respiratory medication	Diarrhea, nausea, reduced appetite, weight loss *use with caution in patients with depression	roflumilast
Macrolide antibiotic	May reduce exacerbation rates in first year in patients prone to exacerbations	Increase rates of antimicrobial resistance, increase rates of hearing impairment, QT-prolongation	azithromycin 250mg daily or 500mg three times weekly erythromycin 250mg BID

What treatment does every patient with COPD need?

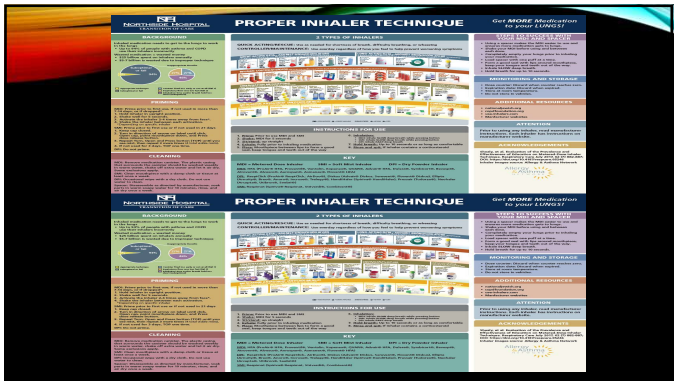
- 1. SABA +/- SAMA
- 2. LABA + LAMA
- 3. LABA + ICS
- 4. LABA + LAMA + ICS

If a patient has worsening symptoms or exacerbations, what treatment do they need?

- 1. SABA +/- SAMA
- 2. LABA + LAMA
- 3. LABA + ICS
- 4. LABA + LAMA +/- ICS

How often do you educate on proper inhaler use?

- 1. More than once a week
- 2. Occasionally
- 3. Rarely
- 4. Never



Types of Respiratory Delivery Devices

	Metered Dose Inhalers (MDIs)	Soft Mist Inhalers (SMIs)	Dry Powder Inhalers (DPIs)	Nebulizers/nebules
Advantages	• Portable • Quick treatment • Generic options	• Portable • Quick treatment	• Portable • Quick treatment • Generic options	• No coordination needed • Cost of short acting medication • Cost of jet nebulizer
Disadvantages	• Weekly cleaning with re-priming • Coordination required • Cost • Recommend spacer for best lung deposition, weekly cleaning of spacer	• Wipe mouthpiece weekly with damp cloth • Set up and priming • Coordination • Cost	• Occasionally wipe mouthpiece with dry cloth • Fast inspiratory effort • Cost	• Long time for treatment • High cost of long acting medications • High cost of vibrating mesh nebulizers • Clean after each use, disinfect weekly (or more) • Jet nebulizer: change nebulizer set up (nebulizer and tubing) and filter

Proper Inhaler Technique

- Assemble MDI/SMI
- Prime MDI/SMI
- Exhale fully away from mouthpiece
- Sit up straight
- Form a good seal with lips on mouthpiece, keep teeth and tongue out of way of airflow
- Inhale
  - MDI/SMI: SLOW and deep while pressing button
  - DPI: FAST and deep
- Hold breath up to 10 seconds
- Exhale slowly
- Wait 30-60 seconds before second puff
- Rinse mouth with water and spit if using inhaled corticosteroid (ICS)

MDI=metered dose inhaler, SMI=soft mist inhaler, DPI=dry powder inhaler

It is important to assess inhaler technique at each encounter.

- 1. True
- 2. False

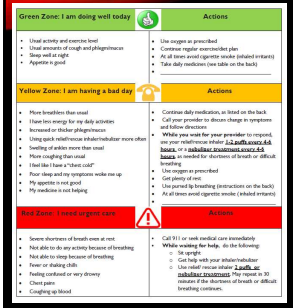
Considerations when Selecting a Device

- Does the patient have any **cognitive barriers** to learning or retaining proper inhaler technique like dementia, stroke, infection, etc.?
  - If yes, consider nebulizer
- Does the patient have **functional decline** that would prevent proper inhaler technique like Parkinson's, arthritis, poor vision, stroke, muscle weakness, low inspiratory flow rate, etc.?
  - If yes, consider nebulizer
- Can the patient produce a **FAST and deep inhale**?
  - If yes, consider DPI
- Can the patient **inhale SLOW and deep** WHILE pressing the actuation button?
  - If yes, consider MDI/SMI
- Is the patient able to **hold breath** after inhalation?
  - If no, consider nebulizer or metered dose inhaler (MDI) with spacer
- Can the patient **afford** the medication?
  - If no, consider short acting bronchodilators (SABD)

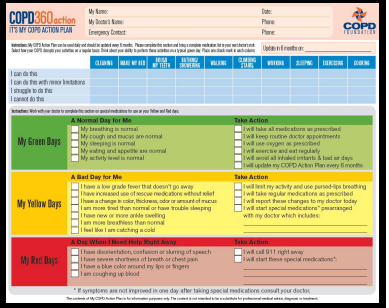
Which is the best delivery device?

- 1. Metered Dose Inhalers
- 2. Soft Mist Inhalers
- 3. Dry Powder Inhalers
- 4. Nebulizer

COPD Action plans



Adapted from American Lung Association



COPD Foundation

Supportive Considerations

- Physical activity
  - Clear benefits and strong predictor of mortality, pursed lip breathing and diaphragmatic breathing improve pulmonary function and increase exercise tolerance
- Nutritional support
  - Dietary advice and nutritional supplementation can increase body weight, quality of life, respiratory muscle strength and 6-minute walk distance.
  - Rehabilitation, nutritional support and protein supplementation may improve fat free mass, BMI, and exercise performance
  - In malnourished hospitalized patients, protein enriched supplementation decreased mortality and improved handgrip strength and body weight 90 days post discharge.
- Panic, anxiety and depression
  - Treat as usual and encourage physical exercise, cognitive behavioral therapy and mind-body interventions (e.g. breathing exercises, mindfulness-based therapy, yoga, and relaxation)
- Fatigue
  - Self-management education, pulmonary rehabilitation, nutritional support and mind-body interventions
- Palliative care treatment of dyspnea
  - Opiates, neuromuscular electrical stimulation (NMES), fans blowing in face, chest wall vibration, pulmonary rehabilitation, acupuncture and acupressure

GOLD 2023

Cost Considerations of Respiratory Medications

Commercial Insurance	Medicare Coverage	No insurance or low income
• **Determine tier coverage, switch to lower tier alternative** • **Copay Assist Cards** for brand options • **Consider generic options:** albuterol, ipratropium, albuterol/ipratropium combo, budesonide/formoterol, or fluticasone/salmeterol	**Part D for Inhalers** • Determine tier coverage, switch to lower tier alternative • Consider generic options **Part B for nebulized medications and nebulizers** • Usually processed through Durable Medical Equipment (DME) companies who regularly bill Part B with supplement (80%/20%), home delivery • Ensure ongoing nebulizer set up orders	• **Community Health Center/Federal Supported clinics:** sliding scale fee programs, lower cost medications • **Consider generic options** • **Samples** from provider's office • **Coupons** from manufacturer websites, Needy Meds, Medicine Assistance Tool, GoodRx, ScriptCo, SingleCare, etc. • **Retail discounts:** Walmart, Kroger, Costco, etc. • **Patient Assistance Programs:** check manufacturer websites and NeedyMeds.org

Patient Assistance Programs

Go directly to manufacturer website or use search engines with links to applications and eligibility criteria like RxAssist.org, NeedyMeds.org, and MedicineAssistanceTool.org

Manufacturer	Medication	Program
GSK	Breo/Anoro/Trelegy Ellipta and Advair/Serevent Diskus, Advair HFA	GSK for You • Income 250% of Federal Poverty Level • Resident of US or US Territory • Complete Application • Signed Prescription • Medicare Part D: Proof spent $600 out-of-pocket, copy of Medicare Part D card
AZ	Breztri/Bevespi Aerosphere, Symbicort HFA	AZ & Me Prescription Saving Program • No insurance coverage (commercial or government) • Income 300% Federal Poverty Level, may vary • Complete application with prescriber signature • If Medicare Beneficiary, must enrolled in Low Income Subsidy (LIS)
BI	Spiriva/Stiolto/Striverdi/ Combivent Respimat, Spiriva HandiHaler, Atrovent HFA	BI Cares Patient Assistance Program • Resident of US or US Territory • No health insurance or not enough coverage • Income eligibility requirements (not disclosed) • Complete application with prescriber signature

Manufacturer websites accessed 9/7/2022 GSK=GlaxoSmithKline, AZ= AstraZeneca, BI= Boehringer Ingelheim

Discharge Final Pause

- Does the patient have appropriate COPD treatment and do they understand when to use it?
  - Admitted for AECOPD
    - Controller maintenance therapy: LAMA/LABA +/- ICS
    - Rescue quick acting therapy: SABA +/- SAMA
  - Admitted for another reason with history of COPD: at least SABD
  - Do not duplicate LAMA/LABA/ICS
- Assess inhaler technique every visit, every time
  - "Show me how you use your inhaler"
  - Correct and reassess technique as needed
  - If unable to master technique, consider another device

LAMA=long acting muscarinic antagonist, LABA= long acting beta-2 agonist, ICS= inhaled corticosteroid, SABA= short acting beta agonist, SAMA= short acting muscarinic antagonist, SABD= short acting bronchodilator

Discharge Final Pause

- If discharging with nebulized medication, ensure working nebulizer at home.
  - May need new prescription for nebulizer
  - Review cleaning and changing nebulizer setup (disposable verses reusable) and filter.
- If discharging with new nebulized medications or new inhaler(s), ensure new prescription.
- If patient unable to afford inhaler or nebulizer medication, consider alternatives.
  - SABA/SAMA
  - Free inhaler coupon
  - Patient Assistance Programs

THANK YOU!

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