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COPD In Focus:

Evidence-Based Diagnosis and Management for the Frontlines

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Disclosures or Conflicts of Interest: None

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Agenda/Learning Objectives

- Describe the diagnostic criteria and key clinical features of COPD
- Summarize guideline-based pharmacologic management of stable COPD, including inhaler selection based on symptom burden and exacerbation risk
- Identify non-pharmacologic interventions and strategies to prevent COPD exacerbations, including smoking cessation, pulmonary rehabilitation, and vaccination.

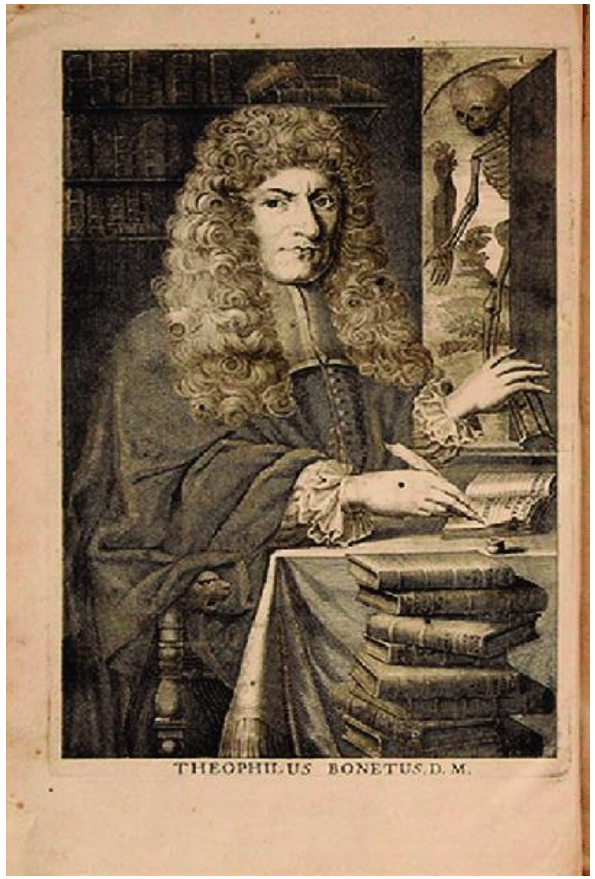
Agenda

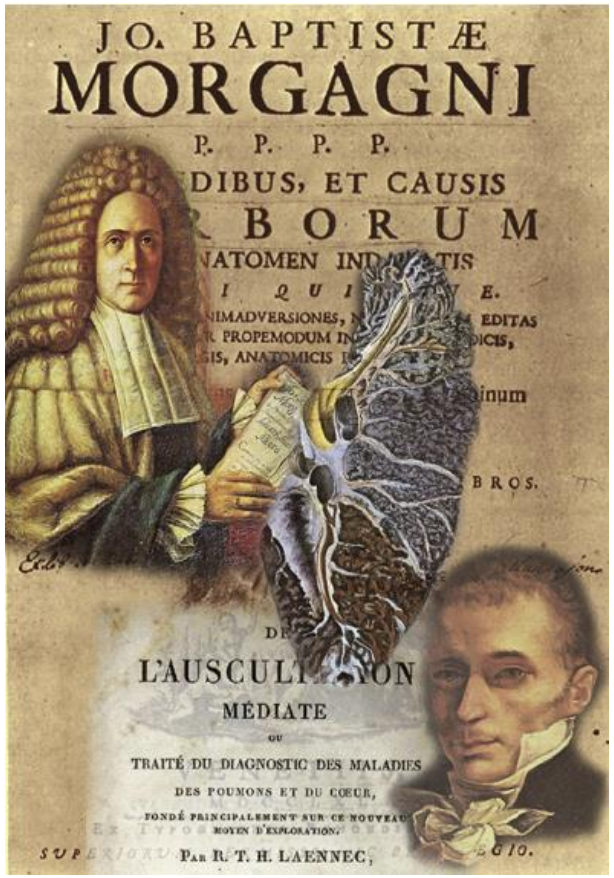
Describe the diagnostic criteria and key clinical features of COPD

Summarize guideline-based pharmacologic management of stable COPD, including inhaler selection based on symptom burden and exacerbation risk

Identify non-pharmacologic interventions and strategies to prevent COPD exacerbations, including smoking cessation, pulmonary rehabilitation, and vaccination.

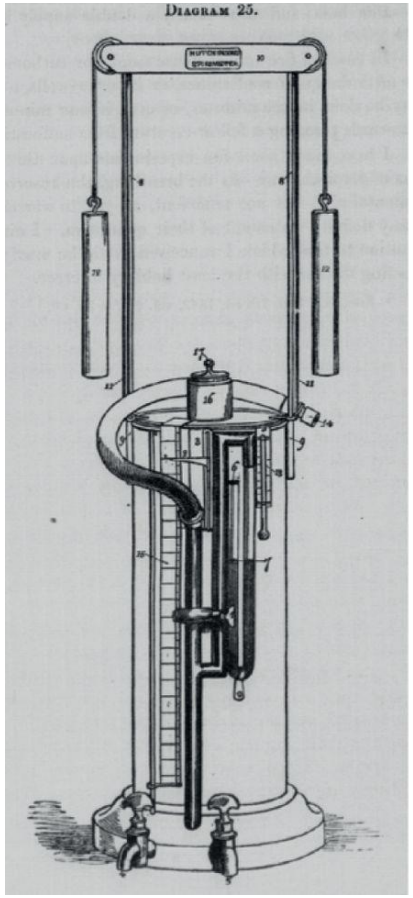
Historical understanding of obstructive lung disease





- Théophile Bonet described “voluminous lungs” in 1679
- Giovanni Battista Morgagni published the first case series on lungs “turgid with air” in 1796
- Charles Badham described “bronchitis” in 1808
- René-Théophile-Hyacinthe Laënnec invents the stethoscope in 1816
- Laënnec describes “in opening the chest, it is not unusual to find that the lungs do not collapse, but they fill up the cavity completely on each side of the heart…The bronchus of the trachea are often at the same time a good deal filled with mucous fluid”

1846: John Hutchinson invents the Hutchinson Spirometer



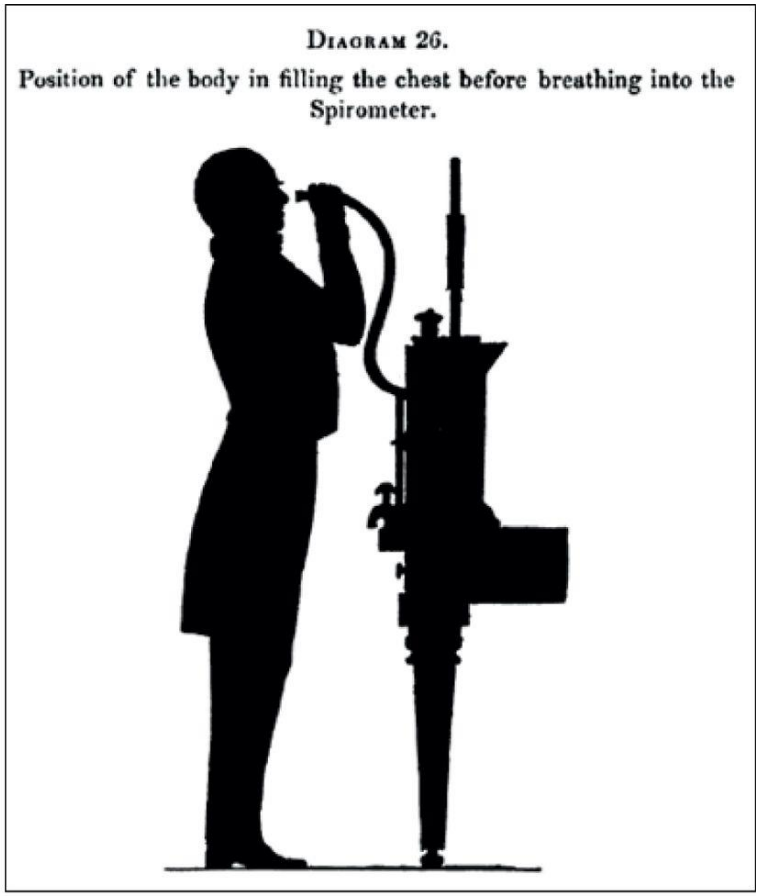


DIAGRAM 26.

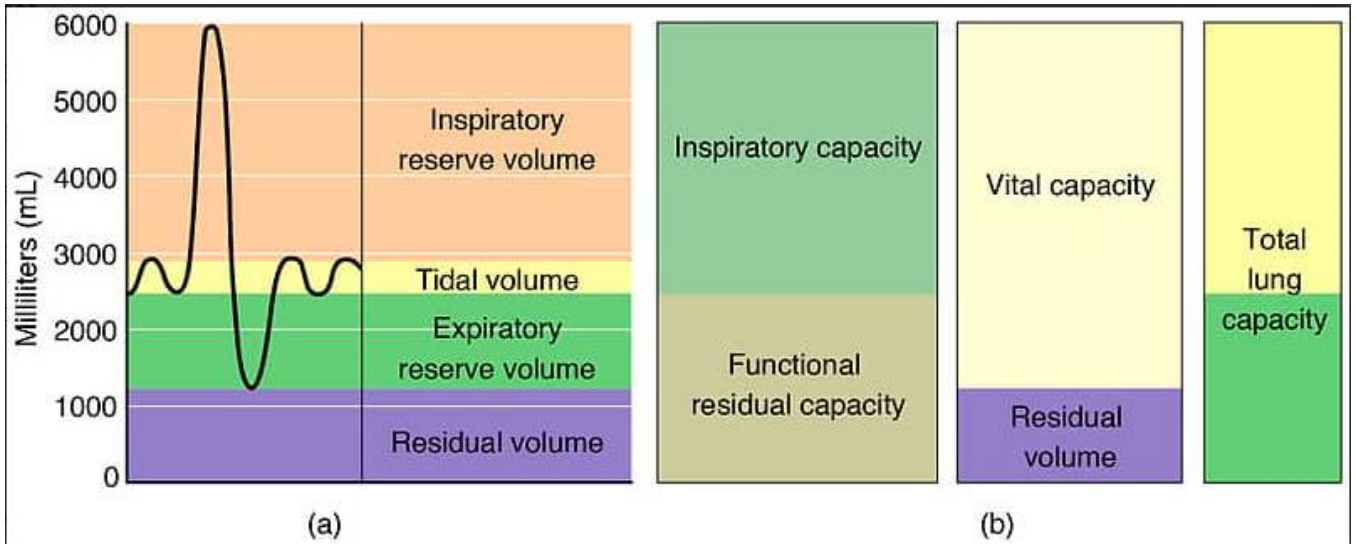
Position of the body in filling the chest before breathing into the Spirometer.

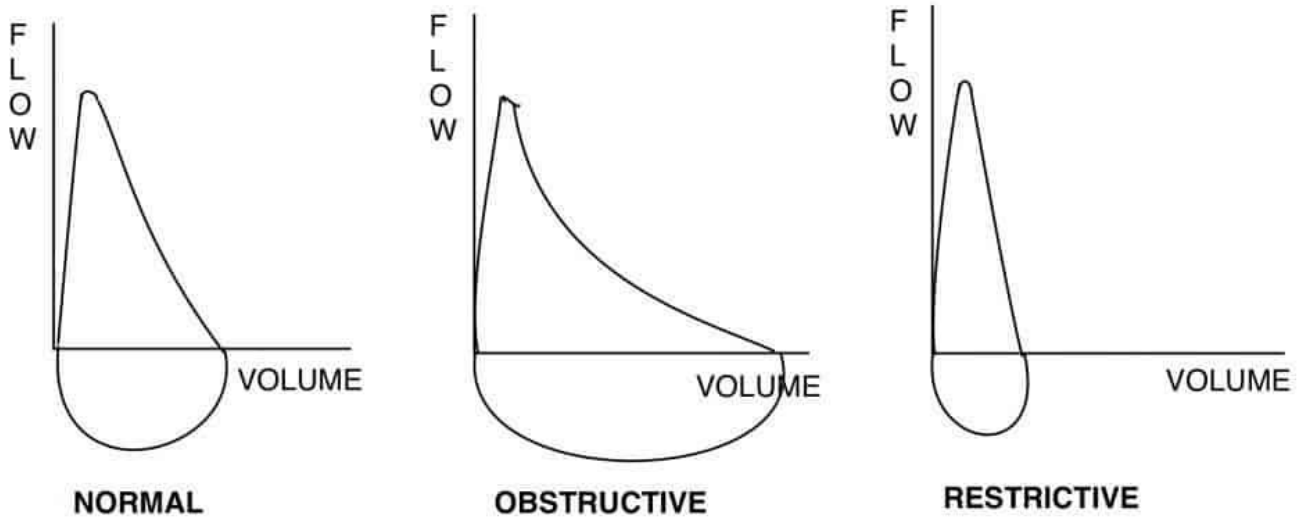
30.—The persons I have examined may be arranged as follows :—

Sailors (merchant service)			121
Fire Brigade of London			82
Metropolitan police			144
Thames ditto			76
Paupers			129
Mixed class (artisans)			370
First Battalion Grenadier Guards			87
Royal Horse Guards (Blue)			59
Chatham recruits			185
Woolwich Marines			573
Pugilists and wrestlers			24
Giants and dwarfs			4
Pressmen	30	Printers	73
Compositors	43		
Draymen			20
Girls			26
Gentlemen			97
Diseased cases			60
Total number			2130

Photo Credit: Kouri A, Dandurand RJ, Usmani OS, Chow CW. Exploring the 175-year history of spirometry and the vital lessons it can teach us today. European Respiratory Review. 2021;30(162). doi:10.1183/16000617.0081-2021

1940's-50's: Tiffeneau, Pinelli, Gaensler develop FEV_1/FVC

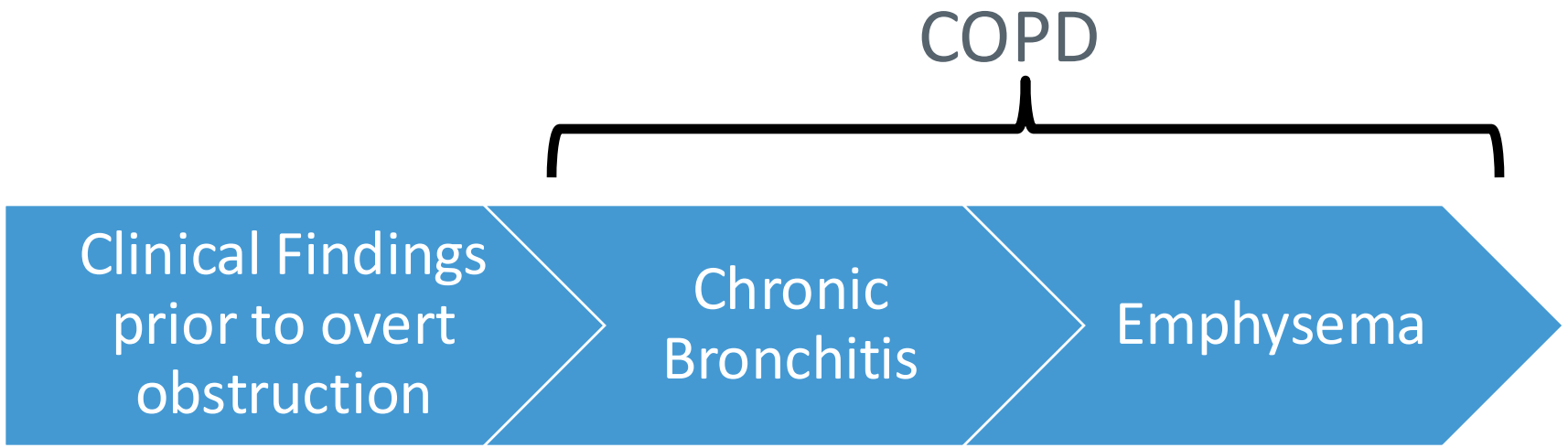




2023 GOLD Definition of COPD

"Chronic Obstructive Pulmonary Disease (COPD) is a 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."

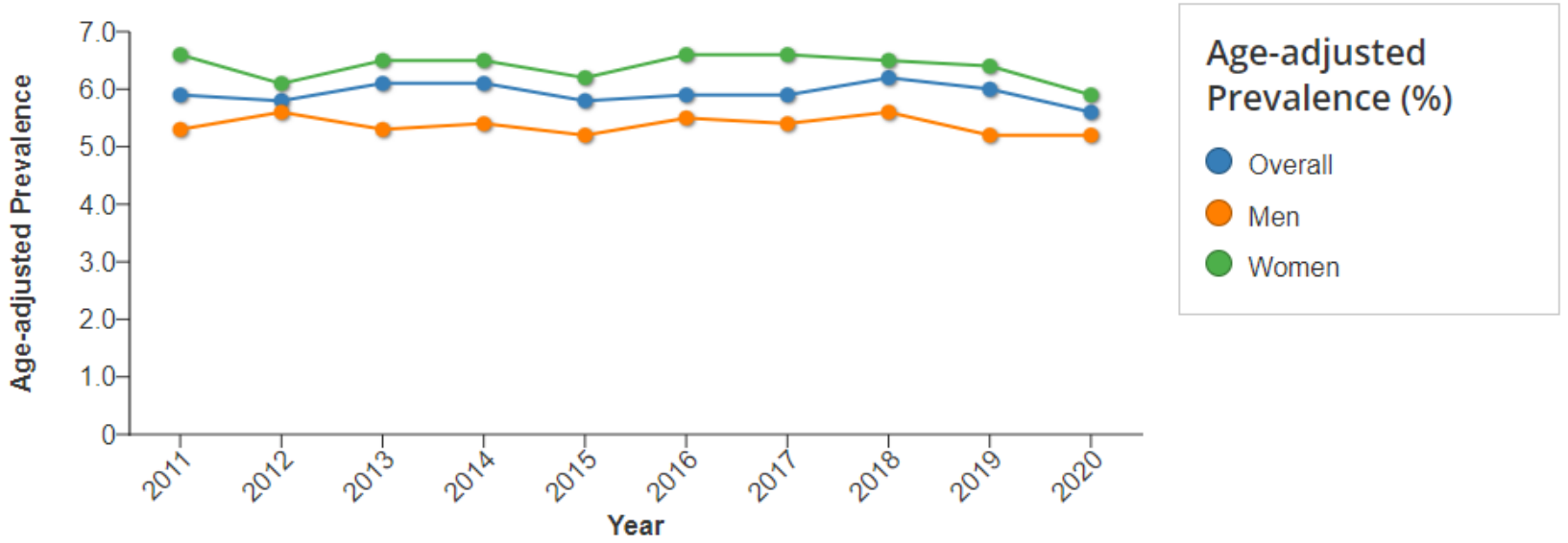
Spectrum of Obstructive Lung Disease



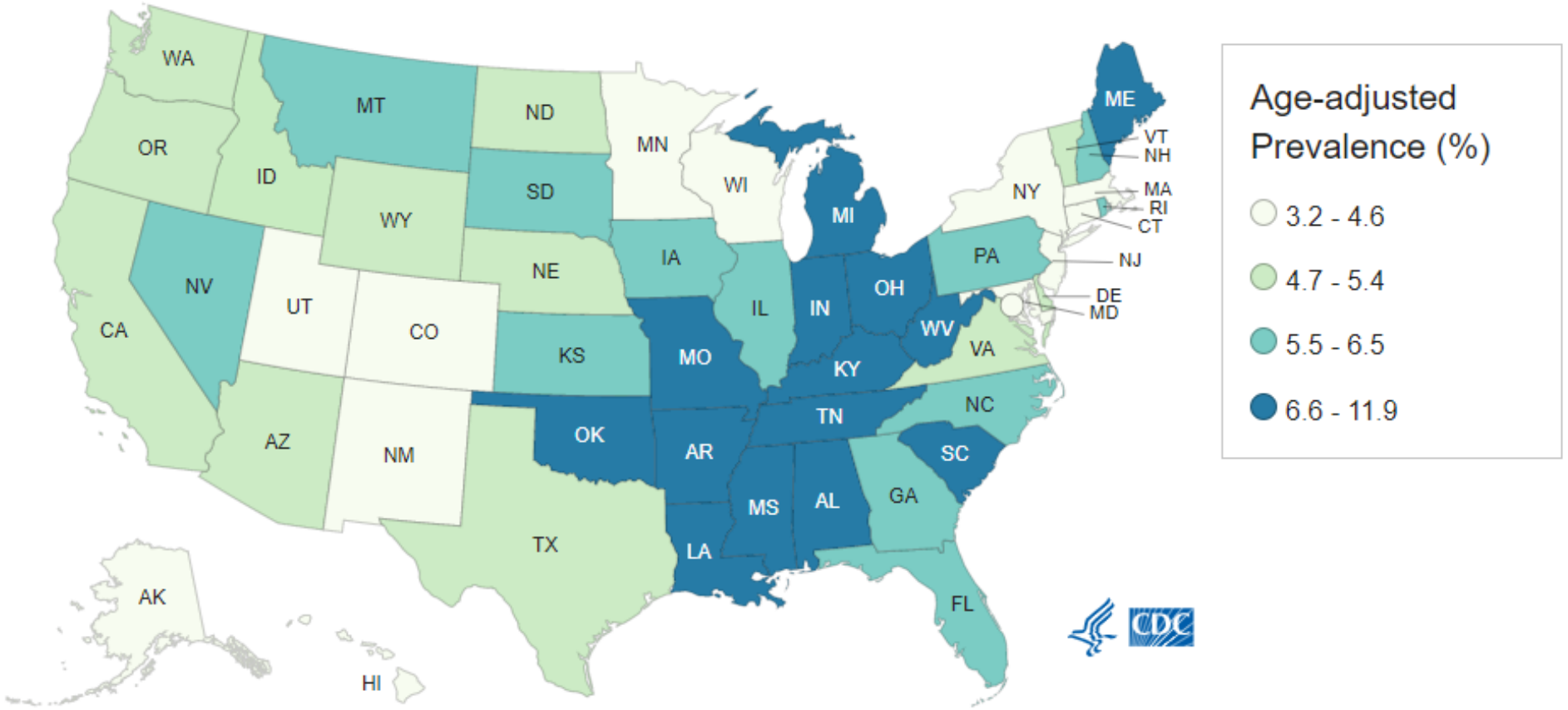
- Radiographic emphysema
- Bronchitis/increased sputum production
- Bronchospasm

Prevalence of COPD in the US

- 5.6% of US adults (~ 12 million) have a diagnosis of COPD and millions more undiagnosed (based on CDC's Behavior Risk Factor Surveillance System (BRFSS) health survey)



Prevalence of COPD by State



Data Source: CDC Behavioral Risk Factor Surveillance System (BRFSS), 2020.

Economic Burden

- 2010 Cost of COPD in US = $50 billion
  - $20 billion indirect costs - i.e. disability (missing work)
  - $30 billion direct costs - ER/clinic visits, hospitalizations, home care, medications

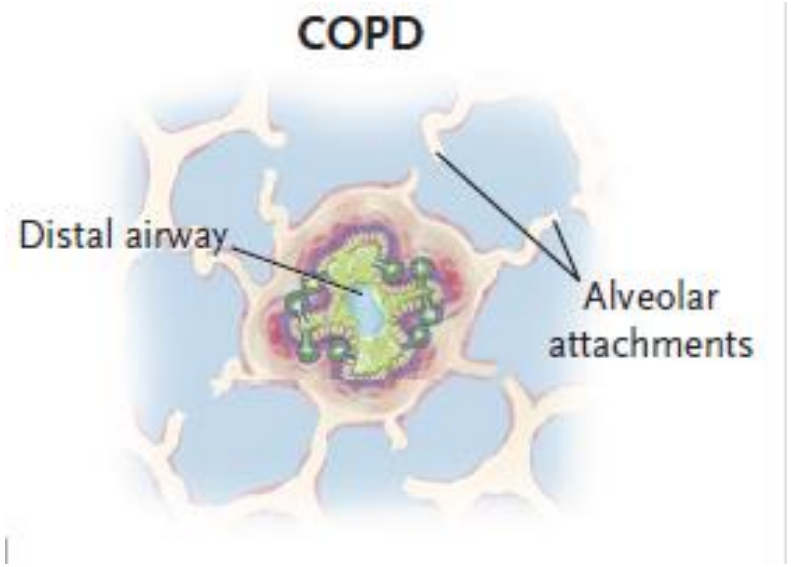
Annual median costs for COPD treatment based on disease severity

Cost categories	Severity of COPD		
	Stage I*	Stage II*	Stage III*
Total medication cost (%)	$512 (31)	$720 (14)	$766 (7)
Total non-medication costs (%)	$489 (29)	$1659 (33)	$3276 (30)
Hospitalization cost (%)	$680 (40)	$2658 (53)	$6770 (63)
Total cost	$1681	$5037	$10,812

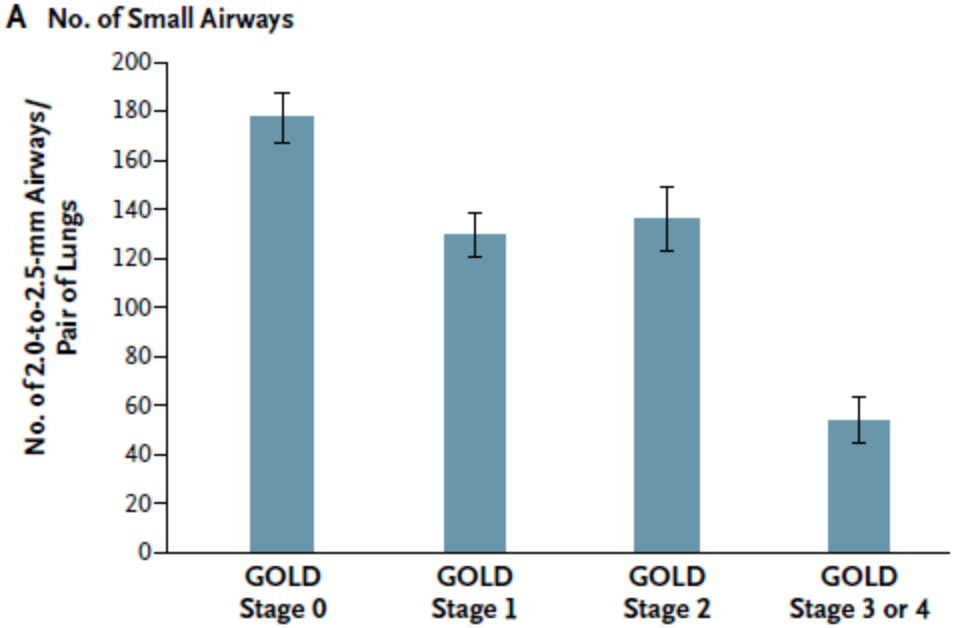
Figure Credit: Clinicoecon Outcomes Res 2013; 5:235-245

COPD Pathogenesis

- Complex, cumulative, and dynamic, likely based on **GET**omics
  - **G**enetic Background
  - **E**nvironmental exposures
  - life**T**ime
- Chronic inflammation leads to narrowing and reduction in the number of small conductive airways (terminal bronchioles) leading to airway collapse due to loss of tethering caused by alveolar wall destruction



N Engl J Med 2010;362:1407-16.



N Engl J Med 2011;365:1567-75.

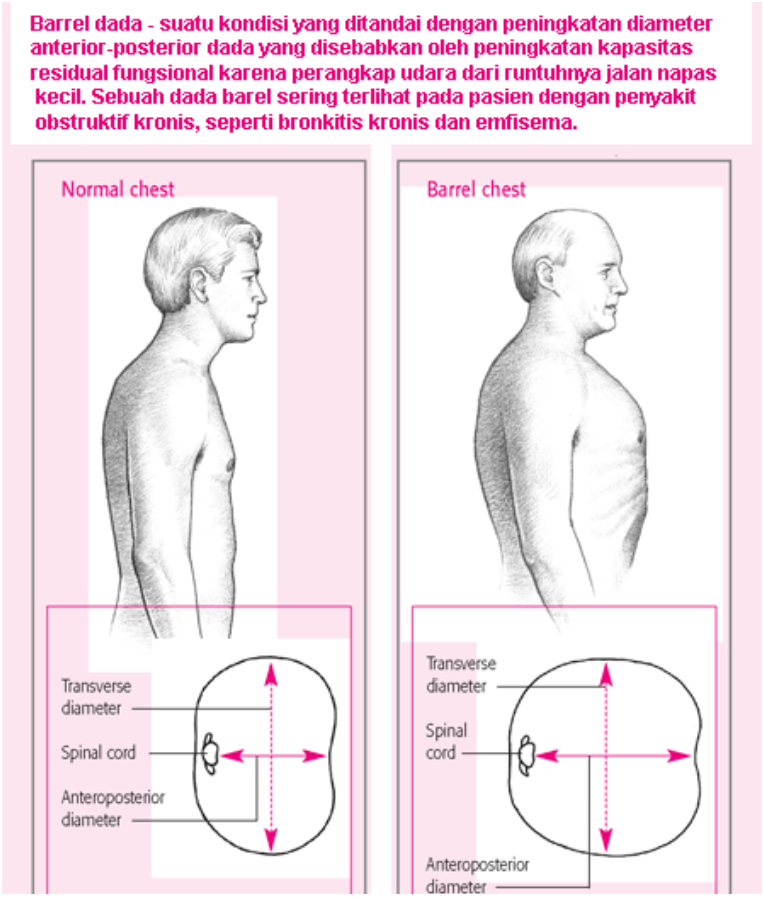
COPD Etiology

- Environmental Risk Factors
  - Cigarette Smoking
    - Other tobacco (pipe, cigar, water pipe), Cannabis, 2nd hand smoke
  - Biomass exposure (somewhat less common in US but more common globally due to wood burning for cooking/heating)
  - Occupational exposure (dusts, chemicals, fumes)
  - Air pollution
- Genetic Risk Factors
  - Alpha-1 Antitrypsin deficiency and others
- Trajectories of Lung Function: Development & Aging
  - Low birthweight, neonatal lung injury, repeated lung infections early in life
- Asthma and Airway Hyper-Reactivity
- Chronic Bronchitis
- Infections
- Sex
- Socioeconomic Status

Clinical Manifestations of COPD

- Dyspnea
  - Progressive
  - Worse with exertion
  - Persistent
- Chronic cough
- Wheezing/chest tightness
- Chronic sputum production
- Episodes of acute worsening of these symptoms often occur (exacerbations)
- Spectrum between patients with more sputum production (chronic bronchitis) to those with more hyperinflation/DOE (emphysema)

Physical Examination

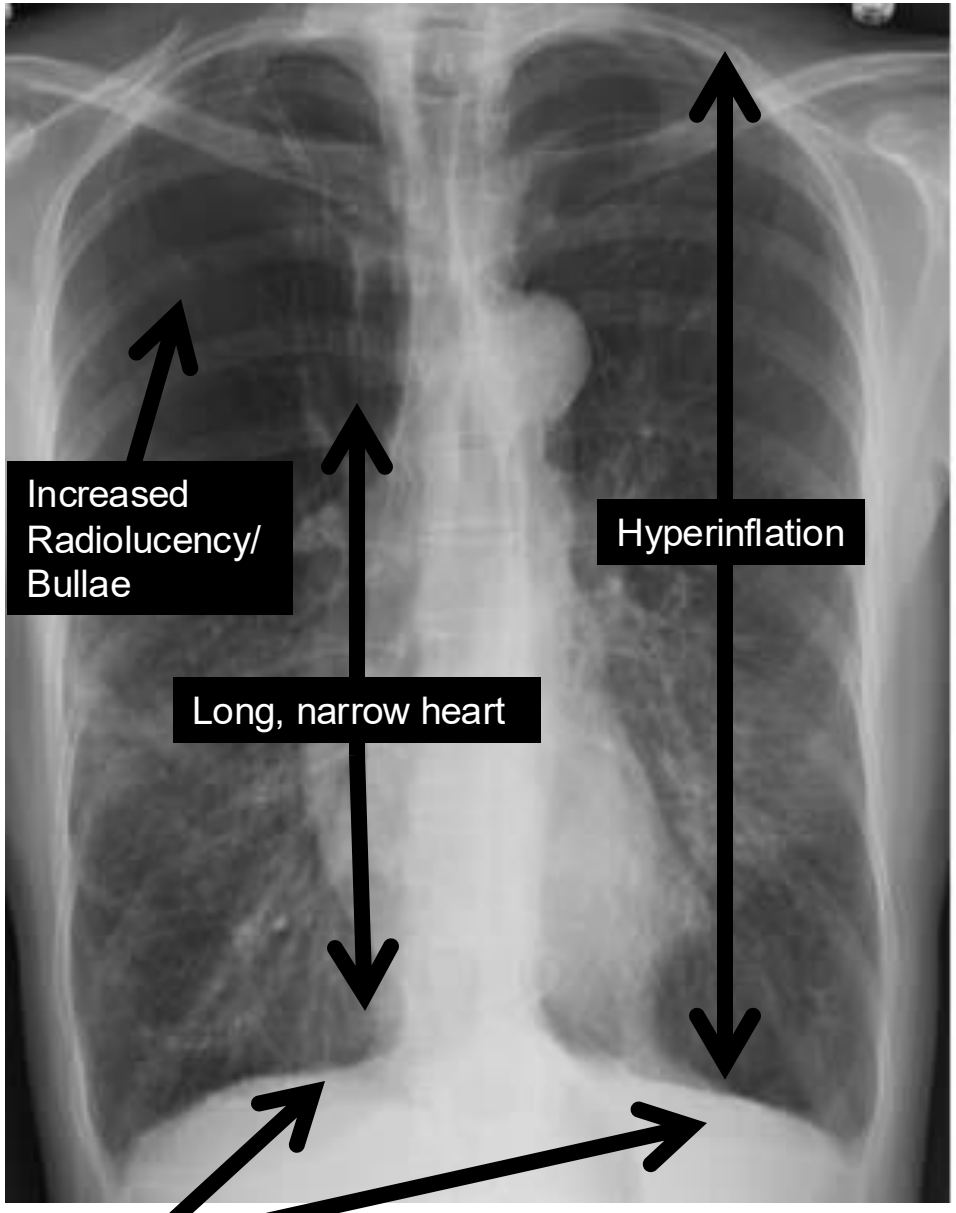


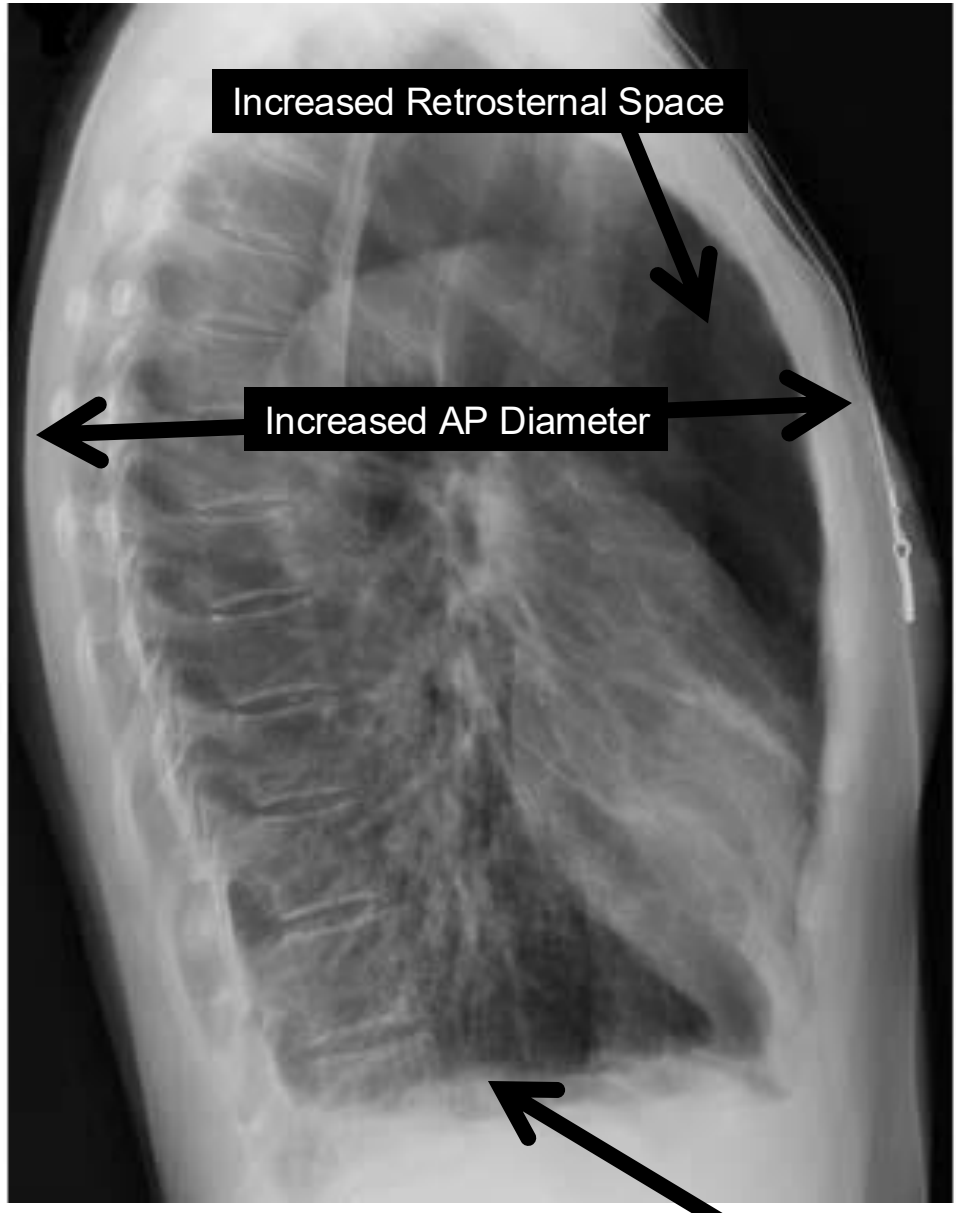
- Tachypnea
- Increased antero-posterior diameter of the chest (“barrel-shaped” chest)
- Decreased breath sounds with prolonged expiratory phase
- Wheezing
- Distant heart sounds
- Yellow staining of the fingers, facial hair
- *Clubbing is NOT a feature of COPD
- Signs of right heart failure (cor pulmonale): elevated JVP, enlarged liver, ascites, peripheral edema
- Signs of respiratory distress (severe exacerbation): grunting, accessory muscle use, pursed lip breathing, abdominal retractions, cyanosis

Laboratory Studies

- Consider CBC to evaluate for anemia as a cause of dyspnea and to check Eos
- Consider BNP to rule out CHF and assess for cor pulmonale
- Consider ABG if bicarbonate is elevated (≥30) to assess for a compensated respiratory acidosis
- WHO: All symptomatic adults with persistent obstruction on spirometry should have alpha-1 antitrypsin level* checked, especially if young (≤45), non-smokers and basilar predominant emphysema.
  - *Normal AAT is > 11 mmol/L

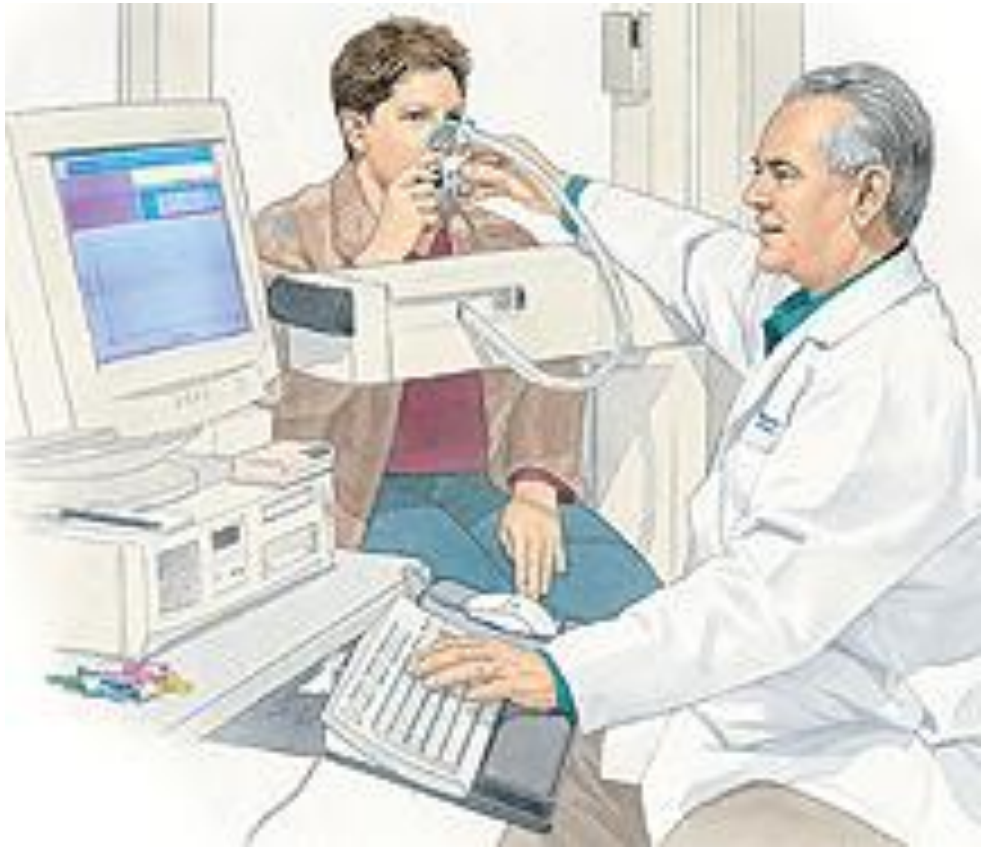
Chest Radiograph





Diagnosis

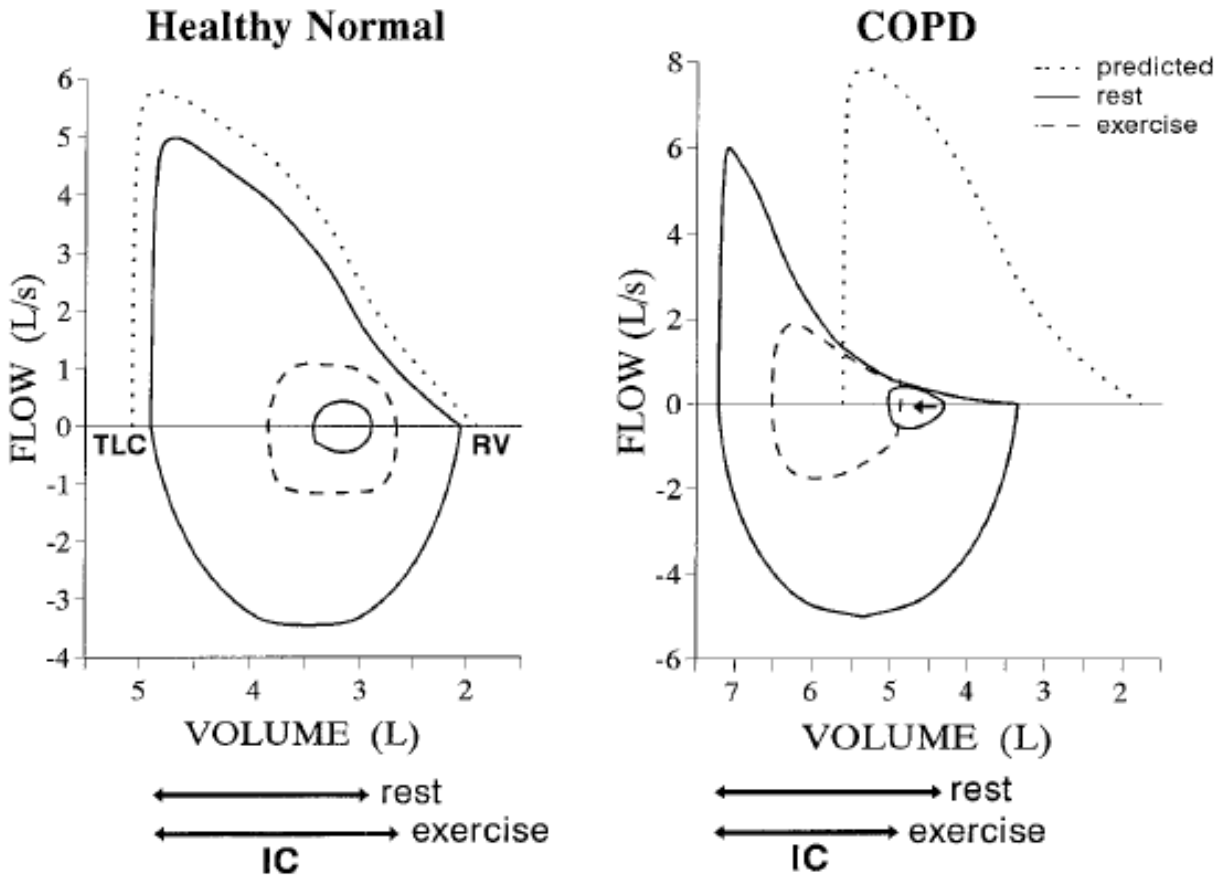
- Symptoms:
  - Dyspnea that is progressive, worse with exercise and persistent
  - Recurrent wheeze
  - Chronic cough that may be intermittent and may be unproductive.
  - Recurrent lower respiratory tract infections
- History of risk factors:
  - Tobacco smoke
  - Indoor smoke
  - Occupational dusts, vapors, fumes, gases and other chemicals
  - Host factors (genetics, developmental abnormalities, low birthweight, premature, childhood resp infections)



Importance of Spirometry

- Patients with chronic respiratory symptoms (cough, sputum, dyspnea) should be screened with spirometry, especially if they are smokers
- “Asymptomatic” smokers should be assessed more carefully as some patients deny limitation on exertion because they have restricted their activities to those that do not cause symptoms
  - Patient with very low daily activities may be symptomatic if they tried to engage in the activities normal for someone of their age and health state
- If in doubt, order PFTs (“active case finding”).... as significant lung function may be lost prior to the onset of significant symptoms

Characteristics Findings on Spirometry for COPD



Characteristic Findings on Spirometry for COPD

- Scooped appearance on flow-volume loop
- **$FEV_1/FVC < 0.70$**
  - May lead to over-diagnosis in the elderly and under-diagnosis in the adults ≤45
  - Alternatively can use FEV_1/FVC < LLN with increasing use of Z-score based diagnosis (based on TORCH trial and GLI reclassification of spirometry)
  - COPD Z –score FEV_1/FVC <−1.64, severity stratified by Z score of FEV1, FEV_1 Z-scores: ≥−1.64 for mild; <−1.64 but ≥−2.55 for moderate; and <−2.55 for severe
- FEV1 is usually reduced
- Total lung capacity can be increased (hyperinflation)
- Residual volume and RV/TLC ratio can be increased (air trapping)
- Diffusion capacity for carbon monoxide (DLCO) can be reduced (emphysema)

American Lung Association.

COPD Screening, Assessment, and Prediction Tools

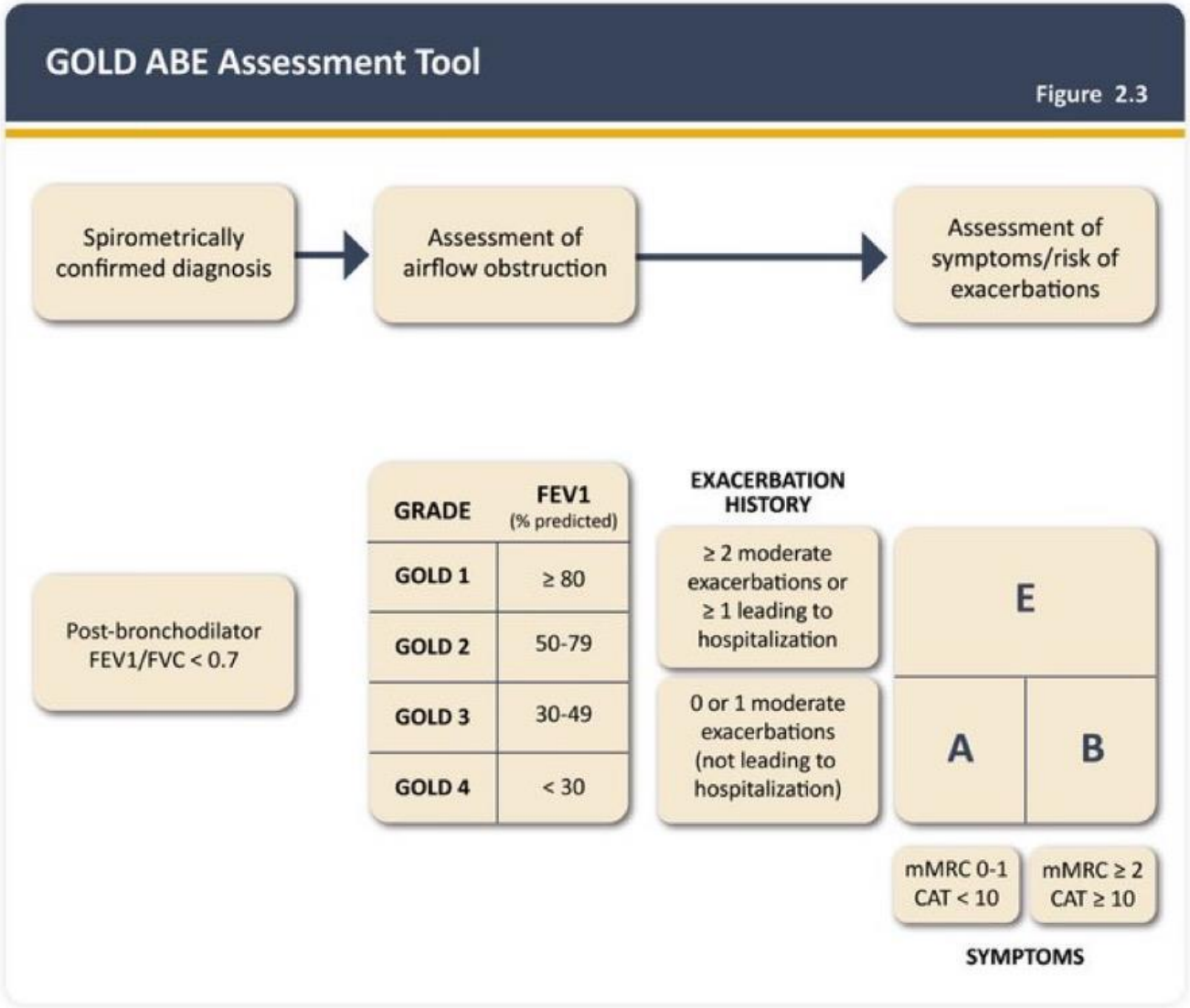
Purpose	Tool	Setting	How Implemented
Screening for COPD in the Community and/or Primary Care Setting	COPD Population Screener Questionnaire (COPD-PS)	Clinic and community	5 questions
	CAPTURE—COPD Assessment in Primary Care to identify Undiagnosed Respiratory disease and Exacerbation risk	Primary care clinic	5 questions plus PFM
	Lung Function Questionnaire	Primary care clinic	5 questions
	Veterans Airflow Obstruction Screening Questionnaire	VAMC primary care	7 questions
	Global Initiative for Chronic Obstructive Lung Disease's *Could it be COPD?* Questionnaire	Self-report	5 questions
Assess Exposure/ Underlying Exposure	Alpha-1 Antitrypsin Testing	Clinic	Blood test
	Fagerstrom Test for Nicotine Dependence	Clinic	6 questions
Assess COPD Control	GOLD Guidelines ABE Assessment Tool	Clinic	Exacerbation risk, spirometry, symptoms assessed using validated questionnaire
	COPD Assessment Tool (CAT)	Clinic	8 questions
	St. George's Respiratory Questionnaire—measures impact on overall health, daily life, and perceived well-being	Clinic or research—self-administration	14 questions
	mMRC Breathlessness Scale	Clinic	1 question scale
	COPD Patient Experience and Healthcare Questionnaire (PREM-C9)	Clinic	9 questions
	Clinical COPD Questionnaire (CCQ)	Clinic	10 questions
	Manchester COPD Fatigue Scale	Clinic	27 questions
	Health Survey Short Form—measures impact of health	Clinic	12 questions
	Chronic Respiratory Disease Questionnaire (CDRQ)—assesses health quality of life	Clinic	20 questions
	Baseline and Transition Dyspnea Indices (BDI/TDI)	Clinic	24 questions
	Exact Respiratory Symptoms (E-RS)—measures respiratory symptoms	Clinical trial	11 questions
	Glittre ADL—measures functional limitations	In-patient pulmonary rehabilitation	Completing ADL-related activities
	Breathlessness, Cough, Sputum Scale—predicts exacerbations	Clinic	3 questions
	Capacity of Daily Living During the Morning (CDLM) questionnaire and the Global Chest Symptoms questionnaire (GCSQ)	Clinical trial	8 questions
Assess Medication Adherence	Adherence Estimator	Self-report	3 questions
	Test of the Adherence to Inhalers (TAI)	Clinic	10 or 12 questions
	In-Check Dial—determines appropriate medication delivery device	Clinic	Physical breathing tool
	Beliefs about Medicines Questionnaire—COPD-specific	Self-report	22 questions
	Drug Adherence Index (DAI)—used to better target medication adherence	Clinic	Predictive modeling tool
Predict Exacerbations and Hospitalizations	ACCEPT—Acute COPD Exacerbation Prediction Tool	Clinical trial	Exacerbation prediction tool
	8P Identifying Your Patient's Risk for Adverse Events After Discharge	Hospital	8 factors
	COPD Root Cause Analysis	Hospital	Questions developed based on identifying contributing factors
	BHDE Index—Body mass index, post-exercise Heart rate recovery, Dyspnea, Exercise capacity	Clinic	BMI, FEV1, Dyspnea, 6-minute walk
	BODE Index—Body mass index, air flow Obstruction, Dyspnea, Exercise capacity	Clinic	BMI, FEV1, Dyspnea, 6-minute walk
	Prediction of Hospitalization Stay in COPD Exacerbations: The AECOPD-F Score—predicts COPD clinic setting hospitalization stay	Clinic	7 questions

COPD Assessment

- Once the diagnosis of COPD is confirmed, the patient requires a formal disease assessment

1. Assess degree of airflow limitation
   - Spirometry
2. Assess symptoms
   - COPD Assessment Test (CAT)
   - Modified Medical Research Council (mMRC)
3. Assess history of moderate/severe exacerbations
4. Assess comorbidities

GOLD Combined Assessment for COPD



Assess Degree of Airflow Limitation Using Spirometry

- In patients with $FEV_1/FVC < 0.70$

GOLD Stage	Classification	FEV1
GOLD 1	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2	Moderate	$50\% \leq FEV_1 < 80\%$
GOLD 3	Severe	$30\% \leq FEV_1 < 50\%$
GOLD 4	Very Severe	$FEV_1 < 30\%$ predicted

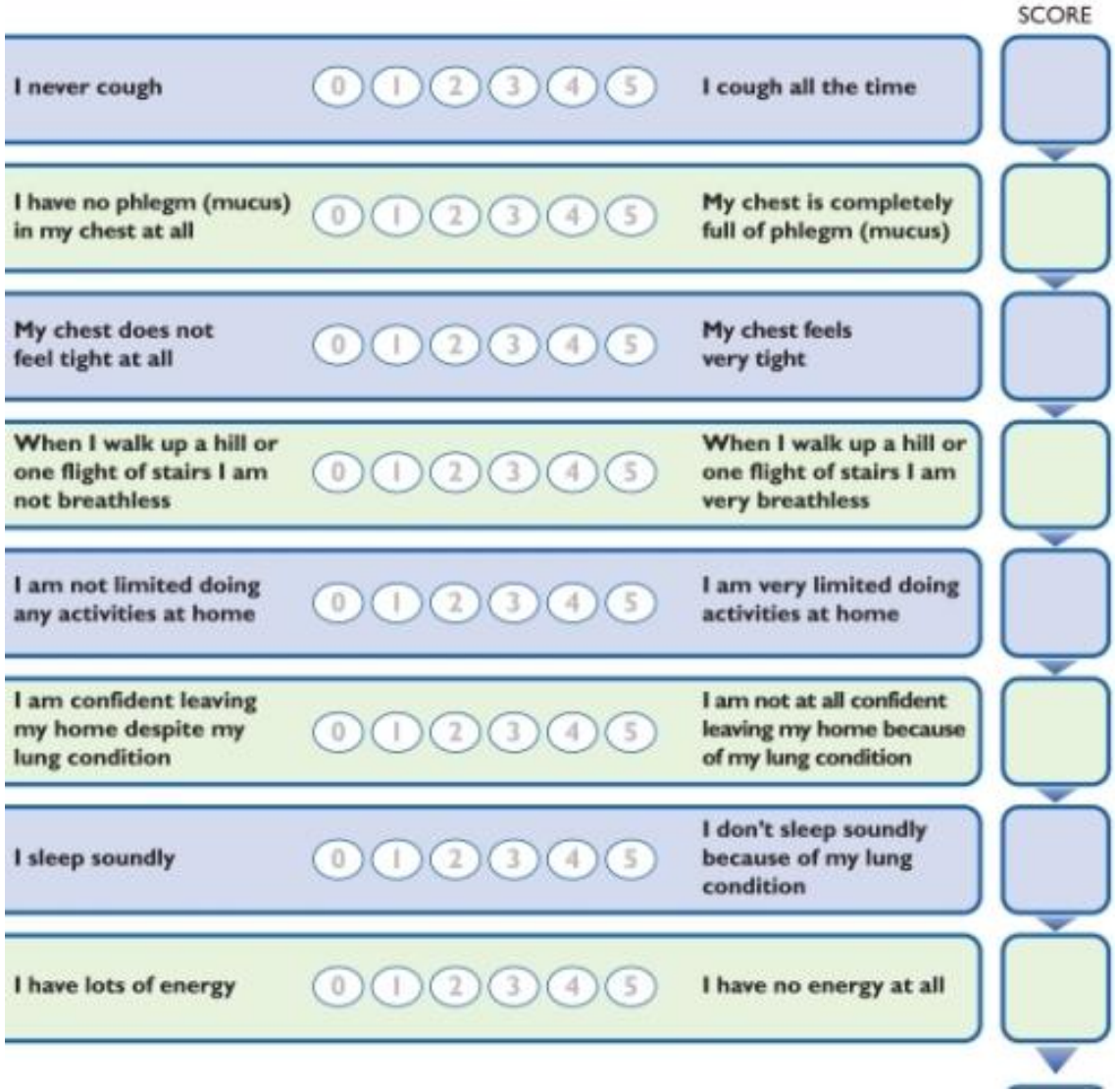
Assess Symptoms: Modified Medical Research Council (mMRC)

- mMRC 0-1 = Less Symptoms
- mMRC ≥2 = More Symptoms

Grade	Patient's description of breathlessness
Grade 0	I only get breathless with strenuous exercise
Grade 1	I get short of breath when hurrying on the level or walking up a slight hill
Grade 2	I walk slower than people of the same age on the level because of breathlessness or have to stop for breath when walking at my own pace on the level
Grade 3	I stop for breath after walking about 100 yards or after a few minutes on the level
Grade 4	I am too breathless to leave the house or I am breathless when dressing

Fletcher CM. *BMJ* 1960;2:1662

Assess Symptoms: COPD Assessment Test (CAT)



<10 = Less Symptoms
≥10 = More Symptoms

Assess Risk of Exacerbations

- Definition of an Exacerbation
  - An increase in dyspnea, cough or sputum production beyond normal day-to-day variations leading to a change in medication
    - Mild: SABDs
    - Moderate: SABDs plus antibiotics and/or oral steroids
    - Severe: Hospitalization or ER visit
- *Hospitalization for a COPD exacerbation is associated with a poor prognosis and increased risk of death!*
- *Can one predict who will exacerbate?*

- ECLIPSE study
- N=2138 over 3 years
- Exacerbations more frequent with increased severity of COPD
- **Single best predictor of exacerbations (across all GOLD stages) was a history of exacerbations**

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Susceptibility to Exacerbation in Chronic Obstructive Pulmonary Disease

N ENGL J MED 363;12 NEJM.ORG SEPTEMBER 16, 2010

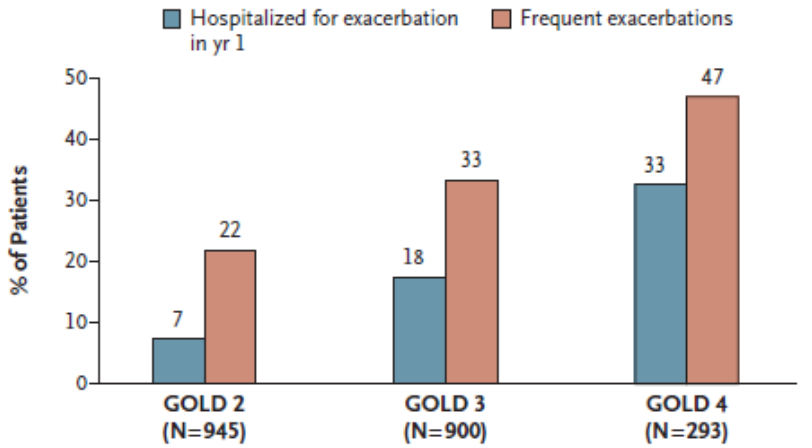


Figure 1. Association of Disease Severity with the Frequency and Severity of Exacerbations during the First Year of Follow-up in Patients with Chronic Obstructive Pulmonary Disease.

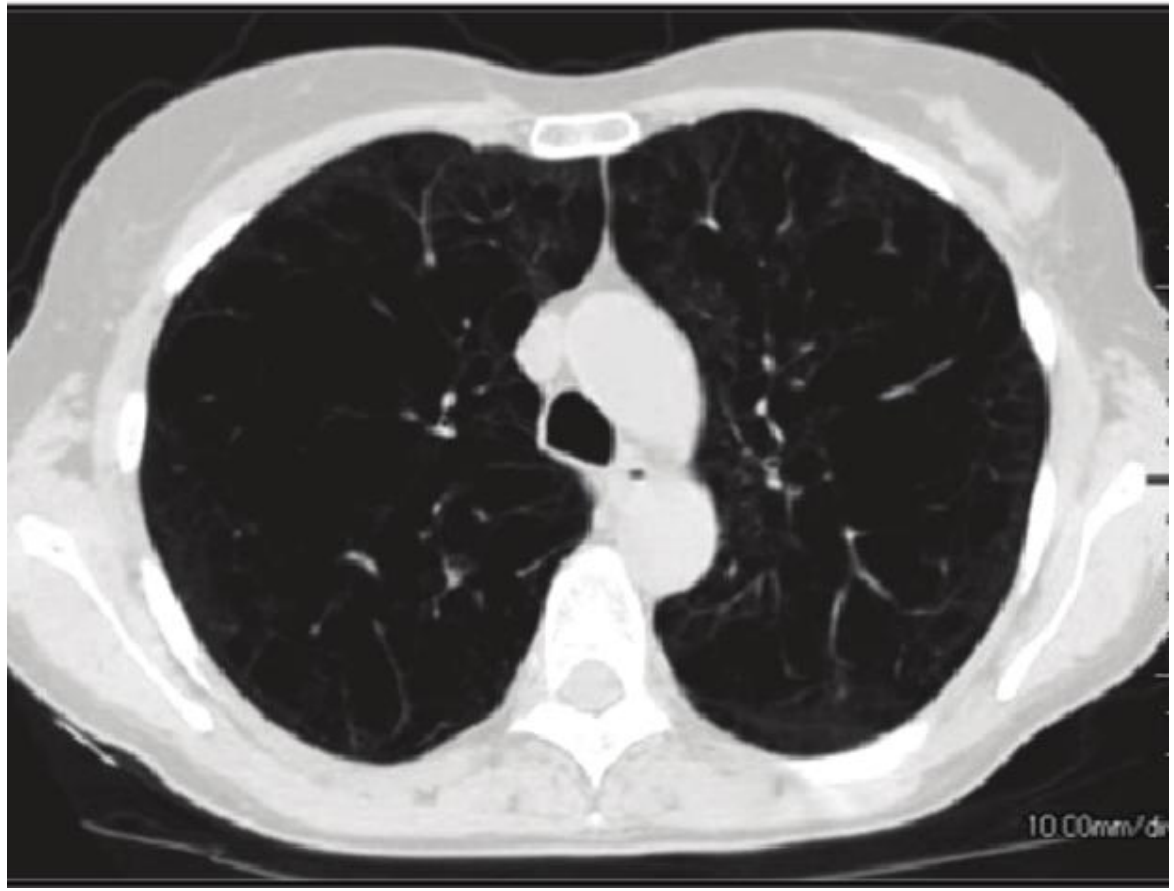
Patients with two or more exacerbations during the year were considered to have frequent exacerbations. An exacerbation requiring hospitalization was classified as severe. Disease severity was classified according to the stages of disease defined by the Global Initiative for Chronic Obstructive Lung Disease (GOLD). P<0.001 for both comparisons.

Assess Comorbidities

- Cardiovascular disease
  - Coronary artery disease
  - Congestive heart failure
  - Pulmonary hypertension/cor pulmonale
  - Arrhythmias
  - Peripheral arterial disease
  - Hypertension
- Osteoporosis
- Depression and anxiety
- Metabolic syndrome and diabetes
- Gastroesophgeal reflux disorder
- Bronchiectasis
- Lung cancer
- Obstructive sleep apnea
- Low BMI

Do I need a Chest CT?

- Differential Diagnosis: Symptoms out of proportion to disease severity or frequent exacerbations raising concern for other process
- Lung Volume Reduction: Lung volume reduction surgery or endobronchial valve therapy
- Lung Cancer Screening: LDCT if 50-80 yo with 20 py smoking history and currently smoke or quit in last 15 years



Predictors of Mortality in COPD

- BODE Index

Points	Approximate 4 Year Survival
0-2	80%
3-4	67%
5-6	57%
7-10	18%

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

The Body-Mass Index, Airflow Obstruction, Dyspnea, and Exercise Capacity Index in Chronic Obstructive Pulmonary Disease

Bartolome R. Celli, M.D., Claudia G. Cote, M.D., Jose M. Marin, M.D., Ciro Casanova, M.D., Maria Montes de Oca, M.D., Reina A. Mendez, M.D., Victor Pinto Plata, M.D., and Howard J. Cabral, Ph.D.

Table 2. Variables and Point Values Used for the Computation of the Body-Mass Index, Degree of Airflow Obstruction and Dyspnea, and Exercise Capacity (BODE) Index.*

Variable	Points on BODE Index			
	0	1	2	3
FEV_1 (% of predicted)†	≥65	50–64	36–49	≤35
Distance walked in 6 min (m)	≥350	250–349	150–249	≤149
MMRC dyspnea scale‡	0–1	2	3	4
Body-mass index§	>21	≤21		

Agenda

Describe the diagnostic criteria and key clinical features of COPD

Summarize guideline-based pharmacologic management of stable COPD, including inhaler selection based on symptom burden and exacerbation risk

Identify non-pharmacologic interventions and strategies to prevent COPD exacerbations, including smoking cessation, pulmonary rehabilitation, and vaccination.

Bronchodilators

- Reduce symptoms
- Reduce frequency and severity of exacerbations
- Improve exercise tolerance
- Improve health status
- DO NOT slow rate of FEV1 decline in individual trials

Bronchodilators

Beta$_2$-Agonists

- Relax airway smooth muscle by stimulating beta2-adrenergic receptors → increased cyclic AMP and produces functional antagonism to bronchoconstriction
- SEs: tachycardia, arrhythmias, tremors, hypokalemia

Antimuscarinics

- Block bronchoconstrictor effects of acetylcholine on M3 muscarinic receptors in airway smooth muscles
- SEs: Dry mouth, urinary retention, worsen glaucoma

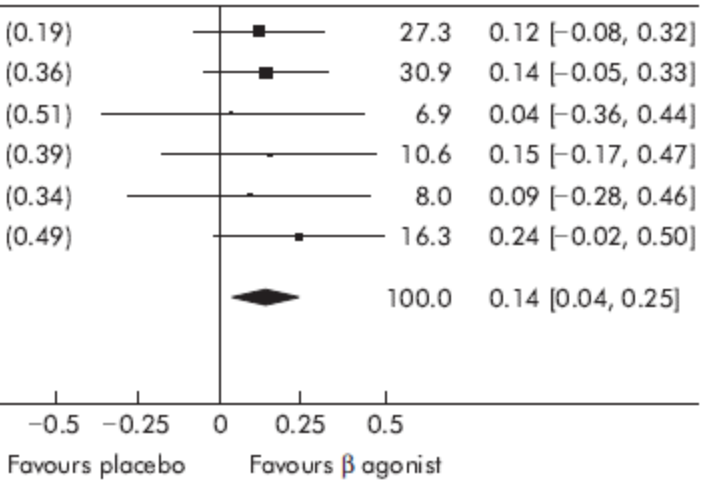
Short-Acting Beta$_2$-Agonist (SABAs) – "Rescue"

- All patients with COPD should receive short-acting beta2-agonists as needed for acute bronchospasm (e.g. albuterol, levalbuterol)
- SABAs improve lung function and decrease breathlessness

Comparison: Short acting β_2 agonist vs placebo
Outcome: FEV_1 (l) post-bronchodilator

Study	β agonist n	Mean (SD)	Placebo n	Mean (SD)	WMD (95% CI fixed)	Weight %	WMD (95% CI fixed)
Dullinger (1986)	10	0.77 (0.26)	10	0.65 (0.19)		27.3	0.12 [−0.08, 0.32]
Guyatt (1989)	24	0.95 (0.30)	24	0.81 (0.36)		30.9	0.14 [−0.05, 0.33]
Light (1975)	14	1.15 (0.56)	14	1.11 (0.51)		6.9	0.04 [−0.36, 0.44]
Shah (1983)	12	0.73 (0.41)	12	0.58 (0.39)		10.6	0.15 [−0.17, 0.47]
Silins (1985)	8	0.85 (0.41)	8	0.76 (0.34)		8.0	0.09 [−0.28, 0.46]
Tandon (1990)	30	1.40 (0.53)	30	1.16 (0.49)		16.3	0.24 [−0.02, 0.50]
Total (95% CI)	98		98			100.0	0.14 [0.04, 0.25]

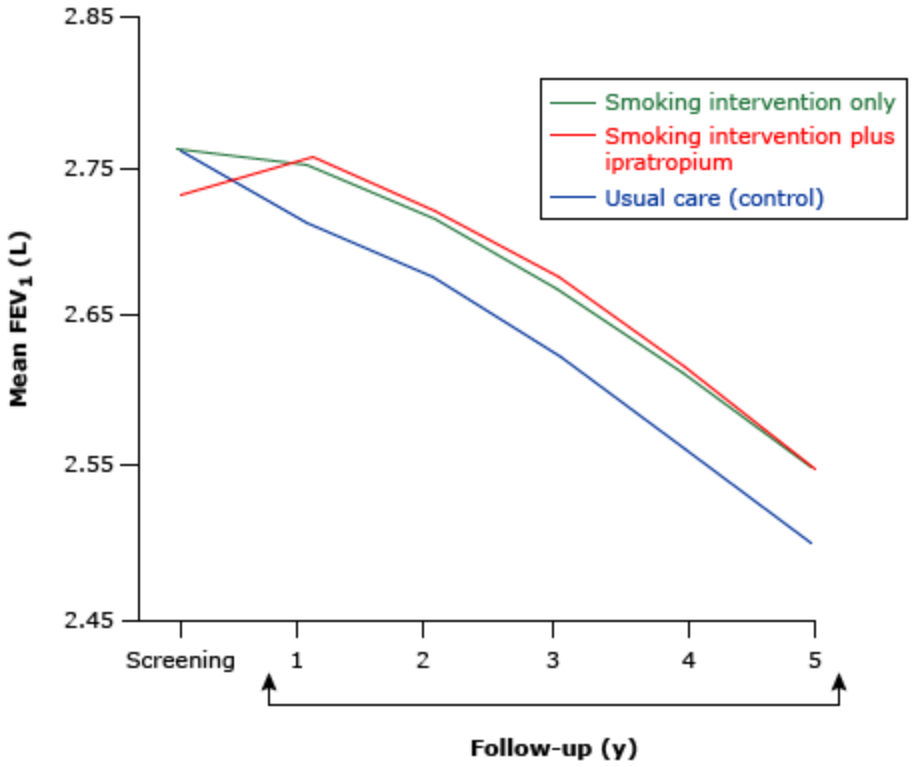
Test for heterogeneity $\chi^2=0.93$ df=5 p=0.97
Test for overall effect z=2.65 p=0.008



Thorax 2003;**58**:580–584

Short Acting Muscarinic Antagonists “Rescue)

- SAMA (ipratropium):
  - Improves lung function (FEV1)
  - Alleviates dyspnea
  - Increases exercise tolerance



Anthonisen NR, Connett JE, Kiley JP, et al. JAMA 1994; 272:1497.

Approach to Bronchodilator Selection

- SABA or SAMA improve FEV1 and symptoms, but are superior together
- LAMA and LABA improve lung function, dyspnea, health status and reduce exacerbation rates, but are superior together (LAMA/LABA)
- LAMA > LABA for decreasing exacerbations and hospitalizations
- Single inhaler therapy more convenient and effective than multiple inhalers

When to use Steroids?

- ICS monotherapy is NOT indicated in COPD (it is in Asthma)
- ICS + LABA improves lung function, health status and exacerbations in patients with exacerbations and moderate to very severe COPD
- Asthma-COPD overlap → ICS/LABA
- Note, there is an Increased risk of pneumonia

The NEW ENGLAND JOURNAL of MEDICINE

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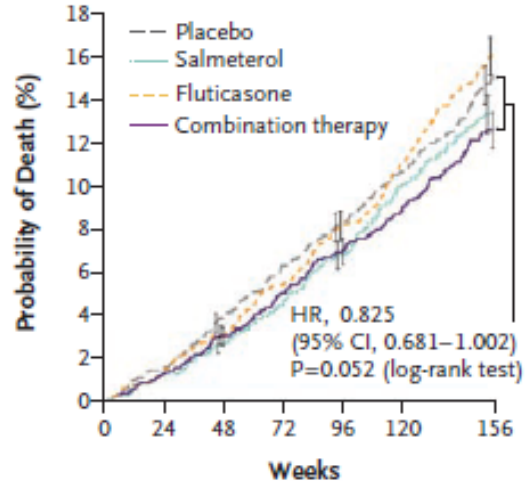
Salmeterol and Fluticasone Propionate and Survival in Chronic Obstructive Pulmonary Disease

Peter M.A. Calverley, M.D., Julie A. Anderson, M.A., Bartolome Celli, M.D., Gary T. Ferguson, M.D., Christine Jenkins, M.D., Paul W. Jones, M.D., Julie C. Yates, B.S., and Jørgen Vestbo, M.D., for the TORCH investigators*

- TORCH Trial
- RCT; n=6112
- Salmeterol + fluticasone vs. placebo, salmeterol alone or fluticasone alone for 3 years
- 1' outcome: No survival benefit
- 2' outcomes
  - Improved health status
  - Improved lung function
  - ***Decreased risk of exacerbation in the ICS/LABA treatment group (NNT=4)***
  - Higher risk of pneumonia in the ICS/LABA

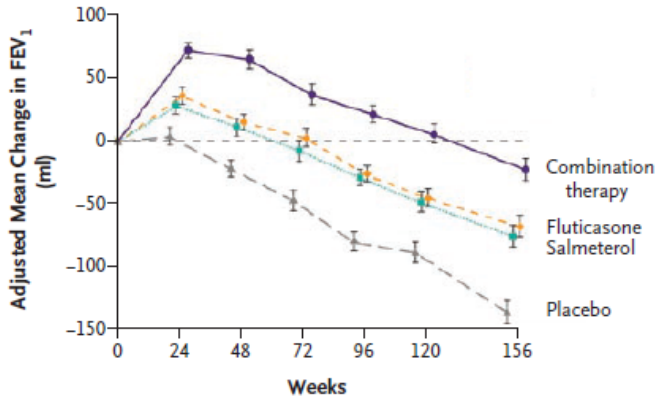
Death from Any Cause



No. of Patients

Placebo	1524	1500	1464	1428	1399	1361	1293
Salmeterol	1521	1502	1481	1451	1417	1368	1316
Fluticasone	1534	1512	1487	1450	1409	1363	1288
Combination therapy	1533	1514	1487	1456	1426	1393	1339

FEV_1



No. of Patients

Placebo	1524	1248	1128	1049	979	906	819
Salmeterol	1521	1317	1218	1127	1054	1012	934
Fluticasone	1534	1346	1230	1157	1078	1006	908
Combination therapy	1533	1375	1281	1180	1139	1073	975

Eosinophilia and COPD exaccerbations

- Low blood eosinophil counts (<100 cells/ mm^3) unlikely to benefit from ICS
- High blood eosinophil counts ($\geq$300 cells/mm^3) an independent risk factor for future exacerbations in patients with COPD and likely to benefit from ICS

Combination LAMA/LABA/ICS, aka “triple therapy”

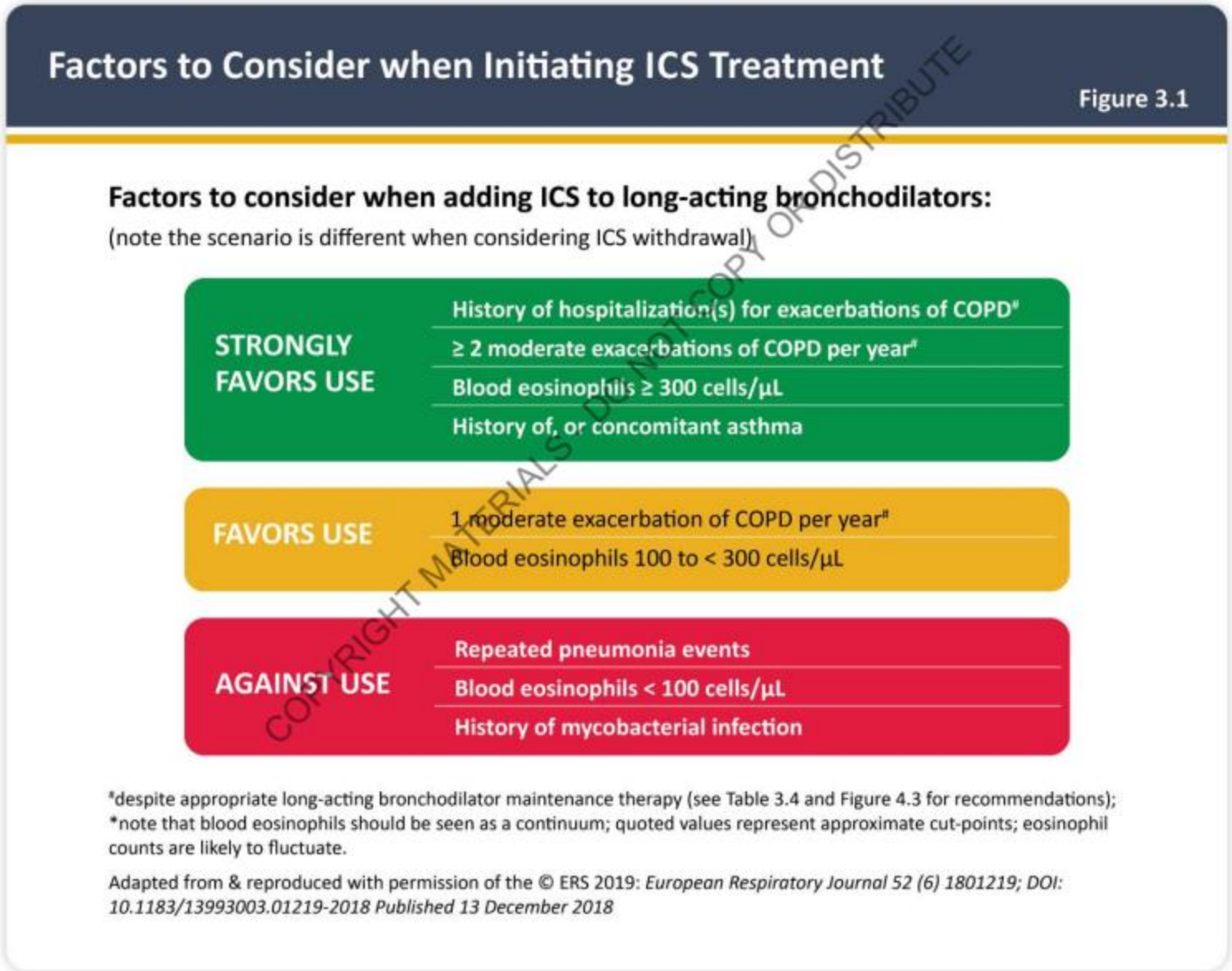
- Compared to ICS/LABA, LABA/LAMA or LAMA monotherapy
  - Improves lung function
  - Improves symptoms
  - Improves health status
  - Reduces exacerbations
  - IMPACT & ETHOS: Mortality benefit in Sx (CAT≥10) patients w/ history of frequent and/or severe exacerbations

ICS Adverse Effects

- Oral candidiasis
- Hoarse voice
- Skin bruising
- Pneumonia
  - Smokers, >55, hx of prior exacerbations/PNA, BMI <25, poor MRC dyspnea score and/or severe airflow limitation
  - Increased risk if Eos <2%

Factors to Consider when Initiating ICS Treatment

Figure 3.1



#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.

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*

Inhaler vs Nebulized?

- Inhaler device technique requires education and training
- Choice of inhaler should be individually tailored
- Peak inspiratory flow rates (PIFR) important to consider in choosing proper inhaler for a patient
- Proper inhaler technique should be assessed at each visit
- DO NOT ASSUME an inhaler has failed unless the patient has consistently demonstrated proper inhaler technique

Airway clearance for increased sputum production

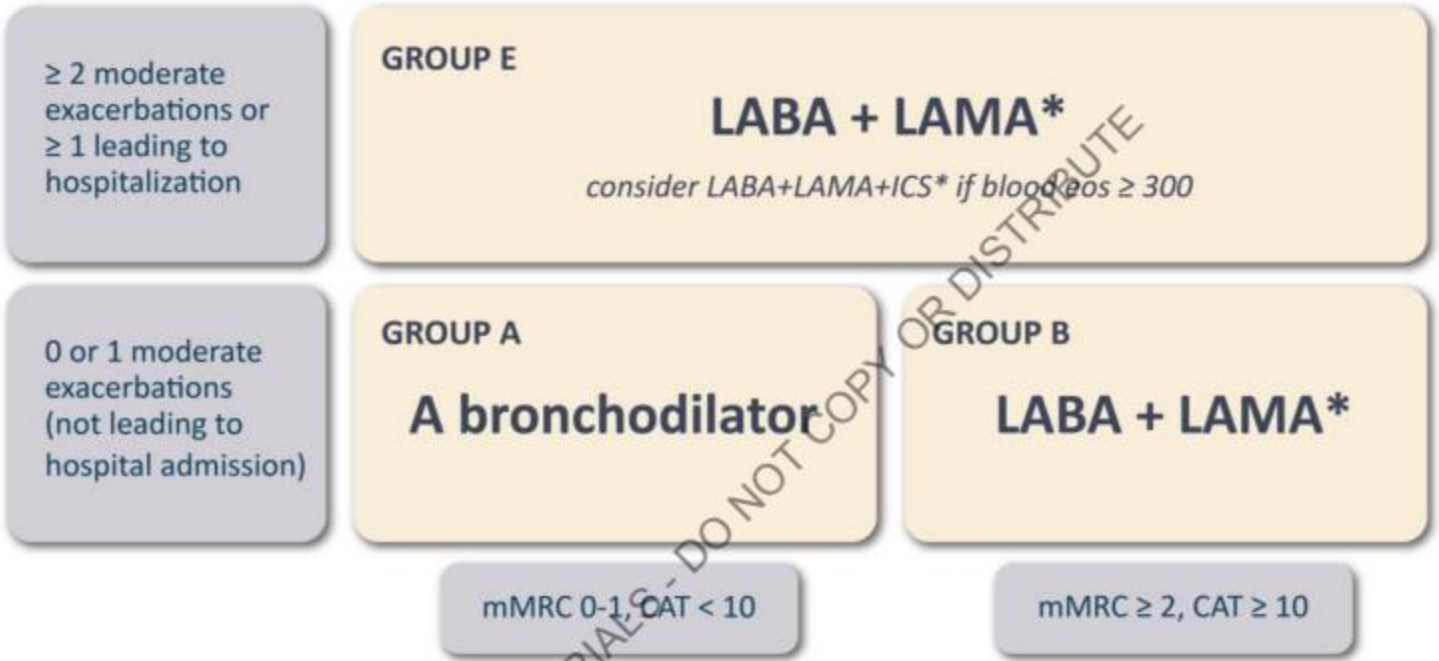
- Flutter devices
- Guaifenesin
- SABA to facilitate airway opening for clearance
- Consider conservative use of saline/hypertonic, though would avoid any above 3% due to risk of paradoxical bronchorrhea or causing bronchospasm

Approach to Pharmacotherapy

GOLD 2023 Guidelines

Initial Pharmacological Treatment

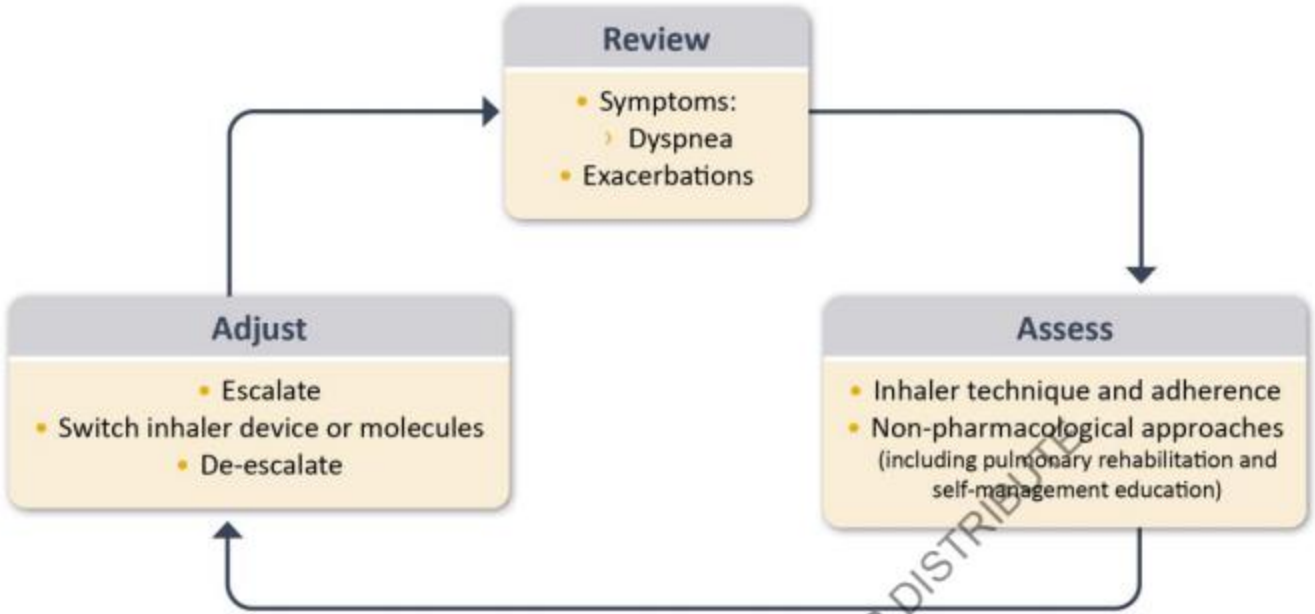
Figure 4.2



*single inhaler therapy may be more convenient and effective than multiple inhalers
Exacerbations refers to the number of exacerbations per year

Management Cycle

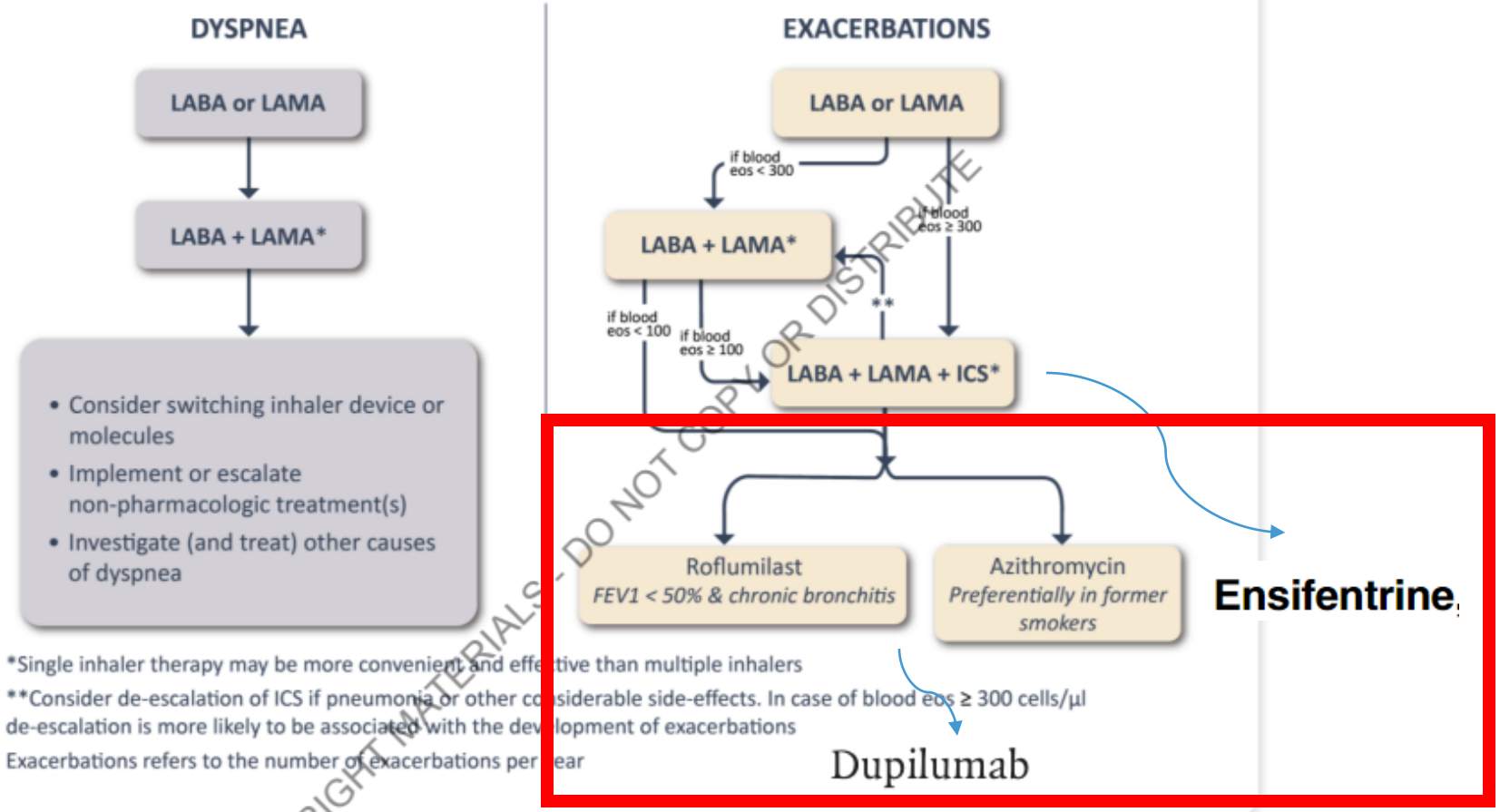
Figure 4.3



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



*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

Exacerbations refers to the number of exacerbations per year

For advanced COPD talk

Agenda

Describe the diagnostic criteria and key clinical features of COPD

Summarize guideline-based pharmacologic management of stable COPD, including inhaler selection based on symptom burden and exacerbation risk

Identify non-pharmacologic interventions and strategies to prevent COPD exacerbations, including smoking cessation, pulmonary rehabilitation, and vaccination.

Smoking cessation has the greatest capacity to influence the natural history of COPD

Effects of Smoking Intervention and the Use of an Inhaled Anticholinergic Bronchodilator on the Rate of Decline of FEV_1

The Lung Health Study

Nicholas R. Anthonisen, MD; John E. Connett, PhD; James P. Kiley, PhD; Murray D. Altose, MD; William C. Bailey, MD; A. Sonia Buist, MD; William A. Conway, Jr, MD; Paul L. Enright, MD; Richard E. Kanner, MD; Peggy O'Hara, PhD; Gregory R. Owens, MD; Paul D. Scanlon, MD; Donald P. Tashkin, MD; Robert A. Wise, MD; for the Lung Health Study Research Group

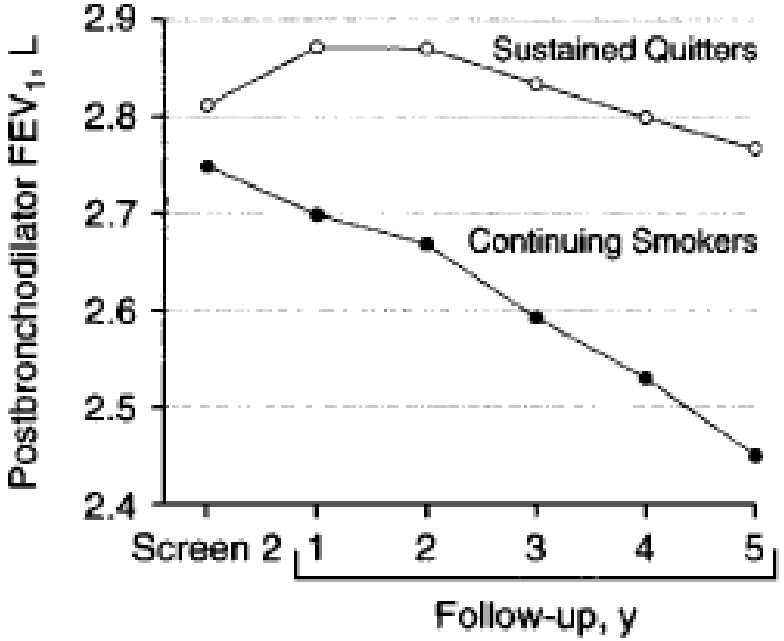


Figure 5.—Mean postbronchodilator forced expiratory volume at 1 second (FEV_1) for participants in the smoking intervention and placebo group who were sustained quitters (open circles) and continuous smokers (closed circles). The two curves diverge sharply after baseline.

Smoking Cessation

- Smoking cessation best accomplished via counseling **AND** pharmacological therapy
  - Counseling:
    - Increases quit rates over self-initiated strategies
    - A brief (3-minute) period of counseling to urge a smoker to quit can result in quit rates of 5-10%
  - Pharmacological agents:
    - Nicotine Replacement Therapy (NRT)
      - Transdermal nicotine patch
      - Nicotine gum
      - Nicotine lozenge
      - Nicotine sublingual tablet
      - Nicotine inhaler
      - Nicotine nasal spray
    - Buproprion (Zyban)
    - Varenicline (Chantix)

Nicotine Replacement Therapy (NRT)

- NRT is superior to placebo
- Used to control nicotine withdrawal symptoms
- Available over the counter
- Patch for long-term NRT
  - Start at 21 mg/day if > ½ pack of cigarettes/d for 6 weeks, then 14 mg/d for 2 weeks, then 7 mg/d for 2 weeks
  - Most common SE: skin irritation; rare adverse cardiovascular side effects
- Gum, Lozenge, Tablet, Inhaler or Nasal Spray for short-term NRT (“Cravings”) as needed
- Combination “patch plus” regiment more effective than any single nicotine replacement product alone (multiple RCTs and meta-analysis)
- Contraindication: +/- acute coronary syndrome; start >2 weeks post cardiovascular event

Buproprion (Zyban)

- Meta-analysis of 44 RCTs of buproprion monotherapy substantially increases likelihood of smoking cessation compared to placebo
  - Start 1 week prior to quit date
  - Dose: 150 mg/d (can increase to 150 mg BID after 3 days), for 7-12 weeks or longer
- Can also consider NRT + buproprion
- SE: insomnia, agitation, dry mouth, HA, *seizures*!
- Seizures risk increased in those with pre-existing seizure disorder, anorexia or bulimia

Varenicline (Chantix)

- Partial agonist of the alpha-4-beta-2 subunit of the nicotinic acetylcholine receptor, which reinforces the effects of nicotine and leads to dependence
- Reduces Sx of withdrawal: binds and prevents nicotine from binding, decreasing the reward associated with smoking
- 7 RCTs and multiple meta-analyses: superior to placebo for smoking cessation
- Effective in perioperative patients
- Superior to buproprion in 3 RCTs
- Superior to NRT in several non-RCT studies
- Dosing: 0.5 mg daily x 3 days, then 0.5 mg BID for 4 days, then 1 mg daily for 12 weeks; can continue for 12 additional weeks
- Renal metabolism
- Smokers should quit 1 week after starting
- SEs: neuropsychiatric (depression, suicidal behavior, erratic/aggressive behavior)

E-Cigarettes

- There is no evidence to support the effectiveness and safety of e-cigarettes as a smoking cessation aide at present.
- Paradoxically, I find that the lack of a physical reminder like finishing a pack of cigarettes combined with the potential increased ease of smoking indoors can lead to an increase in nicotine consumption/dependence especially if used concurrently with combustion cigarettes
- Additionally, I counsel patients that decreased regulations can lead to additional additives which may be harmful in these products (especially those with cannabinoids), and there is a dearth of long-term data on their safety profile relative to combustion tobacco products

Pulmonary Rehabilitation

- Exercise training, disease state education and behavior change
- 2-3x/week for 8-12 weeks
- Designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote long term adherence to health-enhancing behaviors
- Improved dyspnea
- Improved exercise capacity
- Improved health-related quality of life
- Fewer days of hospitalization
- Decreased health care utilization
- Reduces extent of functional decline and hastens recovery after an exacerbation
- Decreased readmissions and MORTALITY (if hospitalized for exacerbation and ≤4 wks post d/c)

Pulmonary Rehab Effect on Dyspnea

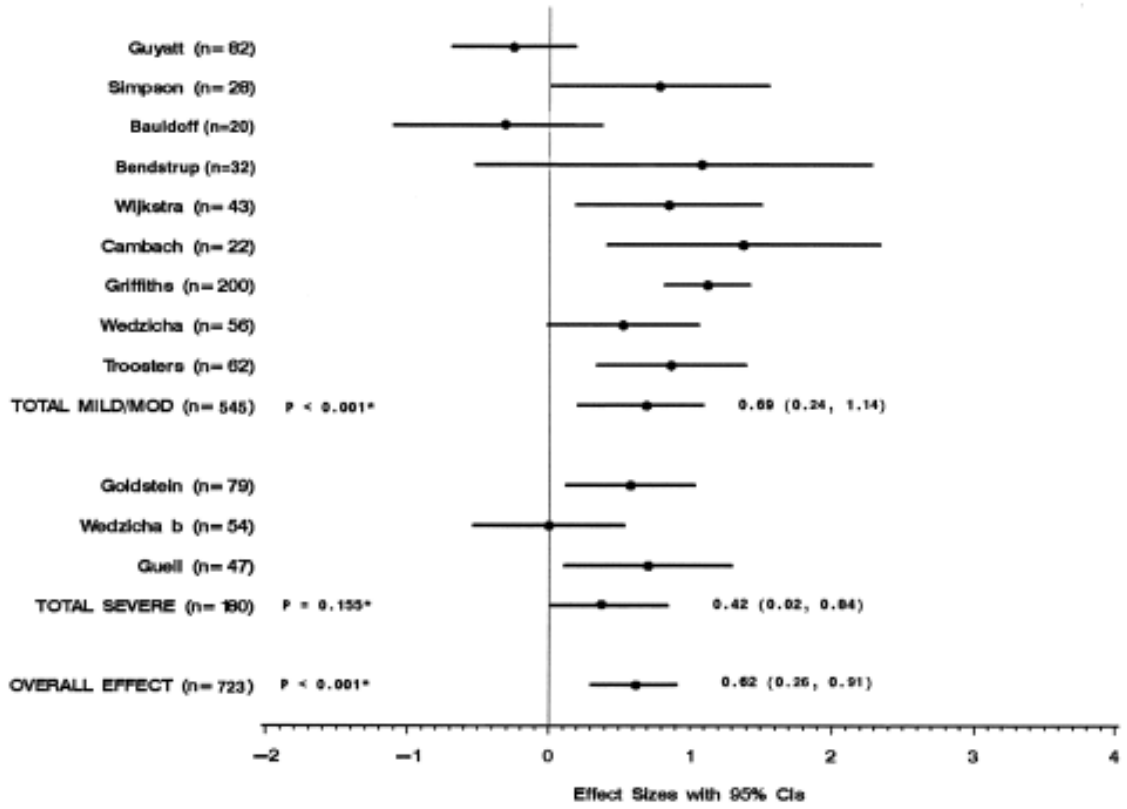
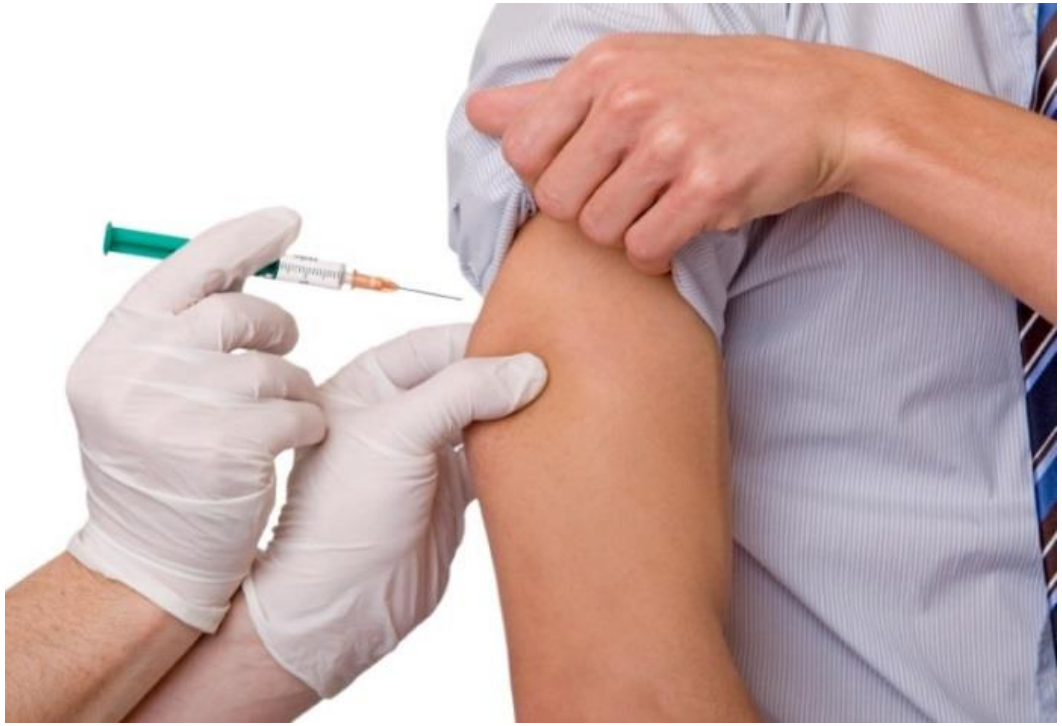


FIGURE 3. Shortness of breath measured by effect size of each trial. * *P* values for test of heterogeneity.

J GEN INTERN MED 2003;18:213–221.

Vaccines

- Annual flu
- COVID-19
- PCV15 followed by PPSV23 OR one dose of PCV20
- Tdap (pertussis)
- Zoster
- RSV



Summary

1. COPD is common, and likely underdiagnosed
2. COPD patients merit an assessment of airflow obstruction (spirometry), symptoms, exacerbation risk, and comorbidities/mortality risk
3. Inhaler technique assessments can
4. Smoking cessation and pulmonary rehab are key modalities to incorporate into management
5. LABA+LAMA is mainstay of therapy for most, with the addition of ICS for those with increased exacerbations or higher blood eos

Questions?

Answers.

CME Survey

Thank You.