COPD Update 2021!

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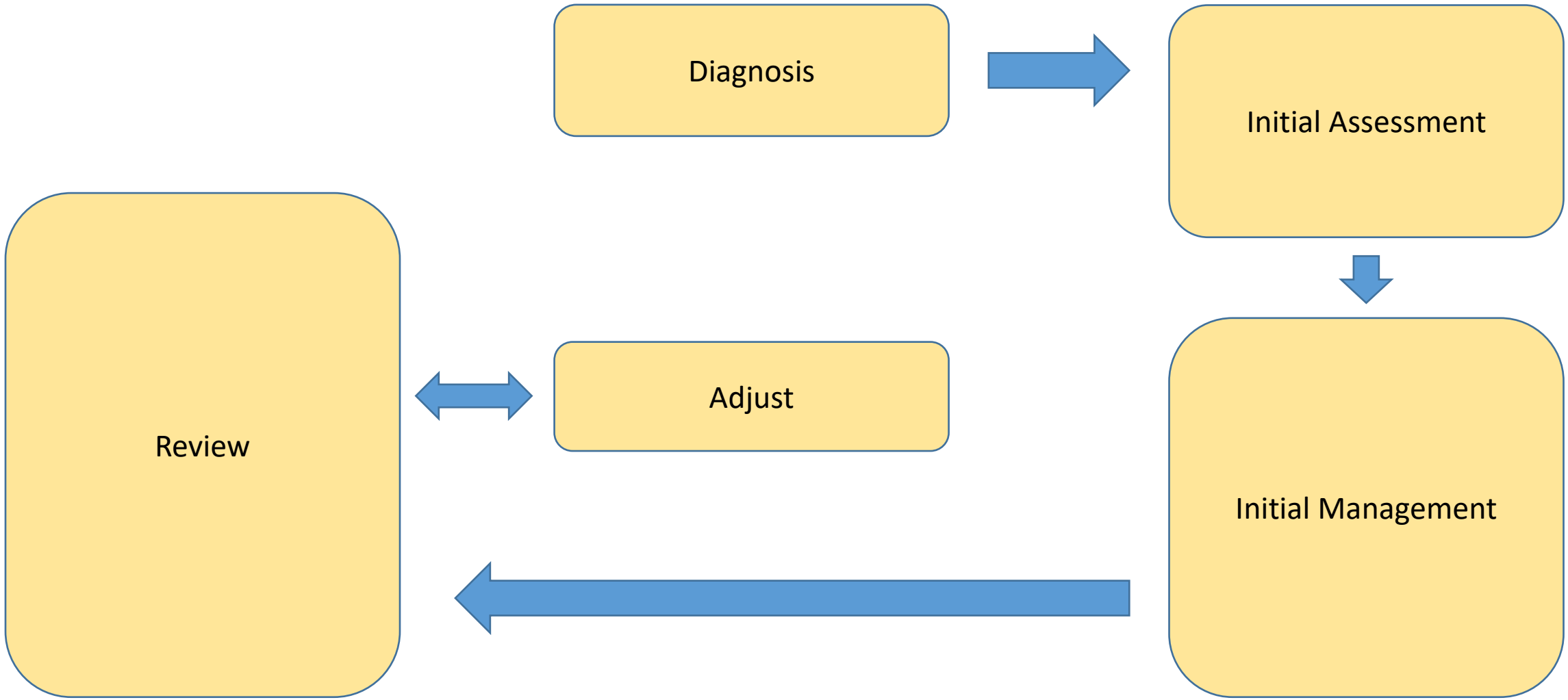
Disclosures

- I have no relevant disclosures for this talk

Learning Objectives

- COPD definition and pathology
- Update and COPD demographics and burden
- Initial assessment of COPD
- Chronic management of COPD
- Define Acute Exacerbation of COPD (AECOPD)
- Management of AECOPD
- Before they go home….

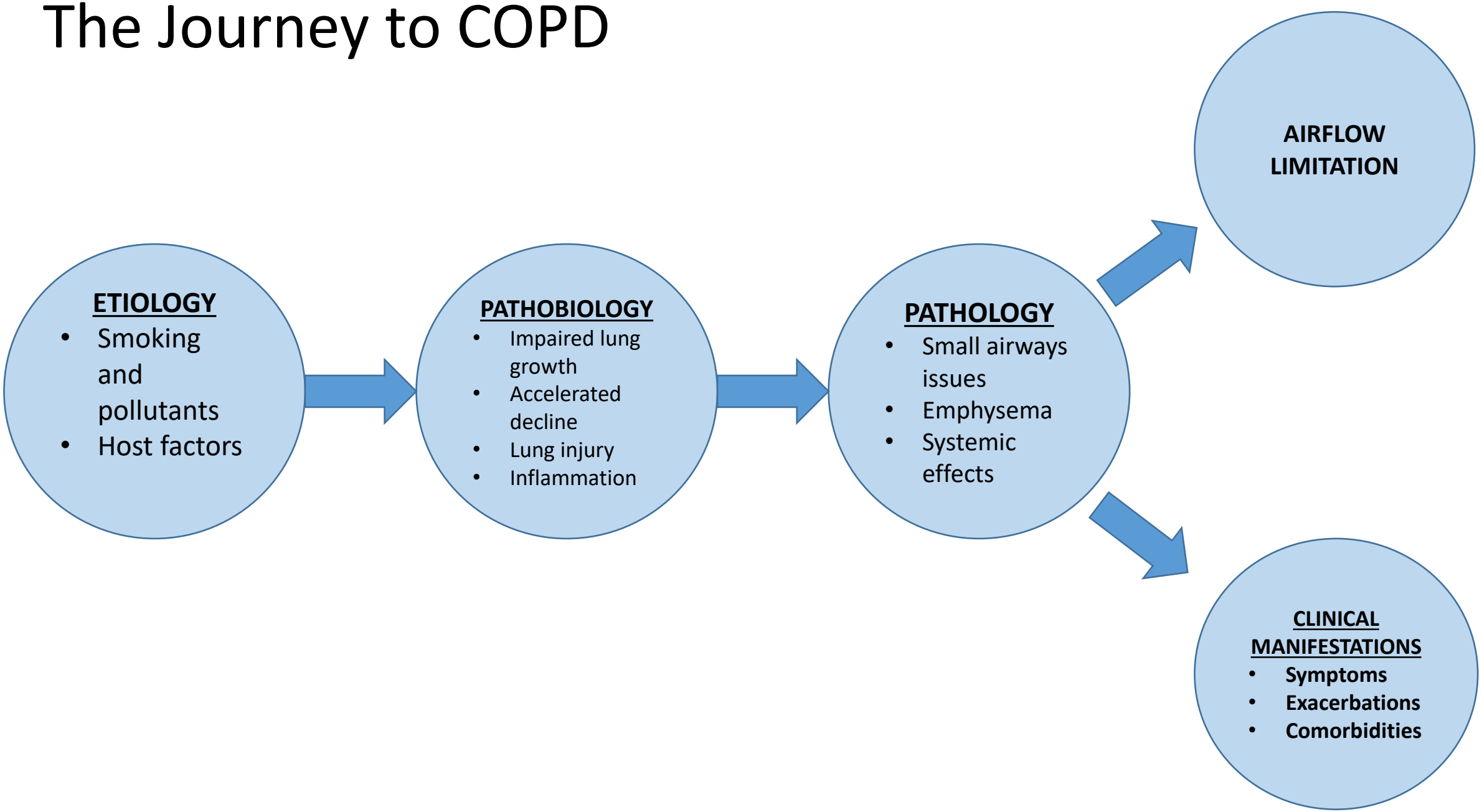
Management of COPD



COPD – Key Points - General

- Common, preventable, treatable
- Most common symptoms- dyspnea, cough and/or sputum
  - Patients tend to underreport
- Airflow limitation – obstructive lung disease
- Main risk factor is smoking
  - Underappreciated: Biomass fuel, air pollution
  - Host factors: genetics, abnormal lung development, accelerated aging
- Most have significant concomitant chronic diseases that contribute to increased morbidity and mortality

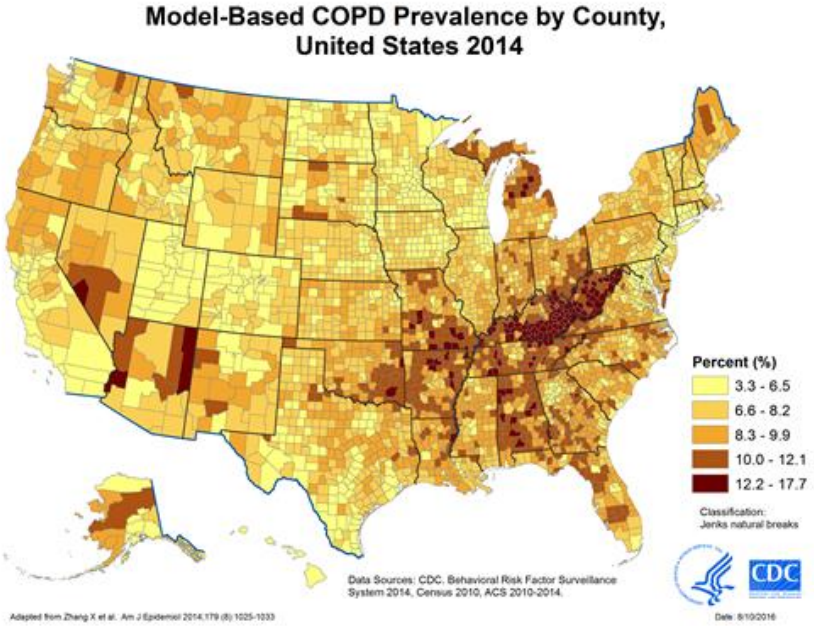
The Journey to COPD



COPD – Burden Globally

- A leading cause of morbidity and mortality worldwide
  - Major economic and social burden; increasing!
  - Risk factors
    - SMOKING!
    - Outdoor, occupational and indoor pollution
    - Age >40
- Prevalence – Underdiagnosed (symptoms + spirometry)
  - BOLD program (Burden of Obstructive Lung Disease)
    - 2010- 384 million worldwide; 11.7%
    - Increased in developing countries (smoking), aging populations in high income countries
    - 2030. Higher prevalence. 4.5 million deaths annually.

COPD- Burden US

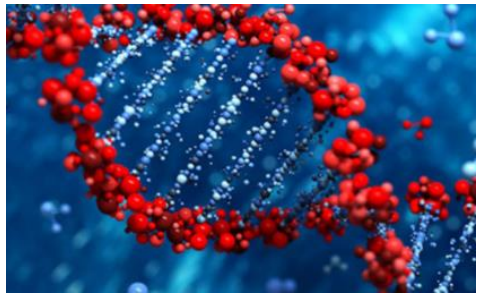


- 15.7 million (6.4%) have COPD in the US[1]
  - 50% with low function but **unaware** they had COPD
- Groups more likely to have COPD
  - Women; > 65 years old
  - American Indians/Alaskan Natives; multiracial non-Hispanics
  - Unemployed, retired, or unable to work; Divorced, widowed or separated
  - Current or former smokers; People who have a history of asthma
- Cost - $32 billion direct costs/year. AECOPD is biggest culprit
- 2nd leading cause of lost Disability-Adjusted Life Years (DALY)

[1]National Center for Health Statistics. *Health, United States 2015 with Special Feature on Racial and Ethnic Health Disparities*. Hyattsville, MD: US Dept Health and Human Services; 2016.

COPD Risk factors

- Tobacco smoke- cigarettes; pipe, cigar, water pipe
  - Marijuana
- Indoor air pollution
  - Burning wood, other biomass fuels; poor ventilation
- Occupational exposures
- Outdoor air pollution
- Genetic factors- alpha-1 antitrypsin deficiency. Gene encoding matrix metalloproteinase 12 (MMP-12) and glutathione S-transferase



COPD Risk factors

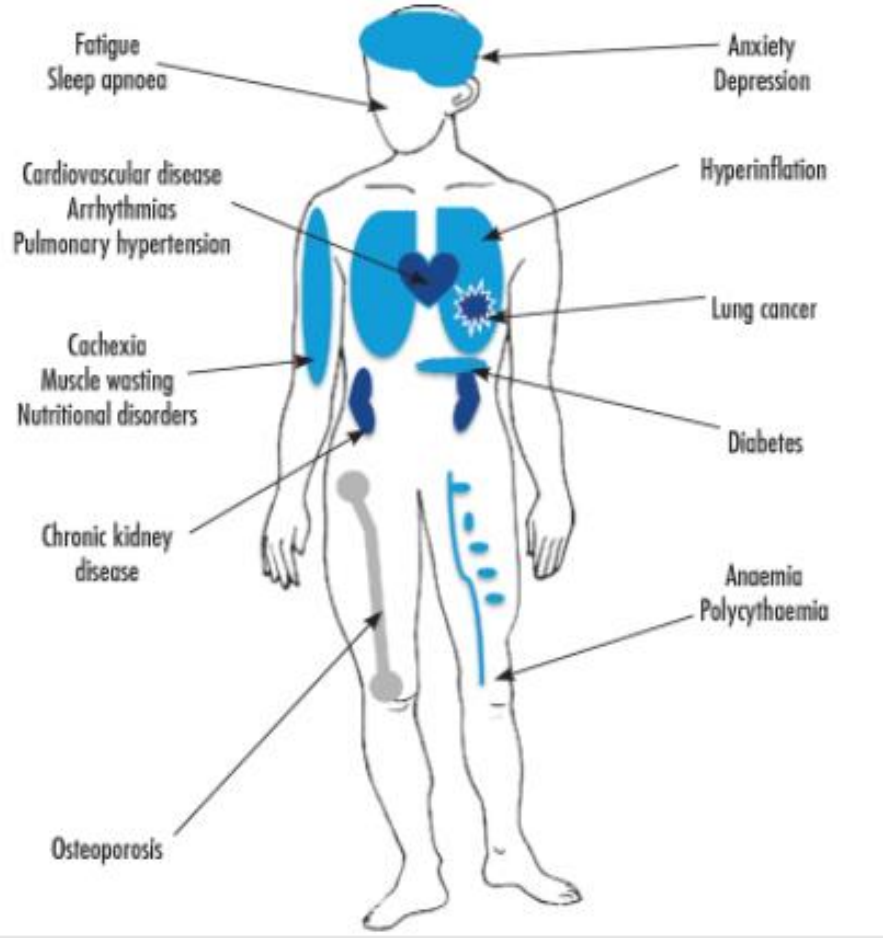
- Age/sex- Older; female
- Lung growth and development
  - Low birth weight and childhood respiratory infections can increase the likelihood of developing COPD
- Socioeconomic status
  - Poverty is *associated* with COPD develop
    - Pollution exposure? Crowding? Poor nutrition? Infections? Other?
- Asthma?

COPD Diagnosis- Key Points

- Consider when:
  - Symptoms- dyspnea, chronic cough or sputum
  - History of recurrent lower respiratory tract (LRT) infections
  - Exposures to risk factors
- Spirometry and proof of obstruction is required to make the diagnosis
  - Peak flow has good sensitivity; poor specificity
- Goals of COPD assessment
  - Severity of airflow limitation
  - Impact on patient's health
  - Risk for negative consequences (exacerbations, admissions, death)

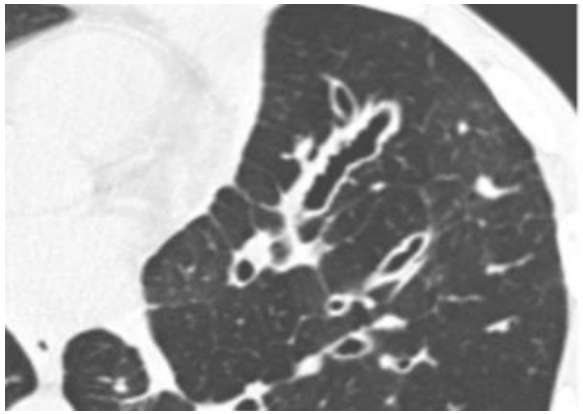
COPD Diagnosis- Key Points

- Recognize concomitant chronic diseases that are frequent in COPD patients
  - Cardiovascular disease
  - Skeletal muscle dysfunction
  - Metabolic syndrome
  - Osteoporosis
  - Depression/Anxiety
  - Lung cancer



COPD – The work up

- Labs
  - Alpha 1- antitrypsin
    - World Health Organization recommends all patients with COPD be screened once
    - Also recommends all family members of A1AT disease patients be screened
    - ATS- All patients with COPD, emphysema and incompletely reversible asthma
- Imaging
  - CXR – best use for alternative diagnoses
  - CT- not routinely recommended
    - Bronchiectasis
    - Lung cancer; lung volume reduction or transplant candidate

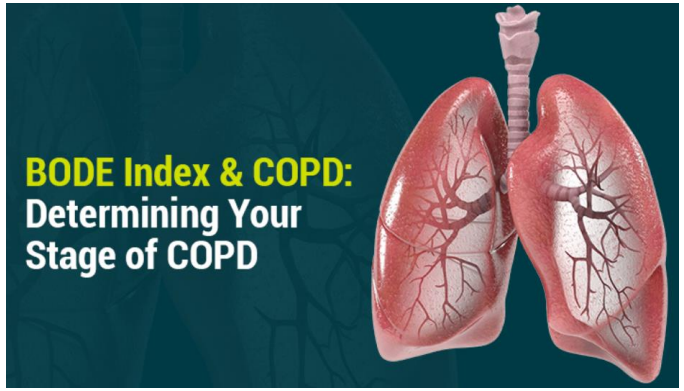


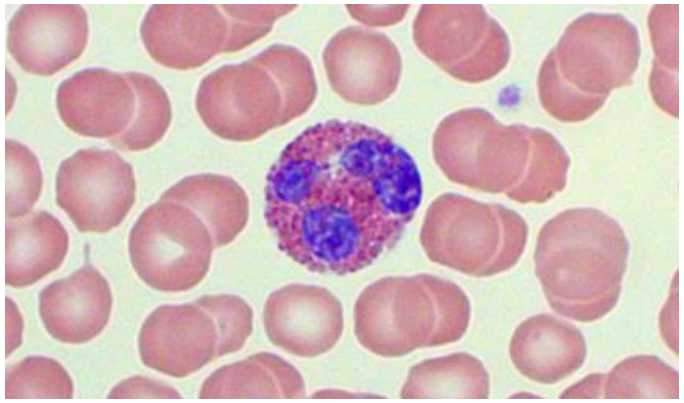
COPD – The work up

- Pulmonary Function Testing
  - Spirometry
  - Lung volumes and diffusion capacity
    - Volumes show gas trapping (elevated residual volume), hyperinflation (elevated total lung capacity)
- Oximetry and ABG
  - Oximetry for all patients with signs of respiratory failure or RHF
  - If O2 sat < 92%, ABG should be assessed
- Exercise testing; assessment of physical activity
  - Strong indicators of impairment and predictor of prognosis

COPD – The work up

- Composite scores
  - BODE Index (Body Mass Index, Obstruction, Dyspnea, Exercise)
- Biomarkers?
  - Eosinophils – Increasingly used as a predictor for steroid-responsiveness
  - CRP, procalcitonin for exacerbations?





COPD Differential Diagnosis

	Onset	Symptoms	Labs/Imaging	Other
COPD	Mid-Life	Slowly progressive		Exposure; obstruction
Asthma	Often childhood	Variable; night>day	Exhaled NO; eosinophils	FH; obesity, atopy; obstruction
CHF	Mid-life	Variable; progressive	Dilated heart; edema. Echo findings	Restriction
Bronchiectasis	Usually older	Copious sputum	Large amounts of bacteria in sputum; characteristic “tram tracks”, bronchial dilation/thickening	CF and congenital immune deficiencies can present younger; obstruction
Tuberculosis	All ages	Sub-acute (weeks)	Reactivation = cavity Primary = LAN	Endemic areas Immunosuppressed
Obliterative Bronchiolitis	Younger, non-smokers	Sub-acute onset; progressive	Expiratory CT findings	RA; post-BMT; post-Lung transplant; obstruction

COPD Assessment - Severity

- Spirometry
  - Global Initiative for Obstructive Lung Disease (GOLD)
- Symptoms
  - Questionnaires
- Exacerbations
  - Frequency/severity

COPD – Spirometry severity. $FEV_1/FVC < 0.7$

GOLD Level	Degree	Definition
GOLD 1	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4	Very Severe	$FEV_1 < 30\%$ predicted

- Uses of spirometry
  - Diagnosis- Do it for diagnosis
  - Severity
  - Follow up annually
    - Therapeutic decisions
      - Alternative diagnoses – Symptoms and spirometry don't line up
    - Identify rapid decliners

COPD – Dyspnea severity

Modified British Medical Research Council **(mMRC)** Questionnaire

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

COPD – Symptom severity

COPD Assessment Test (CAT)

Minimum symptoms	Scale	Maximum symptoms
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 in completely full of phlegm (mucus)
My chest dies bit 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 confident at all 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

Combined COPD Assessment

Refined ABCD Assessment Tool

Spirometry Confirms Diagnosis

Post-bronchodilator FEV1/FVC < 0.7

Assessment of airflow limitation

Grade	FEV_1% pred
GOLD 1	≥ 80
GOLD 2	50-79
GOLD 3	30-49
GOLD 4	<30

Assessment of exacerbations

≥2 or ≥ 1 leading to hospital admission

0 or 1 not leading to hospital admission

Assessment of symptoms/risk of exacerbations

C	**D**
A	**B**

mMRC 0-1
CAT < 10

mMRC ≥ 2
CAT ≥ 10

Prevention and Maintenance Therapy- Keys

- Smoking cessation is critical
- Effectiveness of e-cigarettes is uncertain at this time
  - Associated with increased cigarette use in adolescents
- Pharmacologic therapy can reduce COPD symptoms, frequency and severity of exacerbations and improve health status and exercise tolerance
- Inhaler technique needs to be individualized
- Flu vaccination reduces incidence of LTIs
- Pneumococcal vaccination reduces LTIs

Prevention and Maintenance Therapy- Keys

- Pulmonary rehabilitation improves symptoms, quality of life, and physical and emotional participation in everyday activities
- In patients with *severe* (sat < 89%) resting chronic hypoxemia, long-term oxygen therapy (LTOT) improves survival
  - In patients with stable COPD and resting or exercise induced *moderate* desaturation (89-93%), oxygen treatment should **not** be prescribe routinely
- In patients with severe chronic hypercapnia and a history of hospitalization for acute respiratory failure, long-term non-invasive ventilation may decrease mortality and prevent re-hospitalization
- Palliative care is effective in controlling symptoms in advanced COPD

Vaccination for Stable COPD – Key points

- Influenza vaccination reduces serious illness and death in COPD patients
- The 23-valent pneumococcal polysaccharide vaccine (PPSV23) has been shown to reduce community-acquired pneumonia (CAP) in COPD patients < 65 years old with FEV_1 < 40% predicted and in those with comorbidities
- In the general population of adults ≥65 years old, the 13-valent conjugated pneumococcal vaccine (PCV13) has demonstrated significant efficacy in reducing bacteremia and serious invasive pneumococcal disease

Pharmacologic Treatments for COPD

Bronchodilators (BD)

- Short-acting
  - Beta-agonists (SABA)
  - Muscarinic antagonists (SAMA)
- Long-acting
  - Beta-agonists (LABA)
  - Muscarinic antagonists (LAMA)
- Methylxanthines
  - E.g. theophylline

Anti-inflammatories

- Inhaled corticosteroids (ICS)
- Oral corticosteroid
- PDE4 Inhibitors
- Antibiotics (immune modulators?)
- Mucoregulators and antioxidant agents
- Other
  - Statins
  - LTM

Bronchodilators in Stable COPD- Key points

- Inhaled BD are central to symptom management and regular use can prevent/reduce symptoms
- Regular and as-needed (prn) use of SABA and SAMA improve FEV_1 and symptoms
  - Combination of SABA and SAMA has greater improvements than either alone
- LAMA have a greater effect on exacerbation reduction compared to LABA and decrease hospitalizations

Bronchodilators (BD) in Stable COPD- Key points

- Combination of LABA and LAMA increases FEV_1 and reduces symptoms and exacerbations compared to monotherapy
- Tiotropium (LAMA) improves the effectiveness of pulmonary rehabilitation in increasing exercise performance
- Theophylline exerts a small bronchodilator effect in stable COPD and is associated with modest symptomatic benefits

Anti-inflammatory therapy in stable COPD

- ICS
  - ICS/LABA combination is more effective than the individual components in improving lung function and health status and reducing exacerbations in patients with exacerbations and moderate to severe COPD
  - Regular treatment with ICS increases risk of pneumonia especially in those with severe disease
  - Triple therapy (ICS/LAMA/LABA) improves lung function, symptoms and health status and reduces exacerbations compared to ICS/LABA, LABA/LAMA, or LAMA monotherapy
- Oral steroids
  - Long-term oral steroids have many side effects and no evidence of benefit

Anti-inflammatory therapy in stable COPD

- PDE4 inhibitors
  - In patients with chronic bronchitis, severe to very severe COPD and h/o exacerbations:
    - Improves lung function and reduces moderate and severe exacerbations; including patients on fixed dose LABA/ICS
- Antibiotics
  - Long-term azithromycin and erythromycin reduces exacerbation over one year
  - Treatment with azithromycin is associated with increased incidence of bacterial resistance and hearing test impairments

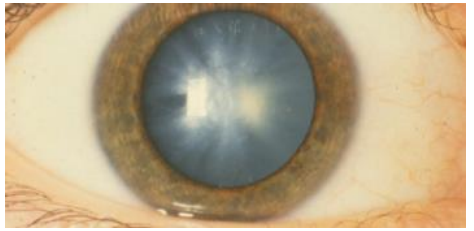
Factors to consider when starting ICS

STRONG SUPPORT	CONSIDER	AGAINST USE
• History of hospitalizations for COPD exacerbations • ≥ 2 moderate* COPD exacerbations per year** • Blood eosinophils > 300 cells/µL • Also has asthma	• 1 moderate COPD exacerbation per year** • Blood eosinophils 100-300 cells/µL	• Repeated pneumonia events • Blood eosinophils < 100 cells/µL • History of mycobacterial infection

*Severity of COPD exacerbation: Mild (increase BD), Moderate (Steroids), Severe (hospital)
**Despite appropriate long-acting bronchodilator maintenance therapy

ICS- adverse effects

- Oral candidiasis
- Horse voice
- Skin bruising
- Pneumonia
  - Higher risk: > 54 years old, h/o exacerbations or pneumonia, BMI < 25, poor MRC dyspnea grade and/or severe airflow limitation. Blood eosinophils < 2%
- Varied results on bone density
- Glucose control issues
- Cataracts
- Mycobacterial infections, including Tb



Anti-inflammatory therapy in stable COPD

- Mucoregulators/Antioxidents
  - Regular treatment with mucolytics such as erdosteine, carocysteine, and N-acetyl cysteine (NAC) reduces the risk of exacerbations in select populations
- Simvastatin
  - Does not prevent exacerbations in COPD patients at increased risk of exacerbations and without other indications for statin treatment
  - Observationally, there are some positive COPD outcomes noted in patients who take them for CV and metabolic reasons
- Leukotriene modifiers
  - Approved for asthma, but not tested adequately in COPD

Initial Pharmacologic Treatment

≥2 or ≥ 1 exacerbations leading to hospital admission

Group C

LAMA

Group D

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

* Consider if highly symptomatic (e.g. CAT >20)
** Consider if eosinophils≥300

0 or 1 exacerbations not leading to hospital admission

Group A

Short or long BD

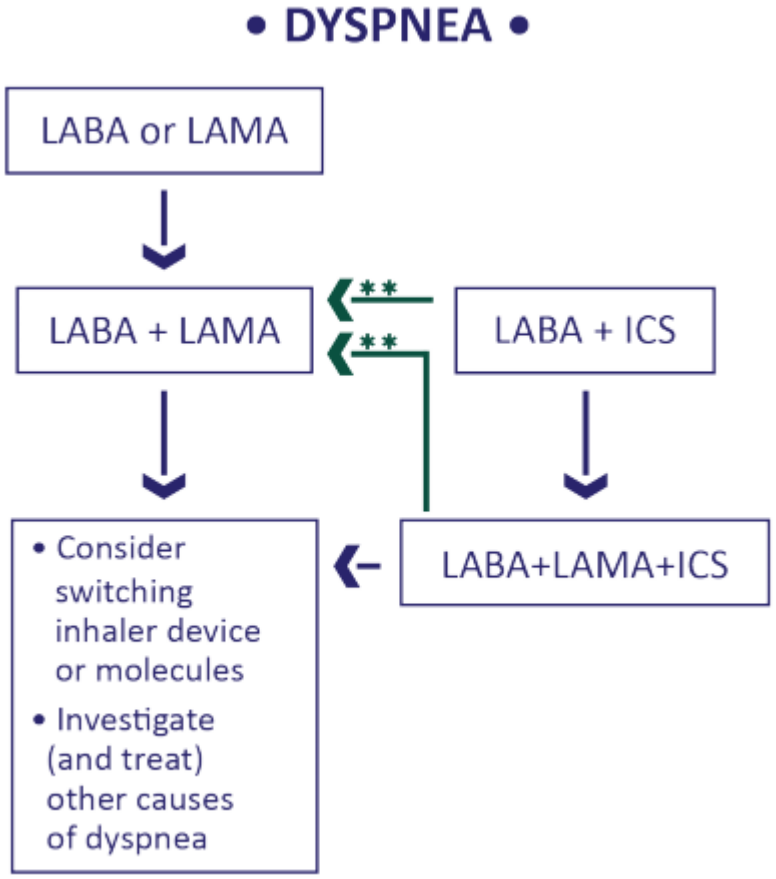
Group B

LABA or LAMA

mMRC 0-1, CAT < 10

mMRC ≥2, CAT ≥ 10

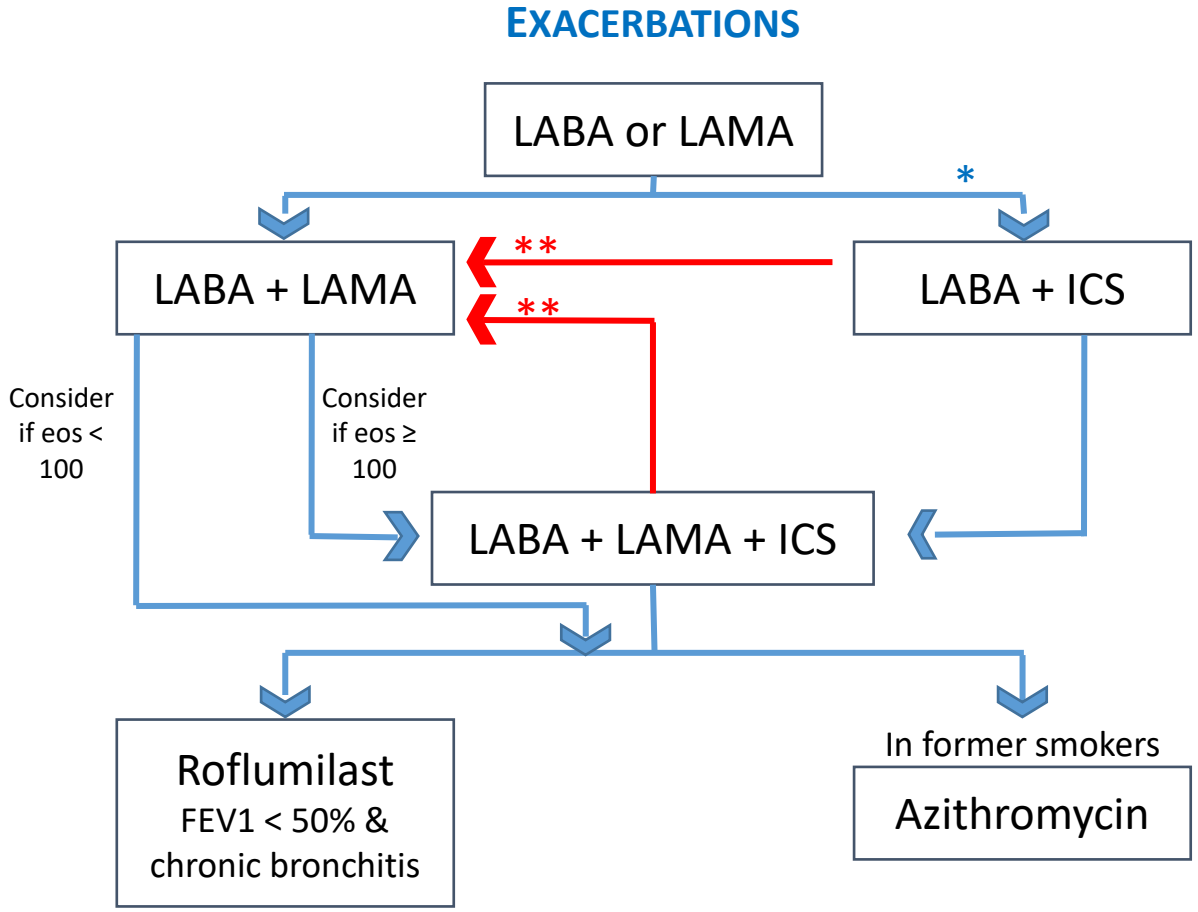
Follow-up Pharmacologic Treatment



- If response to initial treatment, maintain it
- If not:
  - Consider predominant trait to target
    - Dyspnea
    - Exacerbations
  - Place patient in box corresponding to current treatment

**Consider de-escalation of ICS or switch if pneumonia, inappropriate original indication or lack of response to ICS

Follow-up Pharmacologic Treatment



- If response to initial treatment, maintain it
- If not:
  - Consider predominant trait to target
    - Dyspnea
    - Exacerbations
  - Place patient in box corresponding to current treatment

*Consider if eosinophils ≥ 300 or > 100 AND ≥2 moderate exacerbations/1 hospitalization
**Consider de-escalation of ICS or switch if pneumonia, inappropriate original indication or lack of response to ICS

Initial Non-Pharmacologic Treatment

≥2 or ≥ 1 exacerbations leading to hospital admission

Group C
Smoking Cessation
Pulmonary Rehabilitation
Physical Activity
Flu vaccine
Pneumococcal vaccine

Group D
Smoking Cessation
Pulmonary Rehabilitation
Physical Activity
Flu vaccine
Pneumococcal vaccine

0 or 1 exacerbations not leading to hospital admission

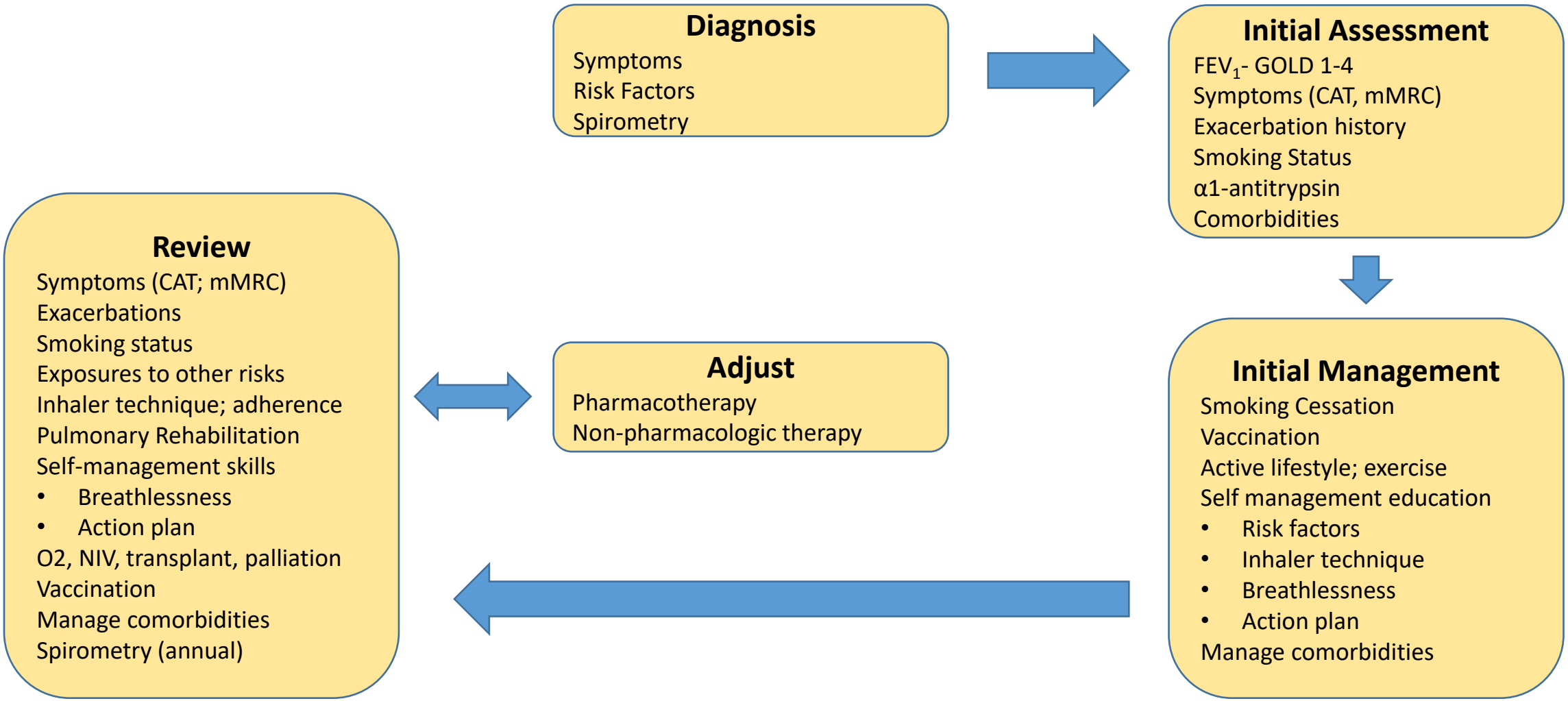
Group A
Smoking Cessation
Physical Activity
Flu vaccine
Pneumococcal vaccine

Group B
Smoking Cessation
Pulmonary Rehabilitation
Physical Activity
Flu vaccine
Pneumococcal vaccine

mMRC 0-1, CAT < 10

mMRC ≥2, CAT ≥ 10

Management of COPD



AECOPD – Definition and Triggers

- Acute worsening of respiratory symptoms that result in additional therapy
  - Mild (Short-acting bronchodilators- SABD alone)
  - Moderate (SABD + steroids and/or abx)
  - Severe (ED or hospitalization; acute respiratory failure)
- Triggers – mainly viral infections
  - Bacterial infections
  - Ambient factors – pollution; cold temperature
    - PM 2.5 – fine particulate matter

AECOPD –Symptoms and pathophysiology

- Symptoms and pathophysiology
  - Increased airways inflammation, mucus production
    - Cough
    - Sputum production
    - Early closure of small airways→ Air-trapping → Dyspnea
  - Sputum…
    - Studies suggests that purulence indicates increased bacteria
    - Eosinophilia in sputum
      - More likely to respond to steroids?
  - Symptom duration – 7-10 days…
    - 8 weeks post-discharge. 20% have not returned to baseline lung function

AECOPD- Management

- Treatment goals
  - Minimize negative impact of the AECOPD
    - Reverse airflow limitation
    - Treat infection appropriately
    - Ensure adequate oxygenation
    - Avert ICU stays; intubation
    - Avoid complications of immobility (PE, deconditioning)
    - Improve nutrition
  - Prevent subsequent exacerbations
    - Vaccination; smoking cessation
- Where do we go…where do we go now….where do we go….
  - 80% of AECOPD are managed as outpatient
  - Studies show that many are not brought the attention of healthcare providers

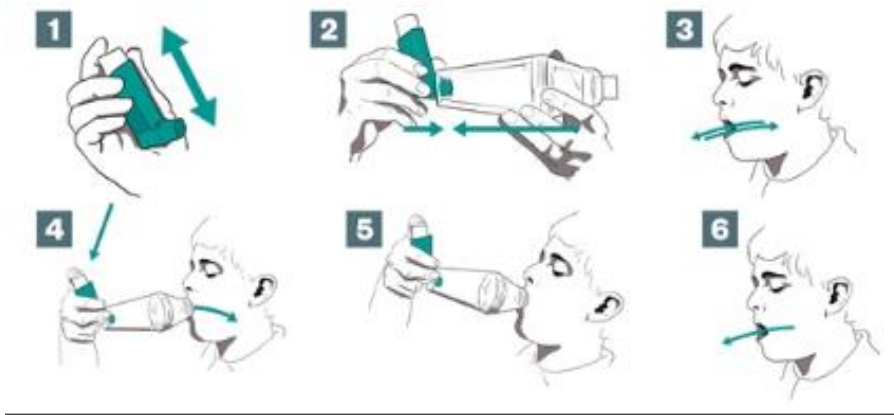
AECOPD- Location of care

- Indications for admission*
  - Severe symptoms
    - Resting SOB, high work of breathing/RR, decreased O2 saturation, confusion, drowsiness
  - Acute respiratory failure (very severe AECOPD)
  - New troublesome physical signs
    - Cyanosis, peripheral edema
  - Failure to improve from initial management
  - Presence of serious comorbidities
    - Heart failure, new arrhythmias, etc…
  - Inadequate home support

*Consider local and home resources

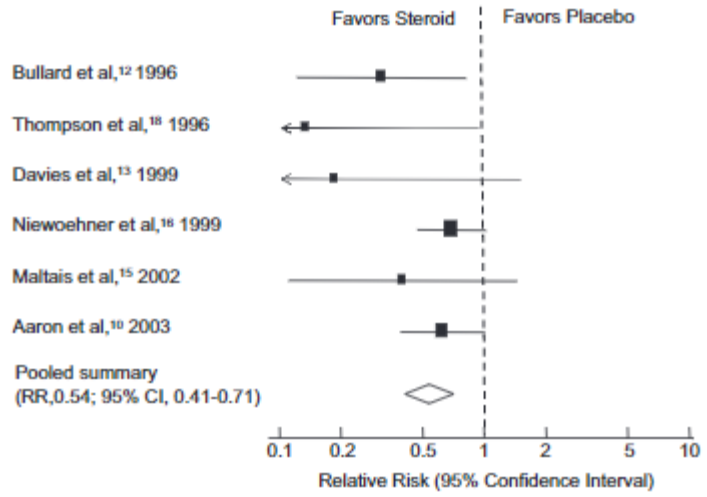
AECOPD- Medical management

- Bronchodilators
  - Short-acting beta-agonists
    - Albuterol (2.5 mg/3 cc; 4-8 puffs with spacer)
    - Levalbuterol (alternative)
      - Less tachycardia?
      - $$$
  - Short-acting anticholinergics?
    - Ipratropium (500 mcg; 2-4 puffs q 4 hours with spacer)
  - MDI vs Nebulizer
    - Actually no superior delivery system
    - Nebs favored by clinicians, but MDI is okay if using more puffs with spacer
      - MDI technique can be poor



AECOPD – Medical Management

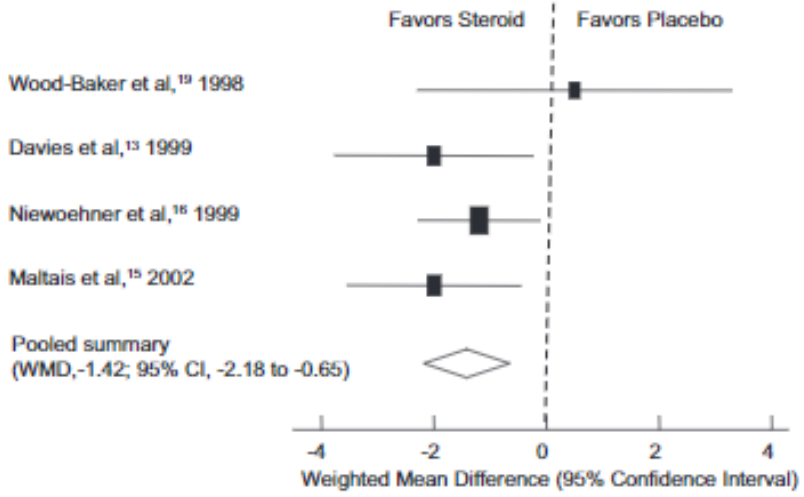
- Steroids
  - Meta-analysis 2008
  - Reduced treatment failure
  - Reduce LOS
  - Increased hyperglycemia



Reduced Treatment Failure

Contemporary Management of Acute Exacerbations of COPD*

A Systematic Review and Metaanalysis



Reduced Length of Stay

(CHEST 2008; 133:756–766)

Case – Steroid management

- Which of the following steroid management is closest to what you would choose for an AECOPD?

  - A. 125 mg methylprednisolone q 6 hours for 1 day, followed by 40-60 mg prednisone bid x 3 days, followed by taper over 2 weeks
  - B. 60 mg methylprednisolone q 6 hours for 1 day, followed by 40-60 mg prednisone bid x 3 days, followed by taper over 1 week
  - C. 40-60 mg prednisone daily x 7 days, followed by taper over 1 week
  - D. 40-60 mg prednisone daily x 14 days then stop
  - E. 40-60 mg prednisone daily x 5 days, then stop

AECOPD – Medical Management

- Steroids!
  - Route?

Very well absorbed

More expensive

AECOPD – Medical Management

Association of Corticosteroid Dose and Route of Administration With Risk of Treatment Failure in Acute Exacerbation of Chronic Obstructive Pulmonary Disease

- Dose? Low dose (20-80 mg/day as good as high dose IV)

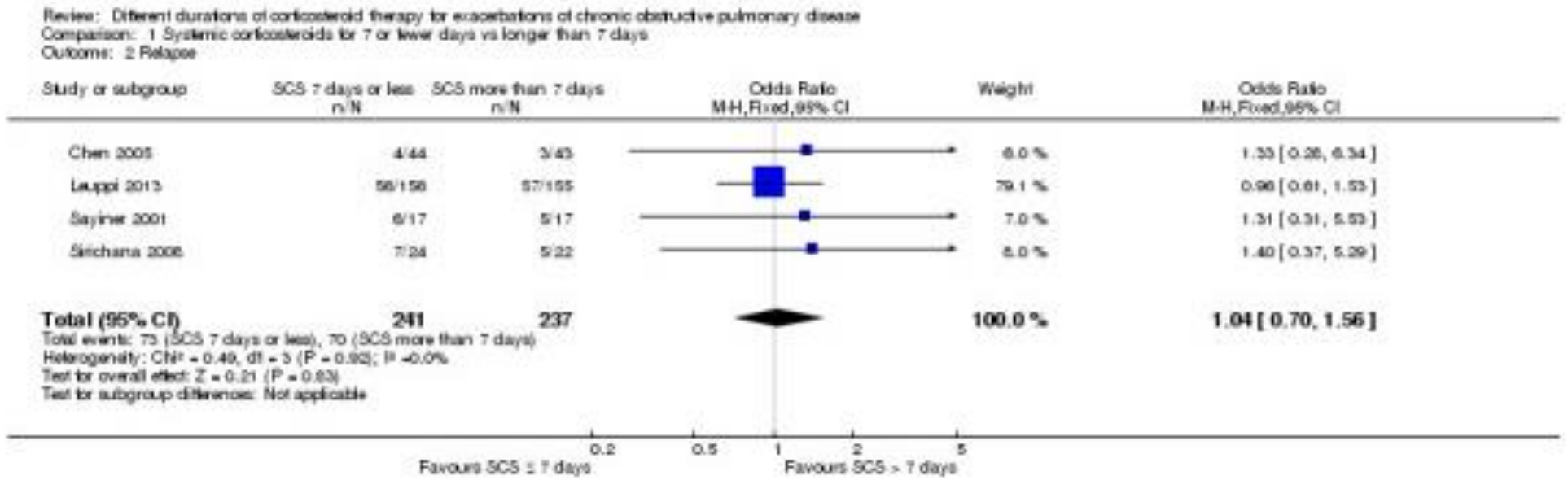
Table 5. Association Between Low-Dose Oral Steroid Therapy vs High-Dose Intravenous Therapy and Outcomes in Acute Exacerbation of Chronic Obstructive Pulmonary Disease

Model	Treatment Failure, OR (95% CI)	Ratio (95% CI)	
		Length of Stay	Total Cost
Unadjusted[a]	0.91 (0.83-1.00)	0.92 (0.91-0.93)	0.92 (0.91-0.93)
Propensity score– and covariate-adjusted[b,c]	0.93 (0.84-1.02)	0.92 (0.91-0.94)	0.93 (0.91-0.94)
Matched sample adjusted for unbalanced covariates[d]	0.84 (0.75-0.95)	0.90 (0.88-0.91)	0.91 (0.89-0.93)
Group treatment for 10% increase in hospital proportion oral steroids, covariate adjusted[b,c]	1.00 (0.97-1.03)		

JAMA. 2010;303(23):2359-2367.

AECOPD – Medical Management

- Duration- Short (< 7 days as good as long)
  - Time to relapse, return of lung function, mortality, length of stay without differences in large meta-analysis. Adverse effects actually about the same
  - REDUCE study – 5 days as good as 14 days



Cochrane Database Syst Rev. 2018 Mar; 2018(3): CD006897.

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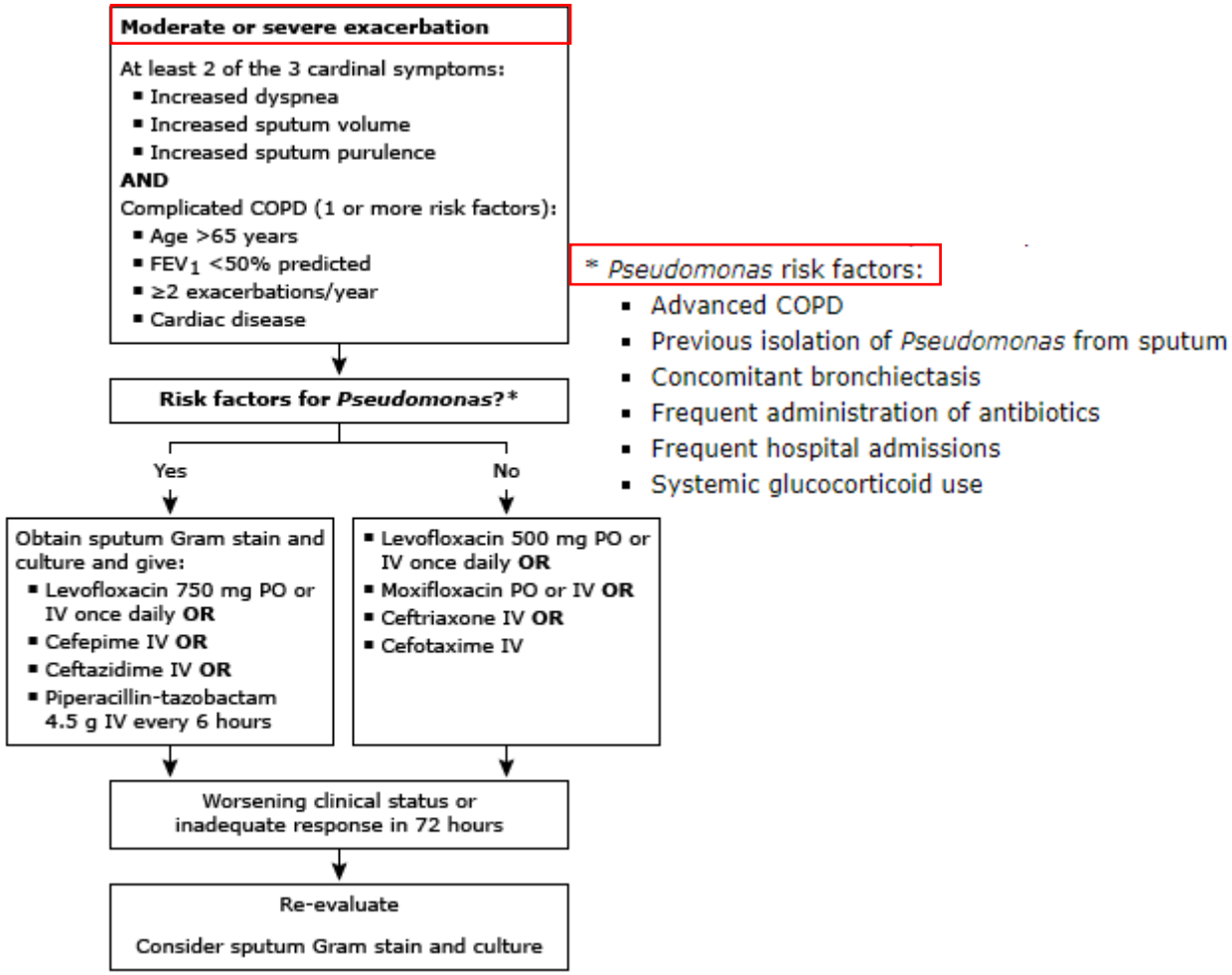
  - C. 40-60 mg prednisone daily x 7 days, followed by taper over 1 week
  - D. 40-60 mg prednisone daily x 14 days then stop
  - E. 40-60 mg prednisone daily x 5 days, then stop

AECOPD – Medical Management

- Antibiotics?
  - Evidence suggests improved outcomes and most recommend for hospitalized patients*
    - Mortality and 30 day readmission?
    - "2 out of 3" rule- Increased dyspnea, sputum change (color/amount), increased cough
    - Mortality benefit in intubated patients
  - Which one?
    - UTD algorithm?
    - Azithro and quinolones (QTc)
  - How long?
    - 5 days as good as > 7 days**



*Chest. 2013;143(1):82.

**J Antimicrob Chemother. 2008;62(3):442.

Case

- 70 year old man arrives in the ED with significant respiratory distress.
  - 1 week of increased cough, wheezing and SOB
  - 50 PY smoker; active ½ PPD
  - Afebrile. RR 28, O2 saturation 82% RA. 89% on 45% Venturi. Tripodding position.
  - Diffuse expiratory wheezes. CXR shows chronic COPD changes
  - Bronchodilators and steroids are initiated. Full code status confirmed.

Which of the following diagnostic test should be ordered next?

- A. Chest CTA
- B. Echo
- C. Blood gas
- D. Troponin

Case- Acute hypercapnic respiratory failure

- ABG 7.24/48/62/27/90% on 45% FiO2
- EKG with sinus tachycardia with multifocal atrial tachycardia (MAT)
- You are called to admit the patient to the floor.
- Which of the following is most concerning regarding floor admission?
  - A. pH 7.24
  - B. CO_2 48
  - C. MAT on EKG
  - D. PaO_2 62
  - E. 45% F_iO_2 needed

AECOPD - Triage

- Indications for ICU
  - Severe dyspnea not responsive to initial treatment
  - Change in mental status (confusion, lethargy, coma)
  - Persistent hypoxia (pO2 < 40) or respiratory acidosis (pH < 7.25)
  - Need for invasive mechanical ventilation
  - Need for vasopressors for hypotension

AECOPD – Severe management

- What is the next most appropriate step for this patient.
  - A. Intubation and mechanical ventilation
  - B. Non-invasive ventilation
  - C. IV antibiotics
  - D. Smoking cessation discussion
  - E. Initiate hospice discussion

AECOPD – Severe management

- Indications for non-invasive ventilation (NIV)
  - Respiratory acidosis. pH < 7.35 and CO >45
  - Severe dyspnea with clinical signs of respiratory muscle fatigue/↑ WOB
    - Accessory muscle use
    - Paradoxical motion of the abdomen
    - Retraction of intercostal spaces
  - Persistent hypoxemia despite supplementation
- Non-invasive ventilation advantages in AECOPD with acute or acute on chronic respiratory failure*
  - Decreased need for intubation
  - Decreased mortality
  - Decreased ICU length of stay
  - Decreased overall length of stay
  - Decreased non-respiratory infections
  - Decreased cost
  - Successful 80% of the time

*Eur Respir J. 2017;49(3) Epub 2017 Mar 15

AECOPD – Severe management

- Initiating NIV (bilevel)
  - Bilevel
    - Interface – Full face mask, nasal mask, nasal pillows
    - Settings
      - Inspiratory Positive Airway Pressure (IPAP)- 8-12 cm H2O
      - Expiratory Positive Airway Pressure (EPAP)- 3-5 cm H2O
    - Close observation for tolerance – RT and RN are key to ensure fit and comfort
      - **Cautious** use of sedations may assist in tolerance
  - Indicators of success
    - Decreased WOB
    - Improvement in pH and O2
  - Most who improve do so in the first 1-4 hours

AECOPD – Severe management

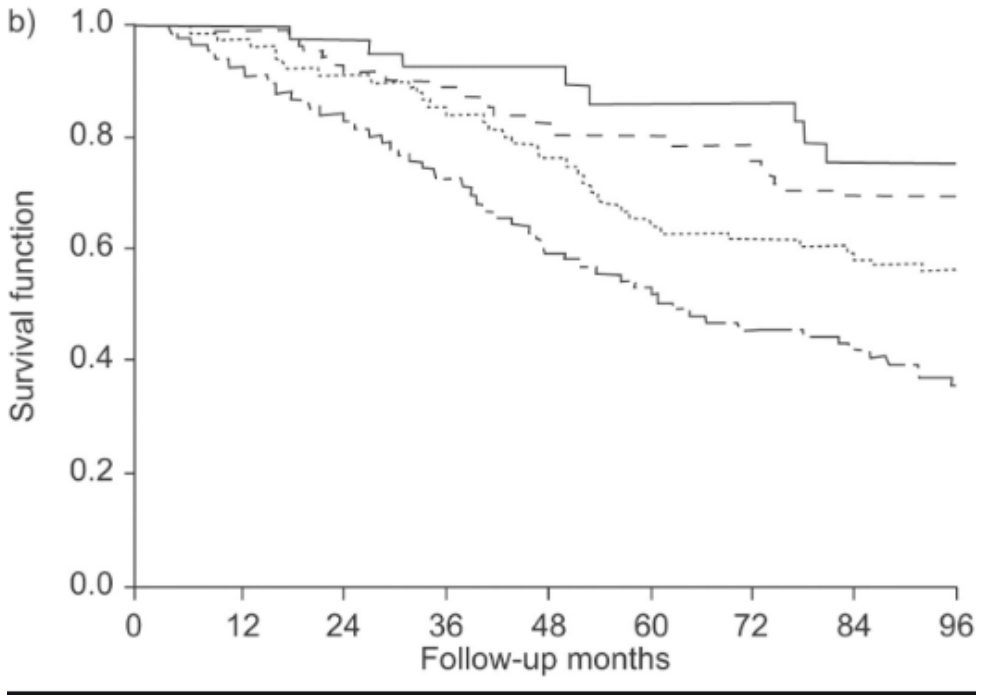
- Indications for invasive mechanical ventilation
  - Unable to tolerate NIV or failure of NIV
  - s/p respiratory or cardiac arrest
  - Diminished consciousness
  - Agitation unable to control with sedation
  - Massive aspiration or persistent vomiting
  - Hemodynamic instability not responsive to fluids and pressors
  - Severe ventricular or supraventricular arrhythmias
  - Life-threatening hypoxia in patients not able to tolerate NIV

COPD Prognosis

- Risk factors for increased mortality - Chronic
  - BODE index
    - BMI
    - Obstruction severity
    - Dyspnea scale
    - Exercise capacity

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		



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COPD Prognosis

- Risk factors for increased mortality after AECOPD
  - Age (each decade past 50)
  - COPD-related previous admissions
  - Dementia
  - CO2 > 55 mm Hg

	β (s.e.)	OR (95% CI)	*p*-value	Weight
Intercept	− 2.12 (0.56)		0.0002	
Age[b]	0.46 (0.08)	1.581 (1.357–1.842)	< 0.0001	2
COPD related previous admissions (Yes vs. No)	0.79 (0.18)	2.201 (1.541–3.144)	< 0.0001	4
Cardio-cerebro-peripheral vascular disease[a] (Yes vs. No)	0.47 (0.15)	1.598 (1.189–2.148)	0.0019	2
Dementia (Yes vs. No)	1.09 (0.39)	2.973 (1.394–6.340)	0.0048	5
PaCO2				
45–55 (vs. < 45)	− 0.05 (0.18)	0.947 (0.663–1.353)	0.7631	0
> 55 (vs. < 45)	0.47 (0.19)	1.601 (1.102–2.326)	0.0135	2
Hospital characteristics				

COPD Prognosis

- Risk factors for increased mortality after AECOPD

	Derivation sample			Validation sample		
	N (%)	Mortality 1 year	*p*-value	*N* (%)	Mortality 1 year	*p*-value
Risk groups			< 0.0001			< 0.0001
Low (0–5)	83 (8.03)	7 (8.43)		498 (15.39)	17 (3.41)	
Low-Medium (6–7)	112 (10.83)	22 (19.64)		513 (15.86)	38 (7.41)	
Medium-High (8–10)	412 (39.85)	134 (32.52)		1307 (40.40)	201 (15.38)	
High (>10)	427 (41.30)	206 (48.24)		917 (28.35)	236 (25.74)	
AUC (95% CI)	0.740 (0.709–0.771)			0.763 (0.741–0.784)		

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AECOPD – Discharge recommendations

- Review all clinical and lab data
- Reassess inhaler technique
- Review meds that are being stopped (abx, steroids)
- Managing any co-morbidities
- Palliative care discussions
  - 1-year mortality after AECOPD is 3-30%*
- Ensure follow up early (< 4 weeks) and late (>12 weeks)
- Pulmonary rehabilitation
- N95 Mask if air pollution/wildfires are factors?
- Review oxygen needs.
- Review maintenance regimen. Medications that can decrease AECOPD
  - Once daily medications now available with 1 ($), 2 ($$), and 3 ($$$) medications

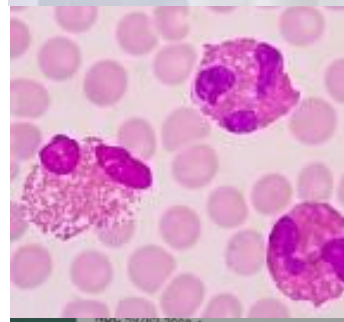
*European Respiratory Journal 2014 44: P3586

Criteria for supplemental oxygen

- NOTT trial (1980) and LOTT trial (2016)
- Indications
  - PaO_2 < 56; or saturation < 89%
  - Cor pulmonale: PaO_2 <59; or saturation < 90%
    - EKG with P pulmonale
    - Hct > 55
    - Clinical evidence of right heart failure
  - If qualifies, assess needs with exercise and sleep
  - LOTT – If no resting hypoxia, no evidence that treating only exercise-induced desaturations yielded any tangible benefit (mortality, readmission, cost)

Review medications and vaccination status

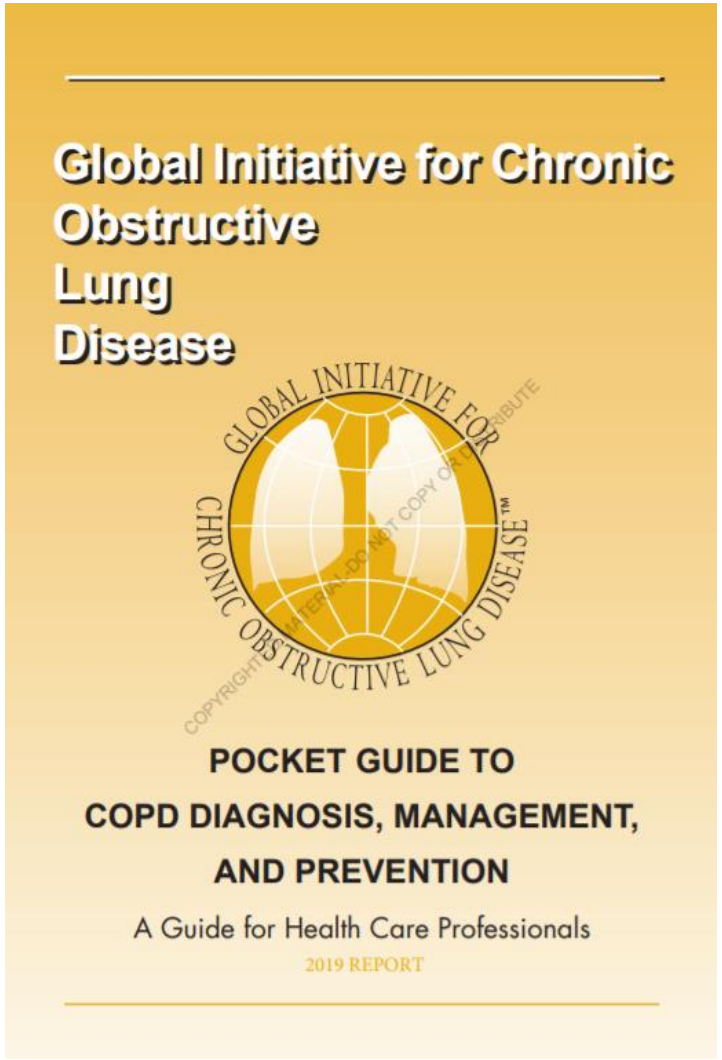
- Medications which can prevent exacerbations
  - Long-acting bronchodilators
    - LAMA and LABA
  - Inhaled corticosteroids
    - Frequent exacerbations
    - Asthma overlap
    - Eosinophilia
  - Roflumilast- selective phosphodiesterase inhibitor
    - Severe COPD with *chronic bronchitis* and frequent exacerbations
  - Chronic azithromycin in frequent exacerbators
    - NEJM 2011- 27% reduction in AECOPD
    - BACE trial 2019 – started in hospital; decrease treatment failures at 3 and 6 months
    - Possible adverse effects: QTc and hearing
- Vaccinations
  - Flu and pneumococcal



Take home points

- COPD is common and has significant morbidity and mortality
- Removing the exposure is the most important management step
- Use spirometry to make the diagnosis and assess severity!
- Symptoms scores and exacerbation frequency determine the COPD phenotype and management
- Use ICS only for appropriate patients
- Vaccinate your patients

GOLD COPD 2020. ATS/ERS 2017 guidelines.



Management of COPD exacerbations: a European Respiratory Society/American Thoracic Society guideline

Jadwiga A. Wedzicha (ERS co-chair)[1], Marc Miravitlles[2], John R. Hurst[3], Peter M.A. Calverley[4], Richard K. Albert[5], Antonio Anzueto[6], Gerard J. Criner[7], Alberto Papi[8], Klaus F. Rabe[9], David Rigau[10], Pawel Sliwinski[11], Thomy Tonia[12], Jørgen Vestbo[13], Kevin C. Wilson[14] and Jerry A. Krishnan (ATS co-chair)[15]

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Thank You!

Feel free to email me with questions!

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