To Air is Human, To Not Wheeze Divine

Obstructive Lung Disease in The Elderly

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Disclosure Statements

I have served on advisory boards for:

- Almirall, AstraZeneca, Boehringer Ingelheim, GlaxoSmithKline, Novartis, Takeda

- I have received honoraria for speaking from:
  - Almirall, AstraZeneca, Boehringer-Ingelheim, Merck, Novartis, Takeda
- I have no financial interests in any pharmaceutical company

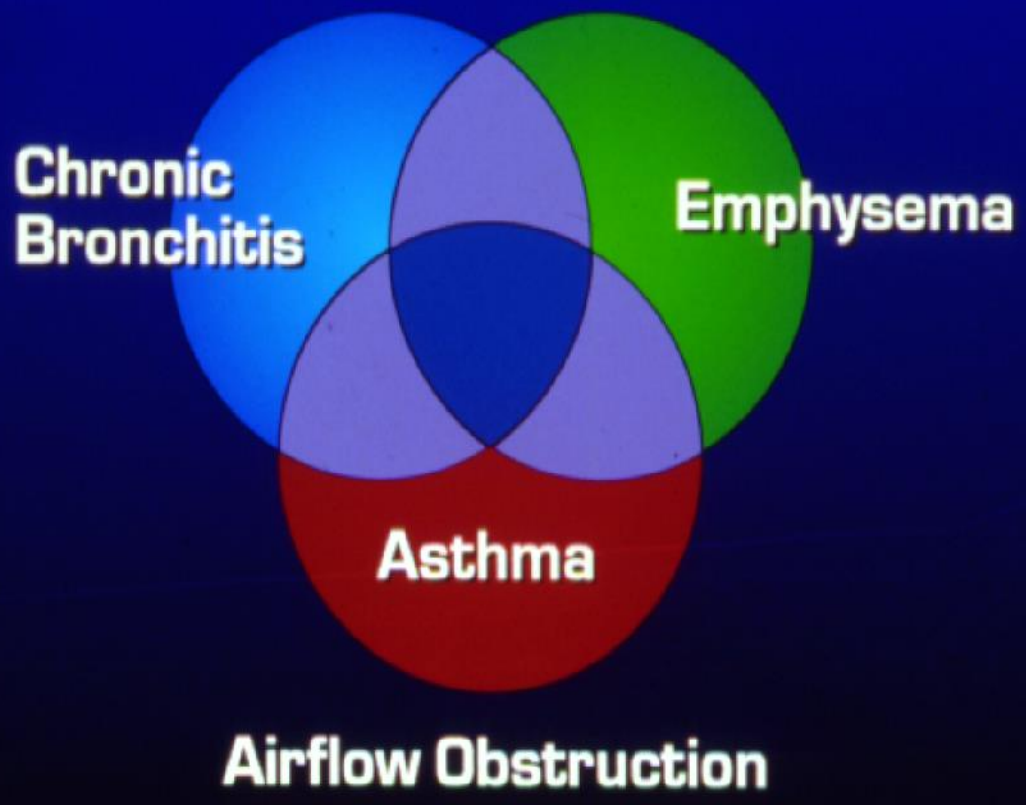
Learning Objectives

- Understand how to diagnose and differentiate between asthma and COPD in the elderly
- Discuss the importance of co-morbidities when treating obstructive lung disease in the elderly
- Learn appropriate management strategies for treating obstructive lung disease

Which of the following most clearly coincides with your feelings?

A. There is no need to differentiate between asthma and COPD as the treatments are similar
B. I would like to separate the two but my patients can’t cooperate with appropriate testing.
C. Diagnosis is irrelevant as my patients can’t be taught how to use inhalers properly
D. I thought this was the lecture on bowel obstructions

Relationship Between Chronic Bronchitis, Emphysema and Asthma



Asthma: Definition

Asthma is defined as an inflammatory disorder of the airways characterized by paroxysmal or persistent symptoms such as dyspnea, chest tightness, wheezing, sputum production and cough, associated with variable airflow limitation and a variable degree of airway hyperresponsiveness to endogenous or exogenous stimuli.

Canadian Consensus on Asthma 1999

Asthma in the Elderly

- Sometimes considered as two categories
  - symptoms developing in childhood
  - symptoms develop de novo later in life
- Risk factors and triggers identical in asthmatics in all age groups
  - dyspnea less common at same level of FEV1
- Comorbid conditions are important
  - 20% CHF, 20% MI, 45% HTN
  - COPD overlap syndrome
- Spirometry/methacholine better than PEFR
- Treatment similar to that in younger pts

All That Wheezes is Not Asthma: Differential Diagnosis of Asthma

- Post-infectious cough
- Post-nasal drip
- Gastroesophageal reflux disease
- COPD
- Heart failure

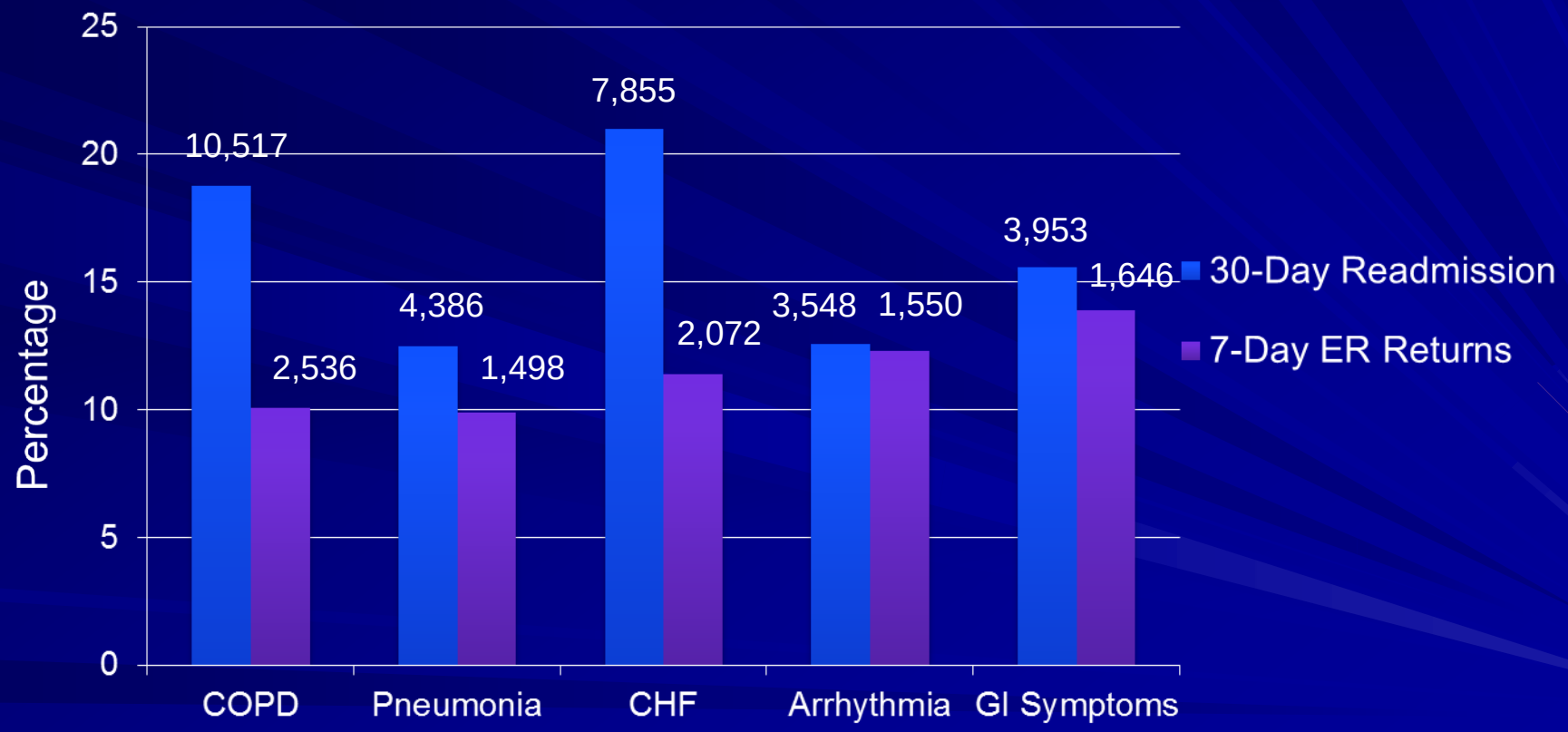
- Angina
- Foreign body
- Lung cancer
- Hyperventilation syndrome
- Vocal cord dysfunction

Definition of COPD

"COPD is a respiratory disorder largely caused by smoking, which is characterized by progressive, partially reversible airway obstruction and lung hyperinflation, systemic manifestations, and increasing frequency and severity of exacerbations"

O'Donnell DE, et al. *Can Respir J* 2007;14 (Suppl B):5B-32B.

COPD: Leading Cause of Readmission and ED Returns



Canadian Institute for Health Information. June 14, 2012

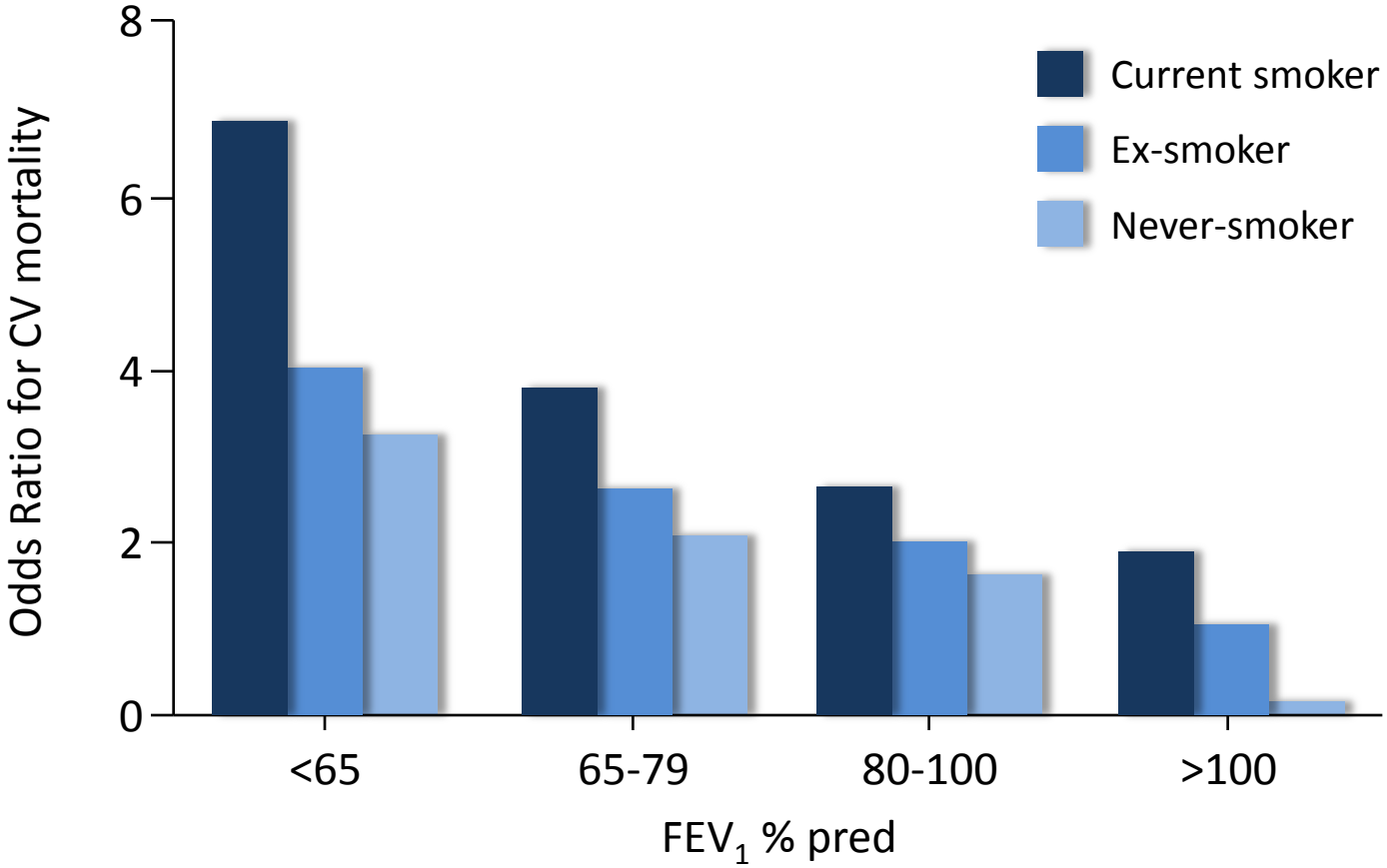
Comorbidities of COPD

- Cardiovascular disease is a major comorbidity in COPD and probably both the most frequent and most important disease co-existing with COPD
- Other major comorbidities:
  - Osteoporosis
  - Depression

    often underdiagnosed and associated with poor health status and prognosis
  - Lung cancer (most frequent cause of death in mild COPD)

Global Initiative for Chronic Obstructive Lung Disease (GOLD), 2011.

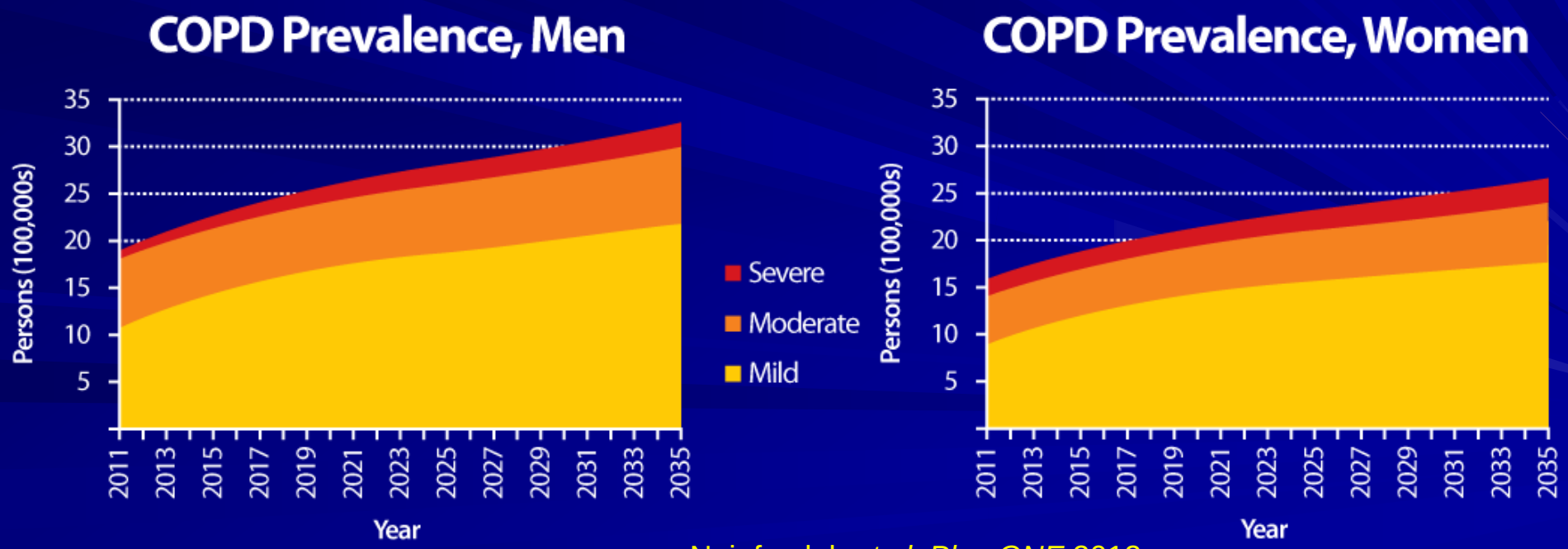
Relationship Between FEV_1, Smoking Status and CV mortality



Young RP, *et al.: Eur Respir J* 2007; 30(4):616-22.

COPD is Common and Increasing in Prevalence

- Total # COPD patients in Canada (including undiagnosed) estimated at 3.45 million in 2011, increasing to 5.83 million in 2035
- Prevalence increases with age
- Canadian population age >40 yrs will increase from 17 million to 24 million by 2035; the population >70 years will double to 8 million



Najafzadeh *et al. Plos ONE* 2012

Barriers to Diagnosis

- Patients attribute symptoms to ageing and do not seek medical attention
- Physicians dismiss early symptoms and focus only on the immediate issue at hand
- Differentiating COPD from asthma

Price *et al. Prim Care Respir J* 2011

COPD is Underdiagnosed:
Screening Spirometry in Primary Practice

Patients >40 years + 20 pack-year history of smoking visiting a primary care physician for any reason (n=1,003)

↓

Screening for COPD

Patients meeting criteria for COPD* (n=208; 20.7%)

Patients not meeting criteria for COPD* (n=795; 79.3%)

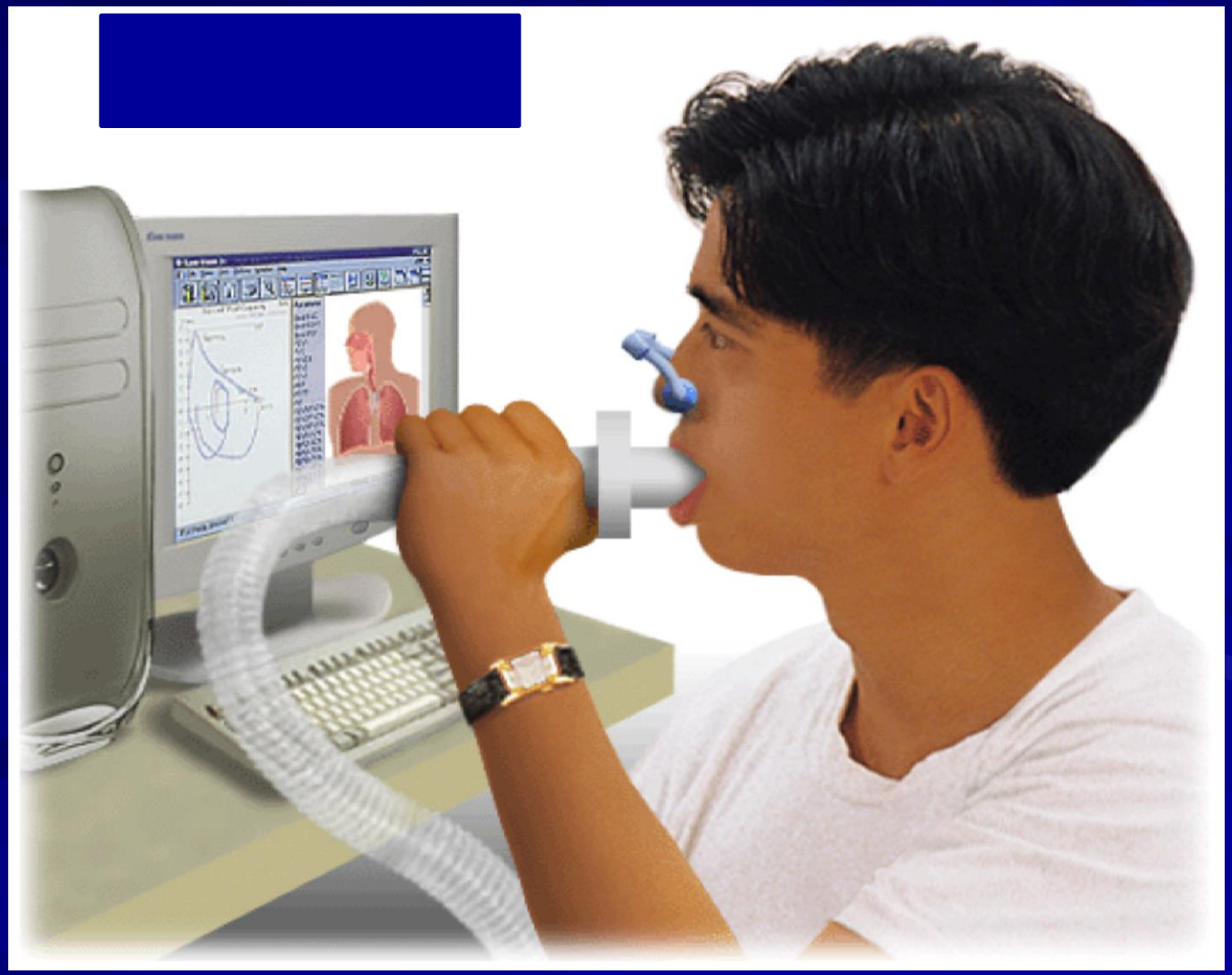
Previous diagnosis of COPD (n=67; 32.7%)

No previous diagnosis of COPD (n=141; 67.3%)

Criteria for COPD: FEV_1/FVC < 0.70

Hill K, *et al.*: *CMAJ* 2010; 182:673-8.

Spirometry



Diagnostic Criteria For COPD

In order to qualify for a diagnosis of COPD, a patient must have:

- Postbronchodilator FEV_1 < 80% of predicted; and
- $FEV_1/FVC < 0.7$

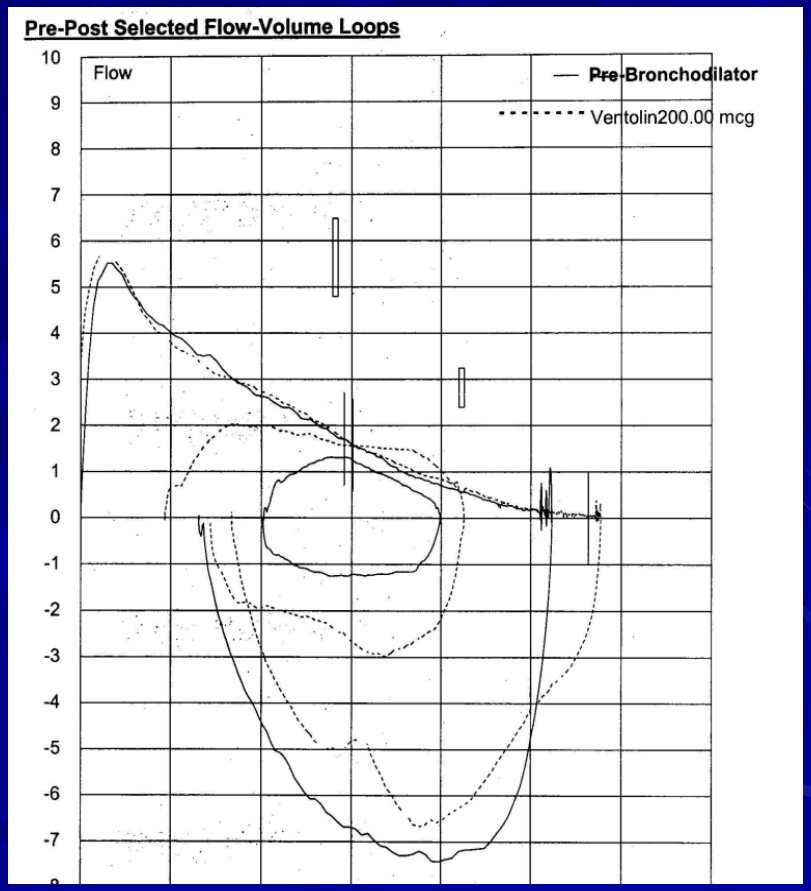
FEV_1 = forced expiratory volume in 1 s
FVC = forced vital capacity

O'Donnell DE, et al. *Can Respir J* 2003;10(Suppl A):11A-33A.

Spirometry Results

Is this asthma or COPD?

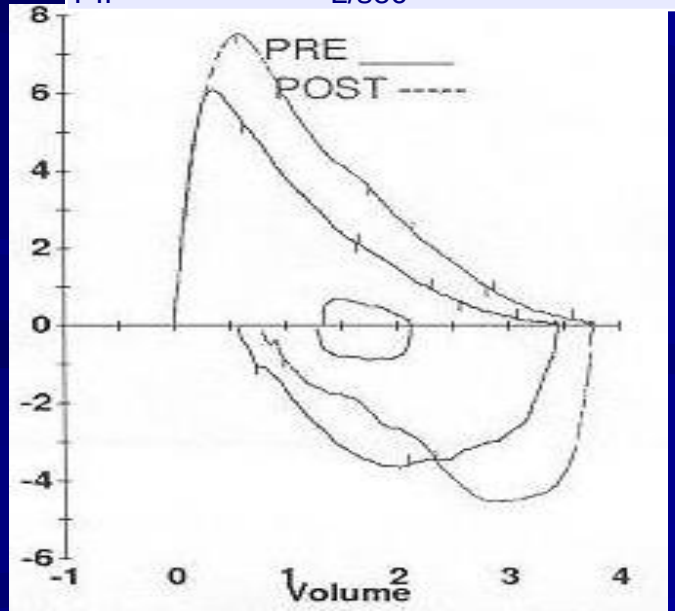
Parameter	Pred. value	Observed pre	% Pred.	Observed post	% pred.	% change
FVC (L)	**5.64**	**5.23**	**93**	**5.77**	**102**	**10.3**
FEV_1 (L)	**4.57**	**2.92**	**64**	**3.01**	**66**	**3.2**
FEV_1/FVC (%)	**81**	**56**	**69**	**52**	**64**	**-6.4**
FEF_{25-75} (L/S)	11.27	5.52	49	5.70	51	3.3
FEF_{50} (L/S)	5.64	2.02	36	1.73	31	-14.3
FEF_{75} (L/S)	2.82	0.75	27	0.59	21	-21.2
VE (L/min)	173	--	--	--	--	--
Raw insp. (cmH_2O/l/s)	0.68	1.71	256			



Example of Results Consistent with Asthma

PULMONARY FUNCTION ANALYSIS

Spirometry		Ref	Pre Meas	Pre % Ref	Post Meas	Post % Ref	Post % Chg
FVC	**Liters**	**3.81**	**3.45**	**90**	**3.78**	**99**	**10**
FEV1	**Liters**	**3.27**	**2.34**	**72**	**2.90**	**89**	**24**
FEV1/FVC	**%**	**86**	**68**	**79**	**77**	**89**	**13**
FEF25-75%	L/sec	3.83	1.44	38	2.40	63	67
FEF50%	L/sec	4.11	1.93	47	3.33	81	73
FEF75%	L/sec	1.91	0.57	30	0.98	51	73
PEF	L/sec	6.55	6.08	93	7.57	116	25
PIF	L/sec		3.63		4.53		25



- An acceptable effort was provided.
- There is evidence of slight airflow limitation that improved with acute bronchodilator.
- This study is similar to those seen in patients with asthma.

β_2 agonists - short-acting

Bronchodilator = "Reliever"

- salbutamol (Ventolin, Apo-salvent)
- terbutaline (Bricanyl)

Which of the following regarding inhaled corticosteroid usage in asthma is true?

A. There is no benefit to the use of ICS in an asthmatic patient with normal lung function
B. Use of an ICS alone to prevent exacerbations is inferior to a combination ICS/LABA as initial maintenance therapy of asthma
C. ICS increases the risk of pneumonia in asthmatic patients on long term therapy
D. ICS usage reduces asthma mortality

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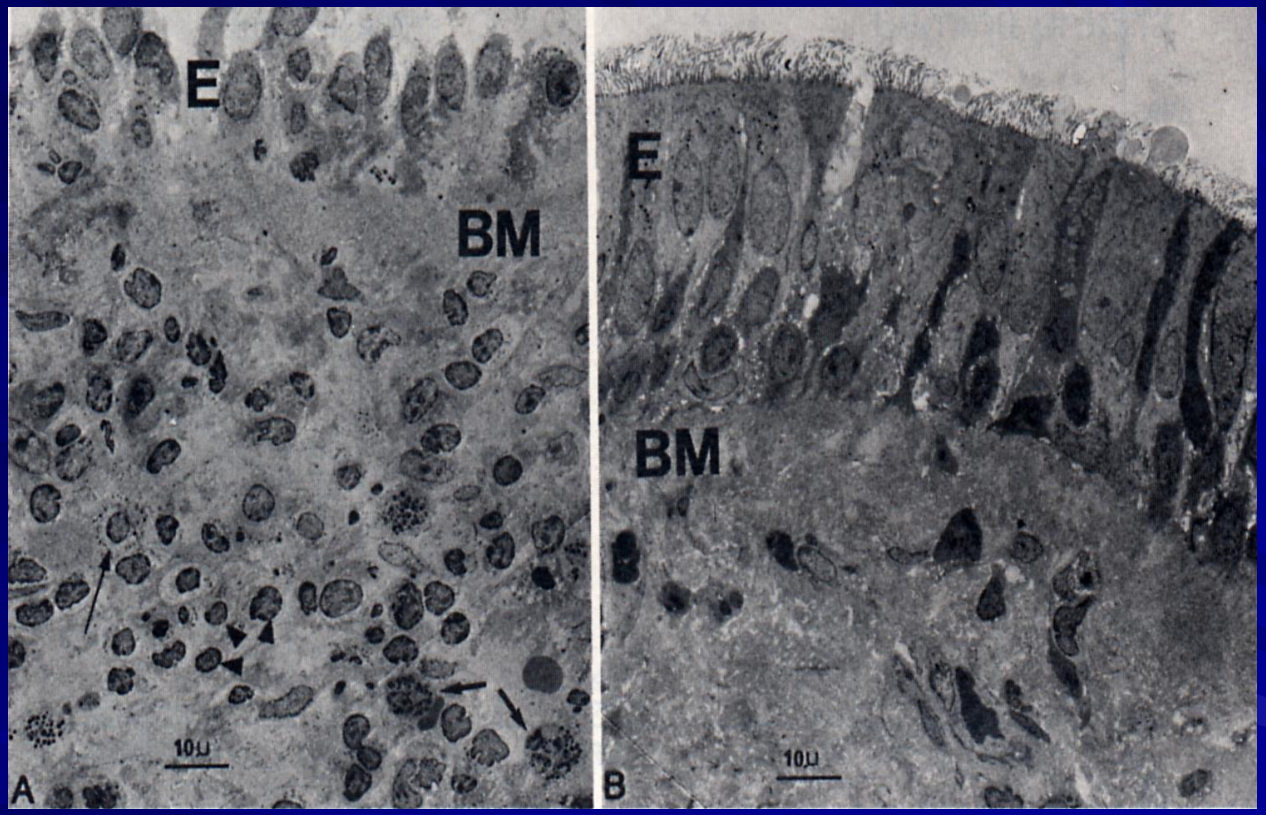
D. **ICS usage reduces asthma mortality**

Effects of Inhaled Corticosteroids on Inflammation



Pre- and post-3–month treatment with budesonide (BUD) 600 mcg b.i.d.

Laitinen LA, et al. *J Allergy Clin Immunol*. 1992;90:32-42.

Inhaled Corticosteroids (ICS)

Anti-inflammatory = "Preventer"

- beclomethasone (QVAR)
- budesonide (Pulmicort)
- fluticasone (Flovent)
- ciclesonide (Alvesco)
- mometasone (Asmanex)

Compared to doubling the dose of ICS, adding a LABA to low dose ICS:

- reduced daytime SABA needs
- decreased nocturnal symptoms
- improved quality of life
- increased FEV1
- increased morning and evening PEFRs
- reduces mild and severe exacerbations

Combination Products

- salmeterol + fluticasone (Advair™)
- formoterol + budesonide (Symbicort ™)
- formoterol + mometasone (Zenhale ™)

Indicators of Asthma Control

Educate Patients That This Level of Asthma Control is Generally Achievable

Characteristic	Acceptable Control
Daytime symptoms	< 4 days/week
Night-time symptoms	< 1 night/week
Physical activity	Normal
Exacerbations	Mild, infrequent
Absence from work or school due to asthma	None
Need for a fast-acting beta-agonist	< 4 doses/week
FEV1 or PEF	> 90% personal best
PEF diurnal variation†	< 10% to 15%

FEV_1 = forced expiratory volume in 1 second; PEF = peak expiratory flow.
†Diurnal variation is calculated as the highest PEF minus the lowest PEF, divided by the highest PEF multiplied by 100 for morning and night (determined over 2 weeks).

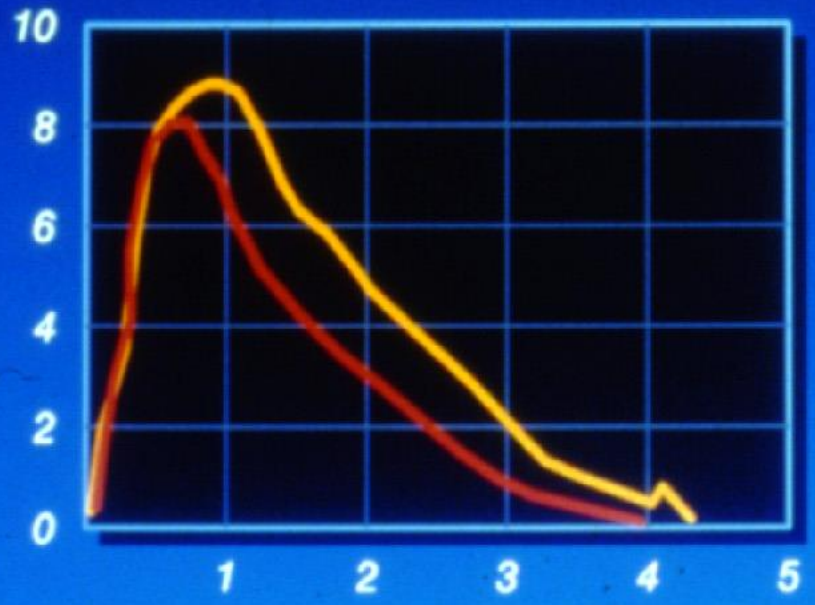
Lougheed MD, et al. Can Respir J 2010; 17(1):15-24.

Poorly Controlled Asthma

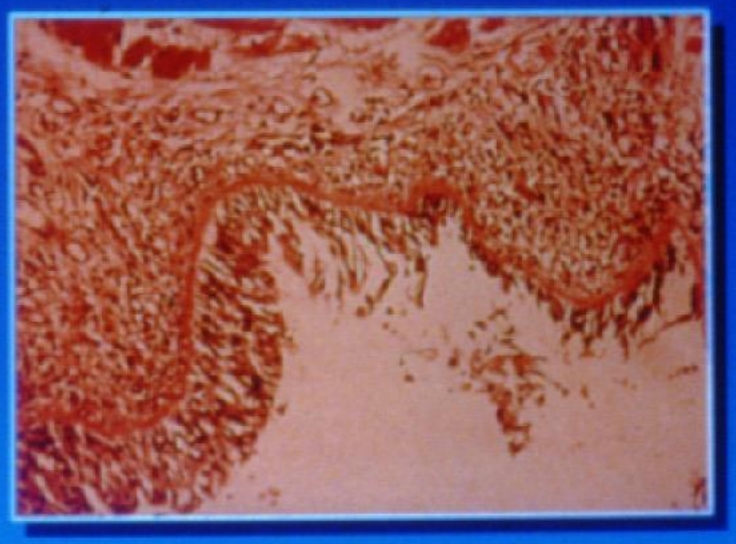
- confirm diagnosis
- check compliance
- review technique
- question exposures/environment
  - allergens, irritants,sensitizers
- conditions that worsen asthma
  - GERD, sinus disease
- obesity
- drugs
  - beta-blockers, NSAIDs
- complications of asthma
  - ABPA
  - E-GPA

Definition of Asthma

Reversible obstructive airway disease



Chronic desquamating eosinophilic bronchitis



Asthma Management Continuum

Children (6 years and over) and Adults

Regularly Reassess

- Control
- Spirometry or PEF
- Inhaler technique
- Adherence
- Triggers
- Co-morbidities

Adjust Therapy to Achieve and Maintain Control

Prednisone

Anti-IgE‡

***≥12 yrs:* Add LTRA**

***6-11 yrs*: Add LABA or LTRA**

≥12 yrs:* Add LABA

***6-11 yrs*: Increase ICS**

Inhaled Corticosteroid (ICS)*

*Second-Line: Leukotriene Receptor Antagonist (LTRA)

Low Dose	***Medium Dose***	***High Dose***
≥12 yrs: ≤250 mcg/day†	*251 – 500 mcg/day †*	*>500 mcg/day †*
6-11 yrs: ≤200 mcg/day†	*201 – 400 mcg/day †*	*>400 mcg/day †*

Fast-acting Bronchodilator on Demand

Environmental Control, Education and Written Action Plan

Confirm Diagnosis

Controlled → **Uncontrolled**

† HFA Beclomethasone or equivalent; *Second-line: LTRA; ‡ Approved for 12 years and over

Lougheed MD, et al. Canadian Thoracic Society Asthma Management Continuum – 2009. Can Respir J 2010;17:

Approach to COPD

Diagnosis (? Screening)

↓

Preventative Measures

↓

Pharmacologic Therapy

↓

Non-Pharmacologic Therapy

↓

Prevention of AECOPD

↓

Surgical and Investigational Measures

Which of the following regarding ICS use in COPD is true?

A. They are first line therapy because of their anti-inflammatory effects
B. Their use increases the risk of developing pneumonia in COPD patients
C. They should not be combined with long-acting beta-agonists
D. Long term use has been shown to decrease mortality in COPD

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Probability* of having a pneumonia reported during the study

	Placebo (N = 1544)	SALM (N = 1542)	FP (N = 1522)	SFC (N = 1546)
Pneumonia	12.3	13.3	18.3†	19.6 ††

† p<0.001 FP vs placebo; †† p<0.001 SFC vs placebo and salmeterol

* Kaplan-Meier estimate

Calverley PM et al. NEJM 2007;356:775-89.

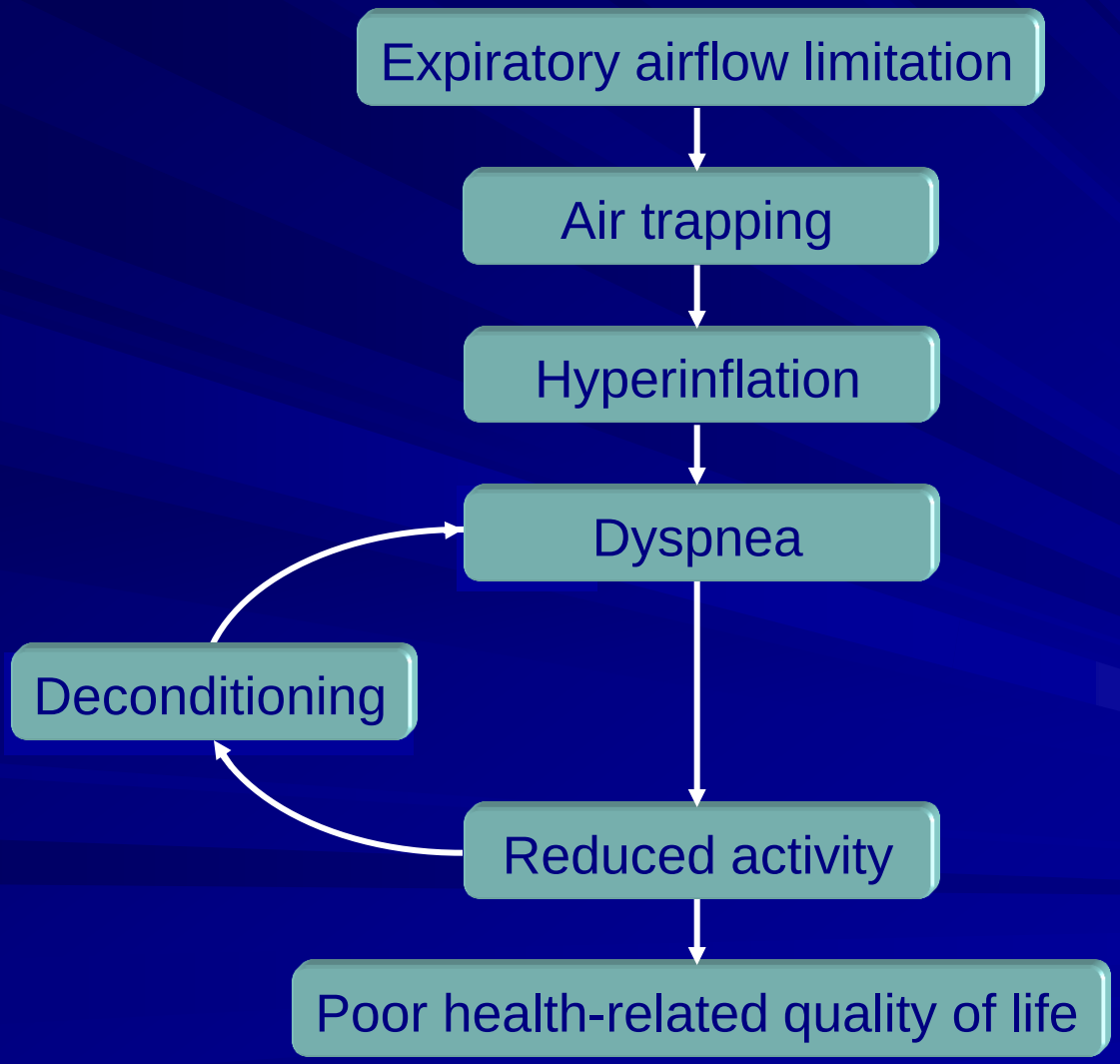
Role of ICS Monotherapy in COPD

“ICS should not be used as monotherapy in COPD and when used should be combined with a LABA”

O′Donnell DE, et al. *Can Respir J* 2007

Why do we use bronchodilators as first-line therapy?

Cycle of Air Trapping, Dyspnea, Reduced Exercise Endurance, and Poor HRQL



Long Acting Bronchodilators in COPD:

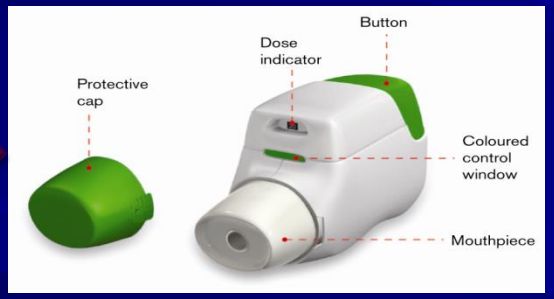
LABA

Formoterol (Oxeze®Turbuhaler® Foradil®Aerolizer®,)
• 12-24 μg inh bid

Indacaterol (Onbrez® Breezhaler®)
• 75 μg inh qd

Salmeterol (Serevent® Diskus®)
• 50 μg inh bid

LAMA



Aclidinium (Tudorza® Genuair®)
• 400 μg inh bid

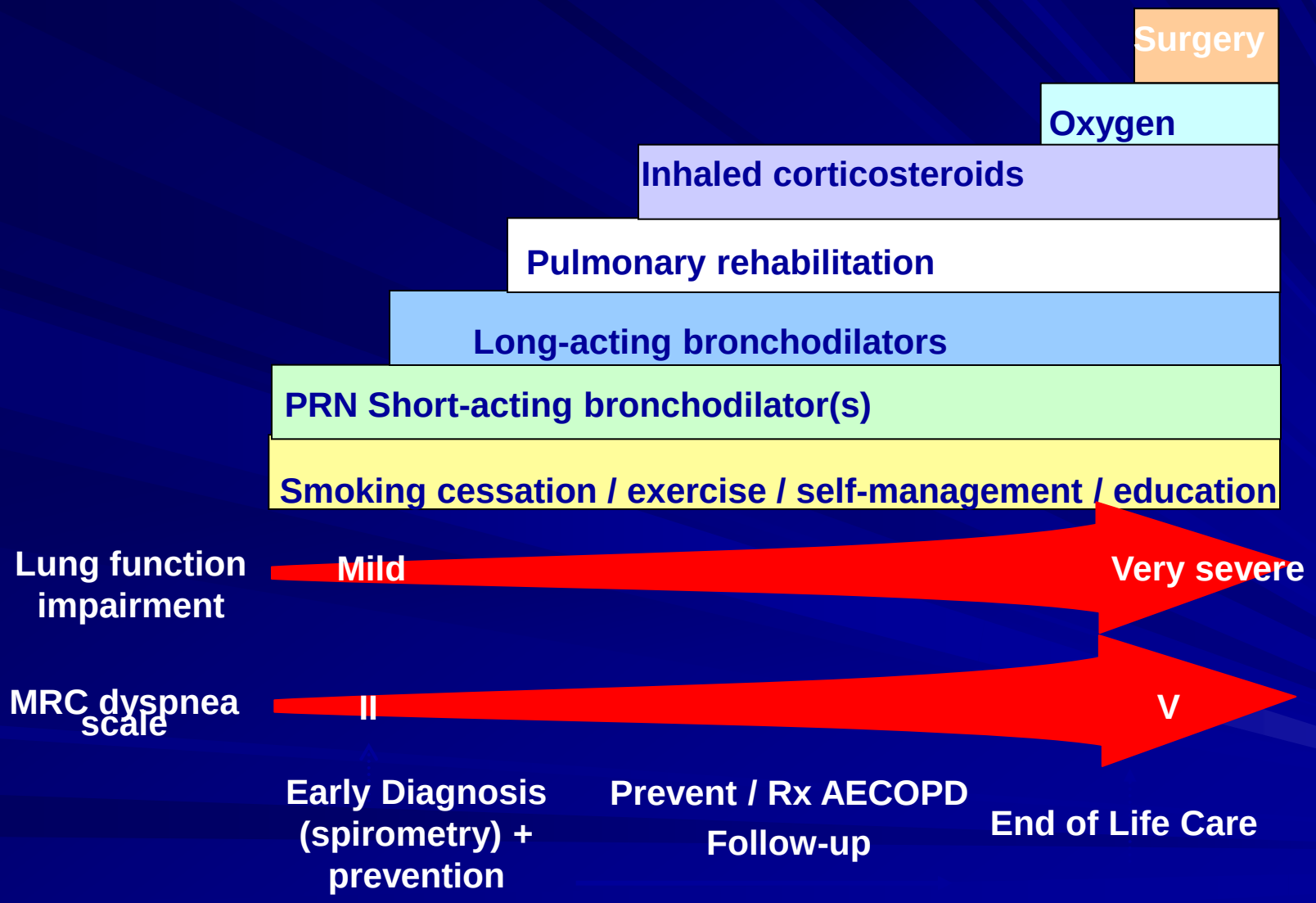
Glycopyrronium (Seebri® Breezhaler®)
•50 μg inh qd

Tiotropium (Spiriva® Handihaler ®)
•18 μg inh qd

Unique Issues To Nursing Home COPD Management

- Diagnosis may not be known and equipment to make it not available
- Treated as an acute problem (“bronchitis”) rather than as a chronic disease
- Severity and prognosis frequently misunderstood
- Medications may be difficult to deliver

Comprehensive Management of COPD



O'Donnell DE, et al. *Can Respir J* 2007;14 (Suppl B):5B-32B.

Asthma vs COPD

Asthma	COPD
early or late onset	late onset
variable symptoms	progressive symptoms
reversible obstruction	mostly fixed obstruction
85% steroid responsive	no role for ICS monotherapy
role for anticholinergics being defined	prominent role for anticholinergics
normal or high DLCO	reduced or normal DLCO
no role for antibiotics	antibiotics for purulent exacerbations