optimising care 2020

Optimising the care of people living with HIV: An update on management of comorbidities to improve patient health

Respiratory & Sleep Medicine Revision & Update

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Overview

- Chronic Obstructive Lung Disease
- Spirometry
- Lung function tests
- Obstructive Sleep Apnoea
- Cases
- Q & A

Chronic Obstructive Pulmonary Disease (COPD)

- Persistent respiratory symptoms
- Airflow limitation due to
  - Airway abnormalities
  - Alveolar abnormalities
- Abnormalities caused by significant exposure to noxious particles or gases
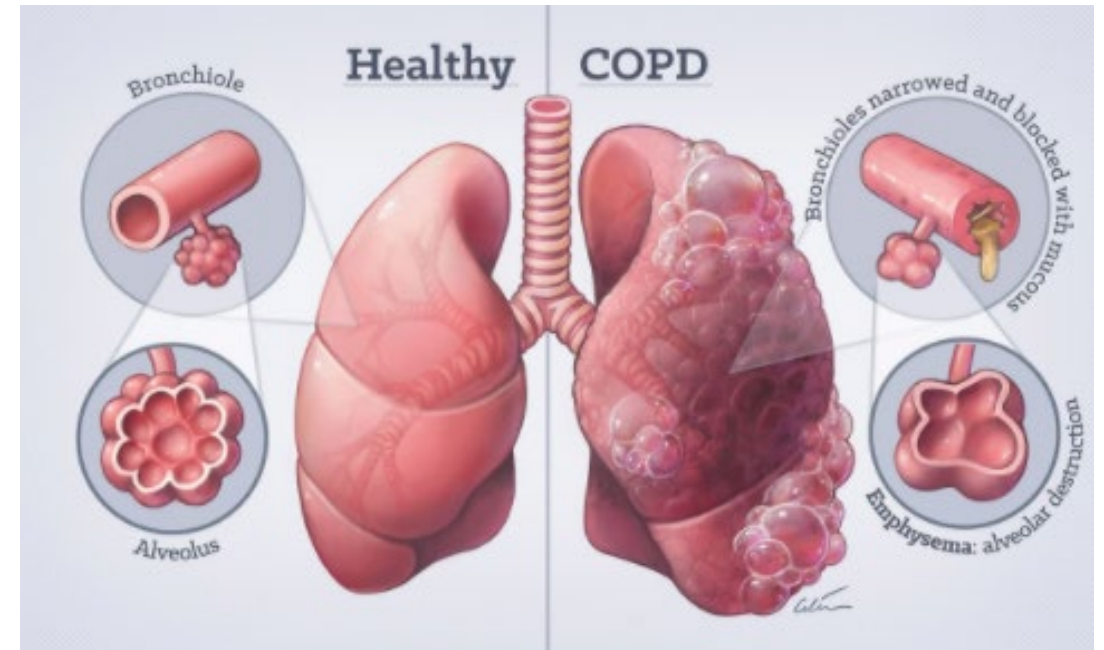
COPD: epidemiology

- Major cause of chronic mo~~rbidity a~~nd mortality
- 4th leading cause of ~~death in the wor~~ld
- ~50% of peopl~~e with sym~~ptoms do not know the~~y have it~~

- 1 i~~n 7 people over 40~~ years old has COPD
- ~~Leading ca~~use of avoidable hosp~~italisation in Austr~~alia
- ~~Indigeno~~us Australians 2.5 tim~~es more likely to h~~ave COPD than
  n~~on-I~~ndigenous Australians

~~Preventable~~

~~Treatable~~

www.copdx.org.au

Toelle et al, Med J Aust 2013;198:144-148

Xuan et al, Respirology 2011;16:51

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COPD-X
Concise Guide

Impact
- Exacerbations
- Symptoms
- Quality of life

Goals of Treatment
- Prevent exacerbations
- Reduce symptoms

Case 1

- Retired businessman
- Ex-smoker, quit 30 years ago, 25 pack-year history
- 1 glass wine/day

- Past History:
  - Hypertension – Ramipril
  - Reflux – Nexium PRN
  - Osteoarthritis – Paracetamol PRN

John
70 year-old male

Case 1

John
70 year-old male

- Wanting to get fit during COVID pandemic
- Dyspnoea on exertion
  - Struggles walking up incline on treadmill
  - Avoids stairs

- Lower respiratory tract infection most winter months – 'blue puffer' ± antibiotics

- Recent review by cardiologist 'all clear'
- Recent blood tests unremarkable

Case 1

John
70 year-old male

Examination:
- BMI 28 kg/m^2
- Sp02 96% room air
- Heart rate 84/min
- BP 134/96

- No clubbing or lymphadenopathy
- Barrel chest
- Chest: clear
- CVS: quiet heart sounds

Case 1

John
70 year-old male

Does John have COPD?

How do you confirm John has a diagnosis of COPD?

- Ask John to complete the COPD Assessment Test (CAT)
- Request a chest x-ray
- Trial Salbutamol 2 puffs when John feels breathless
- Request a CT chest
- Perform spirometry
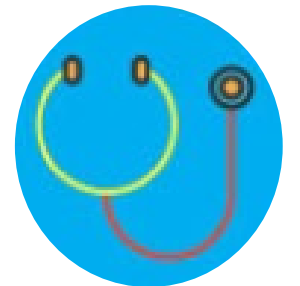- Trial Tiotropium 1puff daily for 4 weeks and review
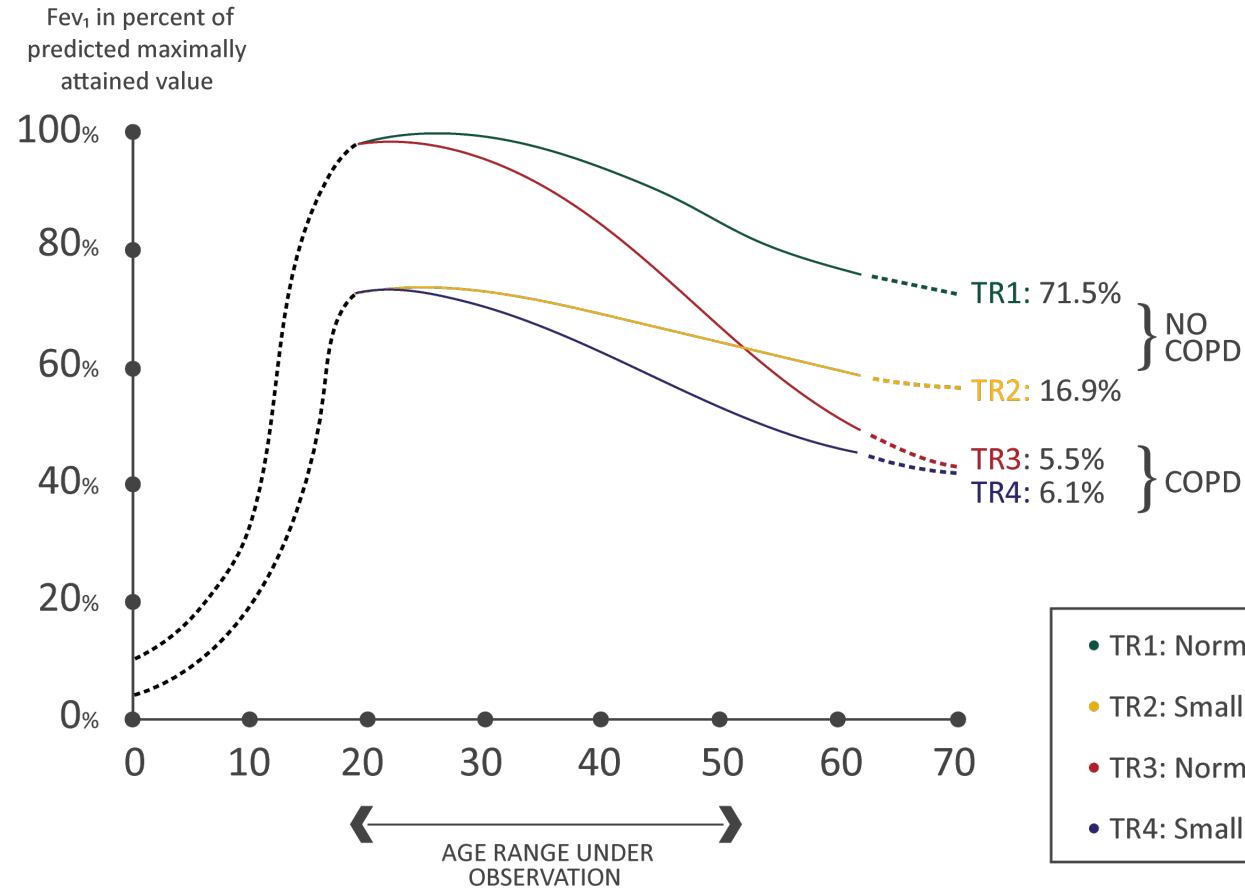
COPD: confirming the diagnosis

Symptoms

Risk factors

FEV1 progression over time

Fev$_1$ in percent of predicted maximally attained value

TR1: 71.5% } NO COPD
TR2: 16.9%
TR3: 5.5%   } COPD
TR4: 6.1%

AGE RANGE UNDER OBSERVATION

- TR1: Normal
- TR2: Small lungs but no COPD
- TR3: Normal initial FEV$_1$ with rapid decline leading to COPD
- TR4: Small lungs leading to COPD

Adapted from Lange et al, NEJM 2015;373:111-22

COPD: confirming the diagnosis

Symptoms

Risk factors

Spirometry

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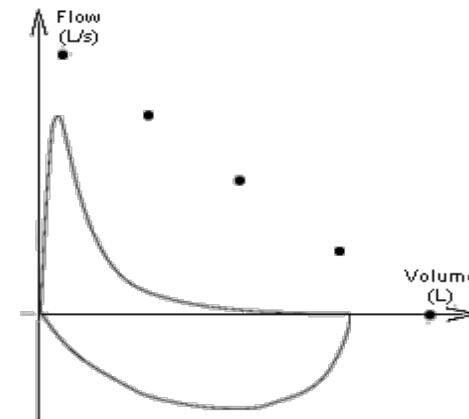
Spirometry

- Measures the amount (**volume**) and speed (**flow**) of air that can be inhaled and exhaled
- Diagnosis
- Assessment of severity of airflow obstruction (Prognosis)
- Follow up assessment
  - Therapeutic decisions
 - Identification of decline

Spirometry: pre procedure

- Indication?
- Anthropometric measures
  - Height
  - (Weight)
  - Sex
  - Age
  - Ethnicity
  - Smoking history
- Reference equations

- Can the patient perform the test?
  - Ability to follow commands
  - Can the patient sit up?
  - Dentures
- Contraindications
  - Pneumothorax
  - Haemoptysis
  - Unstable cardiovascular status
  - Recent surgery or mouth/chest trauma
  - High blood pressure
  - Infection

Quanjer et al, Eur Resp J 2012; 40:1324-1343

Spirometry: quality control

- Spirometer needs calibration on a regular basis
- Variability in results
    - Tests are performed in triplicate
    - Between visits – allow for <10% variability
    - Can also be affected by
        - Patient effort
        - Different devices
- Expiratory curve needs to be displayed digitally or via hard copy to assist with detecting technical errors
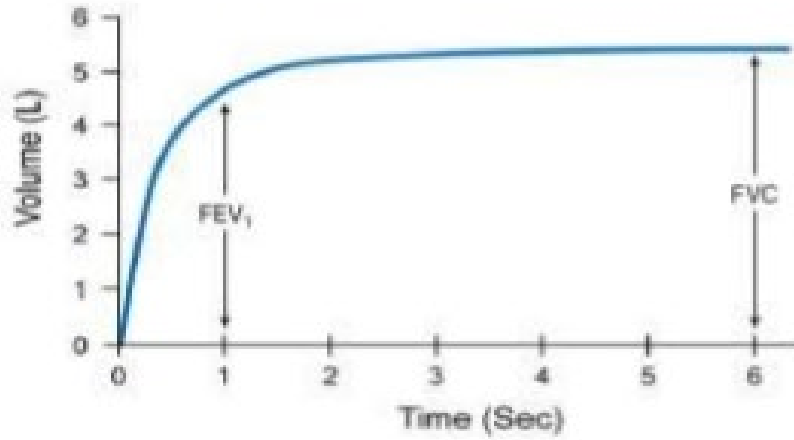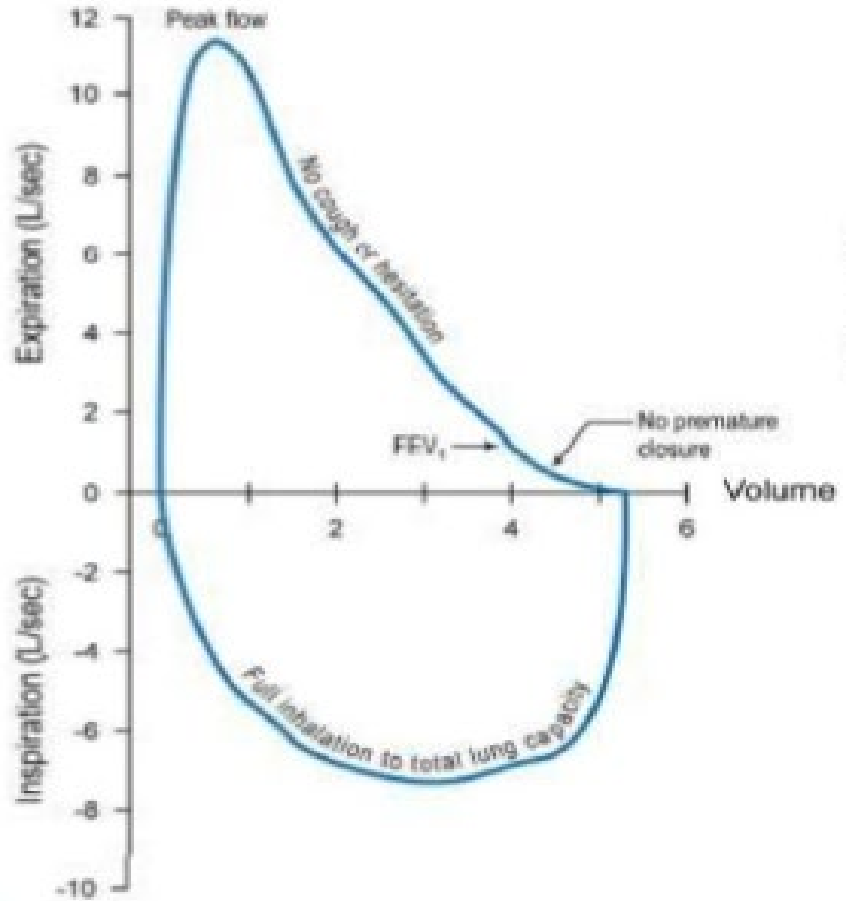
Spirometry: results

- FEV$_1$: forced expiratory volume in 1 second (litres)
  - Amount of air that can be 'forced out' in 1 second
  - How quickly the lungs can be emptied

- FVC: forced vital capacity (litres)
  - Maximum volume of air that can be 'forced out' after a full breath in

- FEV$_1$/FVC ratio (%)
  - Determines presence of airflow limitation (obstruction)

- Normal values ~ >80% of predicted
- Lower limit of normal (LLN) - Upper limit of normal (ULN)

John's spirometry: what does this show?

	Pred	Pred LL	Pred UL	Result	% Pred	Z-Score
FEV1	2.31	1.71	2.90	0.79	34	-3.94
FVC	2.97	2.19	3.78	2.56	86	-0.86
FEV1/FVC %	78.49	65.64	89.52	30.94	39	-4.62
PEF	5.88	4.39	7.36	3.18	54	-2.99
VC IN	2.73	2.04	3.42	2.11	77	-1.48

FEV1 < 80% predicted

FEV1/FVC < 70%

Lower Limit of Normal (LLN) and Z-Scores

	Pred	Pred LL	Pred UL	Result	% Pred	Z-Score
FEV1	2.31	1.71	2.90	0.79	34	-3.94
FVC	2.97	2.19	3.78	2.56	86	-0.86
FEV1/FVC %	78.49	65.64	89.52	30.94	39	-4.62
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VC IN	2.73	2.04	3.42	2.11	77	-1.48

Age
Gender
Height
Ethnicity

Quanjer et al, Eur Resp J 2012; 40:1324-1343

John's post-bronchodilator spirometry

FEV1 < 80% predicted

	Pred	Pred LL	Pred UL	Result	% Pred	Z-Score	Post BD	% Pred	% Change
FEV1	2.31	1.71	2.90	0.79	34	-3.94	0.82	35	3
FVC	2.97	2.19	3.78	2.56	86	-0.86	2.64	89	3
FEV1/FVC %	78.49	65.64	89.52	30.94	39	-4.62	30.97	39	0
PEF	5.88	4.39	7.36	3.18	54	-2.99	3.30	56	4
VC IN	2.73	2.04	3.42	2.11	77	-1.48	2.39	87	13

FEV1/FVC < 70%

John's post-bronchodilator spirometry

Bronchodilator reversibility: change in FEV1 or FVC by ≥200 mL AND ≥12%

	Pred	Pred LL	Pred UL	Result	% Pred	Z-Score	Post BD	% Pred	% Change
FEV1	2.31	1.71	2.90	0.79	34	-3.94	0.82	35	3
FVC	2.97	2.19	3.78	2.56	86	-0.86	2.64	89	3
FEV1/FVC %	78.49	65.64	89.52	30.94	39	-4.62	30.97	39	0
PEF	5.88	4.39	7.36	3.18	54	-2.99	3.30	56	4
VC IN	2.73	2.04	3.42	2.11	77	-1.48	2.39	87	13

No bronchodilator reversibility

Classification of airflow limitation severity (based on post-BD FEV1)

		FEV1/FVC < 70%
GOLD 1	Mild	FEV1 ≥ 80% predicted
GOLD 2	Moderate	50% ≤ FEV1 < 80% predicted
GOLD 3	Severe	30% ≤ FEV1 < 50% predicted
GOLD 4	Very Severe	FEV1 < 30% predicted

John's post-bronchodilator spirometry

	Pred	Pred LL	Pred UL	Result	% Pred	Z-Score	Post BD	% Pred	% Change
FEV1	2.31	1.71	2.90	0.79	34	-3.94	0.82	35	3
FVC	2.97	2.19	3.78	2.56	86	-0.86	2.64	89	3
FEV1/FVC %	78.49	65.64	89.52	30.94	39	-4.62	30.97	39	0
PEF	5.88	4.39	7.36	3.18	54	-2.99	3.30	56	4
VC IN	2.73	2.04	3.42	2.11	77	-1.48	2.39	87	13

Fixed or irreversible severe airflow limitation

John's flow volume loop
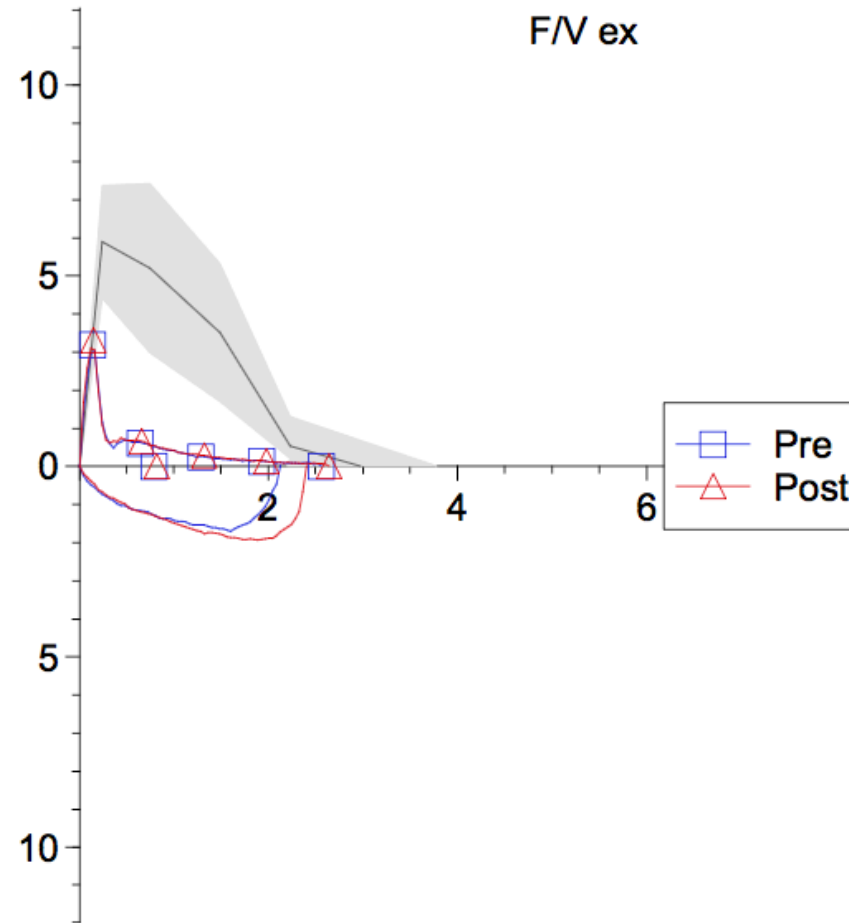
How would you treat John?

- 70 year old male with COPD
- Ex-smoker, 25 pack-year history
- Symptomatic:
  - Dysnoea on exertion
  - Recurrent lower respiratory tract infection
- Co-morbidities: hypertension, reflux, osteoarthritis
- Spirometry: severe fixed airflow limitation

Impact
- Exacerbations
- Symptoms
- Quality of life

Goals of Treatment
- Prevent exacerbations
- Reduce symptoms

Pharmacotherapy

Pulmonary rehabilitation

Vaccination

Action plan

Smoking cessation

Self-management

Nutrition

Comorbidities

Lung Foundation Australia COPD-X Concise Guide

Pharmacological therapy: stable COPD

- Inhaled medications
  - Correct medication
  - Technique
  - Adherence

- Tailor medications based on symptoms, exacerbations, treatment response and side effects
  - Patient's ability to use/take medication

- Inhaled corticosteroids
  - Increased risk of pneumonia

	Increasing COPD severity		
	MILD	**MODERATE**	**SEVERE**
Typical symptoms	⊙ few symptoms ⊙ breathless on moderate exertion ⊙ little or no effect on daily activities ⊙ cough and sputum production	⊙ breathless walking on level ground ⊙ increasing limitation of daily activities ⊙ recurrent chest infections ⊙ exacerbations requiring oral corticosteroids and/or antibiotics	⊙ breathless on minimal exertion ⊙ daily activities severely curtailed ⊙ exacerbations of increasing frequency and severity
Typical lung function	**FEV₁ = 60-80% predicted**	**FEV₁ = 40-59% predicted**	**FEV₁ < 40% predicted**

CONFIRM diagnosis. Confirm post-bronchodilator airflow limitation (FEV₁/FVC <0.70) using **spirometry**. Any pattern of cough with or without chronic sputum production may indicate COPD.

OPTIMISE function. PREVENT deterioration. DEVELOP a plan of care.

Non-pharmacological interventions	**REDUCE RISK FACTORS** Avoid exposure to risk factors including tobacco smoke and air pollution, support smoking cessation, recommend annual influenza vaccine and pneumococcal vaccine according to immunisation handbook
	OPTIMISE FUNCTION Encourage regular exercise and physical activity, review nutrition, provide education, develop GP management plan and written COPD action plan (and initiate regular review)
	OPTIMISE TREATMENT OF CO-MORBIDITIES especially cardiovascular disease, anxiety, depression, lung cancer and osteoporosis
	REFER symptomatic patients to pulmonary rehabilitation
	INITIATE advanced care planning
	MANAGE advanced lung disease with domiciliary oxygen therapy, long-term non-invasive ventilation, surgery and bronchoscopic interventions, if indicated

Pharmacological interventions (inhaled medicines)**	**START** with short-acting relievers: (used as needed): **SABA** (short-acting beta₂-agonist) OR **SAMA** (short-acting muscarinic antagonist)
	ADD long-acting bronchodilators: **LAMA** (long-acting muscarinic antagonist) OR **LABA** (long-acting beta₂-agonist) Consider need for combination **LAMA/LABA** depending on symptomatic response
	CONSIDER adding ICS (inhaled corticosteroids): Single inhaler triple therapy **(ICS/LABA/LAMA)** may be suitable*
	*in patients with ≥1 severe exacerbation requiring hospitalisation or ≥2 moderate exacerbations in the previous 12 months, AND significant symptoms despite LAMA/LABA or ICS/LABA therapy; OR in patients stabilised on a combination of LAMA, LABA and ICS.

Assess and optimise inhaler device technique at each visit. Minimise inhaler device polypharmacy

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Relievers

SABA: Short-acting beta₂-agonists

Ventolin® MDI *salbutamol*

Asmol® MDI *salbutamol*

Airomir™ Autohaler® *salbutamol*

Bricanyl® Turbuhaler® *terbutaline*

SAMA: Short-acting muscarinic antagonist

Atrovent® MDI *ipratropium*

Maintenance

LAMAs: Long-acting muscarinic antagonists

Incruse® Ellipta® *umeclidinium*

Braltus® Zonda® *tiotropium*

Spiriva® Respimat® *tiotropium*

Spiriva® HandiHaler® *tiotropium*

Seebri® Breezhaler® *glycopyrronium*

LAMA/LABA combinations

Ultibro® Breezhaler® *indacaterol/ glycopyrronium*

Spiolto® Respimat® *tiotropium/ olodaterol*

Anoro® Ellipta® *umeclidinium/ vilanterol*

Brimica® Genuair® *aclidinium/ formoterol*

LABAs: Long-acting beta₂-agonists

Onbrez® Breezhaler® *indacaterol*

Foradile® Aerolizer® *formoterol*

Oxis® Turbuhaler® *formoterol*

Serevent® Accuhaler® *salmeterol*

ICS/LABA combinations

Bretaris® Genuair® *aclidinium*

Symbicort® Rapihaler® *budesonide/formoterol*

Symbicort® Turbuhaler® *budesonide/formoterol*

ICS: Inhaled corticosteroids (for patients with COPD and Asthma)

Fluticasone Cipla MDI *fluticasone propionate*

Flixotide MDI *fluticasone propionate*

Arnuity® Ellipta® *fluticasone furoate*

QVAR® MDI *beclometasone*

Seretide® Accuhaler® *fluticasone propionate/ salmeterol*

Seretide® MDI *fluticasone propionate/ salmeterol*

DuoResp® Spiromax® *budesonide/formoterol*

Alvesco® MDI *ciclesonide*

Flixotide® Accuhaler® *fluticasone propionate*

Pulmicort® Turbuhaler® *budesonide*

ICS/LABA combination

Flutiform® MDI *fluticasone propionate/ formoterol*

ICS/LABA/LAMA

Breo® Ellipta® *fluticasone furoate/ vilanterol*

Fluticasone + Salmeterol Cipla®/SalplusF® MDI *fluticasone propionate/ salmeterol*

Trelegy® Ellipta® *fluticasone furoate/ umeclidinium/ vilanterol*

Flare Up Medicines
1. Antibiotics (Refer to Therapeutic Guidelines: Antibiotic: www.tg.org.au)
2. Oral steroids (prednisone, prednisolone)

Notes
• Handihaler, Breezhaler, Zonda and Aerolizer

Lung Foundation Australia COPD-X Concise Guide

Pharmacological interventions (inhaled medicines)**

START with short-acting relievers: (used as needed):
SABA (short-acting beta$_2$-agonist) OR **SAMA** (short-acting muscarinic antagonist)

ADD long-acting bronchodilators:
LAMA (long-acting muscarinic antagonist) **OR LABA** (long-acting beta$_2$-agonist)
Consider need for combination **LAMA/LABA** depending on symptomatic response

CONSIDER adding ICS (inhaled corticosteroids):
Single inhaler triple therapy **(ICS/LABA/LAMA)** may be suitable*

*in patients with ≥1 severe exacerbation requiring hospitalisation or ≥2 moderate exacerbations in the previous 12 months, AND significant symptoms despite LAMA/LABA or ICS/LABA therapy; OR in patients stabilised on a combination of LAMA, LABA and ICS.

Assess and optimise inhaler device technique at each visit. Minimise inhaler device polypharmacy

FACTORS TO CONSIDER WHEN INITIATING ICS TREATMENT

Factors to consider when initiating ICS treatment in combination with one or two long-acting bronchodilators (note the scenario is different when considering ICS withdrawal):

· STRONG SUPPORT ·	· CONSIDER USE ·	· AGAINST USE ·
• History of hospitalization(s) for exacerbations of COPD# • ≥ 2 moderate exacerbations of COPD per year# • Blood eosinophils >300 cells/µL • History of, or concomitant, asthma	• 1 moderate exacerbation of COPD per year# • Blood eosinophils 100-300 cells/µL	• Repeated pneumonia events • Blood eosinophils <100 cells/µL • History of mycobacterial infection

#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.

FIGURE 3.1

Pharmacological therapy: exacerbations

- Short acting bronchodilators
- Oral corticosteroids
  - Short course
- Antibiotics
  - If symptoms and signs to suggest infection

Surgery and bronchoscopic therapy

- Surgery
  - Lung Volume Reduction Surgery
  - Lung Transplantation

- Bronchoscopic procedures
  - Endobronchial Valve Insertion
  - Bronchial Rheoplasty

Case 1

John
70 year-old male

- Tiotropium Respimat 2.5 mcg 2 puffs daily (LAMA)
  - Device too compliated
  - Switched to Umeclinidium 62.5 mcg 1 puff daily (LAMA)

- 2 months later:
  - Spirometry unchanged
  - Still symptomatic, 1 mild exacerbation requiring short course of oral corticosteroid
  - Good inhaler technique and adherence
  - Uptitrated to Umeclinidium/Vilanterol 62.5/25 mcg 1 puff daily (LAMA/LABA)
  - Pulmonary rehabilitation

- Another 3 months later:
  - Mild improvement in spirometry
  - Symptoms improved, no exacerbations
  - Continued on LAMA/LABA
  - Maintenance exercise program
  - For review in 3 months – vaccinations

Lung function tests: when do you request which test?

- Diagnosis
- Assessment of the degree of the disease/disability
- To monitor progress
- To monitor effect of treatment

- Many tests available
- Assess various components of lung function

Lung function tests

- Ventilation
  - Spirometry
  - Flow Volume Loop
- Lung volumes
  - Body Plethysmography
- Gas exchange
  - Diffusing capacity (transfer factor)

- Airway Inflammation
  - Exhaled nitric oxide (FeN0)
- Airway hyper-responsiveness
  - Bronchoprovocation challenge test
- Respiratory Muscle Strength
  - Maximal Inspiratory/Expiratory Pressure (MIPS, MEPS)
  - Sniff Nasal Inspiratory Pressure (SNIP)
- Exercise capacity
  - 6-minute walk test
  - Cardiopulmonary Exercise Test (CPET)

Case 2

- Teacher
- Social smoker, less than 5 pack-years
- 3 glasses wine/week

- Past History:
  - Hayfever – worse in Spring

Mary
57 year-old female

Case 2

Mary
57 year-old female

- Persistent cough 2 months, post viral infection
- Occasional wheeze
- Dyspnoea during cardio workout at gym
- Intermittent hoarse voice

- Examination:
  - Sp02 98% on room air
  - HR 78/min
  - BP 108/72
  - Chest: clear, no wheeze

Mary's spirometry

Spirometry	Pred.	LLN	Baseline Meas.	% Pred.	Post Meas.	% Pred.	Change %
					Ventolin	400.00 mcg	
FEV1(L)	2.77	2.11	2.12	77	2.21	80	4
FVC(L)	3.51	2.69	2.98	85	2.90	82	-3
FEV1/FVC(%)	79.41	67.68	71.34	90	76.36	96	7
PEF(L/S)	6.42	4.94	5.43	85	7.13	111	31
FEF25-75(L/S)	2.43	1.29	1.42	58	1.77	73	25
FIVC(L)	0.00	----	2.41	----	2.67	----	11

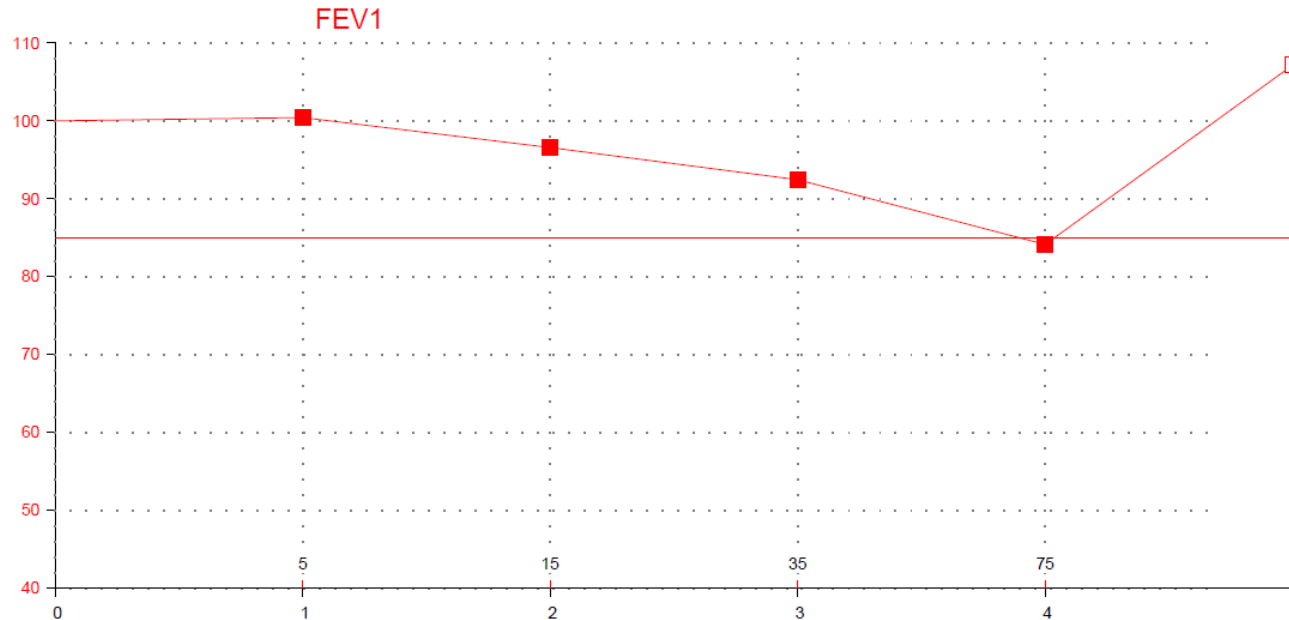**Within normal limits, no bronchodilator reversibility**

What test would you consider next to confirm Mary's diagnosis?

- Skin prick test
- Chest x-ray
- Bronchoscopy
- Bronchoprovocation challenge test
- CT chest

Bronchial Provocation Test (Mannitol)

	Level 1		Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Post
Dose	0.0 mg		5 mg	15 mg	35 mg	75 mg	155 mg	315 mg	475 mg	635 mg	400 mcg
	Meas.	% Pred									
FEV1(L)	2.20	----	2.29	2.12	2.03	1.85	----	----	----	----	2.35
FEV1 % change from Baseline			0.4	-3.4	-7.6	-15.9	----	----	----	----	7.1

FEV1

Technician comments:

Predicted Equations: GLI (Spirometry).
Post test was performed after 400mcg of Salbutamol via spacer.

Positive mannitol challenge test

Airway hyper-responsiveness

Bronchoprovocation challenge test

- Assesses for airway hyper-responsiveness and/or response to therapy
- Indirect or direct challenge tests
  - Methacholine, histamine
  - Mannitol, adenosine, eucapnic hyperventilation
- If diagnosis of asthma is in question
  - Exercise-induced bronchoconstriction
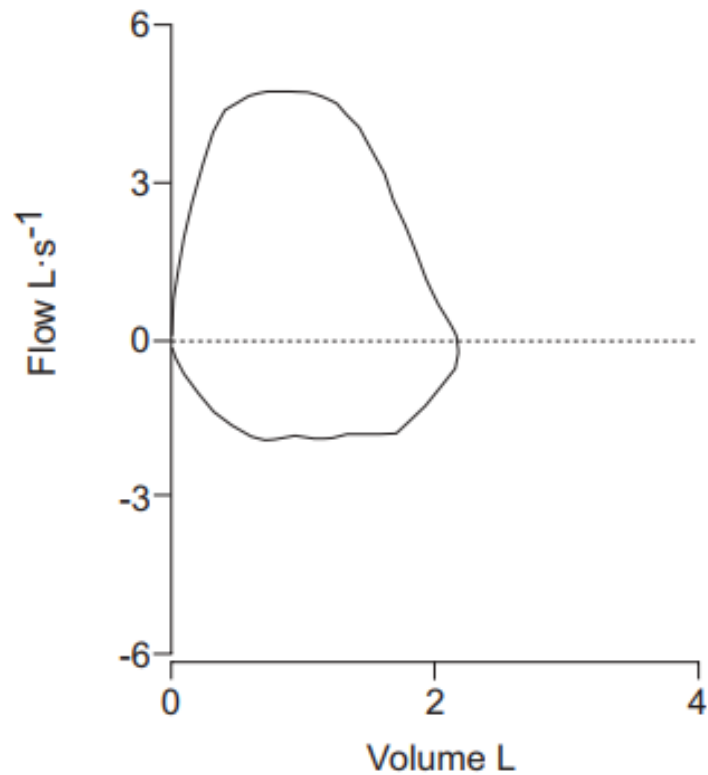- 'Positive' test – agent provokes a significant drop in FEV1

Case 2

Mary
57 year-old female

- Low dose inhaled corticosteroid 2 months

- Ongoing intermittent cough
- Exercising at usual capacity
- No wheeze, rhinitis or reflux

- Inhaler technique checked
- Reported strict adherence

- ICS dose increased – for review in 2 months
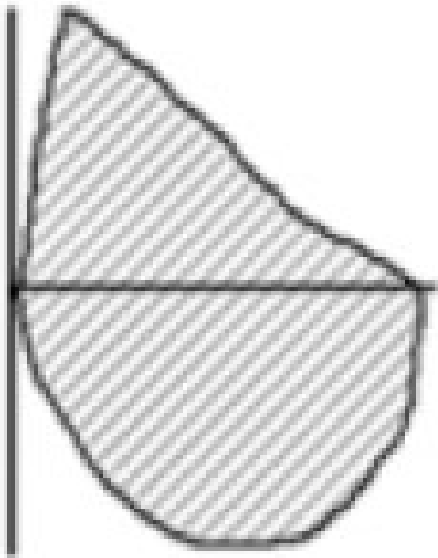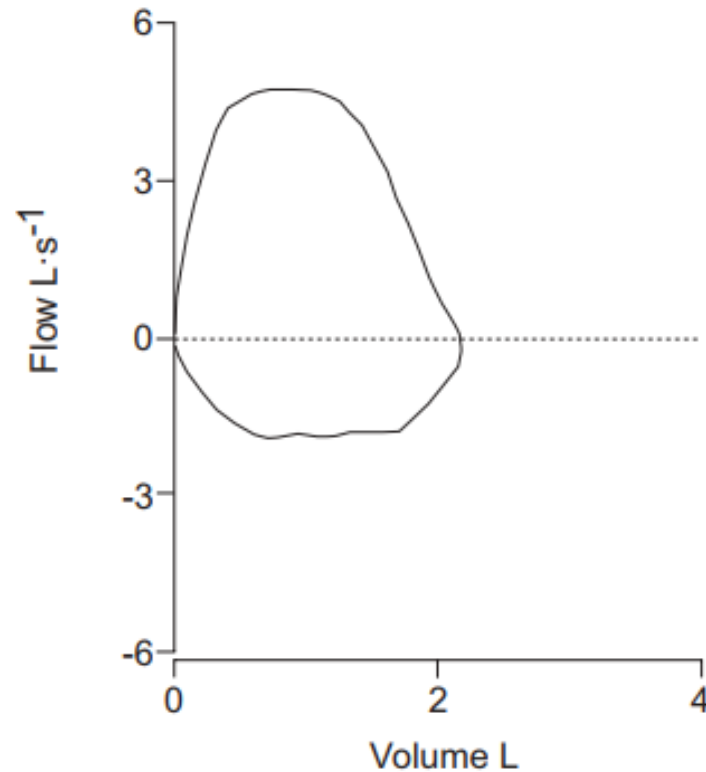- Spirometry is unchanged

Flow-volume loop

What is Mary's diagnosis?

Flow-volume loop

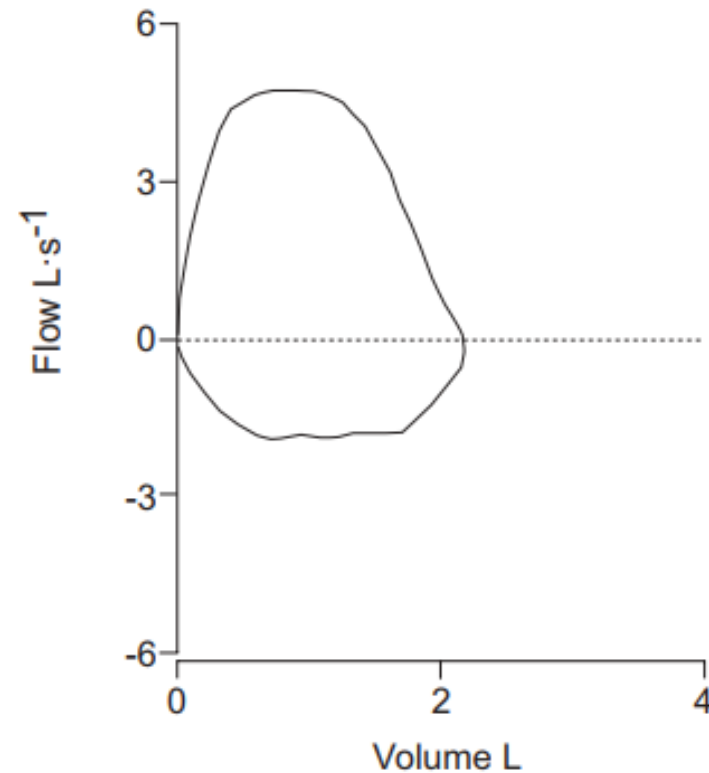Normal

Flattened inspiratory loop

Variable extra thoracic obstruction

Flow-volume loop

Mary's diagnoses:
1. Asthma
2. Vocal cord dysfunction

Case 3

- Retired plumber
- Lifelong non-smoker
- 5 beers/week

- No significant past history
- No regular medications

Paul
78-year-old male

Case 3

Paul
78-year-old male

- Dyspnoea on exertion 3 years, gradually worsening
- Intermittent cough

- Examination:
  - Sp02 96% on room air
  - HR 78/min
  - BP 108/72
  - Clubbed
  - Chest: fine inspiratory bibasal crackles

Spirometry

	Pre-Dilator	% Predicted	Post-Dilator	% Predicted
FEV1 (mls BTPS)	2070	67		
FVC (mls BTPS)	2460	61		
FEV1/VC (%)	84			
PEFR (L/sec)	7.18	90		
FEF25-75 (L/sec)	2.39	76		

Spirometry

	Pre-Dilator	% Predicted	Post-Dilator	% Predicted
FEV1 (mls BTPS)	2070	67		
FVC (mls BTPS)	2460	61		
FEV1/VC (%)	84			
PEFR (L/sec)	7.18	90		
FEF25-75 (L/sec)	2.39	76		

Single Breath Diffusion Capacity for Carbon Monoxide Miller (Am Rev Resp Dis, 1983)

	Observed	% Predicted
DLCO (ml/min/mmHg)*	12.9	49
KCO (ml/min/mmHg/L BTPS)	3.43	86
Alveolar Volume (L BTPS)	3.76	

* Corrected for Hb

Lung Volumes mL BTPS (Body Plethysmography)

	Predicted	Observed	% Predicted
Total Lung Capacity	6982	4100	59
Vital Capacity (Slow)	4388	2500	57
Inspiratory Capacity	3333	2010	60
Functional Residual Capacity	3649	2090	57
Expiratory Reserve Volume	1055	490	46
Residual Volume	2594	1600	62

Moderate restrictive ventilatory defect
Reduced gas transfer

Spirometry

	Pre-Dilator	% Predicted	Post-Dilator	% Predicted
FEV1 (mls BTPS)	2070	67		
FVC (mls BTPS)	2460	61		
FEV1/VC (%)	84			
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Single Breath Diffusion Capacity for Carbon Monoxide Miller (Am Rev Resp Dis, 1983)

	Observed	% Predicted
DLCO (ml/min/mmHg)*	12.9	49
KCO (ml/min/mmHg/L BTPS)	3.43	86
Alveolar Volume (L BTPS)	3.76	
* Corrected for Hb		

Lung Volumes mL BTPS (Body Plethysmography)

	Predicted	Observed	% Predicted
Total Lung Capacity	6982	4100	59
Vital Capacity (Slow)	4388	2500	57
Inspiratory Capacity	3333	2010	60
Functional Residual Capacity	3649	2090	57
Expiratory Reserve Volume	1055	490	46
Residual Volume	2594	1600	62

Usual Interstitial Pneumonia Idiopathic Pulmonary Fibrosis
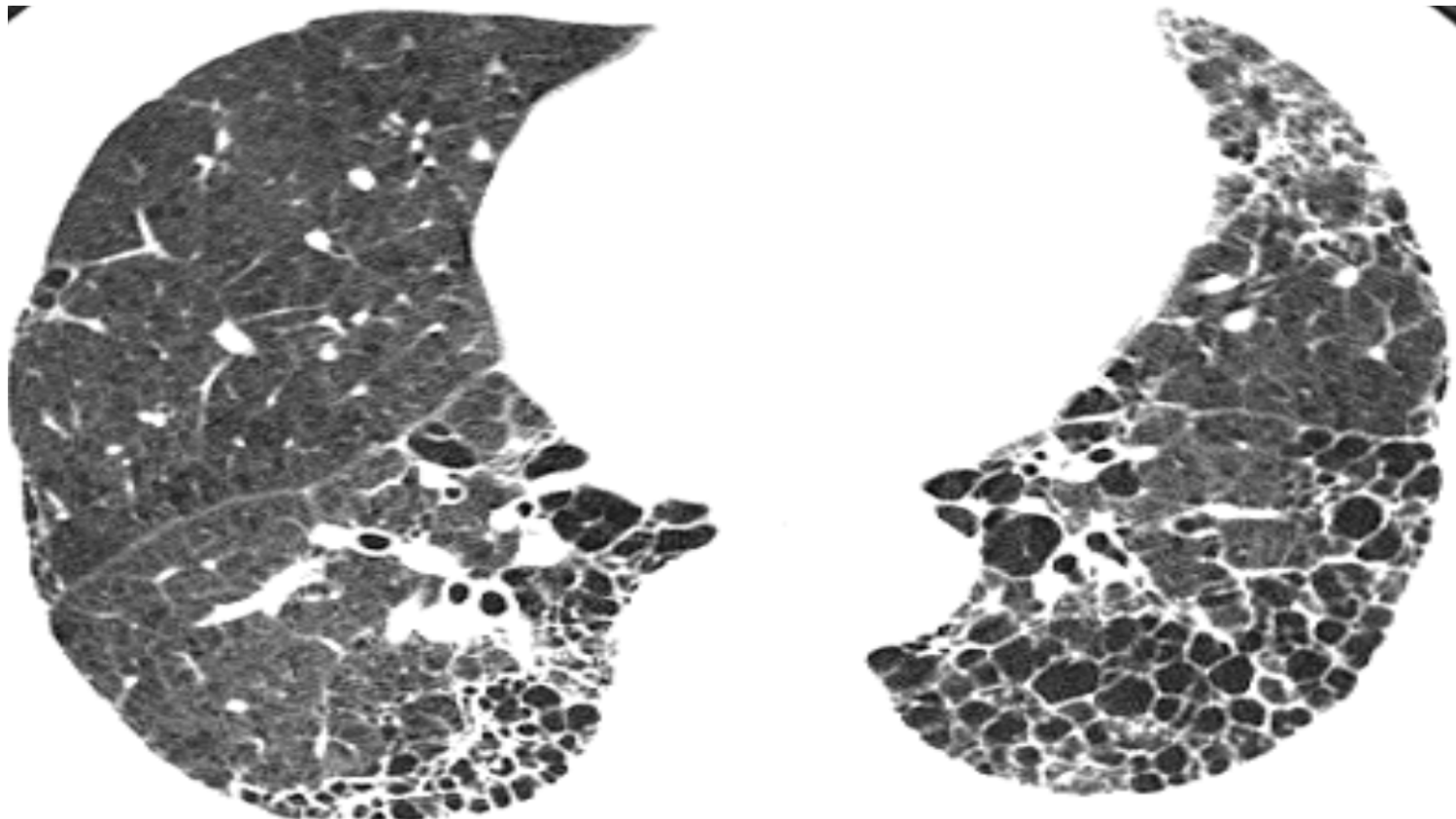
Lung function tests: when do you request which test?

- Diagnosis
- Assessment of the degree of the disease/disability
- To monitor progress
- To monitor effect of treatment

- Spirometry
- Flow Volume Loops
- Lung Volumes
- DLCO

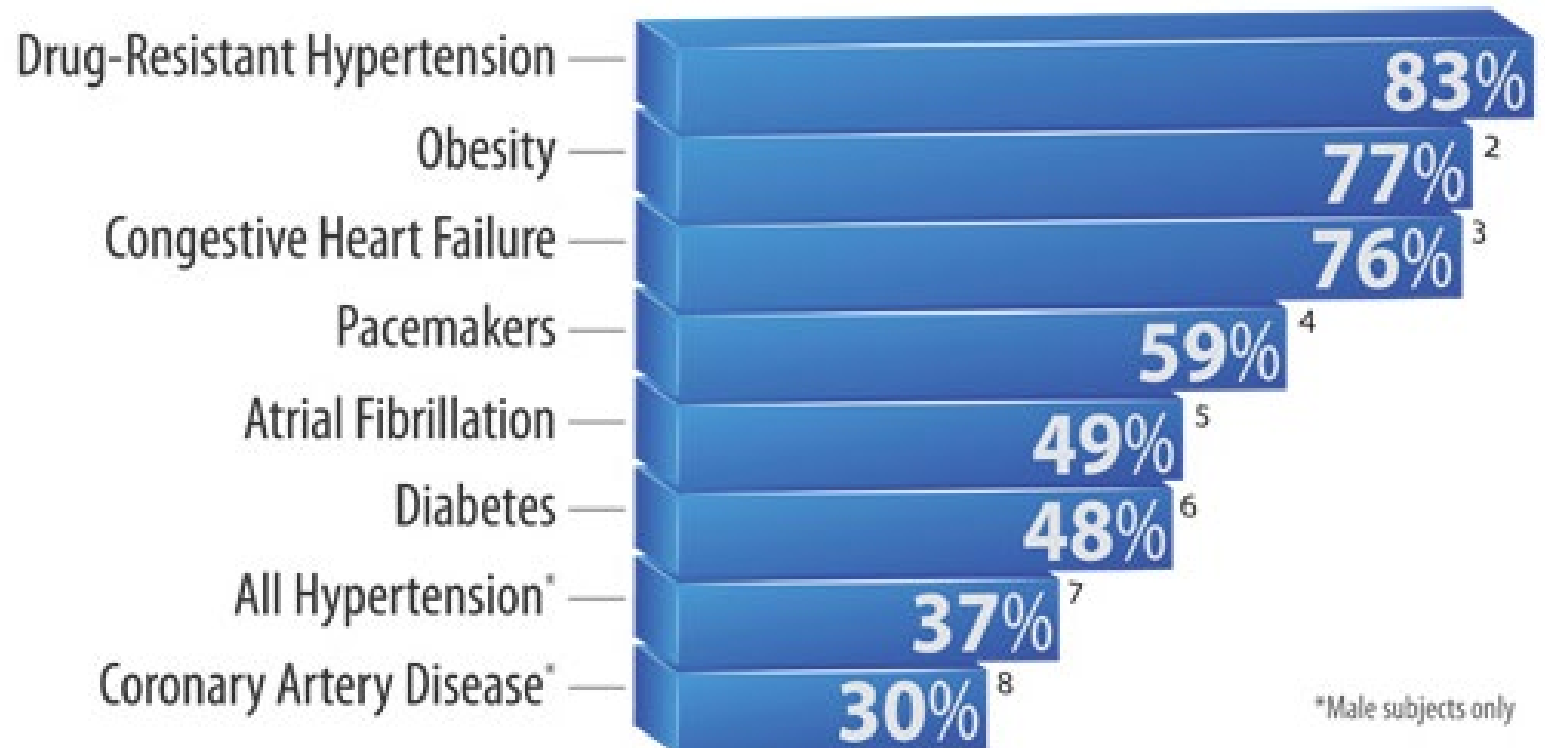- Consider additional tests if above tests are unremarkable
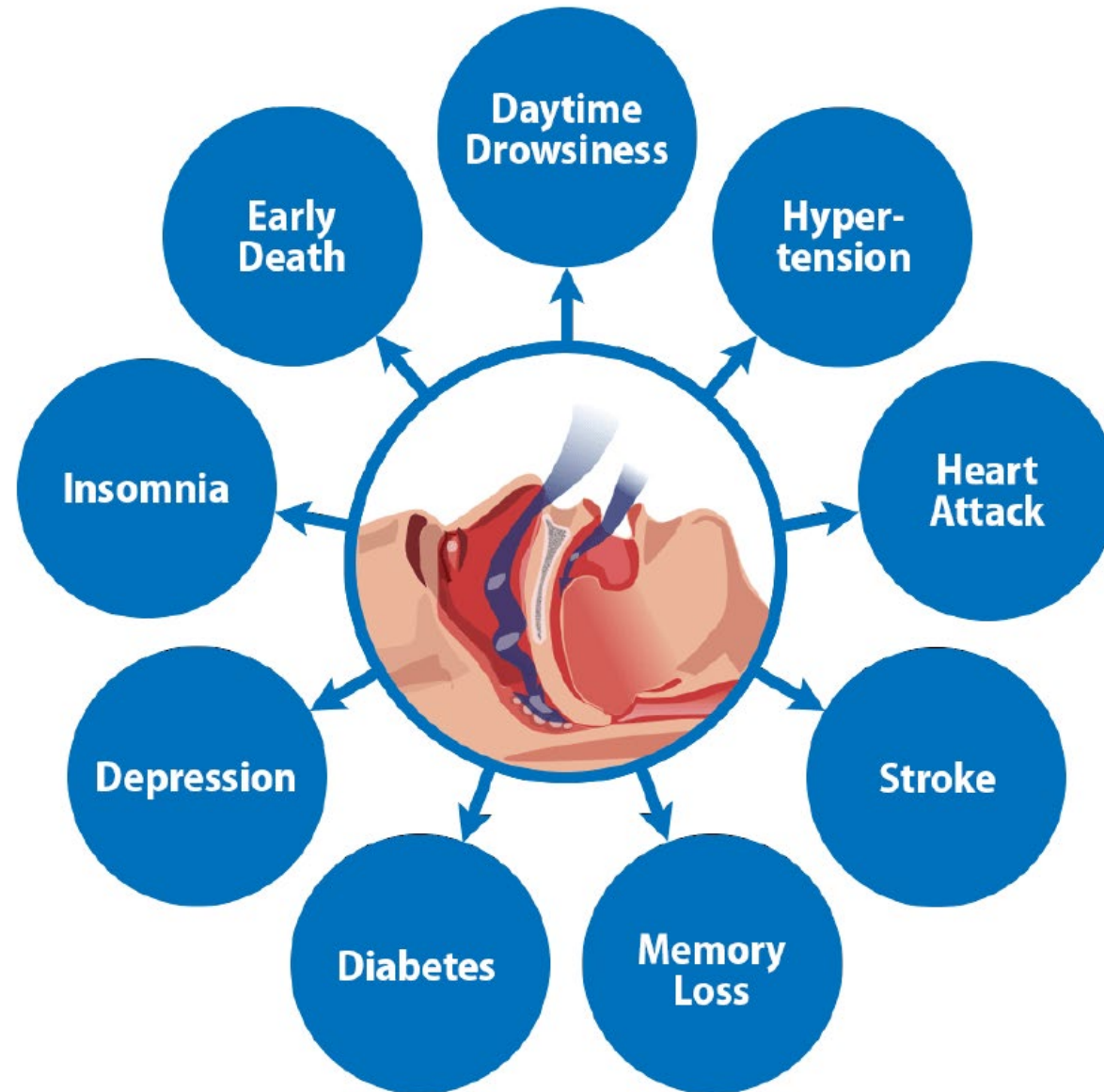
Obstructive Sleep Apnoea

- Sleep disorder characterized by obstructive aponeas, hypoponoea and/or respiratory related effort related arousals
- Caused by repetitive complete or partial collapse of the upper airway during sleep
- Risk factors:
  - Male
  - Older age
  - Obesity
  - Craniofacial and upper airway abnormalities
  - Family history

Prevalence of Sleep Apnoea Co-morbidities

Condition	Percentage
Drug-Resistant Hypertension	83% [1]
Obesity	77% [2]
Congestive Heart Failure	76% [3]
Pacemakers	59% [4]
Atrial Fibrillation	49% [5]
Diabetes	48% [6]
All Hypertension*	37% [7]
Coronary Artery Disease*	30% [8]

*Male subjects only

Case 4

- Truck driver
- Social smoker
- Alcohol 5 drinks/week

- Tonsillectomy as a child
- No regular medications

Tom
38-year-old male

Case 4

- Motor vehicle accident while driving truck
- Reported coughing fit → loss of consciousness
- No significant injuries

- Admitted for neurology assessment
  - EEG, CT brain – unremarkable
  - Cardiac assessment unremarkable

- Discharged home for outpatient sleep study
- To notify driver's license authority prior to returning to work

Tom
38-year-old male

Case 4

- No history of snoring or witnessed apnoeas
- Sleeps 7 hours/night
- Wakes refreshed
- No morning headache
- No daytime tiredness
- Denies sleepiness while driving

- Examination:
  - BMI 39.6 kg/m2
  - Sp02 98% room air
  - Normal nasal flow
  - Normal skeletal facial pattern
  - Oropharyngeal calibre normal
  - Normal CVS and Resp exam

Tom
38-year-old male

Epworth Sleepiness Scale

	No chance	Slight chance	Moderate chance	High chance
Sitting and reading	0	1	2	3
Watching TV	0	1	2	3
Sitting inactive in a public place (e.g. meeting, theatre)	0	1	2	3
As a passenger in a car for an hour without a break	0	1	2	3
Lying down to rest in the afternoon when circumstances permit	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly after lunch without alcohol	0	1	2	3
In a car, while stopped for a few minutes in the traffic	0	1	2	3

Sleep Studies

- Sleep Study Channels
  - EEG
  - EOG
  - Submental EMG
  - ECG
  - Leg movements
  - Oxygen saturation
  - Sound
  - Thoraco-abdominal movements
  - Airflow
  - Body position

- Types of Sleep Studies
  - Attended
    - Level 1 – Laboratory Sleep Study

  - Unattended
    - Level 2 – At least 7 channels
    - Level 3 – At least 4 channels
    - Level 4 – 1 or 2 channels

Sleep Study Referral

Traditional Pathway

| Suspected OSA | GP referral to Specialist | Sleep Study | Treatment |

Alternate Pathway

| Suspected OSA | GP referral for Sleep Study | Sleep Study report sent to GP | Referral to Sleep Physician if required |

Direct referral for sleep study by GP

STOP-BANG score ≥ 4; or

OSA50 score ≥ 5; or

High risk on Berlin questionnaire

ESS ≥ 8

OSA 50

	Please circle if "yes"
Waist circumference >102 cm for males or >88 cm for females	3
Has your snoring ever bothered other people?	3
Has anyone noticed that you stop breathing during your sleep?	2
Are you aged 50 years or over?	2
TOTAL SCORE	

Laboratory vs home sleep study

- Home Sleep Study
  - Convenient
  - Cheaper
  - Validated
  - Unattended

- Patient selection is important

Relatively high clinical (pre-test) probability of OSA

No significant co-morbidities (e.g., cardiac or respiratory diseases)

Unsuitable for home sleep study

- Suspected complicated sleep-disordered breathing
- Medical co-morbidities
- More than one type of sleep disorder
- Difficulties in understanding or complying with instructions
- Sleep studies undertaken for medico-legal purposes
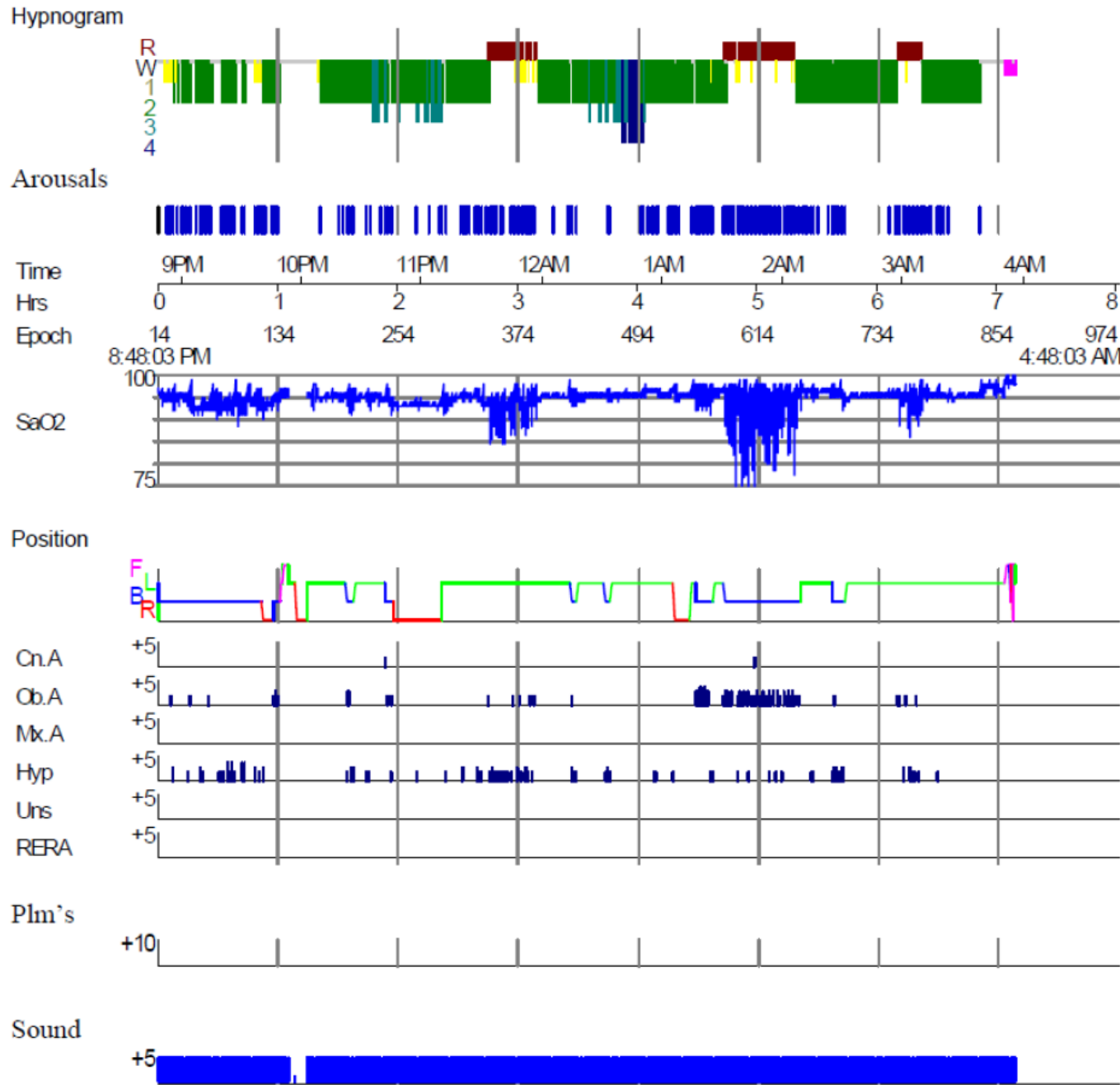
Severe OSA

Respiratory Disturbance Index (RDI) 31.3/hour
Min Sp02 64%
Arousal Index 40.6/hour

Case 4

- Started on CPAP
- Advised not to drive until further assessment

- Referred for Maintenance of Wakefulness Test
  - Urine drug screen negative
  - Did not fall asleep in all 4 trials

Tom
38-year-old male

	SLEEP LATENCY	STAGES OF SLEEP ACHIEVED
TEST 1	40 mins	did not sleep
TEST 2	40 mins	did not sleep
TEST 3	40 mins	did not sleep
TEST 4	40 mins	did not sleep
MEAN SLEEP LATENCY- 40 mins		

Case 4

- Objective evidence of compliance with treatment obtained
- Fit to drive commercial vehicles
  - Must continue to use CPAP
- Needs annual review

Tom
38-year-old male

Take Home Messages

- COPD
  - Confirm diagnosis
  - Spirometry is important
  - COPD-X Guidelines
- Lung Function Tests
  - Screen with spirometry
  - Don't forget flow volume loop
  - Consider additional tests if spirometry is normal
- OSA
  - Screening questionnaires
  - High pre-test probability of OSA + no significant cardio-respiratory co-morbidities – consider home sleep study

Thank you

Questions?