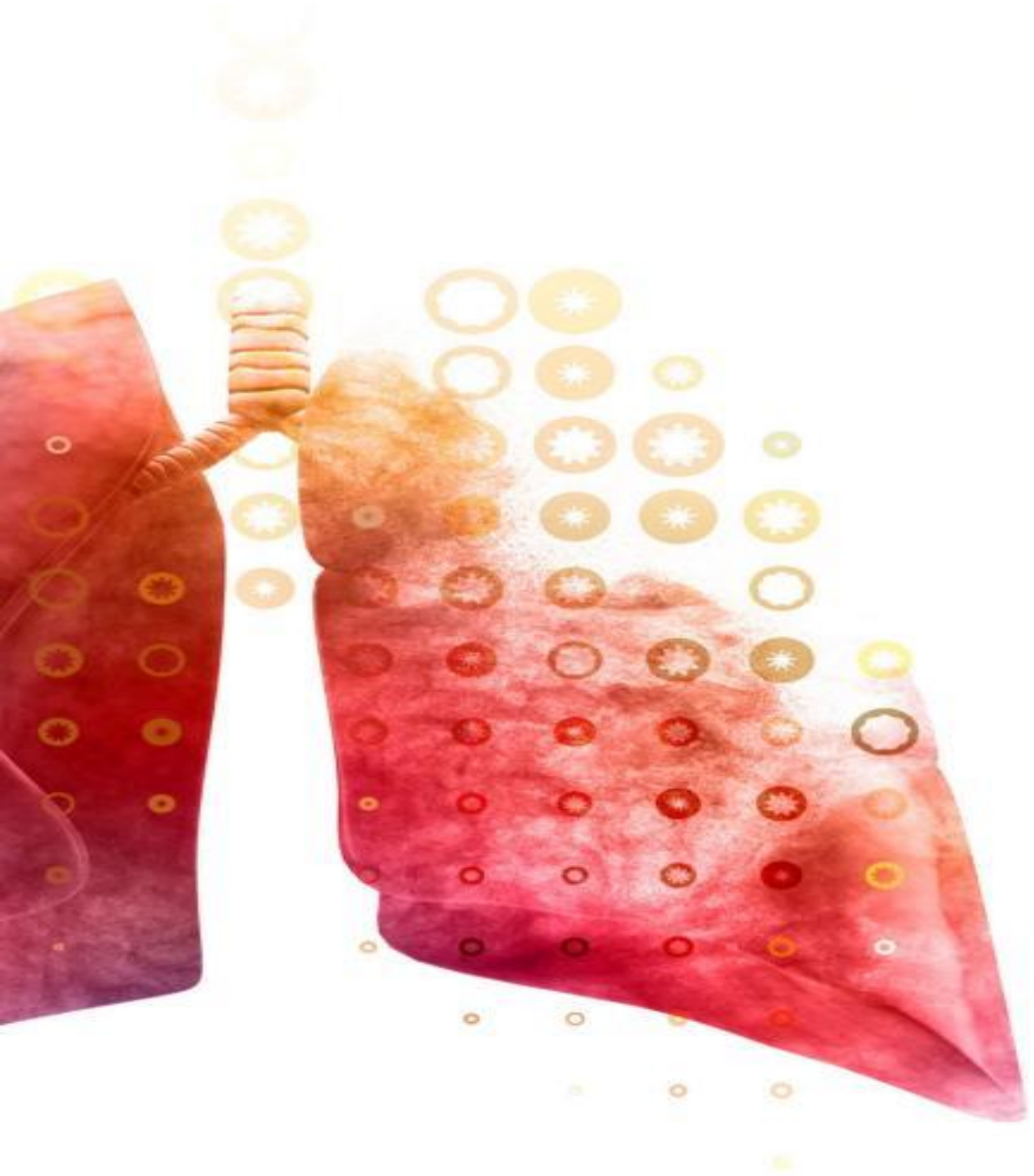

COPD Update

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Roadmap next 30 minutes…

Epidemiology
Risk factors
Clinical presentation
Classification & Current management
Challenges in COPD care
Co morbidities
Some of our data

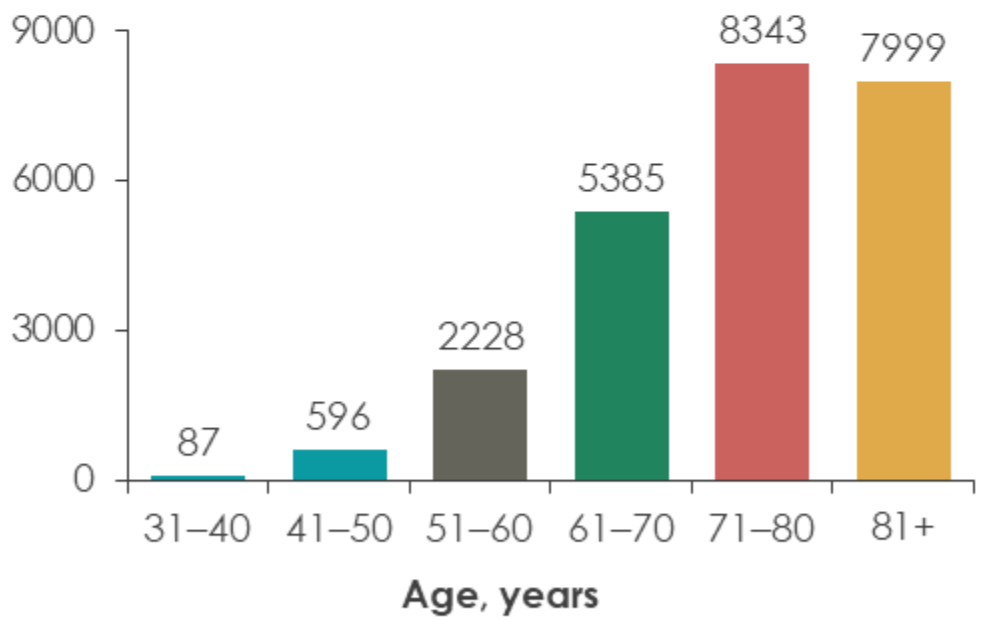
Introduction and epidemiology of COPD

UK-RES-2000567 August 2020

Epidemiology: UK

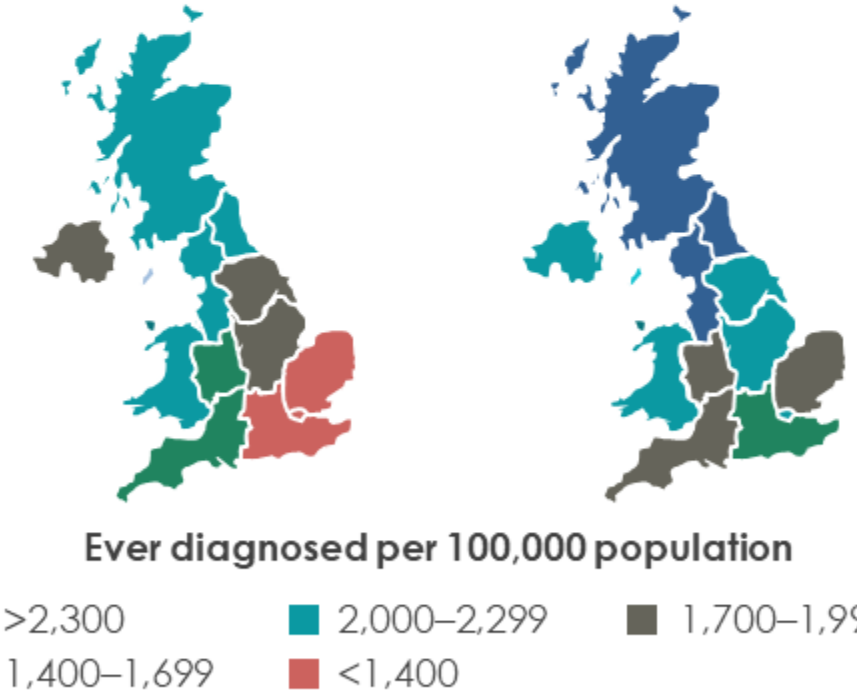
An estimated 1.2 million people are living with diagnosed COPD in the UK, meaning an overall prevalence of 2%

Ever diagnosed with COPD per 100,000 population, 2012



The prevalence of COPD in the UK is increasing year-on-year

2004	2012



Adapted from British Lung Foundation. COPD Statistics. www.statistics.blf.org.uk/copd [Accessed August 2020]

The missing millions

An estimated 3 million people in the UK have COPD

Estimated 2 million people undiagnosed

1.2 million people diagnosed

Adapted from British Lung Foundation. COPD Statistics. www.statistics.blf.org.uk/copd [Accessed August 2020]
NICE. Chronic obstructive pulmonary disease in adults. Quality Standard qs10. Feb 2016

Socioeconomic impact: UK

Costs the NHS £800 million per annum

1 million in-patient bed days per annum

24 million working days lost per annum

Costing the UK £2.7 billion

NHS: National Health Service
Department of Health. Facts about COPD 2010

Mortality: UK

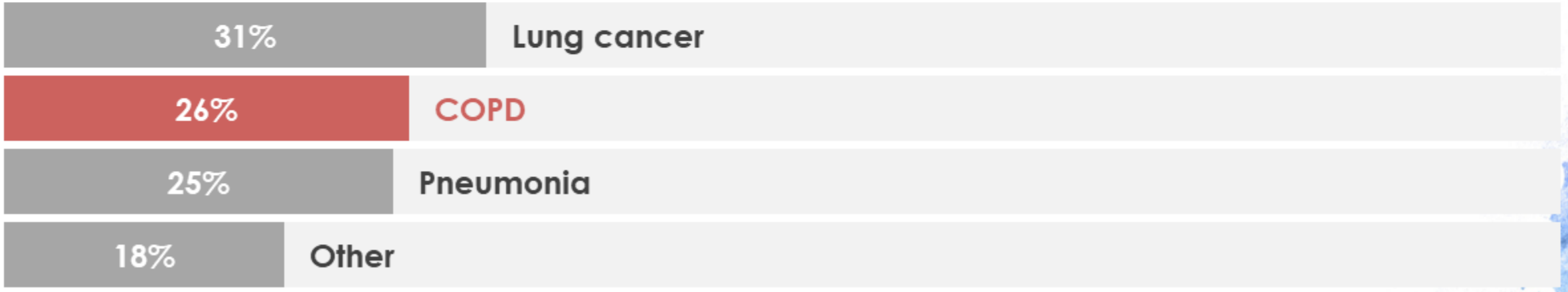
29,776 COPD deaths in 2012

15,245
Male

14,531
Female

Equivalent to 1 death in every 20 in the UK

COPD is the second largest contributor to respiratory mortality



Adapted from British Lung Foundation. COPD Statistics. www.statistics.blf.org.uk/copd [Accessed August 2020]

NHS Long Term Plan and COPD

The NHS will do more to detect and diagnose respiratory problems earlier

Currently around a third of people with a first hospital admission for a COPD exacerbation have not been previously diagnosed. From 2019 we will build on the existing NHS RightCare programme to reduce variation in the quality of spirometry testing across the country. Primary care networks will support the diagnosis of respiratory conditions. More staff in primary care will be trained and accredited to provide the specialist input required to interpret results.

NHS: National Health Service

NHS Long Term Plan, https://www.longtermplan.nhs.uk/online-version/chapter-3-further-progress-on-care-quality-and-outcomes/better-care-for-major-health-conditions/respiratory-disease/ [Accessed August 2020]

Risk factors: smoking

Tobacco smoking is the most widely-recognised risk factor for the development of COPD, including:

- Water pipes
- Marijuana and other drugs

Tobacco smokers have higher rates of:

- Respiratory symptoms
- Annual decline in FEV_1
- Lung function abnormalities
- COPD mortality

Passive exposure to tobacco smoke may contribute to respiratory symptoms and COPD

Smoking during pregnancy may pose a risk for the foetus, by affecting:

- Lung growth and development *in utero*
- Possibly priming of the immune system

FEV_1: forced expiratory volume in 1 second

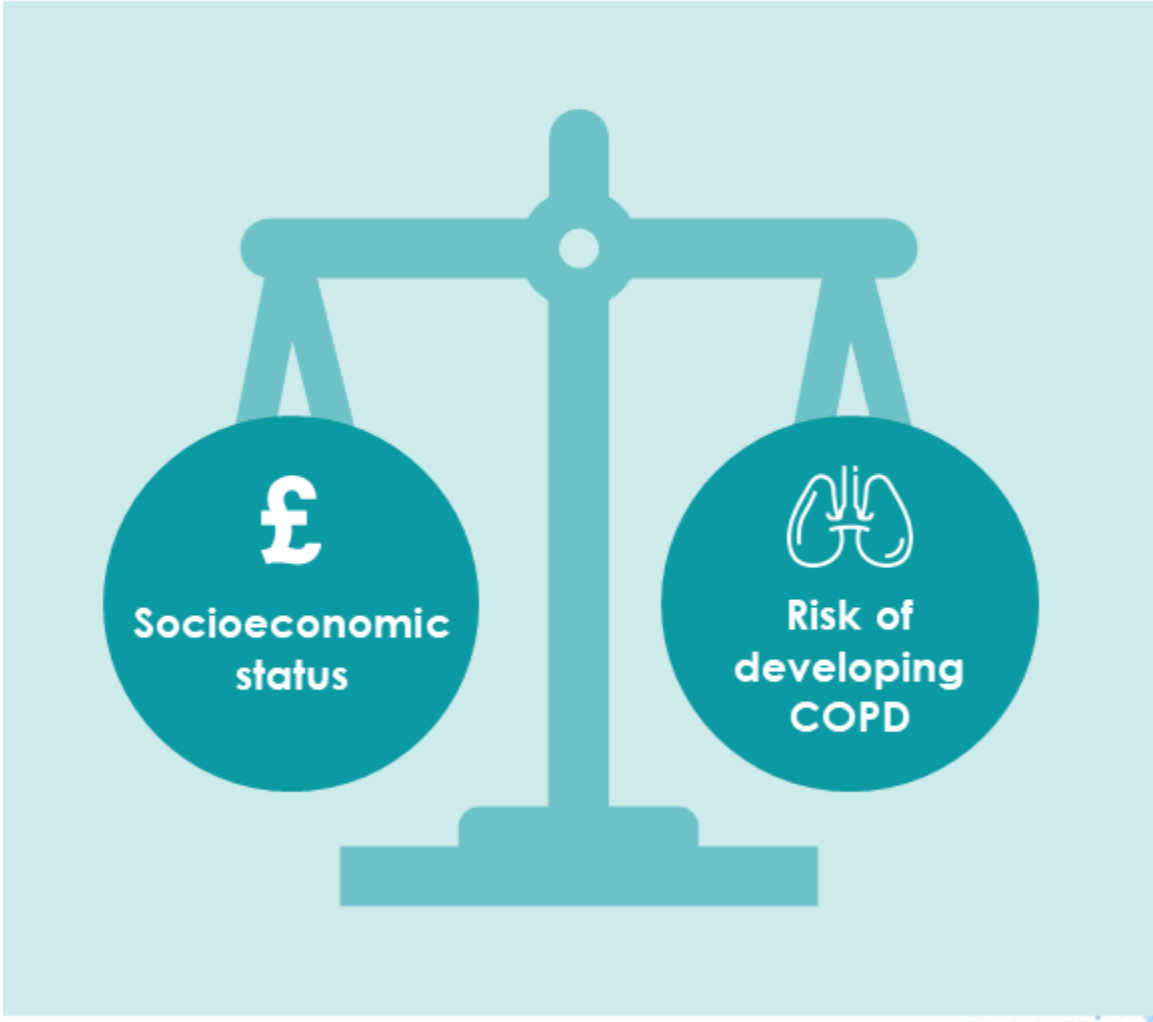
GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report

Risk factor: socioeconomic status

Lower socioeconomic status is associated with an increased risk of developing COPD

Precise reasons for this relationship are unclear, but may be related to:

- Exposures to indoor and outdoor air pollutants
- Crowding
- Poor nutrition
- Infections
- Other factors related to low socioeconomic status



GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report

Risk factor: environmental exposure to particulates

Occupational

Exposure to dusts, chemical agents, and fumes in the workplace

- Up to 20% of cases can be linked to workplace particulate exposures
- A likely cause of COPD for 31.1% of never-smokers

Lifestyle

Indoor pollutants, e.g. from burning fuel on open fires

- Three billion people worldwide use biomass or coal as fuel for cooking and heating, creating a very large at-risk global population

Urban living

Outdoor air pollution

- Interferes with lung growth and development in children
- Less of a risk factor for adults, especially when compared with tobacco smoking

GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report

Key impacts of COPD on patient's life

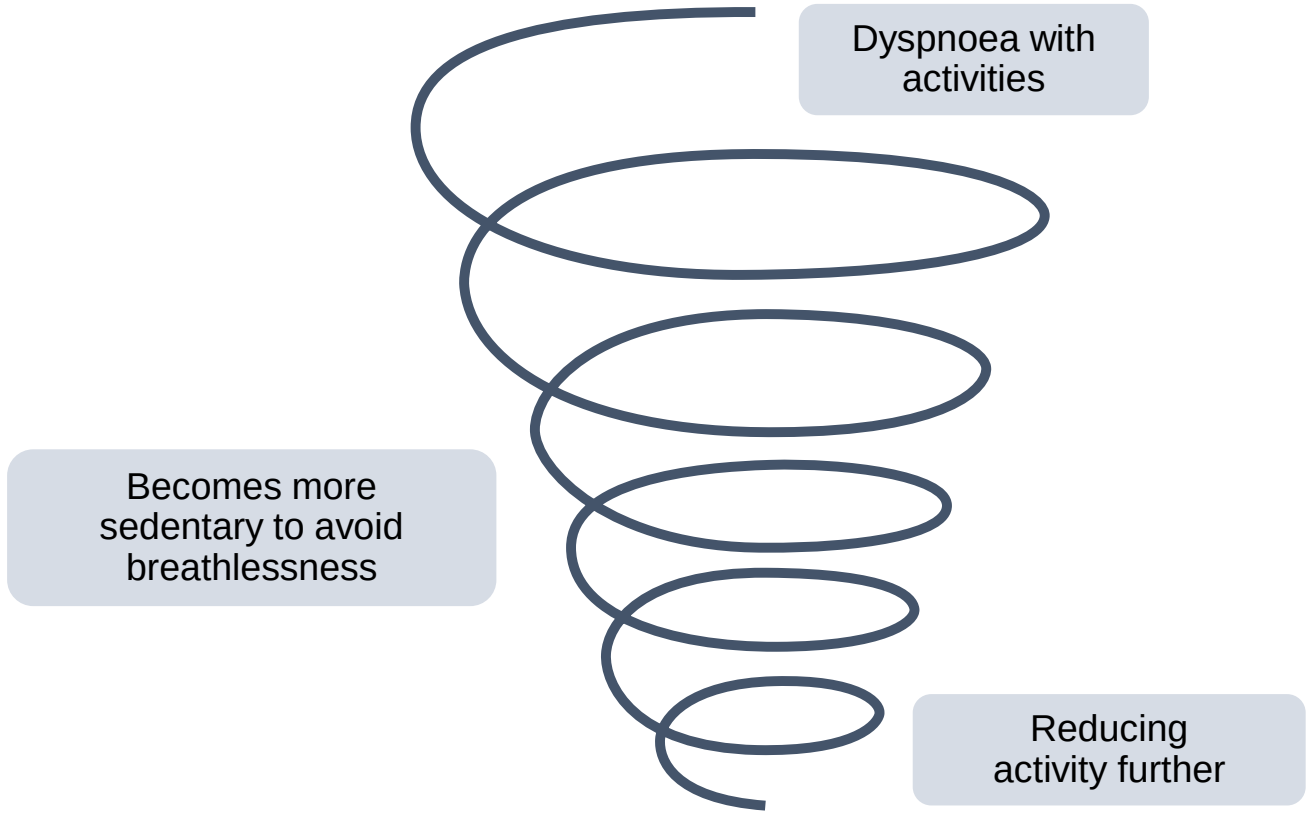
Symptoms, particularly breathlessness[1]

Recurrent exacerbations, or flare-ups[1]

1. COPD in over 16s: diagnosis and management NICE guideline [NG115]. Last updated: July 2019. Available from: https://www.nice.org.uk/guidance/ng115 [Accessed December 2023].

Your interventions can help your patients with COPD maintain or improve their quality of life

Spiral of decline in the dyspnoea cycle[1]



1. Reardon JZ. Am J Med 2006;119:S32–S37.

Key components of COPD management[1]

Treatment/ support to stop smoking[1–4]

Annual influenza and COVID-19 vaccinations and one-off pneumonia vaccination[1,2,4–6]

Pulmonary rehabilitation programme of exercise and education[1–4]

Self-management plan and managing other health problems[1,2,4]

Inhalers and tablets[1–3]

Adapted from: 1. NICE. COPD in over 16s: diagnosis and management NICE guideline [NG115]. Last updated: July 2019. Available from: https://www.nice.org.uk/guidance/ng115 [Accessed December 2023]; 2. GOLD. Global Strategy for the Diagnosis, Management and Prevention of COPD, 2024. Available at: https://goldcopd.org/wp-content/uploads/2023/12/GOLD-2024_v1.1-1Dec2023_WMV.pdf [Accessed December 2023]; 3. NHS. Chronic obstructive pulmonary disease: Treatment. Available at: https://www.nhs.uk/conditions/chronic-obstructive-pulmonary-disease-copd/treatment/ [Accessed December 2023]; 4. British Lung Foundation. COPD treatment. Available at: https://www.blf.org.uk/support-for-you/copd/treatment [Accessed December 2023]; 5. NHS England. Core20PLUS5. Available at: https://www.england.nhs.uk/about/equality/equality-hub/national-healthcare-inequalities-improvement-programme/core20plus5/ [Accessed December 2023]; 6. UK Health Security Agency. COVID-19: the Green book, chapter 14a. Available at: https://www.gov.uk/government/publications/covid-19-the-green-book-chapter-14a [Accessed December 2023].

Clinical signs and symptoms: exacerbations

Exacerbation definition – GOLD 2020

An exacerbation of COPD is defined as an acute worsening of respiratory symptoms that results in additional therapy.

- Patients at high risk of frequent exacerbations from all disease severity groups
- Mainly triggered by respiratory viral infections; bacterial infections and environmental stimuli may contribute (e.g. pollution, ambient temperature)

Exacerbation

↑ Dyspnoea

↑ Sputum purulence & volume

↑ Cough

↑ Wheeze

Increased airway inflammation and marked gas trapping

GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report

Classification of airflow limitation severity

Classification of airflow limitation severity in COPD (based on post-bronchodilator FEV_1)		
In patients with post-bronchodilator FEV_1/FVC <0.70:		
GOLD 1	Mild	FEV_1 ≥80% predicted
GOLD 2	Moderate	50% ≤ FEV_1 <80% predicted
GOLD 3	Severe	30% ≤ FEV_1 <50% predicted
GOLD 4	Very severe	FEV_1 <30% predicted

FEV_1: forced expiratory volume in 1 second; FVC: forced vital capacity
Adapted from GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report

Treatment options : 1

- Smoking cessation : Smoking status & desire to quit
- Vaccinations
- Pulmonary rehabilitation: education & exercise
- Exacerbation education
- Pharmacological optimisation :right medication/correct technique

Treatment options : 2

- Nutrition
- Co-morbidities : **Practical implementation tips: COPD and comorbidities, Dr S Kaul**

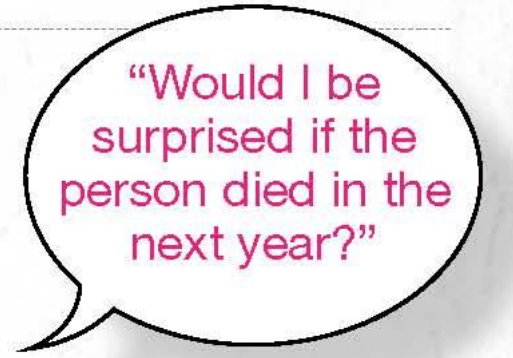
- LTOT
- NIV assessment
- End-of Life

Access

There should be improved access to high quality end-of-life care services that ensure equity in care provision for people with severe COPD, regardless of setting

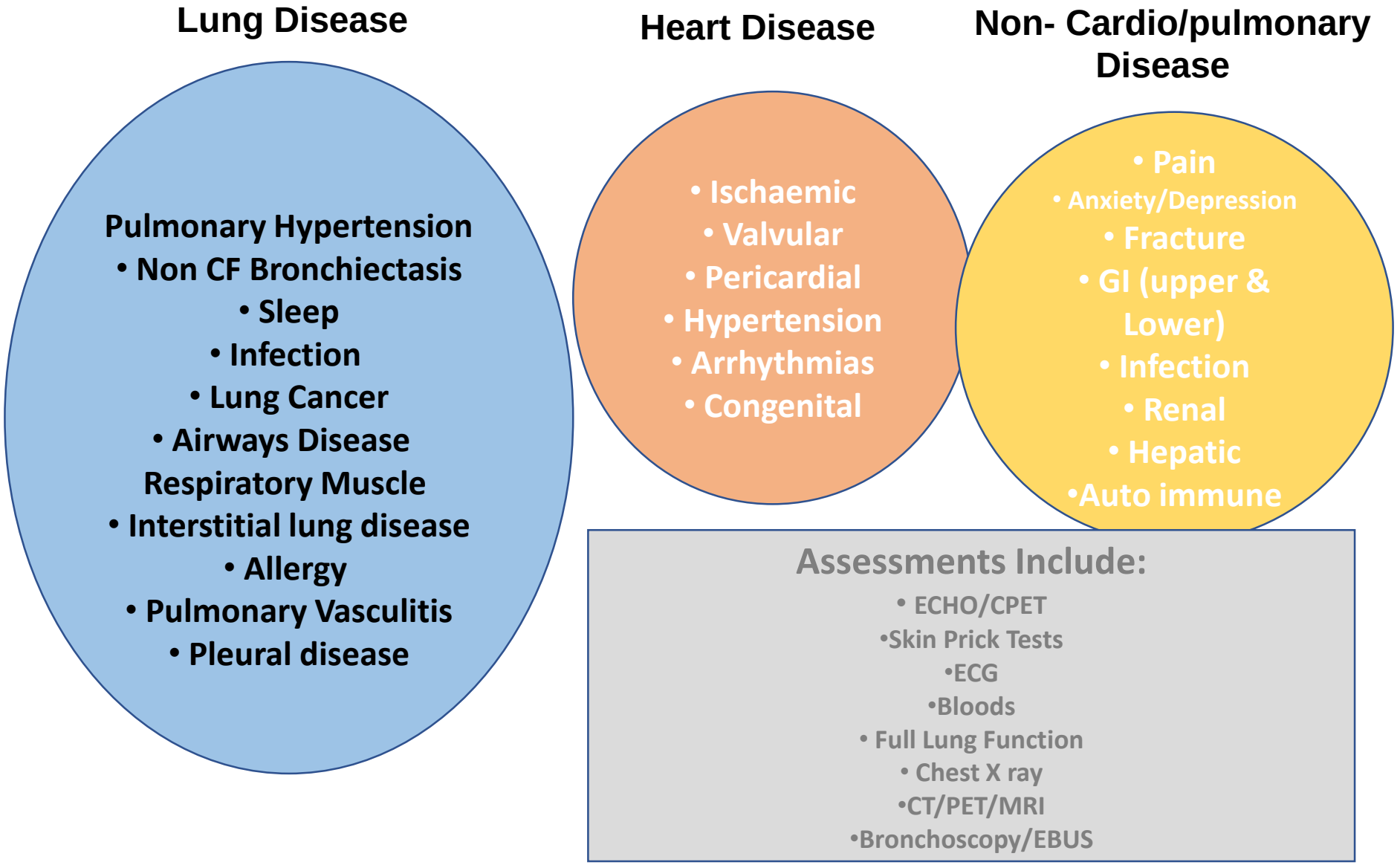
National Strategy for COPD

The 'surprise' question may be helpful in identifying people who require palliative care. There are also several markers that can help identify such people:



- very severe airflow obstruction <30% predicted
- respiratory failure
- low BMI (<19)
- housebound (MRC dyspnoea score 5)
- history of two or more admissions for acute deterioration in previous year (COPD and heart failure)
- need for non-invasive ventilation for acute exacerbation

Shortness Of Breath (SOB) in Patients can be difficult to diagnose...



Conditions associated with COPD

UK-RES-2000578 August 2020

Co morbidities

- On average a patient living with COPD in the UK has 2.8 additional comorbidities

- Anecchino and colleagues investigated a huge COPD cohort of 126, 838 individuals in Italy : vast majority of them (98%), were on at least one prescription for a chronic condition other than a respiratory illness

- Comorbidities in general have a significant impact on health status, healthcare utilization, all-cause hospital admissions and mortality in COPD patients

- COPD patients are more likely to die from a comorbid disease than COPD itself

- Growing epidemiological evidence suggests COPD associated with several age driven diseases eg hypertension, cardiovascular diseases (CVD), diabetes, metabolic syndrome, osteoporosis, asthma, mental disorders and lung cancer

Facts n Figures

- Baty et al (May 2013) studied hospitalised COPD patients (compared to matched controls ie No COPD) reported :
- more co-morbidities (7 [IQR 4–9] vs. 3 [IQR 1–6];)
- more frequently re-hospitalized (annual hospitalization rate 0.33 [IQR 0.20–0.67] vs. 0.25 [IQR 0.14–0.43]/year;)
- longer hospital stay (9 [IQR 4–15] vs. 5 [IQR 2–11] days;)
- and had higher in-hospital mortality (5.9% [95% CI 5.8%–5.9%] vs. 3.4% [95% CI 3.3%–3.5%];)

- An increased risk of in-hospital death was found in COPD-patients with malignant lung neoplasm, pulmonary heart disease, atrial fibrillation and heart failure

COPD comorbidities

COPD is present in the majority of multimorbid patients

- Cardiovascular disease
- Osteoporosis
- Lung cancer
- Anxiety and depression

- Metabolic syndrome and diabetes
- GERD
- Bronchiectasis
- Obstructive sleep apnoea

GERD: gastroesophageal reflux disease

GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report

COPD and cardiovascular disease

CVD is a frequent and important comorbidity in COPD with a direct impact on patient survival[1,2]

Overview

- Includes CAD, heart failure, ischaemic heart disease, arrhythmias, PVD, and hypertension[1,3]
- COPD and CAD share risk factors, e.g. smoking, aging and sedentary lifestyle[3]; hypertension is likely to be the most common comorbidity in COPD[1]

Aetiology

- Precise pathophysiological mechanisms unknown[2,3]
- Systemic inflammation may underlie both pathologies[2,3]
- Low-grade inflammation and inflammatory cells found in peripheral lungs in COPD and in atherosclerotic plaques[3]

Presentation

- In some patients with COPD, right ventricular dysfunction develops as the disease progresses[3]
- Patients with airflow limitation have a higher risk of death from myocardial infarction[3]
- Breathlessness in COPD patients may be caused by CVD such as heart failure or arrhythmias[4]

Management

- There is currently no evidence that CVD should be treated differently in the presence of COPD or vice-versa[1]
- When prescribed, selective β-blockers should be used[1]

CAD: coronary artery disease; CVD: cardiovascular disease; PVD: peripheral vascular disease

1. GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report
2. Cavaillès et al. Eur Respir Rev 2013; 22: 454–75
3. Barnes & Celli. Eur Respir J 2009; 33: 1165–85
4. https://www.blf.org.uk/support-for-you/breathlessness/causes, [Accessed August 2020]

COPD and osteoporosis

A major and often under-diagnosed comorbidity associated with poor health status and prognosis[1]

Overview

- Aging and smoking are shared risk factors for COPD and osteoporosis[2,3]
- Prevalence may be as high as 75% in patients with GOLD stage 4 and higher for females than males[2]

Aetiology

- COPD may be the leading cause of secondary osteoporosis in males[3]
- A pathological link is yet to be established, but may involve inflammation, pulmonary dysfunction, glucocorticoid use, and vitamin D levels[3]

Presentation

- Low BMD and fractures are common in patients with COPD even accounting for age, pack-years of smoking, current smoking, steroid use, and exacerbations[1]
- Vertebral compression fractures may increase kyphosis, which may further reduce pulmonary function[2]

Management

- BMD should be measured in all patients with GOLD grade 3 or 4[2]
- Systemic corticosteroids significantly increase the risk of osteoporosis. Repeated courses for exacerbations of COPD should be avoided if possible[1]
- Osteoporosis should be treated according to usual guidelines[1]

BMD: bone mineral density; GOLD: Global Initiative for Chronic Obstructive Lung Disease

1. GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report
2. Barnes & Celli. Eur Respir J 2009; 33: 1165–85
3. Okazaki et al. J Bone Metab 2016; 23: 111–20

COPD and lung cancer

Smoking cessation is the best prevention for both COPD and lung cancer[1]

Overview

- COPD patients are 3–4 times more likely to develop lung cancer than smokers with normal lung function[2]
- Lung cancer is a common cause of death in COPD[2]
- Prevalence of COPD among patients with lung cancer ranges from 40–70%[5]

Aetiology

- Patients with COPD and lung cancer also share many susceptibility genes[5]

Presentation

- As symptoms of lung cancer are largely non-specific and often present similar to COPD, such as cough and dyspnoea, recognising it in patients with COPD can be particularly challenging[3]
- Referral should be arranged using a suspected cancer pathway referral (for an appointment within 2 weeks) for people who[4]:
  - Have chest X-ray findings that suggest lung cancer or
  - Are aged 40 and over with an unexplained haemoptysis

Management

- Patients with COPD and lung cancer may be ineligible for surgery for lung cancer due to poor physical condition[6]
- COPD management and pulmonary rehabilitation may improve postoperative outcomes for patients[6]

1. GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report; 2. Barnes & Celli. Eur Respir J 2009; 33: 1165–85;
3. Birring & Peake. Thorax 2005; 60: 268–9; 4. https://cks.nice.org.uk/topics/lung-pleural-cancers-recognition-referral/#!scenario, [Accessed August 2020];
5. Cavaillès et al. Eur Respir Rev 2013; 22: 454–75; 6. Dai J et al. Oncotarget 2017; 8: 18513–24

COPD, anxiety and depression

Mental health issues in COPD are often under-diagnosed and under-treated[1]

Overview

- Common, poorly-treated comorbidities of COPD[1]
- Clinically relevant depressive symptoms may occur in 10–80% of all COPD patients[1]
- Untreated depression increases the length and frequency of hospital stays, and results in impaired QoL and premature death[1]

Aetiology

- Depression is associated with declining health[1]
- Depression may also precede COPD (smoking is common in patients with anxiety and depression)[1]

Presentation

- Associated with lower FEV_1 and poor prognosis[2]
- Symptoms of anxiety and depression may be confused with symptoms of COPD[1]
- COPD with frequent exacerbations should be assessed for underlying anxiety and depression[3]
- Physical impairment due to COPD can prevent engagement with social activities[1]

Management

- Studies report that pulmonary rehabilitation alone can improve anxiety and depression[1]
- Antidepressants may modify the perception of COPD symptoms, and improve QoL; however, further evidence is required[1,4]

FEV_1: forced expiratory volume in 1 second; QoL: quality of life

1. Barnes & Celli. Eur Respir J 2009; 33: 1165–85
2. GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report
3. Maurer et al. Chest 2008; 134: 42S–56S
4. Cavaillès et al. Eur Respir Rev 2013; 22: 454–75

COPD, metabolic syndrome and diabetes

Reduced lung function is a risk factor for the development of diabetes[1]

Overview

- Metabolic syndrome and diabetes are common comorbidities of COPD[2]
- In patients with COPD, the prevalence of metabolic syndrome may be >30%,[3] while diabetes is between 1.6 and 16%[1]

Aetiology

- Obesity, neuropathy, and loss of pulmonary elasticity and muscle strength may impact lung function[2]
- Proinflammatory cytokines induce insulin resistance and increase the risk of type 2 diabetes[4]

Presentation

- Smokers are at a higher risk of developing diabetes than non-smokers[2]
- Patients with diabetes and metabolic syndrome have reduced FEV_1 and FVC compared with patients without diabetes[2]

Management

- Guidelines advise that diabetes and COPD should be treated as usual[3]
- High-dose ICS are a risk factor for diabetes[2]
- Inform patients with diabetes that they should be more vigilant of their blood glucose levels when taking oral corticosteroids[5]

FEV_1: forced expiratory volume in 1 second; FVC: forced vital capacity; ICS: inhaled corticosteroids

1. Chatila et al. Proc Am Thorac Soc 2008; 5: 549–55; 2. Cavaillès et al. Eur Respir Rev 2013; 22: 454–75
3. GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report; 4. Barnes & Celli. Eur Respir J 2009; 33: 1165–85
5. Diabetes UK. Corticosteroids and diabetes. https://www.diabetes.co.uk/diabetes-medication/costicosteroids-and-diabetes.html. [Accessed August 2020]

COPD and gastroesophageal reflex disease

GERD is an independent risk factor for COPD exacerbations[1]

Overview

- GERD is an increased movement of gastric content back into the oesophagus[2]
- GERD is experienced by 10–20% of adults in western countries[2]
- Prevalence of GERD is increased in COPD[3]

Aetiology

- The impact of GERD on COPD is undefined[3]
- Possible suggestions: worsening of airway inflammation may be due to aspiration of *H. pylori*, or increased rates of COPD exacerbations may be related to GERD symptoms[3]

Presentation

- GERD is associated with gastro-oesophageal, respiratory, laryngeal, nasal, sinus, ear or teeth symptoms[2]
- Consider other causes of chronic cough at COPD review (reflux, iatrogenic, upper airways, etc.)[4]

Management

- Treatment includes lifestyle changes and, where necessary, H2 antagonists, and PPI[2]

GERD: gastroesophageal reflux disease; PPI: proton pump inhibitors

1. GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report
2. EAACI. Global Atlas of Asthma 2013
3. Chatila et al. Proc Am Thorac Soc 2008; 5: 549–55
4. Morice et al. Eur Respir J 2020; 55: 1901136 [https://doi.org/10.1183/ 13993003.01136-2019]

COPD and obstructive sleep apnoea

During sleep, patients with OSA and COPD have more episodes of oxygen desaturation and more total sleep time with hypoxemia and hypercapnia than those with OSA alone[1]

Overview

- OSA is characterised by irregular breathing at night and excessive daytime sleepiness[2]
- In the UK, OSA affects up to 4% of middle-aged men and 2% of middle-aged women[2]
- Approximately 20% patients with OSA also have COPD[3]

Aetiology

- Collapsing of the upper airway during sleep causes transient wakefulness to allow the airway to reopen[2]
- Evidence suggests OSA shows local upper airway inflammation, systemic inflammation and oxidative stress[3]

Presentation

- The apnoeic events in patients with COPD and OSA have more profound hypoxaemia and more cardiac arrhythmias[1]
- Diagnosis confirmed with a type 3 portable monitoring device; polysomnography is rarely necessary[4]

Management

- CPAP, the standard treatment for OSA, is effective and improves prognosis[4]
- When nocturnal hypoxaemia persists, oxygen therapy may be added[4]
- Weight loss is associated with improvements in OSA severity[5]

CPAP: continuous positive airway pressure; OSA: obstructive sleep apnoea

1. GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report; 2. NICE CKS. Obstructive sleep apnoea. 2015
3. Barnes & Celli. Eur Respir J 2009; 33: 1165–85; 4. Cavaillès et al. Eur Respir Rev 2013; 22: 454–75; 5. Patel. Thorax 2015; 70: 205–6

Skeletal muscle dysfunction

Epidemiology

- Skeletal muscle dysfunction in COPD can have a direct impact on exercise capacity, fatigue and activity levels, which are likely to be associated with health-related quality of life
- Prevalence of skeletal muscle weakness in COPD patients as tested by quadriceps strength is 32%
- More than a quarter of GOLD stage I and II patients have skeletal muscle dysfunction, rising to 38% in GOLD stage IV
- Quadriceps strength is related to fat-free mass index, Medical Research Council dyspnea score, BODE (BMI, airflow obstruction, dyspnea and exercise capacity) index and indeed mortality

Pathophysiology

- The pathophysiology of skeletal muscle weakness in COPD is likely to be multifactorial, but likely to include reduced activity leading to disuse atrophy, systemic corticosteroid therapy, inflammation, hormone imbalance, hypoxia and oxidative stress

- There is a switch away from type I to type II muscle fibers, towards less endurance

Management

- Assessing skeletal muscle dysfunction in routine clinical practice is not currently widespread due to equipment and time requirements

- COPD patients with suspected or known skeletal dysfunction could preferentially be referred to a pulmonary rehabilitation program in order to attempt to reverse the changes

- Neuromuscular stimulation of affected muscles may be a useful adjunct in future, although further work on this is required
- Inspiratory Muscle training can be a useful adjunct

COPD and bronchiectasis

Patients with COPD and bronchiectasis are more likely to have exacerbations[1]

Overview

- Bronchiectasis is a progressive disease characterised by permanent widening and thickening of the bronchi[2]
- Studies suggest that up to 25% of people diagnosed with COPD might actually have bronchiectasis[2]

Aetiology

- Previous severe lower RTI is the most common cause of bronchiectasis[2]
- About 40% of patients with bronchiectasis have no clear underlying cause[2]

Presentation

- Bronchiectasis shares many features with COPD, including chronic cough, sputum production, and exacerbations[1]
- Adults with suspected COPD may have bronchiectasis alone or co-existing with COPD, if they have slow recovery from RTI, recurrent exacerbations or history of smoking[2]
- Consider investigation for bronchiectasis in COPD patients with frequent exacerbations (≥2 annually) and a previous positive sputum culture for *P. aeruginosa* whilst stable[4]

Management

- COPD treatment: more aggressive and prolonged antibiotic therapy may be required[3]
- ICS may not be indicated in patients with bacterial colonisation or recurrent lower RTI[3]

ICS: inhaled corticosteroids; RTI: respiratory tract infection

1. Du et al. PLoS ONE 2016; 11: e1050532
2. NICE CKS. Bronchiectasis. 2018
3. GOLD. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2020 Report
4. Hill et al. Thorax 2019; 74: S1–S69

A lifetime of specialist care

Royal Brompton & Harefield NHS Foundation Trust

'COPD: CT Thorax - friend or foe': Clinical utility of CT in diagnosing co-morbidities.

A Vohra, S Raza, P Dalal, S Kaul.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is associated with several pulmonary and extrapulmonary comorbidities which have a significant impact on healthcare services and patient outcomes. CT Thorax is often requested in COPD patients primarily for coexisting lung disease
however extrapulmonary comorbidities are often under requested and under reported.
Hypothesis - there are many treatable pulmonary and extra pulmonary co morbidities which if diagnosed earlier could lead to improved patient outcomes.

METHODS

Setting -Tertiary Cardiothoracic Centre

Study design: Retrospective review of 600 non-contrast CT thorax scans of COPD patients (diagnosed clinically as per GOLD criteria) using a pre-formed list of co-morbidities (listed below) done between 2010 and 2017. Any consecutive scans were also reviewed. Images were reviewed by two radiologists independently.

Pulmonary: Bronchiectasis, Infection, Lung cancer, ILD
Extra-pulmonary: Coronary artery calcification, Pulmonary artery diameter, Hiatus hernia, Vertebral fractures.
Corresponding Diagnoses: Ischaemic heart disease, Pulmonary artery hypertension, Gastroesophageal reflux disease and Osteoporosis.

SUMMARY

Preliminary analysis indicates a high incidence of potentially treatable extra pulmonary comorbidities. The most frequent lung co morbidity was radiological bronchiectasis with prevalence of 43%.

CONCLUSIONS

To our knowledge this is the first report quantifying the added value of CT Thorax in the assessment of COPD patients. Our recommendation is that a list of imaging diagnoses linked to well recognised treatable COPD comorbidities should be part of the standard work up in the assessment of COPD patients undergoing CT Thorax. This would enable earlier intervention, personalised treatment strategies and better patient outcomes.

References
1.Martinez CH, Miguel DJ, Mannino DM. Defining COPD-related comorbidities, 2004-2014. *J COPD F.*2014;1(1):51-63.
2.Mao B, Lu HW, Li MH, et al. The existence of bronchiectasis predicts worse prognosis in patients with COPD. Scientific Reports. 2015;5:10961.

RESULTS

600 CT chest scans were reviewed (358 men, 242 women). Common reasons for requesting imaging: Lung transplant assessment (26%), Worsening shortness of breath (16%), to assess for imaging evidence of bronchiectasis (10%), LVRS assessment (8%), to exclude malignancy (5%), to exclude infection (5%), to exclude concurrent interstitial lung disease/pulmonary fibrosis (3%) etc.
Retrospective analysis of 600 CT Thorax scans showed a total of 1,255 pulmonary (444) and extra pulmonary (811) findings. (Figure1).

Pulmonary findings: -
Bronchiectasis: 43% (260/600), the presence of bronchiectasis was based on lack of tapering of bronchi and visualization of peripheral bronchi within 1 cm of pleura.
Solitary new lung nodules (>5mm, solid/sub-solid/GGO): 7% (43/600). 8 subjects were found to have biopsy proven lung cancer and 6 subjects had FDG PET positive nodules. 7 subjects were detected at an early stage of lung cancer.
Consolidation/infection 5% (32/600), Small airway changes 3% (16/600), Interstitial lung changes: 6% (35/600), Pleural pathology 3% (20/600) and others (38/600).

Extra pulmonary findings:
Hiatus hernia: 20% (122/600),
Vertebral fractures: 13% (77/600),
Enlarged Pulmonary artery diameter (more than 29mm, ratios of the diameter of the main pulmonary artery to the diameter of the ascending aorta): 22% (133/600),
Coronary artery plaques: 61% (365/600) and others (aortic aneurysm, thyroid abnormality etc) 19% (114/600).

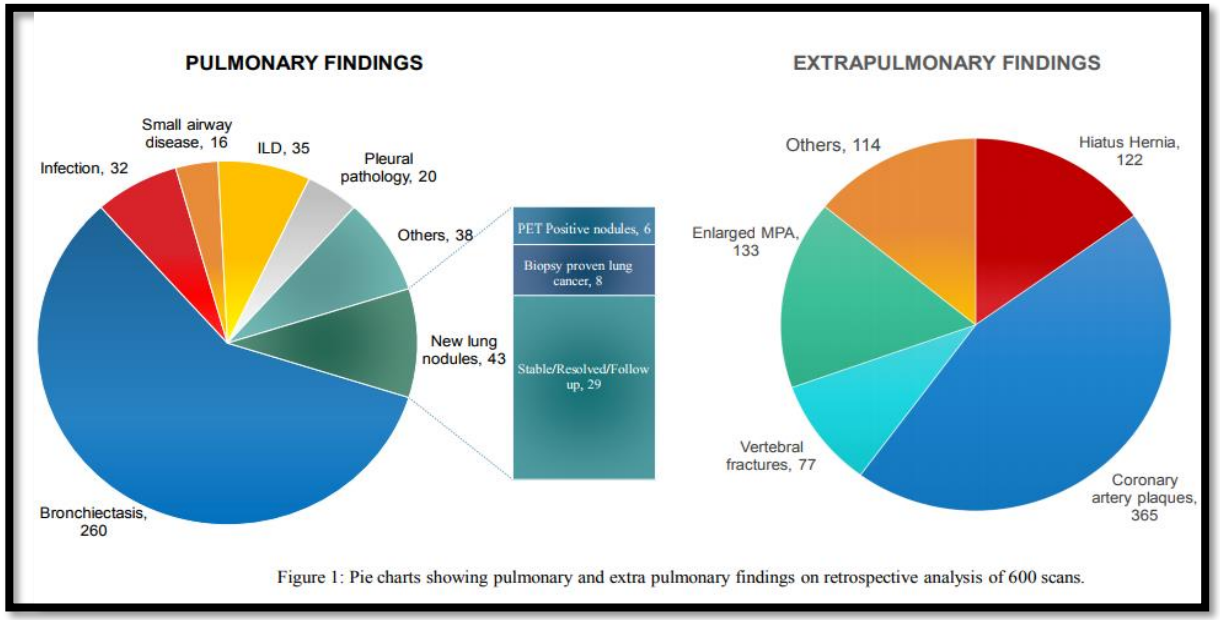
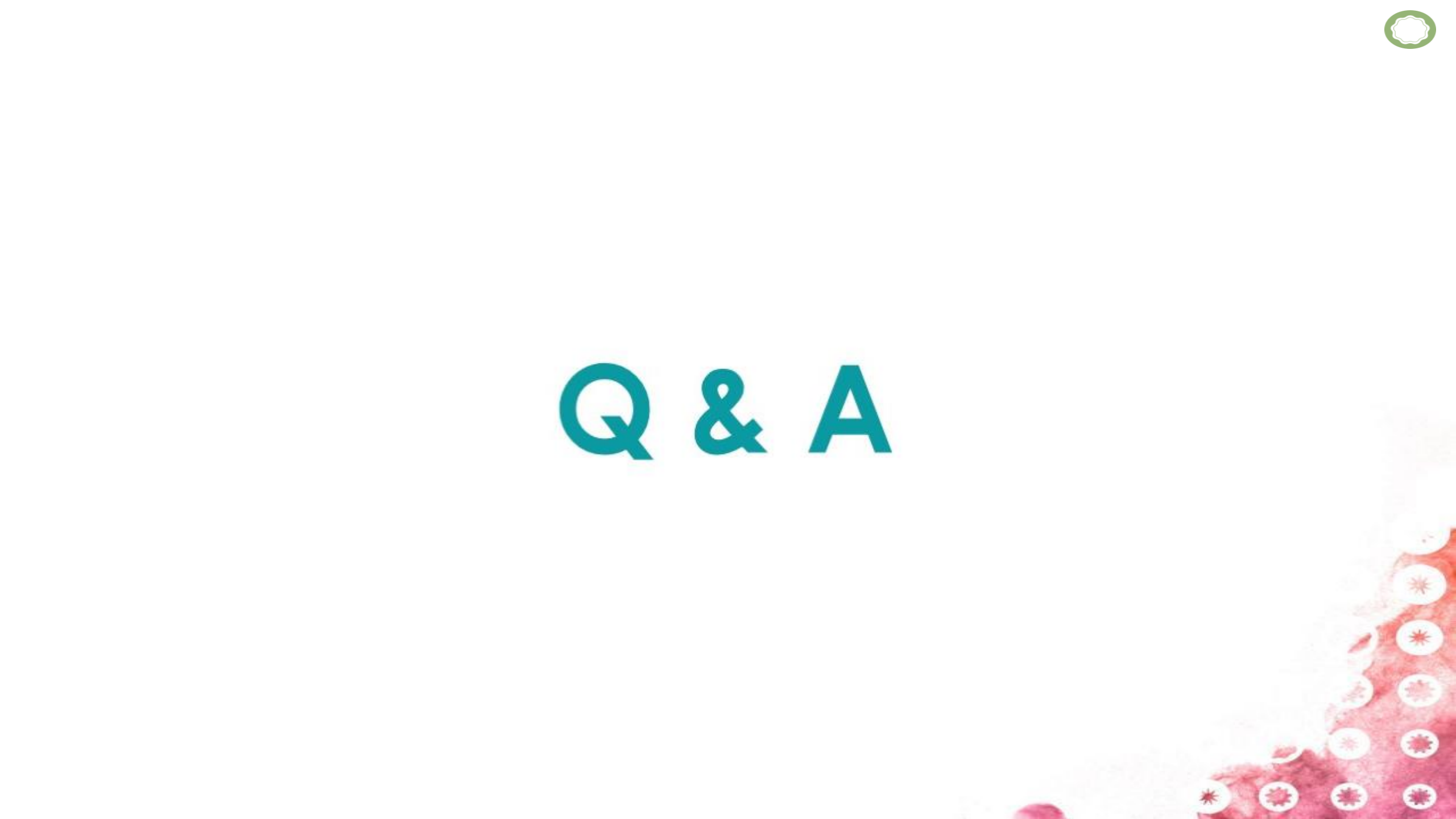


Figure 1: Pie charts showing pulmonary and extra pulmonary findings on retrospective analysis of 600 scans.

Summary

- COPD remains an important cause of morbidity, mortality and health care utilisation
- Many patients have co morbidities both pulmonary and extra pulmonary which are an important cause of the mortality and morbidity
- Whole patient management (total body optimisation) is most likely to produce improved patient outcomes
- Early diagnosis leads to early intervention (pharmacological and non pharmacological) and better patient outcomes

Q & A



Preliminary Post Cardiac Surgery Outcomes Data

	All (n=462)	Non COPD (n=128)	COPD (n=63)	GOLD 1 (n=24)	GOLD 2 (n=33)	GOLD 3 (n=5)	GOLD 4 (n=1)
Age Mean (SD)	66.5 (12.1)	67.2 (11.1)	69.8 (10.3)	72.3 (10.0)	68.6 (10.2)	63.6 (10.1)	79
Sex	M: 71.6% (331)	M: 78.9% (101)	M: 60.2% (38)	M: 66.7% (16)	M: 51.5%(17)	M: 80% (4)	M: 100% (1)
	F: 28.4% (131)	F: 21.1% (27)	F: 39.7% (25)	F: 33.3% (8)	F: 48.5% (16)	F: 20% (1)	F: 0 (0)
BMI Mean (SD)	27.5 (5.6)	27.9 (5.3)	27.2 (5.7)	27.0 (5.1)	27.4 (6.1)	27.2 (7.2)	23.5
CR Mean (SD)	92.7 (49.6)	93.7 (40.5)	90.4 (29.3)	82.4 (25.6)	98.5 (48)	79.0 (24.3)	69

	All (n=462)	Non COPD (n=128)	COPD (n=63)	GOLD 1 (n=24)	GOLD 2 (n=33)	GOLD 3 (n=5)	GOLD 4 (n=1)
ICU Mortality	3.90% 18/462	4.70% 6/128	3.20% 2/63	0% 0/24	6.10% 2/33	0% 0/5	0% 0/1
Reintubations	7.80% 36/462	7.80% 10/128	12.70% 8/63	4.20% 1/24	15.20% 5/33	20% 0/5	100% 1/1
Readmissions	4.80% 22/462	5.50% 7/128	6.30% 4/63	0% 0/24	12.10% 4/33	0% 0/5	0% 0/1
Tracheostomies	5.80% 27/462	7.80% 10/128	7.90% 5/63	4.20% 1/24	9.10% 3/33	20% 01-May	0% (0/1)
LOS Median (25-75% IQR)	2 (1-3)	2 (1-4)	2 (1-4.5)	1 (1-3)	3 (1-5)	1 (1-2)	5