Recognition and diagnosis of chronic obstructive pulmonary disease

COPD is a common lung disease that requires the correct diagnosis for appropriate treatment.

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Chronic obstructive pulmonary disease (COPD) is a common lung disorder associated with substantial impairment of quality of life, disability and premature death for the affected individual. Not only does COPD affect the individual, but it also poses a large socio-economic burden on the community and the health care system.

The under- and misdiagnosis of COPD in populations worldwide is well documented.

The prevalence of COPD in South Africa is not known, but a large percentage of the population are exposed to risk factors for COPD such as cigarette smoking,[1] inorganic dusts and the indoor use of biomass fuel for heating and cooking. The recent recognition that infection with the human immunodeficiency virus is an independent risk factor for the development of COPD[2] further increases the likelihood that South Africa has a high prevalence of COPD.

The under- and misdiagnosis of COPD in populations worldwide is well documented. In the USA it is estimated that only 50% of individuals with COPD have been diagnosed.[3] In a large survey in the USA and Europe only 23% of individuals presenting with COPD were accurately diagnosed.[4] If these findings are extrapolated to the South African context it can be assumed that we too have a large number of either undiagnosed or misdiagnosed individuals with COPD. Primary health care providers are the most likely persons to see individuals with undiagnosed COPD, and are responsible for approximately 70% of the care provided to individuals with COPD.[5] The general practitioner (GP) is thus ideally placed to not only identify, but also correctly diagnose COPD in the population.

As the understanding of the pathophysiology and treatment of COPD has increased, the definition of COPD has evolved. The revised consensus report of the Global Initiative for Chronic Obstructive Lung Disease (GOLD) defines COPD as 'a preventable and treatable disease with some significant extrapulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles and gases.'[6]

The recognition of COPD as a preventable and treatable disease with its own underlying pathological characteristics, treatment options and desired outcome makes the early and accurate diagnosis of COPD essential for adequate patient management.

Early diagnosis

COPD is a heterogeneous disease affecting different individuals in different ways. COPD is often not diagnosed until individuals present with clinical symptoms and moderately advanced disease.

In the early stages of COPD individual patients may experience no or only minimal symptoms. As the disease is slowly progressive, symptoms that develop may be ignored by the patient. A chronic non-productive cough may be accepted as 'just a normal smoker's cough' and unless directly questioned by a health care provider may be dismissed by the patient as unimportant. The development of dyspnoea is insidious and may be compensated for by a modified lifestyle and attributed to the process of ageing.[3] It is therefore necessary for the general practitioner to actively enquire about symptoms that may suggest early COPD in all individuals exposed to risk factors for COPD. In a study in GP practices in the Netherlands, 27% of smokers over the age of 35 years who admitted to having a cough on questioning were found to have evidence of airway obstruction (FEV_1 <80% predicted).[7]

The presence of multiple key symptoms makes the diagnosis of COPD more probable but is not diagnostic.

As symptoms between individuals with COPD vary and the presence of any individual symptom is not diagnostic in itself, it is necessary to directly enquire about a number of key symptoms in individuals exposed to risk factors for COPD, of which smoking is the most important. The presence of multiple key symptoms makes the diagnosis of COPD more probable but is not diagnostic.

Key symptoms

Chronic cough is often the first symptom to develop and may be non-productive. The cough usually starts off intermittently but

later tends to occur daily and throughout the day. Coughing bouts with the production of small volumes of tenacious sputum are not uncommon. Large volumes of sputum production should raise the suspicion of bronchiectasis as an alternative diagnosis. Haemoptysis is not a feature of COPD and its occurrence should prompt further investigation to establish the cause thereof.

Dyspnoea in COPD is characteristically persistent and progressive.

Dyspnoea is the most common reason why individuals with COPD seek medical attention.[3] Dyspnoea in COPD is characteristically persistent and progressive. Individuals with COPD experience dyspnoea at lower levels of activity than unaffected people of the same age even on 'a good day'. The extent to which an individual is limited by their dyspnoea should be explored as it is not only relevant for the staging of COPD but also predicts future mortality risk.[8]

Wheeze and tight chest are nonspecific symptoms and in COPD may vary over the course of a single day or between days. Wheeze may be present in mild COPD but is more likely in severe cases. The presence or absence of wheezing cannot be used to distinguish COPD from asthma.

A complete detailed history of individuals with suspected COPD is required to exclude other causes of these common key symptoms. Conditions such as asthma, tuberculosis, bronchiectasis, bronchogenic carcinoma, and left heart failure, need to be considered in the differential diagnosis. Cognisance must be taken of the fact that cigarette smoking is a risk factor for many other medical conditions.

The diagnostic confusion between COPD and asthma is common, particularly in older smokers.[9] As asthma and COPD have a different pathophysiology and different treatment goals it is essential to diagnose them correctly. Although no features on history are diagnostic for either COPD or asthma the following features may help to separate them in practice.

Features on history suggesting COPD

- Significant smoking history
- Older age group
- Progressive dyspnoea present on all days
- Colds that frequently go to the chest
- Chronic production of phlegm
- Dyspnoea at the onset of exercise.

Features on history suggesting asthma

- Intermittent symptoms
- History of asthma as a child
- Nocturnal dyspnoea and cough
- Dyspnoea after exercise
- A history of allergy, atopy or eczema
- A family history of asthma.

Asthma and COPD may co-exist in an individual and diagnostic differentiation may be difficult. These individuals should be referred to a specialist for further evaluation and optimisation of treatment.

Physical examination

COPD may result in a number of physical signs. However, the clinical examination is usually unremarkable until late in the disease. The importance of a thorough physical examination is to exclude other causes for the patient's symptoms and identify any complications of COPD.

Inspection

The general appearance of an individual with COPD ranges from normal to the two extremes of 'classic' late COPD, the 'pink puffer' or the 'blue bloater'. Individuals with advanced COPD often sit leaning forward with their hands resting on their knees or a solid object, in order to stabilise their shoulder girdle. Tachypnoea with shallow breaths and pursed-lips breathing may be evident.

As hyperinflation develops the anterior-posterior diameter of the chest and the xiphisternal angle increases. There may be recession of the lower ribs on inspiration. Central cyanosis and plethora develop with the onset of hypoxia. Features of right heart failure such as pedal oedema and an elevated jugular venous pressure may become apparent in advanced disease.

Palpation and percussion

The cardiac apex beat may be difficult to palpate and the liver may be displaced downward if there is significant hyperinflation of the lungs.

Auscultation

Extra heart sounds and cardiac murmurs may give a clue to an alternative diagnosis. In COPD the heart sounds may be distant and the pulmonary component of the second heart sound may be loud in established pulmonary hypertension. The breath sounds may be soft with a prolonged expiratory phase. Wheezes and inspiratory crackles may occur. Attention must be paid to auscultation of the base of the lungs, where the presence of fine late inspiratory crackles may suggest an alternative diagnosis such as left heart failure or pulmonary fibrosis.

Lung function testing

Spirometry

Spirometry is essential in all patients where the diagnosis of COPD is considered. Spirometry is required to establish the presence and severity of airflow limitation and to exclude other diagnoses that may present with similar symptoms.[6]

It is feasible to perform spirometry in general office practices. However, some training is required and the spirometer used must be of an approved standard and requires regular calibration.[10] The South African Thoracic Society has published guidelines on the use of spirometry in the office setting which should be adhered to.[11]

The measurements required for individuals with suspected COPD are:

- Forced vital capacity (FVC), which is the volume of air forcibly exhaled from the point of maximal inspiration.
- Forced expiratory volume in 1 second (FEV_1), which is the volume of air exhaled during the first second of the FVC manoeuvre.
- The ratio of the above 2 volumes (FEV_1/FVC) expressed as a percentage.

The measurements used to diagnose, assess and stage COPD should be obtained after the administration of an inhaled bronchodilator (e.g. salbutamol 400 µg).

The measured FEV_1 and FVC are compared with the appropriate reference values based on age, gender, height, weight and race.

Interpretation of results

Values for FVC and FEV_1 >80% predicted are considered to be normal. Airway limitation (obstruction) is defined as FEV_1/FVC <70%. The FEV_1/FVC ratio declines with normal ageing and the potential exists for elderly patients to be misdiagnosed as having airway obstruction. However, in the absence of COPD the FEV_1 would still be above 80% predicted for the person's age, weight, race and gender.

A diagnosis of COPD can be made where FEV_1/FVC <70% and the FEV_1 <80% predicted despite administration of a trial of bronchodilators and corticosteroids.

Neither bronchodilator nor corticosteroid reversibility testing predicts disease progression or response to inhaled corticosteroids in patients with a clinical diagnosis of COPD and abnormal spirometry.[12,13] Routine reversibility testing is not indicated in individuals with COPD.[6,14]

Peak expiratory flow rates (PEF) have not been validated for the diagnosis of COPD and underestimate the degree of

airflow obstruction.[6] PEF measurements are inappropriate for the diagnosis and evaluation of COPD.

Assessing severity

The FEV_1 predicts the prognosis of an individual with COPD but is a poor predictor of disability and quality of life. The staging of COPD severity takes into account FEV_1, level of symptoms and the presence of co-morbid disease.

The spirometric values used in the staging of COPD differ from guideline to guideline and have not been clinically validated. For the purpose of conformity it is recommended that the South African Thoracic Society (SATS) guidelines be followed when staging COPD.[15] The current SATS staging for COPD is shown in Table I. As the guidelines are currently being reviewed it is possible that changes to the staging may be made in the near future.

Additional investigations

Chest X-ray (CXR) is often unhelpful in diagnosing COPD and its main value is the exclusion of an alternative diagnosis. Radiographic changes on CXR associated with COPD are irregular radiolucency of the lung fields, diaphragmatic flattening with blunting of the costophrenic angles, a rapid tapering and peripheral absence of vascular markings and an increased retrosternal airspace seen on the lateral chest film.

Any further investigations should be based on physical findings on examination and clinical judgement.

Conclusion

COPD is a common and often undiagnosed or misdiagnosed disease. A high index of suspicion, a comprehensive history and spirometry in patients with risk factors for and symptoms of COPD can establish an accurate diagnosis in the majority of individuals with this preventable disease.

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Table I. Assessment of severity

	Stage 0	Stage 1	Stage 2	Stage 3
Grade of severity	Normal, but at risk	Mild	Moderate	Severe*
FEV_1 (% of predicted value)	>80	79 - 60	59 - 40	40
Dyspnoea/functional impairment	Normal exercise tolerance	Limits strenuous activity	Limits activities performed at 'normal' pace	Impairs activities of daily living, to virtual inactivity
6-MWD† (m)	Normal (600)	<600 - 200		200
BMI‡ (kg/m^2)	>25	<25 - 21		<21

* Also severe if any of the following are present: repeated hospitalisation for exacerbations, co-morbidity, right heart failure, PaO_2 <6.5 kPa, age >65 years, respiratory acidosis.

† 6-MWD = distance in metres walked in 6 minutes. Normal value in health 600 m; moderate impairment <300 m; severe impairment <200 m. A change of 10% is considered clinically significant.

‡ BMI = body mass index, calculated as follows: mass in kg divided by height in m^2. A change in BMI of 1 kg/m^2 is considered significant.

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In a nutshell

- COPD is common and is often undiagnosed or misdiagnosed in general practice.
- COPD is a treatable disease with disease-specific therapy and an accurate diagnosis is essential.
- COPD can be asymptomatic.
- Smoking is the largest risk factor for COPD.
- COPD should be considered in patients >40 years with a risk factor for COPD and any of the following symptoms: cough, dyspnoea or sputum production.
- COPD and asthma are frequently distinguishable on the basis of history.
- Spirometry is essential to establish the diagnosis of COPD, particularly in the early stages.
- Peak expiratory flow rates should not be used for the diagnosis or staging of COPD.
- The presence of post-bronchodilator FEV_1 <80% together with FEV_1/FVC <70% confirms airway obstruction that is not fully reversible, and establishes a diagnosis of COPD.
- Reversiblity testing with short-acting $beta_2$-agonists or a short course of oral steroids does not predict response to long-term therapy.
- Severity of COPD is staged using FEV_1, symptoms and co-morbid disease.