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## Assessing the severity of COPD

In the UK, modern interest in what is now called chronic obstructive pulmonary disease (COPD) began following the large numbers of deaths seen as a result of the smog and pollution occurring in London during the 1950s [1]. Around this time spirometry was becoming available and it was observed that airflow obstruction was a key factor in determining disability and mortality [2]. These studies, and confusion about the best terminology to use in epidemiological studies, led to the 1958 CIBA symposium which suggested definitions of chronic bronchitis, emphysema, and variable and fixed airflow obstruction [3]. The introduction of a physiological concept of airflow limitation as a diagnostic term was new, and for a long time COPD was known as chronic obstructive airways disease (COAD) as a reflection of this airway-dominated definition. Consequently, it also seemed logical to base the classification of disease severity on the degree of airflow obstruction.

The term 'COPD' was coined in the early 1960s, and has been preferred to the term 'COAD' since the 1990s because it encapsulates the fact that the condition not only affects the airways but also affects the lung parenchyma and the pulmonary circulation. More recently, it has become clear that COPD also has effects outside the lung, most notably on skeletal muscle. One of the consequences of this broader view of the disease has been a reassessment of how to assess disease severity.

It is important to consider what is meant by the term 'severity' in relation to COPD, and why it is useful to assess it. For COPD, the 'severity of illness' is different to the 'severity of disease'. Essentially, 'severity of illness' concerns the level of suffering and disability experienced by the patient,

whereas 'severity of disease' concerns the *risk* of death, suffering and disability [4]. Assessing the severity of disease is important, since it allows interventions to be used at appropriate stages of the disease, it allows a more accurate prognosis to be given, and it allows accurate characterization of patients and populations in clinical trials.

Assessment of disease severity in COPD is complicated by the multi-system nature of the disease and the heterogeneity of its clinical presentation: it must combine markers of the effect of the disease on the lungs with other known prognostic factors. The pre- and post-bronchodilator forced expiratory volume in one second (FEV<sub>1</sub>) can be used to assess the severity of airflow obstruction but other factors such as the patient's exercise capacity, the frequency of exacerbations, the degree of breathlessness (using the MRC scale), the transfer factor (T<sub>L</sub>CO), body mass index (BMI), partial pressure of oxygen in arterial blood (PaO<sub>2</sub>) and the presence of cor pulmonale must be considered to give a better picture of the severity of disease [5].

Many patients with COPD lose weight and there has been considerable interest in the consequences of this, particularly as to whether it is an independent predictor of outcome or whether it is simply a feature of end-stage COPD [6–8]. Body mass can be divided into fat mass and fat-free mass (FFM) and it is the loss of FFM, which includes skeletal muscle, which appears to be most relevant to prognosis [9]. Loss of FFM is an independent predictor of outcome in patients with mild to moderate COPD and is thus not just a consequence of advanced disease [10].

Current national and international guidelines acknowledge the need to consider factors such

as breathlessness and nutritional status when assessing disease severity, but recognize the difficulty of assessing all of these factors in practice. The NICE guideline classifies the severity of *airflow obstruction* into mild, moderate and severe on the basis of the reduction in FEV<sub>1</sub> [5]. The guideline points out that spirometry alone may underestimate the impact of the disease in some patients and overestimate it in others. It also recommends assessment of other prognostic factors, but in the absence of an easily applied multi-dimensional tool it does not attempt to define disease severity.

The GOLD initiative uses FEV<sub>1</sub> to categorize the severity of COPD in a scheme which it describes as “a pragmatic approach aimed at practical implementation” which “should only be regarded as an educational tool, and a very general indication of the approach to management” [11]. In addition to the three categories in the NICE guideline, GOLD includes a Stage 1 category of mild COPD which is defined as a reduced FEV<sub>1</sub>/forced vital capacity (FVC) ratio with FEV<sub>1</sub>  $\geq$ 80% predicted. Stages 2, 3 & 4 are equivalent to the NICE stages ‘mild’, ‘moderate’ and ‘severe’, but in GOLD are named ‘moderate’, ‘severe’ and ‘very severe’. GOLD also includes a Stage 0 “at risk group” with chronic symptoms but normal lung function.

A multidimensional index which incorporates FEV<sub>1</sub>, MRC breathlessness scale, six-minute walking distance and BMI has recently been published [12]. A similar index combining FEV<sub>1</sub>, MRC breathlessness scale and BMI has been developed in the UK [13]. Such indices perform better than severity assessments based purely on FEV<sub>1</sub> as judged by prediction of survival and correlation with health-related quality of life [14].

The study by Steuten et al. [15] in this issue of the Primary Care Respiratory Journal further emphasizes the importance of a multi-dimensional assessment of COPD severity. The authors examined the frequency with which patients in the community had a high MRC breathlessness score, an abnormally high or low BMI, or a low FFM index, when stratified by GOLD stages. They found that a significant proportion of patients with GOLD stage 1 and 2 disease experience significant dyspnoea, are obese or underweight, or have a low FFM index.

Assessing the severity of disease using known prognostic factors combined in these scoring systems is undoubtedly a step forward and is particularly useful for characterizing populations and predicting outcomes. However, it is also

important to remember that the ‘severity of illness’ matters just as much to patients as the ‘severity of disease’, and that management should be focused around patients’ needs, as well as being targeted according to disease severity.

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