

## Diagnosis of Asthma in Adults

### Introduction

Asthma is a common respiratory condition which often proves difficult to diagnose. In the UK, roughly one quarter of adults (aged from 20-44 yrs) suffer from wheeze, 15% have wheeze and breathlessness, with roughly 7% having doctor-diagnosed asthma.<sup>1</sup> The diagnosis of asthma requires clinicians to be aware of the common risk factors, to elicit symptoms, and to use appropriate assessment tools. There is no single gold standard test or investigation for diagnosing asthma.

### Defining Asthma

All definitions of asthma mention the presence of wheeze, breathlessness, chest tightness, and cough. Usually more than one of these is present together with variable airflow obstruction, though symptoms can be variable. More recent descriptions of asthma would also involve the presence of airway hyper-responsiveness and airway inflammation.

### Finding patients

Factors which increase the likelihood of asthma include co-existing atopic conditions such as eczema and allergic rhinitis, and a family history of atopy (in particular a parent or sibling with asthma). There should be a history of variable symptoms, especially where any wheeze, breathlessness, chest tightness or cough is worse in the morning or is triggered by environmental or occupational exposure. Cold air and exercise may also cause symptoms.

Finding wheeze on auscultation, variable peak expiratory flow (PEF) readings, an obstructive FEV<sub>1</sub>/FVC ratio on spirometry (FEV<sub>1</sub>/FVC ratio < 0.73), or a raised serum eosinophil count, are also strong diagnostic pointers.<sup>2</sup> Although not diagnostic, the presence of airways obstruction is a key finding; asthma is one cause of airway obstruction, though lack of obstruction on a single reading does not exclude asthma.<sup>3</sup>

### Occupation and asthma

Some patients with existing asthma will find that they come across triggers at work. In addition, there is the important and separate condition of true occupational asthma, where

exposure to an inhaled sensitiser causes an individual to develop asthma. It has been estimated that one in eight adults with a new diagnosis of asthma has an occupational cause. The importance of this diagnosis cannot be overstressed, since the patient's prognosis may be influenced significantly by stopping exposure to the causative agent. Primary care is ideally placed to identify such patients,<sup>4</sup> and a separate PCRS-UK opinion sheet provides more detail on this subject.<sup>5</sup>

The most frequently-reported agents include isocyanates, flour and grain dust, colophony and fluxes, latex, animals, aldehydes and wood dust. The risk of developing occupational asthma is highest in the year after onset of occupational rhinitis.<sup>6</sup>

### Differential Diagnosis

Possible differential diagnoses can be divided into those conditions where airways obstruction is present and those where it is absent. Factors such as symptom pattern, age, smoking status, occupational and family history and other associated symptoms will help to differentiate these conditions from asthma.

#### Airways Obstruction Absent

Causes of chronic cough,  
Hyperventilation/dysfunctional breathing  
Rhinitis (allergic or otherwise),  
Gastro-oesophageal reflux  
Vocal cord dysfunction,  
Heart Failure  
Fibrotic Lung Disease

#### Airways Obstruction Present

COPD,  
Bronchiectasis,  
Inhaled Foreign Body  
Large Airways Stenosis,  
Lung Cancer,  
Sarcoidosis  
Obstructive Bronchiolitis.

A key factor in differentiating asthma from other obstructive lung diseases is the presence or absence of reversibility. In asthma, obstruction is reversed by bronchodilators or corticosteroids, as described in Fig 2.

### Making a Diagnosis

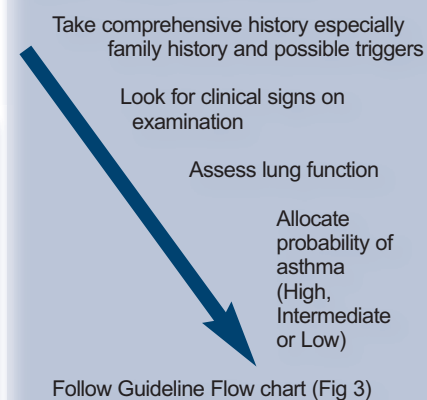
Because the diagnosis of asthma is a clinical

one, all aspects of history, examination, investigation, and treatment trials can, and should, be used when assessing patients. The presence or absence of key features in the history and examination, together with lung function assessment, allows clinicians to categorise patients into three different levels diagnostic likelihood. These are;

- High Probability
  - Key features in history and examination and abnormal lung function
- Intermediate Probability
  - Some features in history and examination, inconclusive lung function
- Low Probability
  - No features in history and examination, other diagnosis likely

The diagnostic process might be described as follows;

Figure 1 : Diagnostic Process



### Lung Function

Airways obstruction in asthma is (by definition) variable and reversible, and can commonly be measured in primary care using two methods – PEF monitoring and spirometry. It is quite clear from the current UK guideline that each has a part to play, which can be summarised as follows.

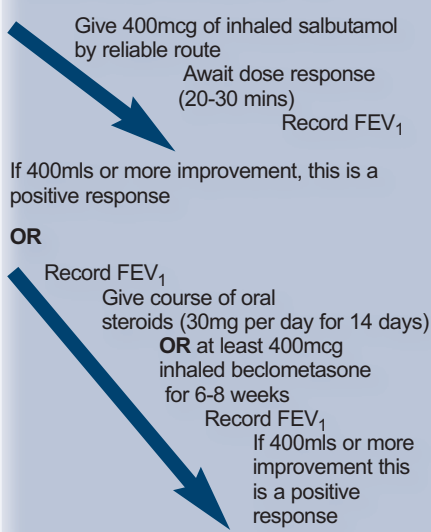
### FEV<sub>1</sub>/FVC ratio

Spirometric measurement of the FEV<sub>1</sub>/FVC ratio by a trained operator is an accurate and reproducible test. Patients with a ratio of

<0.7 have airways obstruction. A patient with asthma may, however, have a normal ratio, especially when asymptomatic. When this occurs, other methods of assessment may be needed, such as serial lung function measurement.

Where obstruction is found, patients should be tested again following the administration of an effective dose of inhaled bronchodilator, or a trial of inhaled/oral corticosteroids. An improvement of 400mls in FEV<sub>1</sub><sup>7</sup> is strongly suggestive of asthma. It should be noted that such an improvement will not be possible in some people, particularly older or shorter patients. A PCRS-UK Spirometry opinion sheet is available.<sup>7</sup>

**Figure 2: Reversibility testing in patients whose FEV<sub>1</sub>/FVC Ratio is < 0.7**



### Peak Expiratory Flow

PEF is a useful tool for demonstrating variability of airflow obstruction. It is portable, inexpensive, and can be assessed easily and recorded by the patient. Its role in monitoring established asthma is well recognised.

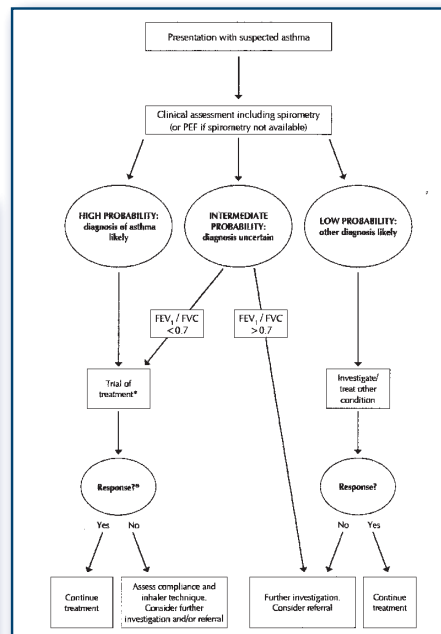
Due to concerns regarding individual device accuracy and variability, confirming reversibility is best done using FEV<sub>1</sub>. This can only be achieved, of course, when obstruction is already present on initial spirometry. Where obstruction is not present, and in patients with symptoms and signs suggesting asthma, the value of serial PEF measurement as a tool for identifying 'high probability' patients is recognised in the most recent UK guideline. In normal controls, the upper limit for PEF variability is 20%; anything greater increases the probability of asthma.

### Treatment trials and investigations

Having established the level of probability of asthma, it should be possible to define a series of appropriate interventions as follows (see

PCRS-UK Quick Guide for further detailed advice on the diagnosis of asthma based on BTS/SIGN Guideline for the Management of Asthma, and also PCRS-UK nurse materials including Patient Group Direction (PGD) for reversibility testing,<sup>8</sup> Protocol for the use of spirometry in primary care,<sup>9</sup> and the spirometry opinion sheet.<sup>3</sup>

**Fig 3: Assessing Probability of Asthma<sup>2</sup>**



### Reasons for referral

It is important to emphasise that an unexpectedly poor response to a trial of treatment (even in a patient where there is a high diagnostic probability of asthma) should result in reassessment of both the patient and their condition.

Particular reasons for onward referral are as follows;

- Diagnosis unclear.
- Unexpected clinical findings (i.e. crackles, clubbing, cyanosis, cardiac disease).
- Unexplained restrictive spirometry.
- Suspected occupational asthma.
- Persistent non-variable breathlessness.
- Monophonic wheeze or stridor.
- Prominent systemic features (myalgia, fever, weight loss).
- Chronic sputum production.
- CXR shadowing.
- Marked blood eosinophilia (>1x10<sup>9</sup>/l)
- Poor response to asthma treatment.
- Severe asthma exacerbation.

### Advanced Diagnostic Tools

Where the diagnosis of asthma remains unclear, there is a role for more advanced investigation. In particular, those patients with

an intermediate probability of asthma and who have normal lung function may require additional investigation. It is important to consider referral in this group, since a diagnosis of asthma usually results in lifelong treatment and may have a significant social and occupational impact for the individual. Currently available and useful advanced diagnostic techniques include the assessment of airway hyper-responsiveness using a bronchoconstrictor challenge (often methacholine), and tests of eosinophilic airways inflammation using exhaled nitric oxide (eNO) or sputum eosinophilia.

These tests may have the additional advantage of predicting those patients who are likely to have a good response to inhaled corticosteroids.

### Conclusion

There is no single, simple diagnostic pathway for adults with suspected asthma. Rating the likelihood of asthma using a three section probability scale helps clinicians to seek confirmation of their clinical findings with both lung function testing and treatment trials. Where diagnostic doubt remains, patients should be referred for further specialised investigation before confining them to an inaccurate diagnosis and a lifetime of (potentially) ineffective treatment.

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