

Is spirometry essential in diagnosing asthma?

No

'I'm commonly consulted by children, whose parents report they were "coughing and wheezing all night". These kids often appear well and their lung function may be normal.'

Asthma is a chronic respiratory disease characterised by fluctuating respiratory symptoms and reversible airflow obstruction.^{1,2} Confirmation of the diagnosis hinges on demonstrating airflow obstruction varying over time. Patients with undiagnosed asthma who consult repeatedly with symptoms ranging in severity³ may demonstrate perfectly normal spirometry.

As there is no single 'gold standard' test, clinical asthma diagnosis is based on evidence of recurrent respiratory symptoms; reversibility with anti-asthma treatment; and variable airflow obstruction. Demonstrating any, or all three, of these features in a clinical setting is challenging: the disease fluctuates. The diagnosis is clear cut if spirometry in a patient with a history suggestive of asthma demonstrates airflow obstruction with reversibility. However, if the test is normal, asthma cannot be excluded.

Is spirometry the most practical test? It would be, if patients could guarantee to exhibit airflow obstruction at the time spirometry is performed; clearly they can not, and this practical and logistic issue limits the feasibility and usefulness of this investigation in every case.

Peak expiratory flow (PEF) and spirometry are both widely accepted as investigations for determining the presence of airflow obstruction.^{1,2} Because variability and reversibility are features of asthma, a normal spirogram or PEF measurement obtained in an asymptomatic patient does not exclude asthma. The challenge, then, is to obtain evidence of intermittent airflow obstruction; serial PEF diary entries offer a practical alternative to a single clinic lung function test. Although FEV1 is more reliable¹ than and preferable² to measurement of PEF (because it allows clearer identification of airflow obstruction), it is not essential for diagnosing asthma.

Quality-assured, reliable spirometry requires a well-trained, competent operator; properly maintained and calibrated equipment; and a cooperative patient able to closely reproduce results.⁴ In contrast, PEF is measured using a simple cheap meter requiring less cooperation by the patient. Reliability of PEF readings can be increased

by training and ensuring that patients have their own meter, as the readings between meters may vary.

THE IMPORTANCE OF TRAINING AND EXPERIENCE

Training and experience are required for interpreting spirometry indices. There are well-established normal values for spirometry based on ethnicity, age, sex, and height. However, airflow obstruction may be underdiagnosed in younger people and overdiagnosed in older people if absolute cut-off values of 70% rather than 'lower limits of normal (LLN)' for FEV1/FVC are used.⁵ Furthermore, normal values are much higher in children than in adults.¹ A lack of skill in interpretation of results, and availability of trained staff and equipment, limits the universal usefulness of spirometry.

For PEF, diagnosis of variable airflow obstruction requires simple arithmetic calculations. The upper 95% confidence limit of diurnal variability (diurnal variability is calculated as [(day's highest minus day's lowest)/mean of day's highest and lowest], and averaged over 1 week) from twice-daily readings is 9% in healthy adults,⁶ and 12.3% in healthy children.⁷ The presence of diurnal variability >10% for adults and >13% for children is regarded as excessive and indicative of asthma.¹ PEF is widely used in case finding⁸ and diagnosing occupational asthma.^{9,10}

Airflow obstruction in asthma is worse during the night and early morning, so lung function indices obtained during office hours may not accurately reflect variability. When spirometry is normal in people with suspected asthma, a pragmatic alternative is to provide a peak flow meter and instructions to record the best of three readings twice a day, when symptoms occur, and if appropriate, in combination with a trial of treatment. This should be followed by a review a few weeks later.

In conclusion, primary care health professionals are likely to be consulted by many people with undiagnosed asthma, and early diagnosis is essential for initiating treatment and informing patients they have (or might have) the disease. There is not always time or the availability of quality-assured spirometry; therefore, utilising home serial PEF diaries offers a practical alternative for facilitating the diagnostic process. In my view, although it may be optimal, spirometry

ADDRESS FOR CORRESPONDENCE

Mark L Levy

Harrow CCG, Kenton Bridge Medical Centre, 155-175 Kenton Road, Harrow, HA3 0YX, UK.

E-mail: mark-levy@btconnect.com

is not essential for diagnosing asthma.

Mark L Levy,

Respiratory Lead, Harrow Clinical Commissioning Group, and Freelance GP.

Provenance

Commissioned; not externally peer reviewed.

DOI: 10.3399/bjgp16X686965

REFERENCES

1. Global Initiative for Asthma. *Global strategy for asthma management and prevention* [2016 update]. GINA, 2016. <http://ginasthma.org/2016-gina-report-global-strategy-for-asthma-management-and-prevention/> [accessed 5 Aug 2016].
2. British Thoracic Society/Scottish Intercollegiate Guidelines Network. *British guideline on the management of asthma: a national clinical guideline*. 2014. <http://www.sign.ac.uk/pdf/SIGN141.pdf> [accessed 5 Aug 2016].
3. Levy M, Bell L. General practice audit of asthma in childhood. *Br Med J (Clin Res Ed)* 1984; **289(6452)**: 1115-1118.
4. Levy ML, Quanjer PH, Booker R, *et al*. Diagnostic spirometry in primary care: proposed standards for general practice compliant with American Thoracic Society and European Respiratory Society recommendations. *Prim Care Resp J* 2009; **18(3)**: 130-147.
5. Miller MR, Levy ML. Chronic obstructive pulmonary disease: missed diagnosis versus misdiagnosis. *BMJ* 2015; **351**: h3021. <http://dx.doi.org/10.1136/bmj.h3021>.
6. Reddel HK, Taylor DR, Bateman ED, *et al*. An official American Thoracic Society/European Respiratory Society statement: asthma control and exacerbations — standardizing endpoints for clinical asthma trials and clinical practice. *Am J Respir Crit Care Med* 2009; **180(1)**: 59-99.
7. Brouwer AFJ, Brand PLP. Asthma education and monitoring: what has been shown to work. *Paediatr Respir Rev* 2008; **9(3)**: 193-199.
8. Levy ML, Nicholson PJ. Occupational asthma case finding: a role for primary care. *Br J Gen Pract* 2004; **54(507)**: 731-733.
9. Fishwick D, Barber CM, Bradshaw LM, *et al*. Standards of care for occupational asthma: an update. *Thorax* 2012; **67(3)**: 278-280.
10. Nicholson PJ, Cullinan P, Burge S. Concise guidance: diagnosis, management and prevention of occupational asthma. *Clin Med (Lond)* 2012; **12(2)**: 156-159.