Buying a spirometer

What should you consider before the purchase?

Spirometry in its simplest terms is the measurement of airflow and volumes that can be exhaled from the lungs from maximum inhalation to maximum exhalation it is used to assess the efficiency of the physical properties of the respiratory tract.

Spirometry gives a good indication of what is happening in the lungs, it helps aid diagnosis of diseases and can differentiate between diseases.

When buying a spirometer make sure that the manufacturer guarantees that the equipment meets the specifications issued by the American Thoracic Society and/or the ECCS and European Respiratory Society.

Portability and battery/mains operation is useful in case the spirometer ever needs to be taken away from the surgery or moved between rooms.

There are a number of different types of spirometer available in the UK. Models are available that connect directly to a PC via a USB port while some have an inbuilt printer. Portability and battery/mains operation is useful in case the spirometer ever needs to be taken away from the surgery or moved between rooms.

Patient interaction with the spirometer is desirable and many models now feature animated incentive displays. Even though most patients with COPD are middle-aged to elderly these incentives are usually well received by adults as well as children. A 'bubblegum' or 'blow the house down' feature is great for encouraging patients who are not particularly good at forced spirometry and most enjoy the challenge.

Another useful feature particularly with smokers is an estimated lung age function. Informing a 40-year-old patient they have an estimated lung age of 75 is a powerful incentive to quit especially when they see it themselves.

The British Thoracic Society issue guidelines on how to perform spirometery correctly and recommend at least three blows of relaxed expiry and three blows of forced expiry. If the spirometer can provide on screen textual comments (for example, blow harder, slow start, abrupt end) on the quality of each blow this saves time, encourages the patient and avoids measurement errors.

Most spirometers measure flow rate using the Fleisch-type pneumotachograph or use a small turbine to count the number of revolutions per unit of time. The number of rotations is proportional

General practitioners
Practice nurses
Hospital Respiratory Laboratories
Occupational health nurses
Health/fitness personnel
Pharmaceutical companies
Specialist units, for example, cystic fibrosis units, lung transplant units

●Professions who would use spirometers.

- Detects early lung dysfunction
- Aids diagnosis
- Predicts future mortality / morbidity
- Provides evidence of disease progression
- Monitors response to treatment, course of a chest infection
- Monitors the effects of environmental conditions
- PEFR may underestimate the degree of airways obstruction, and cannot differentiate between obstructive/restrictive disorders

●Objectives of spirometry.

VITAL CAPACITY (VC) - Volume of air expired from the lungs from maximal inspiration using a slow/relaxed manoeuvre.
FORCED VITAL CAPACITY (FVC) - Volume of air that can be forcibly expelled from the lungs from a position of maximal inspiration.
FORCED EXPIRATORY VOLUME IN THE 1ST SECOND (FEV1) - Volume of air forcibly expelled in the first second - following a maximal inspiration
FEV1/FVC RATIO - This is the FEV1 expressed as a percentage of the FVC
FEV1/FVC x 100= FEV1%
Spirometry indicates the presence of an abnormality if any of the following are recorded:

- FEV1 <80% predicted normal
- FVC <80% predicted normal
- FEV1/FVC ratio <0.7

●Indices measured.

to the volume of air passed through the transducer and the frequency of rotation is proportional to the flow rate. The spirometer should be capable of measuring very low flow rates in patients with severe COPD.

The latest generation of digital compact spirometers is clinically proven to be very stable and do not require regular or daily calibration. Unlike older devices they are less susceptible to temperature, humidity and altitude and are subsequently much more accurate.

It is still good practice to check their accuracy using a 3litre calibration syringe every year. Most manufacturers allow the user to do this after purchasing a suitable 3litre syringe and testing via the spirometers built in calibration check software. Laboriously testing and calibrating spirometers every day is now unnecessary.

Spirometry is all about numbers but visual volume and time graphs on a screen with predicted values based on a patient's height, sex, weight and ethnicity help explain results to the patient. If the spirometer has the ability to show reversibility testing this is also useful.

The latest models of spirometers should be able to automatically calculate and display the indices (illustrated) and will calculate the percentage of the predicted normal values because they have reference data already programmed into them.

Some manufacturers now offer 'link' software which will automatically download this data directly to a patient record in popular clinical management systems which can be a great timesaver. As there are a number of QOF points available for the diagnosis and ongoing management of COPD a feature like this means errors associated with manual entry can be avoided.■

Reference

British Thoracic Society **www.brit-thoracic.org.uk/**

For information contact P.M.S(Instruments)Ltd call 01628 773233 or visit **www.PMSinstruments.co.uk**

●Incentive displays encourage patients of all ages.