Correspondence

Reproducibility of the flow-volume loop

Sir,—We read with interest the paper by Macdonald and Cole in your January issue¹ and congratulate the authors on an important piece of work. There is, however, a vital aspect of reproducibility of respiratory measurements which was not mentioned. This is the ability or otherwise of the instrument to produce a consistent reading. Although most differentiating spirometers produce good results for volume-based measurements such as forced vital capacity, their precision at specific flows is not usually so good. This can mean that the ability of a subject to reproduce a given flow measurement appears less good than it actually is.

We recently developed a flow-volume calibration procedure² which has subsequently been used to assess a wide range of respiratory measuring instruments for both accuracy and precision. Although we cannot comment on the performance of the particular instrument used by the authors, our experience of calibrating another very similar instrument (Ohio

type 842) may be relevant. The table shows the ability of our spirometer to reproduce selected peak flows. The calibrated flow to the spirometer is reproducible to a precision of better than 0.28% by the calibrator. Each flow was reproduced 30 times. The table shows that even if the patient produced exactly the same flow profile every time there would be a significant scatter of results. This is particularly noticeable at low flows. Essentially instrumentation limitations can have a significant effect on the signal-to-noise ratios used by the authors.

We think it is absolutely vital to separate scatter caused by limitations of the measuring instrument from scatter caused by the effort dependence of respiratory manoeuvres. This can only be done by proper assessment of the respiratory measuring instrument.

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Table Scatter of results caused by the limitations of our spirometer

Calibrated flow	±2SD of error
2.00 l s ⁻¹	±10.3%
4.00 l s ⁻¹	±4.2%
6.00 l s ⁻¹	±3.8%
8.00 l s ⁻¹	±3.5%
10.00 l s ⁻¹	±3.5%

References

- 1 Macdonald JB, Cole TJ. The flow-volume loop: reproducibility of air and helium-based tests in normal subjects. *Thorax* 1980; 35:64-9.
- 2 Shaw A, Fisher J, Hughes DW. A flow and volume calibrator for respiratory measuring equipment. *J Med Eng Technol* 1979; 3:248-52.