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LETTER TO THE EDITOR

Recommendations on repeatability of spirometry

*Monica Fletcher[a]
Chris Loveridge[b]

[a] Chief Executive, Education for Health, Warwick, UK
[b] Clinical Lead for Spirometry Training, Education for Health, Warwick, UK

*Correspondence:
E-mail: M.Fletcher@educationforhealth.org

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Dear Sir,

Since the publication of your excellent position paper on spirometry,[1] which is endorsed by our organisation, we have been approached by students asking why our training is not in line with the paper's recommendations on the issue of repeatability.

We now feel compelled to write to you to challenge what you and your co-authors have recommended. It is our experience that, with good, basic training, repeatability of less than 100ml is attainable; therefore we feel that a level of 150 ml is set too high, which potentially compromises patient care.[2] Indeed, 100ml remains the standard of the Association for Respiratory Technology and Physiology (ARTP) and British Thoracic Society (BTS),[3] and interestingly, was also the original ERS standard.[4] The ARTP is the lead professional body for lung function in Europe; we are proud to have our spirometry courses accredited with them and the BTS, and as such, our training standards are based on their recommendations for repeatability criteria.

We believe that repeatability of 100ml or below is both a realistic and achievable target. We challenge that most competent users can get repeatability (although not strictly reproducibility) down to as low as 50ml. We feel that 150ml is too 'soft' a standard, widespread adoption of which may encourage manufacturers to accept less stringent levels of accuracy for their equipment.

Consensus and popularity should not be the basis for a scientific standard. The evidence is what counts and the scientific data supporting a 100ml criterion for repeatability is on the ARTP website under "Quality Assurance". We know that the 100ml is achievable and represents the safest and most appropriate standard and we do not believe we should compromise on this.

This is a real shame. Most of the other standards for primary care spirometry in your paper are set at the correct level, but, on this one issue, you have set the standard too low. We are concerned that this is because of the international readership of the Journal, but should we not, in this case, be setting the highest achievable standard for the rest of the world to aspire to?

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Authors' reply

We thank Fletcher and Loveridge for their interest[1] in our paper.[2]

Criteria for the repeatability of FEV_1 and FVC have indeed varied in different recommendations. This is mostly due to the fact that gradually more studies became available that permitted recommendations to be made on published evidence. We have looked at the ARTP recommendation to which Ms Fletcher and Ms Loveridge refer, and could not find that it defined a 100 ml repeatability limit for FEV_1 and FVC; instead it lists coefficients of variation (CoV). The CoV assumes that differences between the two best values are proportional to the best value. There is no published evidence that the CoV is the same for small and large values of FEV_1 and FVC. On the contrary, the amount of variance was always higher for repeatability expressed as a percentage than in absolute terms; when variability was expressed in ml, those with low lung function showed slightly less variability.[3,4] Ninety percent of patients could match their highest FEV_1 within 120 ml, and within 150 ml for FVC.[3] Bellia *et al*.[5] found that the difference between the two best values of FVC was < 150 ml in 86% of the elderly, and that 94% reproduced the highest FEV_1 within 150 ml.[6]

The 1993 ECCS/ERS report[7] never recommended a fixed 100 ml cut-off; instead, it recommended that the largest FEV_1 and FVC should not exceed the next largest one by more than 5% or 100 ml, whichever was the greatest. This is a far more lenient standard than the present 150 ml repeatability criterion: in people who produce an FVC of 6 litres, it would imply that a repeatability of 300 ml would be acceptable. This more lenient criterion could not be met by 9.5% of subjects in a normal population.[8] As the variability is not proportional to the largest value, dropping the percentage criterion is a step forward. Based on the results alluded to above, obtained with highly trained personnel and strict quality control, it would seem that the limits of repeatability are not 'too soft'. Given the above evidence, the 150 ml criterion for FEV_1 may be slightly too high.

The repeatability criterion is meant to push operators towards obtaining the best possible values from subjects. Making the acceptable limit too narrow might mean a subject tires or loses interest in trying to achieve three blows with such a tight constraint. The proportion of subjects able to achieve 100 ml repeatability is likely to be much lower than the 85% or more who are able to satisfy the 150 ml criterion.The above limits should not be confused with the average within-individual repeatability. Indeed, about 90% of subjects can produce repeatable FEV_1s and FVCs well within those limits. The average difference between the largest and second largest FEV_1 is about 50-65 ml, and for FVC about 75 ml.[2-6]

The results of subjects who fail to meet the ATS/ERS criteria should not be discarded and should not be looked upon as a failure for the subject; they are valid results for that individual and important clinical decisions can be made from the data.

The recommended scientific standards in our document[2] are based on published evidence and have nothing to do with consensus and popularity. We look forward to viewing any evidence stating that 100 ml 'is both a realistic and achievable standard'.

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Philip H Quanjer[a], Mark L Levy[b], Steve Holmes[c], Iain Small[d]

[a] Professor Emeritus of Physiology, Department of Pulmonary Diseases and Sophia Children's Hospital, Erasmus Medical Centre, Erasmus University, Rotterdam, The Netherlands

[b] Senior Clinical Research Fellow, Allergy and Respiratory Research Group, Division of Community Health Sciences: GP section, University of Edinburgh, Scotland, UK; Editor-in-Chief, PCRJ

[c] General Practitioner, Cannards Grave Road, Shepton Mallet, Somerset, UK; Associate Dean (GP Medical Education) Severn Deanery, Bristol,UK; PCRS-UK Education Lead; For and on behalf of: PCRS-UK

[d] General Practitioner, Peterhead Health Centre, Links Terrace, Peterhead, Aberdeenshire, Scotland, UK; Honorary Lecturer, Centre forAcademic Primary Care, University of Aberdeen, Scotland, UK; Chair of the PCRS-UK Executive Committee; For and on behalf of: PCRS-UK

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