

Prediction equations for spirometry in South Africa

To the Editor: The South African Guideline for Office Spirometry was recently published.^[1] Its aim was to provide an updated guideline for office spirometry in South Africa (SA), thereby improving the quality, standardisation and usefulness of spirometry. The need for local prediction equations based on large, all-inclusive studies of the SA population was highlighted in this guideline. It was suggested that the European Community for Steel and Coal (ECSC) prediction equations, derived from the study of Europeans, should be used as a norm, and that the use of a correction factor for adjusting predicted values that was sometimes applied in the past be discouraged.

Following extensive correspondence with local experts, and more importantly recent publications that postdate the guideline,^[2,3] the South African Thoracic Society (SATS) would once again suggest that a correction factor should be used for adjusting predicted values – for the forced vital capacity (FVC) and forced expiratory volume in the first second (FEV₁) – for the local black population as well as people of Asian ancestry. Quanjer *et al.*^[2] recently reported the findings of the European Respiratory Society (ERS) Global Lung

Function Initiative (GLFI), 2012. This large cohort (from 33 countries) included 3 545 black and 8 255 South-East Asian individuals. The authors suggested updated algorithms for the lower limit of normal (LLN) and the z-scores, and highlighted the racial differences as well as the great need for studies from the African continent. The ERS GLFI aims to improve spirometric lung function reference values, and the most recent regression equations were published in May 2013 on their website (<http://www.lungfunction.org>).^[4]

Quanjer *et al.*'s^[2] findings confirmed previous observations that the FEV₁/FVC ratio is similar for blacks and people of Asian descent, but that both the FEV₁ and FVC are around 90% of the predicted value for Europeans. To avoid the over-diagnosis of particularly restrictive impairment, and to avoid over-investigation of healthy individuals, it is therefore suggested that the correction factor of 0.9 for these particular ethnicities be used (e.g. in a 45-year-old Asian male with a predicted FEV₁ of 3 l (according to ECSC predictions) the value would be corrected to 2.7 l (3.0 x 0.9)). The GLFI also recommended that for individuals of mixed ethnic origins, a composite equation taken as the average of the equations may be used to facilitate interpretation until a more appropriate solution is developed.^[2] A

correction factor of 0.95 is therefore suggested for individuals of mixed ethnicity.

In summary, the SATS would propose that a correction factor of 0.9 (for black and Asian individuals) and 0.95 (for individuals of mixed ethnicity) is employed when European-based equations (e.g. ECSC predictions) are used, and that the algorithm in the original SA guideline is altered accordingly (Fig. 1).

**Coenraad F N Koegelenberg
Francois Swart
Elvis M Irusen**

*Division of Pulmonology, Department of Medicine,
Stellenbosch University and Tygerberg Academic
Hospital, Cape Town, South Africa
coeniefn@sun.ac.za*

1. Koegelenberg CF, Swart F, Irusen EM. Guideline for office spirometry in adults, 2012. *S Afr Med J* 2013;103(1):52-62. [<http://dx.doi.org/10.7196/SAMJ.6197>]
2. Quanjer PH, Stanojevic S, Cole TJ, et al. Multi-ethnic reference values for spirometry for the 3 - 95-yr age range: The global lung function 2012 equations. *Eur Respir J* 2012;40(6):1324-1343. [<http://dx.doi.org/10.1183/09031936.00080312>]
3. Quanjer PH, Brazzale DJ, Boros PW, Pretto JJ. Implications of adopting the Global Lungs 2012 all-age reference equations for spirometry. *Eur Respir J* 2013 Mar 21. [Epub ahead of print] [<http://dx.doi.org/10.1183/09031936.00195512>]
4. European Respiratory Society. Implementing GLI 2012 lung function regression equations. <http://www.lungfunction.org/files/ImplementingGLIequations-3May2013.pdf> (accessed 26 June 2013).

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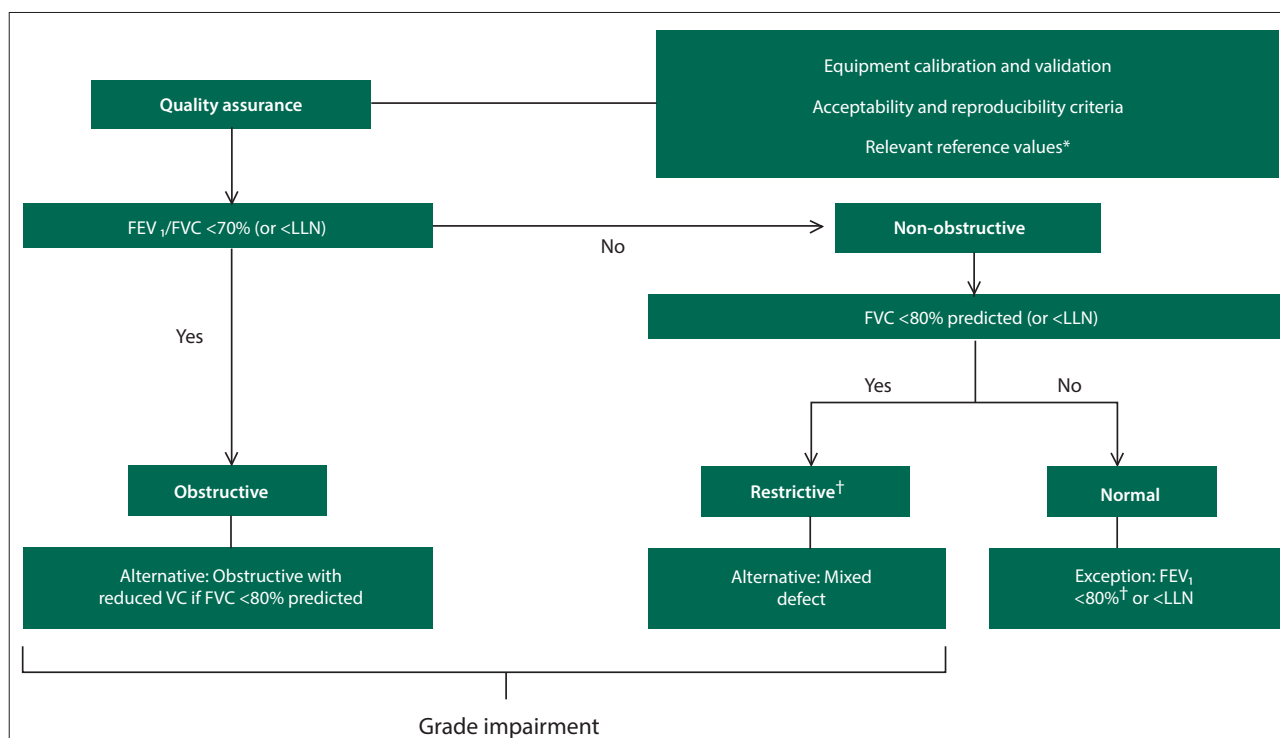


Fig. 1. A revised algorithm for the categorisation of spirometry. FEV₁ = forced expiratory volume in first second; FVC = forced vital capacity; LLN = lower limit of normal (*Consider correction factor for race: 0.90 for black or Asian individuals or 0.95 for individuals of mixed ethnicity. †Consider normal if >80% after correction for race, particularly in the absence of signs or symptoms suggestive of pulmonary disease).