efficient segregation based on molecular typing of *Pseudomonas aeruginosa* would seem to be the only appropriate management strategy for our cystic fibrosis patients.

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References


From the authors:

D.W. Reid and colleagues state that there is anecdotal evidence that the host inflammatory response at the time of acquisition may be what determines subsequent outcome, and propose that the results of our own study may be influenced by a survivor effect. However, unlike the clinical situation of a rapid deterioration and death sometimes seen among a proportion of cystic fibrosis (CF) patients who develop infection with transmissible strains of *Burkholderia cenocepacia*, we have not observed a similar rapid decline in the patients who have recently become infected by a transmissible *Pseudomonas aeruginosa*. D.W. Reid and colleagues also reflected on the experience of Armstrong et al. [1]. However, there are likely to be differences between our own experience and that of Armstrong et al. [1]. Firstly, ours is an adult CF centre, whilst the report of Armstrong et al. [1] concerns paediatric CF patients. Secondly, the vast majority of our patients were infected with sporadic *P. aeruginosa* strains before acquiring a transmissible strain; it is likely that the CF patients in the report by Armstrong et al. [1] were all previously *P. aeruginosa* naïve before developing infection with their clonal strain. Finally, it is possible that individual transmissible *P. aeruginosa* strains may differ in their pathogenicity.

It is clear that prospective studies of the clinical outcome for cystic fibrosis patients who harbour transmissible strains of *Pseudomonas aeruginosa* are needed before we can reach any firm conclusions of the clinical effects of *Pseudomonas aeruginosa* cross-infection in cystic fibrosis. We firmly agree with D.W. Reid and colleagues that until there is evidence to the contrary, cross-infection control measures should include segregation based upon the results of molecular fingerprint typing of isolates.

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References


**The use of computer-animation programs during spirometry in preschool children**

To the Editor:

We read with interest the paper by Gracchi et al. [1] describing the use of computer-animation programs as a device to improve reproducibility in acquiring forced expiratory manoeuvres in 4–8-yr-olds. The study was simple and well designed but the possibility both that the computer-animation programs were not used to their full potential and that the European Respiratory Society “adult” reproducibility criteria are too strict for preschool children must be raised [2, 3].

While we agree that the use of computer-animation incentive programs offers little advantage in the 6–8-yr-old group, younger children cannot always understand, process and carry out multistep tasks. In such children, using a combination of the computer-animation programs will allow the production of a prolonged forceful expiration to be broken down into smaller steps. We find starting with the candles, to achieve maximal peak flow, and then progressing to the balloons or bowling alley games (prolonging the forced expiration) with individualised target modification provides maximum encouragement for each child according to their ability and lung function.

Individualised target modification is necessary as the animations are preset at a target of 120% predicted for both peak expiratory flow and forced vital capacity, a target that is only appropriate if based on suitable reference data for that age group. Any underestimation of predicted values (which, given the paucity of data from healthy 4–8-yr-olds, is quite likely to occur) will mean that the child reaches the animation target before they have truly reached their maximum, thereby losing the incentive to try any harder as they will not be able to see any improvement in their performance. Likewise, on some occasions it may be appropriate to reduce the target % initially in order to encourage the younger children or those with poor coordination to aim for a target that is achievable, thereby encouraging them to try harder next time, and to prevent them giving up.

When comparing the proportion of children in the study by Gracchi et al. [1] who were able to achieve certain reproducibility criteria under the different measurement conditions it is important to note the following: 1) none of the observed differences were significant; 2) most of the children produced forced expiratory parameters within <0.1 L, rather than within 5% of each other, the former equating to a
reproducibility of between 6–10% in most cases; and 3) small numbers in some subgroups meant that an 8.3% difference in "success rate" equates to a difference in performance of a single child.

In conclusion, while we agree that when using the protocol described in this study there is minimal evidence of improved reproducibility, we believe that there is a role in the younger age group for these computer animation incentive programs provided they are used to their full capabilities. We therefore suggest that, before the use of such incentives is dismissed out of hand, further work should be undertaken to clarify these issues, having first ascertained appropriate quality control criteria for spirometry in very young children. Guidelines regarding the latter are currently being developed by an American Thoracic Society/European Respiratory Society Task Force as part of an initiative on lung function testing in preschool children.

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References

From the authors:

We thank W. Kozlowska and colleagues for their worthy comments to our paper on the use of computer animation programs. We concluded that the use of incentives can be helpful in training young infants how to blow and how to perform a flow/volume manoeuvre. However, we were not able to prove that the routine use of these programs is helpful in the improvement of reproducibility and maximal effort [1]. We agree that the use of a tailor-made combination of different programs might improve the performance of young children, provided the use of envelop flow/volume curves. Thus, nonroutine use of incentives should be further investigated and the use of envelop curves for young children should be standardised in the American Thoracic Society/European Respiratory Society (ATS/ERS) guidelines.

In our study we used the reference values of Zapletal et al. [2] and the animation target was achieved at 120% of the predicted value of peak expiratory flow (PEF) and forced vital capacity (FVC). These reference values are indeed back-extrapolations from older children, which might result in underestimation for several lung function parameters in younger children. Comparison of back-extrapolated values with actual values in younger children from the same authors reveals that overestimation is especially a problem for forced expiratory volume in one second (FEV1), but not for FVC [3]. Extrapolated PEF values are even higher compared to the actual values in younger children. Back-extrapolated predicted values for FEV1 (L), FVC (L) and PEF (L/s) in a 100 cm male are 0.76, 0.89 and 2.05, respectively [2], while actual values are 0.85, 0.88 and 2.02, respectively [3]. So, we do not think that the use of back-extrapolated values in our study resulted in underestimation. Whether an eventual raise in animation target to 130 or 140% will result in higher values should be studied.

We agree with W. Kozlowska and colleagues that the reproducibility results largely depend on the criteria which are chosen. For this reason we did not study only the 5% and 100 mL criteria as recommended by the ATS/ERS but also a 7% and 10% criterion. Both using these latter criteria and the coefficient of variation (in table 2) the use of incentives did not result in better reproducibility.

With Kozlowska and colleagues we think that incentives should not be dismissed from the lung function lab for young children, but we plead for a well-considered (nonroutine) use and uniform guidelines. We are happy that the American Thoracic Society/European Respiratory Society Task Force has initiated their development.

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