Table 9: Regression equation using FEV_1 as dependent variable and respectively $FEV_{0.75}$ and $FEV_{0.5}$ as predictive

Parameter	β	CI 95%	a	CI 95%	R^2
$FEV_{0.75}$	1.06	(+1.04; +1.08)	-0.01	(-0.02; +0.02)	0.950
$FEV_{0.5}$	1.17	(+1.13; +1.21)	0.04	(+0.01; +0.08)	0.870

R^2 = determination coefficient (proportion of explained variance);
a = intercept or constant and β = regression coefficient;
$FEV_{0.75}$ = forced expiratory volume in 3/4 of a second;
$FEV_{0.5}$ = forced expiratory volume in half a second.

ducted on infants[25,26] suggest that flows have a better discriminative power versus symptoms than timed volumes can have. In young children FEVt (particularly FEV0.75 and FEV0.5) are certainly easier to achieve than forced expiratory flows are, furthermore these also have a higher repeatability.

Symptomatic subjects have a more elevated occurrence of functional alterations when compared to asymptomatic ones, nevertheless the test's sensitivity here is far from optimal. In fact, as normally to be expected in the young, children are usually defined as symptomatic on the basis of symptoms in the last 12 months reported by parents in the questionnaires. Hence, measurements often occur in a symptom-free period[13,34,35].

The 95% specificity, for asymptomatic children, is expected by definition using regression methods to calculate reference values. MEF75 and, secondarily, FEV1, versus symptoms, seems to be the parameter with the best sensitivity/specificity combination and the best discriminating ability; the FEV0.75 or the FEV0.5 should be considered to be adequate to be used when FEV1 was not obtained or its validity is under discussion (e.g. because of a too short expiratory time). To confirm the previous sentence it would be necessary to show that, particularly for this age group, the forced volumes expired in a time of shorter than 1 second is able to discriminate between healthy and diseased equally, or even better, than FEV1 is able to do: nevertheless this issue can be better resolved in a well designed case-reference or longitudinal cohort study but this is beyond the scope of the current study design.

The physiological implications of the different timed forced expiratory are as yet not well understood. Similarly to other studies on pulmonary flows in young children we observed that the FEV1 is rarely obtainable and, when retrieved, it is somewhat identical to the FVC. Our results showed that the FEV1, when absent or not reliable, could be estimated from $FEV_{0.75}$ applying the corrections emerged (see Table 6). The corrected $FEV_{0.75}$ could be considered a reliable proxy of the FEV1 to be used in those epidemiological studies in which emerge the need to compare flux parameters results in different age strata.

In conclusion, reproducible spirometry can be obtained in the majority of young children aged between 3 and 6 years old. Performing spirometry and using all measurable parameters in this age group has the potential to improve the assessment and the management of pulmonary diseases. In particular the forced expiratory volumes in less than 1 second may provide useful clinical information. It is recommended that such parameters should be collected in young children performing spirometry and further studied for their physiological and clinical significance.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

All of the authors have participated sufficiently in the work to take public responsibility for the whole content of it; in particular the following made substantial contributions to the intellectual content as described below:

PP contributed substantially for the conception and design and the drafting of the manuscript; AB contributed for the critical revision of the manuscript and for important intellectual content; MPF contributed to the drafting of the manuscript; EM contributed in the analysis and interpretation of data; CC contributed to the acquisition of data, technical, and material support; EB contributed to the acquisition of data, technical, and material support; SF contributed to the acquisition of data, technical, and material support; GC contributed to the acquisition of data, technical, and material support; WA contributed obtaining funding, technical, and material support and MB contributed substantially for obtaining funding, the supervision and the critical revision of the manuscript, for important intellectual content

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