Editorial Comment

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The Six-Minute Stepper Test: Solvitur ambulando

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Pulmonary rehabilitation has a well-established role in the management of chronic obstructive pulmonary disease (COPD) by improving exercise performance, health-related quality of life and upper extremity performance, relieving dyspnea and anxiety, and reducing health care utilization [1–3]. It also seems to have beneficiary effects in other chronic lung diseases [e.g. sarcoidosis, idiopathic pulmonary fibrosis, cystic fibrosis (CF) and non-CF bronchiectasis]. It is important to explore additional outcome parameters in order to validate the effect of pulmonary rehabilitation. From a clinical standpoint, this surfaces the major issue of the minimal clinically important difference (MCID), which is the smallest change in treatment outcomes that is identifiable by the patient. Establishing the MCID needs special attention. A low MCID value can lead to overestimation of the treatment effect (type I error, false positive), while on the other side a high MCID value can lead to underestimation (type II error, false negative). Furthermore, from a statistical standpoint, there is no single universally accepted methodology to determine the MCID. Several methodological approaches have been reported in calculating the MCID that mainly fall into two categories, the anchor-based and the distribution-based method [4].

In the latest issue of *Respiration*, Pichon et al. [5] address both of these issues, exploring the importance of the six-minute stepper test (6MST), a relatively new outcome measure, and also trying to determine its MCID. Their study included 62 COPD patients who were prospectively enrolled in a pulmonary rehabilitation program of 3 weeks' duration. The primary end point was the difference in number of steps during the 6MST before and after the rehabilitation program. Secondary end points included the difference in the six-minute walk distance (6MWD), pulse oximetry, heart rate, dyspnea level (according to the modified Medical Research Council scale) and leg discomfort. The 6MST actually simulates the effect of climbing stairs, and there is no standardized method to perform it. In the study by Pichon et al. [5], the test was performed according to a previous study by Borel et al. [6]. The height of the stepper was set at 20 cm. After completion of the rehabilitation program, there was an increase in both the number of steps in the 6MST (11.3%) and the distance covered during the 6MWT (7.5%), with the difference between the two tests not being statistically significant ($p = 0.11$). Also, there was a strong correlation between the total number of steps during the 6MST and the distance covered during the 6MWT both before ($r = 0.71$, $p < 0.0001$) and after ($r = 0.65$, $p < 0.0001$) the rehabilitation program. However, it is noteworthy that the changes observed in the 6MST and the 6MWT exhibited weak correlation ($r = 0.26$, $p = 0.04$). In another retrospective study in COPD patients by Grosbois et al. [7], the correlation between the 6MST and the 6MWT was also modest ($r = 0.34$, $p = 0.03$). Regarding the MCID, the use of the anchor-based method failed to determine its value.

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Thus, the MCID was determined solely by using the distribution-based method and was calculated to be around 20 steps, regardless of sex or COPD severity. Given the fact that there was no strong correlation between the 6MST and the 6MWT, the actual value of this finding is limited. Nevertheless, it provides a first effort in trying to define the MCID in a relatively new and promising test that has certain advantages and deserves further investigation.

Strengths of the study are its prospective character and well-characterized, large cohort of patients. The duration of the pulmonary rehabilitation program (3 weeks) was shorter in comparison to the American Thoracic Society/European Respiratory Society (ATS/ERS) recommendations [8]. This is probably depicted by the fact that the improvement in the 6MWD was only marginally clinically significant [9]. A longer period of rehabilitation could have led to more accentuated improvements.

Under the current data, it seems that these two tests cannot be used interchangeably. Both are considered to be submaximal tests, able to reflect the functional capacity of the patients, but they are not exactly the same. The 6MST requires more energy than the 6MWT, and the latter, when used in patients, is not always a submaximal test [10, 11]. The study by Pichon et al. [5] strengthens this opinion, as the changes observed after pulmonary rehabilitation in the 6MST and the 6MWT showed only weak correlation.

However, the 6MST has been proven to be a valuable outcome parameter after pulmonary rehabilitation programs in several chronic lung diseases. In order to perform the 6MWT, the minimum length of the corridor is 30 m, according to the ATS [12]. On the other hand, the 6MST can be performed without any spatial constraints and it demonstrates sufficient sensitivity to detect improvements after pulmonary rehabilitation in several chronic lung diseases [13, 14]. Thus, it represents an attractive tool for home-based rehabilitation programs. Further prospective studies, as the one performed by Pichon et al. [5], are needed in order to further evaluate and establish the value of 6MST and determine its MCID (solvitur ambulando).

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