

Physical performance measures in patients with COPD

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IMPACT PARAGRAPH

The findings presented in this thesis contribute to a more profound understanding of physical performance outcome measures in patients with chronic obstructive pulmonary disease (COPD). This impact paragraph offers a thoughtful analysis of the scientific and social implications of these findings. It does so by addressing four key questions: 1) What is the main objective of the research described in the thesis and what are the most important results and conclusions? 2) What is the (potential) contribution of the results from this research to science and social sectors? 3) To whom and why are the research results relevant? and 4) How can these target groups be involved in and informed about the research results, so that the knowledge gained can be used in the future?

Main objective, results, and conclusions

Patients with COPD frequently experience limitations in their physical performance, which have a major clinical impact on the patient's daily life. The underlying mechanisms are multifactorial and widely diverse between patients. There are effective (exercise) interventions available that are known to improve the patient's physical performance. Therefore, timely and adequate assessment of physical performance is highly relevant. The main objective of this thesis was to expand the existing knowledge on the feasibility, validity, and responsiveness of commonly used physical performance outcome measures in patients with COPD.

The first part of this thesis demonstrates that the Short physical performance battery (SPPB) is a valid and responsive outcome measure for functional performance in patients with moderate-to-severe COPD following a pulmonary rehabilitation (PR) program. Furthermore, the performance of all three SPPB subtests is advisable in current clinical practice because they provide dissimilar information about the patient's mobility and balance. The second part of this thesis confirms that patient reported outcomes (PROs) establish different disease-related aspects in patients with COPD than objective physical performance exercise tests. Therefore, PROs should be performed in complement to exercise tests to acquire the patient's perspective on the impact of COPD on their daily life in addition to the objectively assessed physical performance. Furthermore, this thesis adds to the existing evidence that a large variability in the tolerated duration of the endurance shuttle walk test is present. However, this large variability cannot be explained by other clinical measures that were assessed in this thesis. The last part of this thesis reports that three in four patients with COPD who are eligible for PR performed the volitional isokinetic quadriceps muscle endurance test correctly. A superior feasibility was

found for isometrically assessed muscle endurance. Furthermore, the isokinetic protocol is able to pick up improvements following a PR program, but this does not apply for all outcome measures of the test. Both the isometric and isokinetic protocols evaluate to a great extent similar aspects of quadriceps muscle endurance, which is not the case when using a non-volitional protocol with repetitive electrical stimulations. Therefore, these findings suggest that volitional and non-volitional outcome measures evaluate partly different aspects of quadriceps muscle endurance in patients with COPD.

Taken together, this thesis underpins the evidence that functional performance, exercise capacity, exercise tolerance, and peripheral muscle function are four distinct yet interconnected domains of physical performance. Therefore, this thesis recommends evaluating these four domains to obtain a comprehensive overview of the patient and prescribe an effective and patient-tailored (exercise) intervention.

Potential contribution to science and social sectors

Timely identification of impaired physical performance in patients with COPD is clinically relevant, as poor physical performance can result in an increased risk of hospitalization, poor quality of life, and even premature mortality. To date, several (exercise) interventions are available to counteract these limitations in physical performance. The results of this thesis demonstrate that functional performance, exercise capacity, exercise tolerance, and peripheral muscle function are four dissimilar domains of physical performance. Therefore, this thesis highlights the importance of assessing multiple, if not all, domains of physical performance in patients with COPD using valid, feasible, reliable, and responsive outcome measures. The obtained results of multiple exercise tests in combination with PROs will provide healthcare professionals with an extensive overview of the patient's physical performance and the patient's perspective on the impact of COPD on their daily life. Information regarding the severity and specific domain of the impairment can be used by healthcare professionals to prescribe a more effective (exercise) intervention. In turn, this is expected to result in greater improvements in physical performance in patients with COPD, which might eventually lead to greater improvements in quality of life, and greater reductions in mortality rate and hospital admissions.

Furthermore, chapter 7 demonstrates that volitional and non-volitional outcome measures of quadriceps muscle endurance are not related. These results raise awareness among healthcare professionals and researchers that those outcome measures should not be used interchangeably.

In addition, this thesis provides minimal important differences for the SPPB and the volitional isokinetic quadriceps muscle test. This knowledge will help healthcare professionals, clinicians, and researchers interpret the effectiveness of interventions in individuals and groups of patients with COPD following a PR program in the Netherlands.

Target group

The research results of this thesis are relevant to multiple target groups, like healthcare professionals, researchers, and patients. First, it raises awareness among healthcare professionals of the need to assess physical performance routinely and extensively in patients with COPD. Furthermore, the obtained knowledge will help healthcare professionals and researchers adequately select, perform, and interpret exercise tests. In turn, this will hopefully lead to an improved and even more patient-tailored prescription of (exercise) interventions to counteract the limitations in physical performance. Therefore, patients will indirectly benefit from the results of this thesis, as the improved screening of physical performance and even more patient-tailored prescription of exercise interventions are expected to improve their quality of life and decrease the risk of hospitalization and mortality. At last, the research results are relevant for other researchers as they provide more insight into the assessment of physical performance in patients with COPD and bring forth novel leads for future research.

Activities

Several steps have been undertaken to engage and inform the target groups of the research results with the aim that the gained knowledge is effectively used in the future. The results of this thesis have been or will be published in international, peer-reviewed journals and have been presented at national and international congresses and meetings, and within multiple PR centres. This is an effective strategy to inform other researchers and healthcare professionals about our novel findings.