Pulmonary Rehabilitation Relieves Dyspnea, but Does It Reduce Mortality?

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To borrow a phrase from Charles Dickens, for pulmonary rehabilitation this is the best of times and the worst of times. A strong scientific basis has been gathered which makes pulmonary rehabilitation arguably the most effective therapy we have to offer patients with pulmonary disease. Yet the lack of availability to the vast majority of patients lessens its impact. This is manifestly true for patients with chronic obstructive pulmonary disease (COPD), and even more so for patients with other chronic pulmonary conditions.

Pulmonary rehabilitation entered clinical practice almost 50 years ago when Tom Petty organized the first multi-disciplinary team to deliver pulmonary rehabilitation. In the 1990s, exercise scientists established the scientific basis of the exercise programs for COPD that are the core of pulmonary rehabilitation. They subsequently introduced concepts such as limb muscle dysfunction and dynamic hyperinflation. It was demonstrated that improving limb muscle function through exercise training reduces ventilatory requirements at a given level of exercise. This allows a slower breathing rate and, thereby, less dynamic hyperinflation. The result is less dyspnea. In fact, pulmonary rehabilitation reduces dyspnea on exertion and increases exercise tolerance to a greater extent than any other COPD therapy. These physiologic concepts have allowed design of adjuncts to exercise programs that have made rehabilitation even more effective.

Pulmonary rehabilitation has been promoted as standard of care by every relevant professional organization in authoritative documents. The 2017 GOLD Guidelines document concludes: “rehabilitation has been shown to be the most effective therapeutic strategy to improve shortness of breath, health status and exercise tolerance... improved functional exercise capacity and health related quality of life have been demonstrated across all grades of COPD severity...Pulmonary rehabilitation also ranks as one of the most cost-effective treatment strategies”.

It is worth trying to discern why pulmonary rehabilitation is so little used despite its unequivocal benefits. A 2013 survey (Desveaux et al., J. COPD) concludes: “the annual national capacity for pulmonary rehabilitation...consistently translated to ≤1.2% of the estimated COPD population” for the countries surveyed. In the United States, a recent Medicare database examination (Nishi et al. J Cardiopulm Rehabil,
2016) revealed that, among Medicare beneficiaries, pulmonary rehabilitation participation rate increased from 2.6% in 2003 to (only) 3.7% in 2012. As many COPD patients lack Medicare coverage, these percentages likely overestimate the participation in the overall COPD population in the United States. A 2015 American Thoracic Society/European Respiratory Society (ATS/ERS) Policy Statement (Rochester et al., Am J Respir Crit Care Med), dealing with strategies to enhance the implementation of pulmonary rehabilitation, concludes that “the ATS and ERS commit to undertake actions that will improve access to and delivery of PR services for suitable patients. They call on their members and other health professional societies, payers, patients, and patient advocacy groups to join in this commitment." But this call seems to be going largely unanswered.

In seeking to understand how uptake of pulmonary rehabilitation might be improved, it is worthwhile examining the situation with long-term oxygen therapy. The provision of oxygen therapy to qualifying patients is near mandatory because it is widely accepted that failure to provide long-term oxygen therapy to hypoxemic COPD patients is associated with substantially increased mortality. This conclusion is founded on two, relatively small, randomized clinical trials (total of about 300 patients) performed more than 35 years ago. Nevertheless, the perception that survival is enhanced by long-term oxygen therapy has made its provision (and funding) more or less mandatory for those meeting the criteria established in these clinical trials. Indeed, it may be asserted that all therapies that prolong survival have high priority.

It, therefore, might be asked whether rehabilitation reduces COPD mortality. It seems understandable that this information is not available. Large-scale multicenter investigations of pulmonary rehabilitation are almost non-existent. Even if a substantial survival benefit is postulated, because in stable COPD the likelihood of dying in the short term is rather low, it would take a very large randomized clinical trial (many thousands of participants) to provide adequate resolution. A design that might be more feasible would be to study rehabilitation of patients shortly after a COPD hospitalization. Because post-hospitalization patients have a relatively high mortality, the number of participants to adequately investigate a given postulated reduction in mortality would be appreciably reduced. Efforts are underway to organize such a trial but, even in a best-case scenario, it will be a number of years before the crucial evidence is available.