Measures of Frailty in Chronic Lung Diseases

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There is increasing interest in the evaluation of frailty in patients with chronic lung diseases. Frailty is a systemic geriatric syndrome that is characterized by vulnerability to stressors and an increased risk for morbidity and mortality in the elderly population. About 4–25% of people older than 65 years are frail, based on traditional measures of frailty, with significant demographic and geographic heterogeneity (1). There is accumulating data that the high rates of frailty in patients with chronic illness such as diabetes, end-stage renal disease, and congestive heart failure contribute to the morbidity and mortality in these disease states (2–4). Several recent studies have demonstrated that there is an increased incidence of frailty in patients with chronic lung diseases (5, 6). This increase in frailty has been associated with increased disability and mortality (7–9). With the recognition that frailty is a biomarker of poor outcomes in patients with chronic lung disease, it is imperative to determine the best instruments to detect frailty, and to understand what we are measuring so that appropriate interventions can be implemented.

In this issue of the *AnnalsATS*, Baldwin and colleagues (pp. 1270–1279) evaluate tools that may be used to measure frailty in patients with chronic lung disease (10). The authors show that the Minnesota Leisure Time Physical Activity Questionnaire, typically used to measure “low activity” in the Fried Frailty Phenotype (FFP), has a significant “floor effect” in patients with pulmonary disease, possibly leading to decreased accuracy of the FFP in pulmonary patients. They investigated

whether the Duke Activity Scale Index, which is designed to measure physical activity in patients with cardiopulmonary disease, would perform better in this patient population and be more predictive of frailty. They measured frailty in two cohorts of patients: one with advanced lung disease awaiting lung transplantation and one with survivors of acute respiratory failure. The authors found that the Duke Activity Scale Index had less floor effect than the Minnesota Leisure Time Physical Activity Questionnaire, with a more normal distribution in both populations. Importantly, the Duke Activity Scale Index better identified patients at risk for death (10).

At this time, there is no consensus on the best approach to measure frailty in the general geriatric population or in particular disease states. Frailty measurements typically measure deficits in multiple domains, including physical activity, weight loss, exhaustion, weakness, mood, cognition, social support, nutrition, and comorbidities (11). The most extensively studied are the FFP, also known as the Cardiovascular Health Study Index, and the Frailty Index of Accumulative Deficits. The Cardiovascular Health Study Index is weighted more to limitations in physical activity and weakness. Other instruments such as the Frailty Index of Accumulative Deficits have a broader approach, with incorporation of measurements of psychosocial domains (11). There have been considerable refinements to these traditional instruments. One example of this is the Survey of Health, Ageing and Retirement Frailty Instrument, which was derived and validated based on the FFP, but

adjusted to use the data available in this large population database (12). As more disease-specific frailty data become available, it is very likely that the current instruments will need to be further refined to reflect the unique components and nuances of patients with chronic lung disease. This study provides novel insights into how modifications to currently available frailty measures may be used to better fit and prognosticate outcomes and interventions in patients with chronic lung diseases.

As we discover better methods/tools to measure frailty in pulmonary patients, we need to be mindful of the domains we are measuring and the correlation of these domains to biological processes underlying chronic lung disease states. It is possible that frailty measurements that detect deficits in physical activity and weakness will be more applicable to patients with significant cardiopulmonary disease compared with other chronic illnesses such as end-stage renal disease, in which mood and nutritional status are more associated with frailty (3). Several studies in patients with lung disease demonstrate that dyspnea and frailty are strongly associated (5, 8, 9). We must be able to discriminate dyspnea related to decline in lung function from dyspnea attributable to frailty and multisystem dysfunction. Frailty in this patient population should not be solely defined by dyspnea and physical limitation. Our instruments need to be able to detect the more generalizable wasting, sarcopenia, and nutritional and energy deficits that characterize the frailty syndrome (13). Confirmation that the frailty syndrome contributes to morbidity and mortality in patients with lung disease coupled with

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development of interventions that improve these inherent biologic deficiencies will complement advances made in the treatment of chronic lung diseases.

In summary, these authors have demonstrated that the traditionally used instruments to measure frailty can be successfully adapted to better predict

outcomes in targeted patient populations. Going forward, it is likely that further modifications to traditional instruments will be necessary to more accurately measure the underlying biological dysfunction that leads to frailty and poor outcomes in specific disease states. Better understanding of the biologic processes

such as sarcopenia, inflammation, and energy imbalance that drive frailty in patients with chronic lung disease will guide development of more useful tools in the future. ■

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