

Do Not Forget to Assess the Muscle Integrity in Patients With COPD

Stefania Cerri, MD
 Enrico Clini, MD, FCCP
 Modena, Italy



Patients with COPD commonly experience systemic consequences of their disease.¹ Almost all elderly individuals with COPD present with extrapulmonary features and conditions that variably affect overall morbidity and mortality.

Survival studies in COPD populations have reported several independent factors related to mortality regarding severity of airflow obstruction, functional exercise capacity, physical activity level, respiratory and extrarespiratory symptoms, and degree of systemic inflammation.² A recent systematic review suggests that walking distance, heart rate, and inflammatory biomarkers (C-reactive protein, WBC counts, and fibrinogen) are associated with clinical outcomes in patients with stable COPD; use of musculoskeletal measures to assess outcomes in patients with COPD requires further investigation.³ Although nutritional assessment is increasingly recognized as part of the multidimensional management of patients with COPD, the prognostic role of nutritional variables is still underestimated and a matter of debate.¹

FOR RELATED ARTICLE, SEE PAGE 1148

AFFILIATIONS: From the Department of Medical and Surgical Sciences at University of Modena Reggio Emilia, Lung Unit and Respiratory Intensive Care Unit at University Hospital of Modena Policlinico.

FINANCIAL/NONFINANCIAL DISCLOSURES: None declared.

CORRESPONDENCE TO: Enrico Clini, MD, FCCP, Department of Medical and Surgical Sciences, University of Modena Reggio Emilia, University Hospital of Modena Policlinico (I), Via del Pozzo 71, 4100 Modena (I); e-mail: enrico.clini@unimore.it

Copyright © 2019 American College of Chest Physicians. Published by Elsevier Inc. All rights reserved.

DOI: <https://doi.org/10.1016/j.chest.2019.01.025>

The study by de Blasio et al⁴ in this issue of *CHEST* investigated the predictive role of raw bioelectrical impedance analysis (BIA) as a valuable method for estimating the fat-free and fat mass on long-term survival in 210 consecutive patients with COPD with varying degrees of spirometric severity. Both BIA variables (impedance ratio [IR] and phase angle [PhA]) used to assess body composition were independently associated with all-cause mortality in the studied population. It was intriguing to note that this risk was strictly associated with each unit increase of IR and unit decrease of PhA independent of lung function and/or functional exercise capacity. This finding suggests that risk of dying increases with worsening of BIA and is associated with the lowest quintile in particular, whereas patients with more severe COPD with lower degree of lung function are more likely to stay in hospital when acute. This article thus describes for the first time that BIA-derived variables are strong predictors of mortality in patients with COPD, independently of age, BMI, comorbidities, and common respiratory parameters. In the COPD population, the same authors have previously found that BIA variables are altered and correlate with disease severity.⁵

BIA is not a gold standard tool to assess muscle mass, but it is an alternative method of estimating fat and fat-free mass for research and clinical use, according to international consensus.⁶ Furthermore, compared with dual-energy X-ray absorptiometry, BIA provides some additional information, specifically regarding intracellular/extracellular compartments and muscle quality. High BIA-derived IR and low PhA reflect a concomitant decrease in body cell mass and cellular integrity and therefore nutritional alterations.⁷ Moreover, BIA-derived IR and PhA variables have a strong prognostic value among hospitalized patients and older individuals and might be helpful in contributing to improvements in patient care and, consequently, clinical outcomes.⁸

The prognostic role of various nutritional phenotypes (eg, malnutrition, cachexia, obesity, sarcopenia, dynapenia, sarcopenic obesity) must be investigated further in the COPD population. For example, sarcopenic obesity, as one of these phenotypes, is associated with worse physical performance and higher systemic inflammatory burden compared with other

body composition phenotypes in patients with COPD.⁹ In this case, high values of BMI may mask muscle wasting in terms of low skeletal muscle mass, although overweight individuals with BMIs > 25 kg/m² do not necessarily experience low fat-free mass. Therefore, the category risk according to phenotypes identifying different body composition are still far from being exhaustively elucidated in term of long-term prognosis.

In general, unintentional weight loss is an established prognostic marker for reduced survival in elderly populations.¹⁰ This finding is mirrored in COPD populations in which unintentional weight loss is also an indicator of reduced survival. The present study by de Blasio et al⁴ offers an interesting perspective in this emerging and challenging area of COPD management. The outpatient rehabilitation setting promoted the comprehensive assessment of individuals, including their nutritional status, based on a multidisciplinary approach.

Recently, a consistent sample of patients with COPD referred for pulmonary rehabilitation underwent an integrated assessment that was able to identify seven different clusters with differences in symptom score, sex, age, risk of acute exacerbations and hospital admission, number of comorbidities, and overall complexity.¹¹ In addition, although determinants of the different constructs of exercise performance vary, there is a strong relationship between peripheral muscle status (ie, quadriceps mass and force) and functional exercise capacity,¹² which need to be assessed and followed up in these patients.

Thus, outside the rehabilitation environment (at a primary care level in particular), nutritional assessment is an important part of comprehensive assessment of patients with COPD and is much less likely to be reported appropriately. COPD management is challenging and requires advanced and sophisticated strategies to meet the patient's individual needs. Due to the complexity of the disease, multidimensional patient

profiling is crucial to identify the right COPD patient for the right treatment.

Identifying physical frailty and sarcopenia in the community is a challenging but feasible task. The BIA method could be used as an easy and relatively low-cost method to incorporate an important variable into the patient's assessment and prognosis, especially for those patients who have COPD and a higher degree of airflow limitation.

References

1. Celli BR, Decramer M, Wedzicha JA, et al. An official American Thoracic Society/European Respiratory Society statement: research questions in chronic obstructive pulmonary disease. *Am J Respir Crit Care Med.* 2015;191(7):e4-e27.
2. Vogelmeier CF, Criner GJ, Martinez FJ, et al. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease 2017 Report. GOLD Executive Summary. *Am J Respir Crit Care Med.* 2017;195(5):557-582.
3. Fermont JM, Masconi KL, Jensen MT, et al. Biomarkers and clinical outcomes in COPD: a systematic review and meta-analysis [published online ahead of print January 7, 2019]. *Thorax.* <https://doi.org/10.1136/thoraxjnl-2018-211855>.
4. de Blasio F, Scafi L, Di Gregorio A, et al. Raw bioelectrical impedance analysis variables are independent predictors of early all-cause mortality in patients with COPD. *Chest.* 2019;155(6):1148-1157.
5. de Blasio F, de Blasio F, Miracco Berlingieri G, et al. Evaluation of body composition in COPD patients using multifrequency bioelectrical impedance analysis. *Int J Chron Obstruct Pulmon Dis.* 2016;11:2419-2426.
6. Cederholm T, Barazzoni R, Austin P, et al. ESPEN guidelines on definitions and terminology of clinical nutrition. *Clin Nutr.* 2017;36(1):49-64.
7. Mulasi U, Kuchnia AJ, Cole AJ, Earthman CP. Bioimpedance at the bedside: current applications, limitations, and opportunities. *Nutr Clin Pract.* 2015;30(2):180-193.
8. Lukaski HC, Kyle UG, Kondrup J. Assessment of adult malnutrition and prognosis with bioelectrical impedance analysis: phase angle and impedance ratio. *Curr Opin Clin Nutr Metab Care.* 2017;20(5):330-339.
9. Joppa P, Tkacova R, Franssen FM, et al. Sarcopenic obesity, functional outcomes, and systemic inflammation in patients with chronic obstructive pulmonary disease. *J Am Med Dir Assoc.* 2016;17(8):712-718.
10. McMinn J, Steel C, Bowman A. Investigation and management of unintentional weight loss in older adults. *BMJ.* 2011;342:d1732.
11. Augustin IML, Spruit MA, Houben-Wilke S, et al. The respiratory physiome: clustering based on a comprehensive lung function assessment in patients with COPD. *PLoS One.* 2018;13(9). e0201593.
12. McNamara RJ, Houben-Wilke S, Franssen FME, et al. Determinants of functional, peak and endurance exercise capacity in people with chronic obstructive pulmonary disease. *Respir Med.* 2018;138:81-87.