



Editorial

The importance of breathing not properly: Chronic obstructive pulmonary disease as a risk factor for rehospitalization in heart failure



Antonello Gavazzi ^{a,*}, Alberto Aimo ^b, Michele Emdin ^{c,d}, Alain Cohen-Solal ^e

^a Research Foundation of the Bergamo Hospital, Ospedale Papa Giovanni XXIII, Bergamo, Italy

^b Cardiology Division, University Hospital of Pisa, Pisa, Italy

^c Institute of Life Sciences, Scuola Superiore Sant'Anna, Pisa, Italy

^d Fondazione Toscana Gabriele Monasterio, Pisa, Italy

^e Cardiology Department, Hôpital Lariboisière - Université Paris Diderot, Paris, France

ARTICLE INFO

Article history:

Received 8 May 2019

Accepted 13 May 2019

Available online 21 May 2019

Heart failure (HF) and chronic obstructive pulmonary disease (COPD) are leading causes of death worldwide. Their prevalence is estimated as 1–3% of the general population and 5–10% of adults, respectively [1]; these conditions often coexist, because smoking is a common risk factor, and low-grade systemic inflammation is a shared pathogenic mechanism. Prevalence estimates of comorbid HF and COPD vary widely according to cohort selection, age, risk factor exposure, and diagnostic criteria. When systematically employing spirometry, COPD was diagnosed in 36% of patients hospitalized for HF [2] and in 30% of stable HF patients [3]. In a primary care cross-sectional study, among 244 elderly patients with stable COPD diagnosed according to the Global Initiative for Obstructive Lung Disease criteria, unrecognized HF was very common (20.5%), with an overall HF prevalence 4-fold higher than in subjects aged ≥ 65 from the general population [4]. In a series of studies including >1000 HF patients, the prevalence of COPD in HF with preserved ejection fraction was 14–34% in hospital cohorts, 16% in randomized controlled trials, and 14–34% in community/outpatient cohorts, and was slightly higher than in HF with reduced ejection fraction (11–31%, 16%, and 16–27%, respectively) [5].

HF and COPD are both associated with increased morbidity and mortality, impaired functional status, and health service use. Coexistence of HF and COPD has been associated to higher mortality than both conditions alone: for example, among 799 patients admitted for new-onset

HF, those with COPD had a significantly lower 5-year survival (31% vs. 71%), and COPD had a strong, independent prognostic value in the whole population and among patients with preserved or reduced ejection fraction [6], as confirmed in a subgroup analysis of a large trial in HF [7].

Both HF and COPD may trigger exacerbations of the other condition, since pulmonary congestion induces bronchoconstriction, and reduced lung functioning increases cardiac stress. In agreement with this conceptual framework, a recent study on the European Society of Cardiology-HF Association (ESC-HFA) Long-Term Registry, where 6920 patients hospitalized for HF and 9409 outpatients were evaluated, reported that COPD is an independent risk factor for 1-year all-cause and HF hospitalization, with a stronger prognostic value than for all-cause mortality [8]. An additional relevant information comes from the database of the ARNO observatory, showing that among 54,059 patients hospitalized for HF, the re-hospitalization rate at 1-year is extremely high (56.6%) and respiratory diseases are the most frequent non-cardiovascular cause [9]. On the other hand, further epidemiological evidence of the link between comorbid HF and COPD and increased hospitalization rates in HF is currently missing.

In the present issue of the Journal, Gulea and Colleagues provide an analysis of 225,160 patients from the US National Readmissions Database, with HF as the first hospitalization diagnosis. ICD-9-CM codes related to COPD were assigned to one third of these patients ($n = 54,953$). Compared to patients without, those with COPD were slightly younger, more frequently male, had a greater prevalence of coronary and peripheral artery disease, and more frequent comorbidities (obesity, diabetes, atrial fibrillation, and kidney disease). Although in-hospital mortality was lower among patients with COPD (3.3% vs. 2.8%, $p < 0.001$), discharged patients with COPD had a shorter time to readmission, and a significantly higher risk for 30-day and 90-day readmission for any cause, as well as for 30-day respiratory-related readmissions and 90-day cardiovascular readmission, even after adjusting for differences in baseline characteristics and length of stay [10].

The Authors should be congratulated for their effort to assess the important issue of COPD as a determinant of outcome in acute HF on a very large scale, even larger than the ESC-HFA Long-Term Registry study [8]. Nonetheless, a significant loss of detail is the inevitable drawback of working on administrative data instead of dedicated patient datasets.

DOI of original article: <https://doi.org/10.1016/j.ijcard.2019.04.087>.

* Corresponding author at: Fondazione per la Ricerca dell'Ospedale di Bergamo, ASST Papa Giovanni XXIII, Piazza OMS, 1, 24127 Bergamo, Italy.

E-mail address: agavazzi@fondazionefrom.it (A. Gavazzi).

A significant limitation of the study by Gulea et al. is the lack of mortality data [10]; indeed, fatal outcomes are much stronger endpoints than HF readmission, and survival analysis on HF hospitalization would be more reliable if accounting for the competing risk of all-cause mortality. Additionally, the findings that COPD patients were younger and had a lower in-hospital mortality is counterintuitive and at odds with the analysis on the ESC-HFA Registry [8], which may cast some doubts even on the attribution to the COPD group based on ICD-9-CM codes such as 4919 (“unspecified chronic bronchitis”) instead of the spirometry evidence of bronchial obstruction [10]. Finally, unfortunately no information is provided on past or current smoking habit, a fundamental pathogenic determinant of either COPD or ischemic HF, whose expected greater prevalence in the COPD subset could explain the greater prevalence of coronary artery disease observed in this cohort.

Despite these limitations, the study provides an important reminder of the clinical and prognostic relevance of COPD in acute HF. In this setting, COPD should be suspected whenever the patient has a long history of asthma or recurrent bronchitis, exposure to smoke or dusts, chemicals, and fumes on the workplace; abnormal findings at arterial blood gas analysis or chest X-ray may provide further clues to the diagnosis of comorbid COPD. In these cases, the patient should be referred to spirometry, which is the only exam that can confirm the diagnosis. By contrast, only 17% of hospitalized HF patients with a COPD diagnosis had documented spirometry, according to the ESC-HFA survey [8]. This extremely limited referral to spirometry poses a risk of both under- or over-diagnosis of COPD; the former deprives patients of bronchodilator therapy and improvements in symptoms and frequency of exacerbations, whereas the latter is associated with underutilization of HF medications, unnecessary prescription of bronchodilators, and increased healthcare costs [8]. When patients are finally diagnosed with both HF and COPD, an integrated, multi-disciplinary approach would be highly useful to tailor life-style recommendations, including cessation of smoking, treatment and follow-up strategies on each

individual phenotype, thus possibly reducing the burden of morbidity and mortality.

Declaration of Competing Interest

None.

References

- [1] N.M. Hawkins, S. Virani, C. Ceconi, Heart failure and chronic obstructive pulmonary disease: the challenges facing physicians and health services, *Eur. Heart J.* 34 (2013) 2795–2803.
- [2] K.K. Iversen, J. Kjaergaard, D. Akkan, et al., Chronic obstructive pulmonary disease in patients admitted with heart failure, *J. Intern. Med.* 264 (2008) 361–369.
- [3] P. Boschetto, A. Fucili, M. Stendardo, et al., Occurrence and impact of chronic obstructive pulmonary disease in elderly patients with stable heart failure, *Respirology* 18 (2013) 125–130.
- [4] F.H. Rutten, M.J.M. Cramer, D.E. Grobbee, et al., Unrecognized heart failure in elderly patients with stable chronic obstructive pulmonary disease, *Eur. Heart J.* 26 (2005) 1887–1894.
- [5] F. Triposkiadis, G. Giamouzis, J. Parisis, R.C. Starlin, H. Boudoulas, J. Skoularigis, J. Butler, G. Filippatos, Reframing the association and significance of co-morbidities in heart failure, *Eur. J. Heart Fail.* 18 (2016) 744–758.
- [6] D. Rusinaru, I. Saaidi, S. Godard, et al., Impact of chronic obstructive pulmonary disease on long-term outcome of patients hospitalized for heart failure, *Am. J. Cardiol.* 101 (2008) 353–358.
- [7] L. Tavazzi, K. Swedberg, M. Komajda, et al., Clinical profiles and outcomes in patients with chronic heart failure and chronic obstructive pulmonary disease: an efficacy and safety analysis of SHIFT study, *Int. J. Cardiol.* 170 (2013) 182–188.
- [8] M. Canepa, E. Straburzynska-Migaj, J. Drozd, et al., Characteristics, treatments and 1-year prognosis of hospitalized and ambulatory heart failure patients with chronic obstructive pulmonary disease in the European Society of Cardiology Heart Failure Long-Term Registry, *Eur. J. Heart Fail.* 20 (2018) 100–110.
- [9] A.P. Maggioni, F. Orso, S. Calabria, et al., The real-world evidence of heart failure: findings from 41 413 patients of the ARNO database, *Eur. J. Heart Fail.* 18 (2016) 402–410.
- [10] Gulea et al., Impact of chronic obstructive pulmonary disease on readmission after hospitalization for acute heart failure: a nationally representative US cohort study, *Int. J. Cardiol.* 290 (2019) 113–118.