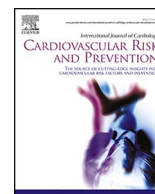




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## Referral of the heart failure patient from cardiology and internal medicine department: Same patients and same rehabilitative approach?

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### 1. Medicine vs. Cardiology: Two different heart failure clinical scenarios

The majority of patients (Pts) with heart failure (HF) are hospitalized in internal medicine departments (IMD), instead of cardiology (CAR). The clinical characteristics differ in the wards [1]. In IMD, predominates heart failure with preserved ejection fraction (HFpEF), and heart failure with reduced ejection fraction (HFrEF) in CAR. The hypertensive etiology is more frequent in IMD and dilated/post-ischemic cardiomyopathies in CAR. In addition, IMD Pts are older, predominantly women, living alone at home and with a greater number of non-cardiac comorbidities. Among the 3 main causes of hospitalization, acute worsening of HF and atrial fibrillation predominated in CAR, while infections had the same prevalence in the two groups.

Furthermore, in recent years, temporal changes have been observed with a clear increase in hospitalizations for HFpEF in IMD, while those, for acute HF in HFrEF, remained unchallenged in CAR and reduced in IMD; moreover non-cardiological care is associated with lower use of beta-blockers and devices and higher mortality [2]. Access to cardiac therapies may not be equitable with consequences on the quality of care whose results are based on guidelines drawn up by cardiologist. An improved collaboration between cardiologists and noncardiologists is mandatory.

### 2. The growing burden of comorbidities in HF

In HF has been demonstrated a significant temporal increase in the number of non-cardiac comorbidities. This leads to an increase in Pts complexity. Differences based on the type of HF are observed in the various studies. In the BIOSAT-CHF cohort [3], in HFrEF most

non-cardiac comorbidities are associated with an increased risk of mortality, while in HFpEF only chronic obstructive pulmonary disease (COPD), anemia and chronic kidney disease (CKD). In the ARIC study [4], the risk of mortality related to comorbidities was comparable in the two types of HF, while atrial fibrillation and sleep apnea significantly increased the risk only in HFpEF. In both studies, the highest prevalence of comorbidities was observed in HFpEF. Age and frailty represent the main predictors of all-cause mortality, but when rehospitalizations are also considered, frailty comes first.

Recently, a study [5] analyzed the impact of comorbidities on functional status and exercise capacity in Pts with chronic HF. As the burden of comorbidities increases, functional capacity decreases. A negative effect on peak  $\text{VO}_2$  is demonstrated by diabetes, COPD, anemia, CKD, obesity and peripheral artery disease; the last three have a greater limiting effect in HFpEF. Moreover, Pts with obese cardiometabolic profile exhibit less improvement with aerobic exercise training. Therefore it is possible to recognize different phenotypes of HF Pts as the comorbidities increase, which requires a multidisciplinary evaluation, such as that offered by the cardiac rehabilitation (CR) team.

### 3. Cardiac Rehabilitation: The tool to improve the care of HF patients

The mechanisms of the beneficial effect of training and CR in P with HF are different and well known. Retrospective studies conducted on large national registries, using the propensity score matching analysis, have shown that CR referral is associated with a lower risk of mortality and HF rehospitalization. Inpatient CR also has the same positive effect on the outcome. The analysis of the Lombardy healthcare administrative database [6] demonstrates that participation in a CR program is

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associated with a 43% reduction in mortality and a 21% reduction in hospitalizations for HF. Unfortunately, referral is still low and late because it occurs on average after three acute exacerbations of the disease. The causes of the poor use of CR in HF are multiple: the lack of benefits perceived by the physician, being elderly, women, blacks, living alone with low economic and cultural level, preserved LVEF and no previous cardiac procedures. The higher burden of comorbidities and poor functional status are also a barrier to CR.

It is paradoxical that, despite the limited use of CR in HF, the latter has demonstrated its effectiveness even in complex Pts. In the REHAB-HF study [7], the greatest increase in physical function in older Pts with acute HF was achieved in subjects with the worst frailty status at baseline, after an early, transitory, personalized and multidomain physical rehabilitation intervention. The increase in fitness was 2.6 times greater in the most fragile subjects compared to pre-frail P; furthermore, CR treatment was cost-effective especially in HFpEF (1 QALY: full cohort \$58,409 vs. \$35,600 in HFpEF). The highest levels of intervention adherence was associated also with a reduction in HF hospitalizations and all-cause mortality, which was not significant, in the full cohort.

The improvement in functional capacity after CR is independent of the type of HF across the spectrum of ejection fraction, with comparable benefits in terms of 5-year survival with the same increase in distance traveled in the 6-min walk test [8]; even all-cause hospitalizations are reduced in frail people, up to 5 years after the completion of a CR program. Therefore, the phenotype of an elderly, frail, comorbid P with HFpEF, often hospitalized in IMD, is the one who can obtain the maximum benefit from CR.

#### 4. Conclusions

The CR improves QoL, functional capacity, reduces hospitalizations and mortality in HF. Specific skills are required. It must also be extended to the usually neglected categories (elderly, women, frail people, comorbidities, ethnic minorities, HFpEF, hospitalized in IMD). Raising awareness among physicians (also inserting the CR into the university educational path), inter-hospital, and interpersonal networks, tele-rehabilitation, improved insurance coverage, are tools to increase referrals.

It is essential to create common therapeutic paths based on evidence based medicine, through consensus document from scientific societies. The joint evaluation between the doctor treating the patient with acute HF and that of CR is essential to define the priority class of the intervention. It can define the setting (inpatient, day hospital or outpatient) most appropriate. Failure to referral should be justified. In this scenario, the progressive reduction of CR departments, in the wider healthcare desertification, represents a limiting factor.

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#### Declaration of competing interest

The authors declare they have no conflict of interest.

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#### References

- [1] E. Ricciardi, G. La Malfa, G. Guglielmi, E. Cenni, M. Micali, L.M. Corsello, P. Lopena, L. Manco, R. Pontremoli, P. Moscatelli, G. Murdaca, N. Musso, F. Montecucco, P. Ameri, I. Porto, A. Pende, M. Canepa, Characteristics of current heart failure patients admitted to internal medicine vs. cardiology hospital units: the VASCO study, *Intern Emerg Med* 15 (7) (2020) 1219–1229.
- [2] C.J. Kapelios, M. Canepa, L. Benson, C. Hage, T. Thorvaldsen, U. Dahlström, G. Savarese, L.H. Lund, Non-cardiology vs. cardiology care of patients with heart failure and reduced ejection fraction is associated with lower use of guideline-based care and higher mortality: observations from the Swedish Heart Failure Registry, *Int. J. Cardiol.* 343 (2021) 63–72.
- [3] K.W. Streng, J.F. Nauta, H.L. Hillege, S.D. Anker, J.G. Cleland, K. Dickstein, G. Filippatos, C.C. Lang, M. Metra, L.L. Ng, P. Ponikowski, N.J. Samani, D.J. van Veldhuisen, A.H. Zwinderman, F. Zannad, K. Damman, P. van der Meer, A.A. Voors, Non-cardiac comorbidities in heart failure with reduced, mid-range and preserved ejection fraction, *Int. J. Cardiol.* (271) (2018) 132–139.
- [4] A. Pandey, M. Vaduganathan, S. Arora, A. Qamar, R.J. Mentz, S.J. Shah, P.P. Chang, S.D. Russell, W.D. Rosamond, M.C. Caughey, Temporal trends in prevalence and prognostic implications of comorbidities among patients with acute decompensated heart failure: the ARIC study community surveillance, *Circulation* 142 (3) (2020) 230–243.
- [5] P. Martens, S.N. Augusto Jr., J.E. Finet, W.H.W. Tang, Distinct impact of noncardiac comorbidities on exercise capacity and functional status in chronic heart failure, *JACC Heart Fail* 11 (10) (2023) 1365–1376.
- [6] S. Scalvini, F. Grossetti, A.M. Paganoni, M.T. La Rovere, R.F. Pedretti, M. Frigerio, Impact of in-hospital cardiac rehabilitation on mortality and readmissions in heart failure: a population study in Lombardy, Italy, from 2005 to 2012, *Eur J Prev Cardiol* 26 (8) (2019) 808–817.
- [7] D.W. Kitzman, D.J. Whellan, P. Duncan, A.M. Pastva, R.J. Mentz, G.R. Reeves, M. B. Nelson, H. Chen, B. Upadhyaya, S.D. Reed, M.A. Espeland, L. Hewston, C. M. O'Connor, Physical rehabilitation for older patients hospitalized for heart failure, *N. Engl. J. Med.* 385 (3) (2021) 203–216.
- [8] D. Scrutinio, P. Guida, M.T. La Rovere, M. Bussotti, U. Corrà, G. Forni, R. Raimondo, S. Scalvini, A. Passantino, Functional outcome after cardiac rehabilitation and its association with survival in heart failure across the spectrum of ejection fraction, *Eur. J. Intern. Med.* 110 (2023) 86–92.