



Commentary

Short length of hospitalization in patients with acute heart failure entails a high risk of readmission: True or false? Insights from the LOHRCA study

Pedro Moliner^{a,b,c,d}, Josep Comin-Colet^{a,b,e,*}^a Community Heart Failure Program, Department of Cardiology, Bellvitge University Hospital, L'Hospitalet de Llobregat, Barcelona, Spain^b Bellvitge Biomedical Research Institute (IDIBELL), L'Hospitalet de Llobregat, Barcelona, Spain^c School of Medicine, Universitat Autònoma de Barcelona, Barcelona, Spain^d Cardio-Oncology Unit, Cardiology Department, Bellvitge University Hospital - Catalan Institute of Oncology (ICO), L'Hospitalet de Llobregat, Barcelona, Spain^e Department of Clinical Sciences, School of Medicine, University of Barcelona, Barcelona, Spain**1. Concerns about acute decompensated heart failure admissions**

Heart failure (HF) is a chronic disease with devastating consequences in terms of mortality, morbidity, health-related quality of life and healthcare costs [1]. Furthermore, several factors contribute to an increase in the prevalence of HF and, as a consequence, an increase in admissions and recurrent admissions due to acute decompensated heart failure (ADHF). In fact, a recent study published by Mendez-Bailón et al. in European Journal of Internal Medicine showed how in the last 15 years there has been a progressive increase in hospital admissions of patients with chronic HF [2].

In line with this, there is a concern regarding the optimal length of a hospitalization due to ADHF. Short hospitalizations could be better because they are cheaper, with lower number of in-hospital complications, however, previous studies had shown that short admissions in patients with ADHF were associated with an increased risk of readmission [3–5]. Some possible reasons that could explain this increased risk of readmission could be a less optimized medical treatment at discharge, the presence of residual congestion, HF aetiology not evaluated in depth or inadequate discharge planning.

2. LOHRCA study: post-discharge clinical outcomes according to length of hospitalization

The LOHRCA study aimed to assess the post-discharge clinical outcomes based on the length of hospitalization (LOH) due to ADHF. This objective was also analyzed according to the department where hospitalizations took place. The study by O Miró et al. published in this issue of European Journal of Internal Medicine is based on a registry of 41 Spanish recruiting centers [6]. A total of 8563 patients admitted due to ADHF were included in 4 periods (2009, 2011, 2014 and 2016). After hospital discharge, the mortality, re-admission due to HF or the combined endpoint were analyzed at 90 days according to the LOH. For this purpose, patients were divided into 4 groups based on the duration of

the index admission (≤ 5 days / 6–10 days / 11–15 days / ≥ 15 days).

The sample of patients studied had a mean age of 80 years \pm 10; most of them were women (55.5%) and comorbidities were common. Mean LVEF was 51% \pm 15 and 25% were in NYHA functional class III–IV prior to decompensation. Regarding medical treatment, there was a low percentage of treatment with ACEI / ARB (57.3%), beta-blockers (40.8%) or MRA (17.1%). This may be due to the type of patient included in the registry; mainly HFpEF and close to 40% being “de novo” HF at the moment of the inclusion. It is remarkable, that 2 risk scales for the assessment of severity of acute heart failure (MEESSI score and EFECT score) were used. During the 90-day follow-up period, 975 patients (11.4%) died, 2760 (32.2%) had a hospital readmission due to ADHF and 3202 (37.4%) fulfilled the combined endpoint.

The main result of the study by O. Miró et al. was that in the group of patients with short hospitalizations no association was found with re-admission or mortality after 90 days of follow-up. On the other hand, in the subgroups with longer LOH (11–15 days and > 15 days), an increase in mortality of 36.5% and 72%, respectively, was observed in the adjusted analyses. Finally, the study does not show differences in re-admission or mortality according to the department where the patients were admitted (Cardiology, Internal Medicine, Geriatrics or Short Stay Units).

3. Clinical implications of LOHRCA study

First, we should congratulate the authors for the elaboration of a multi-center registry that includes a large number of patients from a very significant number of centers and that provides valuable information about acute heart failure in real life.

As we commented previously, several studies have shown an association between short hospitalizations due to ADHF and an increased risk of HF readmission [3–5]. This association has not been observed in the LOHRCA study and it is the main finding to highlight. We can hypothesize about some aspects of the management of HF during the last

* Corresponding author at: Head of Department of Cardiology, Hospital Universitari de Bellvitge, 19th Floor. Feixa Llargà s/n, Hospitalet de Llobregat, 08907, Barcelona, Spain

E-mail address: jcomin@bellvitgehospital.cat (J. Comin-Colet).

<https://doi.org/10.1016/j.ejim.2019.10.009>

Received 12 September 2019; Accepted 5 October 2019

Available online 31 October 2019

0953-6205/ © 2019 Published by Elsevier B.V. on behalf of European Federation of Internal Medicine.

years that could have contributed to these results. First, improvement in medical treatment. We currently use new medications implemented in the last years that have been demonstrated to reduce HF readmission [7], however, it is true that these advances would be limited to patients with reduced LVEF, which appear to be less represented in this study. Second, improvement in the assessment of congestion by lung ultrasound and blood biomarkers. Nowadays, natriuretic peptides are a widely used tool with diagnostic and prognostic value, that helps in decision-making and risk stratification of patients [7]. Third, and of great relevance, implementation in the last decade of disease management programs focused on transitions and particularly in the transition of care after hospitalization, with intensive post discharge follow-up during the vulnerable phase after hospitalization due to ADHF. Previous studies have demonstrated the effects of the implementation of these HF programs in reducing hospital readmission [8]. The main recommendations of these programs are based on:

- Comprehensive multidisciplinary patient assessment during hospitalization to decide which is the best post-discharge follow-up based on the patient's profile and to provide adequate integration of care.
- An early post-discharge ambulatory visit to detect problems as early decompensations and ensure adherence to medical treatment.
- Nurse-based structured follow-up to optimize medical treatment and educate the patient in self-care measures and in the detection of alarm symptoms.
- Finally, provide alternatives to conventional hospitalization for the management of ADHF by means of ambulatory management of congestion in open-access clinics or day care hospitals dedicated to patients with HF [9].

We do not have information on the number of patients in the LOHRCA study who were included in these programs, but we consider that it could be one of the aspects to be taken into account when explaining the results. The study suggests that short hospitalizations in ADHF are safe and they are not associated with increased readmission. We should contextualize these results with the current use of diagnostic, and therapeutic tools, the ambulatory heart failure programs, and always adjusting the LOH to the patient requirements. In other words, what determines the risk of readmission is not the LOH but what you do before and after hospital discharge to prevent it.

The second important finding of the study was the association between longer LOH and higher post-discharge mortality at 90 days. As the authors already point out in the publication, despite the statistical adjustment with multiple factors associated with disease severity, this could really reflect a cohort of more vulnerable and frailty patients. These patients could have a worse prognosis that would not just be a mere consequence of prolonged hospitalization but instead, long LOH would be the “symptom” of patients experiencing more in-hospital complications, more advanced stages of the disease, or a slower recovery due to their baseline situation. This result confirms that we must monitor patients admitted for acute HF with long hospitalizations, and we must especially ensure a correct transition of care including assessing rehabilitation, home care or convalescence centers when appropriate [10].

Finally, no significant differences were observed in post-discharge outcomes according to the department in which the patients were admitted. This result is striking considering the important differences in, age and comorbidity that usually exist between the profile of the patients. The short post-discharge follow-up, limited to 90 days, could have had an effect in the absence of significant differences between departments. Another important factor is that department changes during hospitalization were not reported, which could have consequences in the results according to departments. Finally, the statistical adjustment included two risk scores, the MEESI and the EFECT. Although these risk scores have been shown to be accurate, the MEESI

score was designed to predict risks at 30-day follow-up and the EFECT score misses current clinically important variables with prognostic impact. Moreover, none of these scores included socio-economical information of patients which has been shown to be a determinant factor of mortality and readmission in patients with HF [11]. Thus, we cannot be completely sure whether these risk scores are able to stratify risks between populations admitted in different settings. In other words, can we conclude that outcomes of patients do not differ according the admitting department? The answer is: absolutely not. Precisely, the results observed in this study can partially be explained by a correct and comprehensive clinical assessment at the moment of admission that led to allocation of the patient to the most appropriate department based on his/her clinical profile. There is not a single department that is the best for all patients. The assessment of the patient's heart disease, age, comorbidities, the aetiology of the decompensation etc. is crucial to select the most beneficial department for each patient.

There are some limitations that we should comment, some of them already explained by the authors in the article. This is an observational study of multiple centers and, therefore, each one is guided by its internal protocols for decision making to admit or discharge patients. This is a study from a single country with universal health care system, so the results may not be extrapolated to other socio-economic areas. The characteristics of the sample are markedly close to HFpEF (mostly women, mean LVEF 51%, frequent comorbidities) so we cannot extrapolate the results to specific subgroups such as those with reduced LVEF. Precisely the diagnosis of HFpEF is often a challenge, being a problem even to determine the diagnosis in randomized clinical trials with strict inclusion criteria. The performance of the Framingham Criteria used for the diagnosis of HF in the type of population included in this study is low in real world practice, particularly regarding its specificity leading to an increased risk of overdiagnosis in these settings [12]. The authors state that in up to 92% of cases a determination of natriuretic peptides or echocardiogram was performed to confirm the diagnosis of HF, but no further information or details are provided in this regard in order to fully support the diagnosis of HF in this cohort, particularly in patients managed and discharged back home directly from the emergency departments or observation units. Finally, since it is an admission and mortality analysis, it would be indicated to perform a competing risk analysis to confirm these results.

In conclusion, the LOHRCA study by O. Miró et al. is an interesting study that provides a current view of the patients' clinical profile that are admitted due to ADHF. More studies on this topic will be required but LOHRCA study shows that short hospitalizations due to ADHF are safe in terms of early re-admission or short-term mortality, always adjusting the LOH to the requirements of each patient and applying the diagnostic and therapeutic tools and the current heart failure programs in benefit for the patient.

Declaration of Competing Interest

None

References

- [1] Farré N, Vela E, Clèries M, Bustins M, Cainzos-Achirica M, Enjuanes C, Moliner P, Ruiz S, Verdú-Rotellar JM, Comín-Colet J. Medical resource use and expenditure in patients with chronic heart failure: a population-based analysis of 88 195 patients. *Eur J Heart Fail* 2016;18(Sep 9):1132–40. <https://doi.org/10.1002/ejhf.549>.
- [2] Méndez-Bailón M, Jiménez-García R, Hernández-Barrera V, Comín-Colet J, Esteban-Hernández J, de Miguel-Díez J, de Miguel-Yanes JM, Muñoz-Rivas N, Lorenzo-Villalba N, López-de-Andrés A. Significant and constant increase in hospitalization due to heart failure in Spain over 15 year period. *Eur J Intern Med* 2019;64(Jun):48–56. <https://doi.org/10.1016/j.ejim.2019.02.019>.
- [3] Sud M, Yu B, Wijeyesundera HC, Austin PC, Ko DT, Braga J, Cram P, Spertus JA, Domanski M, Lee DS. Associations between short or long length of stay and 30-Day readmission and mortality in hospitalized patients with heart failure. *JACC Heart Fail* 2017;5(Aug 8):578–88. <https://doi.org/10.1016/j.jchf.2017.03.012>.
- [4] Eapen ZJ, Reed SD, Li Y, Kociol RD, Armstrong PW, Starling RC, McMurray JJ, Massie BM, Swedberg K, Ezekowitz JA, Fonarow GC, Teerlink JR, Metra M, Whellan

- DJ, O'Connor CM, Califf RM, Hernandez AF. Do countries or hospitals with longer hospital stays for acute heart failure have lower readmission rates?: Findings from ASCEND-HF. *Circ Heart Fail* 2013;6(Jul 4):727–32. <https://doi.org/10.1161/CIRCHEARTFAILURE.112.000265>.
- [5] Miñana G, Bosch MJ, Núñez E, Mollar A, Santas E, Valero E, García-Blas S, Pellicer M, Bodí V, Chorro FJ, Sanchis J, Núñez J. Length of stay and risk of very early readmission in acute heart failure. *Eur J Intern Med* 2017;42(Jul):61–6. <https://doi.org/10.1016/j.ejim.2017.04.003>.
- [6] Miró O, Padrosa J, et al. Influence of the length of hospitalisation in post-discharge outcomes in patients with acute heart failure: results of the LOHRCA study. *Eur J Intern Med* 2019. <https://doi.org/10.1016/j.ejim.2019.08.007>.
- [7] Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JG, Coats AJ, Falk V, González-Juanatey JR, Harjola VP, Jankowska EA, Jessup M, Linde C, Nihoyannopoulos P, Parissis JT, Pieske B, Riley JP, Rosano GM, Ruilope LM, Ruschitzka F, Rutten FH, van der Meer P. 2016 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure: the task force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur J Heart Fail* 2016;18:891–975.
- [8] Comín-Colet J, Verdú-Rotellar JM, Vela E, Clèries M, Bustins M, Mendoza L, Badosa N, Cladellas M, Ferré S, Bruguera J. Working group of the integrated program for heart failure management of the Barcelona litoral mar integrated health care area, Spain. efficacy of an integrated hospital-primary care program for heart failure: a population-based analysis of 56,742 patients. *Rev Esp Cardiol (Engl Ed)* 2014;67(Apr 4):283–93. <https://doi.org/10.1016/j.rec.2013.12.005>.
- [9] Comín-Colet J, Enjuanes C, Lupón J, Cainzos-Achirica M, Badosa N, Verdú JM. Transitions of care between acute and chronic heart failure: critical steps in the design of a multidisciplinary care model for the prevention of rehospitalization. *Rev Esp Cardiol (Engl Ed)* 2016;69(Oct 10):951–61. <https://doi.org/10.1016/j.rec.2016.05.001>.
- [10] Zaprutko J, Michalak M, Nowicka A, Dankowski R, Drożdż J, Ponikowski P, Opolski G, Nessler J, Nowalany-Kozielska E, Szyszka A. Hospitalisation length and prognosis in heart failure patients. *Kardiol Pol* 2017;75(4):323–31. <https://doi.org/10.5603/KP.a2016.0183>.
- [11] Cainzos-Achirica M, Capdevila C, Vela E, Cleries M, Bilal U, Garcia-Altes A, Enjuanes C, Garay A, Yun S, Farre N, Corbella X, Comin-Colet J. Individual income, mortality and healthcare resource use in patients with chronic heart failure living in a universal healthcare system: a population-based study in Catalonia, Spain. *Int J Cardiol* 2019;277(Feb 15):250–7. <https://doi.org/10.1016/j.ijcard.2018.10.099>.
- [12] Jimeno Sainz A, Gil V, Merino J, García M, Jordán A, Guerrero L. Validity of Framingham criteria as a clinical test for systolic heart failure. *Rev Clin Esp* 2006;206(Nov 10):495–8.