

Jhund, P. S. (2020) The recurring problem of heart failure hospitalisations. *European Journal of Heart Failure*, 22(2), pp. 249-250. (doi: 10.1002/ejhf.1721)

There may be differences between this version and the published version. You are advised to consult the publisher's version if you wish to cite from it.

This is the peer reviewed version of the following article:
Jhund, P. S. (2020) The recurring problem of heart failure hospitalisations. *European Journal of Heart Failure*, 22(2), pp. 249-250, which has been published in final form at
<http://dx.doi.org/10.1002/ejhf.1721>

This article may be used for non-commercial purposes in accordance with [Wiley Terms and Conditions for Self-Archiving](#).

<http://eprints.gla.ac.uk/204512/>

Deposited on: 3 December 2019

Editorial title: The recurring problem of heart failure hospitalisations

Comment on: Heart Failure in Norway, 200-2014: analysing incident total and readmission rates using data from the Cardiovascular Disease in Norway(CVDNOR) Project.

Authors: Pardeep S. Jhund¹

Affiliations: British Heart Foundation Glasgow Cardiovascular Research Centre, Institute of Cardiovascular and Medical Sciences, University of Glasgow, 126 University Place, Glasgow, G12 8TA

Correspondence: Dr Pardeep S Jhund,
British Heart Foundation Cardiovascular Research Centre,
University of Glasgow,
126 University Place,
Glasgow, G12 8TA,
United Kingdom.
Tel: +44 141 330 1620 Fax: +44 141 330 6955
email: Pardeep.jhund@glasgow.ac.uk

Conflicts of interest: None

Word count: 1114

For many years, the heart failure community tracked the incidence of a first hospitalisation for heart failure (HF) as a marker of the “epidemic” of heart failure[1–3]. With the advent of better treatments for myocardial infarction, there was a fear that the consequence of more survivors with a damaged left ventricle would be a continuing rise in the number of people admitted to hospital for the first time with HF. The maturation of a number of health care record databases founded in the 1960s and 1970s allowed such epidemiological studies to be conducted. Indeed a rising incidence of HF hospitalisation was observed in many countries in the world until the mid-1990s[1–3]. However, at around the mid-1990s we started to see a decline in the incidence hospitalisations for HF[1–3]. The greater use of therapies to prevent the onset of HF, and the expanding treatment of HF, was thought underlie this reversal. But these disease modifying treatments also brought with them improvements in survival with the consequence that there was an increase in the prevalence of heart failure and extension of the time a person lived with HF, thereby increasing the time at risk of further episodes of decompensation. Before the era of effective therapies, HF was a disease that killed very quickly (with a matter of months[4]) but since the introduction of ACE inhibitors/ARBs, beta-blockers and mineralocorticoid receptor antagonists, there has been a transition into a more chronic disease. While HF remains one of the most deadly CV diseases, patients with HF are readmitted multiple times for decompensation of their HF during the course of their lifetime[5]. The current problem therefore faced by many healthcare systems around the world is the issue of recurrent hospitalisations for heart failure. These admissions exert a tremendous burden on healthcare systems around the world and account for the majority of costs associated with HF[6]. Yet while we have multiple sources of evidence that incident HF hospitalisations have been declining less is known about patterns of recurrent HF hospitalisations. This is surprising given what we know about recurrent heart failure hospitalisations. They are a marker of poor prognosis, and the period following a hospitalisation is a particularly high-risk period for recurrent hospitalisation and death. In this edition of the journal Sulo *et al* [7] at all present an analysis of incident and total hospitalisations for heart failure in Norway between 2000 and 2014. The data from this

nationwide retrospective cohort study (which contains all hospital stays with a cardiovascular related diagnosis) confirm that there has been a continual decline in the incidence of first hospitalisation for heart failure. However, they also, and more importantly, report that there has been an increase in the risk of 30-day and 3-year readmissions for heart failure over this time. There was a 1.7% (95%CI 0.7-3%) per year increase in HF readmission rates at 30-day readmission rates in men and 1.1% (95%CI -0.01 to 2.3%) in women. The risk of three-year recurrent hospitalisation was similar while in-hospital mortality decreased in both men and women. Are these trends simply a reflection of making patients live longer and keeping them alive?

We know from analyses of randomised trials that many of the therapies that we use to treat HF with reduced ejection fraction (HFREF) also reduce recurrent HF hospitalisations [8–11].

Therefore, why do we not see this translating into changes and epidemiological trends?

There may be a number of factors at play. The changing demographics of patients with more comorbidities and older age could be one explanation, although the authors found similar trends in each age group. The perhaps more worrying potential explanation for this trend is that there has been a failure to use those therapies which have been shown to be effective in reducing the risk of recurrent HF hospitalisations. A consistent finding from HF registries around the world is the underuse of guideline recommended therapies for HF [12]. Finally, it may be a methodological issue with the database used by Sulo *et al* [7]. They were unable to differentiate HFREF from HF with preserved ejection fraction (HFPEF). No therapies have yet been shown to be effective in HFPEF. Given that HFPEF is characterised by recurrent hospitalisations, more so than HFREF, therefore the growing burden of HFPEF could explain these trends.

Perhaps counter intuitively, these trends could be viewed as a win for the heart failure community. Making patients survive longer will lead to a further prolongation of the period at which they are at risk for a recurrent hospitalisation and consequently increasing the total

number of recurrent hospitalisations occurring which Sulo et al observed. If we are the victims of our own success, we must look at other ways to reduce the risk of HF hospitalisation. We can improve the use of medications and therapies shown to reduce the risk of HF hospitalisation. A more specific method may be to identify those patients at risk of hospitalisation or developing early signs of decompensation and intervening earlier through monitoring devices[13]. Finally an attractive option is reorganizing care to prevent hospital admissions. However, we must ask if this is actually solving the problem or shifting it somewhere else? After recognising the issue of rehospitalisation costs there has been a shift towards treating HF in outpatient setting. This may involve using therapies in the community that were previously used to treat HF in the hospital such as intravenous diuretics or to treat patients in special outpatient units. While this leads to some reduction in costs it must be recognised that these episodes of treatments for HF are as significant an event in the prognosis of the patient as the hospitalisation for HF[14]. The decompensation of a patient requiring treatment outpatient is associated with a higher risk of mortality, much the same as a hospitalisation for HF. Therefore, our ultimate aim should be a reduction in the episodes of decompensation, wherever they may be treated, rather than on hospitalisations per se. This will require further work to understand the epidemiology of these episodes of worsening HF in the community and will need our registries and databases to accurately collect information on these events. Analyses of trials of therapies for HFREF have demonstrated that these events can be modified and that it is important to do so given the prognosis they confer[14,15]. For the HF specialist practising today the best method of reversing these trends is still giving the patient all of the guideline recommended therapies that they are eligible for. However, to monitor our progress in preventing and treating HF we will have to expand our field of vision to capture all the potential HF events that occur, both in and out of the hospital.

References

1. Jhund PS, MacIntyre K, Simpson CR, Lewsey JD, Stewart S, Redpath A, Chalmers JW, Capewell S, McMurray JJ. Long-term trends in first hospitalization for heart failure and subsequent survival between 1986 and 2003: a population study of 5.1 million people. *Circulation*. 2009 Feb;119:515–23.
2. Wasywich C a, Gamble GD, Whalley G a, Doughty RN. Understanding changing patterns of survival and hospitalization for heart failure over two decades in New Zealand: utility of “days alive and out of hospital” from epidemiological data. *Eur J Heart Fail*. 2010 May;12(5):462–8.
3. Teng T-HK, Finn J, Hobbs M, Hung J. Heart failure: incidence, case fatality, and hospitalization rates in Western Australia between 1990 and 2005. *Circ Heart Fail*. 2010 Mar;3(2):236–43.
4. Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS). The CONSENSUS Trial Study Group. *N Engl J Med*. 1987 Jun;316(23):1429–35.
5. Chun S, Tu J V, Wijeyesundera HC, Austin PC, Wang X, Levy D, Lee DS. Lifetime analysis of hospitalizations and survival of patients newly admitted with heart failure. *Circ Heart Fail*. 2012 Jul 1;5(4):414–21.
6. Lesyuk W, Kriza C, Kolominsky-Rabas P. Cost-of-illness studies in heart failure: a systematic review 2004-2016. *BMC Cardiovasc Disord*. 2018;18(1):74.
7. JOURNAL TO INSERT CITATION FOR Sulo et al.
8. Mogensen UM, Gong J, Jhund PS, Shen L, Køber L, Desai AS, Lefkowitz MP, Packer M, Rouleau JL, Solomon SD, Claggett BL, Swedberg K, Zile MR, Mueller-Velten G,

- McMurray JJV. Effect of sacubitril/valsartan on recurrent events in the Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in Heart Failure trial (PARADIGM-HF). *Eur J Heart Fail*. 2018 Feb 12;20(4):760–8.
9. Shen L, Jhund PS, Mogensen UM, Køber L, Claggett B, Rogers JK, McMurray JJV. Re-Examination of the BEST Trial Using Composite Outcomes, Including Emergency Department Visits. *JACC Hear Fail*. 2017 Aug;5(8):591–9.
 10. Rogers JK, McMurray JJ V, Pocock SJ, Zannad F, Krum H, van Veldhuisen DJ, Swedberg K, Shi H, Vincent J, Pitt B. Eplerenone in patients with systolic heart failure and mild symptoms: analysis of repeat hospitalizations. *Circulation*. 2012 Nov 6;126(19):2317–23.
 11. Borer JS, Böhm M, Ford I, Komajda M, Tavazzi L, Sendon JL, Alings M, Lopez-de-Sa E, Swedberg K, SHIFT Investigators. Effect of ivabradine on recurrent hospitalization for worsening heart failure in patients with chronic systolic heart failure: the SHIFT Study. *Eur Heart J*. 2012 Nov;33(22):2813–20.
 12. Crespo-Leiro MG, Anker SD, Maggioni AP, Coats AJ, Filippatos G, Ruschitzka F, Ferrari R, Piepoli MF, Delgado Jimenez JF, Metra M, Fonseca C, Hradec J, Amir O, Logeart D, Dahlström U, Merkely B, Drozd J, Goncalvesova E, Hassanein M, Chioncel O, Lainscak M, Seferovic PM, Tousoulis D, Kavoliuniene A, Fruhwald F, Fazlibegovic E, Temizhan A, Gatzov P, Erglis A, Laroche C, Mebazaa A, Heart Failure Association (HFA) of the European Society of Cardiology (ESC). European Society of Cardiology Heart Failure Long-Term Registry (ESC-HF-LT): 1-year follow-up outcomes and differences across regions. *Eur J Heart Fail*. 2016 Jun;18(6):613–25.
 13. Abraham WT, Adamson PB, Bourge RC, Aaron MF, Costanzo MR, Stevenson LW,

- Strickland W, Neelagaru S, Raval N, Krueger S, Weiner S, Shavelle D, Jeffries B, Yadav JS. Wireless pulmonary artery haemodynamic monitoring in chronic heart failure: a randomised controlled trial. *Lancet*. 2011 Feb;377(9766):658–66.
14. Okumura N, Jhund PS, Gong J, Lefkowitz MP, Rizkala AR, Rouleau JL, Shi VC, Swedberg K, Zile MR, Solomon SD, Packer M, McMurray JJV. Importance of Clinical Worsening of Heart Failure Treated in the Outpatient Setting: Evidence From the Prospective Comparison of ARNI With ACEI to Determine Impact on Global Mortality and Morbidity in Heart Failure Trial (PARADIGM-HF). *Circulation*. 2016 Jun 7;133(23):2254–62.
15. McMurray JJV, Solomon SD, Inzucchi SE, Køber L, Kosiborod MN, Martinez FA, Ponikowski P, Sabatine MS, Anand IS, Bělohávek J, Böhm M, Chiang C-E, Chopra VK, de Boer RA, Desai AS, Diez M, Drozd J, Dukát A, Ge J, Howlett JG, Katova T, Kitakaze M, Ljungman CEA, Merkely B, Nicolau JC, O’Meara E, Petrie MC, Vinh PN, Schou M, Tereshchenko S, Verma S, Held C, DeMets DL, Docherty KF, Jhund PS, Bengtsson O, Sjöstrand M, Langkilde A-M. Dapagliflozin in Patients with Heart Failure and Reduced Ejection Fraction. *N Engl J Med*. 2019 Nov 21;381(21):1995–2008.