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EDITORIAL

Heart failure, zip code, and telemetry: a trinomial in need of understanding



Insuficiencia cardiaca, código postal, y telemetría: un trinomio con necesidad de entenderse

Alberto Zamora^{a,b,*}, Agnés Rivera^c

^a Unidad de Riesgo Vascular y Lípidos, Servicio de medicina Interna, Corporación de Salut del Maresme i la Seva, Hospital de Blanes, Girona, España

^b Facultad de Medicina, Departamento de Ciencias Médicas, Laboratorio de Medicina Traslacional y Ciencias de la Decisión (Grupo TransLab), Universidad de Girona, Girona, España

^c Unidad de Insuficiencia Cardiaca, Servicio de Medicina Interna, Corporación de Salut del Maresme i la Seva, Hospital de Blanes, Girona, España

Congestive heart failure (CHF) is one of the major public health problems in our environment. It affects approximately 26 million people worldwide and 1%-2% of the European population. Its prevalence in Spain is 7%-8%, with an incidence rate of 1.24 per 1000 inhabitants. Prevalence rises exponentially with age, being under 1% before the age of 50 and over 10% over the age of 70. It is the primary cause of hospitalisation in people over 65 years of age, with a re-hospitalisation rate of 23% to 58% during the first year. Hospital mortality rates are approximately 9.2% and these increase up to 14.5% over the follow-up year with a five-year survival rate of 40%. It accounts for 7.1% of public health costs in our environment.¹ Incidence and prevalence rates appear to be on the increase, due to the progressive ageing of the population, improvements in care and survival from chronic diseases and the fact that it constitutes the final stages of many heart diseases where survival has also risen.

The study by Pedro Tárrega López and contributors published in this edition of "Clínica e Investigación en Arteriosclerosis"² describes the differential characteristics of the population with CHF treated in 2 healthcare centres, one in an urban environment and the other in a rural environment, within the ALBAPIC study (heart failure in primary care in Albacete). This is a highly interesting initiative, delivering knowledge on the characteristics of the rural population with CHF. Patients with CHF in rural areas are older, and have a higher rate of concomitant diseases, greater prevalence of oncological diseases, poorer lipidaemic control and lower use of diagnostic and therapeutic measures than residents in urban areas. This is in keeping with data from other populations. In the rural population valve disease was remarkable as CHF aetiology, compared with ischemic heart disease in the urban population. The higher rate of first and second hospital re-admission was notable in the rural population, although as the number of re-admissions increased the proportion was inverted and we are unaware whether this was due to non referral or to the presence of care programmes for patients with advanced CHF. The low number of diagnostic echocardiograms in both areas was also surprising, with this being higher in the rural

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* Corresponding author.

E-mail address: azamora@salutms.cat (A. Zamora).

area (35% vs 22.2%). It would be necessary to have a more detailed awareness of the characteristics of the 2 groups and the availability of ultrasound studies for both groups. One notable fact was the high number of patients with normal ejection fraction. The authors made an interesting final care improvement proposal for patients with CHF to avoid possible inequalities due to geographical location. The proposal included multidisciplinary involvement and collaboration; an improvement in the recording of clinical data; improvement in vaccination coverage and in particular, an improvement in communication between primary care and hospital care, with a prominent role being given to new technologies, and especially telemedicine.

The first CHF registration data from the Spanish Society of Cardiology (SEC-Excelente), contained recently in a press release showed that 44.9% of patients hospitalised for CHF had not been previously diagnosed, indicating a delay in diagnostic procedures.³

We have witnessed a formidable revolution in recent years in the treatment of heart failure with reduced ejection fraction combined with better adherence to drugs and treatments which have been proven to be effective in reducing morbimortality, although there is still much room for improvement. In a recent study in our environment which included outpatients with CHF and ejection fraction of <40% from the MUSIC (2003-2004) and REDIN-SCOR I (2007-2011) registers, with 4-year follow-up, it was observed that patients in the most contemporary register had more frequently received beta blockers (85% compared with 71%; $P < .001$), antialdosteronic agents (64% compared with 44%; $P < .001$), automatic implantable defibrillator (19% compared with 2%; $P < .001$) and re-synchronisation (7.2 compared with 4.8%; $P = .04$). The most contemporary population presented a reduction in sudden death (6.8 compared with 11.4%; $P < .001$) secondary to therapeutic improvement.⁴ In the study by Pedro Tárrega López and contributors the percentages of treatment with beta blockers and antialdosteronic agents were lower. The additions to conventional treatment of mineral corticoid receptor antagonists, angiotensin receptor antagonists and neprilysin enzyme inhibitors (ARNIs) and sodium glucose co-transporter inhibitors (SGLT2) reduces the combined end point of cardiovascular death and admission for CHF by 62%.⁵

Advanced CHF represents between 1% and 10% of patients with CHF but due to its high frequency of recurrent hospitalisations generates a major use of resources which account for the 60% of care costs. The growing number of cutting-edge treatments and technologies for advanced heart failure offer more options than ever before which is why early diagnosis of these patients is important so as to avoid reaching an optimum therapeutic option too late and also to assess when the patient would be a candidate for palliative care programmes to improve their quality of life. The "Heart Team" is particularly necessary for patients with advanced CHF, who may benefit from more complex therapeutic options, such as implantable defibrillators, advanced surgical options with percutaneous techniques or transcatheter or heart transplants.⁶ No patient with advanced CHF should fail to receive or should receive delayed treatment options or optimal care due to geographical issues.

Approximately 50% of patients with CHF present with normal ejection fraction (HF-pLVEF). HF-pLVEF is a complex and

heterogeneous clinical syndrome composed of multiple processes with different psychopathological mechanisms and caution therefore needs to be taken when interpreting outcomes when we group all patient under the same HF-pLVEF umbrella. These patients present with a rate of admissions, re-admissions and impact on quality of life which is similar to patient with reduced ejection fraction and there is no optimum treatment at present. Its management requires an interdisciplinary approach.⁷ The patient phenotype through mass data analysis is presented as a promising option for standardising and improving the treatment of these patients.

A systematic review showed that care in multidisciplinary CHF units was associated with a 32% reduction in hospitalisations for CHF and a 29% drop in mortality from all causes. This constituted a key element in the management of these patients.⁸

The Spanish population living in rural municipalities is estimated to be approximately 6,400,000. Provincial diversity in levels of urbanisation and ruralisation is high. At least 2 million people take a mean of 66 minutes to reach towns, which means there is almost a 50% increase with regard to the threshold of accessibility considered to be optimum. One of the rural population traits is a higher rate of ageing, comorbidity and dependence.⁹ When designing a care route for CHF it is essential to avoid inequity of care to patients who reside in areas which are more distant from urban centres.

New technologies and particularly telemedicine are presented as promising elements for providing systemised care to patients with complex diseases, and they facilitate integration and collaboration between primary and hospital care. In the study by Pedro Tárrega López and contributors² randomised TIM trial results stand out showing that telemedicine reduces re-admissions and mortality and improves the quality of life in both the urban and rural population with CHF.¹⁰ The use of telemedicine in patients with CHF has proven to be cost-effective, with a 35% cost reduction.¹¹ Telemedicine in heart failure is an area with many possibilities but with a long way still to go. The HER-MeS clinical trial, led by the University Hospital of Bellvitge and the primary care teams, with participation for other hospitals and chronic care and nursing teams will be one of the largest studies conducted in Spain, to assess the impact of the mobile telephone and telemetry in patients who have been discharged from hospital with CHF. The programme includes the use of m-Health to coordinate the earliest visit after discharge, facilitating structured patient follow-up with individualised care plans, facilitating coordination in the search for possible alternatives to hospitalisation in the case of decompensation, such as the day hospitals or transfers of patients to other specialised teams if necessary, inducing the Advanced heart failure and transplant unit.¹² When implementing new technologies we should take into consideration the cognitive barriers and motivation as well as the physical problems and problems of perception that the old and elderly people may have so as not to increase a possible digital gap.¹³ The Covid-19 pandemic has entailed an enormous healthcare crisis, with a high cost to lives, and also to economic and social spheres. It has also multiplied by 10 the use of telemedicine. This may be the ideal time to eliminate barriers and continue with the expansion of telemedicine.¹⁴ CHF is a huge public healthcare problem

which requires improvements in its diagnostic and therapeutic approach. If we have diagnosed the problem and we are aware of possible solutions, why are we not dealing with this?

References

1. Lucía Fernández-Gassó, Lauro Hernando-Arizaleta, Palomar-Rodríguez Joaquín A, Victoria Abellán-Pérez María, Álvaro Hernández-Vicente, Pascual-Figal Domingo A. Population-based Study of First Hospitalizations for Heart Failure and the Interaction Between Readmissions and Survival. *Rev Esp Cardiol*. 2019;72(9):740–8.
2. Tárraga López Pedro J, Lucas Perez-Romero F Javier, Panisello Royo Josefa M, Simón García Miguel Angel, Villar Inarejos M Jose, Madrona Marcos Fatima, Sadek Ibrahim M, Octavio Sánchez Raquel, Peiró Monzo Fatima. Análisis comparativo del manejo de la insuficiencia cardiaca en 2 medios diferentes: rural versus urbano. (Estudio ALBAPIC) *Clin Investig Arterioscler*. 2020, <http://dx.doi.org/10.1016/j.arteri.2020.01.003>.
3. <https://secardiologia.es/comunicacion/notas-de-prensa/notas-de-prensa-sec/11628-un-registro-de-la-sec-demuestra-que-la-deteccion-de-la-insuficiencia-cardiaca-de-debut-no-es-optima> (visitada el 25/06/2020).
4. David Fernández-Vázquez, Andreu Ferrero-Gregori, Jesús Álvarez-García, Inés Gómez-Otero, Rafael Vázquez, Juan Delgado Jiménez, et al. Cambio en la causa de muerte e influencia de la mejora terapéutica con el tiempo en pacientes con insuficiencia cardiaca y fracción de eyección reducida. *Rev Esp Cardiol* 10.1016/j.recesp.2020.03.028.
5. Muthiah Vaduganathan, Claggett Brian L, Jhund Pardeep S, Cunningham Jonathan W, Pedro Ferreira João, Faiez Zannad, et al. Estimating lifetime benefits of comprehensive disease-modifying pharmacological therapies in patients with heart failure with reduced ejection fraction: a comparative analysis of three randomised controlled. *The Lancet*. 2020, [http://dx.doi.org/10.1016/S0140-6736\(20\)30748-0](http://dx.doi.org/10.1016/S0140-6736(20)30748-0).
6. Crespo-Leiro, M.G., Metra, M., Lund, L.H., Milicic, D., Costanzo, M.R., Filippatos, G., et al. Advanced heart failure: a position statement of the Heart Failure Association of the European Society of Cardiology. *Eur J Heart Fail*, 20: 1505-1535. doi:10.1002/ejhf.1236.
7. Cohen JB, Schrauben SJ, Zhao L, Basso MD, Cvijic ME, Li Z, Yarde M, et al. Clinical Phenogroups in Heart Failure With Preserved Ejection Fraction. Detailed Phenotypes, Prognosis, and Response to Spironolactone. *JACC Heart Fail*. 2020;8:172–84.
8. Gandhi S, Mosleh W, Sharma UC, Demers C, Far-kouh ME, Schwalm JD. Multidisciplinary Heart Failure Clinics Are Associated With Lower Heart Failure Hospitalization and Mortality: Systematic Review and Meta-analysis. *Can J Cardiol*. 2017;33(10):1237–44, <http://dx.doi.org/10.1016/j.cjca.2017.05.011>.
9. Ernest Reig, Goerlich Francisco J, Isidro Cantarino. Delimitación de áreas rurales y urbanas a nivel local: demografía, coberturas del suelo y accesibilidad. *Fundación BBVA*. 2016;(6). ISBN: 978-84-92937-64-6.
10. Koehler F, Koehler K, Deckwart O, Prescher S, Wegscheider K, Kirwan BA, et al. Efficacy of telemedical interventional management in patients with heart failure (TIM-HF2): A randomised, controlled, parallel-group, unmasked trial. *Lancet*. 2018;22, 1047-57.29.
11. Vestergaard AS, Hansen L, Sørensen SS, Jensen MB, Ehlers LH. Is telehealthcare for heart failure patients cost-effective? An economic evaluation alongside the Danish TeleCare North heart failure trial. *BMJ Open*. 2020;10(1):e031670.
12. Heart Failure Events Reduction With Remote Monitoring and eHealth Support Investigator Initiated Trial (HERMeS) Clinical Trials.gov Archive NCT03663907 (<https://clinicaltrials.gov/ct2/history/NCT03663907?V2=View#StudyPageTop> consultada el 23-06-2020).
13. Wildenbos GA, Linda Peute, Monique Jaspers. Aging Barriers Influencing Mobile Health Usability for Older Adults: A Literature Based Framework (MOLD-US). *Int J Med Inform*. 2019;124:68–77. Apr.
14. Rashid Bashur, Doarn Charles R, Frenk Julio M, Kvedar Joseph C, Woolliscroft James O. Telemedicine and the Covid-19 Pandemic, Lessons for the Future. *Telemed J E Health*. 2020, <http://dx.doi.org/10.1089/tmj.2020.29040.rb>. Apr 8.