

Temporal trends in hospitalizations and in-hospital mortality in heart failure in Spain 2003-2015: differences between autonomous communities



Tendencias temporales en ingresos y mortalidad hospitalaria por insuficiencia cardiaca en España, 2003-2015: diferencias por comunidades autónomas

To the Editor,

Heart failure (HF) is a syndrome whose already high prevalence and incidence have increased in recent years. Although there are various HF-related registries in Spain,^{1,2} few provide an overall picture, with most data being derived from specialized hospitals or units, with the possible associated biases. To study temporal trends in hospitalization and in-hospital mortality due to HF in Spain as a whole and according to autonomous community (AC), we have used the Spanish hospital Minimum Data Set (MDS)³ to analyze all discharges with the principal diagnosis of HF recorded in Spanish public hospitals between 2003 and 2015.³ The study population was based on hospitalization episodes recorded in the MDS between January 1, 2003, and December 31, 2015. The analysis included patients with the principal diagnosis of HF according to ICD-9-CM (International Classification of Diseases, Ninth Revision) codes 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, and 428 and considered hospital attendance (annual rate of hospital

admissions for HF per 100 000 population) and in-hospital mortality. The rate of hospital attendance was adjusted by age and sex. The risk-standardized mortality ratio (RSMR) was calculated as described recently.^{4,5} Quantitative variables were compared using the *t* test and analysis of variance (ANOVA); discrete variables were compared with the chi-square test. *P* values < .05 were considered significant.

Between 2003 and 2015, 4 946 702 admissions due to cardiovascular diseases were recorded; 1 363 022 were for HF (27.5%). The changes over time in the total number of admissions for HF are illustrated in figure 1A and showed a progressive increase from 2003 to 2015 (*P* < .001). The rate of age- and sex-weighted hospital attendance increased from 229.7 to 269.6/100 000 population (*P* < .001) (table 1A). This rate significantly differed among ACs (*P* < .001) (table 1A). The communities with the lowest rates of hospital attendance were the Canary Islands, Chartered Community of Navarre, and Catalonia (table 1A); the highest rates were seen in Principality of Asturias, Community of Madrid, and Aragon. The difference between the communities with the highest and lowest rates of hospital attendance was 259.3/100 000 population (396.3 in Asturias vs 137.0 in the Canary Islands). All of the ACs, except Catalonia, showed a significant increase in the rate of hospital attendance for HF from 2003 to 2015 (table 1A and figure 1B).

In-hospital mortality was significantly different among the ACs throughout the 2003 to 2015 study period (table 1B and figure 1C) (*P* < .001), with highly marked differences in the RSMR, from 7.97%

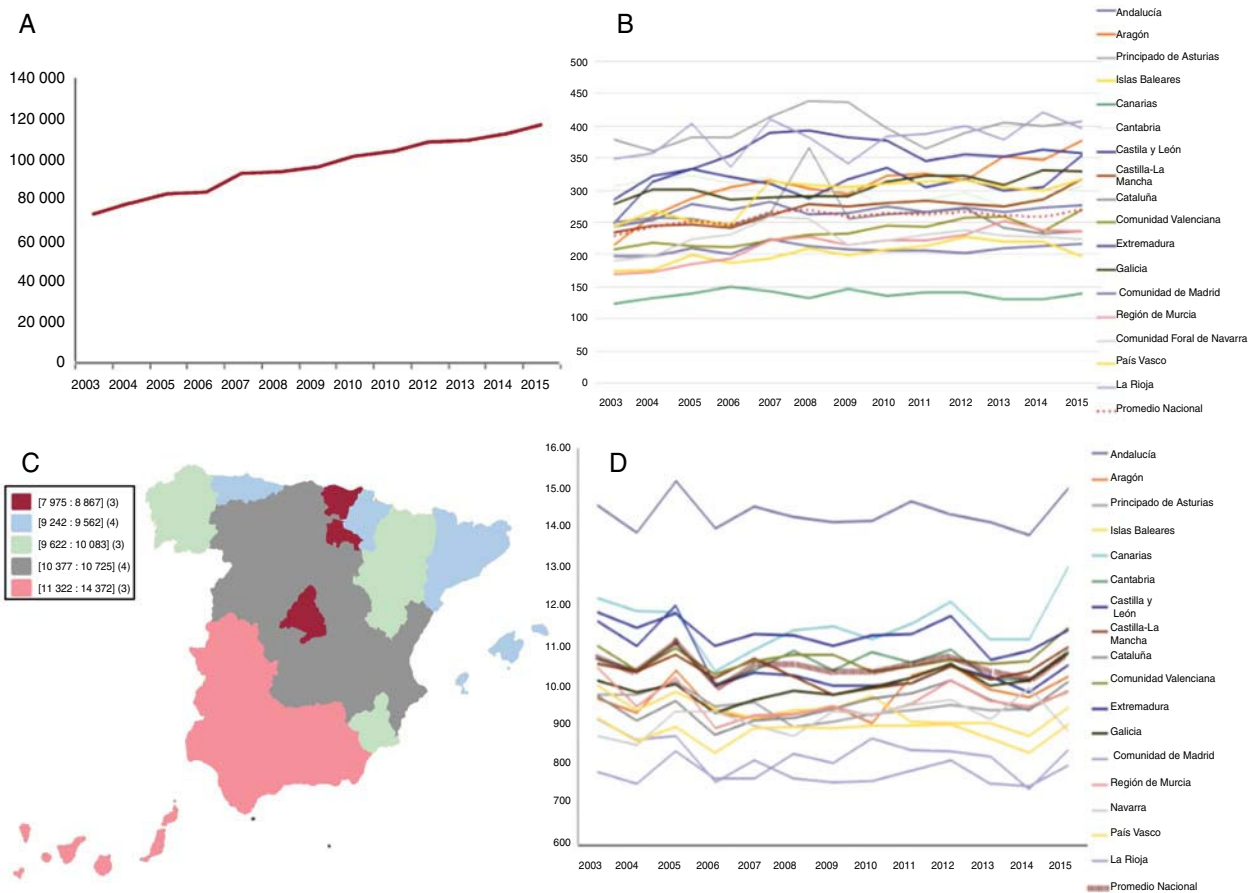


Figure 1. Temporal trends in heart failure in Spain from 2003 to 2015. A: changes in the number of admissions per year with the principal diagnosis of heart failure. B: rates of hospital attendance weighted by age and sex for every 100 000 population in the different autonomous communities. C: graphical representation of the in-hospital mortality rates adjusted by risk in the different autonomous communities. D: changes in the ratios of in-hospital mortality adjusted by risk in the different autonomous communities.

Table 1

Rates of age- and sex-weighted hospital attendance for HF for every 100 000 population between 2003 and 2015 in the different autonomous communities (A) and changes in the risk-standardized mortality ratios in the different autonomous communities in Spain between 2003 and 2015 (B)

A	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2003–2015
Andalusia ^a	197.6	196.7	208.7	200.9	222.8	212.2	207.0	206.5	205.9	203.2	210.3	212.6	217.0	208.0
Aragon ^a	214.2	260.6	286.2	304.1	314.6	303.4	294.3	321.8	324.9	314.5	352.7	346.0	376.7	309.4
Principality of Asturias ^a	378.4	361.2	382.0	381.9	413.3	437.6	436.8	395.5	364.2	389.1	405.0	399.9	406.6	396.3
Balearic Islands ^a	174.1	175.9	199.8	185.8	193.4	210.3	198.5	208.2	213.3	226.9	219.4	219.8	197.6	202.7
Canary Islands ^a	123.9	131.7	138.5	150.3	141.9	131.7	146.2	135.5	141.1	140.1	130.1	130.9	138.5	137.0
Cantabria ^a	305.9	315.5	322.8	311.7	321.0	284.8	305.5	271.5	285.0	296.3	274.3	289.2	306.6	299.0
Castile and León ^a	249.1	313.6	332.0	353.7	389.5	392.5	382.0	376.7	345.6	356.4	351.8	362.0	358.0	351.3
Castile-La Mancha ^a	234.8	244.7	247.2	241.1	260.4	278.9	273.9	280.8	282.9	278.6	274.0	284.7	316.8	270.0
Catalonia ^b	250.3	256.3	255.8	245.2	264.5	266.4	254.7	261.8	266.7	270.5	242.0	232.6	235.8	261.9
Valencian Community ^a	207.3	218.7	213.6	210.6	222.0	230.1	233.2	244.4	242.1	257.5	258.7	236.4	268.9	234.7
Extremadura ^a	286.0	322.6	332.9	320.8	310.3	287.4	316.2	335.0	305.2	317.6	299.2	304.1	354.1	314.8
Galicia ^a	277.6	301.3	301.1	285.1	288.1	290.2	291.3	314.0	322.1	321.9	308.8	331.0	329.1	304.8
Community of Madrid ^a	242.1	253.4	277.3	269.4	281.4	262.6	264.7	274.7	266.4	272.8	266.5	273.0	275.7	267.9
Region of Murcia ^a	169.8	172.6	184.2	194.1	221.2	227.5	215.6	221.6	221.6	231.2	251.3	237.4	235.3	214.9
Chartered Community of Navarre ^a	191.0	197.7	224.3	230.3	259.6	256.0	214.0	221.3	230.9	237.5	229.2	227.8	223.2	226.7
Basque Country ^a	243.8	266.9	251.3	246.9	312.9	308.6	304.7	310.1	313.9	315.8	305.0	300.1	317.1	292.2
La Rioja ^a	348.1	356.6	403.5	336.6	410.9	381.8	342.0	383.0	387.0	398.8	378.8	420.8	395.9	380.0
Spain ^a	229.7	242.8	251.4	247.0	265.6	270.0	259.3	264.4	262.1	266.7	261.3	259.3	269.6	258.0

B	RSMR per y													
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2003–2015
Andalusia	14.56	13.87	15.18	13.98	14.55	14.27	14.16	14.19	14.67	14.34	14.14	13.84	15.03	14.37
Aragon	9.70	9.36	10.41	9.33	9.22	9.30	9.49	9.09	10.27	10.55	9.93	9.72	10.26	9.77
Principality of Asturias	9.78	9.80	10.11	9.52	9.62	9.00	9.12	9.32	9.41	9.54	9.39	9.45	9.90	9.52
Balearic Islands	10.03	9.40	9.87	9.43	9.21	9.42	9.45	9.78	9.10	9.08	9.07	8.75	9.47	9.35
Canary Islands	12.22	11.92	11.89	10.38	10.94	11.41	11.52	11.18	11.60	12.14	11.19	11.19	13.04	11.60
Cantabria	10.70	10.42	11.11	10.06	10.40	10.91	10.41	10.86	10.62	10.93	10.19	10.19	10.92	10.59
Castile and León	11.66	11.02	12.03	10.02	10.36	10.30	10.03	10.04	10.09	10.53	10.25	9.86	10.55	10.44
Castile-La Mancha	10.59	10.38	10.81	10.21	10.72	10.24	9.80	9.95	10.10	10.52	10.18	10.39	11.01	10.38
Catalonia	9.76	9.16	9.63	8.78	9.14	9.23	9.43	9.70	9.83	10.16	9.66	9.41	10.12	9.56
Valencian Community	11.05	10.43	10.96	10.31	10.64	10.79	10.81	10.37	10.51	10.68	10.58	10.65	11.50	10.72
Extremadura	11.89	11.47	11.86	11.05	11.34	11.29	11.04	11.29	11.32	11.78	10.68	10.89	11.41	11.32
Galicia	10.15	9.87	10.06	9.36	9.66	9.90	9.80	9.99	10.23	10.57	10.03	10.17	10.84	10.08
Community of Madrid	9.20	8.67	8.74	7.60	8.13	7.68	7.60	7.64	7.87	8.14	7.56	7.49	8.03	7.97
Region of Murcia	10.48	9.51	10.22	8.96	9.29	9.32	9.46	9.28	9.56	10.16	9.62	9.50	9.88	9.62
Chartered Community of Navarre	8.76	8.54	9.38	9.37	9.02	8.78	9.36	9.31	9.55	9.68	9.19	9.97	8.89	9.24
Basque Country	9.23	8.64	9.00	8.35	8.95	8.97	8.95	9.01	9.02	9.04	8.69	8.34	9.06	8.87
La Rioja	7.85	7.57	8.38	7.69	7.70	8.29	8.07	8.68	8.41	8.36	8.25	7.43	8.40	8.10
Spain	10.84	10.53	11.06	10.19	10.52	10.51	10.38	10.37	10.48	10.64	10.22	10.14	10.80	10.54

RSMR, risk-standardized mortality ratio.

^a $P < .001$.

^b $P = .107$ (not significant).

RSMR tendencies without significant differences for any community or Spain as a whole between 2003 and 2015.

in the Community of Madrid to 14.35% in Andalusia (national average, 10.54%). The in-hospital mortality was unchanged between 2003 and 2015 ($P = .664$) (table 1B). As seen with the national average, there were no significant changes in mortality in any of the communities between 2003 and 2015 (table 1B and figure 1D). Every year, mortality was higher in Andalusia, the Canary Islands, Extremadura, and Castile and León and lower in Community of Madrid, Chartered Community of Navarre, La Rioja, and the Basque Country, with intermediate annual rates in the other regions.

There were also no differences in the RSMR according to sex, with similar mortality in men and women in both Spain as a whole (men, 10.39%; women, 10.32%; $P = .517$) and in the different ACs,

without changes from 2003 to 2015. In men, the RSMR decreased from 10.90% in 2003 to 10.78% in 2015 ($P = .816$); in the same period, it increased from 10.78% to 10.82% in women ($P = .517$). Although the rate of hospital attendance was generally lower in women during the study period, the tendency for an increase in this rate was similar in the 2 sexes ($P = .563$).

In conclusion, this study has revealed a significant increase in the number of admissions and in the rate of hospital attendance for HF between 2003 and 2015 in Spain and in almost all ACs. In addition, in-hospital mortality adjusted by risk (RSMR) was largely unchanged in the study period and remains at about 10% in Spain. These data confirm the tendency shown by older studies^{5,6} and indicate an ever-increasing

impact of HF. The rate of hospital attendance varied significantly among the different ACs, similar to in-hospital mortality. With the limitations inherent to the data source, the hospital MDS, which is dependent on the quality of the disease coding but is used throughout Spain, we believe that our data shed light on a highly impactful problem, that of the continuous increase in HF burden in Spain and of the major differences among ACs. It is essential to identify explanations for these differences through research that relates these data to variables such as socioeconomic factors, geographical dispersion, health care parameters (management systems, health care investment), the existence of HF programs, discharge services, and type of hospital.

Acknowledgments

We thank the Spanish Ministry of Health and the Institute of Health Information of the Spanish National Health System for the resources provided to the Spanish Society of Cardiology to undertake the RECALCAR project.

FUNDING

This work was made possible by an unconditional grant from Menarini.

Manuel Anguita Sánchez,^{a,b,*} Juan Luis Bonilla Palomas,^c María García Márquez,^d José Luis Bernal Sobrino,^{d,e} Cristina Fernández Pérez,^{c,f,g} and Francisco Javier Elola Somoza^d

^aServicio de Cardiología, Hospital Universitario Reina Sofía, Córdoba, Spain

^bServicio de Cardiología, Hospital Quirón Salud, Córdoba, Spain

^cServicio de Cardiología, Hospital San Juan de la Cruz, Úbeda, Jaén, Spain

^dFundación Instituto para la Mejora de la Asistencia Sanitaria, Madrid, Spain

^eServicio de Control de Gestión, Hospital Universitario 12 de Octubre, Madrid, Spain

^fInstituto de Investigación Sanitaria, Hospital Clínico San Carlos, Madrid, Spain

^gDepartamento de Medicina Preventiva, Hospital Clínico San Carlos, Madrid, Spain

* Corresponding author:

E-mail address: manuelanguita@secardiologia.es

(M. Anguita Sánchez).

Available online 12 August 2020

REFERENCES

- López-Mesa JB, Andrés de Llano JM, López-Fernández L, et al. Evolución de las tasas de hospitalización y mortalidad hospitalaria por enfermedades cardiovasculares agudas en Castilla y León, 2001-2015. *Rev Esp Cardiol*. 2018;71:95–104.
- Jiménez-Navarro M, Gómez-Doblas J, Molero E, et al. Heart failure mortality in Spain: is there an andalusian paradox? *Rev Clin Esp*. 2006;206:276–277.
- Registro de altas de hospitalización: CMBD del Sistema Nacional de Salud. Glosario de términos y definiciones. Portal estadístico del SNS [updated Sep 2016]. p. 5-6. Available from: <http://pestadistico.inteligenciadegestion.msbs.es/publicoSNS/comun/DescargaDocumento.aspx?IdNodo=6415>. Accessed 21 May 20.
- Bertomeu V, Cequier A, Bernal JL, et al. In-hospital mortality due to acute myocardial infarction. Relevance of type of hospital and care provided. RECALCAR study. *Rev Esp Cardiol*. 2013;66:935–942.
- Martínez-Santos P, Bover R, Esteban A, et al. Mortalidad hospitalaria y reingresos por insuficiencia cardiaca en España. Un estudio de los episodios índice y los reingresos por causas cardíacas a los 30 días y al año *Rev Esp Cardiol*. 2019;72:988–990.
- Brotos C, Moral I, Ribera A, et al. Tendencias de la morbimortalidad por insuficiencia cardiaca en Cataluña. *Rev Esp Cardiol*. 1998;51:972–976.

<https://doi.org/10.1016/j.rec.2020.05.040>

1885-5857/

© 2020 Published by Elsevier España, S.L.U. on behalf of Sociedad Española de Cardiología.

Heart transplant during the COVID-19 pandemic: follow-up organization and characteristics of infected patients



Trasplante cardíaco durante la pandemia de la COVID-19: organización asistencial y características de los pacientes infectados

To the Editor,

A new acute severe respiratory distress syndrome was first described in December 2019 in China and a novel coronavirus was soon identified afterward as being responsible for what is now known as coronavirus disease 2019 (COVID-19).^{1,2} In a short period of time, this pandemic has tested the capabilities of health care systems worldwide and led to the implementation of various confinement measures intended to stop the spread of the virus. In this setting, it has become essential to organize health care to provide medical attention to this new disease while maintaining appropriate clinical follow-up for other patients.

We present our experience with heart transplant (HT) recipient care during the pandemic in Madrid (Spain). Our program has performed 614 HT procedures in the last 30 years, with patients from a wide geographical area (including the Canary Islands) regularly followed up both at our hospital (as a referral center) and at their local institutions. All information was collected from our medical records (figure 1).

During a 2-month period (February 28 to April 28, 2020), all HT recipients were screened for COVID-19 symptoms. All recipients received information about the confinement and protective measures (face mask and hand hygiene) and about the procedure to be followed in the case of suspected COVID-19. We scheduled telephone follow-up for high-risk patients (ie, late allograft dysfunction) and deferred the visits of stable patients. We maintained visits for the most recent HT recipients (within 3 months after transplantation) in a protective circuit for outpatient care in our hospital. A coronavirus-free area called an intermediate area (IA) was established in our center to evaluate high-risk patients (solid organ transplant recipients, ventricular assist device patients, and oncologic patients) who needed evaluation due to suspected COVID-19. This IA comprised individual rooms that permitted patient evaluation, including chest X-ray and the collection of upper respiratory tract samples for coronavirus RNA detection by polymerase chain reaction (PCR) and blood samples. This IA was available 24 hours a day, 7 days a week and eliminated the need for these patients to visit the emergency department. All IA staff received intensive training in procedures concerning patient isolation, individual protective equipment management, and routine sterilization. The clinical stage at evaluation according to a recently proposed classification³ is shown in figure 1. Stage I (mild) is the initial symptomatic phase, stage II (moderate) has pulmonary involvement without (IIa) and with (IIb) hypoxia due to local lung inflammation, and stage III (severe) is a systemic hyperinflammation syndrome.