

Trends in hospitalization and mortality for heart failure in Spain, 1980–1993

F. Rodríguez-Artalejo*†, P. Guallar-Castillón†‡, J. R. Banegas Banegas† and J. del Rey Calero†

*Department of Preventive Medicine and Public Health, Universidad del País Vasco, Vitoria-Gasteiz; †Department of Preventive Medicine and Public Health, Universidad Autónoma de Madrid, Madrid; ‡Centro Universitario de Salud Pública (CUSP), Universidad Autónoma de Madrid, Madrid, Spain

Aims To describe, for the first time, trends in hospitalization and mortality rates for congestive heart failure in Spain during the period 1980–1993.

Methods and results Data on primary diagnosis of congestive heart failure were taken from the National Hospital Morbidity Survey and the National Vital Statistics. The number of hospital admissions for congestive heart failure rose by 71% (from 42 965 in 1980 to 73 448 in 1993) and hospitalization rates for congestive heart failure increased by 47% (from 348 per 100 000 in 1980 to 511 per 100 000 in 1993). The rise in hospitalizations was limited to persons aged ≥ 65 years, and proved greater among women. Congestive heart failure was the leading cause of hospitalization in persons aged ≥ 65 years, accounting for 5% of all hospital admissions in this age group. Age-

adjusted congestive heart failure mortality declined by 23%. The decline affected all age groups, with the sole exception of the ≥ 80 -year group in which mortality rose. Nevertheless, congestive heart failure remained the third leading cause of cardiovascular death.

Conclusion Congestive heart failure represents a significant hospital and demographic burden for the Spanish population. The hospital burden increased substantially in the period 1980–1993, and will continue to do so in future with the growth of the elderly population.

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Key Words: Heart failure, hospitalization, mortality, trends.

Introduction

Congestive heart failure is an important public health problem in developed countries^[1,2]. The progressive ageing of the population, along with increased survival of patients with ischaemic heart disease and/or high blood pressure, as a result of improvements in treatment, are likely to lead to an increase in the incidence of congestive heart failure in the coming years^[3]. Moreover, therapies with vasodilators and angiotensin converting enzyme inhibitors (ACEI) prolong congestive heart failure survival^[4,5], something which could further contribute to increasing its prevalence in future.

The Framingham Heart Study reported an annual incidence of congestive heart failure of 2.3 cases per 1000 among males and 1.4 cases per 1000 among females^[6]. In the U.S.A., prevalence of self-referred

congestive heart failure in the non-institutionalized adult population stands at 1.1%^[7]. As congestive heart failure is a serious health problem, a significant part of the health care burden falls upon the hospital system. In addition, the prognosis for congestive heart failure is poor. In the Framingham Heart Study, median survival was 1.7 years among males and 3.2 years among females, and survival at 5 years was 25% in males and 38% in females^[8].

Thus, hospitalization and mortality trends constitute a useful instrument for observing possible changes in the health care and demographic impact of congestive heart failure. Although population-based information on this topic is scanty in Europe, there is evidence of a 60% increase in hospital admissions for congestive heart failure in Scotland in the period 1980–1990^[9]. Also, there has been an increase in hospitalizations for congestive heart failure in the U.S.A. in the last two decades^[10,11]. This paper describes trends in hospitalization and mortality rates for congestive heart failure in Spain for the first time, covering the period 1980–1993.

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Correspondence: Dr Fernando Rodríguez Artalejo, Departamento de Medicina Preventiva y Salud Pública, Universidad Autónoma de Madrid, Arzobispo Morcillo, sn 28029 Madrid, Spain.

Table 1 Hospital admissions for congestive heart failure in Spain in the period 1980–1993, by sex

Year	Number			% first-time admissions			Rate per 100 000		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
1980	42 961	23 255	19 706	69.03	67.10	71.32	348.14	412.82	293.77
1981	45 789	24 968	20 821	71.56	69.86	73.61	364.12	434.53	304.83
1982	51 690	27 229	24 461	71.64	70.12	73.33	403.37	464.60	351.72
1983	54 275	28 432	25 843	69.79	67.56	72.24	415.65	475.65	364.96
1984	54 159	27 710	26 449	69.68	67.30	72.18	407.06	454.53	366.88
1985	57 366	29 276	28 090	68.96	66.21	71.83	423.17	470.87	382.73
1986	57 467	28 938	28 529	70.12	68.53	71.74	416.08	456.40	381.83
1987	57 763	27 589	30 174	73.00	72.47	73.48	410.49	426.69	396.71
1988	58 365	27 389	30 976	72.59	70.84	74.14	407.17	415.40	400.08
1989	65 842	31 833	34 009	71.35	70.14	72.49	450.88	473.48	431.53
1990	67 354	33 672	33 682	69.91	69.06	70.76	452.77	491.19	419.88
1991	70 095	33 411	36 684	74.21	72.60	75.68	499.59	523.68	485.02
1992	67 349	33 114	34 235	76.04	75.61	76.47	474.10	512.42	447.14
1993	73 442	35 101	38 341	68.99	67.62	70.26	510.97	536.52	494.85
Change 1993–1980 (%)*	70.95	50.94	94.57	–0.05	0.79	–1.49	46.77	29.97	68.45

*Change 1993–1980 = [(value in 1993 – value in 1980)/value in 1980] × 100.

Methods

Hospitalization data were taken from the National Hospital Morbidity Survey conducted annually by the National Statistics Office (Instituto Nacional de Estadística INE). This survey includes information on primary diagnosis for hospital admissions on a representative sample of Spanish hospitals, public (both civilian and military) and private. The overall sample size consisted of 75% of all Spanish hospitals and 10% of all patient admissions^[12]. Mortality data were taken from the National Vital Statistics database, as supplied by the INE. Only the underlying cause of death mentioned on the death certificate was considered.

For the purposes of this study, the following rubrics of the ninth revision of the International Classification of Diseases (ICD-9)^[13] were deemed to constitute congestive heart failure: 398 (other acute rheumatic heart diseases), 402 (hypertensive heart disease), 404 (hypertensive heart and renal disease), 416 (chronic pulmonary heart disease), 425 (cardiomyopathy), 428 (heart failure), 429 (ill-defined descriptions and complications of heart disease).

The National Hospital Morbidity Survey does not track individuals; therefore the readmission to the hospital of the same person is counted as a separate event. As a consequence, hospital admissions refer to the number of cases admitted to a hospital. Admission rates relate this number to the population (in 100 000) of the country. Finally, hospital stays are the number of days spent in hospital as a consequence of a congestive heart failure admission.

Age-specific congestive heart failure hospitalization and mortality rates were calculated for persons aged ≥45 years, using population estimates furnished by the INE^[14,15]. Lastly, age-adjusted rates were com-

puted, using the direct method^[16] and the European population in 5-year age groups as standard^[17].

Results

Hospitalizations

In 1980 there were 42 961 hospital admissions for congestive heart failure (23 255 in males and 19 706 in females). The number of admissions for congestive heart failure grew progressively until 1993, reaching a figure of 73 442 (35 101 in males and 38 341 in females) (Table 1). This represents an increase with respect to 1980 of 71.0% for both sexes, which breaks down as 50.9% in males and 94.6% in females. The percentage of first-time hospital admission for congestive heart failure over total hospital admissions for congestive heart failure remained stable during the period 1980–1993 (Table 1). Congestive heart failure hospitalization rates rose by 46.8%, going from 348.1 per 100 000 in 1980 to 511.0 per 100 000 in 1993, with men registering a 30.0% and women a 68.5% rise (Table 1).

Whereas 58.1% of all hospital admissions for congestive heart failure involved persons aged ≥65 years in 1980, this figure had risen to 75.1% by 1993. The rise in the number and rate of admissions was limited to persons aged ≥65 years, and proved greater among women (Fig. 1 (a) and (b), Table 2). Age-standardized congestive heart failure hospitalization rates rose by 26.4% for both sexes, which broke down as 26.9 in males and 36.4% in females for the period 1980–1993 (Fig. 1 (c)). The number of admissions for congestive heart failure was higher for women than men aged ≥65 years (Fig. 1 (a), Table 2), due to the greater number of Spanish women in this age stratum. However, male congestive heart failure hospitalization rates remained

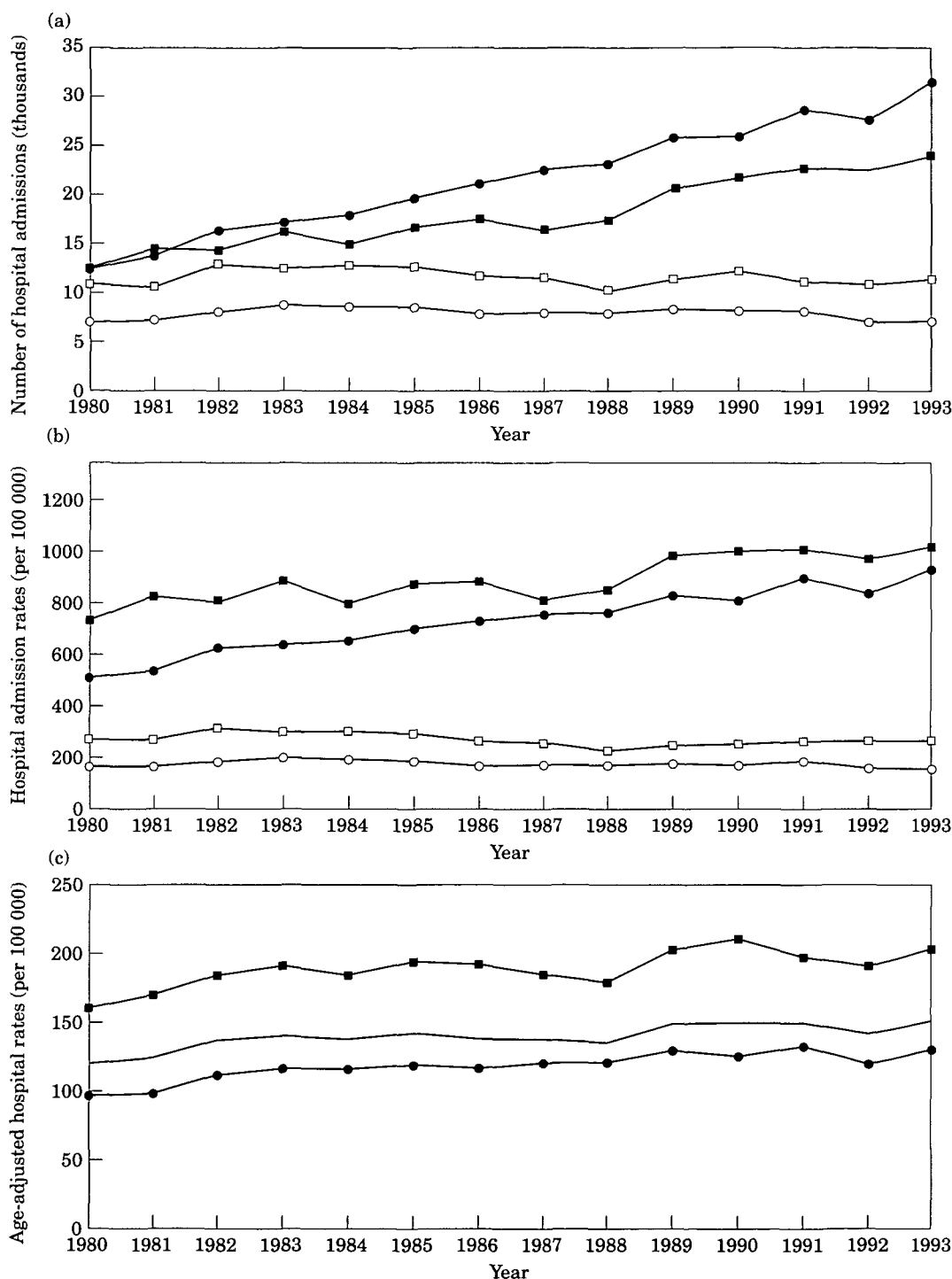


Figure 1 Hospital admissions for congestive heart failure in Spain, 1980-1993. (a) number of hospital admissions; (b) hospital admission rates; (c) age-adjusted hospital admission rates. (a) and (b) □ = men 45-64 years; ○ = women 45-64 years; ■ = men ≥ 65 years; ● = women ≥ 65 years. (c) — = both sexes; ■ = men; ● = women

higher than those for women through the study period (Fig. 1 (b) and (c), Table 2).

Cardiovascular diseases were the principal cause of hospitalization among the Spanish population aged ≥ 65 years in the period 1989-1993 (Table 3). In this age

group and as between all cardiovascular diseases, congestive heart failure was the leading cause of hospitalization for both sexes and for women, and the second leading cause among men, immediately after ischaemic heart disease (ICD-9: 410-414). During the period

Table 2 Hospital admissions for congestive heart failure in Spain in 1980 and 1993, by sex and age group

	Number			Rate per 100 000		
	Total	Men	Women	Total	Men	Women
45–64 years						
Year 1980	17 979	10 830	7149	219.98	275.15	168.70
Year 1993	18 297	11 134	7163	212.82	266.36	162.61
Change 1993–1980 (%)*	1.77	2.81	0.20	–3.25	–3.30	–3.61
65 years and over						
Year 1980	24 982	12 425	12 557	599.49	732.06	508.29
Year 1993	55 145	23 967	31 178	954.85	1014.59	932.65
Change 1993–1980 (%)*	120.74	92.89	148.29	59.28	38.59	83.49

*Change 1993–1980=[(value in 1993 – value in 1980)/value in 1980] × 100.

Table 3 Hospital admissions for all causes and cardiovascular diseases in Spain, 1989–1993, by sex and age groups

	Number			%*			Rates per 100 000		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
45 years and over									
All causes	1 867 083	994 650	872 433	100.00	100.00	100.00	12 949.16	15 087.33	11 222.24
Total cardiovascular	275 319	153 709	121 610	14.75	15.45	13.94	1909.47	2331.53	1564.29
Congestive heart failure	68 824	33 430	35 394	3.69	3.36	4.06	477.33	507.08	455.28
Ischaemic heart disease	76 875	53 004	23 871	4.12	5.33	2.74	533.17	803.99	307.06
Cerebrovascular disease	48 374	25 011	23 364	2.59	2.51	2.68	335.50	379.37	300.53
45–64 years									
All causes	871 057	476 667	394 390	100.00	100.00	100.00	9760.90	10 916.36	8653.84
Total cardiovascular	102 965	65 207	37 758	11.82	13.68	9.57	1153.80	1493.33	828.49
Congestive heart failure	19 540	11 837	7703	2.24	2.48	1.95	218.96	271.08	169.03
Ischaemic heart disease	33 037	26 156	6881	3.79	5.49	1.74	370.20	599.01	150.99
Cerebrovascular disease	11 638	7540	4098	1.34	1.58	1.04	130.41	172.69	89.91
65 years and over									
All causes	996 027	517 983	478 044	100.00	100.00	100.00	18 299.82	23 268.88	14 861.09
Total cardiovascular	172 354	88 502	83 852	17.30	17.09	17.54	3166.63	3975.68	2606.75
Congestive heart failure	49 284	21 593	27 691	4.95	4.17	5.79	905.49	970.00	860.84
Ischaemic heart disease	43 838	26 848	16 990	4.40	5.18	3.55	805.43	1 06.07	528.17
Cerebrovascular disease	36 736	17 470	19 266	3.69	3.37	4.03	674.94	784.79	598.93

*%=percentage over hospital admissions for all causes.

1989–1993, congestive heart failure accounted for 1 013 162 hospital stays per year, namely, 315 104 and 698 058 among persons in the 45–64 and ≥65 age groups respectively.

In Spain, congestive heart failure, ischaemic heart disease and cerebrovascular disease (ICD-9: 430–438) hospitalization rates increased over the period 1980–1993 among men and women aged ≥65 years (Fig. 2). Among the 45–64 age group, however only the ischaemic heart disease hospitalization rate rose (Fig. 2). Congestive heart failure grew progressively less important compared to ischaemic heart disease as a cause of hospitalization among males in the period 1980–1993 (Fig. 2).

Mortality

There were 29 190 congestive heart failure deaths (12 980 in males and 16 210 in females) in Spain in 1980

vs 34 002 (12 723 in males and 21 279 in females) in 1993 (Table 4). This represented a change with respect to 1980 of 16.5% for both sexes, which broke down as –2.0% in men and 31.3% in women. Although congestive heart failure mortality rates for both sexes registered no change between 1980 and 1993, they declined by –15.6% in men and rose by 13.6 in women (Table 4).

In 1980, 83.1% of all congestive heart failure deaths occurred among persons aged ≥65 years, with this figure rising to 88.3% by 1993. All age groups registered a decline in the mortality rate except for the ≥80 age group, in which rates rose. Age-standardized congestive heart failure mortality rates declined by 23.0% (30.9% in males and 17.5% in females) from 1980 to 1993 (Fig. 3). Male congestive heart failure mortality rates remained higher than those for women throughout the period.

The decrease in congestive heart failure mortality rates coincided with a moderate decline in ischaemic

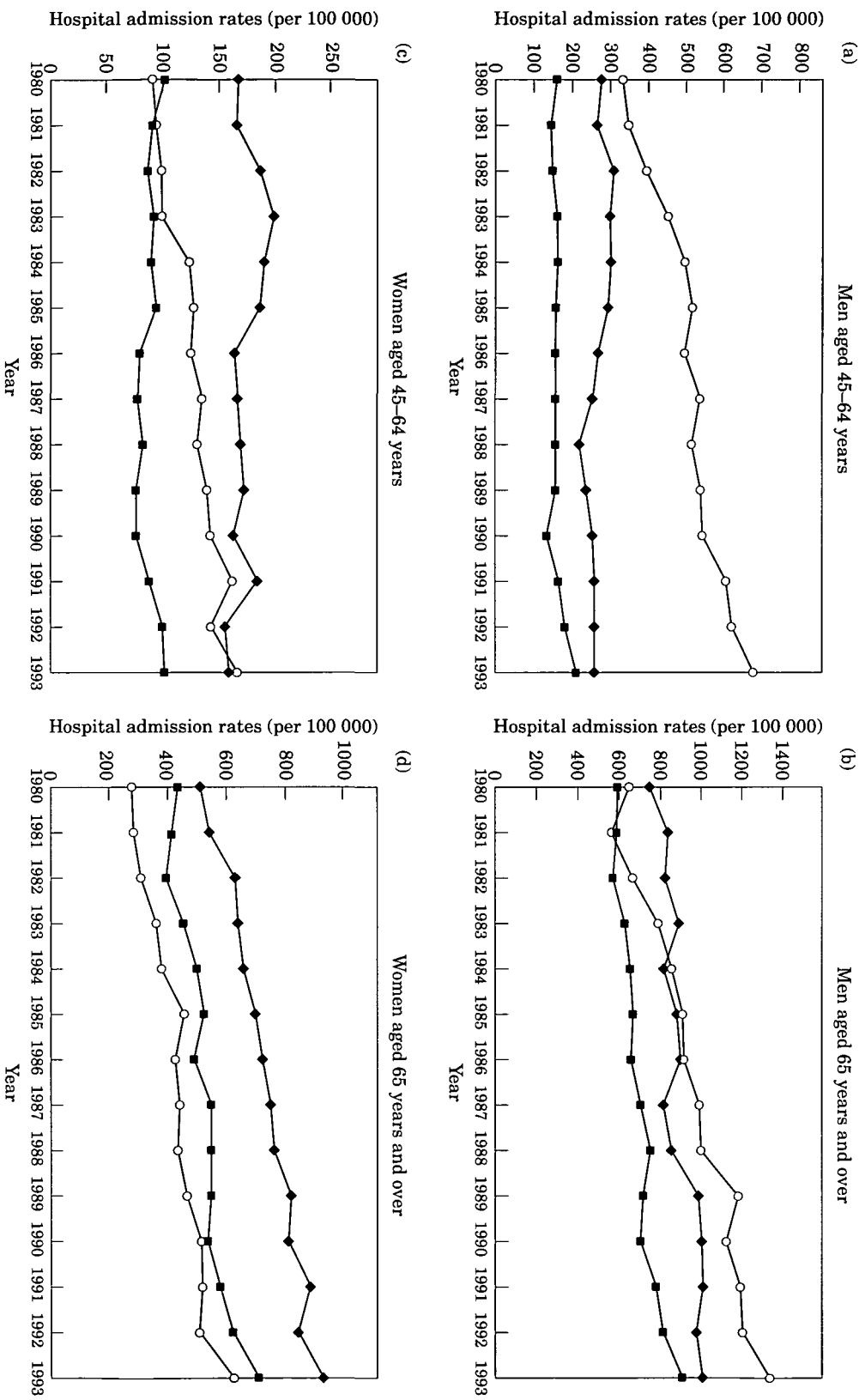


Figure 2 Hospital admission rates for cardiovascular diseases in Spain, 1980-1993. ○ = ischemic heart disease; ■ = cerebrovascular disease; ◆ = congestive heart failure.

Table 4 Deaths from congestive heart failure in Spain in the period 1980–1993, by sex

Year	Number			Rates per 100 000		
	Total	Men	Women	Total	men	Women
1980	29 190	12 980	16 210	236.52	230.42	241.65
1981	29 807	13 067	16 740	237.01	227.41	245.08
1982	28 749	12 389	16 360	224.33	211.39	235.24
1983	31 028	13 182	17 846	237.61	220.53	252.03
1984	29 540	12 427	17 113	222.01	203.84	237.38
1985	31 123	13 234	18 889	236.95	212.86	257.36
1986	31 946	12 810	19 136	231.29	202.03	256.11
1987	30 760	12 230	18 530	218.59	189.15	243.62
1988	31 916	12 523	19 393	222.63	189.93	250.47
1989	32 635	12 498	20 137	223.46	185.89	255.51
1990	32 940	12 610	20 330	221.42	183.95	253.44
1991	33 895	13 076	20 819	241.57	204.95	275.26
1992	32 847	12 541	20 306	231.21	194.06	265.21
1993	34 002	12 723	21 279	236.55	194.47	274.64
Change 1993–1980 (%)*	16.49	– 1.98	31.27	0.01	– 15.60	13.65

*Change 1993–1980=[(value in 1993 – value in 1980)/value in 1980] × 100.

heart disease mortality and a marked fall in mortality due to cerebrovascular disease and cardiovascular causes as a whole (Fig. 4). As a result, congestive heart failure continued to rank as the third leading cause of cardiovascular death in Spain. In the period 1989–1993, cardiovascular diseases accounted for 40.4% of all deaths in Spain, with congestive heart failure giving rise to 25.2% of cardiovascular deaths in persons aged ≥ 45 years.

Discussion

Congestive heart failure is the leading cause of hospitalization among persons aged ≥ 65 years in Spain. Furthermore, the congestive heart failure hospitalization rate rose substantially among persons aged ≥ 65 years during the period 1980–1993.

Among the determinants of these results, there are both artificial and real factors. The most important artificial factor is that the Hospital Morbidity Survey database holds no information on congestive heart failure as secondary diagnosis on admission, or on patients who develop congestive heart failure post-admission and require treatment. Moreover, the coding of the grounds for hospital admission has improved substantially in Spain since the second half of the 1980s. This has led to the diagnosis of congestive heart failure being gradually replaced by other more specific diagnoses, such as ischaemic heart disease or other causes of congestive heart failure. Thus, while our results indeed show congestive heart failure to be an important public health problem, they underestimate the related hospital burden in Spain and the increase in same during the period 1980–1993.

Of the real factors responsible for the increase in congestive heart failure-related hospitalizations in

Spain, probably the most important is the growth and ageing of the Spanish population during the study period. Whereas the 1981 population census put the number of persons aged ≥ 65 years at 4 236 724 (11.2% of the total population), the 1991 census reported a figure of 5 370 252 persons in this age group (13.8 of the total population)^[18,19]. The effect of these demographic factors can be seen in the increased steepness of the hospitalization slope when unadjusted for said factors (Fig. 1 (a) vs (b) and (c)). The rise in hospitalizations was rendered possible by the greater supply and accessibility of hospital services ensuing from the growth in the number of general hospitals^[20] and the improvement in means of transport in Spain that took place between 1980 and 1993.

The fact that hospitalizations increased solely among persons aged ≥ 65 years could, in part, be attributable to the decline in ischaemic heart disease^[21] and the generalization of antihypertensive treatments since the 1960s in Spain^[21,22], thus displacing the appearance of congestive heart failure towards more advanced ages. It is additionally possible that the introduction of vasodilator-^[4] and ACEI-based^[5] treatments for congestive heart failure may have contributed to delaying hospitalizations until such ages. Lastly, as the percentage of first-time hospitalizations remained stable throughout the study period, the increase in the number of hospitalizations might be due to a rise both in congestive heart failure incidence and survival.

The health care burdens imposed by the principal cardiovascular disorders are a reflection of the respective frequencies of such disorders at different ages. Ischaemic heart disease appears earlier and can be the cause of congestive heart failure and cerebrovascular disease. Accordingly, ischaemic heart disease generates a greater number of hospitalizations in the 45–64 age stratum, while congestive heart failure predominates in

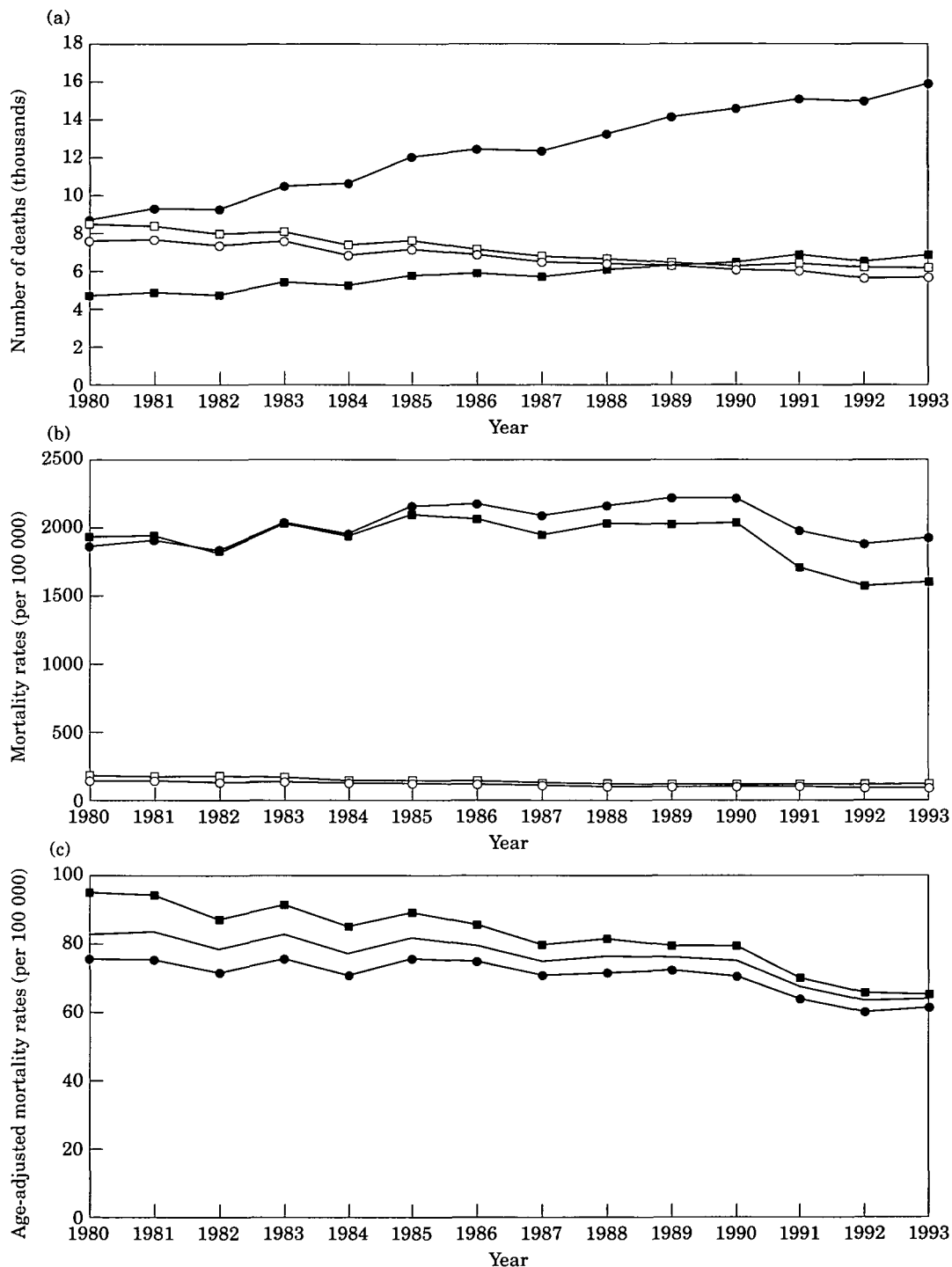


Figure 3 Deaths from congestive heart failure in Spain, 1980–1993 (a) number of deaths; (b) mortality rates; (c) age-adjusted mortality rates. (a) and (b) □ = men 45–79 years; ○ = women 45–79 years; ■ = men ≥ 80 years; ● = women ≥ 80 years. (c) — = both sexes; ■ = men; ● = women.

the ≥ 65 age stratum (Table 2). Attention should also be drawn to the considerable number of cerebrovascular disease-related hospitalizations, particularly among women aged ≥ 65 years (Table 2). In Spain, as in a number of Mediterranean countries, cerebrovascular disease is more frequent than ischaemic heart disease^[23].

This is consistent with the fact that in Spain, hypertension, the chief risk factor for cerebrovascular disease, is as frequently the cause of congestive heart failure, as is ischaemic heart disease^[24].

In the main, our results coincide with those obtained in Scotland^[9] and the U.S.A.^[10,11,25]. In

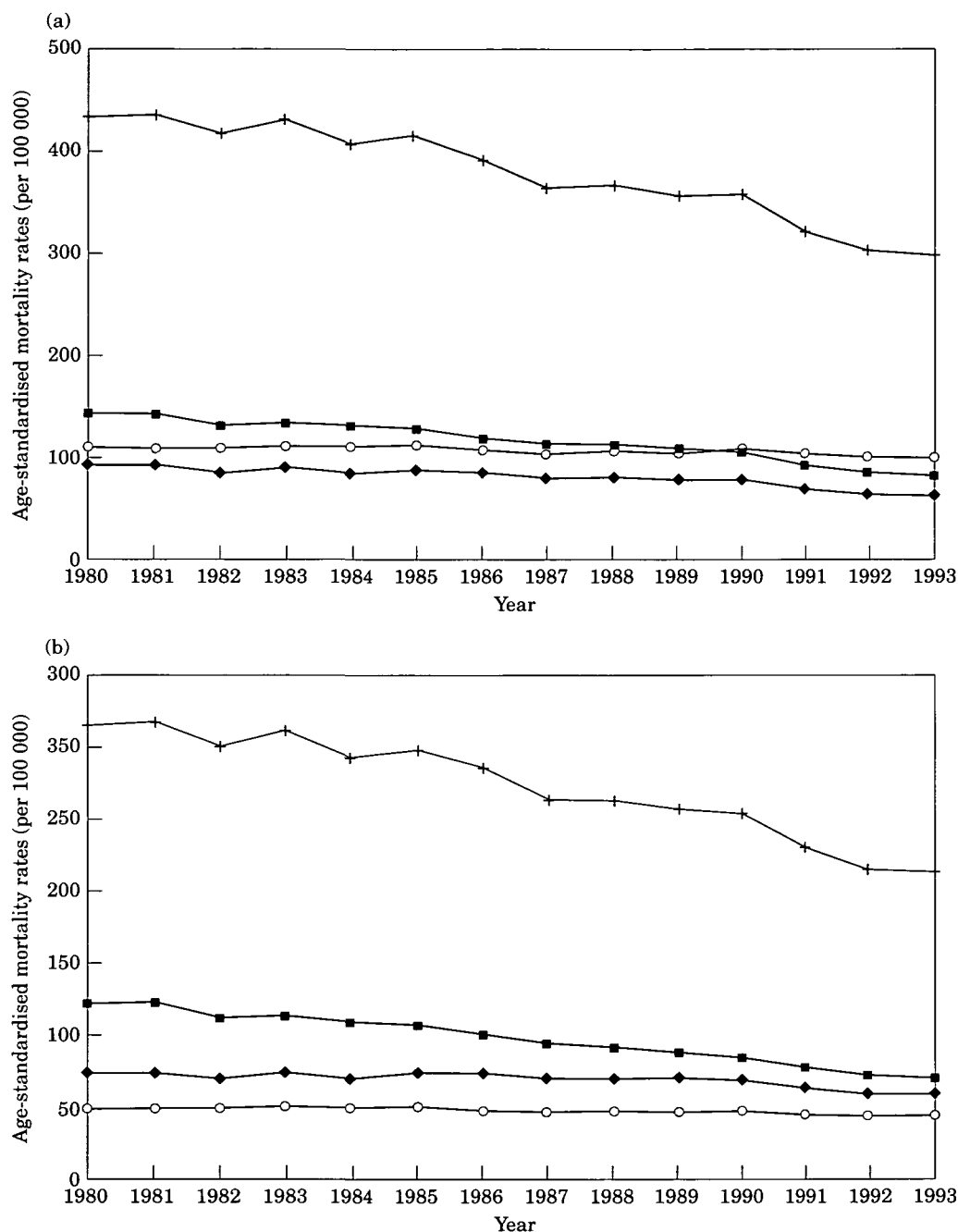


Figure 4 Age-standardized mortality, in persons aged ≥ 45 years, for cardiovascular diseases in Spain, 1980–1993. (a) men; (b) women; + = total cardiovascular; O = ischaemic heart disease; ■ = cerebrovascular disease; ◆ = congestive heart failure.

Scotland, however, the increase in hospitalizations was also reported for young adults and, in addition, the percentage of congestive heart failure admissions over total admissions at general and geriatric medical units grew in the period 1980–1990. In the U.S.A. on the other hand, the rise in hospitalizations in the period 1971–1990 basically affected the ≥ 65 -year age group. In both Scotland and the U.S.A., hospitalization rates were higher among men. Nevertheless, inter-country

differences in coding practices and hospital-morbidity data sources hinder any comparison of hospitalization rates.

As regards congestive heart failure mortality, the most important finding was the reduction in age-adjusted rates for the period 1980–1993. It is feasible that part of the decline in congestive heart failure mortality might have been due to the decrease in ischaemic heart disease and, also, to the diagnosis of

congestive heart failure being gradually replaced by the more specific diagnosis of ischaemic heart disease, as a result of improvements in diagnostic techniques and accessibility of health care services. However, the improvement in diagnosis and certification of cause of death would tend to affect persons aged ≥ 80 years to a lesser extent. Despite the observed decline, congestive heart failure remained the third leading cause of cardiovascular death in Spain. Moreover, our data underestimate the demographic impact of congestive heart failure, because they included congestive heart failure only where it was the underlying cause of death. Regional studies into multiple causes of death suggest that congestive heart failure was mentioned on death certificates as contributory or secondary cause approximately 1.6 times more frequently than it was as the underlying cause (personal communication by Dr Antonio de Lucas).

Our results are consistent with those from Canada, where a decline in age-adjusted mortality was observed in both sexes in the period 1980–1989^[26]. In the U.S.A. however, a rise in congestive heart failure mortality was reported for the period 1980–1988, followed by a slight decline in 1989 and 1990^[11,27]. It is possible that the decline in these last 2 years might be ascribable to the revision of the Standard Death Certificate in the U.S.A. in 1989 and the ensuing substitution of congestive heart failure by more specific causes of death^[11,27]. Among the possible explanations for the differences in mortality trends between Spain, Canada and the U.S.A. in the period 1980–1988, is the different definition of congestive heart failure. In both ours and the Canadian analyses, as against that for the U.S.A., rubrics 402 and 404 were included. Mortality under rubrics 402 and 404 declined in the U.S.A. during the study period^[11]. In Spain, however, the decrease in age-adjusted mortality in the period 1980–1993 remains at 24.9% (32.5% in men and 19.8% in women) when rubrics 402 and 404 are excluded from the analysis.

We conclude that congestive heart failure represents a significant hospital and demographic burden for the Spanish population, particularly the ≥ 65 age segment. The hospital burden increased substantially in the period 1980–1993, and will continue to do so in future with the growth in the number and proportion of the elderly population.

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