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EPIDEMIOLOGY AND PREVENTION

Epidemiology of Ischaemic Heart Disease in Spain: Estimation of the Number of Cases and Trends from 1997 to 2005

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Introduction and objectives. The large amount of information on rates of acute coronary syndrome accumulated in Spain over the last two decades is summarized in this paper, which also estimates the number of cases expected in 2002 and the trend for 1997 to 2005.

Methods. Published information on the situation in the 90's was reviewed and summarized. We present the incidence of acute myocardial infarction (AMI), and an estimate of the absolute number of patients expected for various acute coronary syndromes in each autonomous community in Spain in 2002, along with the trend for 1997 to 2005.

Results. Approximately 68,500 patients will suffer AMI in 2002 and 40,989 of them will be hospitalized, while the rest will die before admission. A further 24.9% of admitted patients will not survive 28 days. Slightly less than half will be younger than 75 years old, an age with a better prognosis (28-day mortality 38.8%). Approximately 33,500 patients with unstable angina will be admitted, and 4.5% of them will die within 3 months of admission. Assuming the incidence of AMI remains stable, the absolute number of cases will increase by 2.28% yearly (9,847 cases in total) and hospitalizations for acute coronary syndromes will increase by 1.41% (8,817 cases in total) between 1997 and 2005.

Conclusion. Ischaemic heart disease generates increasing demand for health care in Spain. Case fatality is high among the approximately 68,500 AMI patients, given that scarcely two thirds will have been hospitalized in 2002.

Key words: *Epidemiology. Heart disease. Myocardial infarction. Unstable angina.*

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Epidemiología de la cardiopatía isquémica en España: estimación del número de casos y de las tendencias entre 1997 y 2005

Introducción y objetivos. En las dos últimas décadas se ha acumulado una importante cantidad de información sobre la frecuencia de la cardiopatía isquémica en España, que se resume en este trabajo junto a una estimación del número absoluto de casos que habrán aparecido en el año 2002 y a la tendencia en el período 1997-2005.

Métodos. Se han revisado las publicaciones referidas a la situación en la década de los noventa en España. Se presentan las tasas y la estimación del número absoluto de pacientes con infarto agudo de miocardio (IAM) y los ingresados esperados por distintos síndromes coronarios agudos por comunidades autónomas en el año 2002 y las tendencias entre 1997 y 2005.

Resultados. En el año 2002 se habrán producido unos 68.500 IAM, de los cuales 40.989 habrán sido hospitalizados. El resto habrá fallecido fuera de los hospitales. Además, el 24,9% de los ingresados tampoco habrá sobrevivido 28 días. Apenas la mitad de los pacientes tendrá menos de 75 años, edad con mejor pronóstico (letalidad a los 28 días del 38,8%). Se habrán producido unos 33.500 ingresos por angina inestable, de los cuales el 4,5% habrá fallecido a los 3 meses del ingreso. De mantenerse la incidencia estable, se ha estimado que el número absoluto de casos de IAM aumentará un 2,28% anual en la población (9.847 casos en total) y las hospitalizaciones por síndrome coronario agudo un 1,41% (8.817 casos en total) entre 1997 y 2005.

Conclusión. La cardiopatía isquémica genera una demanda asistencial creciente en España. Los pacientes con IAM tienen una gran letalidad a escala poblacional, ya que sólo dos terceras partes de los aproximadamente 68.500 pacientes con esta patología habrán sido hospitalizados en el 2002.

Palabras clave: *Epidemiología. Enfermedad coronaria. Infarto de miocardio. Angina inestable.*

INTRODUCTION

In the last decade, a lot of information has been compiled on the dimensions of the problem of ischemic heart disease (IHD) and its risk factors in

ABBREVIATIONS

IHD: ischemic heart disease
 AMI: acute myocardial infarction
 IBERICA: Identification, Specific Search,
 and Registry of Acute Coronary Ischemia
 REGICOR: Girona Heart Registry
 MONICA: Monitoring Trends and Determinants
 of Cardiovascular diseases

Spain. IHD continues to be the primary cause of death in men and the third most important cause of death in women, being responsible for 11% and 10% of deaths in men and women, respectively, in 1997.¹

The incidence of acute myocardial infarction (AMI) (number of new cases/100 000 inhabitants and year) in the Spanish population age 35 to 64 years is among the lowest in the world and seems to have stabilized in the last 10-15 years.^{2,3} These data contrast with the perception shared by many doctors that the number of patients being seen for IHD in hospitals is increasing. This impression is confirmed by the findings of hospital morbidity statistics, which indicate that the number of patients discharged alive or deceased with the diagnosis of IHD passed from 30 032 in 1977 to 94 124 in 1993⁴ (Figure 1).

On the other hand, IHD tends to appear in the fifth decade of the life and increases in frequency with age and the coexistence of risk factors. Since Spain will become the most «elderly» country in the world in few decades,⁵ we can expect to see an increase in morbidity and mortality due to chronic diseases, including IHD.

The aim of this review is to examine what is known about the frequency of IHD and to estimate the absolute number of cases that will occur in Spain and

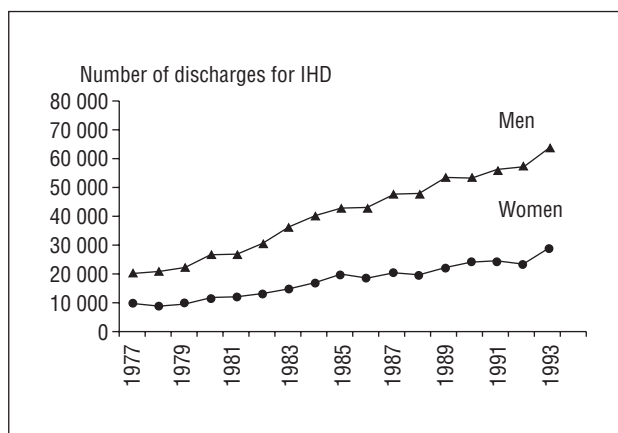


Fig. 1. Evolution of admissions for ischemic heart disease (IHD) between 1977 and 1993 in Spain, according to the national survey of hospital morbidity (Instituto Nacional de Estadística, 1999).

its autonomic communities in 2002. We also propose to study the trend in the total number of cases of AMI in the population and hospitalizations for AMI or unstable angina between 1997 and 2005.

METHODS

The source of the data used for this review is based on scientific articles on the dimensions of the IHD problem published in peer-reviewed journals in the last decade. Studies with a population base obtained from adequate sample sizes were selected.

Mortality and estimation of the number of patients with AMI in Spain

The number of cases of AMI that occur in the Spanish population age 25 to 74 years and the number deaths in the first 28 days after AMI were calculated using the data from three population studies: MONICA-Cataluña,³ REGICOR,² and IBERICA^{6,7} (Table 1). The raw rates per decade of age (25-34, 35-44, 45-54, 55-64, and 65-74 years) and sex were used. In autonomic communities that do not have a population registry of the incidence of AMI in persons age 25 to 74 years, the specific mean rate per decade of age was extrapolated from the IBERICA study. The same calculation was made in the population over 74 years-old using the raw rates for the age group over 74 years of REGICOR for the period 1996-1997⁸ in men and women (Table 1).

Hospitalization and mortality at 28 days and one year due to AMI

The number of people seen in hospitals for AMI was calculated based on the percentage of patients that reach the hospital in relation to the total number of cases of AMI that occur in the general population according to the population studies mentioned above^{2,3,6,8} (Table 1).

The number of patients with AMI treated in hospitals who die in the first 28 days was calculated using raw data from the IBERICA study⁷ for patients under 75 years, and data from the REGICOR study for those over 74 years.⁸ It has been assumed that lethality increases by 4% at one year of follow-up among survivors of the acute phase in patients under 74 years, as indicated by a 12-year follow-up study of patients under 74 years,⁹ and by 11% in patients over 74 years, as found in a specific analysis made using data from the PRIAMHO study¹⁰ (Table 1).

Hospitalization and mortality at 3 and 6 months for unstable angina

To estimate the number of patients who are attended in hospitals in Spain for unstable angina, it was

TABLE 1. Basic data on the population incidence and lethality of acute myocardial infarction (AMI), proportion of patients who receive hospital care and their mortality, number of patients with unstable angina seen in the hospital, their 3-month mortality, and the proportion of readmissions in 6 months

	Men		Women	
	25-74 years	#>75 years	25-74 years	≥75
Population ¹⁶	12 913 308	1 151 305	13 294 888	1 927 540
AMI				
Incidence of AMI ^{6,8}	194/100 000	1.500/100 000	38/100 000	830/100 000
28-day population mortality due to AMI ^{6,8}	38.8%	74.4%	45.7%	76.0%
Proportion hospitalized ^{6,8}	77.8%	43.7%	76.8%	38.2%
Mortality due to AMI				
28 days ^{7,10}	14.0%	47.0%	20.0%	41.0%
1 year ¹⁰	18.0%	58.0%	24.0%	52.0%
Unstable angina				
3-month mortality ^{12,13}	3.0%	7.4%	3.0%	7.4%
Readmission in 6 months ¹³	19.0%	21.1%	20.0%	22.0%
Prevalence of angina ^{14,15*}	7.4%	–	7.6%	–

*Population 45 to 74 years.

assumed that the number of admissions for unstable angina is equal to the number of first infarctions. This assumption is based on the results of the RESCATE study, in which all patients hospitalized for acute coronary syndromes (AMI and unstable angina) between 1994 and 1996 in 4 hospitals of Catalonia were registered. In this study it was observed that the

number of patients hospitalized for these two acute pathologies was very similar.^{11,12} In accordance with the findings of the IBERICA study, 82% of hospital AMI were considered first AMI.

The 3-month lethality was based on the results of the PEPA study, the unstable angina register of 18 hospitals of Spain, 13 and the number of readmissions

TABLE 2. Estimate of the number of total and mortal cases of acute myocardial infarction (AMI) in men in 2002 by autonomic community, according to incidence rates observed in population studies (MONICA-Cataluña, REGICOR and IBERICA) available for the 1990s

	No. of AMI			95% CI	No. of deaths in 28 days		
	25-74 years	≥75 years	Total		25-74 years	≥75 years	Total
Andalusia	4443	2467	6910	6747-7073	1726	1827	3553
Aragón	889	722	1610	1532-1689	345	534	880
Asturias	790	550	1340	1268-1411	307	407	714
Balearic Islands	697	318	1015	953-1077	234	236	469
Canary Islands	1055	494	1550	1472-1627	410	366	776
Cantabria	371	258	629	579-678	144	191	335
Castilla y León	1840	1585	3425	3310-3539	715	1173	1888
Castilla-La Mancha	1165	968	2132	2042-2223	420	717	1136
Catalonia	4831	2763	7594	7424-7765	1744	2046	3790
Community of Valencia	2735	1660	4395	4265-4525	1063	1229	2292
Extremadura	724	512	1236	1167-1305	281	379	660
Galicia	1974	1396	3370	3257-3484	767	1034	1801
Madrid	3483	1880	5364	5220-5507	1353	1392	2745
Murcia	1102	402	1504	1428-1580	362	298	659
Navarra	490	271	761	707-815	188	201	389
Basque Country	1548	837	2385	2290-2481	553	620	1173
La Rioja	197	140	337	302-373	77	104	180
Ceuta	45	23	68	52-84	18	17	34
Melilla	38	22	59	44-74	15	16	31
Spain	28 415	17 270	45 685	44 060-47 309	10 719	12 786	23 505

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within 6 months from the RESCATE data¹² (Table 1).

Prevalence of angina in the Spanish population

The number of people with self-declared angina in the population age 45 to 74 years was calculated according to the results of the PANES study.^{14,15}

Reference population

The number of cases per autonomic community and in Spain overall was estimated using the projection of the National Institute of Statistics for the years 1997 to 2005 as the reference population.¹⁶

Presentation of results

The estimates of the number of coronary events are presented by age groups, sex, and autonomic community with the 95% confidence interval (CI).

Validation of the estimates

The estimates made were validated by calculating the ratio between the estimated number of cases of mortal IHD and the number of deaths due to IHD in each autonomic community according to official statistics on mortality.¹ The official figures for mortality correspond to 1997; therefore, to calculate

this ratio the number of cases of mortal IHD were estimated using the 1997 population.

RESULTS

Estimates of the expected number of patients with AMI in Spain in 2002 by autonomic community, sex, and age group, as well as the expected number of cases of mortal AMI are shown in Tables 2 and 3. It has been estimated that 68 494 cases of AMI will take place in Spain in 2002 (95% CI, 65 723-71 264), and that 38 700 patients will die in the first 28 days (56.5%). In the population over 74 years, the estimated number of cases is 33 269 (48.6%). Of the mortal cases, 24 906 (64.4%) will occur in persons over 74 years. More than half of all the cases in Spain will take place in the autonomic communities of Catalonia, Andalusia, Madrid, and Valencia.

Of the total number of AMI, 40 989 patients (95% CI, 38 871-43 107) will receive hospital care (59.8%) and the rest, 27 505 (40.2%), will die without it. Of the patients with AMI who reach the hospital, 12 785 (31.2%) will pass away within a year and 10 191 (24.9%) in the first 28 days after the onset of symptoms.

It is also estimated that 77.6% of the patients 25 to 74 years old with AMI will receive hospital care and that 15.1% will die within 28 days and 19.1% within one year. Nevertheless, in the population over 74 years, only 41.0% will receive hospital care, of which 44.3% will die within 28 days and 55.3% within one

TABLE 3. Estimate of the number of total and mortal cases of acute myocardial infarction (AMI) in women in 2002 by autonomic community, according to incidence rates observed in population studies (MONICA-Cataluña, REGICOR and IBERICA) available for the 1990s

	No. of AMI			95% CI	No. of deaths in 28 days		
	25-74 years	≥75 years	Total		25-74 years	≥75 years	Total
Andalusia	1084	2300	3384	3270-3497	496	1742	2238
Aragón	214	608	822	766-878	98	460	558
Asturias	204	540	743	690-797	93	409	502
Balearic Islands	122	294	416	376-455	56	222	278
Canary Islands	239	439	678	627-729	109	333	442
Cantabria	91	247	338	302-374	41	187	229
Castilla y León	446	1342	1788	1706-1871	204	1017	1221
Castilla-La Mancha	297	766	1063	999-1127	136	580	716
Catalonia	1066	2603	3670	3551-3788	480	1972	2452
Community of Valencia	660	1514	2174	2083-2266	302	1147	1449
Extremadura	177	459	636	587-686	81	348	429
Galicia	506	1339	1846	1761-1930	232	1015	1246
Madrid	870	1954	2824	2720-2928	398	1480	1878
Murcia	270	355	625	576-674	118	269	387
Navarra	140	244	385	346-423	61	185	246
Basque Country	360	832	1192	1124-1260	141	631	771
La Rioja	46	123	169	144-195	21	93	114
Ceuta	10	21	31	20-42	5	16	20
Melilla	9	18	26	16-36	4	13	17
Spain	6811	15 999	22 809	21 663-23 955	3075	12 120	15 195

TABLE 4. Estimate of the number of men hospitalized for acute myocardial infarction (AMI) (incident and recurrent) in 2002 by autonomic community, according to incidence rates observed in population studies (MONICA-Cataluña, REGICOR and IBERICA) available for the 1990s

	No. of AMI			95% CI	No. of deaths in 28 days			No. of deaths in 1 year		
	25-74 years	≥75 years	Total		25-74 years	≥75 years	Total	25-74 years	≥75 years	Total
Andalucía	3457	1077	4534	4402-4666	484	506	990	622	625	1247
Aragón	691	315	1006	944-1069	97	148	245	124	183	307
Asturias	614	240	854	797-912	86	113	199	111	139	250
Balearic Islands	542	139	681	630-732	76	65	141	98	81	178
Canary Islands	821	216	1037	974-1100	115	101	216	148	125	273
Cantabria	288	113	401	362-440	40	53	93	52	65	117
Castilla y León	1432	692	2124	2033-2214	200	325	526	258	401	659
Castilla-La Mancha	906	423	1329	1257-1400	127	199	325	163	245	408
Cataluña	3758	1206	4965	4827-5103	526	567	1093	677	700	1376
Community of Valencia	2128	725	2853	2748-2957	298	341	639	383	420	803
Extremadura	563	223	787	732-842	79	105	184	101	130	231
Galicia	1536	610	2145	2055-2236	215	287	502	276	354	630
Madrid	2710	821	3531	3415-3647	379	386	765	488	476	964
Murcia	858	176	1033	970-1096	120	83	203	154	102	256
Navarra	381	118	500	456-543	53	56	109	69	69	137
Basque Country	1204	366	1570	1492-1647	169	172	340	217	212	429
La Rioja	153	61	215	186-243	21	29	50	28	36	63
Ceuta	35	10	45	32-58	5	5	10	6	6	12
Melilla	29	9	39	27-51	4	4	9	5	5	11
Spain	22 107	7540	29 647	28 338-30 956	3095	3544	6639	3979	4373	8352

TABLE 5. Estimate of the number of women hospitalized for acute myocardial infarction (AMI) (incident and recurrent) in 2002 by autonomic community, according to incidence rates observed in population studies (MONICA-Cataluña, REGICOR and IBERICA) available for the 1990s

	No. of AMI			95% CI	No. of deaths in 28 days			No. of deaths in 1 year		
	25-74	≥75	Total		25-74	≥75	Total	25-74	≥75	Total
Andalusia	832	879	1711	1630-1792	166	360	527	200	457	657
Aragón	164	232	396	357-435	33	95	128	39	121	160
Asturias	156	206	363	325-400	31	85	116	38	107	145
Balearic Islands	94	112	206	178-234	19	46	65	22	58	81
Canary Islands	183	168	351	314-388	37	69	105	44	87	131
Cantabria	70	94	164	139-189	14	39	53	17	49	66
Castilla y León	343	513	855	798-913	69	210	279	82	267	349
Castilla-La Mancha	228	292	521	476-566	46	120	166	55	152	207
Cataluña	819	994	1814	1730-1897	164	408	572	197	517	714
Community of Valencia	507	578	1085	1021-1150	101	237	339	122	301	422
Extremadura	136	175	311	277-346	27	72	99	33	91	124
Galicia	389	512	900	842-959	78	210	288	93	266	359
Madrid	668	746	1415	1341-1489	134	306	440	160	388	549
Murcia	207	136	343	307-379	41	56	97	50	71	120
Navarra	108	93	201	173-229	22	38	60	26	49	74
Basque Country	276	318	594	546-642	55	130	186	66	165	232
La Rioja	35	47	82	65-100	7	19	26	8	24	33
Ceuta	8	8	16	8-23	2	3	5	2	4	6
Melilla	7	7	13	6-20	1	3	4	2	3	5
Spain	5231	6111	11 342	10 533-12 151	1046	2506	3552	1255	3178	4433

TABLE 6. Estimate of the number of men hospitalized for unstable angina and population prevalence of angina in men in 2002 by autonomic community, according to the results of population based studies (RESCATE, PEPA and PANES) available for the 1990s

	No. of patients with unstable angina hospitalized				3-month mortality of unstable angina in hospitalized pts			Readmission in 6 months of patients with unstable angina			No. of persons w/ angina
	25-74 years	≥75 years	Total	IC del 95%	25-74 years	≥75 years	Total	25-74 years	≥75 years	Total	45-74 years
Andalusia	2828	881	3709	3589-3828	85	65	150	537	186	723	98 722
Aragón	565	258	823	767-879	17	19	36	107	54	162	11 708
Asturias	502	196	699	647-751	15	15	30	95	41	137	21 520
Balearic Islands	443	114	557	511-603	13	8	22	84	24	108	16 610
Canary Islands	671	177	848	791-905	20	13	33	128	37	165	8 853
Cantabria	236	92	328	292-363	7	7	14	45	19	64	4.925
Castilla y León	1171	566	1737	1655-1819	35	42	77	223	119	342	35 919
Castilla-La Mancha	741	346	1087	1022-1151	22	26	48	141	73	214	9 186
Cataluña	3074	987	4061	3936-4186	92	73	165	584	208	792	55 622
Community of Valencia	1741	593	2333	2239-2428	52	44	96	331	125	456	59 031
Extremadura	461	183	644	594-693	14	14	27	88	39	126	8 418
Galicia	1256	499	1755	1673-1837	38	37	75	239	105	344	42 579
Madrid	2217	672	2888	2783-2994	67	50	116	421	142	563	35 735
Murcia	701	144	845	788-902	21	11	32	133	30	164	13 831
Navarra	312	97	409	369-448	9	7	17	59	20	80	3 705
Basque Country	985	299	1284	1214-1354	30	22	52	187	63	250	13 558
La Rioja	126	50	176	150-202	4	4	7	24	11	34	4 960
Ceuta	29	8	37	25-49	1	1	1	5	2	7	658
Melilla	24	8	32	21-43	1	1	1	5	2	6	520
Spain	18 084	6168	24 251	23 067-23 435	543	456	999	3436	1301	4737	464 607

year (Tables 4 and 5).

It has been estimated that 33 529 patients (95% CI, 31 613-35 444) in the population over 24 years will be hospitalized for unstable angina. Of the total number of patients with unstable angina hospitalized, 1497 (4.5%) will have died within 3 months of admission and 6693 (20.0%) will be readmitted for some reason in the next 6 months of follow-up

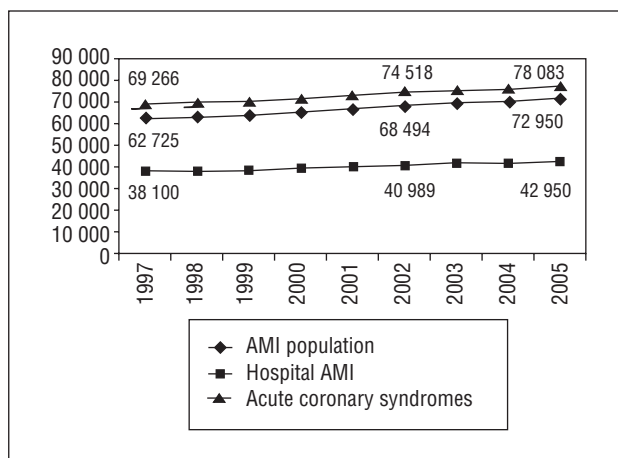


Fig. 2. Estimate of the total number of patients with acute myocardial infarction (AMI) in the Spanish population, and of the number of patients with AMI and acute coronary syndromes (myocardial infarction + unstable angina) hospitalized between 1997 and 2005.

(Tables 6 and 7).

It was estimated that 956 000 persons in the population 45 to 74 years old would suffer angina in 2002. There are no data on the population under 45 years or over 74 years.

In Table 8 is shown the ratio of the estimated number of mortal cases in 1997 and the official number of deaths due to IHD in the same year, which was 0.95 (1.02 in men and 0.86 in women). This ratio is less than 0.70 in the Canary Islands, in both men and women, and in Andalusia and Melilla, in women.

The estimated trend in the total number of AMI that occur in the Spanish population, the number of patients hospitalized for this cause, and the number of patients hospitalized for AMI and unstable angina between 1997 and 2005 is shown in Figure 2. These numbers will increase by 2.28% a year (9847 cases between 1997 and 2005), to 1.41% (4850 cases) and 1.41% (8817 cases), respectively.

DISCUSSION

The estimations made of the dimensions of the IHD problem between 1997 and 2005 indicate that the aging of the population in itself will increase the number of cases of AMI and unstable angina in Spain.

It has been estimated that in 2002 between 65 700 and 71 200 cases of symptomatic AMI will take place

TABLE 7. Estimate of the number of women hospitalized for unstable angina and population prevalence of angina in women in 2002 by autonomic community, according to the results of population based studies (RESCATE, PEPA and PANES) available for the 1990s

	No. of patients with unstable angina hospitalized				3-month mortality of unstable angina in hospitalized pts			Readmission in 6 months of ipatients with unstable angina			No of persons w/ angina
	25-74 years	≥75 years	Total	95% CI	25-74 years	≥75 years	Total	25-74 years	≥75 years	Total	45-74 years
Andalusia	681	719	1399	1326-1473	20	53	74	136	158	294	113 460
Aragón	134	190	324	289-360	4	14	18	27	42	69	15 438
Asturias	128	169	297	263-330	4	12	16	26	37	63	17 292
Balearis Islands	77	92	168	143-194	2	7	9	15	20	36	10 392
Canary Islands	150	137	287	254-320	5	10	15	30	30	60	13 865
Cantabria	57	77	134	111-157	2	6	7	11	17	28	6 443
Castilla y León	280	419	700	648-752	8	31	39	56	92	148	27 020
Castilla-La Mancha	187	239	426	386-467	6	18	23	37	53	90	1 435
Catalonia	670	814	1483	1408-1559	20	60	80	134	179	313	66 644
Community of Valencia	415	473	888	830-946	12	35	47	83	104	187	79 995
Extremadura	111	143	255	223-286	3	11	14	22	32	54	3 571
Galicia	318	419	737	683-790	10	31	41	64	92	156	53 408
Madrid	547	611	1157	1091-1224	16	45	62	109	134	244	58 140
Murcia	169	111	281	248-313	5	8	13	34	24	58	9 592
Navarra	88	76	165	139-190	3	6	8	18	17	34	2 660
Basque Country	226	260	486	443-529	7	19	26	45	57	102	8 494
La Rioja	29	38	67	51-83	1	3	4	6	8	14	1 370
Ceuta	6	7	13	6-20	0	0	1	1	1	3	675
Melilla	5	5	11	4-17	0	0	1	1	1	2	544
Spain	4279	4999	9278	8546-10 009	128	370	498	856	1100	1956	490 438

TABLE 8. Estimated number of deaths due to ischemic heart disease (mortal acute myocardial infarction + mortal unstable angina) and number declared officially in men and women, by autonomic communities, in 1997

	Men			Women			Overall		
	Estimated	Official	Ratio	Estimated	Official	Ratio	Estimated	Official	Ratio
Andalusia	3 428	3 928	0.8673	2 116	3 263	0.6485	5 544	7 216	0.7684
Aragón	855	779	1.0970	532	517	1.0291	1 387	1 296	1.0699
Asturias	713	743	0.9597	495	587	0.8439	1 208	1 330	0.9086
Balearic Islands	463	429	1.0802	266	302	0.8816	730	731	0.9981
Canay Islands	695	1 074	0.6472	387	738	0.5242	1 082	1 812	0.5971
Cantabria	321	241	1.3332	217	197	1.1034	539	438	1.2298
Castilla y León	1 826	1 446	1.2626	1 150	968	1.1883	2 976	2 414	1.2328
Castilla-La Mancha	1 109	1 011	1.0973	699	768	0.9099	1 808	1 779	1.0164
Catalonia	3 566	3 308	1.0781	2 295	2 467	0.9303	5 861	5 775	1.0150
Community of Valencia	2 211	2 554	0.8658	1 360	1 861	0.7306	3 571	4 415	0.8088
Extremadura	645	643	1.0029	411	555	0.7407	1 056	1 198	0.8814
Galicia	1 762	1 630	1.0808	1 209	1 323	0.9139	2 971	2 953	1.0060
Madrid	2 453	1 960	1.2516	1 658	1 579	1.0498	4 111	3 539	1.1616
Murcia	620	578	1.0734	364	404	0.9020	985	982	1.0029
Navarra	371	303	1.2245	235	203	1.1571	606	506	1.1975
Basque Country	1 104	1 040	1.0618	723	691	1.0467	1 828	1 731	1.0558
La Rioja	173	147	1.1762	106	106	1.0012	279	253	1.1029
Ceuta	27	27	1.0001	16	22	0.7181	43	49	0.8735
Melilla	22	28	0.7976	13	21	0.6107	35	49	0.7175
Spain	22 366	21 849	1.0237	14 253	16 631	0.8570	36 619	38 480	0.9516

in Spain and that, of these patients, 56.5% will die in the first 28 days. This high rate of lethality is surprising from the perspective of hospitals because rates of lethality of 4-7% have been described in the hospital setting in clinical trials¹⁷ and 15%-18% in hospitals.^{7,10,11} It must be considered that patients are highly selected and generally low-risk in clinical trials, which explains the low lethality observed.¹⁸ Population registers have shown that two-thirds of all patients with AMI in the 25 to 74-year age group die before reaching the hospital. This fact, together with the high lethality observed in patients over 74 years, explains the high lethality of AMI in the population.

On the other hand, in the Framingham heart study it was observed that up to 30% of the AMI that occur in the community are silent; which is to say, that they were detected by the appearance of specific changes in periodic electrocardiograms made in the absence of symptoms or medical care.¹⁹ This means that the figure of AMI in Spain could rise to approximately 98 000 cases if the Framingham figure were to prove extrapolatable to Spain. The 28-day lethality would then decrease to 39.5%.

The acute coronary syndrome has generated an increasing demand for care in recent years, as indicated by the evolution of the number of hospital discharges with this diagnosis (Figure 1).⁴ This increased demand for care could be related to a larger number of cases of AMI in the population. The incidence of AMI in the 25-74 year-old population remains stable. Nevertheless, the increased life expectancy and decreased birth rate in Spain are producing a progressive aging of the population that is translated, in turn, into an increased frequency of chronic diseases like IHD. The incidence, mortality, and lethality of AMI in patients over 74 years are much greater than in patients between 25 and 64 years,⁸ and most cases of AMI take place after 64 years.²⁰ The greater demand for care could also be due to the greater incidence of recurrent acute coronary syndromes due to the decreasing lethality observed in patients hospitalized in the last two decades, which is related to therapeutic improvements.^{9,21} This greater demand for care is also reflected in an increase in the number of admissions for heart failure.²²

The discrepancy between the figures of the survey of the hospital discharge diagnoses⁴ and those estimated in this study derives from the fact that this survey includes not only acute coronary syndromes but also admissions related to programmed diagnostic procedures.

The increase in the number of interventionist procedures in the last decade, as is evident in the registry of interventions of the Section of Hemodynamics and Interventionist Cardiology of the Spanish Society of Cardiology, is another indicator of the increase in healthcare activities related to IHD. In

this registry, a mean annual increment of 14% has been observed in the last decade in the number of coronariographies and of 20% in the number of non-surgical revascularization procedures.²³ The possibility that the practice of these procedures has prevented a potential increment in the incidence of AMI cannot be excluded, although its impact on the population presumably would have been small.

According to the estimate made, 74 500 people will be admitted to Spanish hospital centers for an acute coronary syndrome in 2002, 55% for AMI and the rest for unstable angina. If this incidence remains stable, in 2005 the number of patients hospitalized for acute coronary syndromes will reach 78 000 admissions.

Study characteristics and limitations

The calculations were made using the results of population surveys and hospital registries made in Spain in the last decade. Most of these registries carried out quality control procedures to guarantee data quality and their internal validity. In some autonomic communities, local population data were used because local population registries were available. In the rest, average values were extrapolated from the IBERICA study,⁶ which monitored an approximate population of 4 800 000 people age 25-74 years in 8 regions (20% of the Spanish population of that age group). Therefore, this population can be considered reasonably representative (external validity) of the general population of Spain. The rates in the population over 74 years come from the province of Girona and correspond to 1996 and 1997.⁸ The extrapolation of data from this province to the country as a whole may be questionable. Nevertheless, the data corresponding to the population age 25 to 74 years of Girona is very similar to the average values obtained from the IBERICA study, so it can be accepted, with the necessary reservations, that the data for the population over 74 years-old are also a good estimate. On the other hand, these are the only data on population incidence in this age group in Spain.

All these estimates are mere approaches to reality, and cannot be known with the accuracy that one would wish. In any case, confidence intervals and indirect validations are presented whenever possible. In particular, the study of validity indicates that the estimates come close to the official figures for mortality due to IHD. In any case, the estimated number of mortal cases is lower than the number of cases declared in death certificates, especially in women and in two autonomic communities, the Canary Islands and Andalusia. Although the official statistics generally overestimate mortality due to IHD slightly,²⁴ in the specific case of these two communities the number of estimated cases could be lower than that of real cases. The Canary Islands and

Andalusia are the two autonomic communities with the highest official mortality due to IHD,¹ which is probably related to a higher incidence of AMI. The use of the mean incidence of the IBERICA study could lead to underestimation of the number of real cases, especially in the Canary Islands.

On the other hand, the new definition of AMI based on troponin values²⁵ should lower the «diagnostic threshold». One overall effect should be to increase the number of AMI by approximately 25% in patients hospitalized with indicative symptoms²⁶ and, possibly, to reduce its lethality and the number of cases of unstable angina, although the number of patients will remain the same for purposes of healthcare.

To estimate the number of people who present angina pectoris in the Spanish population, the data of the PANES study have been used.^{14,15} These results probably overestimate the number of people with angina, due to the limited sensitivity and specificity of the questionnaire, as well as the sampling method used in this study, which was not a random sampling of the population but by itineraries. The number of people with angina in Spain probably does not surpass 600 000.

Definitively, the dimension of the problem of IHD in Spain in 2002 is not very different from that of the past decade in terms of incidence. About 68 500 patients will have symptomatic AMI, of which two-thirds will be admitted to hospitals. The rest will die before being seen in an adequate setting. Just under half of the patients will be under 74 years old. Our estimates indicate that both hospital activity related with acute coronary syndromes and the total number of cases in the population will grow by more than 10% between 1997 and 2005.

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Errata

In the special article titled «Chest Pain Units. Organization and Protocol for the Diagnosis of Acute Coronary Syndromes», published in volume 55, number 2, February 2002, Figure 1 contains the following errors:

- In the section Observation, where it says 30 min it should say 6-9 h.
- In the Figure legend, 1 should be * and 2 should be **.