

Acute Myocardial Infarction Hospitalization Statistics: Apparent Decline Accompanying an Increase in Smoke-Free Areas

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Recent research suggests that the introduction of antismoking regulations reduces the incidence of acute myocardial infarction (AMI). The aim of this study was to analyze changes in AMIs in the Barcelona metropolitan area in Spain following implementation of the 2006 antismoking law. Data was collected on all discharges from hospitals funded by the Catalan Health Service in 2004-2006. All patients aged over 24 years who lived in the area and who received a primary diagnosis of AMI were included. Annual AMI hospitalization rates, with 95% confidence intervals, were estimated for each year and stratified according to age and sex. The 2004 rate was higher than the 2005 rate for most age and sex groups, though confidence intervals overlapped. The 2006 rates were lower than the 2005 rates for all age groups, and there was no overlap in confidence intervals in men. In conclusion, the introduction of regulations on smokefree areas was accompanied by a reduction in the AMI hospitalization rate

Key words: Myocardial infarction. Smoking. Environmental tobacco smoke. Epidemiology.

Estadísticas de atla hospitalaria del infarto agudo de miocardio: declive aparente con la extensión de espacios sin humo

Estudios recientes indican que regulaciones del consumo de tabaco reducen los infartos agudos de miocardio (IAM). Se analiza la evolución del IAM en la región metropolitana de Barcelona con la ley de 2006. Se obtuvo información sobre altas financiadas por el Servicio Catalán de la Salud para 2004-2006. Se incluyó a los pacientes mayores de 24 años residentes en la zona con diagnóstico principal de IAM. Se estimaron tasas anuales de hospitalización por IAM estratificadas por edad y sexo con intervalos de confianza (IC) del 95% para cada año. Las tasas en 2004 son mayores que en 2005 para la mayoría de los estratos, pero los IC se solapan. Las tasas en 2006 son menores que en 2005 para todos los grupos, y los IC no se solapan en varones. Las regulaciones sobre espacios sin humo se acompañan de una disminución de los IAM hospitalizados.

Palabras clave: Infarto de miocardio. Tabaquismo. Humo ambiental de tabaco. Epidemiología

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INTRODUCTION

Smoking is a major cause of coronary heart disease. Although the exact mechanism is not completely understood, the consumption of even small quantities of cigarettes is associated with acute myocardial infarction (AMI). Recently, exposure to environmental tobacco smoke (ETS) has also been shown to cause AMI.¹ In the US and Europe, recent evaluations of comprehensive regulations to

reduce exposure to ETS have shown a decline in AMI. This suggests that previous assessments of the contribution of ETS to all AMI incidence may have been seriously underestimated.²⁻⁵ The purpose of the present study is to determine the short-term impact of antismoking legislation that came into force in Spain in 2006 by analyzing the evolution of AMI incidence in a specific population group using hospital discharge data.

METHODS

The study is based on the Barcelona metropolitan area (5 million inhabitants), a separate healthcare region within Catalonia (Spain). Since 1991, regional acute care hospitals have reported activity through the Catalan minimum, basic data set on hospital discharge (CMBDAH). The database includes patient characteristics—like place of residence, age and gender—and hospitalization data—like International Classification of Diseases Ninth Revision (ICD-9) main and secondary diagnoses. Data are compiled and analyzed, and statistics and reports are published periodically; information is made available on demand for specific studies.⁶ In 2003, the CMBDAH underwent a major change with the introduction of a new data management application.

For the present study, we collected data on all hospital discharges financed by the Catalan Health Service (CatSalut) for 2004-2006. All patients aged >24 residing in the area and with a main diagnosis

of AMI (ICD-9-CM code 410.x1) were included. CatSalut individual identification numbers were used to check data and eliminate duplicate records caused by interhospital patient transfers. The CatSalut population registry at June 30 of each year provided the denominators by establishing the estimated at-risk population as that recorded at the midpoint of each year). Age- and gender-specific annual hospitalization rates were calculated for each year with 95% confidence intervals (CI) to facilitate comparisons. Standardized rates were computed by the direct method using Epidat 3.1 software and taking the 2006 population as standard.⁷

On January 1, 2006, major antismoking legislation (Spanish law 28/2005) came into effect. This included a ban on advertising, a reduction in sales outlets, and a workplace smoking ban (with exemptions for cafés, bars, restaurants, night clubs, and discotheques). Earlier legislation had been limited in scope and implementation had varied greatly.⁸ The new law received extensive public attention and media coverage, and its implementation in workplaces (including retail stores and other enclosed public places) was considered satisfactory.

RESULTS

Table 1 shows AMI hospitalization rates for 2004-2006. In 2004, rates were higher than in 2005 for most age groups, but CIs overlapped. In 2006, rates were lower than in 2005 for all age groups, and total adjusted rates CI for men did not overlap.

TABLE 1. Patients With Acute Myocardial Infarction Discharged From Acute Care Hospitals by Age-group and Gender (Annual Rates per 100 000 Inhabitants), per Year. Barcelona Metropolitan Area, 2004-2006

	2004			2005			2006		
	Episodes	Rate	95% CI	Episodes	Rate	95% CI	Episodes	Rate	95% CI
Men, age									
25-34	20	4.6	2.6-6.6	17	3.8	2.0-5.6	21	4.6	2.6-6.6
35-44	158	41.4	34.9-47.8	140	35.1	29.3-41.0	151	36.6	30.8-42.5
45-54	460	152.1	138.2-165.9	456	146.9	133.5-160.4	424	133.5	120.8-146.1
55-64	676	263.5	243.7-283.3	709	270.2	250.3-290.1	623	235.6	217.1-254.0
65-74	846	443.3	413.5-473.1	785	409.1	380.5-437.6	694	359.0	332.4-385.7
≥75	1016	749.6	703.7-795.6	962	684.2	641.1-727.3	882	606.4	566.5-646.3
Total	3176	186.1	179.7-192.6	3069*	175.0*	168.8-181.2*	2795*	156.4*	150.6-162.1*
Adjusted rate		185.6	179.2-192.1		175.0*	168.9-181.2*		156.4*	150.6-162.1*
Women, age									
25-34	4	1.0	0.02-1.9	2	0.5	0-1.1	1	0.2	0-0.7
35-44	25	6.7	4.1-9.4	26	6.8	4.2-9.4	15	3.8	1.9-5.7
45-54	56	17.7	13.1-22.4	56	17.3	12.7-21.8	51	15.4	11.2-19.6
55-64	134	49.1	40.8-57.4	116	41.2	33.7-48.7	111	38.8	31.6-46.1
65-74	349	152.0	136.1-168.0	292	127.3	112.8-142.0	259	113.1	99.3-126.9
≥75	942	382.2	357.8-406.6	942	372.6	348.8-396.3	895	345.7	323.1-368.4
Total	1510	81.5	77.4-85.6	1434	75.6	71.6-79.5	1332	69.0	65.3-72.7
Adjusted rate		81.2	77.1-85.3		75.6	71.7-79.6		69.0	65.3-72.7

*Indicates statistically significant differences.

TABLE 2. Changes in Acute Myocardial Infarction Hospitalization Rates, by Gender. Barcelona Metropolitan Area, 2004-2006

	2004	2005	2006
Men			
Annual adjusted rate, per 100 000 inhabitants	185.6	175.1	156.3
Annual rate difference	Reference	-10.6	-18.7
Annual decline, %	Reference	-5.69%	-10.68%
Women			
Annual adjusted rate, per 100 000 inhabitants	81.2	75.7	69.02
Annual rate difference	Reference	-5.6	-6.6
Annual decline, %	Reference	-6.85%	-8.76%

Table 2 summarizes absolute and relative changes in adjusted rates by gender. In men, the decline in 2006 (-10.68%) was much greater than in 2005 (-5.69%); in women, it was only slightly greater (-8.76% vs -6.85%). This decline is apparent in all age groups except men aged <45. If the percentage decline in 2006 had been the same as that of 2005, recorded AMI hospitalizations for 2006 would have risen by 156.

DISCUSSION

The present study shows a populationwide reduction in AMI hospitalization rates in the Barcelona healthcare area. Although we found AMI rates in older age groups fell between 2004 and 2005, the decline seems to have increased after antismoking legislation banning smoking from workplaces and many enclosed public spaces came into force in 2006.

The new law introduced strict regulations affecting workplaces but granted exemptions to bars and restaurants.⁹ Recent studies document subsequent large-scale improvements in population exposure to ETS, both in perceived and in actual environmental data,^{10,11} and incidence of smoking in the Barcelona population has fallen.¹² Clearly, though, other relevant changes in the management of ischemic coronary disease and its risk factors have occurred in recent years. These include offering incentives to primary health care providers to increase treatment for hypertension, hyperlipidemia and diabetes, and to help smokers break the habit; the establishment of standard protocols for emergency AMI care (including prehospital fibrinolysis); and the use of primary or secondary angioplasty to treat AMI episodes.^{13,14} These developments have happened gradually and although they may have contributed to the decline recorded in 2005, they cannot explain the greater decline in men in 2006.

The present study is limited as it is based on secondary data from the CMBDAH database, a standard resource, and has been restricted to

publicly-funded hospital care. However, population-based epidemiologic studies estimate similar figures for AMI hospitalization.¹⁵ Another limitation is the short time-frame (3 years), although this is due to changes introduced to CMBDAH in 2003 to upgrade database quality. One further limitation is the fact that the population estimate could have been slightly exaggerated, although this would affect all 3 year-groups equally. Major changes in the foreign immigrant population registries occurred in 2001-2003, but not in 2004-2006. In this densely populated area, access to specialized AMI care is relatively swift and homogeneous. However, these results should be confirmed by further studies.

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