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## Original article

## Current state of breast cancer surgery in Andalusia and Catalonia

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## A B S T R A C T

**Background:** Surgery is an essential element of breast cancer treatment. The aim of this study was to describe the progress and current practice in oncological breast surgery in Catalonia and Andalusia.

**Material and method:** An observational study was conducted, collecting data from the Minimum Basic Data Set at Hospital Discharge.

**Results:** A total of 37 537 women from Catalonia and 24 186 from Andalusia were studied. The rate of admission due to breast cancer in women increased substantially during the study period, as well as the percentage of women who underwent breast-conserving surgery. However, the increase in breast-conserving surgery has not been consistent among age groups and hospital levels.

**Conclusions:** As a whole, the increase in breast-conserving surgery has shown the need for interventions to promote the use of procedures of proven effectiveness.

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## Estado actual de la cirugía oncológica de mama en Andalucía y Cataluña

## R E S U M E N

## Palabras clave:

Cáncer de mama

Cirugía oncológica

Mastectomía

Tendencias

Cataluña

Andalucía

**Introducción:** La cirugía es un elemento esencial en el tratamiento del cáncer de mama. El objetivo del trabajo es describir la evolución y el estado actual de la cirugía oncológica de mama en Cataluña y Andalucía.

**Material y método:** Se llevó a cabo un estudio observacional basado en el análisis del Conjunto Mínimo Básico de Datos de Altas Hospitalarias en el período 1996–2005.

**Resultados:** La muestra incluyó a 37.537 mujeres de Cataluña y 24.186 de Andalucía. En el periodo estudiado se produjo un notable incremento de las tasas de hospitalización.

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Igualmente hay un marcado incremento en el porcentaje de casos intervenidos mediante cirugía conservadora. Sin embargo, esta difusión de la cirugía conservadora ha sido desigual por grupos de edad y tipo de centro.

*Conclusiones:* En conjunto se pone de relieve el aumento de la proporción de mujeres tratadas con mastectomía subtotal y la necesidad de estrategias que favorezcan la diseminación de intervenciones de probada efectividad

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## Introduction

Breast cancer is the most frequently occurring malignant tumour in women.<sup>1</sup> In Spain, a woman's risk of developing breast cancer before the age of 74 is 1/16-18.<sup>2</sup> In addition, the incidence rate has an age-adjusted annual growth rate of 2%-3%. However, the use of screening programs and diagnostic and therapeutic techniques has resulted in a continuous decrease in the total mortality rates ever since 1989-1990; five-year survival rates are currently at 75%.<sup>2-4</sup>

Surgery is used as the main treatment for breast cancer.<sup>5,6</sup> At the end of the 19th century (1894), Halsted established systematic locoregional treatment by means of total removal of the breast with ablation of the pectoral muscles and axillary lymph nodes.<sup>7</sup> Better understanding of breast cancer's natural history has enabled the progressive introduction of less disfiguring excision techniques that preserve more of the breast and neighbouring lymphatic areas.<sup>8,9</sup>

Using Payne's 1970 study as a basis,<sup>10</sup> Fisher began a randomised clinical trial in 1971. After 10 years of follow-up, this study showed that Halsted-type radical mastectomy had no advantages over a simple mastectomy (preserving the pectoral muscles while performing axillary nodal dissection with or without radiation therapy) with regard to total survival and recurrence-free time.<sup>11</sup> After 25 years of follow-up, results were recently published which confirm each and every one of the previous findings and relegate Halsted's aggressive technique to historical rather than therapeutic texts.<sup>12</sup>

In the search for optimal treatment, and in order to contribute to preserving quality of life without decreasing survival treatments, conservative surgical treatment appeared in the form of tumour excision with selective partial breast resection. Veronesi in 1981<sup>13</sup> and Fisher et al in 1985<sup>14</sup> performed studies that showed that conservative surgery with radiation therapy resulted in similar survival rates to those of mastectomy. Later studies have shown that these techniques are equally effective, provided that the tumour has a single location and measures <4 cm.<sup>15</sup>

The high incidence rate of breast cancer in the female population, added to the recent and noteworthy evolution of techniques and concepts in surgical treatment, means that a more precise understanding is needed about the type of oncological surgery offered to patients. The main objective of this study is to describe the evolution of breast cancer surgery in our area, and secondly, to explore certain factors that may have influenced the propagation of the more conservative techniques. To this end, we used information collected from

clinical and administrative databases in hospital admissions records from the autonomous communities of Catalonia and Andalusia between 1996 and 2005.

## Materials and method

This is an observational study based on the analysis of the minimum basic list of hospital admission data (CMBDAH) from Andalusia and Catalonia corresponding to patients admitted to an acute care centre with breast neoplasia between 1996 and 2005 and classed as 174.0 through 174.9, 198.81, 233.0, and v10.3 in the International Classification of Diseases (ICD-9-MC).

Access to the databases was arranged by contacting the Andalusian and Catalan health services (SAS and SCS respectively). We selected patient demographic characteristics (age, place of residence), all diagnostic and procedural fields, and the hospital care level. We excluded admissions for which no procedures related to surgical treatment were recorded.

Patients were classified according to the type of surgery practiced upon initial admission: procedure codes correspond to radical mastectomy (85.45-85.48), total mastectomy (85.41-85.44), or subtotal mastectomy (85.20-85.24, 85.33-85.36). In order to improve result interpretation, patients with codes corresponding to radical and total mastectomy were analysed as a single set.

The age variable was categorised in 5 classes (<40, 40-49, 50-59, 60-69, ≥70) and patients were grouped by health care district in Catalonia (which comprises 8 health care districts) and in Andalusia (whose 8 health care districts correspond to that community's 8 provinces). Hospitals were classified by their care level, technological resources and their population of reference according to the health service classifications in each of the communities. In Andalusia, SAS classifies centres as type I (highly specialised hospitals which provide a reference for specialised services), type II (basic general hospitals located in provincial capitals), and type III (basic general hospitals in health districts). In Catalonia, the SCS uses a similar system that classifies hospitals according to whether they are high-technology, of reference, district, in the complementary network, isolated or private. In order to increase our capacity to compare the 2 communities, we decided to combine the "district," "complementary network," and "isolated" hospital categories, since their care level and technological resources are similar. We chose not to perform a combined analysis using data from both communities, due to the differences in the socio-demographic, prevalence, and

incidence characteristics for the disease. Patient comorbidity was measured using the Charlson index in its version for administrative data.<sup>16</sup>

### Statistical analysis

A descriptive analysis was performed and we calculated admission population rates. Here, the denominator was the female population over 10 years of age residing in each of the autonomous communities according to the population age groups, as provided by the Spanish National Institute of Statistics.<sup>17</sup> We obtained rates per 100 000 inhabitants that were standardised by age using the direct method, with the 2005 Spanish population as the standard of reference. This permitted us to describe the rate evolution in each of the autonomous communities during the study period. Furthermore, we analysed the statistical significance of the linear tendency during the study period, with regard to the significance of the period coefficient in a variance weighted least squares regression model.

Using the surgery type as a dichotomic dependent variable, we estimated the risk of conservative surgery according to the centre type, adjusting for patient age, morbidity index and the study period. Given the binomial nature of the dependent variable (conservative/non-conservative surgery) and the data's hierarchical structure (patients grouped by hospitals), we applied a multi-level, multi-variable logistic regression analysis<sup>18</sup> estimating odds ratios (ORs) adjusted for each type of centre, using provincial hospitals as a reference.

Variability within the communities was studied by calculating the standardised rates of subtotal mastectomies by age and according to the health district in which the patient resides. By means of the indirect method, and using the general rates by age for each of the communities, we calculated the

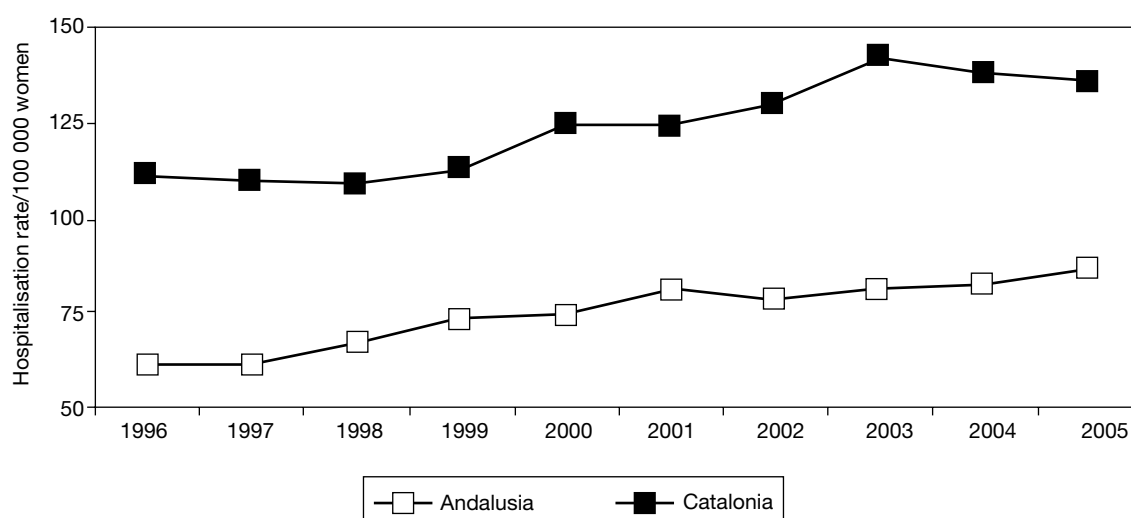
number of expected mastectomies per age group and health district and the ratio of expected and observed interventions (standardized surgical ratio, SSR). Values >1 indicate a higher percentage of conservative surgery than the expected rate; those <1 indicate a lower percentage. The statistical significance level was established at  $P < .05$ . Statistical analysis and data cleaning were performed using Intercooled Stata 9.2 statistical software.<sup>19</sup>

## Results

During the study period, 1996 to 2005, Andalusia recorded 24 186 admissions of patients diagnosed with breast cancer and treated with a surgical procedure (total/subtotal mastectomy). Catalonia recorded 37 537 admissions. Andalusia's standardised admission rate by age group per 100 000 inhabitants was 61 in 1996 and 87 in 2005; in Catalonia, it was 112 in 1996 and 136 in 2005 (Figure 1). The mean age of the women admitted was 58 years ( $SD=14$ ) for both autonomous communities, with a slight tendency to decrease over the study period. We saw significant results in the linear evolution of the percentages according to the patient's place of residence, age group (except for those older than 70) or the type of hospital in which they were treated throughout the study period (Tables 1 and 2).

### Surgical technique

With regard to the surgical technique employed during the study period, the most relevant aspect is the progressive increase in the number of patients with breast cancer receiving conservative surgery compared with patients whose surgical treatment involved radical or total mastectomy. This parallel evolution is not equal in the 2 autonomous communities.



**Figure 1 - Hospitalisation rate among women admitted for breast cancer and surgical treatment, standardised by age, and per autonomous community.**

Table 1 – Characteristics of patients admitted for breast cancer in Andalusia and Catalonia (1996–2005)

	1996		1997		1998		1999		2000		2001		2002		2003		2004		2005		1996-2005	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	Diff%
<b>Andalusia</b>																						
Age, y																						
<41 <sup>a</sup>	220	12.49	224	12.33	248	12.4	271	11.77	298	12.86	259	9.99	246	9.63	322	11.86	309	10.86	364	11.09	364	-1.4
41–50 <sup>a</sup>	334	18.97	350	19.26	417	20.85	488	21.19	470	20.28	580	22.38	592	23.18	607	22.37	698	24.53	823	25.08	823	6.11
51–60 <sup>b</sup>	411	23.34	379	20.86	456	22.8	524	22.75	548	23.64	613	23.65	607	23.77	662	24.39	703	24.71	757	23.07	757	-0.27
61–70 <sup>a</sup>	403	22.88	466	25.65	470	23.5	553	24.01	531	22.91	607	23.42	582	22.79	540	19.9	579	20.35	625	19.04	625	-3.84
>70	393	22.32	398	21.9	409	20.45	467	20.28	471	20.32	533	20.56	527	20.63	583	21.48	556	19.54	713	21.72	713	-0.6
<b>Central type</b>																						
Regional <sup>b</sup>	709	40.26	795	43.75	948	47.4	1072	46.55	1109	47.84	1161	44.79	1138	44.56	1236	45.54	1292	45.41	1571	47.87	1571	7.61
Specialty	665	37.76	648	35.66	674	33.7	751	32.61	739	31.88	848	35.72	865	33.87	913	33.64	978	34.38	1125	34.28	1125	-3.48
District <sup>b</sup>	199	11.3	176	9.69	190	9.5	223	9.68	205	8.84	253	9.76	224	8.77	229	8.44	211	7.42	248	7.56	248	-3.74
<b>Catalonia</b>																						
Age, y																						
<41 <sup>b</sup>	299	9.64	274	8.74	293	9.47	295	9.04	310	8.43	361	9.72	367	9.04	514	11.32	456	10.2	439	9.79	439	1.45
41–50 <sup>a</sup>	659	21.24	688	21.95	656	21.21	720	22.07	738	20.07	808	21.76	861	21.21	1030	22.68	1016	22.73	1063	23.72	1063	3.84
51–60 <sup>a</sup>	682	21.98	687	21.91	689	22.28	766	23.48	887	24.12	927	24.97	1024	25.23	1118	24.61	1138	25.46	1050	23.43	1050	1.09
61–70 <sup>a</sup>	756	24.36	738	23.54	695	22.47	699	21.42	790	21.48	747	20.12	831	20.47	897	19.75	887	19.84	912	20.35	912	-5.32
>70	707	22.78	748	23.86	760	24.57	783	24	952	25.89	870	23.43	976	24.05	983	21.64	973	21.77	1018	22.71	1018	-1.06
<b>Centre type</b>																						
High-technology <sup>b</sup>	1128	36.35	1153	36.78	1062	34.34	1178	36.1	1220	33.18	1294	32.97	1326	32.67	1613	35.51	1544	34.54	1539	34.34	1539	-2.01
Reference <sup>a</sup>	1145	36.9	1169	37.29	1155	37.34	1218	37.33	1371	37.29	1330	35.82	1505	37.08	1642	36.15	1534	34.32	1534	34.23	1534	-2.67
District <sup>a</sup>	555	17.89	500	15.95	537	17.36	527	16.15	523	14.22	518	13.95	638	15.72	681	14.99	624	13.96	627	13.99	627	-3.9
Private <sup>a</sup>	275	8.86	313	9.98	339	10.96	340	10.42	563	15.31	641	17.26	590	14.54	606	13.34	768	17.18	782	17.45	782	8.59

<sup>a</sup>Linear tendency,  $P < .001$ .<sup>b</sup>Linear tendency,  $P < .05$ .

Table 3 – Percentage of patients with subtotal mastectomy in Andalusia and Catalonia (1996–2005)

	1996		1997		1998		1999		2000		2001		2002		2003		2004		2005		1996-2005	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	Dif%
Andalusia																						
Admissions	450	25.95	577	32.69	698	36.04	901	41.27	984	44.34	1.060	42.5	1.176	47.79	1.258	48.29	1.384	51.28	1.545	53.09	27.14	
Age, y																						
<41 <sup>a</sup>	74	34.91	99	46.26	91	40.09	116	48.33	130	48.15	108	46.35	134	57.26	152	50.17	149	53.21	176	58.28	23.27	
41–50 <sup>a</sup>	103	32.09	123	38.56	168	42.53	203	47.1	215	50.23	281	51.85	302	55.21	297	54.4	361	57.21	359	53.9	21.81	
51–60 <sup>a</sup>	117	28.89	117	31.71	157	35.68	239	48.19	277	53.07	267	45.56	289	50.26	354	55.4	393	59.73	398	62.38	33.49	
61–70 <sup>a</sup>	84	20.84	139	29.89	176	37.77	210	38.25	228	43.18	264	44	286	49.48	258	48.31	301	52.44	354	59.5	38.66	
>70 <sup>a</sup>	72	18.32	99	24.87	106	25.92	133	28.48	134	28.45	140	26.27	165	31.31	197	33.79	180	32.37	258	36.39	18.07	
Centre type																						
Regional <sup>a</sup>	195	28.22	272	35.98	361	40.43	480	48.88	505	49.03	528	48.66	571	53.72	618	53.6	643	54.86	696	52.85	24.63	
Specialty <sup>a</sup>	179	27.29	207	32.6	230	34.43	251	34.72	292	40.61	311	37.65	347	40.97	385	43.36	451	47.32	543	53.03	25.74	
District I <sup>a</sup>	54	27.14	59	33.52	70	36.84	86	38.74	79	38.54	87	34.39	104	46.43	109	47.81	122	57.82	144	60.25	33.11	
Catalonia																						
Admissions	1287	44.97	1398	48.32	1505	51.93	1817	58.9	2045	58.61	2054	58.14	2448	63.72	2700	66.23	2746	66.1	2866	67.95	22.98	
Age, y																						
<41 <sup>a</sup>	141	54.44	143	58.61	161	60.53	171	63.1	205	71.18	236	68.21	257	76.04	297	69.72	288	69.4	283	69.7	15.26	
41–50 <sup>a</sup>	307	54.63	313	52.96	339	57.85	419	65.37	422	62.8	449	60.35	543	69.35	596	70.45	626	68.94	675	69.44	14.81	
51–60 <sup>a</sup>	312	51.32	348	56.96	385	61.4	475	67	541	66.22	549	64.36	664	70.71	710	73.5	754	74.36	700	73.07	21.75	
61–70 <sup>a</sup>	328	45.05	353	50.07	363	54.5	422	61.79	488	63.79	456	63.07	552	67.9	607	70.5	594	69.88	638	73.42	28.37	
>70 <sup>a</sup>	199	28.23	241	32.48	257	34.13	330	42.25	389	41.08	364	41.98	432	44.58	490	50.1	484	50.05	570	56.27	28.04	
Centre type																						
High-technology <sup>b</sup>	448	46.96	489	49.29	513	55.46	696	65.48	702	62.51	694	62.08	767	63.86	934	70.07	969	70.63	961	69.59	22.63	
Reference <sup>a</sup>	480	43.88	540	48.39	605	53.78	683	57.73	772	58.35	784	60.17	971	65.79	1039	65.93	979	66.42	1065	71.05	27.17	
Districts	231	42.54	208	43.51	219	42.12	257	50.39	259	51.39	275	55.22	392	63.64	383	62.89	363	62.05	392	66.44	23.9	
Private	128	47.23	161	52.44	168	51.22	181	55.02	312	57.88	301	49.02	318	57.92	344	61.54	435	60.17	448	59.89	12.66	9

<sup>a</sup>Linear tendency, P<.001.

### Results in Andalusia

In Andalusia at the beginning of the study period, 1 in 4 surgical procedures (25.9%) was a subtotal mastectomy, and in 2005, the proportion increased to 1 in 2 (53.1%) (Table 2). This increase was also observed when we selected the carcinomas in situ exclusively (ICD 233), with an increase in the percentage of conservative surgeries (40.5% in 1996 and 51.9% in 2005).

Distribution per age group for the type of surgery showed a different incorporation rate for conservative surgery techniques in women younger than 60 and in those aged 60 to 69. In women younger than 60, the percentage of patients treated with conservative surgery was higher than that treated with mastectomy between 1999 and 2001. In patients aged 60 to 69, conservative surgical treatments did not outnumber mastectomies until 2003. For the patient group older than 70, the conservative surgery percentage was 36% in 2005 (Table 2).

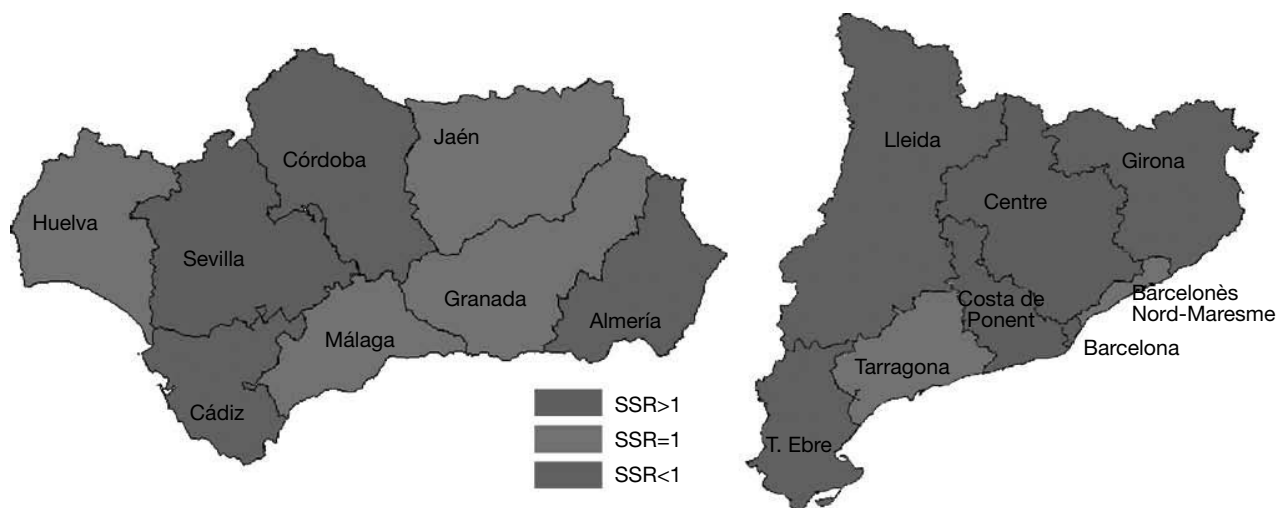
In Andalusia, the incorporation of conservative surgical techniques differed according to the type of hospital. In regional hospitals, beginning in 2002, surgery for breast cancer using conservative techniques was more frequent than mastectomy. In specialty and provincial hospitals, the change occurred at a later time, between 2004 and 2005.

Different values are also observed for the conservative surgery rate according to the health district in which the patient resides. The standardised rate for conservative surgery in 2005 was 42/100 000 women in Andalusia as a whole. In Seville, the rate was 53/100 000. In Cádiz, Almería, and Córdoba, the rates were 29.7, 34.7, and 37.4/100 000 respectively (with a variation ratio of 1.7 between the maximum and minimum rates). Figure 2 shows the map of Andalusia with the 8 health districts marked according to the standardised surgery ratio and showing the existing degree of intraterritorial variability.

The multi-level logistic model of estimated risk for subtotal mastectomy depending on hospital type and adjusted for age, Charlson morbidity index and study period, confirmed some of those differences, including patient age and the years in the study period in particular (Table 3).

### Results in Catalonia

At the beginning of the study period in Catalonia, subtotal mastectomy was the technique used in 1 out of every 2 surgical procedures (45%). In 2005, the proportion changed to 2 out of 3 (69%) (Table 2); this increase was also seen in the percentage of conservative surgery (50% in 1996 and 77.6% in 2005) used for carcinomas in situ (ICD 233).



Andalusia		Catalonia	
	Standardised surgical ratio		Standardised surgical ratio
Almería	0.8 (1.0-0.7)	Barcelona (city)	1.1 (1.1-1.0)
Cádiz	0.7 (0.8-0.6)	Barcelonès Nord-Maresme	1.0 (1.1-0.9)
Córdoba	0.9 (1.0-0.7)	Centre	1.0 (1.1-1.0)
Granada	1.0 (1.1-0.8)	Costa de Ponent	1.1 (1.2-1.0)
Huelva	1.1 (1.3-0.8)	Girona	0.8 (0.9-0.5)
Jaén	1.0 (1.1-0.8)	Tarragona	0.9 (1.1-0.8)
Málaga	1.0 (1.1-0.9)	Terres del Ebre	0.7 (0.9-0.5)
Sevilla	1.3 (1.4-1.1)	Lleida	0.7 (0.9-0.6)

SSR indicates standard surgical ratio = observed cases/expected cases

**Figure 2 - Standardised surgery ratio (SSR) for subtotal mastectomy by province (for Andalusia) and health district (for Catalonia) in which the patient resides.**

By age groups, the introduction of conservative surgery followed a diffusion pattern with different speeds (Table 2). In women younger than 60, the percentage of conservative surgery was higher than that for mastectomy before 1996, the year when this study was initiated. In patients aged 60-69 years, conservative surgery techniques were predominant beginning in 1997. For the 70+ age group, the change to predominantly conservative surgery took place in 2003.

Catalonia also experienced a different pace for the introduction of conservative surgery depending on the type of centre. In high-technology hospitals and centres of reference, conservative surgical treatment was preferred over mastectomy beginning in 1998. In provincial hospitals, the change took place in 1999.

Different values are also observed for the conservative surgery rate according to the health area in which the patient resides. The standardised rate for conservative surgery in 2005 was 79.6/100 000 women in Catalonia as a whole. In the Costa de Ponent area, the rate was 87.7/100 000. In Terres de l'Ebre and Lleida, the rates were 57 and 59.5/100 000 respectively (variation ratio of 1.5 between the maximum and minimum rates). Figure 2 shows the map of Catalonia and the variability that exists among different health districts.

The multi-level logistic model of estimated risk for subtotal mastectomy depending on hospital type, adjusted for age, Charlson morbidity index and study period, confirmed these differences, including patient age and the years in the study period in particular (Table 3).

## Discussion

Breast cancer in developed countries can be observed in a dynamic evolutionary context in which diagnostic and therapeutic techniques have undergone rapid changes. This study shows that during the 10-year study period, a notable increase occurred in the hospitalisation rates for breast cancer surgery, and exposes and quantifies the process by which conservative mastectomy gained ground.

During the study period, the standardised admission rates by age were higher in Catalonia than in Andalusia (Figure 1). Despite limitations from an extrapolation that found breast cancer rates for the entire autonomous community based on the numbers for Granada (1998-2000, 53/100 000) and Girona (2000, 70/100 000), we can state that the difference between the breast cancer incidence rates for these autonomous communities is the most apparent factor that explains the differences we observe in the admission rates.

The increase in hospitalisation rates is partly due to the implantation of population screening programmes (prevalent cases of the disease in the first screening rounds, and incident cases in subsequent rounds).<sup>3,4</sup> We also note an increase in the percentage of cases for which an operation was performed using conservative surgical techniques. This increase occurred in a parallel manner in the 2 autonomous communities, and the growth rate was similar, but differences in the process that was followed when implementing population screening in both communities could have led to some differences.<sup>20</sup> The difference in the percentage of subtotal mastectomies in the study period by age group shows that the increase was greater in Andalusia among women aged 51 to 70. In Catalonia, however, this difference is more pronounced among women older than 60.

The mean age of admitted patients was 58 years, with a slight tendency to decrease over the study period. This result is similar to that from the GEICAM epidemiological study in 1990-1993, which showed a mean age at time of diagnosis of 56.7 years.<sup>21</sup> This discreet decrease could be explained as an effect of the screening campaigns that identify patients with the disease in a subclinical phase, and by the age group in which the population's breast cancer incidence rate is growing exponentially (35-60 years).

The diffusion pattern for conservative surgery techniques is very similar between the 2 autonomous communities, even if it was not concurrent in time. It widened the age group for the patients undergoing surgery (older than 60) and the range of hospitals performing it (provincial hospitals); this process may have been aided by the creation of work groups or specific units, also known as functional units.

Certainly, the diagnosis of breast cancer in the initial stages of the disease, aided by population screening campaigns, has been a factor (although not the only one) favouring the implementation of conservative surgical techniques. In these patients, conservative surgery was thought to be a safe, non-disfiguring treatment which offered the possibility of better quality of life.<sup>22,23</sup> Other determining factors were that tools improving the statistical study and histological and biological pre-operative description of the disease and patient follow-

**Table 3 – Adjusted odds ratios in a multi-level logistic model for conservative surgery**

	Catalonia	Andalusia
Age, y		
<41	2.82 (2.57-3.09)	2.50 (2.25-2.79)
41-50	2.36 (2.20-2.53)	2.44 (2.23-2.67)
51-60	2.68 (2.51-2.87)	2.40 (2.20-2.62)
61-70	2.26 (2.12-2.42)	2 (1.83-2.18)
>70	1	1
Comorbidity (Charlson index)		
0	1.18 (1.05-1.33)	2.31 (2.11-2.52)
<6	0.89 (0.77-1.03)	2.03 (1.80-2.3)
≥6	1	1
Hospital care level		
High tech/regional	1.15 (0.76-1.74)	1.79 (1.08-2.95)
Reference/specialty	1.20 (0.90-1.61)	1.06 (0.68-1.63)
District/local I	1	1.15 (0.69-1.91)
Private/local II	0.61 (0.46-0.80)	1
Period		
1996-1998	1	1
1999-2001	1.60 (1.50-1.70)	1.58 (1.46-1.72)
2002-2005	2.23 (2.1-2.36)	2.27 (2.1-2.45)
Variance among centres	0.29 (0.06)	0.25 (0.07)

up were incorporated during the study period (thick-needle biopsy, radio-guided and magnetic resonance imaging-guided biopsy techniques, and the selective sentinel node biopsy technique). Treatment with neoadjuvant chemotherapy in patients with tumours larger than 3 cm and the new chemotherapy regimens with taxanes have also permitted access to conservative surgical treatment for a patient group which had traditionally received total mastectomy.<sup>24,25</sup> It is thought that the key points for disseminating innovation are related to the innovation's inherent characteristics and its professionals, management and context.<sup>26</sup>

One of the study's limitations is that resulting from using a clinical/administrative database as its information source. The results are largely dependent on that information source's ability to include associated diagnoses and procedures, and on each centre's codification practices. It is evident that one of these limitations is the lack of description of the disease's degree of evolution, whether using the international classification TNM or by referring to its stage.

To conclude, this study shows that during the study period, there was a notable increase in the number of admissions for breast cancer, and in the percentage of patients treated with conservative surgery. During the study period, diffusion of this type of surgery has not been equal for the 2 autonomous communities, or even within each one. These differences are larger depending on the age group, the hospital's technological resources and the patient's place of residence.

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