Differences Between Women's and Men's Access to Interventional Cardiovascular Procedures at Public Hospitals in Andalusia (Spain)

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Introduction and objectives. The aim of this study was to determine whether there are differences between women's and men's access to coronary revascularization procedures for acute coronary syndrome in Andalusia, Spain.

Methods. This observational multicenter study was based on the Andalusian Minimum Basic Data Set (CMBDA). The study included all hospitalizations at public hospitals in the period 2000-2003 that involved emergency admission and in which the principal diagnosis was acute myocardial infarction or unstable angina. There were 46 007 cases (16 391 women and 29 616 men). The relationships between sex and the use of cardiac catheterization, percutaneous transluminal coronary angioplasty and coronary artery bypass grafting were analyzed. Patients were categorized according to age, principal diagnosis, and comorbidity (Charlson index). Multivariate logistic regression analysis, which included adjustment for the other variables, was used to determine the association between sex and procedure use.

Results. Women in the study population were older and had more severe comorbidity than men. They underwent diagnostic and therapeutic procedures less frequently, irrespective of age group, diagnosis, and comorbidity. After adjusting for age, diagnosis, and comorbidity, the odds ratio (reference category: men) was 0.68 (95% CI, 0.64-0.72) for cardiac catheterization, 0.61 (95% CI, 0.57-0.66) for percutaneous transluminal coronary angioplasty, and 0.38 (95% CI, 0.29-0.50) for coronary artery bypass grafting.

Conclusions. During hospitalization for acute coronary syndrome, women less frequently had access to interventional cardiovascular procedures than men. Further research is needed to clarify the roles played by social, cultural and biological factors in determining the observed differences.

Key words: *Gender. Coronary revascularization. Acute myocardial infarction. Unstable angina.*

Diferencias entre mujeres y varones en el acceso a procedimientos cardiovasculares intervencionistas en los hospitales públicos de Andalucía

Introducción y objetivos. Investigar si hay diferencias entre mujeres y varones en el acceso a procedimientos cardiovasculares intervencionistas en el síndrome coronario agudo en Andalucía.

Métodos. Estudio observacional multicéntrico, basado en el Conjunto Mínimo de Datos Básicos de Andalucía (CMBDA). Se estudiaron todos los episodios de hospitalización (hospitales públicos) con ingreso urgente y diagnóstico principal de infarto agudo de miocardio o angina inestable producidos durante 4 años (2000-2003), que suponen 46.007 casos (16.391 mujeres y 29.616 varones). Se analizó la relación entre el sexo y la utilización de cateterismo cardiaco, angioplastia coronaria transluminal percutánea y anastomosis arterial coronaria, y se estratificó a los pacientes por grupo de edad, diagnóstico principal y comorbilidad (índice de Charlson). Se realizaron análisis de regresión logística multivariable para estudiar la asociación entre el sexo y el uso de procedimientos, tras ajustar por el resto de variables.

Resultados. Las mujeres de la población estudiada fueron mayores y con más comorbilidad que los varones. En ellas se realizaron con menor frecuencia los procedimientos diagnósticos y terapéuticos estudiados, en todos los grupos de edad, diagnóstico y comorbilidad. Tras ajustar por edad, diagnóstico y comorbilidad, la *odds ratio* (OR) (categoría de referencia: varón) fue 0,68 (intervalo de confianza [IC] del 95%, 0,64-0,72) para el cateterismo, OR = 0,61 (IC del 95%, 0,57-0,66) para la angioplastia y OR = 0,38 (IC del 95%, 0,29-0,50) para la anastomosis arterial coronaria.

Conclusiones. En la hospitalización por síndrome coronario agudo, las mujeres acceden con menor frecuencia que los varones a los procedimientos cardiacos intervencionistas. Se necesitan nuevas investigaciones para

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ABBREVIATIONS

PTCA: percutaneous transluminal coronary
    angioplasty.
UA: unstable angina.
CABG: coronary artery bypass grafting.
AMI: acute myocardial infarction.
iCh: Charlson index.
ACS: acute coronary syndrome.

clarificar el papel que desempeñan diversos factores de ámbito social, cultural y biológico en la explicación de las diferencias observadas.

Palabras clave: *Género. Procedimientos de revascularización. Infarto agudo de miocardio. Angina inestable.*

INTRODUCTION

Coronary artery disease has traditionally been considered as a condition that affects men. This might explain why, for a long time, women were not included in research programs or enrolled clinical studies, with findings obtained for men simply being extrapolated to women.[1,2] This approach is hard to justify given that ischemic heart disease is the leading cause of death in women in most industrialized countries.[3,4]

After the Framingham study,[5] many articles were published that analyzed sex differences in the epidemiology, prevention, diagnosis, and clinical signs and symptoms of coronary artery disease. Some articles explored sex as a predictive factor for use of health services.[6,7] The results, at times controversial,[8] stimulated debates and studies on the topic.

Revascularization procedures remain the most effective treatment for ischemic heart disease. Many studies have shown that fewer women undergo invasive procedures. Some authors suggest that this is due to the worse clinical state of women with ischemic heart disease, greater technical difficulties associated with carrying out such procedures, and higher associated mortality.[9,10]

The pattern of cardiovascular disease differs between women and men.[10] There are differences in the pathophysiology of the disease, the age of presentation, clinical symptoms, the influence of risk factors and psychosocial factors, and prognosis.[11] Although the differences found between men and women in the resources dedicated to diagnosis and therapy have been attributed to all these factors, a gender-based analysis poses the question of whether part of the difference in the use of different procedures

can be explained by sex discrimination. In such analyses, gender is understood to be a "cultural and social construct that is constantly changing, and that assigns different attributes and functions to men and women, and that can lead to inequality in terms of health care, or in other words, can lead to unnecessary, avoidable, and unjust discrimination."[12]

For some time now, studies have been done that focus on this gender issue and inequalities, and discrimination in health care have been detected. The differential use of cardiovascular procedures in men and women has been shown in a number of studies.[13,14] Few such studies have been done in Spain, although those published by Moreno et al[15] and Aguilar et al[16] deserve a mention. These studies suggest that inequalities between men and women in resources dedicated to diagnosis and therapy may be present in the Spanish health system.

The present study aimed to analyze the use of interventional cardiovascular procedures in a broad population—all patients admitted to hospital for unstable angina or acute myocardial infarction in public hospitals in the Spanish autonomous region of Andalusia over 4 years—and to explore possible sex discrimination.

METHODS

Study Population

We studied all hospital admissions to hospital recorded in the minimum basic data set (MBDS) obtained from hospital discharge reports in the 32 hospitals that comprise the Andalusian Public Health System health system. The study period comprised January 1, 2000 through December 31, 2003.

The following selection criteria were applied:

– Main diagnosis of acute myocardial infarction (AMI) or unstable angina (UA). These diagnoses corresponded to codes 410.01, 410.11, 410.21, 410.31, 410.41, 410.51, 410.61, 410.71, 410.81, 410.91, 411.1, 413.0, 413.1, and 413.9 of the ninth revision of the International Classification of Diseases (ICD-9-CM).
– Patients alive on arrival at the hospital and admitted as an emergency case. This criterion aimed to avoid errors in cases in which the main diagnosis would have been coded as AMI or UA in those with a personal history of ischemic heart disease and another (nonemergency) reason for admission.

All admissions that met these criteria were included in the study, regardless of whether they represented the first or subsequent hospitalizations of a given patient.

After this selection process, those discharged because of transfer to another hospital while in an acute state (5187 cases) were excluded. The aim of

this exclusion criterion was to avoid the same hospitalization episode being included twice in the analysis. Also excluded were cases in which the sex of the patient was not specified (113 cases).

Thus the final analysis population comprised 46 007 cases of hospitalization.

Diagnostic and Therapeutic Procedures

We analyzed the interventional cardiovascular procedures used in the diagnosis and treatment of acute coronary syndrome (ACS) in the patients included in the analysis during their time in hospital stay. These procedures were diagnostic cardiac catheterization (codes ICD-9-CM: 37.21, 37.22, 37.23, 88.55, 88.56, 88.57), percutaneous transluminal coronary angioplasty (PTCA) with or without stenting (codes ICD-9-CM: 36.01, 36.02, 36.05, 36.09, 36.06, 36.07, 36.09), and coronary artery bypass grafting (CABG) (codes ICD-9-CM: 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19).

To detect whether such procedures had been performed, all fields of the procedures recorded in the CMBD were assessed. We allowed multiple procedures to be counted during the same stay in hospital.

Independent Variables

The primary independent study variable was sex. We also analyzed the following explanatory variables that could have acted as confounding variables or that could have modified the sex effect and the use of interventional cardiovascular procedures:

– Age, analyzed in 3 groups (≤44 years, 45-64 years, and ≥65 years).
– The primary diagnosis as stated in the CMBD (AMI or UA).
– Concurrent diseases, quantified by applying the adapted Charlson index (iCh),[17] which consists of 17 diagnoses with a weighting based on the risk of death at 1 year (Table 1). This variable was transformed into 4 levels for the purposes of this analysis: level 1 (iCh=0), level 2 (iCh=1), level 3 (iCh=2), and level 4 (iCh≥3). ICH CALC 1.1 software, which was

developed for use with Microsoft Access®, was used to calculate iCh.[17]
– Secondary diagnosis of diabetes mellitus during a stay in hospital (codes ICD-9-CM, 250.00 to 250.93) was analyzed independently because of its importance in coronary artery disease.
– The admissions service.

Statistical Analysis

The use of diagnostic and therapeutic interventional cardiovascular procedures was expressed as a percentage. A descriptive analysis of the characteristics of the patients was done according to sex.

The association between sex and the use of each one of the procedures included was analyzed with stratification according to age, primary diagnosis, and concurrent diseases. In each group, the strength of the association was assessed with the odds ratio (OR), statistical association, the 95% confidence interval (CI), and the χ^2 test.

A multivariate logistic regression analysis with forward stepwise selection of variables was done for each of the interventional cardiovascular procedures. Sex was used as the main independent variable and adjustment was made for possible confounding factors (age, diagnosis, and iCh). A model was also constructed that tested diabetes as an independent variable but without iCh (as this index already includes diabetes). Prior to the multivariate analysis, possible interactions between age and sex were investigated with regard to the usage of the different procedures studied. No such interactions were found, and so no interaction terms were introduced in the final model.

The statistical package SPSS 12.0 for Windows was used for the analysis.

RESULTS

After applying the case selection criteria described in the Methods section, 46 007 admissions to hospital were included. Of these, 16 391 (35.6%) corresponded to women and 29 616 (64.4%) to men.

TABLE 1. **Weighting of Concurrent Diseases Included in the Charlson Index***

Acute myocardial infarction	1	Diabetes, chronic complications	2
Congestive heart failure	1	Hemiplegia or paraplegia	2
Peripheral cardiovascular disease	1	Renal disease	2
Dementia	1	Malign tumors	2
Chronic pulmonary disease	1	Moderate/severe hepatic disease	3
Peptic ulcer	1	Solid metastatic tumor	6
Mild hepatic disease	1	AIDS	6
Mild-moderate diabetes	1		

*AIDS indicates acquired immune deficiency syndrome.

Characteristics of the Population According to Sex

The study variables according to sex are shown in Table 2. The women admitted to hospital were older than the men–81% of the women were in the over-65-years age group.

Acute myocardial infarction was more common than UA and accounted for 60% of the hospital admissions to hospital in men and 54% in women. It should be noted that the site of AMI did not show substantial differences according to sex and that the most frequent types of AMI were anterolateral (accounting for 15.2% of the admissions to hospital in women and 16.3% in men), subendocardial (15.1% of the admissions to hospital in women and 13.9% in men), and inferoposterior (5.4% of the admissions to hospital in women and 9.2% in men).

Women had higher indices of concurrent diseases than men, with statistically significant differences between the sexes (Table 2). Diagnosis of diabetes was associated with AMI or UA in 16 178 (35.2%) cases, and affected 46% of the women and 29% of the men.

The service that admitted most patients was intensive care (29%), followed by cardiology and internal medicine, with statistically significant differences between men and women ($P<.0001$). Overall, 32% of the male patients were admitted by the intensive care service compared to 24% of the women.

Use of Interventional Procedures According to Sex

In 80% of the patients admitted to the hospital, 86% of the women and 77% of the men did not undergo any interventional procedure (Table 2). Diagnostic catheterization was done in 20%, PTCA in 12%, and CABG in 0.8%. The number of angioplasties without stenting was minimal, and so only total angioplasties were considered. All these procedures were done more often in men than in women.

Tables 3, 4, and 5 show the relationship between the practice of interventional cardiovascular procedures and sex, stratified according to age, diagnosis, and concurrent disease. All procedures studied were done more often in men than women, both in the case of admission for AMI and for UA, in all age groups, and for all groups of extent of concurrent disease. This relationship between sex and use of procedures was statistically significant in all groups, except for the group under 45 years of age for catheterization and CABG, and for the group with most extensive concurrent disease for CABG. Likewise, on stratifying for the presence of diabetes as a secondary diagnoses, the use of the 3 procedures studied was greater in men than in women both for those with and for those without diabetes, and all these differences were statistically significant.

The possible presence of an interaction between the sex and age was investigated for the different procedures. The findings were negative and so age was treated as a possible confounding factor in the multivariate analyses. In these analyses, after adjusting for other variables, sex was still associated with use of the 3 procedures studied, with women undergoing fewer procedures than men (Table 6). Of the multivariate models tested, those that included the iCh were more explanatory than those that included diabetes, and the OR for sex were very similar in both these models, and so only the results for iCh are presented.

Use of Interventional Procedures According to Other Variables

The findings for the remaining variables included in the multivariate logistic regression models are presented in Table 6. All procedures studied were done more frequently in the age groups under 65 years old than in the older patients. Both diagnostic catheterization and PTCA decreased as the extent of

TABLE 2. Study Variables According to Sex*

	Women	%	Men	%	P
Age, y					<.0001
≤44	282	1.7	1630	5.5	
45-64	2816	17.2	10 534	35.6	
≥65	13 293	81.1	17 452	58.9	
Primary diagnosis					<.0001
UA	7564	46.1	11 788	39.8	
AMI	8827	53.9	17 828	60.2	
Diabetes, yes	7568	46.2	8610	29.1	<.0001
Diabetes, no	8823	53.8	21 006	70.9	<.0001
Concurrent disease (Charlson index)					<.0001
iCh=0	7294	44.5	16 790	56.7	
iCh=1	6605	40.3	8999	30.4	
iCh=2	1592	9.7	2520	8.5	
iCh≥3	900	5.5	1307	4.4	
Admission					<.0001
First	13 576	82.8	25 149	84.9	
Readmission	2815	17.2	4467	15.1	
Status on Discharge					<.0001
Alive	14 458	88.2	27 148	91.7	
Dead	1933	11.8	2468	8.3	
Procedure†					<.0001
CABG	64	0.4	322	1.1	
PTCA	1150	7.0	4254	14.4	
Catheterization	2264	13.8	6926	23.4	
None	14 127	86.2	22 690	76.6	

*PTCA indicates percutaneous transluminal coronary angioplasty; UA, unstable angina; CABG, coronary artery bypass grafting; AMI, acute myocardial infarction; iCh, Charlson index.
†the percentages do not add up to 100% as the same patient could have undergone several procedures during the same stay in hospital.

TABLA 3. **Relationship Between Sex and Usage of Interventional Cardiovascular Procedures: Analysis Stratified by Age***

	Sex (Total)	No. of Patients	%	Odds Ratio	95% CI	χ^2 (*P*)
CABG						
≤45 years				0.76	0.17-3.38	.719
	Women (282)	2	0.7			
	Men (1630)	15	0.9			
45-64 years				0.27	0.148-0.50	<.0001
	Women (2816)	11	0.4			
	Men (10 534)	149	1.4			
≥65 years				0.42	0.30-0.57	<.0001
	Women (13 293)	51	0.4			
	Men (17 452)	158	0.9			
PTCA						
≤45 years				0.67	0.49-0.92	.013
	Women (282)	53	18.8			
	Men(1630)	416	25.5			
45-64 years				0.55	0.48-0.61	<.0001
	Women (2816)	364	12.9			
	Men (10 534)	2240	21.3			
≥65 years				0.57	0.52-0.63	<.0001
	Women (13 293)	733	5.5			
	Men (17 452)	1598	9.2			
Diagnostic catheterization						
≤45 years				0.88	0.68-1.14	.351
	Women (282)	103	36.5			
	Men (1630)	643	39.4			
45-64 years				0.7	0.64-0.77	<.0001
	Women (2816)	720	25.6			
	Men (10 534)	3455	32.8			
≥65 years				0.62	0.58-0.67	<.0001
	Women (13 293)	1441	10.8			
	Men (17 452)	2828	16.2			

*PTCA indicates percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass grafting; CI, confidence interval.

concurrent diseases increased, although an inflection was found in the case of CABG, with statistically significant differences only found in the comparison with the group with iCh=2 versus the group with iCh=0. The reason for admission to hospital was not included in the model for use of CABG, and catheterization and angioplasty were more frequent in all types of AMI than in UA.

DISCUSSION

This study has shown that women admitted to the hospital for AMI or UA have undergone fewer interventional cardiovascular diagnostic and therapeutic procedures than men. This difference between the sexes cannot be explained by differences in age, reason for admission, and concurrent disease. Unlike other studies, this study chose a well-defined population, namely, patients with an emergency admission to hospital for a specifically diagnosed condition. With this approach, we hoped to achieve relative homogeneous populations of men and women

with regard to the indication for the interventional procedures. Given that diagnosis was confirmed on admission to the hospital admission in all cases, the greater difficulties associated with diagnosis of ACS in women can be ruled out as an explanation for the differences found in the extent of use of these procedures.

The population analyzed is sufficiently large to allow the recording of reliable data on what happens to patients with ACS. Given the characteristics of our health system, most of these procedures are carried out in public hospitals, and those done in private hospitals are not very representative.

The main limitations of the study are derived from the use of a secondary data source (CMBD). This makes it difficult to probe further analyze into possible reasons for the differences between sexes in the resources dedicated to diagnosis and therapy, and we are obliged to limit any explanatory analysis to the variables included in this database. Thus, we cannot investigate the role of history of heart disease or other clinical and social variables, or other variables

TABLE 4. Relationship Between Sex and Usage of Interventional Cardiovascular Procedures: Analysis Stratified by Diagnosis*

	Sex (Total)	No. of Patients	%	Odds Ratio	95% CI	χ^2 (P)
CABG						
UA				0.31	0.20-0.47	<.0001
	Women (7564)	26	0.3			
	Men (11 788)	129	1.1			
AMI				0.39	0.27-0.56	<.0001
	Women (8827)	38	0.4			
	Men (17 828)	193	1.1			
PTCA						
UA				0.42	0.36-0.48	<.0001
	Women (7564)	266	3.5			
	Men (11 788)	936	7.9			
AMI				0.48	0.45-0.52	<.0001
	Women (8827)	884	10			
	Men (17 828)	3318	18.6			
Diagnostic catheterization						
UA				0.54	0.50-0.59	<.0001
	Women (7564)	805	10.6			
	Men (11 788)	2100	17.8			
AMI				0.53	0.50-0.56	<.0001
	Women (8827)	1459	16.5			
	Men (17 828)	4826	27.1			

*PTCA indicates percutaneous transluminal coronary angioplasty; UA, unstable angina; CABG, coronary artery bypass grafting; AMI, acute myocardial infarction; CI, confidence interval.

associated with the health care professionals themselves that might help explain the differences between men and women in use of diagnostic catheterization, PTCA, and CABG. In fact, the lack of information on all these variables does not allow us to quantify to what extent the differences are due to biological factors or to problems of inequality or even to different individual preferences. It is not possible to rule out that the procedures are underreported in the CMBD, as the extent of use appears low. Underreporting, however, should not affect the comparison between men and women, which is the main aim of the study.

Another limitation of the study is that it only considers a part of the total use of interventional cardiovascular procedures, those that occur in an emergency hospital setting as a result of acute ischemic heart disease. This might represent a limitation when interpreting the results. The lower extent of use found in women in this setting could be compensated by greater use of the same procedures once the woman has been discharged after emergency admission to hospital. To investigate this possibility further, all scheduled admissions in the same hospitals and the same periods were selected in which diagnostic catheterization, PTCA, and CABG were done regardless of the primary diagnosis, and a similar pattern was found. That is, usage was lower in women than in men (17 928 diagnostic catheterizations, 32.8% in women and 67.2% in men; 5679 PTCA, 23%

in women and 77% in men, and 2529 CABG, 23.3% in women and 76.7% in men).

The number of diagnostic catheterizations was significantly lower in women than in men in all age groups for the 2 diagnoses studied and for all extents of underlying disease. The association between sex and usage of this procedure remained after adjustment for the remaining variables. Diagnostic catheterization is the standard procedure for studying the presence and extent of coronary artery disease. Given that the technique provides independent prognostic information, has no absolute contraindications, and is associated with a low rate of complications,[18] it is difficult to understand this finding. Some clinical differences between the sexes that have been described in ACS could explain, in part, by this difference, that is, lower cardiac risk in women (3-vessel lesions less common, as well as a lower incidence of diffuse disease and better left ventricular function).[19] In fact, Rathore et al[20] found lower rates of cardiac catheterization in women than in men, but these differences were attenuated on adjustment for a range of clinical factors.

Percutaneous transluminal coronary angioplasty was also used less often in women than in men, with the difference particularly marked in patients aged over 65 years. This is in line with data from the GUARANTEE registry[21] and other publications,[22] although the authors did not find differences between the sexes when adjustments were made for risk factors such as

TABLE 5. Relationship Between Sex and Usage of Interventional Cardiovascular Procedures: Analysis Stratified by Concurrent Disease (Charlson Index)*

	Sex (Total)	No. of Patients	%	Odds Ratio	95% CI	χ^2 (*P*)
CABG						
iCh 0				0.4	0.27-0.59	<.0001
	Women (7294)	30	0.4			
	Men (16 790)	170	1			
iCh 1				0.32	0.21-0.50	<.0001
	Women (6605)	26	0.4			
	Men (8999)	107	1.2			
iCh 2				0.31	0.13-0.70	.002
	Women (1592)	7	0.4			
	Men (2520)	35	1.4			
iCh>3				0.14	0.01-1.12	.018
	Women (900)	1	0.1			
	Men (1307)	10	0.8			
PTCA						
iCh 0				0.42	0.38-0.46	<.0001
	Women (7294)	562	7.7			
	Men (16 790)	2765	16.5			
iCh 1				0.53	0.47-0.59	<.0001
	Women (6605)	486	7.4			
	Men (8999)	1172	13			
iCh 2				0.47	0.36-0.61	<.0001
	Women (1592)	75	4.7			
	Men (2520)	240	9.5			
iCh>3				0.49	0.31-0.77	.001
	Women (900)	27	3			
	Men (1307)	77	5.9			
Diagnostic catheterization						
iCh 0				0.52	0.48-0.56	<.0001
	Women (7294)	1119	15.3			
	Men (16 790)	4320	25.7			
iCh 1				0.56	0.51-0.61	<.0001
	Women (6605)	916	13.9			
	Men (8999)	2002	22.2			
iCh 2				0.55	0.45-0.66	<.0001
	Women (1592)	169	10.6			
	Men (2520)	445	17.7			
iCh>3				0.51	0.37-0.70	<.0001
	Women (900)	60	6.7			
	Men (1307)	159	12.2			

*PTCA indicates percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass grafting; iCh, Charlson index; CI, confidence interval.

age, concurrent disease, smoking habit, history of heart and lung disease, and body surface area.[13,23]

Given that the differences according to sex found for usage of PTCA occur in all age groups and groups of extent of concurrent disease, they might be explained by other factors, such as a longer delay in arrival hospital, for example, the time elapsed since onset of symptoms may exceed that considered safe according to clinical recommendations[24,25] or women may be in a worse clinical state that would imply a possible contraindication.[26] On the other hand, the guidelines for clinical practice consider being a female gender as a predictive factor for complications.[27,28]

The differences between women and men, measured by OR, were greater for more complex invasive procedures, and particularly for CABG. Arguments that have been put forward in the literature to explain why fewer CABG procedures are performed in women than in men include women having more extensive concurrent diseases,[28] less multivessel disease,[26] a higher percentage of unstable cardiac symptoms and more emergency surgery,[29] the need for more complex surgery with a higher number of associated complications, and higher mortality.[30] At times, the woman females may refuse surgery and opt for pharmacological treatment.[4] Of all these explanations

TABLE 6. Logistic Regression Analysis of Usage of Diagnostic and Therapeutic Cardiovascular Procedures*,†

	Odds ratio	95% CI	
CABG			
Sex			
Woman	0.382	0.291	0.503
Age, y			
45-64	1.103	0.667	1.826
<45	1.524	1.231	1.887
First admission	1.526	1.098	2.122
Charlson index			
1	1.222	0.976	1.529
2	1.565	1.109	2.208
>3	0.832	0.448	1.524
PTCA			
Sex			
Woman	0.615	0.573	0.661
Age, y			
45-64	2.95	2.623	3.318
<45	2.603	2.442	2.774
Diagnosis			
Anterolateral AMI	3.672	3.378	3.993
Inferolateral AMI	2.992	2.476	3.615
Inferoposterior AMI	2.853	2.567	3.169
Subendocardial AMI	2.333	2.12	2.566
Other types of AMI	2.194	2.009	2.396
Charlson index			
1	0.944	0.883	1.008
2	0.732	0.647	0.83
>3	0.485	0.395	0.595
Diagnostic catheterization			
Sex			
Woman	0.682	0.645	0.72
Age, y			
45-64	3.265	2.952	3.611
<45	2.579	2.451	2.715
Diagnosis			
Anterolateral AMI	2.139	2.001	2.286
Inferolateral AMI	1.738	1.474	2.049
Inferoposterior AMI	1.525	1.395	1.667
Subendocardial AMI	1.801	1.676	1.935
Other types of AMI	1.341	1.252	1.436
Charlson index			
1	0.973	0.923	1.026
2	0.804	0.732	0.883
>3	0.544	0.47	0.629

*PTCA indicates percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass grafting; AMI, acute myocardial infarction; CI, confidence interval; iCh, Charlson index.
†The reference categories were male sex, age >65 years, unstable angina, Charslon index 0, and duplicate admission..

for the differences between men and women, the only one that we have been able to test in this study was concurrent disease. We found that the pattern of differences according to sex was repeated in each subgroup of concurrent disease analyzed.

The women in this study, were older and in a worse state of health (in terms of females concurrent disease) than the males at the time of hospital admission. This study shows that, once in hospital, fewer diagnostic and therapeutic resources were used for women, and that 86.2% of women did not undergo any interventional procedure during their hospital stay in –almost 10% less than men (in absolute terms).

Another indicator of discrimination in the therapeutic resources used was the lower percentage of admissions to intensive care services for women compared to men, regardless of age, reason for admission, and concurrent diseases. This finding coincides with Swahn et al[31] and Álvarez-León et al,[32] who also described a higher mortality in patients with AMI who were not admitted to such units. A possible explanation is that women wait longer before seeking medical attention, and so a greater percentage of them are admitted in subacute phase of the disease, when intensive vigilance is not required.

Although it is probable that some of the differences found are related to biological and clinical factors, it also seems likely that some of them are associated with a problem of discrimination. Purely biological factors alone cannot explain the differences, which persisted for all age groups, for patients with little or extensive concurrent disease, and for both UA and AMI. The differences were apparent both for usage of diagnostic and therapeutic procedures, and for admission to intensive care units.

In recent times, much has been learned about discrimination between men and women in health care; nonetheless, as affirmed by Vaccarino et al,[33] awareness of this discrimination and its causes has yet to lead to significant changes or improvements in the health systems. Sex should be considered as an independent variable and included as such in studies to identify differences and inequalities in health. More extensive investigation into the causes responsible for the differences and inequalities in ACS in women is necessary. The findings could help prevent a disease that kills and improve treatment once it has been diagnosed.

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