

## New Data on Secondary Prevention of Myocardial Infarction in Spain. Results of the PREVESE II Study

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**Introduction and objectives.** The PREVESE Study reported the situation of secondary prevention after myocardial infarction in Spain. Similar surveys conducted in Europe have also shown that the implementation of secondary prevention is not adequate. The aim of this second PREVESE study was to compare the situation in Spain four years after the first study.

**Patients and method.** We included retrospectively 2,054 patients discharged after myocardial infarction from 74 Spanish hospitals. We studied the available information recorded in medical records after discharge, the prevalence of risk factors, procedures performed, and medical treatment before admission and at discharge. We compared the data collected with those from the first PREVESE study because the data collection methodology was similar.

**Results.** The information recorded in the hospital medical records was satisfactory in relation to the most important risk factors (hypertension 94.8%; dyslipidemia and diabetes 97.9%; and smoking 89.2%). Compared with the previous study, there was a significant decrease in the percentage of smokers (46.1 vs. 35.4%). The echocardiogram was performed more frequently (60.1 vs. 85.6%) and there were also significant differences related to drug treatment at discharge, with an important increase in the prescription of beta-blockers (33.5 vs. 45.1%), ACE inhibitors (32.5 vs. 46.4%), and lipid-lowering drugs (6.7 vs. 30.5%).

**Conclusions.** This study shows some improvement in the management of myocardial infarction patients after a four-year period, mainly due to more prescription of cardioprotective drugs at hospital discharge.

**Key words:** Myocardial infarction. Prevention. Drugs.

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### Nuevos datos sobre la prevención secundaria del infarto de miocardio en España. Resultados del estudio PREVESE II

**Introducción y objetivos.** El estudio PREVESE dio a conocer la situación de la prevención secundaria del infarto de miocardio tras el alta hospitalaria en España. Registros europeos similares pusieron de manifiesto que las medidas de prevención secundaria no se aplican correctamente. El objetivo de este segundo estudio PREVESE ha sido constatar la situación 4 años después del primero.

**Pacientes y método.** Se han registrado en el momento del alta 2.054 pacientes de 74 hospitales españoles y se ha estudiado retrospectivamente la cumplimentación de las historias clínicas, la prevalencia de los factores de riesgo, los procedimientos diagnósticos y terapéuticos utilizados y el tratamiento previo al ingreso y al alta. Se han comparado los datos con los del estudio PREVESE precedente y se ha seguido la misma metodología para la recogida de datos.

**Resultados.** La cumplimentación de la historia clínica ha sido buena para los factores de riesgo de primer orden (los antecedentes de hipertensión se hallaban registrados en el 94,8% de las historias, los de dislipemia y de diabetes en el 97,9% y los de tabaquismo en el 89,2%). En cuanto a la prevalencia de factores de riesgo con relación al estudio anterior, se ha encontrado una disminución significativa del tabaquismo (46,1 frente a 35,4%). La ecocardiografía se ha utilizado con mayor frecuencia (60,1 frente a 85,6%) y se han producido cambios significativos en cuanto a la terapéutica al alta, con incrementos en la prescripción de bloqueadores beta (33,3 frente a 45,1%), IECA (32,5 frente a 46,4%) y, sobre todo, de hipolipemiantes (6,7 frente a 30,5%).

**Conclusiones.** El tratamiento del infarto de miocardio en nuestro país ha mejorado en algunos aspectos en un intervalo de 4 años, sobre todo en lo referente a la prescripción de fármacos con mejor perfil cardioprotector en el momento del alta hospitalaria.

**Palabras clave:** Infarto de miocardio. Prevención.

\*Al final del artículo se relacionan los miembros del comité científico y los investigadores principales de cada centro participante en el estudio PREVESE II.

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**ABBREVIATIONS**

ARA II: angiotensin receptor antagonists II.  
 DCP: data collection picture.  
 EF: ejection fraction.  
 CVRF: cardiovascular risk factors.  
 AHP: arterial hypertension.  
 AMI: acute myocardial infarction.  
 ECAI: enzyme converting angiotensin inhibitors.  
 MI: myocardial infarct.  
 BMI: body mass index.

*Fármacos.***INTRODUCTION**

Cardiovascular disease continues to be the primary cause of death in developed countries, and more concretely, in Europe, despite a tendency to a reduction in the mortality rate.<sup>1</sup> Nevertheless, this reduction is accompanied, paradoxically, by an increase in the prevalence of these diseases, especially chronic cases, due to the aging of the population, better treatment in the acute phase, and the effect of certain medications on reducing complications.<sup>2</sup>

There is recent scientific evidence regarding certain secondary prevention measures, the control of cardiovascular risk factors (CVRF), and the use of cardioprotective medications, such as plaque antiaggregates,<sup>3</sup> beta-blockers,<sup>4</sup> and, above all, statins,<sup>5-7</sup> can reduce recurrences and improve prognosis, which has been supported –by recommending pertinent actions in this sense– by all the scientific cardiological societies.<sup>8-10</sup> In spite of this, patient records show that the application of the evidence and the recommendations of the guidelines are far from desirable.<sup>11</sup>

The aim of this study is to analyze the prevalence of CVRF, the use of diagnostic methods and functional evaluation, and the treatment prescribed both during a hospital stay and upon discharge for patients admitted to Spanish hospitals with an acute myocardial infarction. The data collected was compared with a similar study carried out 4 years ago which is known as the PREVESE study.<sup>12</sup>

**PATIENTS AND METHODS****Patients**

Retrospectively from May, 1998 with a data collection picture (DCP) designed for this purpose by the study's Scientific Committee, we collected the

data from all successive patients discharged who had been admitted to a coronary unit with the diagnosis of AMI during the 3 previous months in 74 Spanish hospitals dispersed over the entire country (Table 1). The offer to participate was made to nearly all hospitals, with the condition that they admitted patients with AMI into coronary or intensive care units and that they had a qualified person available to respectively collect the data from the clinical histories. With these provisions, the 74 hospitals listed in the addendum agreed to participate, together with the participating investigators.

Any patients who had died during their hospital course were excluded from the study, and data from 2054 patients who had been discharged were included. A total of 32 of the 34 hospitals that participated in the PREVESE I also participated in PREVESE II. The methodology used for data collection was exactly the same in both studies.<sup>12</sup>

**Data included**

In each case the data that was found in the clinical patient history was noted, such as age, gender, weight, height, CVRF antecedents (smoking, arterial hypertension, dyslipidemia, diabetes, obesity, alcohol consumption, and participation in sports), family history, personal history of ischemic heart disease, and profession and type of activity performed at work. If these data were not available, this was noted in the DCP.

Also noted was treatment prior to admission, the type and location of the MI, the performance of fibrinolysis or primary angioplasty and Killip class. We also noted whether the following procedures performed during the hospital course: echocardiogram; conventional, isotope, or echocardiography stress test;

**TABLE 1. List of DCP by location**

Location	Number
Andalusia	406
Aragon	63
Asturias	70
Balearic Islands	39
Canary Islands	101
Cantabria	45
Castile-La Mancha	104
Castile and Leon	100
Catalonia	211
Community of Valencia	226
Extremadura	44
Galicia	99
Community of Madrid	253
Community of Murcia	95
Navarre	24
Basque Country	174

Holter monitor; and coronary angiography, in addition to ECG data and chest X-ray. As far as lipid values and other analytical tests were concerned, we noted the results closest to hospital discharge, as in many centers there were no lipid values for the first 24 hours. Finally, we also noted the medications prescribed upon discharge and the revascularization procedures that were performed.

### Quality control

For each of these parameters, we studied the frequency of their appearance or lack of appearance in the clinical history in order to establish the level of completeness, the prevalence of CVRF according to sex, the personal history of ischemic heart disease and treatment prior to hospital admission, as well as the sex of the patient. We analyzed the characteristics of the AMI and the performance of fibrinolysis and primary angioplasty. Of the exploratory procedures performed, we analyzed the ejection fraction, the appearance of occult or clinical ischemia with provocation tests, and the number of vessels affected on coronary angiography.

### Comparison of study data PREVESE I

Finally, we compared the data of the 2 PREVESE records carried out at an interval of 4 years, comparing the prevalence of CVRF, AMI characteristics, use of exploratory measures, and the treatment prescribed at hospital discharge, with the aim of finding out whether there were any differences during this interval of time. To do this, we compared the totals of both patient cohorts and of the 32 hospitals that had participated in both records.

### Sample size

For the PREVESE II study, we calculated a minimum study size of 2000 patients, recommending that the data of at least 25 patients per center be recorded. This would assure confidence intervals of  $\pm 2.5\%$ , with subgroups of 1000 having a confidence interval of  $\pm 3.1\%$ .

### Statistical analysis

For quantitative variables, the mean and standard deviation were calculated, and for the qualitative variables, the percentage frequencies were calculated. The quantitative variables were analyzed by Student *t* test and the qualitative variables by the  $\chi^2$  test and the exact Fisher test.

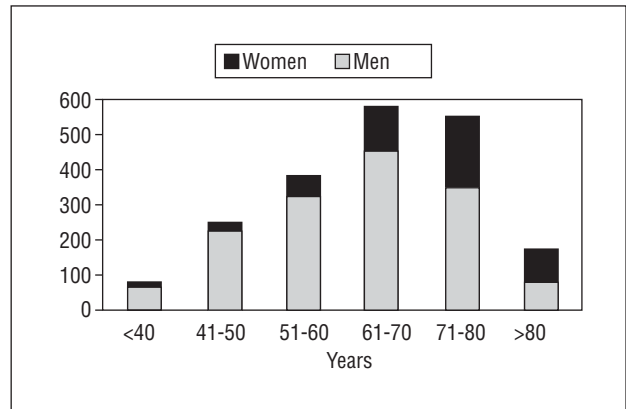


Fig. 1. Distribution by sex and age group.

### Data quality control

Data quality control was carried out by an independent company (CIBEST) in collaboration with the study's Scientific Committee.

## RESULTS

### Population studies

A total of 2054 patients discharged after an AMI in 74 Spanish hospitals were included, with a mean age of  $64.3 \text{ years} \pm 12.7 \text{ years}$ ; the age of the male patients (75% of the sample) was significantly less than that of the female patients ( $62.2 \text{ years} \pm 12.5 \text{ years}$  versus  $70.1 \text{ years} \pm 11.4 \text{ years}$ , respectively). Distribution by sex and age is shown in Figure 1.

### Completeness of clinical history

Table 2 shows the percentage of data that was missing from the patient clinical histories, and it was observed that the records were most complete that concerned first line CVRF antecedents (hypertension, diabetes, and dyslipidemia), with a 95% to 98% completion rate, with the exception of habitual smoking, which was noted with somewhat less frequency (89.2%). On the other hand, other data, such as a history of obesity, weight and height, work activity, and family history were lacking in 44% to 46% of cases. Information regarding personal history was also missing in 22.8% of the family histories.

In the same manner, 18% of the patient histories did not note total cholesterol level, and in 23% did not note triglycerides, while the absence of C-LDL and C-HDL levels was noted in 53.3% and 49% of cases, respectively (this data was not included in the table).

TABLE 2. Data not included in the clinical history

	Number of histories in which data was missing	% Denominating (n=2054)
AHP	107	5.2
Dyslipidemia	43	2.1
Smoking	223	10.8
Diabetes	43	2.1
Obesity	1012	44.7
Weight/height	1184/1262	57.6/61.4
BMI	842	63.2
Family history	1125	54.7
Personal history	468	22.8
Alcohol use	608	29.6
Work activity	1047	50.1
Sports participation	1185	57.7

AHP indicates arterial hypertension; BMI, body mass index.

### CVRF prevalence

Table 3 shows the distinct prevalence of CVRF according to sex. Of note is the high prevalence in both sexes of hypertension, overweight, and obesity. There were significant differences between men and men with respect to a history of hypertension and diabetes, being more frequent among women, and smoking being more frequent in men.

### History of ischemic heart disease

Fifteen point five percent of the patients had suffered a previous AMI, 3.2% had undergone surgical intervention, and 2.0% had undergone angioplasty. A history of chest pain was more frequent among women (17.2%) than among men (13.3%).

### AMI characteristics

Seventy-three point six percent of patients had Q-wave infarcts, with 39% being anterior, 56.4% inferior, and the rest either in both locations or in an undetermined location. Thrombolysis was performed on 50.2% of

the Q-wave infarcts, and primary angioplasty performed on 7.1% of them.

### Treatment upon admission

Upon admission, 10.8% of patients received antiaggregant treatment, 15.9% took IECA, 15.3% calcium antagonists, 13.4% nitrates, 7.7% hypolipemics, and 7.1% beta-blockers. Of interest was the greater number of women being treated pharmacologically (nitrates and IECA) with significant differences, although these did not exist between the most essential medications, such as anti-aggregates, beta-blockers, and hypolipemics.

### Exploratory measures

The results of lipid analysis were noted in 82% of the clinical histories, and there were no differences with regard to sex or age. The average values obtained, mean plus standard deviation, were 206.4 mg/dL±43.4 mg/dL for total cholesterol, 40.1 mg/dL±16.1 mg/dL for C-HDL, 139.6 mg/dL±40.4 mg/dL for C-LDL, and 157.2 mg/dL±83.0 mg/dL for triglycerides.

In 97.1% of patients chest x-ray was performed, in 85.6% an echocardiogram was performed, and in 48.8% a conventional stress test was performed, while in 10.3% other tests to detect ischemia were carried out (isotope or ECG stress testing), and in 3.8% Holter monitoring was performed.

The mean ejection fraction (FE) found on echocardiography was 50.9%, with a standard deviation of 12.9. There was no significant difference in the EF value according to sex, but there was with regard to age, with the EF being lower in patients age 71 years and higher in comparison with those of 60 years. In the same way, the EF was significantly lower among patients with anterior MI (mean, 46.6%) that in patients with inferior MI (53.3%). Nevertheless, there was also no difference between patients who underwent thrombolysis and those who did not undergo thrombolysis, or between those who received

TABLE 3. Prevalence of risk factors according to sex

CVRF	No.*	%	Men	Women	P
AHP	926/1947	47.5	41.3	65.6	.001
Smoking	722/2037	35.4	44.0	9.5	.001
Dyslipidemia	684/2011	34.0	33.8	34.5	NS
Obesity	225/725	31.0	28.6	33.7	NS
Overweight	336/725	46.3	46.4	38.3	NS
Diabetes type 1	73/2011	3.6	3.0	5.7	.05
Diabetes type 2	455/2011	22.6	18.8	35.0	.001
Family history	147/2011	7.3	9.8	10.7	NS

\*No.: patient with valid data;

CVRF indicates cardiovascular risk factors; AHP, arterial hypertension; NS, not significant.



IECA treatment upon discharge and those who did not.

In 41.3% of the conventional stress tests performed there were symptoms and/or signs of ischemia, as well as in 61.2% of isotopic stress tests and 40.6% of patients in whom stress echocardiography was performed. Seven hundred sixty-one patients also underwent coronary angiography before discharge, which represents 37.8% of the patient cohort. As a result of coronary angiography, 394 angioplasties were performed, of which 106 were primary, 67 recovery, and 221 elective, representing a total of 20.5% of patients. Finally, 4.2% of patients underwent coronary revascularization surgery before discharge.

### Treatment upon discharge

Upon discharge, only 4.1% of patients were classified as being NYHA functional class III-IV, while the Killip class of the same level was seen in the acute phase in 9.3% of patients. As far as the treatments prescribed on discharge, these are listed in Table 4, differentiated by sex. The medications most frequently prescribed were plaque antiaggregates, in 87.8% of patients, followed by IECA, beta-blockers, and nitrates, at a rate of about 45%, and the hypolipidemics at a rate of 30.5%. As can be seen in Table 4, there is a significantly greater prescription rate for male patients of beta-blockers, plaque anti-aggregates, and hypolipidemics, while the nitrates and IECA, as well as anti-diabetic medication, digitalis, and diuretics were prescribed more frequently for the women.

Of the prescriptions for plaque anti-aggregates, 93.4% were for acetylsalicylic acid, while among the hypolipidemics statins were used in almost all cases (96.5%), and nitrates were prescribed in the form of transdermic patch in 65.4% of cases.

### Comparison with the PREVESE I study

On comparison of the total samples of both records, (1242 patients from 39 hospital in PREVESE I and 2054 from 74 centers in PREVESE II), a significant increase in the average age (62.8 years±11.8 years versus 64.3 years±12.7 years) and the percentage of women (21.5% versus 25.1%) was found in the PREVESE II records. Also significant was the fact that the mean hospital stay was reduced from 13.8 days±8.0 days to 11.5 days±10.2 days, and that among the CVRF patients there was a decrease in the prevalence of smokers (46.3% versus 35.4%).

In the first study, 60.1% of patients underwent echocardiograms, 50.6% underwent stress tests, and 12.6% Holter monitoring, while in the second study there was an increase in the number of echocardiograms performed (85.6% of patients), and a significant decrease in Holter monitoring (3.8% of patients), with a slight increase in ischemia detection tests (59.1% of patients).

Changes in treatment upon discharge from 1 study to the other are noted in Table 5, which shows a significant increase in prescriptions for beta-blockers and IECA and, above all, in statins (from 4.5% to 29.4%); there was also a significant decrease in prescriptions for nitrates and calcium antagonists.

Analyzing only the data from the 32 hospitals that participated in both studies and the samples from both studies at the time of hospital discharge (1329 patients in PREVESE I and 1180 in PREVESE II), the findings were similar, and the reduction in the number of smokers (down to 21.2%) is even more marked. Among the medications prescribed at time of discharge in these particular hospitals, there was also no difference with regard to the total sample, with percentages being almost identical (data not included in the tables).

TABLE 4. Treatment received by patients upon discharge according to sex

Type of treatment	Total (n=2054)	Men (n=1506)	Women (n=505)	P
Plaque anti-aggregates	1804 (87.8%)	1346 (89.3%)	427 (84.5%)	<.05
Anticoagulants	162 (7.9%)	120 (7.9%)	39 (7.7%)	NS
Beta-blockers	926 (45.1%)	706 (46.9%)	202 (40.0%)	<.05
IECA	953 (46.4%)	676 (44.8%)	263 (52.1%)	<.05
ARA II	82 (4.0%)	53 (3.5%)	27 (5.3%)	NS
Hypolipidemics	626 (30.5%)	496 (32.9%)	131 (25.9%)	<.05
Nitrates	882 (42.9%)	604 (40.1%)	251 (49.7%)	<.001
Calcium antagonists	363 (17.7%)	266 (17.6%)	89 (17.6%)	NS
Digitalis	87 (4.2%)	44 (2.9%)	43 (8.5%)	<.001
Diuretics	324 (15.8%)	185 (12.3%)	132 (26.1%)	<.001
Anti-arrhythmics	65 (3.2%)	40 (2.6%)	24 (4.7%)	NS
Insulin	163 (7.9%)	88 (5.8%)	73 (14.5%)	<.001
OAD	213 (10.4%)	134 (8.9%)	76 (15.0%)	<.001

IECA indicates enzyme converting angiotensin inhibitors; ARA, angiotensin receptor antagonists; OAD, oral anti-diabetics; NS, not significant.

## DISCUSSION

The principal aim of the treatment and secondary prevention of patients with ischemic cardiopathy must be to reduce risk, the first priority according to the recommendations of European scientific societies,<sup>8,9</sup> based on the existing evidence and as agreed by the experts. An efficient method of determining how to apply these recommendations in practice is to use records that include all the patients treated in daily practice in the countries or areas where the problem is to be studied. A homogenous group of patients for this purpose would be composed of those patients who have been discharged from hospital after suffering a MI.

The first record of these characteristics in our country was the PREVESE study,<sup>12</sup> which included 1242 patients discharged from 39 Spanish hospitals in 1994. Shortly afterward, findings were published from a similar study carried out in Galicia.<sup>13</sup> Other studies have included not only patients with MI, but also those who were discharged after hospitalization for unstable angina or after undergoing either surgical or percutaneous revascularization.

In our country data has been published from 3215 patients with these characteristics from 25 hospitals included in a secondary prevention program, called 3C.<sup>14</sup> In France similar data has been published in the PREVENIR study,<sup>15,16</sup> which included 1334 patients discharged after MI or unstable angina from 77 hospitals. All these studies have shown that, at the time of hospital discharge, patients with acute ischemic heart disease did not receive adequate attention with regard to secondary prevention measures, and that this situation must be improved.

In Europe, the studies carried out under the auspices of the European Cardiology Society (EUROASPIRE) have also called attention to the deficient control of CVRF in secondary prevention.<sup>17-19</sup> In these European studies, patients have been interviewed and examined at least 6 months after discharge (mean 1.4 years), and it has been proven that the situation did not improve between the first and second EUROASPIRE studies, performed 2 years apart and with the directives of the European Cardiology Society being published in order to improve the situation. In the most recent study,<sup>18</sup> with patients reviewed between 1999 and 2000, 21% of patients continued smoking, 31% continued to be obese, and 50% were not maintaining their arterial pressure below the recommended numbers; also, 72% of patients with diabetes had not achieved their objectives and 58% continued to have a total cholesterol value over the target level of 190 mg/dL recommended by the European directives cited. The conclusion of the comparative study of the same centers that participated in both studies<sup>19</sup> was that CVRF had not been adequately corrected in spite of the existing evidence,

and that the recommendations of the groups of experts, medicine as a whole was deficient in this regard, as the authors concluded in their publication.

These studies provide knowledge of the development of a particular situation, as long as there has been no change in the methods, as is the case with both the European studies and both PREVESE studies. It is more difficult to compare the results from different studies, as the manner in which the data is obtained has a significant effect on the results.

### Completeness of clinical histories

The first step toward obtaining secondary prevention would be obtaining complete clinical histories with regard to CVRF. This aspect has been studied in our group of patients, and it was found that the attention given to patients with CVRF is greater, with recording of same being made in almost all clinical histories (Table 2), while the rest are incomplete, with up to half of the clinical history missing. Reference to smoking appears with less frequency (89.2%) than dyslipidemia (97.9%). Physicians probably forget to inquire about a smoking habit and concentrate on more obvious habits, without considering the fact that anti-smoking counseling is of primordial importance.

The completeness of the patient records was better in our study than in the 3C study,<sup>14</sup> probably because this included other coronary diseases and not only acute myocardial infarction (AMI). In any case, we must point out that in the EUROASPIRE study,<sup>18</sup> the completeness of clinical histories at the time of hospital discharge, according to the data from the tables that correspond to patients with IM, was inferior to ours, lacking 12% to 14% of the history data and up to nearly 30% in the case of a history of dyslipidemia.

Other data that indicates how much attention is being paid to secondary prevention is the determination of the lipid values and whether they are recorded in the clinical history during the hospital stay. In almost 20% of our patients the total cholesterol and triglyceride values were not recorded in the history, and in half of the cases cholesterol values either were not determined or not recorded, a situation that is almost identical in the case of the patients in the EUROASPIRE study.<sup>18</sup>

### Patient characteristics and treatment

The prevalence of patients with CVRF encountered in our sample is shown in Table 3. The high prevalence rate is similar to that found in the French PREVENIR study<sup>16</sup> and in another national register of heart patients that we have cited.<sup>14</sup> The lack of recording of some data in the histories (Table 2), as we already indicated, did not allow comparison with other studies.

As far as AMI characteristics and the details of hospital treatment are concerned, if we compare them with PREVESE I<sup>12</sup> we can point out some differences. Patient age has increased significantly (62.8 years versus 64.3 years), as has the percentage of women (21.5% versus 25.1%), and the length of hospital stay has been significantly reduced from 13.8 days to 11.5 days. The prevalence of CVRF has remained practically unchanged, except for a significant decrease in the number of smokers. These data do not vary significantly between the total patient cohort and the smallest patient cohort from the hospitals that participated in both studies. This leads us to think that participation in the PREVESE I study did not change the rate of completeness of clinical histories.

The percentage of Q-wave MI decreased from 79.7% to 73.6%, with a logical increase in non-Q-wave MI. The performance of echocardiograms has increased significantly, having reached 85.6%, and the use of Holter monitoring has been drastically reduced, from 12.6% to 3.8%. Thirty-seven point eight percent of patients underwent coronary angiography and 17% underwent angioplasty before discharge, data that was not obtained in the previous study.

Thrombolysis was performed in 50.2% of the Q-wave MI, and in 7.1% of patients primary angioplasty was performed; therefore the percentage of patients with revascularized Q-wave reached 57.3%, comprising 41.3% of the total study cohort. In an almost identical manner, in the PRIAMHO study,<sup>20</sup> the largest study on AMI published in our country, thrombolysis was performed in 41.8% of the total number of 5242 patients included in the study.

### Pharmacological treatment

As far as pre-admission pharmacological treatment is concerned, the medications typically used by patients varied from 7.1% (beta-blockers) to 18.6% (plaque anti-aggregates). Along with 7.7% of patients who took hypolipidemics, it is likely that for many patients other medications (IECA, calcium antagonists and diuretics) were prescribed for hypotension. It is possible that in this regard and more frequently than for those patients with CVRF, the female patients received more pharmacological treatment than the male patients.

Treatment prescribed at discharge is detailed in Table 4, differentiated by sex. In this case, the female patients received less treatment with cardioprotective medications than the male patients, a finding that was also noted in the 3C study,<sup>14</sup> while more of the remaining medications were prescribed for women. Table 5 compares the treatment regimens on discharge of both PREVESE studies. It seems important to note the significant increase in the prescription of beta-blockers, which reached 45.1%, of IECA, which increased to 46.4% and, above all, the marked increase in the pres-

TABLE 5. Discharge treatment in the two PREVESE studies

Type of treatment	PREVESE 1994	PREVESE 1998	P
Plaque anti-aggregates	1192 (89.7%)	1811 (87.8%)	NS
Anticoagulants	104 (7.8%)	162 (7.9%)	NS
Beta-blockers	442 (33.3%)	926 (45.1%)	<.001
IECA	432 (32.5%)	953 (46.4%)	<.001
ARA II	—	82 (4.0%)	—
Resins	8 (0.6%)	7 (0.3%)	NS
Fibrates	21 (1.6%)	35 (1.7%)	NS
Statins	60 (4.5%)	604 (29.4%)	<.001
Nitrates	828 (62.3%)	1186 (57.7%)	<.05
Calcium antagonists	352 (26.5%)	363 (17.7%)	<.001
Digitalis	72 (5.4%)	87 (4.2%)	NS
Diuretics	172 (12.9%)	324 (15.8%)	<.05
Anti-arrhythmic	51 (3.8%)	65 (3.2%)	NS
Insulin	86 (6.5%)	163 (7.9%)	NS
OAD	96 (7.2%)	213 (10.4%)	<.05

IECA indicates enzyme converting angiotensin inhibitors; ARA, angiotensin receptor antagonists; OAD, oral anti-diabetics; NS, not significant.

cription of hypolipidemics, which increased from 6.7% to 30.5% and even more markedly, the increase in statin prescriptions, from 4.5% to 29.4%. It is also important to note the significant decrease in the prescription of nitrates and, above all, calcium antagonists. The changes are practically the same when data from only those hospitals that participated in both studies are taken into account.

Extracting from the EUROASPIRE study<sup>18</sup> those data that correspond to the treatment prescribed at time of discharge for patients with IM, we observed that the prescription rate for beta-blockers continued to decrease (45.1% versus 74.7%) as was, although to a lesser degree, the prescription of hypolipidemics (30.5% versus 42.3%), and there are no notable differences with regard to anti-aggregates or IECA. The French PREVENIR study<sup>15,16</sup> also revealed increased prescription rates for MI patients upon discharge of up to 70% for treatment with beta-blockers, 52% with IECA, and 42% with hypolipidemics. Extensive studies have recently been published of patients with MI who were discharged from the hospital focusing on hypolipidemic treatment, and in particular on statins, that were received at the time of discharge. In the United States, the National Registry of Myocardial Infarction 321 data have been published, which included 138 000 patients studied between 1998 and 1999 from 1470 hospitals, and it was found that the prescription of hypolipidemics upon discharge was made in 31.7% of the cases studied. In a similar manner, a Swiss study of more than 19 000 patients from 58 hospitals<sup>22</sup> showed a prescription rate for statins of 27% upon discharge; both of these numbers are similar to those we found in our patient cohort.



Considering these data, ours as well as those of the studies referenced in the bibliography that refer to patients with MI treated between 1998 and 1999, the present situation seems to be a tendency toward an increase in hypolipidemic treatment and the use of statins. Therefore, in the EUROASPIRE II study,<sup>18</sup> 1.4 years after discharge, 64.6% of post-MI patients received hypolipidemics (58.% with statins) although, in spite of this, 58.8% did not reach the therapeutic objectives indicated by the guidelines. This means that, in spite of more medications being prescribed, they are either not being provided at an adequate dose or the drug course is not being completed, as the authors of a study recently published in *The Lancet* comparing the two EUROASPIRE studies<sup>19</sup> assert.

### Study limitations

We present the results of a retrospective study of the existing data contained in hospital clinical histories, which allowed us to get a fairly accurate view of what is happening in daily clinical practice in this field in our country, but which did not allow us to reach other, more far-reaching, conclusions. The comparison with other studies was also limited, except in the case of those that were carried out using the same methodology.

The selection of hospitals was based solely on their availability to participate in the study, and as all the regions except one were represented, with a significant number of DCP from each of them, although some of the parameters were not the same as in the previous study, with certain characteristics that would have made the sample more representative, we believe that the number of patients included and the possibility of comparison with the previous study allowed us to study the apparent changes on this second pass with an acceptable confidence level.

Another limitation of this study, in comparison with the PREVESE I study, is that, for primarily budgetary reasons, 6-month followup of the patients included in the study was not possible. Finally, in both PREVESE studies, the lack of lipid profile data in the first 24 hours of the hospital stay is another important limitation. Nevertheless, we believe that the studies reflect current daily practice and its limitations.

### CONCLUSIONS

The PREVESE II study has allowed us to compare in detail the changes that have come about in our country regarding secondary prevention in the MI patient during a 4-year interval from 1994 to 1998, a period in which decisive multicenter studies have been published in this regard<sup>5-7</sup> and standards were dictated in this regard by the scientific societies.<sup>8-10</sup> It is clear that treatment of MI seems to have improved in our country, at least in part, with shorter hospital stays,

greater utilization of some exploratory procedures, and an increase in the prescription of drugs which have a cardioprotective effect.

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