Impact of Implementing Common Guidelines at Different Care Levels in a Healthcare Area on the Improvement of Atrial Fibrillation Treatment

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Introduction and objectives. Atrial fibrillation (AF) is treated in different settings by different specialists. The objective of the study was to analyze the impact of the implementation of a practice guideline about AF treatment common to the different levels of health attention on the adequacy of AF treatment and on corrective interventions.

Methods. The study was performed in 2 periods, before and after the implementation of a practice guideline common to all health care levels. In each period, patients with AF who consulted to any of the health care attention levels of a sanitary area were included. Data referring to treatment and compliance of guidelines before and after the visit were recorded prospectively.

Results. 293 patients were included in the first period and 267 in the second one. After the guideline implementation, adequacy before the visit, both of antiarrhythmic treatment and of antithrombotic prophylaxis were superior than in the first period (80% vs 71%; *P*=.009; and 81% vs 67%; *P*<.001, respectively). The percentage of improvement in case of a previous inadequacy of antithrombotic prophylaxis was significantly better in the second period than in the first one (35% vs 9%; *P*<.001), but the percentage of corrective interventions on antiarrhythmic treatment was similar in both periods.

Conclusions. The implementation of a common practice guideline in the different levels of health care attention is useful to improve adequacy of AF treatment, although there is still some reluctance to change an inadequate antiarrhythmic treatment.

Key words: *Atrial fibrillation. Adequacy treatment. Treatment protocol. Levels of health care.*

Impacto de la instauración de un protocolo común en los distintos niveles asistenciales de un área sanitaria para la mejora del tratamiento de la fibrilación auricular

Introducción y objetivos. La fibrilación auricular (FA) se trata en múltiples ámbitos asistenciales. El objetivo del estudio fue analizar el impacto de la instauración de un protocolo de tratamiento de la FA común a todos ellos en la adecuación del tratamiento y en las intervenciones correctoras en caso de inadecuación.

Métodos. El estudio se realizó en 2 períodos, antes y después de la elaboración y difusión de un protocolo de tratamiento de la FA común para los distintos ámbitos de atención sanitaria de un hospital de tercer nivel y de un centro de atención primaria relacionado. En cada período se incluyó a todos los pacientes adultos con FA que consultaron en ellos. Se registraron el tratamiento de la FA y la adecuación de éste a las guías clínicas vigentes antes y después de la visita.

Resultados. Se incluyó a 293 pacientes en el primer período y a 267 en el segundo. La adecuación antes de la visita fue superior en el segundo período (tratamiento antiarrítmico del 80 frente al 71%; p = 0,009; profilaxis antitrombótica del 81 frente al 67%; p < 0,001). El porcentaje de intervenciones correctoras en caso de profilaxis antitrombótica inadecuada fue superior en el segundo período (el 35 frente al 9%; p < 0,001), pero este porcentaje no cambió en el tratamiento antiarrítmico.

Conclusiones. La elaboración y difusión de un protocolo de tratamiento de la FA común a los distintos ámbitos asistenciales es útil para la mejora de la adecuación del tratamiento de la FA, pero persiste la reticencia a cambiar un tratamiento antiarrítmico inadecuado.

Palabras clave: *Fibrilación auricular. Adecuación del tratamiento. Protocolo de tratamiento. Ámbitos asistenciales.*

INTRODUCTION

Atrial fibrillation (AF) is the most frequent arrhythmia in clinical practice and its prevalence is expected to increase due to the increased survival in the general

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ABBREVIATIONS

AF: atrial fibrillation

population and of patients with comorbidities that predispose to the development of AF.[1,2] The wide range of clinical manifestations and seriousness of presentation[1,3] means patients with AF are attended in many different healthcare settings by a variety of specialists.

Atrial fibrillation is a potentially serious condition given that it doubles mortality and has a high level of morbidity.[1,3-7] However, AF-related complications can largely be prevented or efficiently controlled by early, adequate treatment of arrhythmia.[7-9] Similarly, the earlier therapy is begun, the more likely it is that sinus rhythm can be restored and maintained.[7,9] Consequently, adequate treatment in each healthcare setting is crucial to the subsequent optimal evolution of the patient.

However, treatment of AF and prophylaxis for complications often vary according to the specialist responsible for each patient despite the availability of clinical guidelines and consensus documents.[10-13] Furthermore, these are applied differently in different settings. In a recent study, we determined the inadequacy of some aspects of AF treatment in half the patients with this arrhythmia and the reluctance of specialists to rectify inadequacies in most cases.[14] These findings have been corroborated elsewhere.[15-19]

The objective of the present study is to evaluate the impact of implementing a common AF treatment protocol in different settings within a healthcare area, on improving treatment and increasing specialists' commitment to rectifying preexisting inadequacies.

METHODS

Settings

The study was conducted in an urban, tertiary hospital and a primary care clinic (PCC) in the catchment area. The contexts in which patients were included were the following: *a)* family physician clinics in the PCC; *b)* PCC and hospital outpatient cardiology clinics; *c)* hospital emergency room (ER); and *d)* conventional hospital wards.

Patients attending ER and subsequently admitted were included in ER setting when evaluating before the visit, and in the hospital setting at discharge, as final treatment depends on the physicians on the wards.

Different healthcare settings are independent and autonomous in their treatment of these patients and face no restrictions in the application of treatments recommended in the clinical guidelines below (electric cardioversion, antiarrhythmic drugs, anticoagulants, antiplatelet treatment).

Periods

The study was conducted in 2 periods, as follows:

Period 1 or preintervention. We included all adult patients (>18 years) with antecedents of AF demonstrated by electrocardiogram attending any of the healthcare settings mentioned during 14 consecutive days in June 2004 whether their reason for attending was directly AF-related or not. We excluded patients first diagnosed with AF at this consultation (first episodes), as they did not receive treatment prior to AF and we could not therefore evaluate treatment adequacy before the visit or the change in treatment if it were inadequate.

Period 2 or postintervention. We included all adult patients (>18 years) with antecedents of AF demonstrated by electrocardiogram attending clinic in any of the healthcare settings mentioned during 14 consecutive days in June 2005 (the same period as in 2004), whether the reason for consultation was AF-related or not. We again excluded first episodes.

In the 2 periods, all patients were treated according to the criteria of the physician responsible and followed the care routines established at the time of the study. The same specialists were responsible for patients in the 2 periods, although there were changes among the interns who collaborated in attending patients.

Intervention

Between the 2 periods, we designed a protocol for action in the face of AF agreed by physicians from all the healthcare settings involved through the participation of 2 or 3 representatives from each. The protocol covered both treatment of different types of AF and procedures for referral between fields. To create this, the physicians responsible based themselves on the current clinical guidelines specified below[10-13] and adapted them to the realities of the healthcare area.

The protocol was publicized in 2 ways: *a)* a pocket-sized brochure summarizing the protocol was distributed to all physicians working in the healthcare settings involved, both interns (n=81) and specialists (n=53), and *b)* in each setting, clinical sessions were led by 2 of the physicians responsible for preparing the protocol. In the sessions, they explained AF treatment, data obtained on adequacy in the first period, the reason for preparing the agreed protocol and described the protocol. Although sessions were aimed at the same physicians who had received the summary, only 70% attended.

Variables Studied

In the 2 periods, we conducted a personal interview with each patient and/or their close family, and reviewed clinical records.

We obtained the following data on each patient:

– Age
– Gender
– Social-family support (good, partial, none)
– Quality of life/degree of dependence (Barthel index, Annex 1)
– Arterial embolism risk factors (number and type)
– AF classification (paroxystic, persistent, permanent)
– Reason for visit (see text)
– Antiarrhythmic treatment. Type of treatment and adequacy according to current clinical guidelines (see text)
– Prophylactic treatment for arterial embolism. Type of treatment and adequacy according to current clinical guidelines (see text)

Reasons for attending clinic were classified in 2 subgroups: *a)* directly AF-related, and *b)* non AF-related.

Treatment was considered adequate when it corresponded to that in clinical guideline recommendations current at the time of the study, even though they might differ on certain points. In the first period, we accepted: "Guidelines of the Spanish Society of Cardiology on Cardiac Arrhythmias," "Guidelines for the treatment of atrial fibrillation in hospital emergency services," "ACC/AHA/ESC guidelines for the management of patients with atrial fibrillation."[10-12] In the second period, we also accepted the more recent "7th Consensus of the American College of Chest Physicians."[13] This was not available for inclusion in the first period evaluation but could be included in the second period and in the preparation of the protocol.

Evaluation of adequacy of treatment was conducted before and after the study visit. We considered treatment inadequate when it was not specified in guidelines for the use it was being given, when it was not the first choice treatment and there was no justifiable reason for not using the first choice treatment, or when there was a contraindication to its use. However, we did consider adequate, prophylactic treatment for arterial embolism, in patients theoretically indicated for anticoagulation, according to guidelines, but not receiving it because of a medical or social contraindication detailed in their clinical records.

In the first and second periods, the physicians responsible for the patients were only informed about the existence of an epidemiologic study which some of their patients had been included in. They were asked to give permission for inclusion, but, to avoid bias, were not informed in advance about the exact nature of data gathered or about the period when analysis would be conducted.

Data on the variables studied were gathered by interns (n=8) and of specialists in family and community medicine (n=2), internal medicine (n=3, including 2 subspecialists in ER), and cardiology (n=1). All data was recorded by interns under the supervision of the specialists, who then judged the adequacy or inadequacy of treatment based on the specified clinical guidelines. The same specialists were involved in data collection in the 2 periods.

Statistical Analysis

Values are expressed as mean (SD) for continuous variables and absolute values or percentages for discontinuous variables. For comparisons we used the Student's *t* test and one-way ANOVA with Bonferroni correction for normally distributed continuous variables and χ^2 and the Fisher test for qualitative variables. A *P* value less than .05 was considered significant. Calculations were with software SPSS 12.0.

RESULTS

We included 293 patients in the first period and 267 in the second. Table 1 shows the settings patient came from and percentages of patients with AF versus total number of visits in each setting, as well as clinical-epidemiologic characteristics of patients included. In the first period, 2 patients admitted to ER or in-hospital died: 1 of an AF-related cause (antiarrhythmic treatment). In the second period, 5 patients died: 2 of AF-related causes (1 antiarrhythmic treatment, 1 anticoagulation treatment) (*P*=.27).

Antiarrhythmic Treatment

In the first period, antiarrhythmic AF treatment varied greatly in all settings (Table 2). In 71% of patients, antiarrhythmic treatment was adequate according to clinical guideline recommendations current at the time of the study. We found no differences in drug regimens between patients attending in the different settings studied. However, significant differences existed in adequacy of treatment, with greater adequacy in patients attending ER and lower adequacy in patients attending family physician clinics and in-hospital (*P*=.007).

In 31 patients, antiarrhythmic treatment drugs were modified at the study visit. Treatment was most frequently changed following medical attention in ER (*P*<.001 vs other settings). The principal reasons for attending clinic that led to modification of antiarrhythmic treatment were directly AF-related: complications of the illness or treatment and symptoms caused by AF.

After the visit, overall adequacy of antiarrhythmic treatment rose from 71% to 73% (nonsignificant). The increased percentage of adequate antiarrythmic treatments was not significant in any setting. We continued to record significantly greater inadequacy of antiarrhythmic treatment in primary care (Table 3).

The principal reasons for inadequate antiarrhythmic treatment before and after the visit (Tables 2 and 3,

TABLE 1. **Settings of Provenance and Clinical-Epidemiologic Characteristics of Patients Included***

	Family Physician P1/P2	Outpatient Cardiologist P1/P2	ER P1/P2	Hospital P1/P2	Total P1/P2
Total visits	4534/7150	457/676	1284/1496	377/351	6652/9673
Patients with AF, % of total visits	126 (2.8)/85 (1.2)‖	69 (15)/52 (7.6)‖	83-59† (6.5-4.6)/ 106-83† (7-5.5)	15-37† (4-10.3)/ 24-42† (6.8-12)‖	293 (4.4)/ 267 (2.8)
Age, years (SD)	75 (9)/75 (10)	69 (13)/69 (13)	77 (10)/76 (12)	70 (15)/75 (10)	74 (11)/74 (12)
Gender M:W	58:68/39:46	41:28/23:30	37:46/42:65	7:8/12:12	143:150/116:153
Barthel	95 (14)/92 (15)	98 (5)/91 (14)§	88 (16)/80 (24)§	85 (18)/81 (21)	93 (14)/86 (20)
Reason for consultation					
Related	12/8	45/26†t	36/39§	9/7	102/80§
AF symptoms	1/2	3/2	9/11	0/1	13/16
AF control	11/5	42/24	0/0	0/0	53/29
AF complication	0/1	0	20/21	7/5	27/27
Secondary effect	0/0	0	7/7	2/1	9/8
Not related	114/77	24/27†t	47/68§	6/17	191/189§
Classification					
Paroxystic	83/23‖	23/14	20/25	4/2	130/64‖
Persistent	1/8§	10/4	3/3	0/3	14/18
Permanent	42/54‖	36/35	60/9	11/19	149/187‖

*P1 indicates period 1; P2, period 2.
†Initial-discharge. The difference between the initial number of patients and the number at discharge is because 24 patients visited initially in ER were admitted and, therefore, discharged from the hospital. Moreover, 2 patients died in the first period and 5 in the second.
‡$P<.05$.
§$P<.01$.
‖$P<.001$.

respectively) were: *a)* digoxin prescribed as the only drug and as first choice to control heart rate in patients with moderate or high physical activity (guideline Class IIb recommendation only in patients in repose); *b)* digoxin in patients with paroxysmal AF (Class III recommendation both to control heart rate, with Level of Evidence B, and for cardioversion or prophylaxis of new episodes, with Level of Evidence A); *c)* amiodarone for chronic control of heart rate in patients with permanent AF (this does not appear as a guideline recommendation) and *d)* other, includeding:

– Amiodarone as first choice therapeutic for chronic treatment in patients without structural cardiomyopathy with paroxysmal AF and very isolated episodes (<1/year), clinically well-tolerated (antiarrhythmic treatment in these cases is a Class IIb recommendation with level of evidence C, and amiodarone is the second choice drug)
– β-blockers in patients with chronic obstructive pulmonary disease and bronchial hyper-reactivity (Class III recommendation, level of evidence C)
– Combined calcium antagonists and β-blockers in patients with history of bradycardia

After implementing the protocol (period 2), we also found substantial clinical variety in antiarrhythmic drug regimens before the visit although differences arose when compared with the settings of inclusion (Table 4). Overall adequacy increased significantly with respect to the previous year (80% vs 71%; $P=.009$). This was reflected in all healthcare settings although it was not significant in individual cases (Figure 1A). Family physician clinics continued to record a lower level of adequacy.

In the second period, antiarrhythmic treatment was modified in 35 patients. Treatment was most frequently modified in ER and in-hospital ($P<.001$ vs other settings), and reasons for attending clinic leading to changes were the same as in the first period. The percentage of corrective interventions to remedy previous inadequacy was similar to the previous period, both overall and in individual settings (Figure 2A). Reasons for inadequacy were also similar, both before and after the visit, although the frequency of each changed (Tables 4 and 5, respectively).

Antithrombotic Prophylaxis

In the first period, 53% of patients received anticoagulation treatment before medical attention, and 30% received antiplatelet treatment (4% received both). Overall adequacy of arterial embolism prophylaxis was 67% before the study visit and we found no significant differences between settings (Table 2). After the visit, overall adequacy was 70% (nonsignificant increase) with no significant differences between settings.

The principal reasons for inadequacy of antithrombotic prophylaxis before and after the visit (Tables 2 and 3, respectively), were: *a)* no anticoagulation in patients with AF and high risk of arterial embolism without contraindication (non-fulfillment of Class I recommendation and Level of Evidence A); *b)* no

TABLE 2. **Drug Regimen Before Visit in the First Period***

	Total	Family Physician	Outpatient Cardiologist	ER	Hospital	*P*
Antiarrhythmic drugs before visit						
Digoxin	116 (40%)	48 (38%)	23 (33%)	39 (47%)	6 (40%)	NS
Amiodarone	62 (21%)	28(22%)	15 (22%)	14 (17%)	5 (33%)	NS
β-blockers	25 (9%)	14 (11%)	7 (10%)	4 (5%)	0 (0%)	NS
Calcium antagonists	16 (5%)	5 (4%)	5 (7%)	4 (5%)	2 (13%)	NS
Class Ic antiarrhythmic drugs	21 (8%)	11 (9%)	6 (9%)	3 (4%)	1 (7%)	NS
Without treatment	65 (22%)	25 (20%)	14 (20%)	26 (31%)	1 (7%)	NS
Adequacy of antiarrhythmic treatment before visit						.007
Yes	207 (71%)	78 (62%)	51 (74%)	69 (83%)	9 (60%)	
No	86 (29%)	48 (38%)	18 (26%)	14 (17%)	6 (40%)	
Causes of inadequate antiarrhythmic treatment						
Digoxin to control HR	34 (12%)	18 (14%)	7 (10%)	5 (6%)	4 (27%)	NS
Digoxin for prophylaxis in Paroxysmal AF	30(10%)	24 (19%)	4 (6%)	2 (2%)	0	<.001
Amiodarone for chronic control of HR	18 (6%)	3 (2%)	6 (9%)	7 (8%)	2 (13%)	NS
Other	11 (4%)	5 (4%)	3 (4%)	2 (2%)	1 (7%)	NS
Antithrombotic prophylaxis before visit						
Anticoagulation	154 (53%)	59 (47%)	46 (67%)	37 (45%)	12 (80%)	.004
Antiplatelet treatment	88 (30%)	40 (32%)	21 (30%)	20 (24%)	7 (47%)	NS
Without treatment	62 (21%)	27 (21%)	9 (13%)	26 (32%)	0	NS
Adequacy of antithrombotic prophylaxis before visit						NS
Yes	197 (67%)	77 (61%)	52 (75%)	56 (68%)	13 (87%)	
No	96 (33%)	49 (39%)	17 (25%)	27 (32%)	2 (13%)	
Causes of inadequate antithrombotic prophylaxis						
No anticoagulation when this is indicated	74 (25%)	42 (33%)	14 (20%)	17 (20%)	1 (7%)	.029
Neither anticoagulation nor antiplatelet treatment when these are indicated	5 (5%)	6 (5%)	0	9 (11%)	0	.033
Anticoagulation not indicated	3 (1%)	1 (0.3%)	1 (1.4%)	0	1 (7%)	NS

*AF indicates atrial fibrillation; HR, heart rate; NS, nonsignificant.

anticoagulation or antiplatelet treatment in patients in who, due to lower risk of arterial embolism, the 2 choices of treatment are accepted (non fulfillment of Class I recommendation and Level of Evidence A); and *c)* anticoagulation in patients without medical indication (Class III recommendation and Level of Evidence C) or with medical or social contraindications.

Prophylaxis was less adequate in patients with paroxysmal AF both before the visit (58% vs 74% in permanent AF and 85% in persistent AF; *P*=.006) and after the visit (61% vs 78% in permanent AF and 85% in persistent AF; *P*=.005). Adequacy was greater in patients with a previous neurologic complication, both before the visit (83% vs 64%; *P*=.01) and after the visit (87 vs 67%; *P*<.007), although we found no relationship between adequacy of treatment and other risk factors such as advanced age (anticoagulated patients were younger, although the difference was nonsignificant), diabetes, high blood pressure or presence of heart failure. Adequacy at discharge was lower in family physician clinics than other settings (*P*=.05).

Overall adequacy of arterial embolism prophylaxis before the visit was greater in the second period than the first (81% vs 67%; *P*<.001). This was reflected in all settings although it was only significant in ER (Figure 1B). The percentage of corrective interventions in cases of previous inadequacy was also greater than in the first period (Figure 2B), both overall (35% vs 9%; *P*<.001) and in ER and outpatient cardiology. We also recorded a nonsignificant increase in family physician clinics.

The reasons for inadequacy were similar to those in the first period, both before and after the visit, although the frequency of each changed (Tables 4 and 5, respectively). In the second period, we found no relation between adequacy of arterial embolism prophylaxis and AF type, or with any of the risk factors for arterial embolism, either before or after the visit.

DISCUSSION

This study shows the value of training and of unifying criteria for AF treatment. Between the 2 periods in the

TABLE 3. **Drug Regimen After Visit in the First Period***

	Total	Family Physician	Outpatient Cardiologist	ER	Hospital	*P*
Antiarrhythmic drugs after visit						
Digoxin	106 (36%)	48 (38%)	22 (32%)	22 (39%)	14 (36%)	NS
Amiodarone	59 (20%)	28 (22%)	14 (20%)	8 (14%)	9 (23%)	NS
β-blockers	28 (10%)	14 (11%)	7 (10%)	3 (5%)	4 (10%)	NS
Calcium antagonists	18 (6%)	5 (4%)	4 (6%)	5 (9%)	4 (10%)	NS
Class Ic antiarrhythmic drugs	24 (8%)	11 (9%)	7 (10%)	5 (9%)	1 (3%)	NS
Without treatment	68 (23%)	25 (20%)	15 (22%)	17 (13%)	11 (28%)	NS
Adequacy of antiarrhythmic treatment after visit						.002
Yes	212 (73%)	78 (62%)	55 (80%)	49 (86%)	30 (77%)	
No	79 (27%)	48 (38%)	14 (20%)	8 (14%)	9 (23%)	
Causes of inadequate antiarrhythmic treatment						
Digoxin to control HR	29 (10%)	17 (13%)	5 (7%)	3 (5%)	4 (10%)	NS
Digoxin for prophylaxis in paroxysmal AF	30 (10%)	24 (19%)	5 (7%)	1 (2%)	0	<.001
Amiodarone to control HR	14 (5%)	3 (2%)	2 (3%)	5 (9%)	4 (10%)	NS
Other	10 (3%)	5 (4%)	3 (4%)	0	2 (5%)	NS
Antithrombotic prophylaxis after visit						
Anticoagulation	151 (52%)	59 (47%)	46 (67%)	26 (46%)	27 (68%)	.001
Antiplatelet	86 (30%)	40 (32%)	22 (32%)	16 (29%)	11 (29%)	NS
Without treatment	51 (18%)	26 (21%)	8 (12%)	13 (23%)	4 (10%)	NS
Adequacy of antithrombotic prophylaxis after visit						.05
Yes	204 (70%)	79 (63%)	52 (75%)	41 (73%)	33 (84%)	
No	87 (30%)	47 (33%)	17 (25%)	16 (27%)	6 (16%)	
Causes of inadequate antithrombotic prophylaxis						
No anticoagulation when indicated	69 (24%)	41 (33%)	14 (20%)	10 (18%)	4 (10%)	.01
Neither anticoagulation nor antiplatelet treatment when these are indicated	12 (4%)	6 (5%)	0	5 (9%)	1 (3%)	NS
Anticoagulation not indicated	1 (0.3%)	1 (0.8%)	1 (1.4%)	0	1 (3%)	NS

*AF indicates atrial fibrillation; HR, heart rate; NS, nonsignificant.

study, no new ideas or technological approaches were developed. We simply publicized and reinforced the application of known concepts in our context.

The benefit of implementing the protocol was twofold. In the postintervention period, initial adequacy was notably greater in all healthcare settings, reflecting the use of the consensus protocol and the training given during the year between the 2 periods analyzed. More importantly, in the second period we also found a significant increase in corrective interventions in cases previously found to be inadequate. This reflects physicians' commitment to improving the situation of patients receiving inadequate treatment.

Although the results of implementing a combined treatment protocol in different healthcare settings may seem obvious, little previous experience exists of the value of similar training programs. However, results reported elsewhere are also positive[20,21]: Zimetbaum et al[20] showed the usefulness of providing information about clinical guidelines for AF in ER on improvements in cost-effectiveness, although they did not determine intrinsic adequacy. In Spain, previous experience of programs to improve AF treatment has also been reported by Ruiz et al,[21] who achieved 90% anticoagulation in patients without contraindications. However, these researchers implemented their own protocol and no data were given about anticoagulation prior to the intervention. The present study includes scientific tests of prior status of treatment and treatments were prescribed by a number of physicians other than the researchers and those responsible for the protocol. Application of the protocol to a non-selected sample of physicians objectively increases the value of the level of acceptance.

The commitment of physicians to remedying preexisting inadequacies was evident in arterial embolism prophylaxis, but this was not the case with antiarrhythmic treatment, despite an overall improvement in the initial adequacy of antiarrhythmic treatment in the second period. The explanation may lie in the multifactorial nature of the issue. To date we have found no other study that determines the level of physicians' commitment to improving inadequacies existing before consultation. Most studies of AF treatment adequacy are descriptive and only refer to anticoagulation.[15-19,22,23] Adequacy of

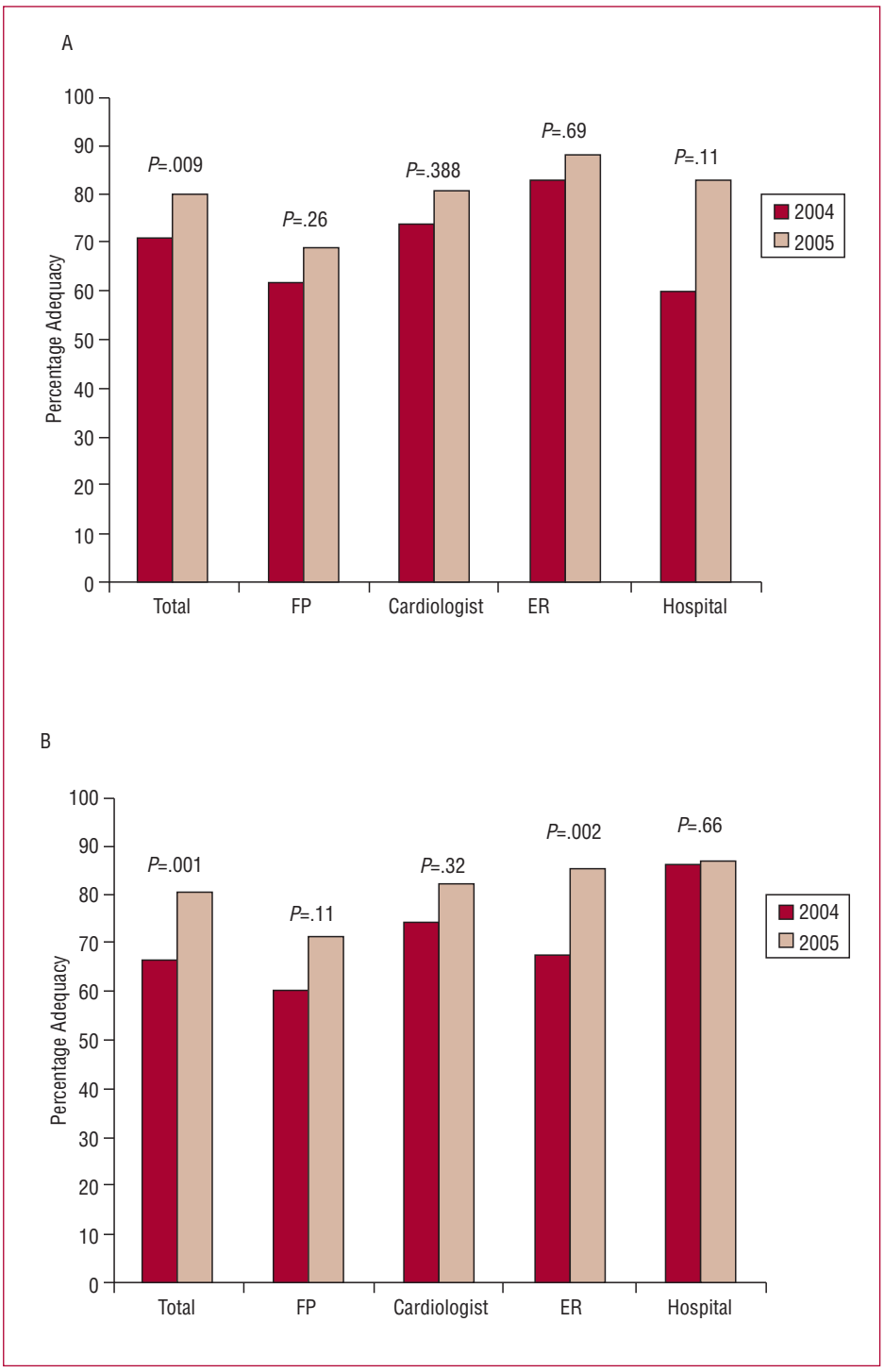

Figure 1. Comparison of adequacy of antiarrhythmic (A) and antithrombotic treatments (B) before visit between preintervention and postintervention periods. FP indicates family physician; ER, emergency room.

antiarrhythmic treatment is barely studied[24] and there may be less awareness of incorrect use. Alternatively, in cases when the principal reason for a change of treatment was a complication in treatment or illness, fear or reluctance to start a new treatment without a specific reason to do so, may be the explanations. Finally, the great improvement found in initial adequacy in the second period may have been influenced by less obvious corrective interventions.

However, despite increased adequacy in primary care before the visit, in comparison with the previous year, and at discharge, in comparison with before the visit, patients in primary care continued to be the least likely to receive anticoagulation treatment or to have it changed because of its inadequacy. Family physicians are, or should be, the doctors who best know the personal, social, and family situation of patients in order to determine whether to start and/or maintain anticoagulation treatment

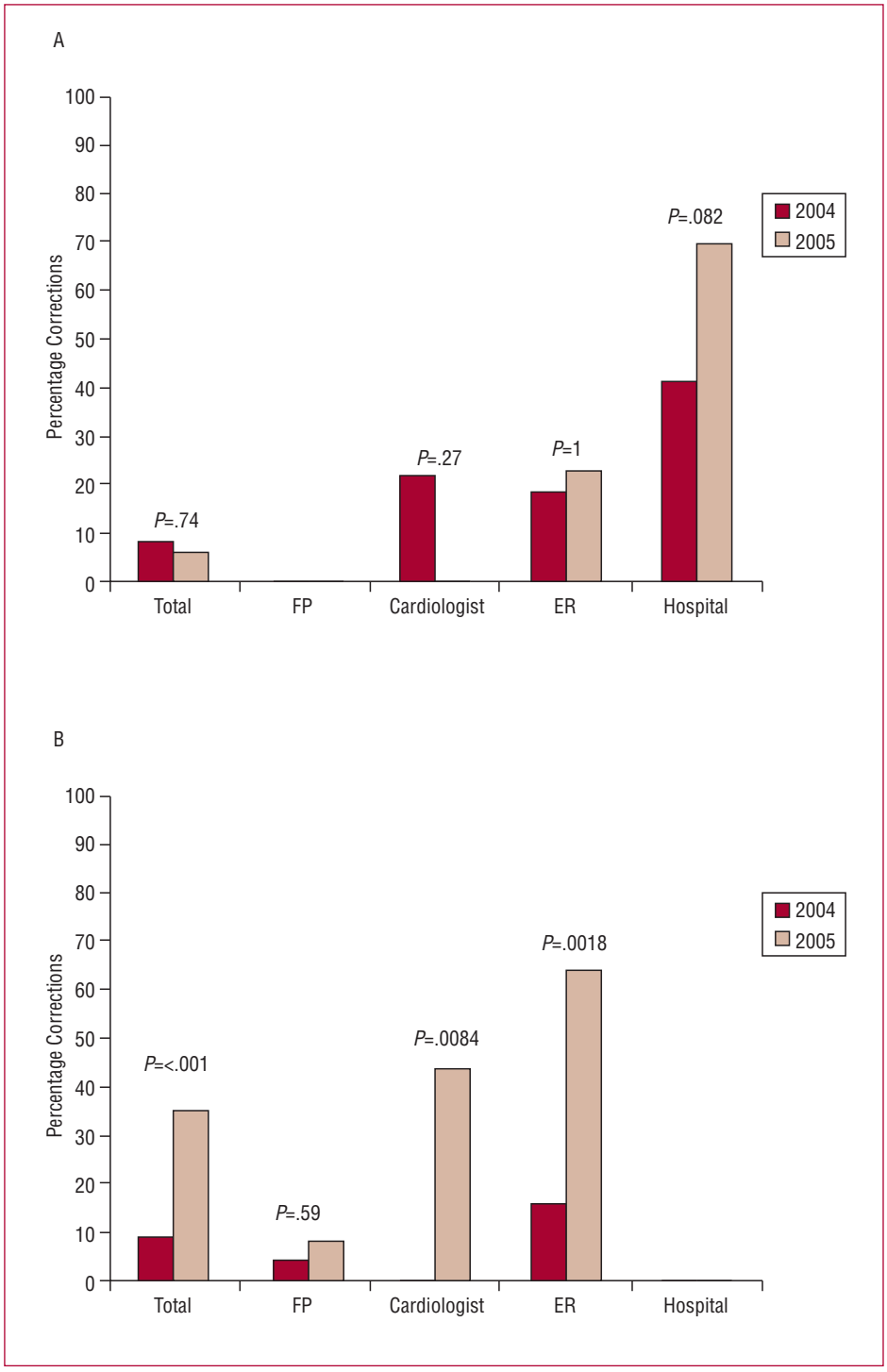

Figure 2. Comparison of percentage of correction in case of inadequacy of antiarrhythmic (A) and antithrombotic (B) treatments between preintervention and postintervention periods. FP indicates family physician; ER, emergency room.

and to control adequate follow-up and possible harmful effects or events that might justify interrupting it. The present study found increased, but nonsignificant, adequacy of treatment in primary care as did Martín et al,[22] who reported 81% adequacy in antithrombotic prophylaxis in a primary care clinic. These studies demonstrate anticoagulation treatment can be started and controlled from primary care although figures for adequacy of treatment in most studies conducted in this and other settings do not usually surpass 60%.[15-19,24] In primary care, many patients with AF attending family physician clinics are controlled by cardiologists. This may explain the lack of commitment and reluctance to change treatment on the part of family physicians, patients, or patients' families. Whatever the case may be, increased training sessions in primary care seem indicated.

To date, numerous multicenter studies have been conducted to evaluate the adequacy of coordinated

TABLE 4. **Drug Regimen Before Visit in the Second Period***

	Total	Family Physician	Outpatient Cardiologist	ER	Hospital	*P*
Antiarrhythmic drugs before visit						
Digoxin	125 (47%)	34 (40%)	22 (42%)	51 (48%)	18 (75%)	.021
Amiodarone	48 (18%)	20 (24%)	11 (21%)	13 (12%)	4 (17%)	NS
β-blockers	45 (17%)	14 (16%)	16 (31%)	14 (13%)	1 (4%)	.012
Calcium antagonists	33 (12%)	9 (11%)	10 (19%)	11 (10%)	3 (12%)	NS
Class Ic antiarrhythmic drugs	19 (7%)	8 (9%)	4 (8%)	7 (7%)	0	NS
Without treatment	55 (21%)	14 (16%)	11 (21%)	27 (25%)	3 (12%)	NS
Adequacy of antiarrhythmic treatment before visit						.017
Yes	214 (80%)	59 (69%)	42 (81%)	93 (88%)	20 (83%)	
No	53 (20%)	26 (31%)	10 (19%)	13 (12%)	4 (17%)	
Causes of inadequate antiarrhythmic treatment						
Digoxin to control HR	21 (8%)	12 (14%)	5 (10%)	3 (3%)	1 (4%)	.03
Digoxin for prophylaxis in paroxysmal AF	7 (3%)	0	1 (2%)	4 (4%)	2 (8%)	NS
Amiodarone to control HR	24 (9%)	12 (14%)	4 (8%)	6 (6%)	2 (8%)	NS
Other	3 (1%)	2 (2%)	1 (2%)	0	0	NS
Antithrombotic prophylaxis before visit						
Anticoagulation	155 (58%)	43 (51%)	40 (77%)	55 (52%)	16 (67%)	.01
Antiplatelet	68 (25%)	31 (36%)	8 (15%)	25 (24%)	4 (17%)	.032
Without treatment	44 (16%)	9 (11%)	4 (8%)	27 (25%)	4 (17%)	.001
Adequacy of antithrombotic prophylaxis before visit						NS
Yes	216 (81%)	61 (72%)	43 (83%)	91 (86%)	21 (87%)	
No	51 (19%)	24 (28%)	9 (17%)	15 (14%)	3 (12%)	
Causes of inadequate antithrombotic prophylaxis						.023
No anticoagulation when indicated	36 (13%)	20 (24%)	7 (13%)	7 (7%)	2 (8%)	.006
Neither anticoagulation nor antiplatelet treatment when these are indicated	13 (5%)	4 (5%)	2	7 (7%)	0	NS
Anticoagulation not indicated	2 (1%)	0	0	1 (1%)	1 (4%)	NS

*AF indicates atrial fibrillation; HR, heart rate; NS, nonsignificant.

treatment of AF in different centers within the same setting, whether in primary care,[9,10] ER,[12-14] or in-hospital,[15-17] but multidisciplinary analysis within a single healthcare area, as in the present study, has not been conducted. This enables us to make reliable comparisons and even design future strategies. Moreover, given that the structure of healthcare areas and settings studied is similar to other parts of Spain, the intervention we conducted could be applied elsewhere. However, the peculiarities of each area, especially the intensity and type of relationship between different settings and their capacity and autonomy for therapeutic action, could substantially influence results. In our case, improved results in ER, in-hospital and outpatient cardiology can probably be explained by closer relationships between these settings, favored by physical proximity and a certain flow of physicians from one setting to another. Future improvements in communication with primary care will depend on each hospital.

Limitations of the Study

One limitation of the present study is the inclusion of the "7th Consensus of the American College of Chest Physicians" in the second period as an accepted clinical guideline. While inclusion in this period was obligatory, as it was already current, it could have increased the range of patients considered as receiving adequate treatment. In any case, all patients believed to need antithrombotic prophylaxis as defined by the consensus document were also in need of prophylaxis according to at least one of the guideline documents accepted in the first period.

CONCLUSIONS

The present study shows that the consensus of physicians involved in attending patients with AF, following the implementation of a specific protocol derived from this consensus and adapted to all the settings,

TABLE 5. **Drug Regimen after Visit in the Second Period***

	Total	Family Physician	Outpatient Cardiologist	ER	Hospital	*P*
Antiarrhythmic drugs after visit						
Digoxin	120 (46%)	35 (41%)	23 (44%)	38 (46%)	24 (57%)	NS
Amiodarone	50 (19%)	21 (25%)	9 (17%)	15 (18%)	5 (12%)	NS
β-blockers	43 (16%)	14 (16%)	15 (29%)	10 (12%)	4 (10%)	.039
Calcium antagonists	34 (13%)	9 (11%)	9 (17%)	11 (13%)	5 (12%)	NS
Class Ic antiarrhythmic drugs	18 (7%)	8 (9%)	3 (6%)	7 (8%)	0	NS
Without treatment	49 (19%)	13 (15%)	10 (19%)	14 (17%)	12 (29%)	NS
Adequacy of antiarrhythmic treatment after visit						<.001
Yes	212 (81%)	58 (68%)	41 (79%)	73 (88%)	40 (95%)	
No	50 (19%)	27 (32)	11 (21%)	10 (12%)	2 (5%)	
Causes of inadequate antiarrhythmic treatment						
Digoxin to control HR	19 (7%)	11 (12%)	5 (10%)	2 (2%)	1 (2%)	.032
Digoxin for prophylaxis in paroxysmal AF	4 (2%)	0	2 (4%)	2 (2%)	0	NS
Amiodarone to control HR	23 (9%)	13 (15%)	3 (6%)	5 (6%)	2 (5%)	NS
Other	5 (2%)	3 (4%)	1 (2%)	1 (1%)	0	NS
Antithrombotic prophylaxis after visit						
Anticoagulation	163 (62%)	44 (52%)	43 (83%)	48 (58%)	28 (67%)	.003
Antiplatelet	73 (28%)	31 (36%)	8 (15%)	22 (26%)	12 (29%)	NS
Without treatment	27 (10%)	10 (12%)	1 (2%)	13 (16%)	3 (7%)	NS
Adequacy of antithrombotic prophylaxis after visit						<.001
Yes	228 (87%)	63 (74%)	47 (90%)	79 (95%)	39 (39%)	
No	34 (13%)	22 (16%)	5 (10%)	4 (5%)	3 (3%)	
Causes of inadequate antithrombotic prophylaxis						
No anticoagulation when indicated	25 (10%)	17 (20%)	5 (10%)	2 (2%)	1 (2%)	<.001
Neither anticoagulation nor antiplatelet treatment when these are indicated	6 (2%)	3 (4%)	0	2 (2%)	1 (2%)	NS
Anticoagulation not indicated	3 (1%)	2 (2%)	0	0	1 (2%)	NS

*AF indicates atrial fibrillation; HR, heart rate; NS, nonsignificant.

can significantly improve antiarrhythmic treatment in daily clinical practice. However, greater emphasis should be placed on specific issues, especially the commitment of all physicians to improving treatment.

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ANNEX 1. **Barthel Index**

Parameter	Patient Status	Score
Eating	Totally independent	10
	Needs help to cut meat, bread, etc	5
	Dependent	0
Washing	Independent: enters and leaves the bathroom alone	5
	Dependent	0
Dressing	Independent: can put on and take off clothes button clothes and tie shoelaces	10
	Needs help	5
	Dependent	0
Personal hygiene	Independent for washing face, hands, brushing hair, shaving, putting on makeup, etc	5
	Dependent	0
Stools	Normal continence	10
(to determine the previous week)	Occasional episodes of incontinence, or Needs help to administer suppositories or laxatives	5
	Incontinence	0
Micturition	Normal continence or is able to take care of catheter if inserted	10
(to determine the previous week)	Maximum 1 daily episode of incontinence or Needs help to take care of catheter if inserted	5
	Incontinence	0
Use of WC	Independent to go to the WC, take off and put on clothing	10
	Needs help to go to the WC, but can clean self	5
	Dependent	0
Movement	Independent to go from chair to bed	15
	Minimal physical help or supervision needed	10
	Needs great degree of help, but is capable of staying seated alone	5
	Dependent	0
Walking	Independent, walks 50 m alone	15
	Needs physical help or supervision to walk 50 m	10
	Independent in wheelchair without help	5
	Dependent	0
Stairs	Independent to go up and down stairs	10
	Needs physical help or supervision	5
	Dependent	0