Health Service Research

Nonadherence to guidelines for prescribing antiplatelet/anticoagulant therapy in patients with atrial fibrillation

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Abstract

Background. We have found no papers evaluating nonadherence to guidelines for the treatment of atrial fibrillation (AF), taking into account the two risk scales [C, congestive heart failure; H, hypertension; A, age; D, diabetes mellitus; S, stroke (CHADS\textsubscript{2}) and C, congestive heart failure; H, hypertension; A, age; D, diabetes mellitus; S, stroke; V, vascular disease; A, age; Sc, sex category (CHA\textsubscript{2}DS\textsubscript{2}-VASc)] and the two types of treatment that are recommended (antiplatelet/anticoagulant therapy).

Objective. To determine the extent of lack of adherence when prescribing anticoagulant and antiplatelet therapy to patients with AF and associated factors.

Methods. Cross-sectional, observational study of 144 patients with AF who visited the emergency department of Elda Hospital in 2013–14 (Spain). Main variable: the patient was prescribed a therapy different from that indicated by the guidelines (nonadherence) or not prescribed any therapy. Secondary variables: CHADS\textsubscript{2}, CHA\textsubscript{2}DS\textsubscript{2}-VASc, HAS-BLED, type of AF and symptoms related to AF.

Multivariate models were constructed to identify the associated factors by calculating the adjusted odds ratios (OR).

Results. Nonadherence occurred in 90 patients [62.5%, 95% confidence interval (CI): 54.6–70.4%]. Associated factors were higher CHADS\textsubscript{2} (OR = 1.30, 95% CI: 0.96–1.75, \( P = 0.091 \)) and CHA\textsubscript{2}DS\textsubscript{2}-VASc (OR = 1.23, 95% CI: 1.02–1.47, \( P = 0.027 \)), and lower HAS-BLED (OR = 0.67, 95% CI: 0.49–0.91, \( P = 0.011 \)).

Conclusions. Nonadherence to guidelines was found in three out of every five patients. A greater cerebrovascular risk and a lower haemorrhagic risk were associated with this behaviour. Qualitative studies are needed to determine the causes.

Key words. Anticoagulants, atrial fibrillation, physician’s practice patterns, platelet aggregation inhibitors, primary health care.

Introduction

Atrial fibrillation (AF) is the most common sustained arrhythmia in clinical practice (1), posing a serious public health problem since it is an independent predictor of mortality, doubling its risk (2,3). AF affects the quality of life of patients (4), increases hospitalizations, favours the development of heart failure and arterial thromboembolic events (primarily in the form of stroke) and produces greater residual disability (2,5–7). Its incidence and prevalence increase with age (1,8). In Spain, the prevalence is high, 4.4% in patients aged over 40 years (9).
Hospital emergency departments see a high volume of patients, with AF accounting for 3.6% of general emergencies and 10% of admissions (10,11). It is important to take early therapeutic action, as this increases the likelihood of restoring sinus rhythm (SR), avoiding the serious consequences of arterial embolism (4–6,12).

At present, the criteria for recommending oral anticoagulation and antiplatelet therapy to prevent the consequences of AF are based on the CHADS₂ (C, congestive heart failure; H, hypertension; A, age; D, diabetes mellitus; S, stroke) and CHA₂DS₂-VASc (C, congestive heart failure; H, hypertension; A, age; D, diabetes mellitus; S, stroke; V, vascular disease; A, age; Sc, sex category) classifications (5,13). Although other authors have analysed the inadequacy of anticoagulant prescribing in patients with AF (14–18), none has evaluated nonadherence to the guidelines, taking into account the two risk scales (CHADS₂ and CHA₂DS₂-VASc) and the two types of treatment that are recommended (antiplatelet and anticoagulant therapy) (5,13). This is an important issue, since, in these patients, failure to receive this therapy involves greater cardiovascular risk. In order to provide more scientific evidence in this area, we conducted a study in the emergency department of the General University Hospital of Elda (Alicante, Spain), with the goal of determining the degree of nonadherence to guidelines in prescribing anticoagulation and antiplatelet therapy to AF patients, as well as factors associated with this problem. Unlike previous studies, we carried out our study in an emergency department, using both scales (CHADS₂ and CHA₂DS₂-VASc), taking into account both antiplatelet and anticoagulant therapy, and assessing the risk scores as associated factors.

Methods

Study population

Patients with AF attending the General University Hospital of Elda.

The General University Hospital of Elda is a public facility with a total of 410 beds. The approximate number of emergencies seen each year is 57,000, equivalent to 160 general emergencies daily in adults (not including the specialties of obstetrics, gynaecology or paediatrics) (19).

Design and study participants

This was an observational, descriptive and cross-sectional study. We analysed a sample of patients with AF who presented consecutively to the emergency department of the General University Hospital of Elda between October 2013 and April 2014. AF was defined as having a personal history of the condition (medical records) corroborated by an electrocardiogram. Of all the patients with AF, those who had a contraindication to antiplatelet therapy (hypersensitivity to the active ingredient, liver failure...) or anticoagulant therapy (allergies, clinically significant active bleeding...) were excluded because, when assessing nonadherence to the clinical guidelines for this type treatment, it would not make sense to analyse the absence of a prescription for contraindicated therapy.

Variables and measurements

The main variable was nonadherence to guidelines when prescribing anticoagulant and antiplatelet therapy. This was defined as a patient who, according to the guidelines, met recommendations for oral anticoagulation or antiplatelet therapy but this was not prescribed before his or her arrival at the emergency department (5,13), i.e. the patient had been prescribed another therapy (or none) different from that indicated by the guidelines. The prescriptions were determined from the medical records at the primary health care centres.

All primary care prescriptions have to be made through a computerized system. All prescriptions are recorded in the patient’s medical history, which also includes the diagnosis associated with each of the patient’s treatments. Thus, primary care physicians are aware that the patient is diagnosed with AF. This decision includes the type of AF and its evolution time. With this information, the clinician chooses the treatment to be prescribed.

The guidelines indicate that a patient with AF who presents a CHADS₂ ≥2 points should be anticoagulated. If the CHADS₂ is between 0 and 1, the CHA₂DS₂-VASc scale must be applied, and if the value is 2 or higher, oral anticoagulation must be prescribed. If the value is 1, the guidelines recommend prescription of anticoagulation or otherwise (difficulty with adherence or patient choice) antiplatelet therapy. Finally with a CHA₂DS₂-VASc of 0, the recommendation is to not administer any antithrombotic or, optionally, anti-aggregation treatment. Clinical guidelines for treatment of AF also indicate there is a scale for assessing bleeding risk (HAS-BLED) (H, hypertension; A, abnormal renal and liver function; S, stroke; B, bleeding; L, labile international normalized ratio; E, elderly; D, drugs or alcohol), in which the higher the value, the higher the risk of bleeding. However, an elevated value on this scale does not imply suspension of anticoagulant therapy, but rather tighter control of the anticoagulated patient (5,13).

Secondary variables used were CHADS₂, CHA₂DS₂-VASc, HAS-BLED type of AF (paroxysmal <48 hours and ≥2 episodes; persistent with SR restored; persistent without SR restored; permanent) (5,13), and presence of symptoms related to AF at the time the patient came to the emergency room. To calculate the scales, we measured age (years), gender, hypertension, heart failure, diabetes mellitus, stroke, other cardiovascular diseases, impaired liver and/or kidney function, history of bleeding, international normalized ratio and drugs (5,13). All these variables were measured by clinical interview with the patient, using a questionnaire designed for this study. This questionnaire was a standard data collection sheet used by the health care professional for recording information on a patient with AF, meeting the inclusion criteria but none of the exclusion criteria. The selection of variables for our study was based on those included in the thrombotic and bleeding risk scales, and those clinical variables recorded for this type of patient (type of AF and symptoms) following the emergency department protocol.

Sample size

The total number of patients with AF who were seen during the study was 144. Assuming a confidence interval (CI) of 95% and an expected rate of 60%, the error obtained in the estimation of our main variable was 8.0%.

Statistical analysis

The variables were described using the standard methodology in health sciences, namely frequencies and percentages (qualitative variables), and means and standard deviations (quantitative variables). The unadjusted odds ratios (OR) were calculated for each measured variable using bivariate logistic regression models (dependent variable → nonadherence; independent variable → the factor). To determine associated factors in a multivariate form, three binary logistic regression models were constructed. These included the variables, type of AF and presence of symptoms. Each included a single risk scale (CHADS₂, CHA₂DS₂-VASc or HAS-BLED) due to problems of collinearity with the other variables. In other words, each multivariate model had the same dependent variable (nonadherence) and three explanatory variables: the risk scale (CHADS₂,
CHADS\textsubscript{2}-VASc or HAS-BLED), the presence of AF-related symptoms and the type of AF. Through these models, the adjusted OR for each of the risk scales was obtained (the exponent of the coefficient associated with each factor). Finally, Cartesian graphs were drawn with the predicted probability of the models to help interpret the results (probability of nonadherence adjusted for the three factors).

All analyses were conducted at a significance level of 5\% and for each relevant parameter its associated CI was calculated. The statistical software used was IBM SPSS Statistics 19.

**Results**

Figure 1 shows the lack of adherence to the clinical guidelines for the prescription of antiplatelet and anticoagulant therapy to patients with AF by primary care physicians. This figure also displays the therapeutic algorithm of the clinical guidelines (5,13). Notably, in 90 out of the 144 patients, the clinical guidelines were not followed correctly (nonadherence), equivalent to 62.5\% of the patients (95\% CI: 54.6–70.4\%).

Tables 1 and 2 show the descriptive and unadjusted OR of the study sample. The descriptive data of the sample are shown in the first column of the tables. Notably, most of the patients were older than 65 years (78.5\%), the proportion of women was 56.3\%, and 36.8\% of the AF episodes were paroxysmal, <48 hours and >2 episodes. Concerning the coexistence of other cardiovascular risk factors in the patients seen, the most prevalent disease was hypertension (73.6\%), 11.1\% had other cardiovascular diseases, 7.6\% stroke and 21.5\% heart failure.

Regarding the unadjusted OR, greater nonadherence in older patients, with some types of AF, with higher CHADS\textsubscript{2} and CHA\textsubscript{2}DS\textsubscript{2}-VASc and lower HAS-BLED was statistically significant (P < 0.05). Furthermore, although not statistically significant (the 95\% CI included zero) but clinically relevant, a higher CHADS\textsubscript{2} score was associated with lack of adherence to the guidelines analysed (5,13).

Figure 2 shows the adjusted OR for the different risk scales. As the risk of stroke increased, the likelihood of nonadherence to the guidelines (CHADS\textsubscript{2} and CHA\textsubscript{2}DS\textsubscript{2}-VASc) also rose. However, an inverse association was found between the bleeding risk (HAS-BLED) and our outcome.

**Discussion**

**Summary**

This pioneering study quantifies the magnitude of nonadherence to guidelines for prescribing both anticoagulant and antiplatelet therapy using the CHADS\textsubscript{2} and CHA\textsubscript{2}DS\textsubscript{2}-VASc risk scores in patients already diagnosed with AF seen in an emergency department. This magnitude indicates that approximately three out of five patients with AF do not have the recommended therapy, which could considerably increase the risk of arterial thromboembolism. Additionally, this nonadherence was associated with a greater risk of stroke and a lower risk of bleeding.

**Strengths and limitations**

The main strength of this study is that it is the first to assess nonadherence to guidelines for prescribing anticoagulant and antiplatelet therapy in patients with AF in an emergency department using both the CHA\textsubscript{2}DS\textsubscript{2}-VASc and the CHADS\textsubscript{2} risk scales. These novel results underline the need to establish training strategies for physicians aimed at reducing this nonadherence.

Concerning the limitations, we acknowledge that the study has a cross-sectional design and, therefore, there is no patient follow-up. However, considering that our main objective was to measure the degree of adherence to guidelines (prevalence), this does not affect the findings. To minimize potential measurement bias, all the variables were measured comprehensively and using primary data. Finally, selection bias was minimized by selecting all the patients entering the emergency department during a given period.

![Figure 1](https://example.com/figure1.png)

**Figure 1.** Nonadherence to guidelines for prescribing antiplatelet and anticoagulant therapy in 144 patients with atrial fibrillation who attend a Spanish emergency department. Based on the treatment algorithm included in the clinical guidelines for the management of patients with atrial fibrillation in Spain (5). ACT, anticoagulant therapy; ATT, antiplatelet therapy.
Comparison with existing literature

It is difficult to compare our results with those of other studies because all the studies so far have mainly analysed either the CHADS2 score or the CHA2DS2-VASc score, in addition to which they only studied anticoagulant therapy. These studies found a nonadherence ratio ranging between ~20% and 60% (14–17). Our study found a higher ratio. However, we must bear in mind that our study determined adherence before the patients were seen in the emergency room (treatment before emergency department care). In other words, all the studies cited assessed medication at the time of diagnosis of the patient by hospital services (14–17), whereas we assessed the appropriate management of medication prescribed by primary health care services. This could explain the difference in the prevalence figures found because, as suggested above (20), the perceived risk of cerebral haemorrhage by the health care professional may be different and, therefore, increase the rate of nonadherence.

### Table 1. Descriptive and analytical characteristics (qualitative variables) of the patients diagnosed with atrial fibrillation who visit the emergency department of Elda Hospital, Spain (data from 2013 to 2014)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total n = 144 n (%)</th>
<th>Unadjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female gender</td>
<td>81 (56.3)</td>
<td>1.33 (0.67–2.62)</td>
</tr>
<tr>
<td>Age ≥ 65 years</td>
<td>113 (78.5)</td>
<td>2.96 (1.31–6.70)</td>
</tr>
<tr>
<td>Age ≥ 75 years</td>
<td>69 (47.9)</td>
<td>2.03 (1.02–4.05)</td>
</tr>
<tr>
<td><strong>Clinical variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart failure</td>
<td>31 (21.5)</td>
<td>0.94 (0.41–2.12)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>106 (73.6)</td>
<td>0.96 (0.45–2.07)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>22 (15.3)</td>
<td>1.73 (0.63–4.73)</td>
</tr>
<tr>
<td>Stroke</td>
<td>11 (7.6)</td>
<td>2.89 (0.60–13.90)</td>
</tr>
<tr>
<td>Other cardiovascular diseases</td>
<td>16 (11.1)</td>
<td>0.73 (0.26–2.13)</td>
</tr>
<tr>
<td><strong>Atrial fibrillation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paroxysmal ≤48 hours and ≥2 episodes</td>
<td>53 (36.8)</td>
<td>2.08 (0.79–5.45)</td>
</tr>
<tr>
<td>Persistent (SR restored)</td>
<td>36 (25.0)</td>
<td>10.00 (3.05–32.77)</td>
</tr>
<tr>
<td>Persistent (SR not restored)</td>
<td>28 (19.4)</td>
<td>12.00 (3.18–45.23)</td>
</tr>
<tr>
<td>Permanent</td>
<td>27 (18.8)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125 (86.8)</td>
<td>0.40 (0.13–1.28)</td>
<td></td>
</tr>
</tbody>
</table>

n (%), absolute frequency (relative frequency). CI, confidence interval; OR, odds ratio; SR, sinus rhythm. OR were calculated through bivariate logistic regression models (dependent variable → nonadherence; independent variable → the secondary variable). CI, confidence interval; OR, odds ratio; SR, sinus rhythm.

### Table 2. Descriptive and analytical characteristics (quantitative variables) of the patients diagnosed with atrial fibrillation who visit the emergency department of Elda Hospital, Spain (data from 2013 to 2014)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total n = 144, x (SD)</th>
<th>Unadjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analytical variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHADS2</td>
<td>1.7 (1.2)</td>
<td>1.30 (0.96–1.75)</td>
</tr>
<tr>
<td>CHA2DS2-VASc</td>
<td>3.7 (2.0)</td>
<td>1.23 (1.02–1.47)</td>
</tr>
<tr>
<td>HAS-BLED</td>
<td>2.5 (1.2)</td>
<td>0.67 (0.49–0.91)</td>
</tr>
</tbody>
</table>

x (SD), mean (standard deviation). OR were calculated through bivariate logistic regression models (dependent variable → nonadherence; independent variable → the secondary variable). CI, confidence interval; OR, odds ratio.

### Figure 2. Probability of nonadherence to the guidelines as the risk increased.

OR were adjusted by type of atrial fibrillation and the presence of symptoms related to atrial fibrillation. CI, confidence interval; OR, odds ratio.

Regarding the association between risk scales and nonadherence to clinical guidelines, only one study in Germany assessed this issue (14). The factors found in this study were older age, female gender, a greater number of co-morbidities, fewer medications, fewer doctor visits, having been hospitalized many times, not having had a stroke, and a lower HAS-BLED score. These factors are difficult to compare with our study, since we used both antiplatelet and anticoagulation therapy. However, many of the elements of the stroke risk scales (CHADS2 and CHA2DS2-VASc) were among the associated factors. Nevertheless, we
must bear in mind that it is much more relevant to analyse the scales as associated factors rather than each of the components thereof, as clinical guidelines have a therapeutic algorithm based on these scales and not on each of their factors independently. In other words, the health professional will pay greater attention to the totality of the risk factors for stroke and not to each of the factors separately, as stated in the German study. Finally, our study was consistent with the German study with regard to the HAS-BLED scale. However, as mentioned earlier, we evaluated the clinical guidelines for AF treatment and the German study only considered anticoagulation.

Implications for research and/or practice
This study not only indicates that there is a prevalent problem in clinical practice that can lead to embolic phenomena, it also identified that a higher value on the risk scores for stroke was associated with the problem. We believe this may be because these patients are at increased risk of bleeding, and the physician therefore takes a conservative approach with respect to patient treatment. Nonetheless, this explanation must be substantiated by qualitative studies, since with collinearity between the risk scales for stroke and the HAS-BLED we cannot assess this issue. This is because with a quantitative design (cross-sectional observational), we can only find associations between our primary variable and the different factors analysed, so if we want to know the causes of this lack of adherence we should select focus groups to determine why primary care physicians do not prescribe the proper medication for these patients. As a result of these studies, we can design interventions to minimize the problem. This question has been examined in the management of warfarin, where Bungard et al. (20) analysed the possible causes for the lack in prescribing, emphasizing those related to the patient, the physician and the health system. Following this study, it would be interesting to determine whether these factors remain the same when anticoagulant and antiplatelet therapy are analysed together in a public, free and universal health care system. This may lead to better practice in prescribing therapy to patients with AF and thus reduce the incidence of cerebrovascular complications.

When analyzing our results, our attention was drawn to the high prevalence of nonadherence to clinical guidelines as well as its association with a higher thrombotic risk, whereas logically we expected to obtain an inverse association with the risk of bleeding. Although qualitative studies would be needed to assess the reasons for these associations and the high prevalence, we think they could be related to the beliefs and training of health care professionals, and the beliefs and attitudes of patients (20). In other words, there may be other factors apart from the clinical factors analysed in our work which we cannot evaluate using a quantitative design. What our study has indicated, however, is the magnitude of a problem that should be minimized in clinical practice. The authors believe that this explanation must be substantiated by qualitative studies, since we cannot evaluate using a quantitative design. What may be other factors apart from the clinical factors analysed in our study has indicated, however, is the magnitude of a problem that we cannot evaluate using a quantitative design. What may be other factors apart from the clinical factors analysed in our work which we cannot evaluate using a quantitative design.

Conclusion
There is a considerable lack of adherence to the guidelines when giving anticoagulation and antiplatelet therapy to patients with AF (three out of five patients). This poor adherence was associated with a high cerebrovascular risk and a lower haemorrhagic risk. Qualitative studies are needed to determine the causes of this nonadherence and to promote training programs to decrease its magnitude and, consequently, reduce the incidence of thromboembolic events.

Declaration
Funding: none.
Ethical approval: approved by the Ethics Committee of the Department of Health of Elda and performed according to the standards of good clinical practice and current legislation.
Conflict of interest: none.

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References


