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Original Article

Anticoagulant Treatment Profile in an Institutionalised Geriatric Population with Non-Valvular Atrial Fibrillation

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SUMMARY

Purpose. This study aims to analyze the characteristics of institutionalized geriatric population with NVAF according to the type of anticoagulant treatment, especially in patients with severe functional and cognitive decline and those who met palliative care criteria.
Methods. This cross-sectional observational study was conducted in 13 nursing homes with a population diagnosed with NVAF. Sociodemographic and functional assessment variables, the type of prescribed anticoagulant treatment, frailty status and palliative care criteria were collected. The clinical and functional assessment was analysed based on treatment type.
Results. Of the 342 residents fulfilled the inclusion criteria, 78.1% were women and 48% were ≥ 90 years of age. Furthermore, 99.4% had high comorbidity (Charlson ≥ 3), 98.8% were at high risk of stroke (CHADS2-VASc ≥ 2), 90.1% were in a frailty stage (IF-CSS > 0.2), and 86.3% were polymedicated. Additionally, 51.4% were anticoagulated with direct oral anticoagulants (DOACs), 28.4% with vitamin K antagonists (VKAs), and 1.8% with low-molecular-weight heparins (LMWHs). Finally, 8.5% were receiving antiplatelet agents (AAs), while 9.9% were not receiving any antithrombotic treatment. Patients treated with AAs were older ($p = 0.028$), while those not receiving treatment had greater cognitive deterioration ($p = 0.004$), met the palliative criteria ($p = 0.027$), and had a lower frequency of polymedication ($p < 0.001$).
Conclusions. Our study shows that very elderly patients consume DOACs and VKAs in advanced stages of frailty and dependency. The findings suggest the need to tailor anticoagulation in geriatric patients to align treatment with quality of life and end-of-life goals.

1. Introduction

Nonvalvular atrial fibrillation (NVAF) is the most common cardiac arrhythmia among the elderly. It affects 1%–2% of the general population[1] and its incidence increases to as high as 9% among individuals > 80 years of age,[2] and 17% among those living in extended-stay residences and nursing homes. Thirty percent of all strokes are attributable to NVAF, which results in disability in 60% of cases and death in another 20%.[3,4]

Prevention of thrombotic events secondary to NVAF involves the use of anticoagulant(s) (Acs), vitamin K antagonists (VKAs), direct oral Acs (DOACs), and low-molecular-weight heparins (LMWHs), for which various scientific societies have drafted protocols containing usage recommendations.[5]

Although VKAs are the most widely used Acs in Spain, they present some disadvantages given their narrow therapeutic margins, drug and food interactions, and responses that are difficult to predict. In contrast, DOACs yield a more predictable response, demonstrate greater efficacy in both primary and secondary stroke prevention, have better safety profiles among patients with atrial fibrillation,[6,7] and have fewer interactions. However, DOACs are more expensive than VKAs despite economic studies proving their cost-effectiveness.[8,9] Although they are recommended as first-line treatment(s) in the guidelines of the European Society of Cardiology[5] and the American Heart Association,[10,11] as well as by the Beers and STOPP-START criteria, because of their superior safety and efficacy profile,[12,13] their use remains limited in Spain.[14]

There are some gaps in current clinical practice guidelines regarding the use of Acs in patients who are frail and elderly, and those experiencing severe deterioration and limited life expectancy.[15]

Almost one-third of individuals diagnosed with advanced dementia and NVAF living in elderly nursing homes remain anticoagulated in the final 6 months of their lives. Moreover, the importance of the risks/benefits of anticoagulation in geriatric patients with high dementia-related mortality — in whom the primary treatment objective is quality of life and symptom control — remains unclear.[16] In addition, the institutionalized geriatric population is poorly represented in most clinical trials[17] and the available scientific evidence is limited to VKAs.[3,18–20]

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As such, the present study aimed to analyze the profile of institutionalized geriatric patients undergoing Acs treatment for NVAF; the characteristics of patients according to treatment group; and the use of Acs in patients with severe functional and cognitive impairment and palliative needs.

2. Patients and methods

A cross-sectional, multicenter, observational study was conducted in the final week of October 2021 in 13 nursing homes in Spain under the aegis of one group applying the same healthcare protocols.

Although this was a cross-sectional study, residents of the centers diagnosed with NVAF < 6 months were excluded to ensure that the Rosendaal method was calculated with greater precision. Patients < 65 years of age, those who were unable to take the medication, or for whom it was not certain that they were adequately taking the medication, together with those temporarily treated with antiaggregants and Acs, were also excluded. Data were obtained from nursing home records, and informed consent was obtained from all study participants or their legal representatives.

2.1. Study variables

Sociodemographic and functional assessment variables included age, sex, Charlson Comorbidity Index score, functional capacity according to the Barthel score index,[21,22] degree of cognitive impairment using the Pfeiffer Short Portable Mental Status Questionnaire (SPMSQ),[23] risk for fall(s) risk using the Tinetti score,[24] and the presence of polymedication (≥ 5 drugs). Clinical variables, such as creatinine clearance, as estimated using the Cockroft and Gault equation,[25] cardioembolic risk, per the $CHA2DS_2$-VASc score,[26] and frailty status, according to the frailty index score (IF-CSS), were collected.[27] Palliative patient criteria included irreversible pathology in the terminal phase, poor prognosis, with survival < 1 year, severe functional deterioration (physical and/or cognitive), and/or priority to control symptoms.[28]

Thrombotic events, such as stroke, deep vein thrombosis, or pulmonary embolism, were noted as a history of the disease to determine differences from other patient groups.

For residents undergoing VKA treatment, the degree of Acs control was established by calculating time in the therapeutic range (TTR) using the Rosendaal method and establishing the degree of Acs control by self-testing at the institution (CoaguCheck, Roche Diagnostics K.K., Tokyo, Japan) during the past 6 months.

2.2. Statistical analysis

Data are expressed as absolute and relative frequency. An exploratory univariate analysis was performed to study population characteristics according to the type of Acs treatment used.

Pearson's chi-squared or Fisher's exact tests were applied due to the qualitative nature of the variables analyzed. All statistical tests were two-sided and differences with $p < 0.05$ were considered to be significant. Data analysis was performed using SPSS version 17 (SPSS Inc., Chicago, IL, USA).

2.3. Ethics approval

This study was approved by the Research Ethics Committee of Hospital General de Móstoles (Madrid, Spain) and was performed in accordance with the principles of the Declaration of Helsinki.

2.4. Compliance with ethical standards

The authors declare that principles of ethical and professional conduct have been followed.

Data obtained from medical records of the participating residents were pseudonymized into a central coded database by a team that was physically and functionally independent of the research team, thereby maintaining the necessary quality, security, confidentiality, and ethical requirements for such cases. Personal data were treated confidentially in accordance with current European legislation.

3. Results

Data from 1571 medical records were analyzed and 342 (21.7%) residents fulfilled the inclusion criteria, of whom 267 (78.1%) were female and 164 (48%) were > 90 years of age. Sociodemographic, functional, and therapeutic control variables are summarized in Table 1. Almost one-half of the sample was > 90 years of age and the majority exhibited high comorbidity (Charlson Comorbidity Index ≥ 3 [99.4%]), a high stroke risk ($CHADS_2$-VASc ≥ 2 [98.8%]), frailty (IF-CSS > 0.2 [90.1%]), and were polymedicated (86.3%).

Of all residents, 176 (51.4%) were anticoagulated with DOAcs, 97 (28.4%) with VKAs, and 6 (1.8%) with LMWHs. In addition, 29 (8.5%) patients were anti-aggregated, and 34 (9.9%) did not receive any antithrombotic therapy at the time of this study. Finally, 66 patients treated with acenocoumarol (68%) did not exhibit adequate TTRs. Specific DOAcs treatment included apixaban (n = 91 [26.6%]), followed by other DOAcs (dabigatran, edoxaban, and rivaroxaban) (n = 85 [24.85%]).

Results of univariate analysis are summarized in Table 2. The percentages reported in each column were calculated for each treatment group (VKAs, DOAcs). Age-related differences in Acs treatment

Table 1
Sociodemographic and functional characteristics of the sample.

	Total (N = 342)	
	n	%
Age		
90 years or more	164	48.0%
Between 80 and 89 years	140	40.9%
Under 80 years	38	11.1%
Sex		
Female	267	78.1%
Charlson		
≥ 3	340	99.4%
Functional capacity		
Barthel ≤ 60	233	68.1%
Cognitive assessment		
Pfeiffer ≥ 8	121	35.4%
Fall risk		
Tinetti < 19	227	66.4%
Polymedicated		
> 5 medications	295	86.3%
Kidney function		
GF < 30 mL/min	27	7.9%
Palliative criteria	107	31.3%
Frailty		
IF-CSS > 0.2	308	90.1%
Cardioembolic risk		
CHADS2-VASc ≥ 2	338	98.8%
Embolic event		
Stroke, DVT or PTE	73	21.3%

DVT: deep vein thrombosis; GF: glomerular filtration; IF-CSS: Frailty Index; PTE: pulmonary thromboembolism.

were observed (p = 0.028), as patients > 90 years of age tended to be treated with more Acs and anti-aggregants, except for those prescribed DOAcs. The older age group also tended not to receive any prophylactic treatment whatsoever, and this difference was significant. These untreated patients exhibited more cognitive impairment (p = 0.004), a lower frequency of polymedication (p < 0.001), and fulfilled palliative criteria (p = 0.027).

4. Discussion

Our study demonstrated a significant prevalence of NVAF among a sample of the institutionalized geriatric populationin Spain (approximately 20%), which is consistent with rates reported in previous studies and other cohorts with similar characteristics.[29–31] Additionally, we identified a high cardioembolic risk that justified Acs treatment, consistent with other studies reporting rates of up to 99.5%, as well as more recent studies reporting inpatient anticoagulation rates of approximately 50%.[3,32] Among patients with a history of thrombotic events, 23.9% were treated with DOAcs and 22.7% with VKAs. Notably, 90.1% of the participants corresponded to the frail population, which significantly contrasts with the 39% reported in another study.[33] This difference could be due to the advanced age of our sample, with 48% of participants ≥ 90 years of age.

In our study, 51.4% of patients received DOAcs, compared with 28.3% treated with VKAs. This significant difference may be explained by the change in the prescription pattern observed worldwide in response to the limitations of VKAs and the emerging evidence supporting the effectiveness and safety of DOAcs in clinical practice.[8,34–36] Among patients ≥ 90 years of age, we observed that the proportion of those receiving DOAcs versus VKAs was similar. This may underscore the complexity of therapeutic decisions for NVAF in this age group. This finding could reflect the need for caution in prescribing DOAcs to this specific group, possibly due to concerns regarding their fragility and increased risk for bleeding. However, real-world data analyses have indicated that DOAcs, particularly edoxaban, are safe, even in patients at high risk.[9,36]

Building on this trend, a recent multicenter study across European countries focused on hospitalized frail patients with atrial fibrillation (EURopean study of Older Subjects with Atrial Fibrillation [EUROSAF]). Findings from the EUROSAF study revealed a 50% decrease in mortality among those receiving DOAcs, irrespective of frailty level.[32] This aligns with the shifting landscape of Acs therapy, in which the observed higher use of DOAcs in our study resonated with their demonstrated benefits in improving patient outcomes. Evolving prescription patterns underscore the broader global acknowledgment of the advantages yielded by DOAcs over traditional VKAs.

We observed that 31.3% of residents who fulfilled the criteria for palliative care were treated with Acs therapy. Some reports have suggested that patients with severe impairment undergoing Acs treatment exhibit a reduction in the incidence of ischemic stroke and hemorrhagic complications,[12,34,37] which could justify the continuation of such therapy. However, there is a marked lack of consensus and evidence supporting the discontinuation of these treatments at advanced stages of decline and at the end of life.[15]

In our study, we found that 35.4% of the sample had severe cognitive impairment and a high percentage of these individuals were not receiving any treatment at all, which may reflect the persistent dilemma of managing Acs in patients with severe cognitive impairment, an area that still requires clarification. Despite the relationship between NVAF and increased risk for dementia, anticoagulation may not be optimally applied in this group.[33,38] This emphasizes the importance of adopting a more personalized approach that balances risks and benefits while considering quality of life and symptom management. With this in mind, evidence regarding the use of Acs in frail geriatric patients remains controversial, thereby complicating

Table 2
Results of the univariate analysis.

	Anticoagulants			Oral antiaggregants	None	Univariate hypothesis
	VKAs (n = 97)	DOAcs (n = 176)	LMWHs (n = 6)	(n = 29)	(n = 34)	comparison
Age, n (%)						**0.028**
90 years or more	42 (43.3%)	79 (44.9%)	3 (50.0%)	21 (72.4%)	19 (55.9%)	
Between 80 and 89 years	39 (40.2%)	82 (46.6%)	1 (16.7%)	6 (20.7%)	12 (35.3%)	
Under 80 years	16 (16.5%)	15 (8.5%)	2 (33.3%)	2 (6.9%)	3 (8.8%)	
Sex, n (%)						0.432
Female	75 (77.3%)	133 (75.6%)	6 (100.0%)	24 (82.8%)	29 (85.3%)	
Charlson, n (%)						0.253
≥ 3	95 (97.9%)	176 (100.0%)	6 (100.0%)	29 (100.0%)	34 (100.0%)	
Functional capacity, n (%)						0.282
Barthel ≤ 60	66 (68.0%)	114 (64.8%)	6 (100.0%)	21 (72.4%)	26 (76.5%)	
Cognitive assessment, n (%)						**0.004**
Pfeiffer ≥ 8	38 (39.2%)	50 (28.4%)	3 (50.0%)	9 (31.0%)	21 (61.8%)	
Fall risk, n (%)						0.678
Tinetti < 19	62 (63.9%)	115 (65.3%)	5 (83.3%)	22 (75.9%)	23 (67.6%)	
Polymedicated, n (%)						**< 0.001**
> 5 medications	88 (90.7%)	159 (90.3%)	6 (100.0%)	23 (79.3%)	19 (55.9%)	
Kidney function, n (%)						0.14
GF < 30 mL/min	3 (3.1%)	17 (9.7%)	1 (16.7%)	2 (6.9%)	4 (11.8%)	
Palliative criteria, n (%)	28 (28.9%)	47 (26.7%)	3 (50.0%)	11 (37.9%)	18 (52.9%)	**0.027**
Frailty, n (%)						0.077
IF-CSS > 0.2	90 (92.8%)	154 (87.5%)	5 (83.3%)	25 (86.2%)	34 (100.0%)	
Cardioembolic risk, n (%)						0.094
CHADS2-VASc ≥ 2	95 (97.9%)	175 (99.4%)	5 (83.3%)	29 (100.0%)	34 (100.0%)	
Embolic event, n (%)						**0.028**
Stroke, DVT or PTE	22 (22.7%)	42 (23.9%)	3 (50.0%)	5 (17.2%)	1 (2.9%)	

DVT: deep vein thrombosis; GF: glomerular filtration; IF-CSS: Frailty Index; LMWHs: low-molecular-weight heparins; PTE: pulmonary thromboembolism; VKAs: vitamin K antagonists; DOAcs:direct oral Acs.

management. This is reflected in the discordant results of previous studies.[39,40] These differences highlight the need to carefully evaluate individual patient profiles and the specific characteristics of each DOAcs to optimize anticoagulation therapy, particularly in geriatric populations with multiple vulnerabilities. In this context, decision-making algorithms for Acs that consider a multidimensional approach for elderly patients and account for life expectancy have become particularly relevant.[2] Comprehensive geriatric assessment, such as the Multidimensional Prognostic Index (i.e., "MPI"),[36] along with palliative care need assessment tools such as the *Necesidades Paliativas* CCOMS-ICO (i.e., "NECPAL"),[41] and deprescription tools such as STOPP-PAL[26,28,35,42] can be useful in the early identification of palliative requirements and in estimating a prognostic trajectory that guides appropriate interventions in these patients, ensuring that the therapeutic decisions align with the individuals' values and end-of-life wishes. Nevertheless, the clinical benefit of DOAcs versus VKAs appears to be significantly dependent on age and inherent mortality of the geriatric cohort. Recent studies have suggested that VKAs maintain a net clinical benefit up to 87 years of age, whereas in the case of apixaban, this benefit extends to 92 years of age. This could be attributed to its more favorable safety profile and lower impact on quality-adjusted life years > 0.1,[43] demonstrating the interrelationship between cohort mortality and the benefits derived from Acs therapy and further emphasizing the need to individualize therapeutic decisions globally.

We consider our study to be relevant given the broad sample of institutionalized patients > 90 years of age with NVAF, in whom Acs prescriptions were analyzed. However, the present study had a few limitations, including its cross-sectional design, absence of hemorrhagic risk analysis, and lack of assessment of the adverse outcomes associated with OAcs. First, its cross-sectional design prevented the identification of causal relationships and remained descriptive. Second, the HAS-BLED scale (Hypertension, Abnormal Renal/Liver Function, Stroke, Bleeding History or Predisposition, Labile INR, Elderly, Drugs/Alcohol Concomitantly) was not used to assess hemorrhagic risks, thereby limiting the depth of possible interpretation of the safety of Acs treatment. Finally, the adverse outcomes frequently observed with OAcs in elderly population, such as hemorrhagic events and falls, which are essential considerations in the management of Acs therapy, were not evaluated.

5. Conclusions and implications

Our results highlight the importance of a comprehensive geriatric assessment and evaluation of palliative criteria for the use of Acs in geriatric patients diagnosed with NVAF. Acs continues, even in the terminal stages of disease and in severe dementia, highlighting the need for further studies to guide prescription and clinical decision making in these complex scenarios.[44]

The predominant use of DOAcs versus VKAs reflects a trend toward safer and more effective treatments for NVAF. This is consistent with current clinical guidelines and supportive evidence from patient-level studies suggesting a favorable profile for DOAcs. However, the need for improved management of the therapeutic range persists, especially in patients receiving VKAs, for whom our study revealed a significant proportion outside the optimal therapeutic range.

Declaration of conflicts of interest

The authors declare that they have no conflicts of interest, be they direct or indirect related to the work submitted for publication.

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