

Emergency room treatment of patients with atrial fibrillation with rapid ventricular response

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Abstract

Introduction: atrial fibrillation (AF) is the most prevalent cardiac arrhythmia worldwide, and its incidence is expected to double over the next two decades, leading to a significant increase in its associated morbidity and mortality rates. In this context, the emergency room is in a crucial position to provide effective treatment to positively impact these patients' survival and reduce the complications that ensue if AF is not addressed promptly.

Objective: to characterize the population of patients with AF with rapid ventricular response (RVR) seen in an emergency room in Armenia, Quindío, from 2021-2022.

Materials and method: this was a retrospective study at a healthcare facility in the city of Armenia. Patients over the age of 18 who presented to the ER for various reasons and had AF with RVR on their admission electrocardiogram were included. A total of 644 medical charts were collected, 523 of which were excluded because they did not meet the inclusion criteria, with 121 patients ultimately analyzed.

Results: among the included patients, 56% (n=68) were males, and 85% were 60 years old or older, thus reflecting the high prevalence of AF in elderly people. The predominant treatment was pharmacological therapy, which was instated in 92.6% of the cases, with an 82% success rate. In addition, a small percentage (7.4%) required electrical cardioversion, which was successful in 66.6% of the cases.

Conclusions: it is essential to promptly diagnose and treat patients with AF in the emergency room, especially in a population where most were diagnosed with AF for the first time. (*Acta Med Colomb* 2025; 50. DOI: <https://doi.org/10.36104/amc.2025.3171>).

Keywords: atrial fibrillation, emergency medicine, electrical cardioversion, emergency room, arrhythmias.

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Introduction

Atrial fibrillation (AF) is the most common arrhythmia. It is estimated that, by 2030, its prevalence will reach 12.1 million cases in the United States and 17.9 million in the European Union (1). In Oriental countries, a continuous growth of prevalence rates is projected over the next decades, with an estimated range from 4.0-5.4% by 2050 (2).

In Colombia, as in the rest of the world, the incidence of AF increases with age. However, the age of onset in the Colombian population is slightly lower than in the global population (3). In addition, the average cost of treating a patient with controlled AF in Colombia reaches \$6,218,179; however, this cost can triple in those with rapid ventricular response (RVR) and is even higher in those whose initial manifestation was acute myocardial infarction (1).

According to data from the Comprehensive Social Protection Information System (SISPRO, in Spanish), the national prevalence of AF went from 41-87 cases per 100,000 inhabitants from 2013 to 2017. The regions with

the highest prevalence of AF include Antioquia, Bogotá, Eje Cafetero and Santander (3). However, despite being one of the regions with the highest prevalence in the country, there were no studies found in the literature describing the epidemiology of AF in Eje Cafetero, particularly in the department of Quindío.

All the above highlights the importance of addressing this issue. Therefore, this study sought to characterize the cases of AF in the emergency room within the context of RVR, in order to obtain information on the features of patients in our region and the pharmacological treatment provided in the acute setting. With this information, the goal is to promote the creation of specific measures for prompt detection and appropriate management of our patients.

Method

A retrospective study was conducted in the city of Armenia, Quindío, including patients over the age of 18 who were admitted to the hospital between January 2022 and January

2023 for any reason, and in whom AF was documented on the electrocardiographic tracing. To achieve this, the medical charts registered over the course of the year were filtered by ICD-10 diagnoses (I471, I480, I481, I482, I489, I499, and R000).

A total of 644 medical charts were reviewed for this study. Only cases involving patients over the age of 18 who were seen in the emergency room, had AF with RVR recorded on the admission electrocardiogram, and were treated in the emergency room, were selected. Rapid ventricular response was defined as a heart rate of more than 110 beats per minute, in line with the European Society of Cardiology (ESC) criteria (4). This resulted in the inclusion of 121 medical charts. Sociodemographic data, any history of a prior AF diagnosis, ambulatory treatment, and emergency room treatment and its effectiveness were analyzed for these patients.

The information obtained from these 121 medical charts was processed and analyzed using the Excel statistical package. The data was structured, differentiating between qualitative and quantitative variables, which allowed absolute frequencies (the count for each value) and relative frequencies (the proportion of each value compared to the total) to be calculated.

Results

A total of 644 medical charts were gleaned, 523 of which were excluded because they did not meet the inclusion criteria. Of the 121 patients included in the study, most were males (56%; $n=68$), 85% were 60 years old or older ($n=103$), and 52% ($n=63$) belonged to the contributive regimen of the Healthcare Social Security System (SGSSS, in Spanish) (Table 1).

Hypertension was the most frequent comorbidity, found in 62.8% of the patients, followed by heart failure (22.3%), and 7.4% of the patients did not report any comorbidities. This data is presented in Table 2.

Regarding a prior diagnosis, AF was a known condition in 36% ($n=44$) of the patients, 86% ($n=38$) of whom were on outpatient medical treatment. As far as treatment, 97% ($n=37$) were on heart rate control medications, only 36.8% ($n=14$) were on anticoagulant treatment, including vitamin K antagonists (21% $n=3$) or direct oral anticoagulants (78% $n=11$), and 5% ($n=2$) had rhythm control strategies.

The predominant symptom prompting the emergency room visit was chest pain (25.6% $n=31$), followed by dyspnea (24.8% $n=30$) and palpitations (22% $n=27$) (Table 3).

The majority of the patients had no other concomitant condition that could have triggered the increased ventricular response (46.7% $n=57$). However, infections were most frequently associated with ventricular frequency decompensation (18% $n=22$), followed by decompensated heart failure (11.4% $n=14$). It is worth noting that the most frequent infection in patients with RVR was pneumonia, with 41% ($n=9$); this data is presented in Table 4.

Table 1. Sample characteristics.

Age		Sex		Health insurance regimen	
< 60 years	≥ 60 years	M	F	Subsidized	Contributive
18	103	68	53	58	63
14.8%	85.2%	56%	44%	48%	52%

Table 2. Comorbidities in patients seen in the emergency room.

Comorbilities	n	%
Hypertension	76	62.8
Heart failure	27	22.3
Diabetes mellitus	25	20.6
Ischemic heart disease	25	20.6
Thyroid disorders	22	18.2
Respiratory diseases	22	18.2
Valve diseases	12	9.9
CVA or TIA	10	8.3
Kidney disease	9	7.4
Poisoning	5	4.1
Peripheral artery disease	3	2.5
Liver disease	3	2.5
Dyslipidemia	2	1.6
Congenital heart disease	2	1.6
Coagulation disorders	1	0.8
Others	16	13.2
None	9	7.4

Table 3. Chief complaint leading to the emergency room visit.

Chief complain	n	%
Chest pain	31	25.6
Dyspnea	30	24.8
Palpitations	27	22.3
Focal neurological deficits	9	7.4
Collapse	6	5.0
Abdominal pain	6	5.0
Syncope	5	4.1
Weakness	4	3.3
Fever	2	1.7
Diarrhea	1	0.8

Table 4. Triggers identified in patients with AF in the emergency room.

	n	%
None	57	46.7
Infection	22	18.0
Decompensated CHF	14	11.4
AMI	7	5.7
Poor adherence to medications	7	5.7
CVA	3	2.4
Chronic obstructive pulmonary disease exacerbation	3	2.4
Other	9	7.3

Altogether, 92.6% (n=112) of the patients received pharmacological treatment in the emergency room, either to control the frequency (59%; n=66), rhythm (15%; n=17) or both (26%; n=29), with an 82% success rate (n=92). The remaining 7.4% (n=9) required electrical cardioversion due to hemodynamic instability, with a 66.6% success rate (n=6).

As far as frequency control, the most frequently used medication was metoprolol (57.7%; n=45), followed by carvedilol (18%; n=14) and digoxin (12.8%; n=8). The medication most often used for rhythm control was amiodarone (32.3%).

Discussion

Within the sample of patients included in the study, most were 60 years old or older, accounting for 85.2% of the cases. Furthermore, the most common medical conditions were hypertension, ischemic heart disease and diabetes mellitus. These findings coincide with both the global and national epidemiology, in which these three conditions have frequently been independently associated with AF (1, 3).

Unlike in other emergency rooms, chronic obstructive pulmonary disease (COPD) was not among the most common comorbidities (2). Instead, there was a higher incidence of thyroid disorders and chronic kidney disease, which concurs with the literature, in which these conditions are also frequently associated with AF (5).

The most frequent chief complaints among the patients were chest pain and dyspnea, accounting for 50% of the cases. This finding is highly clinically relevant, as ischemic heart disease has been found in approximately 30% of cases. An observational study in Bogotá documented that 9.5% of the patients had clinical and paraclinical findings of coronary disease and 24.8% had positive troponin levels (2). This underscores the importance of considering coronary disease as a possible underlying cause in patients who consult due to chest pain and dyspnea in the context of AF.

As far as emergency room treatment, the heart rate control strategy was in line with the current clinical practice

guidelines, which emphasize this approach as the first step in managing the symptoms (4). In 77% of the cases, first-line medications were used, most commonly beta blockers, with metoprolol being the most frequent, followed by carvedilol and bisoprolol. However, digoxin was also recorded in 11.7%, despite being a second-line medication and associated with a higher risk of mortality in patients with AF (4, 6).

On the other hand, the predominant rhythm control strategy was expectant management in most cases. This approach was probably motivated by the fact that 64% of the patients had been diagnosed for the first time and, therefore, were not on anticoagulants. In addition, the lack of availability of transesophageal echocardiography at the institution may also have contributed to this strategy. Only 45% of the patients underwent either pharmacological or electrical measures aimed at reverting the rhythm. Among the pharmacological measures, there was a significant use of amiodarone, despite the availability of other alternatives (2). The high rate of amiodarone use could be explained by its high availability in the area. There was also a 2.4% use of adenosine, despite not being indicated for AF rhythms (4). This could be due to diagnostic confusion in the context of very rapid rhythms that mask AF and are mistakenly interpreted as supraventricular tachycardia.

Given the above, it is essential for AF management in the emergency room to be based on the current clinical practice guidelines, prioritizing electrical cardioversion in hemodynamically unstable patients, regardless of their CHA₂DS₂-VA, and heart rate control in the remaining AF cases with RVR (AF RVR). After this, each patient should be characterized according to his/her symptoms (EHRA), the length of time with AF (paroxysmal, persistent or permanent), comorbidities and functional status, and not only in terms of thromboembolic (CHA₂DS₂-VA) and bleeding (HAS-BLED) risk factors. This, in coordination with the cardiology service, will help determine the treatment strategy to follow, (rhythm control vs. heart rate control) and whether there is an indication for full anticoagulation. It should be noted that all patients who undergo cardioversion require four weeks of full anticoagulation, and a high HAS-BLED does not contraindicate anticoagulation (4).

Out of the 37 patients in our study who were on heart rate control medications, only 36.8% (n=14) had anticoagulation treatment. This fact is relevant, considering that up to 35% of patients with AF and a high risk of bleeding seen in the emergency room are discharged without a prescription for oral anticoagulants, which increases the risk of fatal thromboembolic events (4, 7, 8).

Patients with valvular AF (moderate-severe mitral stenosis or mechanical valves) have an indication for anticoagulation with vitamin K antagonists (warfarin). On the other hand, direct oral anticoagulants like rivaroxaban and apixaban are recommended as first-line treatment for those with nonvalvular AF and no contraindications. These drugs have shown an efficacy similar to warfarin in preventing strokes,

with a significantly lower risk of intracranial hemorrhage, lower mortality, and less need for therapeutic follow-up (4, 7-9). The recent availability of non-vitamin K antagonist oral anticoagulants in our country was also reflected in our study, in which 78% (n=11) of the anticoagulated patients used one of these drugs.

In addition to adhering to the treatment proposed in the literature, emergency room physicians should be familiar with the drugs available at their institutions and their specific characteristics. It is also important to highlight that adequate communication should be maintained with the patient after the initial management, as this is a determinant factor in treatment adherence. Effective communication is a pillar of appropriate AF management, both for controlling the heart rate as well as preventing thromboembolic events. Patient education on the disease, related risk factors and treatment lowers their anxiety with regard to the disease and fosters adequate control and ambulatory follow-up (4, 7, 9-12).

Among this study's limitations was the fact that, since it was a retrospective study, a large number of patients had to be excluded due to incomplete information in the medical charts. In addition, the causes of hemodynamic instability that led to the decision to perform electrical cardioversion were not adequately documented. Likewise, since this study was carried out at a single center, the results cannot be generalized to other populations or healthcare settings with different resources.

In future studies, it would be valuable to evaluate how different intervention strategies for managing AF in the emergency room affect long-term clinical outcomes, beyond the success rate, including the length of stay in the emergency room or the rate of recurrence of AF with RVR.

Conclusions

After analyzing the data collected, the characteristics of the study population were found to be similar to those reported in the global epidemiology. We highlight the importance of prompt diagnosis and treatment in this group of patients, especially considering that most were admitted to the emergency room with a diagnosis of new-onset AF, with no identified triggering event.

On the other hand, most of the patients were found to be hemodynamically stable, which explains why beta blocker treatment continues to be the first line of treatment for heart rate control.

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