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Original Research Article

A prospective study on optimizing arrhythmia management in a tertiary care hospital

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ABSTRACT

Background: Arrhythmias, particularly atrial fibrillation (AF), significantly contribute to morbidity and mortality, especially in older adults. Effective management is essential to reducing stroke risk and improving outcomes. However, real-world treatment often deviates from guidelines, raising concerns about care consistency. This study aims to identify prevalent arrhythmias, assess stroke risk, examine the relationship between arrhythmias and age, and analyze prescription patterns of antiarrhythmic drugs (AADs) and anticoagulants in a tertiary care setting.

Methods: A prospective observational study was conducted with 50 patients diagnosed with arrhythmias. Data were collected through structured interviews using the arrhythmia-specific questionnaire in tachycardia and arrhythmia (ASTA) and medical records. Prescription patterns were analyzed using the Vaughan-Williams classification system.

Results: Atrial fibrillation with a rapid ventricular rate (AF with FVR) was the most common arrhythmia (44%). A significant 88% of patients had a severe stroke risk based on the CHAD₂ scale. Beta-blockers were the most prescribed AADs (45.59%), with amiodarone being the most common (30.88%). Heparin (37.68%) and aspirin (28.99%) were the leading anticoagulants.

Conclusions: The findings highlight AF's high prevalence and associated stroke risk in older adults. While prescription patterns align with guidelines, the reliance on Amiodarone necessitates careful monitoring. Greater adherence to guideline-recommended newer oral anticoagulants (NOACs) is needed to optimize outcomes.

Keywords: Arrhythmia, Atrial fibrillation, Stroke risk, Antiarrhythmic drugs, Anticoagulants, Prospective study

INTRODUCTION

Arrhythmia refers to fluctuations in heart rate, often linked to atrial tachyarrhythmias, particularly atrial fibrillation (AF), characterized by rapid and irregular atrial contractions. Initially presenting as short episodes, AF can progress to longer and more persistent occurrences. Arrhythmias result from disruptions in the heart's electrical impulses, leading to abnormal heart rhythms, such as ventricular tachycardia or bradycardia, even during rest. Antiarrhythmic therapy aims to restore normal sinus rhythm, ideally maintaining a heart rate between 60 and 100 beats per minute at rest. However, antiarrhythmic

drugs (AADs) can sometimes produce proarrhythmic effects. A study revealed deviations from international guidelines, particularly with the use of amiodarone as a first-line treatment, highlighting a large discrepancy between clinical guidelines and current practice.¹ A meta-analysis found a significant association between ivabradine and an increased risk of AF, with one new AF case occurring for every 208 patient-years of treatment.² Antibiotics like macrolides and fluoroquinolones are also known to induce arrhythmias by affecting cardiac repolarization.³ Arrhythmias, particularly AF and supraventricular arrhythmias, pose a significant risk to patients with heart failure (HF), contributing to increased

morbidity and mortality.⁴ Additionally, renal impairment in patients with AF undergoing percutaneous coronary intervention (PCI) exacerbates the prognosis, underscoring the complexity of managing such conditions.⁵ Proper prescription patterns of antiarrhythmic drugs, guided by the Vaughan Williams classification, are essential for effective treatment. Risk factors for arrhythmias include both non-modifiable factors, such as coronary artery disease and age, and modifiable factors like smoking, obesity, and hypertension. The condition is associated with several comorbidities, including hypertension, diabetes, and heart failure, complicating treatment and necessitating adherence to guidelines to avoid polypharmacy and adverse drug interactions.⁶ Diagnosis primarily involves electrocardiograms (ECG) and electrolyte testing, as symptoms like breathlessness are often insufficient for accurate detection. Early and accurate diagnosis, along with a comprehensive understanding of antiarrhythmic drug therapy, is crucial for managing arrhythmias and improving patient outcomes. The purposes of this study include determining the most prevalent type of arrhythmia, assessing the risk of stroke among arrhythmic patients, exploring the relationship between arrhythmias and age, identifying the need for anticoagulant medication, and analyzing the prescription patterns of AADs and anticoagulants.

Objectives

Primary objective was to identify the most prevalent type of arrhythmia.

Secondary objectives were to: assess the risk of stroke in patients with arrhythmias, explore the relationship between arrhythmias and age, evaluate the need for anticoagulant medication in arrhythmia management, analyze the prescription patterns of antiarrhythmic drugs (AADs) and identify the most frequently prescribed AAD, and examine the prescription patterns of anticoagulants and identify the most frequently prescribed anticoagulant.

METHODS

Study design

This study is a prospective, observational investigation conducted in a tertiary care hospital's cardiac care unit. The study aimed to assess the management of arrhythmias by collecting and analysing baseline data, including demographic details, medical history, co-morbidities, and other relevant clinical information of patients diagnosed with arrhythmias.

Study population

The study population consisted of 50 patients diagnosed with various forms of arrhythmias and receiving antiarrhythmic therapy. Patients were selected based on specific inclusion and exclusion criteria to ensure the validity and relevance of the study's findings.

Data sources

Data were collected through structured interviews with patients using the arrhythmia-specific questionnaire in tachycardia and arrhythmia (ASTA).

Additional data were obtained from patient medical records, including laboratory reports and therapeutic data. Interactions with cardiac care providers were also conducted to gather detailed information regarding treatment guidelines and practices.

Inclusion criteria

Patients aged 21 years and older, patients diagnosed with any form of arrhythmia, patients currently on antiarrhythmic therapy, including those with a prior diagnosis of arrhythmias, and patients with relevant comorbidities related to cardiovascular health were included.

Exclusion criteria

Patients under 21 years of age, patients who had undergone major surgery within the last six months, pregnant individuals, and patients with incomplete medical records or those unable to provide informed consent were excluded.

Data collection and study procedure

After obtaining ethical approval from the Institutional Review Board (IRB) and consent from relevant hospital authorities, data collection was conducted from 01 January to 29 September 2023.

Each patient participated in a one-on-one interview using the validated ASTA. The questionnaire covered demographic details (e.g., age, sex, body weight), medical history, drug allergies, reasons for admission, comorbidities, and therapeutic data, including drug dosage, frequency, duration, and route of administration.

Discussions were also held with attending medical practitioners to gather information on the types of arrhythmias diagnosed and the specific antiarrhythmic treatment protocols followed. The Vaughan-Williams classification system was used to categorize both the arrhythmias and their associated therapies.

Patients who were unaware of their condition or the importance of adhering to medical advice were provided with educational materials, including patient information leaflets (PILs). These materials emphasized preventive measures and provided instructions on the proper use of prescribed medications and preventive aids.

All collected data were systematically entered into a Microsoft Excel spreadsheet for analysis, with descriptive statistics applied.

RESULTS

Overview of patient demographics and clinical profiles

The study included 50 patients, with a mean age of 69.2 years (± 16.7 years). The gender distribution showed a slight female predominance (54%) over males (46%). The majority of patients were older adults, with the highest percentage (24%) aged between 71-80 years. Notably, no patients were in the 31-40 years age group. Atrial fibrillation with a rapid ventricular rate (AF with FVR) was the most prevalent type of arrhythmia, diagnosed in 44% of patients, followed by paroxysmal atrial fibrillation (PAF) at 26%. According to the CHAD2 scale, a significant majority of patients (88%) were classified as having a severe risk of stroke, with smaller percentages falling into the moderate (8%) and low-risk (4%) categories. This distribution highlights an older demographic with a predominance of severe arrhythmia cases in the study cohort, details are depicted in Table 1.

Table 1: Overview of patient demographics and clinical profiles.

Parameters	Number of patients	%	Mean $\pm$ SD
Gender distribution			
Male	23	46	
Female	27	54	
Age distribution (years)			
21-30	3	6.00	
31-40	0	0.00	
41-50	4	8.00	
51-60	6	12.00	
61-70	11	22.00	
71-80	12	24.00	
81-90	11	22.00	
91-100	3	6.00	
Total	50	100	69.2 $\pm$ 16.7
Type of arrhythmia			
AF with FVR	22	44.00	
PAF	13	26.00	
AF with CVR	4	8.00	
Sinus bradycardia	3	6.00	
Sinus tachycardia	6	12.00	
MPC VT	1	2.00	
Atrial flutter	1	2.00	
Risk of stroke (CHAD2 scale)			
Low	2	4.00	
Moderate	4	8.00	
Severe	44	88.00	

Distribution of antiarrhythmic and anticoagulant medications

The study evaluated the distribution of antiarrhythmic and anticoagulant drugs among patients. For antiarrhythmic therapy, a total of 68 medications were administered, with

beta-blockers being the most commonly prescribed, accounting for 45.59% of the total. Amiodarone, a potassium channel blocker, was the most frequently used individual drug, representing 30.88% of prescriptions. Calcium channel blockers (diltiazem and verapamil) made up 8.82% of the total, while other drugs such as digoxin and noradrenaline comprised 14.70%. Regarding anticoagulant therapy, 69 medications were prescribed, with heparin being the most common at 37.68%, followed by aspirin at 28.99%. The least prescribed anticoagulant was nicoumalone, representing just 1.45% of the total. This data highlights the predominance of heparin and aspirin in anticoagulant therapy, similar to the preference for beta-blockers and amiodarone in antiarrhythmic treatment, details are depicted in Table 2.

Table 2: Distribution of antiarrhythmic and anticoagulant medications.

Drug category and specific drug	Number of patients (N)	Percentage
Antiarrhythmic drugs		
Bisoprolol	18	26.47
Metoprolol	11	16.18
Propranolol	1	1.47
Carvedilol	1	1.47
Amiodarone	21	30.88
Diltiazem	3	4.41
Verapamil	3	4.41
Digoxin	5	7.35
Noradrenaline	5	7.35
Total	68	100.00
Anticoagulant drugs		
Heparin	26	37.68
Aspirin	20	28.99
Clopidogrel	7	10.14
Ticagrelor	8	11.59
Apixaban	5	7.25
Dabigatran	2	2.90
Nicoumalone	1	1.45
Total	69	100.00

DISCUSSION

The management of arrhythmias, particularly atrial fibrillation (AF), in this prospective study reflects both adherence to and deviations from established clinical guidelines, offering critical insights into real-world practices within a tertiary care setting. The study identified AF with a rapid ventricular rate (AF with FVR) as the most prevalent arrhythmia, consistent with its recognized dominance among older adults, who constituted the majority of our patient cohort. This aligns with findings from Kirchhof et al in the Lancet, which also highlighted the high incidence of AF in similar populations.⁷ The significant proportion of patients at severe risk of stroke, as indicated by the CHAD2 scale, underscores the urgent need for effective anticoagulation strategies. However,

while beta-blockers and Amiodarone were the most commonly prescribed antiarrhythmic drugs (AADs), reflecting current guideline recommendations, the high reliance on amiodarone warrants caution due to its known proarrhythmic and toxic side effects, as emphasized by January et al in circulation.⁸ Moreover, the underutilization of newer oral anticoagulants (NOACs) like apixaban, despite their proven superiority in reducing stroke risk as demonstrated by Granger et al in *The New England Journal of Medicine*, points to a gap between clinical evidence and practice.⁹ This discrepancy could be attributed to concerns over the cost, availability, or physician familiarity with NOACs, which might limit their adoption despite their advantages. Additionally, the study's focus on the prescription patterns reveals a preference for traditional anticoagulants like heparin and aspirin, mirroring older treatment paradigms rather than the evolving landscape that favors NOACs. These findings suggest that while the treatment of arrhythmias in this setting is largely aligned with established practices, there is a critical need for updating treatment protocols to incorporate the latest evidence-based therapies, particularly in the use of NOACs, to optimize patient outcomes and minimize stroke risk in high-risk populations. Furthermore, comparing these findings with the comprehensive meta-analyses and guidelines, such as the 2019 AHA/ACC/HRS update, reveals that there is still significant room for improvement in bridging the gap between clinical trials and everyday clinical practice, especially in settings where resource limitations and physician preferences may drive decision-making processes that diverge from the latest evidence-based recommendations.

Limitations

The study's observational design limited the ability to establish causality between treatment protocols and patient outcomes. Additionally, the relatively small sample size, short study duration, and single-center setting may have affected the generalizability of the findings.

To overcome these limitations, future research should consider a multicenter study with a larger sample size to improve the generalizability of results. Extending the study duration would allow for better assessment of long-term treatment outcomes. Additionally, incorporating a randomized controlled trial (RCT) design could help establish causal relationships between treatment protocols and patient outcomes.

CONCLUSION

This study underscores the critical role of tailored arrhythmia management, particularly in older adults with a high risk of stroke, as demonstrated by the prevalence of atrial fibrillation with rapid ventricular rate (AF with FVR) and the widespread use of beta-blockers and amiodarone. While these findings align with current clinical guidelines, the underutilization of NOACs like apixaban, despite their

superior efficacy in reducing stroke risk, highlights an area for improvement in treatment protocols. The study contributes to the growing body of evidence emphasizing the need for more comprehensive and up-to-date management strategies in arrhythmia care, particularly in resource-constrained settings. Future research should focus on larger, multicenter studies to validate these findings, explore the long-term outcomes of current treatment practices, and identify barriers to the adoption of newer, more effective therapies. By addressing these gaps, this study not only enhances our understanding of arrhythmia management but also lays the groundwork for improving patient outcomes through more evidence-based practices.

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