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ORIGINAL RESEARCH

Heterogeneity in the role of emergency physicians and treatment of acute atrial fibrillation in emergency departments—results of the International Atrial Fibrillation Background (AFiB) Study

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Abstract

The consept of emergency departments (EDs) with specialized teams of emergency physicians originated in the United Kingdom and the United States during the 1970s and was expanded across most European countries in the twenty-first century. Among the various cardiac arrhythmias encountered in EDs, atrial fibrillation (AF) is the most prevalent, contributing to ED congestion. Existing guidelines offer multiple treatment options for acute-onset AF occurring within 48 hours. The aim of The Atrial Fibrillation Background Study is to evaluate treatment strategies, practices and the role of emergency physicians in managing acute-onset AF in Western medical tradition across Europe, the United States and China (Hong Kong). The data for this nonexperimental survey were collected through a questionnaire administered to the medical director or a senior physician at each of the 12 participating EDs. We obtained information regarding the total number of physicians employed in these EDs, their respective specialties, and the patient caseloads they managed. Additionally, we gathered data on the diagnostic and treatment protocols employed for atrial fibrillation (AF). In the investigated EDs in Hong Kong, the United Kingdom and the United States, patients were treated by emergency physicians. Comparatively, many European EDs primarily relied on physicians with traditional medical specialties. Diagnostic methods employed for acute AF ranged from point-of-care testing to comprehensive laboratory panels and echocardiography. In terms of AF treatment, rate control was the preferred approach in Hong Kong and the USA EDs, while rhythm control was preferred in European settings. Regarding rhythm control, there were considerable variations in preferences between pharmacological and electrical cardioversion methods. Findings from the AFiB Study highlight the growing significance of emergency physicians in the management of acute AF, as well as the divergent treatment approaches for acute AF observed in EDs between Europe and the United States.

Keywords

Emergency department; Role of emergency physicians; Acute-onset atrial fibrillation; Treatment strategy; Treatment practices; Atrial fibrillation diagnostics; Rhythm control; Rate control

1. Introduction

The concept of emergency departments (EDs) staffed by specialized emergency medicine (EM) practitioners started almost simultaneously in the developed English-speaking world during the 1970s, primarily originating in the USA [1, 2]. In Europe, the development of EM as a medical specialty gained significant momentum mainly during the 2000s [3]. However, the Franco-German model, characterized by physician-led prehospital emergency medical services and the presence of non-

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EM-trained physicians within EDs, remains prevalent in some central European countries [1, 4]. EDs are undergoing organizational changes, which are mirrored by evolving treatment practices.

Atrial fibrillation (AF) is the most prevalent cardiac arrhythmia encountered in EDs and contributes to ED overcrowding. This is also attributed to the escalating prevalence and incidence of AF, as reported in recent studies [5, 6]. Notably, the incidence of AF has shown a strong correlation with age, suggesting a further increase in the future owing to the global aging population [6, 7]. Although AF rarely poses as an immediate life-threatening condition, it can significantly increase the risk of mortality and morbidity [6]. In addition, given the increased risk of thromboembolic complications, particularly strokes, associated with AF and the tendency for thrombus formation in the left atrium, anticoagulation therapy is frequently warranted [8, 9].

The recommended approach for diagnosing AF involves a 12-lead Electrocardiography (ECG) or, at the very least, a high-quality single-lead ECG recording lasting over 30 seconds. A 12-lead ECG can also be used to determine heart rate and screen for conduction abnormalities, ischemic events and structural heart disease [8, 9]. Both the guidelines provided by the American College of Cardiology, the American Heart Association, and the Heart Rhythm Society (AHA/ACC/HRS) and those by the European Society of Cardiology (ESC) advocate an initial workup that includes the evaluation of thyroid and kidney function, serum electrolyte levels, and a complete blood count. Additionally, the AHA/ACC/HRS and ESC guidelines stress the importance of utilizing transthoracic echocardiography (TTE) to diagnose structural heart conditions and to guide treatment decisions [8–10]. Moreover, these guidelines recommend screening for associated ailments such as coronary heart disease, cerebral ischemia and stroke, depending on the patient's clinical presentation [8, 9]. However, it is important to note that once the initial screening for underlying conditions has been conducted, a comprehensive reevaluation in the event of recurrent AF paroxysms is generally unnecessary.

For managing acute AF, the choice between rate control and rhythm control strategies varies among hospitals. No definitive guidelines exist to conclusively favor one over the other. However, some evidence suggests that rhythm control may be preferable for younger patients (under 70 years old), while rate control may be more suitable for older individuals with multiple comorbidities such as heart failure and hypertension [11]. Recent studies have reported benefits in achieving short- and long-term restoration of sinus rhythm [12, 13]. For patients who remain symptomatic despite receiving adequate rate control therapy, cardioversion (CV) is the preferred approach [8, 9]. In the context of CV, both pharmacological and, when necessary, electrical CV, as well as primarily electrical CV strategies, have demonstrated high efficacy with rare adverse events [14, 15]. In patients with AF lasting more than 48 hours and who are not anticoagulated, transesophageal echocardiography can be employed to assess the presence of left atrial appendage thrombus, which serves as a contraindication to nonemergency CV [9].

In recent decades, there have been significant transformations in the treatment approaches for acute AF. Additionally, emergency physicians (EPs) have taken responsibility for treatments in EDs in numerous countries. Consequently, we aim to examine and assess the treatment practices for acute AF in ED settings across various countries.

2. Objectives

The International Atrial Fibrillation Background (AFiB) study is a multicenter international survey investigating the approaches and treatment preferences for acute-onset AF in diverse EDs in several countries with varying durations of experience in EM, including those where EM is not established as a medical specialty.

The primary objective of this study is to evaluate the roles of different specialists and resident physicians working in the ED in making treatment decisions and administering treatments for acute-onset AF.

The secondary objective is to analyze the utilization of medical resources, including laboratory tests, radiographs, ultrasound and other diagnostic tools, in patients presenting with acute-onset AF.

The third objective is to compare the treatment protocols for acute-onset AF across the participating EDs.

3. Methods

To investigate the treatment responsibility and policies concerning acute AF, we conducted a structured survey that included both quantitative and qualitative questions. This survey was distributed to 12 EDs located in the United States, Europe and China. Among the European countries, Belgium, Finland and Iceland, with altogether six different EDs, had relatively limited experience with EM. For comparative purposes, we selected EDs with well-established EM traditions, including two representing the U.S. model (EDs in the USA) and two representing the UK model (EDs in Wales, UK and Hong Kong, China). Additionally, Austrian and German EDs were included to represent the Franco-German tradition, even though they do not have EM as a distinct medical specialty. In total, 12 EDs participated in the study, aiming to examine EDs in various stages of EM evolution.

The data were collected from the questionnaires distributed to the medical director, or in one instance, a senior specialist, at each participating ED during the spring of 2018. The responses were based on administrative and statistical data collected within each ED. Significant changes in treatment practices were updated during the manuscript writing process in 2020–2021.

Data analysis was conducted based on the background questions aimed at extracting information about the ED operating environment. The count of physicians refers specifically to those who work either full-time or at least 50% part-time within the ED. Additionally, we gathered tacit information concerning the treatment of acute AF, encompassing the implicit or unspoken expertise possessed by healthcare professionals, which typically remains undocumented in written records.

4. Results

Table 1 provides the basic information of the 12 participating departments in this study. The total annual patient attendance across the EDs varied, with numbers ranging from 17,500 to 145,000. The number of physicians working in the EDs also exhibited a wide range, from eight physicians at Heilig Hartziekenhuis Mol in Belgium to 87 physicians at the University of Massachusetts Memorial Hospital in the USA. In most of the hospitals, the EDs were primarily staffed by EPs. Notably, in locations such as Hong Kong, the UK and the USA, only EPs regularly served as physicians in the EDs. In Austria and Germany, where the specialty of EM had not been officially recognized, the EDs were overseen by internal medicine and critical care physicians. In Belgium, Finland and Iceland, while multiple specialties were represented in the EDs, EPs predominantly led these departments.

4.1 The role of different specialties

For acute-onset AF, treatment decisions were predominantly made by EPs in the Anglo-American tradition of EM, specifically in Hong Kong, the UK, and the USA. In contrast, cardiologists were the primary decision-makers in hospitals located in Belgium and Iceland, while internists primarily determined AF treatment in Austria, Finland and Germany, although there were instances of overlap.

The choice of treatment was made by a senior physician in Germany and Iceland, as well as in one US hospital and two of the three Belgian hospitals. In other EDs, treatment decisions were made by both senior physicians and trainees. The comments provided in the survey responses shed light on how, in several EDs, EM is gradually assuming a more comprehensive role in emergency healthcare services, including the management of AF (Table 2, Comments 1–5).

4.2 Use of resources

Electrocardiography (ECG) was mandatory for diagnosing AF, and potassium levels were analyzed for every patient in all of the participating EDs. Fig. 1 provides an overview of the utilization of laboratory tests and imaging procedures. Notably, in three EDs, point-of-care (POC) tests were employed before CV instead of the conventional laboratory analyses. The EDs of Austrian and Belgian hospitals routinely conducted comprehensive laboratory assessments, whereas only a limited number of tests were performed in the EDs of Finland and the UK.

The utilization of chest X-ray imaging varied across most hospitals, with between 50% and 100% of patients undergoing this procedure. However, in two hospitals, chest X-rays were conducted for only a small percentage of patients, specifically between 5% and 10%. The use of TTE in EDs varied significantly. In five EDs, echocardiography was performed for $\geq$50% of the patients, and in at least one ED, TTE and lung ultrasound were used as the standard approach instead of chest X-ray. Conversely, TTE was infrequently employed in four EDs (Fig. 1).

4.3 Treatment strategies

The selection of rhythm control over rate control varied considerably, ranging from 10% to 90% of patients, depending on the hospital. CV, comprising both electrical and pharmacological methods, was more prevalent in European centers, whereas rate control was the preferred approach in hospitals located in Hong Kong and the USA. Electrical CV was more frequently used in Finland, Germany, Iceland and one Belgian hospital, while other European hospitals primarily utilized pharmacological CV (Fig. 2 and Table 2, Comments 6–9).

In hospitals with a low proportion of rhythm control, medical practitioners regarded CV as an emergency measure reserved for patients experiencing hemodynamic instability. The inclination toward rate control was attributed to factors such as considerations related to health insurance, potential adverse effects in non-anticoagulated patients, and concerns about the reliability of patient-reported medical histories. Additionally, there were expressed concerns regarding the potential for thromboembolic complications following CV (Table 2, Comment 10). In one ED, the preference for rate control was further explained by the higher prevalence of valvular heart disease among patients presenting with acute AF.

In three Belgian hospitals, the location for performing CV, *i.e.*, in the ED or the cardiac care unit (CCU), depended on whether it was conducted by an EP or a cardiologist. In one U.S. hospital, CV was exclusively performed in the CCU, while in all other hospitals, it was performed in the ED. The typical treatment duration varied across hospitals, ranging from 3 to 8 hours for both pharmacological and electrical CV and from 3 to 6 hours for rate control therapy (refer to Comment 11). In most hospitals, the maximum length of stay was 24 hours, with only two hospitals (the Hong Kong ED and one of the Finnish EDs) incorporating observation units that allowed for extended treatment durations.

Since the survey was conducted, there have been changes in treatment practices in certain clinics. Notably, in the Austrian ED, there has been an increase in the utilization of electrical CV, accounting for approximately 70% of treatments, while pharmacological CV was administered in only around 20% of cases. Similarly, in the USA, there appears to be a growing preference for rhythm control. In Iceland, the involvement of cardiologists had diminished, with EPs now making approximately 90% of the treatment decisions for acute-onset AF patients in the ED. Both Finnish hospitals have seen a continuous strengthening of the role of EPs in the management of acute-onset AF patients.

It is worth noting that clinics following a rate control strategy tended to be larger on average, with patient counts of around 117,000 per year, compared to clinics that preferred either pharmacological or electrical CV, which had patient counts averaging 74,500 and 54,100 per year, respectively. However, the size of the ED was not the sole determining factor, as there were clinics with approximately 100,000 annual patient visits that emphasized either pharmacological or electrical CV.

TABLE 1. Basic information of the 12 emergency departments participating in this study.

Hospital	Country	Number of patients per year				EM as speciality
		Total ED patients	Primary care patients	Secondary and tertiary care pts	Physicians in the ED*	
Vienna General Hospital	Austria	68,000	41,000	27,000	28	No
Heilig Hartziekenhuis Mol	Belgium	17,500	2000	15,500	8	Yes
University Hospital of Leuven	Belgium	58,000	4350	53,650	35	Yes
Ziekenhuis Oost-Limburg	Belgium	53,000	7950	45,050	18	Yes
Kanta-Häme Central Hospital	Finland	44,000	15,000	29,000	24	Yes
Päijät-Häme Central Hospital	Finland	95,433	24,000	71,433	24	Yes
University Hospital of Jena	Germany	33,000	0	33,000	24	No
Prince of Wales Hospital	Hong Kong, China	145,000	40,000	105,000	31	Yes
Landspitali	Iceland	81,163	20,000	30,000	44	Yes
University Hospital of Wales	UK	120,000	36,000	84,000	44	Yes
Sentara Norfolk General Hospital	USA	70,000	7000	63,000	47	Yes
University of Massachusetts Memorial Hospital	USA	136,000	81,600	54,400	87	Yes

**In some hospitals, physicians working part-time in the ED (i.e., consultants and non-EM residents from other clinics) are not included in these numbers. ED: emergency department; EM: emergency medicine.*

TABLE 2. Specific comments on practices.

The role of different specialties	
Comment 1	"In unstable patients presenting (or brought in) with AF to the ED, the Emergency Physician will treat the patient. Sometimes, some choices they make may differ slightly from what the cardiologist would do."
Comment 2	"Cardiologists do not want ED physicians to cardiovert patients."
Comment 3	"Cardiologists still largely manage the care of cardiac patients in the ED, but EM is gradually taking over more of the service, including decisions on acute AF, rate and rhythm ctrl, sedation and cardioversion."
Comment 4	"EM does almost everything in this scenario in… —very rarely would a (general) physician or cardiologist be involved. Occasionally, an intensivist might advise on treatment in the emergency situation, but EM is the dominant specialty in our department and practice."
Comment 5	"Some five years ago, generally, internists made decisions in AF treatment and anesthesiologists gave procedural sedation. Nowadays, EPs, trainees and specialists usually give procedural sedation and in at least half of cases also take care of cardioversion and other treatment."
Treatment strategies	
Comment 6	"Start with pharma; if not successful, then electrical CV."
Comment 7	"Some insecurity about electrical CV."
Comment 8	"Processing discussed with patients. Rhythm control preferred in younger patients with severe symptoms."
Comment 9	"In younger and in symptomatic patients, usually electrical CV if there are no contraindications. After two or three cardioversions during the same year, either rate control or for younger patient's referral to a cardiologist for ablation."
Comment 10	"Problems with rhythm control: medicolegal concern for embolism, getting appropriate studies prior to CV (TTE), anamnesis about the duration".
Comment 11	"Treat and discharge. Try to avoid excess crowding."

AF: atrial fibrillation; ED: emergency department; EM: emergency medicine; CV: cardioversion; TTE: transthoracic echocardiography.

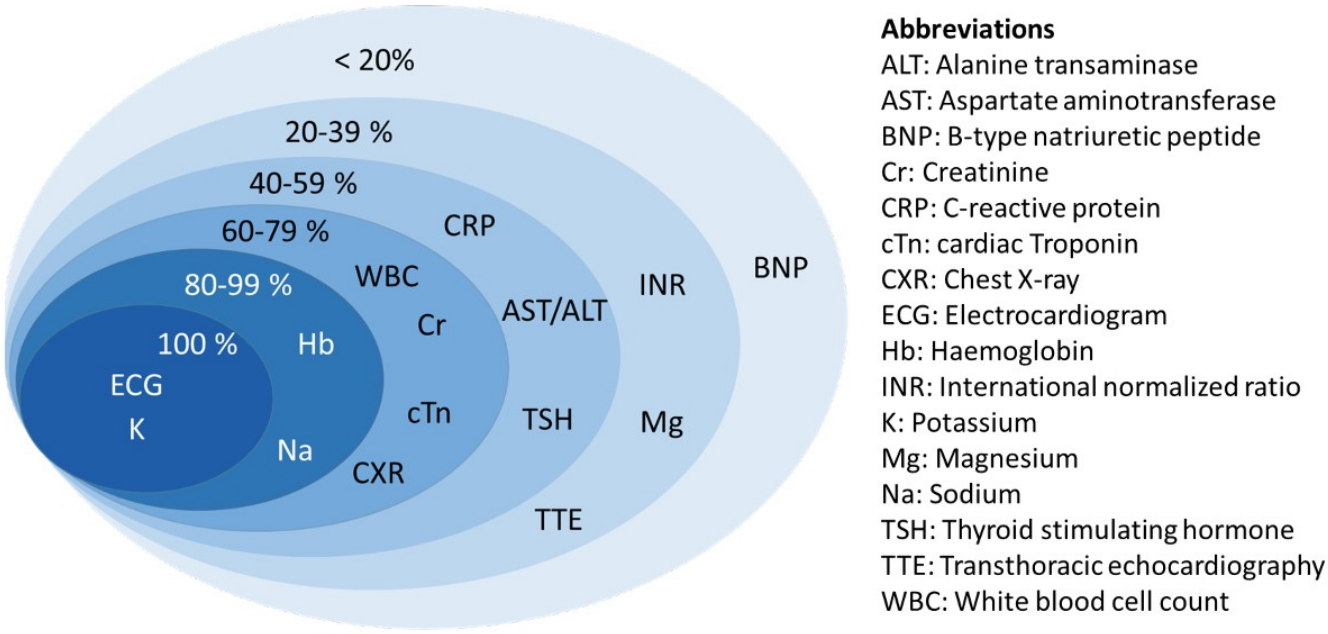

FIGURE 1. Utilization of resources: laboratory tests and imaging studies performed for acute atrial fibrillation. Percentages indicate the proportion of EDs using the test in question for almost every AF patient.

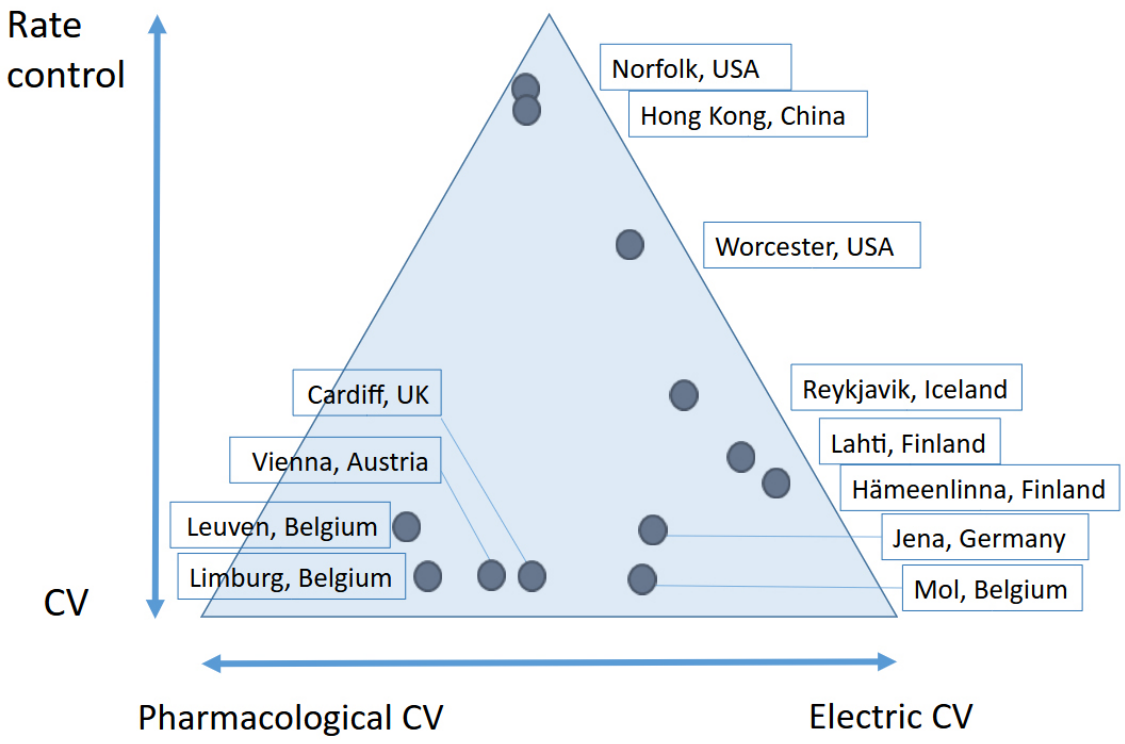

FIGURE 2. Treatment strategies implemented: proportions of rhythm versus rate control and pharmacological versus electrical cardioversion in the participating EDs. Fig. 2 shows the comparison of rate control versus rhythm control along the y-axis and pharmacological versus electrical cardioversion along the x-axis concerning the treatments administered. Abbreviations: Vienna: Vienna General Hospital, Austria; Mol: Heilig Hartziekenhuis Mol, Belgium; Leuven: University Hospital of Leuven, Belgium; Limburg: Ziekenhuis Oost-Limburg, Belgium; Hämeenlinna: Kanta-Häme Central Hospital, Finland; Lahti: Päijät-Häme Central Hospital, Finland; Jena: University Hospital of Jena, Germany; Hong Kong: Prince of Wales Hospital, Hong Kong, China; Reykjavik: Landspitali, Iceland; Cardiff: University Hospital of Wales, UK; Norfolk: Sentara Norfolk General Hospital, USA; Worcester: University of Massachusetts Memorial Hospital, USA; CV: cardioversion.

5. Discussion

The AFiB Study aimed to assess the treatment protocols for acute AF in the EDs of 12 hospitals located in Europe, China (Hong Kong), and the USA. Based on the survey results, we observed substantial variations in the protocols for managing acute-onset AF, along with disparities in the involvement of EPs. With the establishment of the EM specialty, there is a discernible gradual shift in the responsibility for treating acute AF from other specialists to EPs.

The participating EDs in this study can be broadly categorized into four groups. The first two groups represent well-established traditions in EM, either following the U.S. model or the UK model, where EPs typically take charge of decision-making and the implementation of AF treatment. The third group consists of study hospitals located in countries where the specialty of EM is in its early stages, including Iceland and Belgium, which have somewhat longer traditions in EM, as well as Finland, which has relatively less experience with EM [3]. In these EDs, patients presenting with acute-onset AF receive treatment from EPs, cardiologists and internists. Lastly, in the Austrian and German EDs that participated in the study, internists, critical care physicians and other non-EPs working full-time in the ED managed acute-onset AF. The field of EM is also evolving in Germany, as the supraspecialty of EM has gained recognition [4]. Doctors who are already specialized in areas such as family medicine, general surgery, or internal medicine may undergo further training in the ED to attain the supraspecialty of EM. As indicated by the free comments in the questionnaire and the subsequent update comments two years later, the specialty of EM in the study hospitals is continuously evolving and developing.

The resources used for managing patients with acute-onset AF varied significantly among the participating hospitals. There was considerable heterogeneity in the use of laboratory tests and imaging studies, ranging from POC tests to comprehensive laboratory panels, including TTE. Across the studied EDs, routine analysis of 12-lead ECG and potassium was standard practice. Sodium and blood counts were measured in over 80% of the EDs, while other blood tests were conducted in only a few cases. Several factors may account for these variations. Firstly, some EDs may prioritize rapid patient throughput, with supplementary tests being performed at a later stage in outpatient clinics. Secondly, in EDs where rhythm control is the primary strategy, patients with AF paroxysms may frequently visit the ED, avoiding the need for repeated extensive evaluations. However, it is important to note that the results from our sample of 12 EDs did not consistently align with these considerations. Lastly, differences in practices between countries may also contribute to variations in the extent of laboratory diagnostics conducted within EDs.

Although some smaller cohort size studies have suggested a potential association between low serum magnesium levels and AF burden, no definitive connection has been established to date [16, 17]. Based on our data, it appears that measurements of serum magnesium or natriuretic peptide, another biomarker possibly linked to AF, were infrequently conducted [18].

Hyperthyroidism and excessive alcohol consumption are commonly recognized as risk factors for AF [9]. However, our data indicates that thyroid function tests and transaminase levels were routinely assessed in only about 50% of the participating EDs. We believe that this observation may be attributed to the factors discussed above, rhythm control strategy and use of outpatient clinics.

As part of the treatment for new-onset AF, it is important to identify potential underlying conditions that may trigger AF episodes [9]. High-sensitivity cardiac troponin (cTn) serves as a marker for myocardial cell damage, and an increase in circulating high-sensitivity cardiac troponin T (hs-cTnT) has been linked to an elevated risk of incident AF [19]. Conversely, AF patients who experience myocardial injury tend to have a poorer prognosis compared to those without such injury [20]. In our study, cTn was routinely analyzed in over half of the participating EDs.

Chest X-rays are often performed to identify potential signs of congestive heart failure before CV. In our study, chest X-rays were requested for most patients in two-thirds of the participating EDs. TTE was performed on an average of one-third of patients, with variability across EDs ranging from zero to every patient presenting with acute-onset AF. Notably, TTE was most frequently utilized in the Austrian ED, as well as in one American ED and one Belgian ED. It is worth highlighting that in certain EDs, TTE was employed as an alternative to chest X-rays for assessing both the structure of the heart and pulmonary congestion. It is recommended to include TTE in the initial workup for all AF patients [9]. According to a recent nationwide study conducted in Finland, two-thirds of EPs routinely performed TTE in their daily clinical practice [21].

There were significant variations in treatment approaches for patients presenting with acute-onset AF. Notably, rate control was mostly favored in hospitals located in the USA and Hong Kong, which aligns with findings from previous research. A survey detailing treatment protocols for acute-onset AF indicated that EPs initially opted for rate control in the following proportions: 94% in the USA, 71% in Canada, 61% in Australia, and 43% in the UK during the 2000s [22]. In another study conducted as an online survey in 2012, EPs and cardiologists in the USA preferred rate control strategy in 80% to 89% of new-onset AF cases [23].

Physicians in the European EDs tended to favor a rhythm control strategy. Among these, electrical CV was the preferred technique in one of the Belgian hospitals, in Germany, Iceland, and Finland. Conversely, the other European EDs included in the study preferred pharmacological CV as their initial approach. Comparable findings were reported in a Canadian study from 2008, which assessed eight major academic hospitals. In that study, CV was attempted in 59% of patients, with a primary focus on pharmacological CV in 56% of cases [24].

We also assessed the treatment strategies in EDs based on their patient volumes to investigate potential associations. While there was a tendency for larger clinics for rhythm control, the results were mixed, and thus, no definitive conclusion can be drawn.

Recent studies have indicated that a significant proportion of patients with acute AF spontaneously revert to sinus rhythm. A delayed CV strategy has been suggested as non-inferior to

early CV in achieving sinus rhythm, although some studies have linked it to increased resource utilization and instances of acute heart failure [25, 26]. Interestingly, in the EDs studied in this research, irrespective of the chosen treatment approach (rhythm or rate control), patients with acute AF typically spent three to eight hours in the ED. Delayed CV did not appear to be the preferred approach in these EDs.

The variations in treatment approaches between the USA, Hong Kong and Europe might be attributed to well-established traditions, especially when different options align with scientific evidence [9, 27]. Additionally, medicolegal considerations may also exert an influence on these treatment decisions.

6. Strengths and limitations

The strength of this study lies in the representation of EDs from four distinct approaches within the specialty of EM: the USA and the UK with well-established yet distinct EM approaches, countries where the specialty is still emerging, and those without EM. Notably, we observed that treatment choices were generally independent of the historical context of EM. Given the limited number of EDs included in the study, we were able to provide insights into the opinions and attitudes of the specialists guiding treatment practices for acute-onset AF.

However, there are certain limitations to consider. Our results are derived from a survey focused on EDs rather than an extensive study involving numerous individual patients. Furthermore, the nature of this study is descriptive, involving only 12 EDs, and therefore, the findings cannot be generalized to the whole country where the EDs were located. The questionnaire was primarily completed by the heads of the respective clinics, with one exception being a senior physician, potentially introducing bias. On the positive side, the responses from each ED were based on administrative and other statistical data, enhancing their objectivity. As a result, this study does not determine the optimal approach to treating acute-onset AF or the specific specialties that should be represented in the ED. Additionally, it does not establish whether different treatment practices have an impact on resource allocation in hospitals or the post-treatment clinical care of AF patients. Despite these limitations, our findings contribute new insights to existing data [5, 15, 22, 23].

7. Conclusions

The results of this AFiB Study highlight the differences both in the role of EPs and in the treatment strategies for acute-onset AF between EDs in different parts of the world, especially in Europe. Since EM is a rapidly developing medical specialty worldwide, the role of EPs is becoming increasingly important in the management of acute-onset AF. Thus, this trend could reduce the necessity for consultations, resulting in time and resource savings.

8. Key messages

The role of emergency physicians is becoming increasingly important in the management of acute atrial fibrillation.

The AFiB Study highlights the differences in the treatment strategies for acute-onset AF between EDs in different parts of the world, especially in Europe.

ABBREVIATIONS

ACC, American College of Cardiology; AF, Atrial Fibrillation; AFiB Study, Atrial Fibrillation Background Study; AHA, American Heart Association; CCU, Cardiac care unit; cTn, Cardiac Troponin; CV, Cardioversion; ECG, Electrocardiography; ED, Emergency Department; EM, Emergency Medicine; EP, Emergency Physician; ESC, European Society of Cardiology; HRS, Heart Rhythm Society; POC, Point-of-care; TTE, Transthoracic echocardiography; UK, United Kingdom of Great Britain and Northern Ireland; US/USA, United States of America.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

MH, VH and AP—together designed and drafted the study, which was based on AP's original idea. MH and VH—performed data acquisition and analysis. HMB, THR, CAG, MBS, WB, GG, HD, HP, BML, CL and PV—were responsible for data acquisition in their respective EDs and revised the draft critically for important intellectual content. All authors approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Our study is a non-experimental descriptive survey concerning treatment practices of acute atrial fibrillation in EDs. We do not report any experiments on humans. Only the authors of the AFiB study participated in the survey and returning a completed questionnaire was taken as informed consent to participate. All methods were carried out in accordance with relevant guidelines and regulations. Because no individual patients or their health records were involved, the approval for the study was waived by the Regional Ethics Committee of the Expert Responsibility area of Tampere University Hospital.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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