Original Article

Streamlining Atrial Fibrillation Care: Building a Comprehensive Program to Provide High-Quality, Individualized Care

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ABSTRACT

Atrial fibrillation is the most common sustained arrhythmia with a variable presentation ranging from asymptomatic incidental diagnosis by physical examination or electrocardiogram screening, to severely symptomatic requiring emergent treatment. The variation in care represents an opportunity to build a comprehensive center of excellence within a hospital system. We present our experience building the Swedish Comprehensive AFib Network and a dedicated AFib clinic at a large quaternary urban medical center. We focused on patient and referral engagement, standardized protocols to promote best practices, data collection to improve quality of care, and broad evaluation of a single but multidisciplinary disease process. We hope this can offer insight into how other programs can be started for atrial fibrillation or other disease-focused clinics. We report our experience in the first 2 years, having evaluated over 700 new patients, and demonstrated an improvement in the rate of anticoagulation usage and a reduction in hospitalizations among patients included in our program.

Keywords: atrial fibrillation and flutter, stroke prevention, risk factor reduction, program coordination, referral streamlining

Introduction

Atrial fibrillation and its related arrhythmia, atrial flutter (denoted together as AF in this document) are the most common sustained arrhythmias. AF is estimated to affect 12 million people in the United States by 2030.[1,2] There are nearly half a million annual hospitalizations with AF as the primary diagnosis in the United States.[3]

AF is a complex condition where the initial point-of-contact ranges from medical office to emergency department (ED) to inpatient hospital. This leads to variability in the evaluation and management of AF by providers, physicians, and caregivers with differing levels of expertise, interest, and available time. A new diagnosis of AF carries significant implications and can lead to anxiety for patients and families. The initial consultation requires nuanced discussion about stroke risk and mitigation, medications and/

or procedural treatment options, and evaluation for risk factors or etiologies. This is challenging to accomplish in a limited time.

In our experience, patients with AF often do not have a "home" to manage their disease and associated comorbidities. Patients can have many providers managing parts of AF. This can include primary care managing comorbid conditions such as hypertension and diabetes, sleep medicine managing sleep apnea, general cardiology coordinating rate or rhythm control and anticoagulation, electrophysiology if needed for ablation, proceduralist (both electrophysiology and structural heart) if needed for left atrial appendage occlusion, and emergency medicine physicians for acute management. Each of these providers might contact another provider involved in managing a specific aspect of the patient's care, but oftentimes, there is not a central point of contact.

To address some of these concerns, many programs have invested in creating specialty clinics that focus on comprehensive care coordination. Some published examples include specialty care models for human immunodeficiency virus,[4] nonalcoholic fatty liver disease,[5] genetic diseases,[6] and children with chronic respiratory failure.[7] These clinics are often highly organized and committed to access, improving outcomes, and navigating care transitions.

Our institution is a large urban American healthcare system. We queried our electronic medical record (EMR) system from July 2021 to June 2023 and found AF was the 11th most common inpatient primary diagnosis, fifth most common outpatient primary diagnosis, and 11th most common ED primary diagnosis. We had a clear opportunity to enhance care for a significant population.

To improve standard of care in AF management, in alignment with rapidly changing clinical practice guidelines including American guidelines from 2019[8] and European guidelines from 2020,[9] we created the Swedish Comprehensive AFib Network (SCAN) and a dedicated AFib Clinic within our cardiology division to treat patients, streamline referrals, create protocols, and provide education to our referral base and medical community. Our aim was to become a regional expert referral center with a clinical focus on AF management.

Methods

Our mission is to create a state-of-the-art evidence-based center of excellence for the evaluation and treatment of atrial fibrillation in a large quaternary care medical system, with a focus on comprehensive risk factor reduction, stroke prevention, alleviation of symptoms, and improvement in outcomes. Our goal was to reduce major adverse events, such as ED visits, hospitalizations, strokes, and mortality. The focus of the clinic is expedited outpatient evaluation of new patients with AF referred by primary care providers, ED, and hospital-based providers. We set a target of 1 week for hospital and ED follow-up and 2 weeks for outpatient referrals from primary care.

We received funding and administrative support to build a team to conduct this mission, with our clinic launching in July 2021. Funding was primarily to support a database administrator and registered nurse (RN) program coordinator, along with administrative support for physician leaders. Institutional Review Board approval was not required. Our program is led by a general cardiologist, an electrophysiologist, and RN program coordinator. In addition, we have a dedicated registered nurse, medical assistant, and patient care coordinator/scheduler. Our clinic is staffed by four general cardiologists who each spend one half day per week in the Swedish AFib Clinic, along with one APC who has five half-day clinics per week.

First, we needed patients. We worked closely with referral coordinators to outline appropriate patients for referral to SCAN. Our RN program coordinator reviewed charts to confirm appropriateness and triage as needed. For example, patients with significant non-AF cardiac disease requiring other services were directed to the relevant specialists, ie, someone with severe mitral regurgitation who developed AF as a complication would be more appropriate for a valve clinic with target toward mitral valve intervention. We scheduled patients quickly to minimize the loss during the referral process, with a goal to consult on new patients within one to 2 weeks of referral.

Second, we promoted clinical excellence and standardized pathways. To facilitate and expedite care in the ED, we developed protocols for acute management of AF including anticoagulation, rate and rhythm control such as acute cardioversion, medication dosing and timing, and postdischarge referrals. Virtual and in-person educational seminars were held with physicians and caregivers in our affiliated network of primary care clinics. Protocols were created for the outpatient setting including starting rate control and anticoagulation therapy as well as parameters for escalation to higher level of care or referral to our program. We established guidelines for outpatient initiation of antiarrhythmic therapy (sotalol) based on electrophysiology and cardiology expertise as well as review of literature and best practices. This supplemented the existing protocol for inpatient initiation of dofetilide. Other best practices such as amiodarone screening and surveillance for toxicities were introduced. Patients were rapidly referred to electrophysiology for catheter ablation consideration if needed. We are a high-volume center for atrial fibrillation ablations and enjoy a high level of collaboration with our electrophysiologists.

Third, we focused on data collection and quality improvement. To ensure completeness of data collection and promote guideline-directed management of AF, we created EMR templates specific to our clinic to capture core metrics for structured reporting among our clinicians. The templates were also shared among cardiology clinicians to encourage adoption. These included the initial date of AF diagnosis (as best known) and correct labeling of the type of AF (paroxysmal, persistent, longstanding persistent, or permanent) to avoid confusing terminology such as chronic AF. All patients were risk stratified with the CHA_2DS_2-VASc score[10] to assess whether anticoagulation was indicated for stroke prophylaxis, and if not, reasons why. We also documented and recorded left atrial volume by transthoracic echocardiography, body mass index (BMI), and STOP-BANG score[11] for sleep apnea

assessment. If unknown at the initial visit, these data points were updated as the workup proceeded. We met monthly to review our metrics and data trends to identify ways to improve care, such as improving compliance with anticoagulation for those patients where it is indicated.

Fourth, we embraced comprehensive evaluation, which is the cornerstone of our patient-facing program. We reviewed with patients all facets of AF management, whether that is risk factor modification, stroke prevention, or alleviation or symptoms. Risk factor modification is a central component of AF treatment. The value of diet, exercise, weight management, blood pressure control, glucose control, and treatment of sleep apnea in improving outcomes from AF is well substantiated. We collaborate with our sleep medicine and weight management colleagues to identify and screen patients for referral and expedited evaluation. Generally, we encouraged patients to consult with the weight management clinic if BMI was 35 or more, which was a significant proportion of our patients (see **Supplemental Digital Content 1, Weight Management**, http://links.lww.com/JHQ/A228). We were diligent about sleep apnea screening given its importance in AF and frequently referred patients for sleep medicine consultation (see **Supplemental Digital Content 2, Sleep Medicine**, http://links.lww.com/JHQ/A229). Many patients screened positive for suspected sleep apnea based on our data despite having no prior knowledge of sleep-related disorders.

A central focus of the program was anticoagulation and stroke prevention. Addressing these issues has been a goal of our educational outreach. Many patients are not on appropriate anticoagulation or stroke mitigation strategies even when they have a high risk for stroke. When clinically appropriate, patients are referred for percutaneous or surgical left atrial appendage occlusion (LAAC) procedures. Many LAAC referrals into our hospital system come directly to the implanting physicians, but for those that do not, the SCAN program serves as a central contact point for patient inquiries and physician referrals to assess appropriateness.

Results

In the first 2 years since launching our clinic in July 2021, we evaluated 706 new patients and conducted over 1,600 appointments, including telemedicine. We compared AF patients managed in our SCAN clinic with AF patients managed in our cardiology practice ("cardiology clinic") and with AF patients managed in noncardiology settings, primarily Primary Care ("general clinic"). While the overall AF patient population tends to be older with common cardiovascular comorbidities (Table 1, AFib Patient Characteristics), SCAN captured patients early in the AF disease process, who were, on average, younger with less comorbidities, and predominantly paroxysmal AF (see **Supplemental Digital Content 3, AF Type**, http://links.lww.com/JHQ/A230).

Patients newly diagnosed with AF often have multiple medical encounters, as they navigate the new disease. We tracked 180-day outcomes among patients newly diagnosed with AF. We have not yet demonstrated a reduction in stroke, mortality, or ED visits (Figure 1, Outcomes). Patients in our program had fewer hospitalizations compared with those seen in the cardiology clinic.

With our focus on stroke prevention, primarily through the use of oral anticoagulation (OAC) or LAAC when appropriate, SCAN patients had a higher rate of OAC use compared with those seen elsewhere. (Figure 2, OAC Rate).

The Swedish AFib Clinic opened its doors in 2021 and was not immune to the staffing challenges found throughout health care. Owing to the early success of the program, our initial staffing level quickly proved inadequate to meet our goal time frame for accommodating patients. At its inception, the clinic was staffed with two physicians (each 0.5 days/week in Swedish AFib Clinic) and one advanced practice clinician (APC) (2.5 days/week) providing a total of 3.5 clinic days/week. As our program grew, we tracked data and convinced leadership to add two additional cardiologists, each 0.5 days/week to our clinic in September 2022, thus allowing us to capture higher volume again (see **Supplemental Digital Content 4, Volumes By Month**, http://links.lww.com/JHQ/A231). This directly led to the reduction in our median time of referral to new appointment in the third quarter of 2022 (Table 2, Referral-to-Visit). We are proud of our short median referral to appointment time of 11 days (8 from ED and 15 from primary care).

Limitations

Many follow-up items in the EMR must be entered manually and followed up individually. After a new patient visit, there are typically tasks for the patient to complete including laboratory work, ambulatory

## Table 1. Comparison of AFib Characteristics Between SCAN and Non-SCAN Patients

	General clinic	Cardiology clinic	SCAN clinic
Number of patients	2,977	3,350	706
Average age[a]	74.3	72.5	66.8
Average body mass index[a]	29.8	29.0	29.8
Average CHADS-VASc score[a]	3.34	3.20	2.61
Male, %[a]	53.6	57.3	58.2
Congestive heart failure, %[a]	25.4	25.9	9.9
Hypertension, %	54.2	57.1	56.2
Diabetes, %[a]	12.8	10.3	15.6
Stroke or thromboembolism, %[a]	15.4	11.5	14.0
Vascular disease, %[a]	31.0	36.2	14.0
Obstructive sleep apnea, %[a]	17.8	18.1	25.8
On anticoagulation, %[a]	69.8	84.8	88.8

AF patient characteristics, July 2019 to July 2023.
[a] Difference between cohorts is statistically significant, $p < .05$.
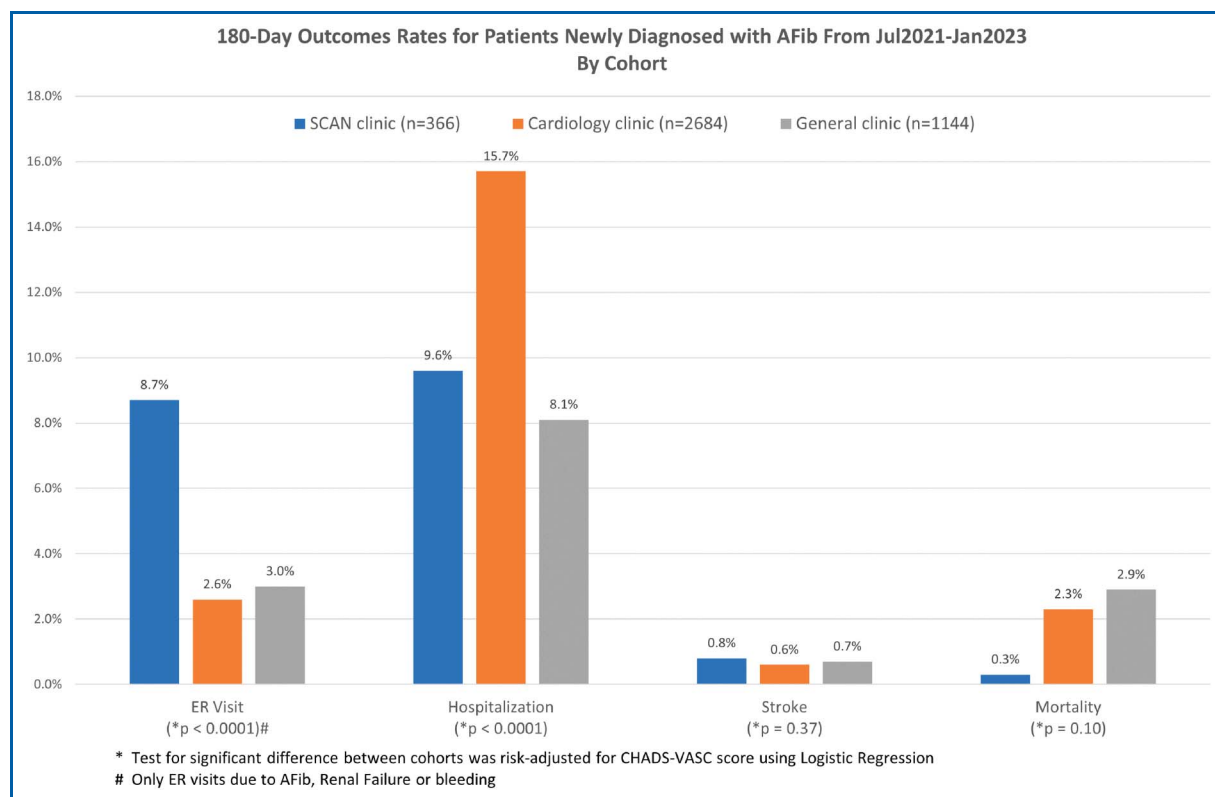
Figure 1. 180-Day outcome rates for patients newly diagnosed with AFib. AFib, atrial fibrillation; ER, emergency room; SCAN, Swedish Comprehensive AFib Network.
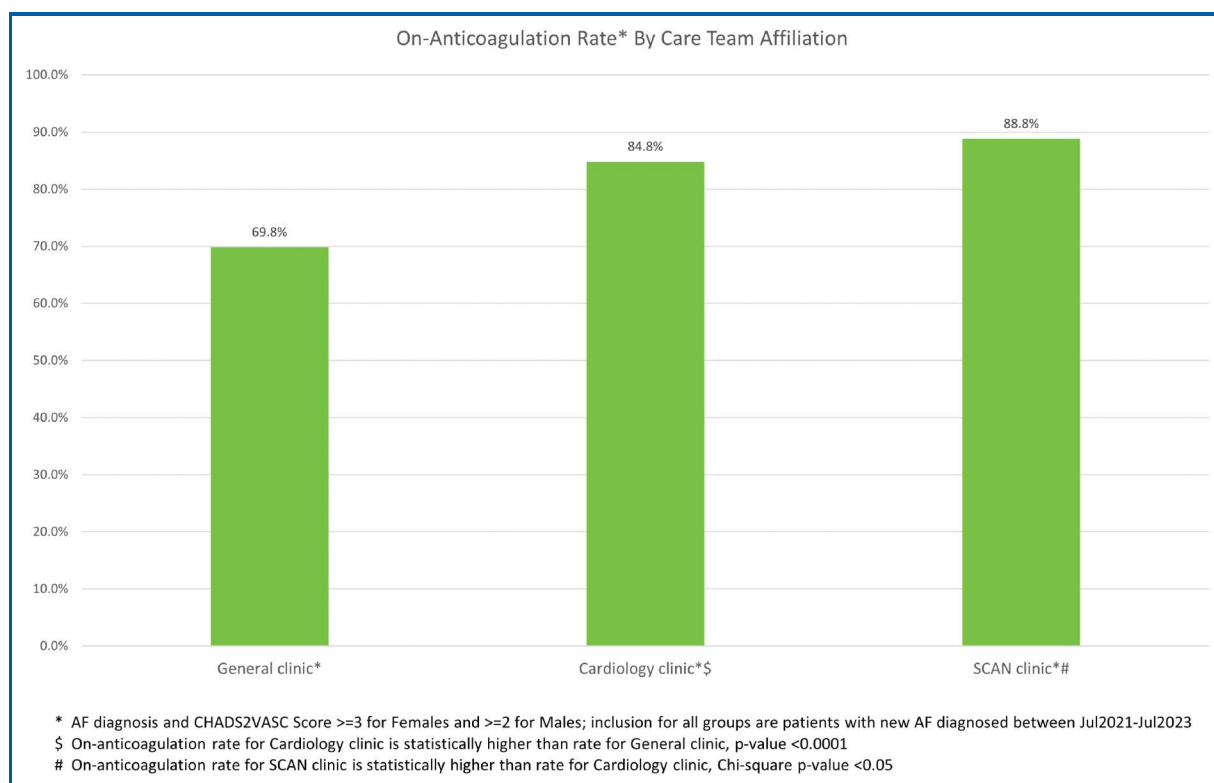
Figure 2. Anticoagulation rates among SCAN and non-SCAN patients. SCAN, Swedish Comprehensive AFib Network.

electrocardiogram monitoring, diagnostic imaging, and/or evaluation by other subspecialties. A lot of time and labor is spent on ensuring patients started on antiarrhythmic or anticoagulation therapy is tracked properly. We worked on pulling reports from the EMR to assist with detailed tracking. Efforts are underway to identify if artificial intelligence tools can be used.

For clinicians accustomed to patient care only, opening a focused program within a large established healthcare system was more complex than anticipated.

Coordination with Information Services and Human Resources was a necessary but time-consuming process, along with the complexity and frustration of "creating" a new clinic within the EMR templates.

Discussion

We present our experience identifying a very common diagnosis among a medically complex population and building a center of excellence streamlining and improving care. This population is typically

Table 2. Trends in Timing Between Referral to Appointment										
	Overall	**2021 Q3**	**2021 Q4**	**2022 Q1**	**2022 Q2**	**2022 Q3**	**2022 Q4**	**2023 Q1**	**2023 Q2**	**2023 Q3**
Overall	11	7	13	9	17	22	13	8	9	5
Referrals from emergency department	8	5	8	6	10	12	11	7	5	5
Referrals from primary care	15	8	21	10	23	26	19	6	13	17
Monday to Friday only.										

elderly with significant cardiovascular and noncardiovascular comorbidities, sometimes uncovered during the workup of their AF. Rather than focusing on a singular aspect of AF care, our approach emphasized a comprehensive evaluation of risk factors, emphasizing that modifying and reducing risk factors improves AF outcomes.

Many of our patients were referred for sleep apnea screening and weight loss management, in accordance with clinical practice guidelines that recommend aggressive treatment in patients with AF. Anticoagulation therapy is a cornerstone of stroke prevention in AF, and our program showed high rates of anticoagulation prescription compared with our general cardiology and primary care practices.

We have shown a significant reduction in hospitalizations in the first 180 days after enrollment in our program, highlighting cost reduction and improvement in patient experience with less time in the hospital. We suspect the reason for decreased hospitalizations is partially due to having a centralized base with frequent communication between patients, clinicians, and nurses to ensure patients can quickly titrate treatment plans to prevent hospitalizations.

Initially, our referral pathways targeted physician to clinic referrals, but in response to direct patient interest, a self-referral pathway on the public-facing webpage was created for patients to request a consult by submitting an online form. We anticipate this will emerge as a strong source of referrals as more patients engage with online sources.

While the clinic was envisioned to manage just AF care, not infrequently, other cardiac conditions were identified during the workup (for example, valve disease or cardiomyopathies on echocardiogram, coronary atherosclerosis on coronary artery calcium scans or cross-sectional imaging). When appropriate, patients were transitioned to other clinics if they needed ongoing management for coronary artery disease, heart failure, valvular disease, etc. This also allowed for the APC to escalate care of a patient if management of the other conditions was outside of their scope of practice. The integration of our specialty clinic within the larger multidisciplinary cardiology division allows for seamless transitions and access to subspecialists.

Conclusions

Atrial fibrillation is a common, but complex, disease requiring multifaceted care. Coordinated care and creating a medical "home base" has the potential to improve patient outcomes. For many patients with newly diagnosed AF, this is their first touch point with the medical system. There is benefit in creating and sustaining a team-based comprehensive program for AF care. Areas of focus include triaging appropriate referrals, rapid access from diagnosis to consultation, standardizing care pathways, data collection for quality improvement, and, perhaps most importantly, helping patients navigate a convoluted healthcare system. We demonstrate high use of oral anticoagulants for stroke prevention and a reduction in hospitalizations in the first 180 days after AF diagnosis in patients enrolled in our program.

Implications

Atrial fibrillation care can be enhanced through a team-based collaborative approach. We present our experience building an AF center of excellence within our health system focused on access, best practices, quality improvement, and comprehensive evaluation. Integrated care models of delivery focused on single disease processes can improve patient outcomes and streamline care.

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