Treating the right patient at the right time: An innovative approach to the management of atrial fibrillation

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The Canadian Cardiovascular Society Access to Care Working Group recently published a series of commentaries on access to cardiovascular care in Canada. These commentaries included proposed minimally acceptable wait times for patients with atrial fibrillation (AF) to be assessed by a cardiologist or an electrophysiologist. To improve access to medical care for the patient with AF, a nurse clinician-based AF clinic was established in the Calgary Health Region (Alberta) in 2005. More than 330 patients had been referred at the time of writing. The time from referral to initial nurse assessment was 38 ± 31 days, to physician review and establishment of a management plan was 66 ± 49 days and to in-person specialist physician assessment was 80 ± 55 days. These wait times are markedly shorter than historical wait times to see an arrhythmia specialist in the Calgary Region. As experience increased, wait times continued to shorten significantly. Preliminary data suggest that early assessment and patient education may reduce emergency department visits and hospitalizations for AF. This experience suggests that a nurse clinician-based AF clinic may provide earlier access to medical care and may improve health outcomes in the long term.

Key Words: Access to care; Atrial fibrillation

Atrial fibrillation (AF) is the most common sustained arrhythmia and is associated with substantial morbidity and mortality (1). The prevalence of AF increases with age, ranging from 0.4% to 1% in the general population, and increasing to 8% in people older than 80 years of age (1,2). Indeed, the lifetime risk of developing AF in individuals older than 40 years of age is one in four (3). In the past decade, the number of patients with AF who are 50 to 65 years of age has increased dramatically, reflecting the aging of the 'baby boomers'. Furthermore, the demand on health care use for the management of individuals with AF is likely to increase dramatically over the next 20 to 30 years as this segment of the population continues to age. In August 2006, the Canadian Cardiovascular Society (CCS) Access to Care Working Group published medically acceptable wait times for outpatient assessment and noninvasive investigations by a cardiologist for a patient with AF of no longer than six weeks (4). In July 2006, the CCS Access to Care Working Group and the Canadian Heart Rhythm Society published medically acceptable wait times for outpatient assessment and noninvasive investigations of a patient with AF of no longer than four to 12 weeks, depending on the urgency of the need for consultation (5). Although there are no country-wide data, these medically acceptable wait times are probably not being met anywhere in Canada at present. More cardiologists and heart rhythm specialists are required to meet this need, but innovative approaches to the assessment, investigation and management of patients with AF are also clearly needed.

Traiter le bon patient au bon moment : Une approche novatrice de la prise en charge de la fibrillation auriculaire

Le groupe de travail de l'accès aux soins de la Société canadienne de cardiologie a récemment publié une série de commentaires sur l'accès aux soins cardiovasculaires au Canada. Ces commentaires incluaient des propositions sur les temps d'attente minimaux acceptables pour les patients atteints de fibrillation auriculaire (FA) devant être évalués par un cardiologue ou un électrophysiologiste. Afin d'améliorer l'accès aux soins médicaux du patient atteint de FA, une clinique de FA d'infirmières cliniciennes a été mise sur pied en 2005, dans la région sanitaire de Calgary, en Alberta. Plus de 330 patients y avaient été aiguillés au moment d'écrire ces lignes. Le délai entre l'aiguillage et la première évaluation par une infirmière était de 38 ± 31 jours, entre l'analyse par le médecin et un plan de prise en charge, de 66 ± 49 jours, puis jusqu'à l'évaluation en personne par un médecin spécialiste, de 80 ± 55 jours. Ces temps d'attente étaient considérablement plus courts que les temps d'attente habituels avant de voir un spécialiste de l'arythmie dans la région de Calgary. Avec l'expérience, les temps d'attente continuent de diminuer de manière significative. Selon les données préliminaires, l'évaluation précoce et l'évaluation des patients peuvent réduire le nombre de consultations au département d'urgence et les hospitalisations en raison de la FA. D'après cette expérience, une clinique de FA d'infirmières cliniciennes peut assurer un accès plus rapide aux soins médicaux et améliorer les issues de santé à long terme.

In August 2004, the Department of Medicine and Division of Cardiology of the Department of Cardiac Sciences in the Calgary Health Region/University of Calgary (Calgary, Alberta) entered into an alternative reimbursement plan with Alberta Health and Wellness. As part of this agreement, funds were allocated for innovation projects aimed at reducing access times for medical care and standardizing clinical care based on current scientific knowledge and practice guidelines. Funding was provided for the establishment of an AF clinic as a demonstration project within this program. The model of the Calgary Health Region AF clinic was based on well-established models of nurse clinician-based pacemaker and implantable defibrillator clinics in our institutions that use care maps under supervision by cardiologists or electrophysiologists, but with direct physician involvement only as required; AF practice guidelines based on the CCS Consensus Conference on AF and approved by the Division of Cardiology in the Calgary Health Region; an interactive team of internists, cardiologists, electrophysiologists, nurse clinicians, an administrative assistant and a pharmacist, with the support of a referral community of family practitioners (urban and nonurban), emergency room physicians, internists (urban and nonurban) and community cardiologists, as well as the anticoagulation clinic in the Calgary Health Region.

AF clinic process

The referral and assessment management approach is summarized in Figure 1. Patients must be referred by a physician who agrees to provide

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Figure 1 Flow chart of atrial fibrillation clinic referral and patient assessment and management process

ongoing care. Referrals are accepted from emergency room physicians; in this case, the clinic staff facilitate finding a family physician to provide ongoing care if the referred patient did not have a family physician at the time. Each patient is assigned to a primary nurse clinician. Details regarding the characteristics of AF (including electrocardiogram documentation of AF), current and past treatments for AF, history and investigations for the presence of underlying structural heart disease, and other significant comorbidities are obtained and reviewed by clinic staff. Telephone contact with the patient is initiated as soon as possible by the nurse clinician, and the CCS symptomatic AF scale (6) and the CHADS₂ risk of stroke (Congestive Heart failure, hypertension, Age ≥ 75 years, Diabetes, and prior Stroke) (7) are determined. Patients are invited to attend an introductory group education class on AF presented by the nurse clinicians. The patient's clinical profile is reviewed by the nurse clinician with one of the AF clinic physicians (an electrophysiologist or internist). Additional investigations may be ordered and reviewed. A treatment plan is then formulated. Face-to-face clinic visits with the nurse clinician and a clinic physician are arranged when the plan involves issues beyond the scope of practice of the primary care physician (for example, discussions about antiarrhythmic drug therapy, cardioversion, pacemaker or ablation procedures). However, in many instances, a treatment plan is developed and communicated to the referring physician for implementation without an actual patient visit to the clinic. Follow-up is arranged by the primary AF clinic nurse clinician to assess the efficacy of the treatment plan and patient satisfaction with the outcome. Additional interventions may be recommended or the treatment plan may be changed, depending on patient outcomes. When an effective and acceptable therapeutic strategy is in place, and if no further intervention is required, the patient is discharged from the clinic and returned for ongoing care to the follow-up physician.

AF clinic developmental chronology and activities

The first nurse clinician was hired in August 2005. The initial priority was to develop policies and procedures for the AF clinic and train the nurse clinician. The nurse clinician initially participated in AF patient assessments with the participating electrophysiologists. The nurse clinician then began contacting patients and reviewing histories before the assessment by the physician. A second nurse clinician and administrative assistant were hired in March 2006. At this time, the activities of the AF clinic were widely advertised, and referrals from the emergency room and medical community at large were invited. Since the initiation of the AF clinic, more than 330 patients have been referred for assessment. Patient demographics of the first 264 patients are shown in Table 1. The characteristics of AF and risk for stroke are summarized in Table 2. Patients referred were younger

TABLE 1
Characteristics of atrial fibrillation clinic patients

Patients, n	264
Age, years (mean $\pm$ SD)	63 $\pm$ 13
Male sex, n (%)	158 (60)
Cardiac conditions, n (%)	
No structural heart disease	71 (27)
Coronary artery disease	36 (14)
Hypertension	127 (48)
Nonischemic cardiomyopathy	7 (3)
Hypertrophic cardiomyopathy	3 (1)
Valve disease	17 (6)
Pulmonary hypertension	12 (5)
Atrial or ventricular septal defect	4 (2)
Transient ischemic attack/stroke	12 (5)
Other	54 (20)
Other medical conditions, n (%)	
None	100 (38)
Diabetes	35 (13)
Thyroid disease	36 (14)
Sleep apnea/snoring	43 (16)
Pulmonary disease	15 (6)
Other	68 (26)

than the average age of a patient with AF, likely reflecting that this group is more symptomatic and more likely to be considered for specific therapies such as novel drug therapies or ablation procedures.

Initially, most patient assessments were conducted by the AF clinic's nurse clinician and physician, with direct patient contact. The average physician contact time with each patient was approximately 15 min. However, as experience increased, more and more patients were being managed by a nurse or by physician review of patient data, resulting in a patient management plan being sent to the referring physician for implementation. Subsequent follow-up and management plan changes were implemented by the AF clinic staff as required.

Patient access times: The number of referrals to the AF clinic since it became fully operational in mid-2006 has ranged from 20 to 40 per month. The majority of patients referred are from Calgary (64%), while 29% are from nonurban southern Alberta and 7% are from out of province. The distribution of wait times for initial nurse clinician review, initial physician review and initial nurse or physician clinic review are shown in Figure 2. The nurse clinicians were able to make initial contact with 59% of patients within six weeks of referral and with 95% of patients within 12 weeks of referral. Delays in initial contact with the patient were usually related to incomplete contact information provided in the referral process, the patient being away for a prolonged period or the lack of an answering machine at home. Of patients managed at the outset by a nurse or physician review with recommendations transmitted to the referring physician, 32% were reviewed within six weeks of referral and 77% were reviewed within 12 weeks of referral. Of patients managed initially by an AF nurse or physician clinic visit, 26% were assessed within six weeks of referral and 66% were assessed within 12 weeks of referral. The average wait time for an initial assessment in the AF clinic in the past year was 38 $\pm$ 31 days. The average wait time for physician review and establishment of a management plan was 66 $\pm$ 49 days, and for in-person physician assessment at the clinic, when necessary, was 80 $\pm$ 55 days. This last wait time compared very favourably with an average wait time for a patient with AF referred to the cardiac arrhythmia clinic to be seen by an electrophysiologist in the year preceding the establishment of the AF clinic, which was 221 $\pm$ 174 days ($P < 0.0001$) (Figure 3).

More recently, the time to first physician review of the patient (63 $\pm$ 38 days) or first direct clinic visit with a physician (69 $\pm$ 43 days) has shortened compared with access times for the first 50 patients assessed in

TABLE 2
Characteristics of atrial fibrillation and stroke risk

First episode, n (%)	45 (17)
Recurrent, paroxysmal, n (%)	177 (44)
Recurrent, persistent, n (%)	70 (27)
Permanent, n (%)	3 (1)
Atrial flutter/tachycardia, n (%)	29 (11)
Atrial fibrillation triggers, n (%)	
None	164 (62)
Alcohol	26 (10)
Caffeine	25 (9)
Exercise	26 (10)
Sleep	13 (5)
Fatigue	42 (16)
Stress	35 (13)
Vagal	1 (0)
Other	23 (9)
Symptom scores, n (%)	
CCS SAF 0	25 (9)
CCS SAF 1	71 (27)
CCS SAF 2	55 (21)
CCS SAF 3	34 (13)
CCS SAF 4	5 (2)
CCS SAF not available	74 (28)
Stroke risk scores, n (%)	
CHADS ₂ 0	54 (20)
CHADS ₂ 1	80 (30)
CHADS ₂ 2	40 (15)
CHADS ₂ 3	16 (6)
CHADS ₂ 4–6	4 (2)
CHADS ₂ not available	70 (27)

CCS SAF Canadian Cardiovascular Society severity of atrial fibrillation; CHADS₂ Congestive Heart failure, hypertension, Age ≥75 years, Diabetes, and Prior Stroke

the AF clinic in 2005 (111±113 days and 108±72 days, respectively; $P \leq 0.007$). Changes in the distribution of wait times for initial nurse clinician review, initial physician review and initial nurse or physician clinic review over time are shown in Figure 4. With increased experience, the percentage of patients who waited more than 12 weeks for physician-guided management of AF decreased from 40% to 24%.

AF clinic capacity: Within the past six months, an average of 24 new patients per month were assessed and management plans were prescribed. In addition, an average of 146 patient follow-up visits per month were conducted. At present, 30% of the nurse clinician time is spent on communication with referring physicians and patient education.

Impact on emergency department visits: A preliminary evaluation of the impact of the AF clinic on emergency department visits and hospitalizations for a primary diagnosis of AF or atrial flutter was performed. Of 68 patients residing in Calgary who were managed at the AF clinic between spring 2005 and July 2006, the number of emergency department visits and hospitalizations for a primary diagnosis of AF or atrial flutter were determined from health records for the six months before and six months after the patient's first contact with the AF clinic. In the six months before contact with the AF clinic, 22 of these 68 patients had visited an emergency department on 39 occasions for management of AF. In the six months following contact by the AF clinic, four patients had visited an emergency department six times for the management of AF (an 82% reduction). In the six months before contact with the AF clinic, seven of these 68 patients had been admitted to hospital on nine occasions for the management of AF. In the six months following contact by the AF clinic four patients had been admitted to hospital on four occasions for the management of AF (a 56% reduction).

Figure 2) Distribution of wait times for assessment by the atrial fibrillation (AF) clinic nurse clinician, review of patient by the AF clinic physician (MD) or direct patient assessment by the AF clinic nurse and MD

Figure 3) Wait times to assessment by an AF clinic (AFC) nurse between January 2006 and September 2006 compared with wait times for assessment of a patient with AF referred to an electrophysiologist in the cardiac arrhythmia clinic (CAC) at the University of Calgary, Calgary, Alberta, between January 2005 and September 2005. Apr April; Aug August; Feb February; Jan January; Jul July; Jun June; Mar March; Sep September

Anticoagulation: The AF clinic does not directly manage anticoagulation. This task is performed by either the anticoagulation clinic in the Calgary Health Region or the patient's referring physician. However, the AF clinic physicians do make recommendations to the referring physician on the type of antithrombotic therapy required based on the patient's risk of stroke and provide education to the referring physician regarding factors that determine risk of stroke. Of patients initially assessed, 15% were not on antithrombotic therapy, 31% were on acetylsalicylic acid (ASA) and 54% were on warfarin. Changes in antithrombotic therapy were recommended for 48 patients. Changes included initiation of warfarin in eight patients, initiation of ASA in 10 patients not previously on antithrombotic therapy, changing antithrombotic therapy from ASA to warfarin in nine patients, and changing warfarin therapy to ASA in 14 patients. Antithrombotic therapy was discontinued in eight patients.

DISCUSSION

Our experience to date demonstrates that this nurse clinician-based clinic for the assessment and management of patients with AF substantially shortens access times to specialized cardiology care. Preliminary data suggest that this program reduces the number of emergency department visits and hospitalizations for a primary diagnosis of AF

Figure 4) Changes in the distribution of wait times for assessment by the atrial fibrillation (AF) clinic nurse clinician, review of patient by the AF clinic physician or direct patient assessment by the AF clinic nurse and physician. The distribution of wait times for the first 50 patients assessed in 2005 is shown in the upper panel. The distribution of wait times for assessment of all subsequent patients is shown in the lower panel

early following intervention. It is possible that other focused clinical care models may achieve similar outcomes.

The current standard for the management of a patient with AF has been referral to an internist, cardiologist or electrophysiologist for an expert opinion on care. Wait times are long, and when the patient is seen, all the relevant information related to the management of that specific patient may not be available. Incompleteness of the referral information may result in delay, and a further delay is created by waiting for additional tests before implementing a management plan. Once therapy is initiated, there may be further delays to review the efficacy or tolerability of therapy. Our present health care model does not allow for rapid reassessment of the patient by the consultant. Although the consultant may clearly outline a course of management, including changes in drug therapy and dose ranging of drug therapy, in our experience, these recommendations are rarely completely implemented by the referring physician. The AF clinic structure is based on current AF practice guidelines. The nurse clinicians retrieve the relevant information and organize additional tests as required, based on review of the information with one of the clinic physicians. Perhaps the biggest and

most important advantage of the AF clinic structure is that the nurse clinicians follow up with the patients and referring physicians to ensure that adjustments in drug doses or changes in drug therapy are implemented as planned. The patient's response to therapy is reviewed with a clinic physician as required. This AF clinic model reduces the direct amount of time that the AF physician specialist is involved in the patient's care, yet permits more timely evaluation, initiation of treatment and follow-up to ensure a positive outcome.

The model of the AF clinic is based on initial contact and patient education from trained nurse clinicians. These nurses have delegated responsibilities that are clearly defined by institutional protocol and follow guidelines for delegated responsibilities approved by the College of Physicians and Surgeons of Alberta.

Participation of the referring physicians is essential to the success of the AF Clinic. Not all patients will have direct contact with an AF physician specialist. In some instances, patient education and reassurance about their condition or physician education and reassurance that the current treatment approach is acceptable is all that is required. In other instances, recommendations about urgent intervention to control the ventricular rate and initiate anticoagulation to prevent stroke are provided by the AF clinic, and the patient is assessed at a later date in the AF clinic.

The use of trained nurse clinicians has been reported to provide a timely, safe and efficacious cardioversion service for the treatment of AF in the United Kingdom, where doctor shortages have created prolonged access times for this procedure (8,9). In addition, the use of nurse clinicians to titrate drug doses for patients with congestive heart failure has been shown to significantly improve compliance of drug therapy for heart failure and to improve clinical outcomes (10,11). As we become more efficient in the clinic, we expect to at least double our present patient management capacity.

Although we are encouraged by the early success of this program, long-term follow-up will be required to assess the impact of early intervention on long-term outcomes and health care use. We are prospectively collecting a variety of data elements. Future analyses are planned to assess patient and physician satisfaction with the service and to assess the cost effectiveness of our approach.

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