Approach to atrial fibrillation

Essentials for primary care

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Abstract

Objective To support family physicians in preventing atrial fibrillation (AF) in patients at risk and in identifying and managing those with established AF; and to summarize key recommendations for ideal screening and care of patients.

Sources of information The 2020 Canadian Cardiovascular Society and Canadian Heart Rhythm Society comprehensive guidelines for the management of AF, based on current evidence and clinical experience related to AF.

Main message Atrial fibrillation, which is estimated to affect at least 500,000 Canadians, is associated with high risks of stroke, heart failure, and death. Primary care clinicians occupy a central role in the management of this chronic condition, focusing on the challenges of preventing AF and identifying, diagnosing, treating, and following patients with AF. Evidence-based guidelines that provide optimal management strategies have been published by the Canadian Cardiovascular Society and Canadian Heart Rhythm Society to assist in these tasks. Messages critical to primary care are offered to support effective knowledge translation.

Conclusion Most patients with AF can be managed effectively in primary care. Family physicians not only play an important role in ensuring patients with AF receive timely diagnoses, but they are also key to providing initial and ongoing care, especially in patients with comorbid conditions.

Editor's key points

- Family physicians provide essential preventive care and case identification by recognizing relevant risk factors and diagnosing patients with atrial fibrillation (AF).
- Clinical evaluation and classification of AF is necessary for family physicians to support shared decisions with patients to manage risk of stroke and systemic embolism with anticoagulation therapy.
- Specific treatments for rate and rhythm control can improve symptoms and complications, including heart failure, in patients with AF.
- Family physicians should be aware of special considerations such as comorbid coronary artery disease and perioperative concerns when managing patients with AF.

Points de repère du rédacteur

- Les médecins de famille jouent un rôle essentiel dans les soins préventifs et l'identification des cas en identifiant les facteurs de risque pertinents et en posant un diagnostic chez les patients atteints de fibrillation auriculaire (FA).
- L'évaluation clinique et la classification de la FA sont nécessaires pour que les médecins de famille puissent soutenir la prise de décisions partagée avec les patients en vue de gérer le risque d'accident vasculaire cérébral et d'embolie systémique avec une anticoagulothérapie.
- Des traitements bien précis qui favorisent le contrôle de la fréquence et du rythme sont susceptibles d'atténuer les symptômes et les complications, y compris l'insuffisance cardiaque, chez les patients atteints de FA.
- Les médecins de famille devraient connaître les considérations particulières comme la coronaropathie comorbide et des préoccupations périopératoires, lorsqu'ils prennent en charge des patients atteints de FA.

Approche à l'égard de la fibrillation auriculaire

Éléments essentiels en première ligne

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Résumé

Objectif Aider les médecins de famille à prévenir la fibrillation auriculaire (FA) chez les patients à risque, et à identifier et prendre en charge les personnes présentant une FA établie; résumer les principales recommandations pour un dépistage et des soins idéaux pour les patients.

Source de l'information Les lignes directrices exhaustives publiées en 2020 par la Société canadienne de cardiologie et la Société canadienne de rythmologie pour la prise en charge de la FA. Elles reposent sur les données et l'expérience clinique actuelles relatives à cette affection.

Message principal La fibrillation auriculaire, qui, selon les estimations, touche au moins 500 000 Canadiens, est associée à des risques élevés d'accident vasculaire cérébral, d'insuffisance cardiaque et de décès. Les cliniciens de première ligne jouent un rôle central dans la prise en charge de cette affection chronique en mettant l'accent sur les défis de la prévention de la FA, ainsi que du repérage, de la pose du diagnostic, du traitement et du suivi des patients atteints de la FA. Pour les aider dans ces tâches, la Société canadienne de cardiologie et la Société canadienne de rythmologie ont publié des lignes directrices fondées sur des données probantes qui proposent des stratégies de prise en charge optimales. Des messages essentiels pour les soins primaires sont communiqués de manière à soutenir une application des connaissances efficace.

Conclusion La plupart des patients atteints de FA peuvent être pris en charge efficacement au niveau des soins primaires. Non seulement les médecins de famille jouent-ils un rôle important en voyant à ce que les patients qui souffrent de FA soient diagnostiqués à temps; ils sont également essentiels à la prestation des soins initiaux et continus, surtout chez les personnes présentant des troubles comorbides.

Case description

Jim is an obese, 68-year-old retired teacher currently taking no mediations and having no known comorbidities. He is a lifetime non-smoker, does not exercise, and drinks about 4 units of alcohol per week, denying any bingeing. He presents to your office for a same-day appointment describing mild, poorly localized, non-exertional chest discomfort and feeling "off." He denies prior episodes, shortness of breath, dyspnea, or gastrointestinal or other systemic symptoms. On evaluation, he is hemodynamically stable with a blood pressure of 132/84 mm Hg and an irregularly irregular pulse of approximately 130 beats per minute (BPM). Heart sounds are normal, as are the remainder of the physical examination findings. Electrocardiogram results confirm atrial fibrillation (AF) at 137 BPM but are otherwise normal. His hematology and biochemistry laboratory results, including those assessing renal and thyroid function, are normal with no evidence of other secondary causes of AF. Echocardiogram results reveal left atrial enlargement and mildly impaired left ventricular relaxation. How would you plan the management of AF for Jim?

Sources of information

The 2020 Canadian Cardiovascular Society (CCS) and Canadian Heart Rhythm Society (CHRS) comprehensive guidelines for the management of AF represent a comprehensive overhaul of earlier recommendations, integrating current evidence and clinical experience.[1] The 2020 guidelines were formulated with the consensus of a Canadian panel composed of multidisciplinary experts on AF, including primary care practitioners. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system was used to evaluate recommendation strength and quality of evidence.[2] Final iterations of the guidelines were peer reviewed by external content experts, patient stakeholders, and the CCS Guidelines Committee.[1] The Canadian guidance aligns closely with other international guidelines, including those of the European Society of Cardiology and of the American Heart Association, American College of Cardiology, and Heart Rhythm Society.[3,4]

Main message

Atrial fibrillation, the most common of all sustained arrhythmias, is a high-stakes disease.[5] It substantially impairs quality of life (QOL), increases mortality up to 4-fold, and is a major cause of heart failure (HF) and stroke.[5-7] In Canada the effects of AF lead to direct health care utilization costs of approximately $815 million annually in 2010 Canadian dollars.[8] Up to 24% of all stroke and systemic embolism events are direct results of AF.[9]

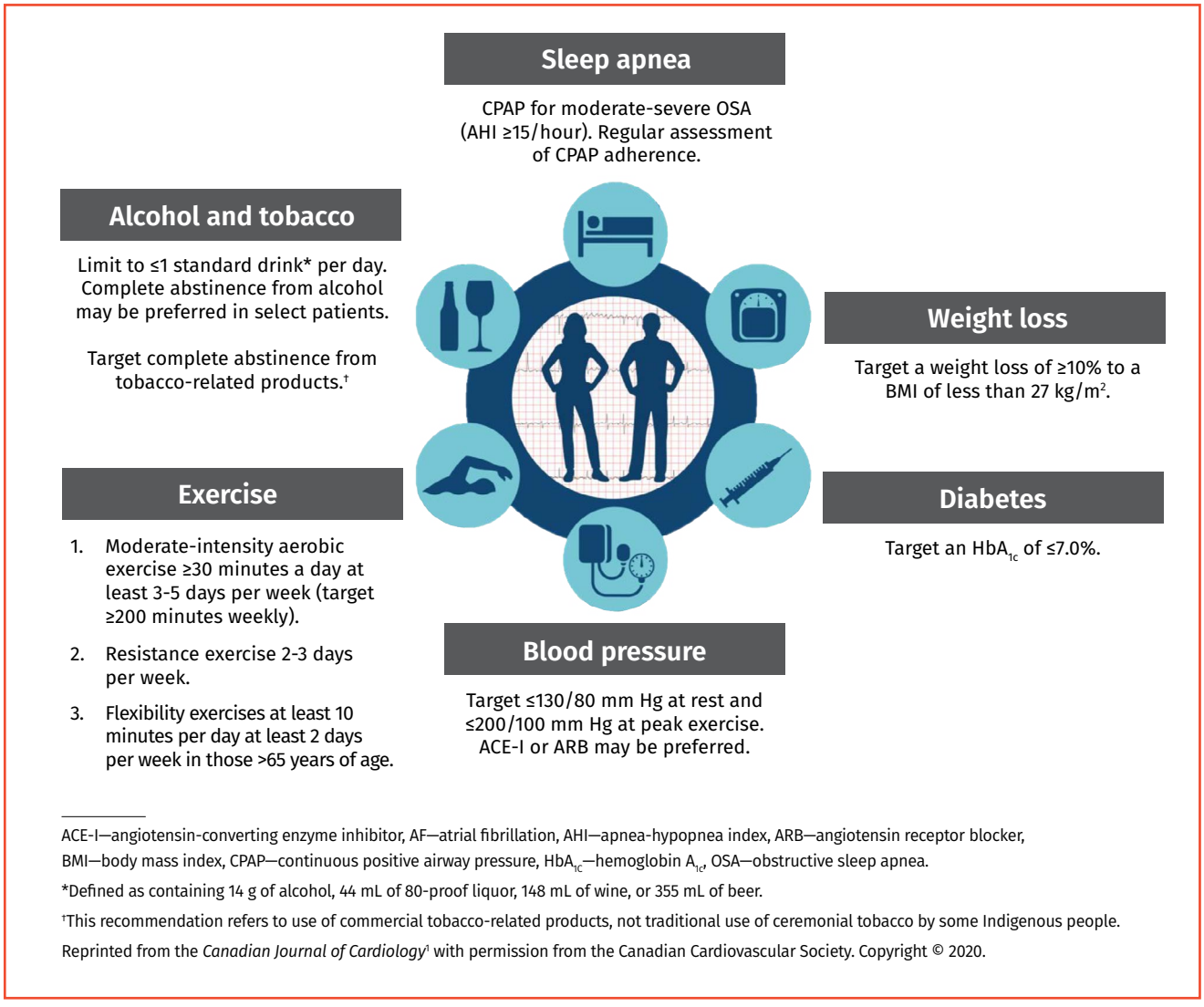
Given that AF is estimated to affect at least 500,000 Canadians (extrapolating from US data),[10] it is imperative that primary care clinicians participate in the challenge of helping patients prevent AF and in diagnosing, treating, and following those patients who have AF. The CCS and CHRS, as well as other international organizations, provide guidance based on high-quality research to assist in the optimal management of these patients. This article aims to provide a summary of key recommendations from the 2020 CCS and CHRS guidelines on AF[1] of relevance to primary care providers to help family physicians prevent, diagnose, and manage AF effectively in primary care settings.

Risk factors and prevention. Identification of risk factors and relevant comorbid conditions enables clinicians to recognize patients who are appropriate for interventions to reduce the risk of development of AF, reduce the risk of AF recurrence, and target screening for silent AF (**Figure 1**).[1]

Modifiable risk factors. Hypertension is a strong independent risk factor for developing AF for both men and women, conferring a 1.5-fold and 1.4-fold risk, respectively, after adjusting for other associated conditions.[11] Diabetes is associated with a 40% higher risk of developing AF, with the risk 3% higher for each additional year of diabetes duration.[12] Active tobacco smokers have a higher risk of AF compared with past users, with cumulative risk related to duration of use.[13] Alcohol use is associated with a higher risk of AF, both with acute consumption—typically more than 5 standard drinks (eg, holiday heart syndrome)—and habitually, with an 8% increase in incident AF with each additional drink per day.[14] Moderate-intensity exercise is inversely associated with risk of AF; fitness is associated with a 7% lower risk of incident AF with every additional metabolic equivalent achieved on exercise testing.[15] Paradoxically, habitual intense endurance exercise in athletic populations is associated with a small increase in AF incidence.[16] Obesity is associated with an increased risk of approximately 3% to 7% for each unit increase in body mass index.[17,18] Independent of body mass index, weight gains of 16% to 35% and more than 35% in men between the age of 20 and midlife (mean age 51.5 years) are associated with increases in the risk of AF of 34% and 61%, respectively.[19] Patients with moderate to severe obstructive sleep apnea (OSA) have a 2- to 4-fold increased risk of AF, while treatment of OSA with continuous positive airway pressure reduces the risk of AF.[20,21] Overt and subclinical hyperthyroidism are associated with 42% and 31% higher risks of AF, respectively.[22] Prevalence of AF increases with HF severity (increasing from <10% among those with New York Heart Association class I HF to approximately 50% among those with class IV HF),[23] and AF is more common among patients with HF who have preserved ejection fraction compared with those who have reduced ejection fraction.[24]

Nonmodifiable risk factors. The most consistent and powerful risk factor for AF is age.[25] Estimates of the

Figure 1. Modifiable risk factors associated with development of AF and treatment targets: ***Consideration should be given to managing coexisting diabetes and dyslipidemia consistent with contemporary guideline recommendations.***



ACE-I—angiotensin-converting enzyme inhibitor, AF—atrial fibrillation, AHI—apnea-hypopnea index, ARB—angiotensin receptor blocker, BMI—body mass index, CPAP—continuous positive airway pressure, HbA_{1c}—hemoglobin A_{1c}, OSA—obstructive sleep apnea.

*Defined as containing 14 g of alcohol, 44 mL of 80-proof liquor, 148 mL of wine, or 355 mL of beer.

†This recommendation refers to use of commercial tobacco-related products, not traditional use of ceremonial tobacco by some Indigenous people.

prevalence of AF increase from less than 0.5% to 1% in those younger than 50 years to 6% to 15% in those 80 years and older.[26] Male sex is associated with a 1.5-fold increased risk of developing AF.[25] Genetic factors are also relevant, with AF being more common in those with a family history among first-degree relatives.[27]

Classification of AF. Atrial fibrillation is classified by duration and continuity, mainly for consideration of treatment to terminate the arrhythmia, referred to as rhythm control (**Box 1**). Generally, the longer a patient has AF, the lower the probability of successful conversion to and maintenance of sinus rhythm. However, it is critical to understand that all classifications of AF include risk of stroke and systemic embolism, and decisions regarding anticoagulation should not be determined on this basis. However, AF may be also classified as secondary to acute illness or surgery. It is then subclassified as *reversible*, where there is no underlying cardiac pathology (eg, post-operative AF); it is not likely to recur following treatment; and it does not require long-term anticoagulation therapy. Alternatively, it may be *provoked*, where there

Box 1. Classification of AF

Paroxysmal AF: Recurrent episodes lasting >30 seconds but <7 days

Persistent AF: Episodes lasting for >7 days, but <1 year

Long-standing AF: Present for >1 year, but with a view to consider rhythm control

Permanent AF: Continuous AF where rhythm control is not being considered

AF—atrial fibrillation.

is substantial abnormal underlying cardiac substrate or pathology (eg, chronic obstructive pulmonary disease exacerbation); it is likely to recur; and it usually requires anticoagulation. It is recommended that patients with atrial flutter be stratified and treated in the same manner as patients with AF.[1]

Screening for asymptomatic AF. A substantial burden of asymptomatic, undiagnosed AF exists. Taken together, screening studies have yielded detection rates of approximately 0.9% or a number needed to screen (NNS)=111 to detect a single case.[28] Because AF rates rise sharply with age, screening only persons aged 65 years or older produced a higher detection rate of 1.44% (NNS=69).[29] Use of single-time-point pulse palpation or single-lead electrocardiogram did not influence detection rates[29]; however, pulse palpation has lower specificity and lower cost (**Table 1**).[1,28,30-57] Detection rates are also improved with the use of continuous versus single-time-point assessment owing to high rates of intermittent AF. Continuous screening in 75- and 76-year-old individuals in Sweden yielded a detection rate of 3% (NNS=33).[58] Consumer devices such as Kardia and Apple Watch yield high sensitivity and specificity in AF screening (**Table 1**).[1,28,30-57] Opportunistic screening for AF in individuals 65 years or older during clinical encounters is strongly recommended. A summary of screening methods is provided in **Table 1**.[1,28,30-57]

Clinical evaluation of patients with AF. Clinical assessment should focus on establishing duration of disease, severity of symptoms, cause of AF, comorbidity, and complications to inform symptom control, prevention of stroke and systemic embolism, and management of risk factors and complications. Key features of a complete history, examination requirements, and appropriate investigations for patients with AF are reviewed in **Figure 2**.[1]

Stroke prevention in patients with AF. Large clots embolizing from the left atrial appendage to the cerebral circulation can result in strokes secondary to AF that are far more severe than atherosclerotic events. Rates of severe permanent disability and of 1-year mortality associated with strokes in patients with AF are approximately 40% and 50%, respectively, nearly double the rates observed among patients with strokes without AF.[59,60] Anticoagulation therapy reduces the absolute risk of stroke related to AF, with direct-acting oral anticoagulants (DOACs) having been shown to be at least as effective as vitamin K antagonists (VKAs) with similar or less major bleeding.[61,62]

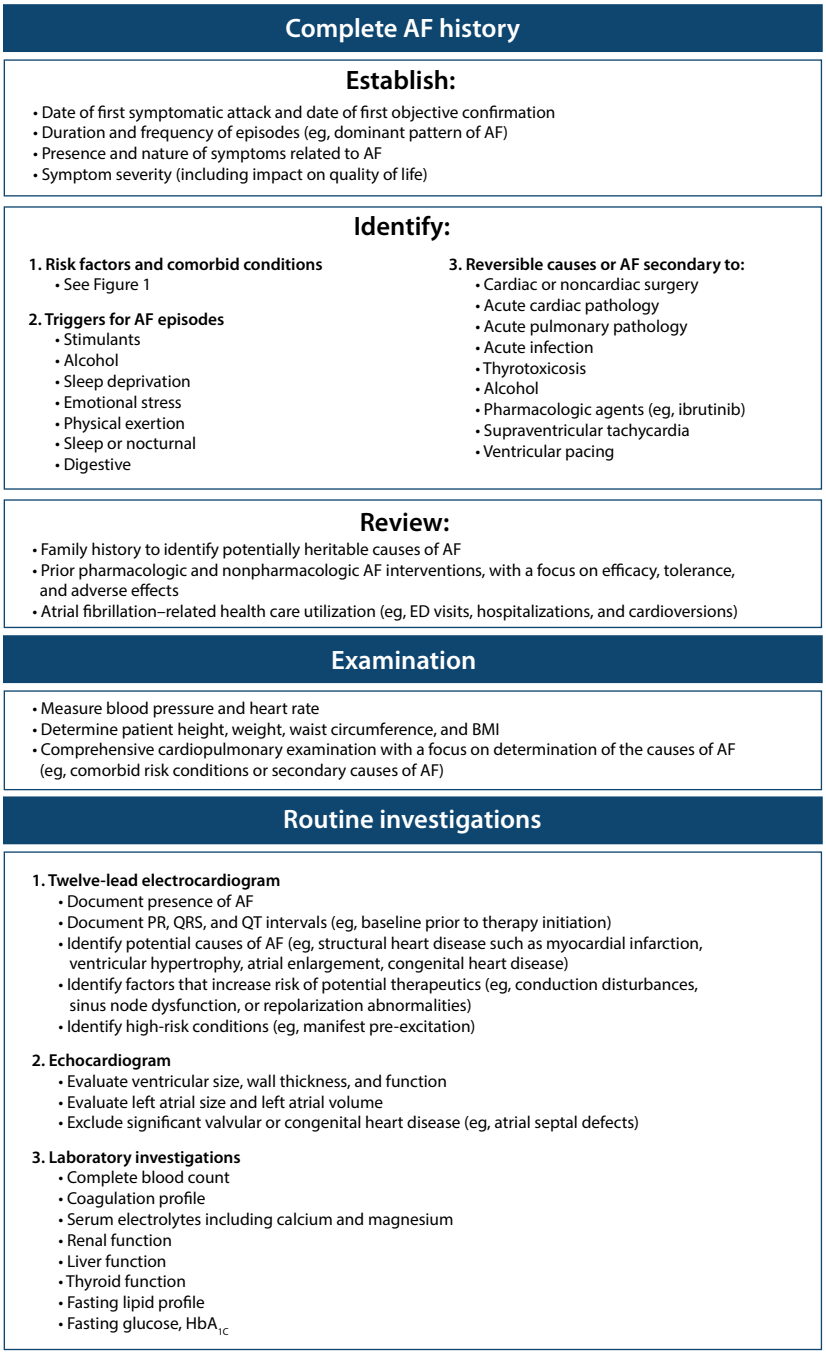
Risk stratification: Untreated AF is associated with an annual rate of stroke of approximately 5%.[63] Several factors increase the risk of stroke at 5 years' follow-up, including age (2.1% for patients aged 65 to 74 years and 4.4% for those 75 years and older), female sex (0.86%), hypertension (1.6%), HF (2.4%), diabetes (2.3%), and prior stroke (7.9%).[64] To ensure the benefit of anticoagulation

Table 1. Atrial fibrillation screening methods

TECHNIQUE	DEVICE*	METHOD	ADVANTAGES AND DISADVANTAGES	ACCURACY†
Pulse-based[1,28,30-43]	Pulse palpitation	Pulse irregularity detected using manual palpation	• Time efficient • High sensitivity • Cost-effective • Easy to apply across health care settings • Easy to perform at home	• Sensitivity 84%-97% • Specificity 69%-75%
	Blood pressure monitor (eg, M6 Comfort, Blood Pressure Analyzer, WatchBP)	Algorithm based on pulse irregularity	• Time efficient • High sensitivity • Easy to apply across health care settings • Easy to perform at home	• Sensitivity 92%-100% • Specificity 86%-97%
	Plethysmography (eg, finger probe, Apple Watch, smartphone photoplethysmograph application)	Algorithm based on pulse irregularity	• Capable of intermittent (smartphone camera) and extended (watch-based) monitoring • Easy to perform at home • Potentially costly	• Sensitivity 92%-96% • Specificity 92%-98% (lower in continuous watch-based application)
Rhythm-based[1,28,30,40-42,44-57]	Single-lead ECG (eg, Kardia, MyDiagnostick, Zenicor-ECG)	Automated algorithm based on R-R irregularity	• Capable of intermittent (symptom-based) monitoring • ECG can be reviewed by health care professional	• Sensitivity 94%-99% • Specificity 92%-97%

ECG—electrocardiogram.
*Specific devices are named based on published evidence. The M6 Comfort blood pressure monitor is manufactured by OMRON Healthcare (Kyoto, Japan), the Blood Pressure Analyzer and WatchBP are manufactured by Microlife USA Inc (Clearwater, Fla), the Apple Watch is manufactured by Apple Inc (Cupertino, Calif), Kardia is manufactured by AliveCor Inc (Mountain View, Calif), MyDiagnostick is manufactured by Applied Biomedical Systems BV (Maastricht, the Netherlands), and Zenicor-ECG is manufactured by Zenicor Medical Systems AB (Stockholm, Sweden).
†Ranges are based on authors' calculations.

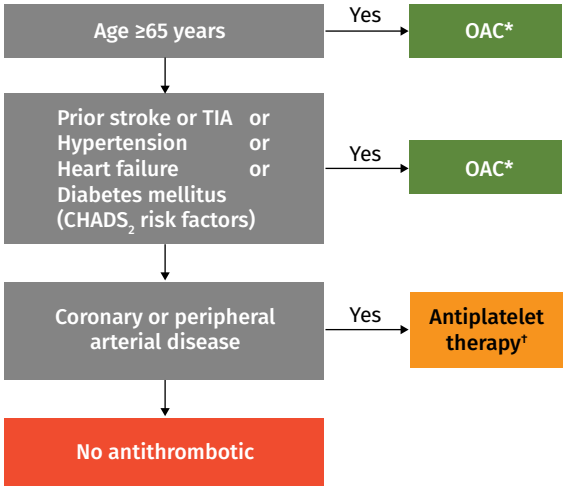
Figure 2. Clinical evaluation of patients with AF



AF—atrial fibrillation, BMI—body mass index, ED—emergency department, HbA_{1c}—hemoglobin A_{1c}.

exceeds the risk of major bleeding it is necessary to stratify risk based on these factors, for which the CCS and CHRS recommend using CHADS-65 (referring to patients who are 65 years or older and have 1 or more risk factors among congestive HF, hypertension, age ≥75 years, diabetes mellitus, or stroke or transient ischemic attack [$CHADS_2$]), a binary decision algorithm (**Figure 3**).[1] The CHADS-65 algorithm recommends oral anticoagulation therapy for any patient with AF who is 65 years of age or older or in those younger than 65 with either hypertension, HF, diabetes, or prior stroke, regardless of sex.

Figure 3. Canadian Cardiovascular Society algorithm (CHADS-65) for stroke prevention in nonvalvular AF



AF—atrial fibrillation; $CHADS_2$—congestive heart failure, hypertension, age ≥75 years, diabetes mellitus, stroke or TIA; OAC—oral anticoagulant; TIA—transient ischemic attack.

*A direct OAC is preferred over warfarin.

†Therapeutic options include 81 mg of acetylsalicylic acid daily alone; 75 mg of clopidogrel daily alone; or 81 mg of acetylsalicylic acid daily in combination with either 75 mg of clopidogrel daily, 60 mg of ticagrelor twice daily, or 2.5 mg of rivaroxaban twice daily (depending on clinical circumstances).

Vitamin K antagonists: A meta-analysis of 6 randomized controlled studies of VKAs (mainly warfarin) versus placebo showed a 64% relative reduction in all strokes (ischemic or hemorrhagic), with number need to treat (NNT)=37 for primary prevention and NNT=12 for secondary prevention. The number needed to harm (owing to major extracranial hemorrhage) was 333, suggesting substantial benefit from oral anticoagulant (OAC) therapy.[61]

Antiplatelet agents (such as acetylsalicylic acid [ASA]) are not recommended for stroke prevention related to AF given their relatively low efficacy and comparable risk of major bleeding.[65] Antiplatelet agents should be used only for secondary prevention of ischemic vascular disease in patients for whom anticoagulation is contraindicated.

Vitamin K antagonist benefits are optimized when the international normalized ratio is maintained between 2 and 3 and is directly related to the amount of time patients stay within the therapeutic range. Systemic embolism events, major bleeding, and mortality increase by factors of 2.6, 1.5, and 2.4, respectively, when time in therapeutic range falls below 65%.[66] In a Canadian study of more than 7000 patients with AF, more than 30% of those taking warfarin did not reach this threshold.[67] Warfarin is further limited by the need for long-term regular monitoring, numerous drug and food interactions, wide variation in dose requirements, teratogenicity, and slow onset or offset kinetics.

Direct-acting oral anticoagulants: Four DOACs are approved for use in Canada: apixaban, dabigatran, edoxaban, and rivaroxaban. These agents have been directly compared with VKA in randomized controlled trials with more than 70,000 patients.[68-71] A meta-analysis of these trials favoured DOACs over VKA for risk of stroke or systemic embolism (relative risk reduction [RRR]=0.19, absolute risk reduction [ARR]=0.68, NNT=147; $P<.0001$), risk of intracranial hemorrhage (RRR=0.52, ARR=0.76, NNT=132; $P<.0001$), and all-cause mortality (RRR=0.10, ARR=0.78, NNT=128; $P=.0003$) and a trend toward reduced risk of major bleeding (RRR=0.14, ARR=0.91, NNT=110; $P=.06$). However, DOAC use was associated with an increase in gastrointestinal bleeding (relative risk=1.25, absolute risk increase=0.53, number needed to harm=186; $P=.043$).[62] Based on these data, fewer drug and food interactions, and no requirement for drug monitoring, the CCS and CHRS preferentially recommend DOACs over warfarin for stroke prevention in most patients with nonvalvular AF.[1] However, DOACs are contraindicated in patients with mechanical heart valves in any location as well as in those with moderate to severe mitral stenosis. It must be emphasized that when DOACs are prescribed, the correct dose must be selected based on patient age, weight, and renal function (**Table 2**).[1,70,72-76] Canadian studies have demonstrated DOAC dosing discordant with product monographs occurs in 8% to 14% of patients with AF, with patients mainly being underdosed, in both primary care and specialist practices.[77-79] Thrombosis Canada provides a simple online tool to support correct dosing: **https://thrombosiscanada.ca/tools/?calc=antithromboticAlgorithm**.

Concomitant AF and coronary artery disease (CAD). Approximately 30% of patients with AF have concomitant CAD.[80] Management of such patients in the first year following acute coronary syndrome or percutaneous coronary intervention is complex, requiring up to 3 antithrombotic drugs (eg, combination anticoagulant and antiplatelet agents). During this period, clinicians with expertise in antithrombotic therapy should be involved in management of these patients. However, patients with AF and stable CAD are usually managed by primary care practitioners, and questions about using an antiplatelet medication (usually ASA) in combination with an OAC often come up. The AFIRE (Atrial Fibrillation and Ischemic Events with Rivaroxaban in Patients with Stable Coronary Artery Disease) trial randomized 2236 patients with AF and stable CAD to receive rivaroxaban monotherapy or rivaroxaban in combination with a single antiplatelet drug (eg, ASA).[81] The trial was stopped early owing to increased harm in the combination anticoagulant and antiplatelet therapy arm, where a 45% ($P<.05$) increase in mortality and 41% ($P<.01$) increase in major

Table 2. Dosing considerations for warfarin and direct-acting oral anticoagulants related to renal function

CREATININE CLEARANCE	MEDICATION				
	WARFARIN[72]	APIXABAN[73]	DABIGATRAN[74]	EDOXABAN[75]	RIVAROXABAN[76]
≥50 mL/min	Dose adjusted for INR 2.0-3.0	5 mg twice daily	150 mg twice daily*	60 mg daily†	20 mg daily
30 to 49 mL/min	Dose adjusted for INR 2.0-3.0	5 mg twice daily‡	Consider 110 mg twice daily	30 mg daily	15 mg daily
15 to 29 mL/min	No RCT data§	Very limited RCT data‖	No RCT data¶	Very limited RCT data¶	No RCT data
<15 mL/min (or on dialysis)	No RCT data#	Very limited RCT data¶	No RCT data¶	No RCT data¶	Very limited RCT data¶

INR—international normalized ratio, RCT—randomized controlled trial.
*110 mg of dabigatran taken orally twice daily is recommended if age ≥80 years or if ≥75 years with other bleeding risk factors, including creatinine clearance of 30 to 50 mL/min.
†Consider 30 mg of edoxaban daily if weight ≤60 kg or if the patient is taking a concomitant potent P-glycoprotein inhibitor other than amiodarone or verapamil.
‡Consider 2.5 mg of apixaban taken orally twice daily if 2 of the 3 following criteria are present: age ≥80 years, body weight ≤60 kg, or serum creatinine level ≥133 μmol/L.
§Dose-adjusted warfarin has been used, but data regarding safety and efficacy are conflicting.
‖The ARISTOTLE (Apixaban for the Prevention of Stroke in Subjects with Atrial Fibrillation) trial included a small number of patients with creatinine clearance as low as 25 mL/min.[70]
¶Product monograph suggests the drug is contraindicated for this level of renal function.
#Dose-adjusted warfarin has been used, but observational data regarding safety and efficacy are conflicting and may lean toward causing harm.

bleeding was observed, with no ischemic vascular benefit. In patients with AF and stable CAD (defined by the absence of acute coronary syndrome or percutaneous coronary intervention in the preceding 12 months), OAC therapy provides adequate protection against ischemic coronary events in addition to stroke and systemic embolism. Combined anticoagulant and antiplatelet therapy is not recommended beyond 12 months.[81]

Perioperative management of anticoagulants in patients with AF. Primary care clinicians often face the decision to modify anticoagulation therapy for patients who require surgical procedures. Factors to consider include the patient's underlying stroke risk and renal function, procedural bleeding risk, and anticoagulant used. The PAUSE (Perioperative Anticoagulation Use for Surgery Evaluation) study[82] defined an algorithm considering all these factors to assist clinicians in this decision. The CCS and CHRS guidelines recommend use of an online tool from Thrombosis Canada, based on the PAUSE algorithm, to provide a perioperative OAC dosing schedule and manage this complex problem safely: **https://thrombosiscanada.ca/tools/?calc=perioperativeAnticoagulantAlgorithm**.

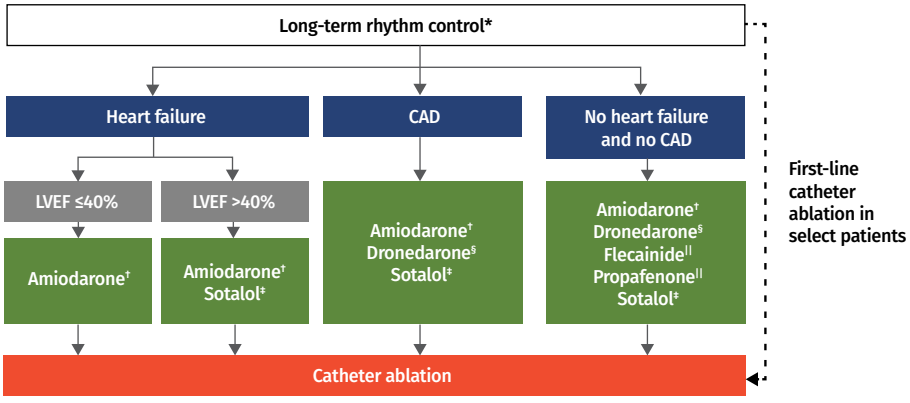
Rate and rhythm control in patients with AF. Contemporary management of AF is based on improving arrhythmia-related symptoms, exercise tolerance, and QOL and on reducing morbidity and mortality associated with AF. For patients with established AF, multiple randomized trials have demonstrated no significant difference in cardiovascular outcomes between patients treated with strategies involving ventricular rate control versus rhythm control.[83-85] However, an initial strategy of rhythm control for patients with newly diagnosed AF (ie, within a year) has been associated with reduced cardiovascular death and reduced rates of stroke,[86] and thus rhythm control should be the preferred early strategy.

For patients under rhythm control, the initial choice of antiarrhythmic therapy is primarily driven by safety and tolerability. The agents have relatively similar efficacy (**Figure 4**).[1] If the initial drug does not achieve the desired results, referral for alternative antiarrhythmic trials or catheter-directed pulmonary vein isolation may be considered. Anticoagulation must be maintained even in patients who have achieved apparent rhythm control.[83]

For patients being treated with ventricular rate control, pharmacologic strategies work to reduce ventricular rate by prolonging atrioventricular (AV) node refractoriness. Principal classes of agents used include β-blockers, non-dihydropyridine calcium channel blockers (ND-CCBs), and digoxin (**Figure 5**).[1] In patients without substantial left ventricular dysfunction (left ventricular ejection fraction >40%), β-blockers and ND-CCBs are first-line options. Beta-blockers may be more effective at slowing ventricular rates both at rest and during exercise; however, their use is associated with a higher risk of adverse effects (fatigue and exercise intolerance) and their dose-response curves flatten quickly, resulting in minimal gain at the higher end of dose curves.[87-89]

Excessive ventricular rates during AF may cause severe symptoms and, in some patients, can lead to development of tachycardia-induced cardiomyopathy and HF. The CCS and CHRS guidelines recommend targeting a

Figure 4. Approach to long-term rhythm control: ***Initial choice of AAD therapy is driven mainly by safety and tolerability. If the initial medication does not produce desired results, an alternative AAD may be prescribed or catheter ablation may be considered.***



AAD—antiarrhythmic drug, CAD—coronary artery disease, LVEF—left ventricular ejection fraction.

*Consider atrial fibrillation symptom burden, possibility of adverse drug reactions, and patient preference.

†Consider alternative AADs or ablation rather than long-term amiodarone (significant risk of extra-cardiac side effects).

‡Sotalol should be used in caution in patients with high-risk features for torsades de pointes (≥65 years, female, reduced renal function, concomitant use of potassium-wasting diuretic drugs). Sotalol is not recommended for patients with left ventricular hypertrophy.

§Dronedarone should be used with caution in combination with digoxin.

||Class IC agent should be combined with atrioventricular nodal blocking agent. Use caution for patients with left ventricular hypertrophy.

resting ventricular heart rate target of 100 BPM or less for patients with preserved left ventricular ejection fraction and minimal symptoms attributable to AF. For patients unable to achieve this heart-rate target, it is advisable to change drug classes (eg, from a β-blocker to an ND-CCB) or initiate combination therapy with digoxin.[1]

In general, referral to a cardiologist or arrhythmia specialist for advanced care should be considered for those with newly diagnosed AF, for those with an underlying electrophysiologic disorder (eg, preexcitation), or when pharmacologic therapy fails to improve AF-related symptoms or improve QOL (**Table 3**). In those with refractory tachycardia despite maximal or combination medical therapy, implantation of a permanent pacemaker with subsequent AV node ablation can provide effective rate control. Although this approach has been associated with sustained improvements in symptoms, exercise tolerance, and QOL, it has several limitations including the need for pacemaker implantation (and its associated complications) as well as the permanent loss of AV node conduction.

Case resolution

Jim is informed of his AF diagnosis and the issues that need to be addressed. Weight reduction, alcohol avoidance, and moderate exercise are encouraged. He is referred for sleep study to rule out OSA.

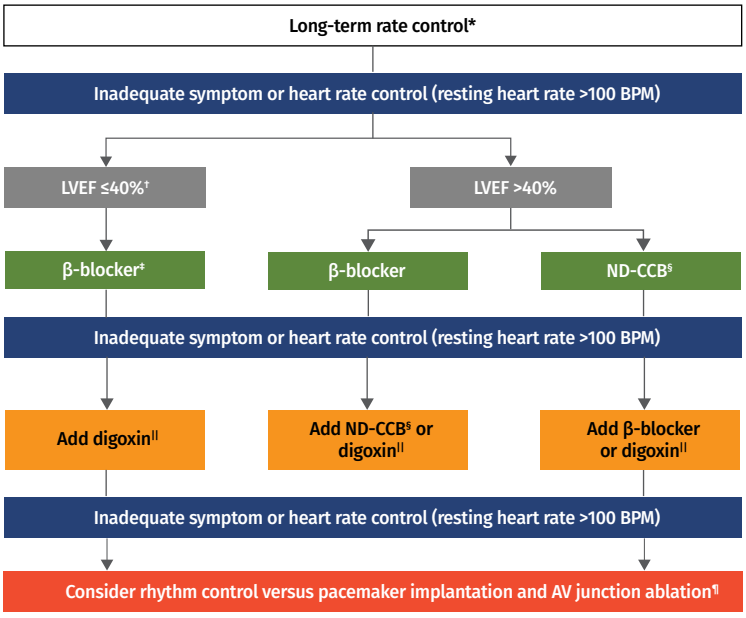
At age 67, despite having a $CHADS_2$ score of 0, Jim has an annual risk of stroke and systemic embolism exceeding 2% that can be reduced by approximately two-thirds with OAC use. After a shared decision-making conversation that addresses risks and benefits, a DOAC is prescribed for long-term therapy. He is advised to report any symptoms of bleeding but not to stop his anticoagulant for minor episodes such as epistaxis, bruising, or rectal bleeding. He is educated on the importance of avoiding other medications that increase bleeding risk, such as ASA and nonsteroidal anti-inflammatory drugs. He is provided with laboratory test requisitions for renal function and hemoglobin at 6-month intervals.

Jim's symptoms and tachycardia also need to be addressed. A β-blocker is prescribed, targeting a heart rate less than 100 BPM. He is referred to a cardiologist to rule out underlying CAD and for consideration of rhythm control and maintenance. Once his heart rate and other symptoms have been stabilized, he is advised to follow up with his primary care team every 3 to 6 months to monitor renal function, hemoglobin, and cardiac status.

Conclusion

Atrial fibrillation is a common disease with a high prevalence that can be diagnosed and managed effectively in primary care settings. The 2020 CCS and CHRS guidelines summarize current evidence and provide clear recommendations for optimal care of patients with and at risk of AF. The CCS also has resources to support shared

Figure 5. Approach to long-term rate control: *Choice of a specific rate-controlling regimen should be based on a patient's characteristics and the drug's efficacy and side-effect profile.*



AF—atrial fibrillation, AV—atrioventricular, BPM—beats per minute, LVEF—left ventricular ejection fraction, ND-CCB—non-dihydropyridine calcium channel blocker.

*Consider AF symptom burden, possibility of adverse drug reactions, and patient preference.

†Consider role of catheter ablation in patients with coexisting AF and heart failure.

‡Evidence-based β-blockers (bisoprolol, carvedilol, metoprolol) are recommended.

§Diltiazem, verapamil.

‖Digoxin is most beneficial in addition to first-line agents in those who fail to achieve satisfactory symptom or heart rate control, or as monotherapy in sedentary individuals with side effects from or contraindications to first-line agents. Therapeutic drug monitoring may be useful in adjusting digoxin dose.

¶Consider cardiac resynchronization therapy prior to AV junction ablation in those with reduced LVEF.

Table 3. Indications for specialist referrals for patients with AF

ISSUE	APPROPRIATE REFERRAL
Hemodynamic instability Cardiac ischemia Consideration of urgent cardioversion Heart rate >140 BPM	Urgent referral to ED
Refractory tachycardia >100 BPM Underlying conduction abnormality (eg, accessory pathway) Consideration of long-term rhythm control, including the following: • Pharmacologic management • Cardioversion • Catheter-directed pulmonary artery isolation • AV node ablation or pacemaker	Cardiology
Anticoagulation issues: • End-stage renal disease • Persistent minor bleeding while taking an OAC • Complex perioperative management	Hematology or internal medicine

AF—atrial fibrillation, AV—atrioventricular, BPM—beats per minute, ED—emergency department, OAC—oral anticoagulant.

decision making and risk management with patients available at **https://ccs.ca/pocket-guides/**, including the *Atrial Fibrillation Pocket Guide*,[90] which is a quick reference for providers. The complete guidelines also contain more detailed information on the strength of recommendations and quality of evidence for this guidance. Family physicians not only play an important role in ensuring patients with AF receive a timely diagnosis; they are also key to providing initial and ongoing management, especially in patients with comorbid conditions such as CAD or chronic kidney disease.

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Contributors

All authors contributed to the literature review and interpretation and to preparing the manuscript for submission.

Competing interests

Dr Alan Bell has received consulting, research, or speaking fees from Bristol-Myers Squibb-Pfizer, Bayer, and Servier. He is a member of the primary panel of the Canadian Cardiovascular Society and Canadian Heart Rhythm Society Atrial Fibrillation Guidelines Committee and is Vice President of Thrombosis Canada. **Dr Jason G. Andrade** reports having received grants and personal fees from Medtronic, grants from Baylis, and personal fees from Biosense Webster, Bristol-Myers Squibb-Pfizer, and Servier. **Dr Laurent Macle** reports having received personal fees from Medtronic, Bristol-Myers Squibb-Pfizer, and Servier, and grants and personal fees from St Jude Medical/Abbott and Biosense Webster. **Dr Kim A. Connelly** is listed as an inventor on a patent application by Boehringer Ingelheim on the use of dipeptidyl peptidase 4 inhibitors in heart failure and reports having received research grants through his institution from AstraZeneca, Servier, and Boehringer Ingelheim; support for travel to scientific meetings from Boehringer Ingelheim and honoraria for speaking engagements and ad hoc participation on advisory boards from Servier, Merck, Eli Lilly, AstraZeneca, Boehringer Ingelheim, Ferring, Novo Nordisk, Novartis, Bayer, and Janssen; and honoraria and research funding from Bayer, Servier, Pfizer, and Boehringer Ingelheim, all of which manufacture direct-acting oral anticoagulants. **Lisa Labine** has no conflicts of interests to declare. **Dr Alexander G. Singer** is Principal Investigator on grants funded by IBM, Calian, Research Manitoba, the Canadian Institutes of Health Research, and the Public Health Agency of Canada. He is also Network Director of the Manitoba Primary Care Research Network, which is a provincial network within the Canadian Primary Care Sentinel Surveillance Network.

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