

Atrial fibrillation anticoagulation care in a large urban family medicine practice

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Abstract

Objective To determine the proportion of patients with atrial fibrillation (AF) in primary care achieving guideline-concordant stroke prevention treatment based on both the previous (2010) and the updated (2012) Canadian guideline recommendations.

Design Retrospective chart review.

Participants Primary care patients (N=204) with AF. The mean age was 71.3 years and 53.4% were women.

Setting Large urban community family practice in Toronto, Ont.

Main outcome measures Patient demographic characteristics such as sex and age; a list of current cardiac medications including anticoagulants and antiplatelets; the total number of medications; relevant current and past medical history including presence of diabetes, stroke or transient ischemic attack, hypertension, and vascular disease; number of visits to the family physician and cardiologist in the past year and past 5 years, and how many of these were for AF; the number of visits to the emergency department or hospitalizations for AF, congestive heart failure, or stroke; if patients were taking warfarin, how often their international normalized ratios were recorded, and how many times they were in the reference range; CHADS₂ (congestive heart failure, hypertension, age ≥75, diabetes mellitus, and stroke or transient ischemic attack) score, if recorded; and reason for not taking oral anticoagulants when they should have been, if recorded.

EDITOR'S KEY POINTS

- In patients with CHADS₂ (congestive heart failure, hypertension, age ≥ 75, diabetes mellitus, and stroke or transient ischemic attack) scores of 0 and 1, the rates of Canadian Cardiovascular Society guideline-concordant atrial fibrillation management were significantly lower when applying the 2012 guidelines than when applying the 2010 guidelines ($P<.001$).
- All patients with CHADS₂ scores of 0 and 1 should be reassessed to ensure that they are receiving optimal stroke prevention treatment according to their individualized risk, using new risk stratification tools.
- Knowledge translation activities targeting primary care providers to address the new quality-of-care gap generated by more stringent recommendations are needed.

Results Among those who had CHADS₂ scores of 0, 64 patients (97.0%) were receiving appropriate stroke prevention in AF (SPAF) treatment according to the 2010 guidelines. When the 2012 guidelines were applied, 39 patients (59.1%) were receiving appropriate SPAF treatment ($P<.001$). For those with CHADS₂ scores of 1, 88.4% of patients had appropriate SPAF treatment according to the 2010 guidelines, but only 55.1% were adequately treated according to the 2012 guidelines ($P<.001$). Of the patients at the highest risk (CHADS₂ score >1), 68.1% were adequately treated with anticoagulation and an additional 8.7% (6 of 69) had documented reasons why they were not taking anticoagulants.

Conclusion When assessed using the 2012 Canadian Cardiovascular Society AF guidelines, the proportion of patients receiving appropriate SPAF therapy in this primary care setting decreased substantially. All patients with CHADS₂ scores of 0 or 1 should be reassessed to ensure that they are receiving optimal stroke prevention treatment.

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Le traitement de la fibrillation auriculaire par anticoagulation dans une grande clinique urbaine de médecine familiale

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Résumé

Objectif Déterminer la proportion des patients souffrant de fibrillation auriculaire (FA) en milieu de soins primaires qui reçoivent un traitement de prévention des accidents vasculaires cérébraux conforme aux directives de la Société canadienne de cardiologie, et ce, en utilisant les directives précédentes (2010) ou les directives mises à jour de 2012.

POINTS DE REPÈRE DU RÉDACTEUR

- Chez les patients qui ont un score de 0 et de 1 au CHADS₂ (pour : Congestive heart failure, Hypertension, Age > 75, Diabetes mellitus, et Stroke ou ischémie cérébrale transitoire), la proportion des traitements de la fibrillation auriculaire qui étaient conformes aux directives de la Société canadienne de cardiologie était significativement plus basse lorsqu'on utilisait les directives de 2012 par rapport à celles de 2010 ($P < .001$).
- Tous les patients qui ont des scores de 0 ou de 1 au CHADS₂ devraient être réévalués de façon à s'assurer qu'ils reçoivent le traitement optimal pour prévenir les accidents vasculaires cérébraux, et ce, selon leur risque individuel et en utilisant les nouveaux outils de stratification du risque.
- Il y a lieu d'instaurer des activités de formation à l'intention des soignants de première ligne pour qu'ils prennent connaissance de la nouvelle brèche dans la qualité des soins qui résulte des recommandations plus strictes.

Cet article a fait l'objet d'une révision par des pairs.
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Type d'étude Revue rétrospective de dossiers.

Participants Patients des soins primaires (N=204) souffrant de fibrillation auriculaire. L'âge moyen était de 71,3 ans et 53,4% étaient des femmes.

Contexte Une grande clinique communautaire urbaine de médecine familiale à Toronto, Ontario.

Principaux paramètres à l'étude Caractéristiques démographiques des patients, p. ex. sexe et âge; liste des médicaments actuels pour le cœur, incluant les anticoagulants et les antiplaquettaires; nombre total de médicaments; histoire pertinente, passée et présente, incluant la présence de diabète, d'accident vasculaire cérébral ou d'ischémie cérébrale transitoire, d'hypertension et de maladie vasculaire; nombre de visites au médecin de famille et au cardiologue au cours de l'année précédente et des 5 dernières années, et combien de ces visites étaient pour de la FA; nombre de visites à l'urgence ou d'hospitalisations pour de la FA, de l'insuffisance cardiaque ou pour un accident vasculaire cérébral; le patient prenait-il de la warfarine, à quelle fréquence les INR ont été enregistrés et combien de fois les valeurs étaient à l'intérieur de la normale; le score CHADS₂ (pour : Congestive heart failure, Hypertension, Age > 75, Diabetes mellitus, et Stroke ou ischémie cérébrale transitoire) s'il a été noté; et les raisons pour ne pas prendre des anticoagulants oraux lorsque c'était indiqué, si elles ont été notées.

Résultats Parmi les patients qui avaient un score de 0 au CHADS₂, 64 (97,0%) recevaient le traitement approprié pour prévenir un accident vasculaire cérébral secondaire à la FA d'après les directives de 2010. Lorsqu'on utilisait plutôt les directives de 2012, 39 patients (59,1%) recevaient le traitement préventif approprié ($P < .001$). Parmi les patients qui avaient un score de 1 au CHADS₂, 88,4% avaient le traitement préventif approprié selon les directives de 2010, alors que seulement 55,1% d'entre eux étaient traités adéquatement d'après les directives de 2012 ($P < .001$). Dans le cas des patients présentant le risque le plus élevé (score > 1 au CHADS₂), 68,1% recevaient une anticoagulation correcte, tandis qu'un autre 8,7% (6 patients sur 69) avaient des raisons documentées pour ne pas prendre d'anticoagulants.

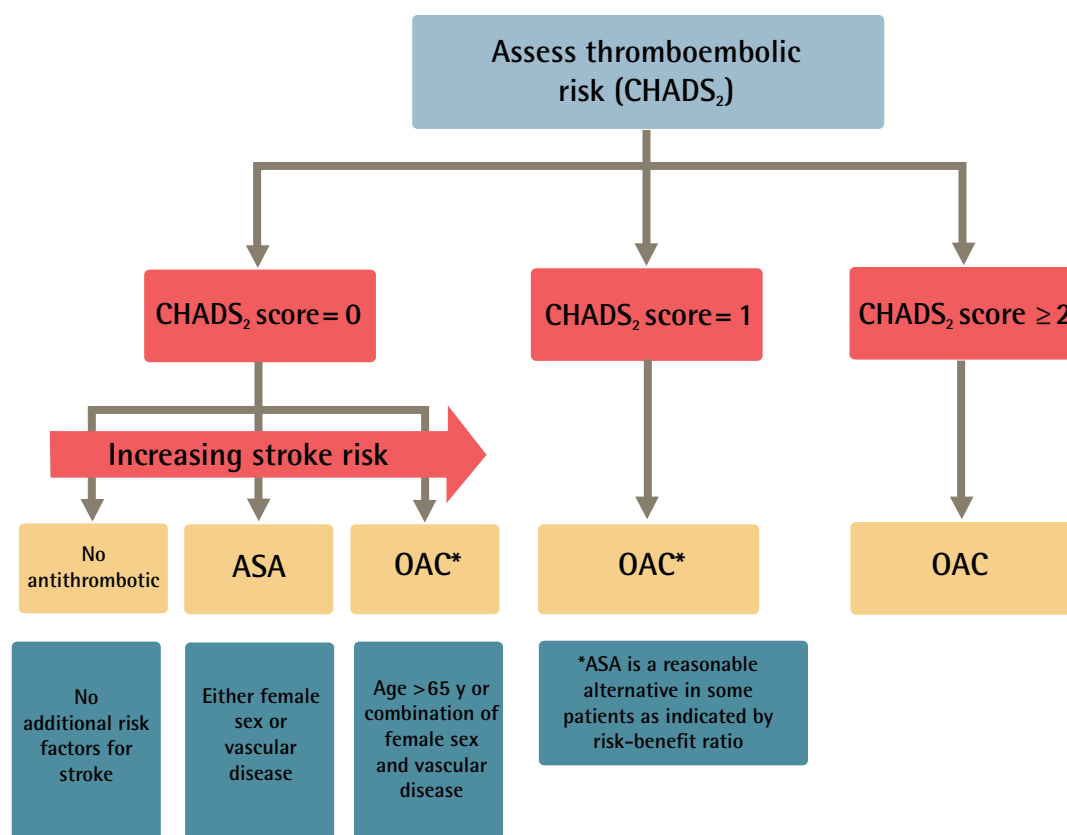
Conclusion Lorsqu'on utilise les directives de 2012 de la Société canadienne de cardiologie pour la FA pour déterminer la proportion des patients de ce milieu de soins primaires qui reçoivent un traitement adéquat pour prévenir les accidents vasculaires cérébraux, on observe que cette proportion est beaucoup moindre. Tous les patients qui ont un score de 0 ou de 1 au CHADS₂ devraient être réévalués pour s'assurer qu'ils reçoivent le traitement optimal pour prévenir les accidents vasculaires cérébraux.

Atrial fibrillation (AF) is the most common cardiac arrhythmia, the incidence of which is growing as the population ages.^{1,2} Patients with AF account for 15% of all stroke patients, leaving them with an increased risk of death, or a new disability in 60% of cases.³ Fortunately, stroke prevention therapy (eg, anticoagulation) can reduce the risk of stroke in patients with AF by almost two-thirds.^{4,5} However, systematic reviews have found that of all patients at high risk of stroke due to AF, only 51% receive any anticoagulation, and of these patients, their international normalized ratios (INRs) are within the target range only half the time.^{6,7}

Guidelines recommend identification of specific risk factors for stroke in patients with AF.¹⁻⁸ Although formal risk assessment tools incorporating these risk factors have been available for some time,⁹ there is evidence that these are not used consistently to inform selection of treatment.¹⁰⁻¹³ Based on the CHA₂DS₂-VASc (congestive heart failure; hypertension; age ≥ 75 ; diabetes mellitus; stroke or transient ischemic attack; vascular disease [previous myocardial infarction, peripheral artery

disease, or aortic plaque]; age 65 to 74 years; sex category [ie, female]) model,¹⁴ the updated 2012 Canadian Cardiovascular Society guidelines recommend use of a modified CHADS₂ (congestive heart failure, hypertension, age ≥ 75 , diabetes mellitus, and stroke or transient ischemic attack) scoring tool to assess stroke risk (**Figure 1**).¹⁵ Most notably, this tool further refines the risk stratification of patients with a CHADS₂ score of 0 using age (>65 years), female sex, and presence of vascular disease to identify patients who should be taking anticoagulants despite their CHADS₂ scores of 0. These recommendations are in contrast to previous guidelines, which suggested use of a less-precise risk assessment tool (the original CHADS₂) and indicated that acetylsalicylic acid was an appropriate choice for a greater proportion of patients (**Table 1**).^{15,16} In addition to this refinement of risk stratification, the new guidelines also recommend preferential use of new oral anticoagulants (OACs) (eg, dabigatran, rivaroxaban, apixaban) over warfarin.¹⁵ These newer agents have been shown to be at least as good as, and in some cases better than, warfarin with respect

Figure 1. Treatment of atrial fibrillation based on the CHADS₂ score



ASA—acetylsalicylic acid, CHADS₂—congestive heart failure, hypertension, age ≥ 75 , diabetes mellitus, and stroke or transient ischemic attack, OAC—oral anticoagulant.
Adapted with permission from Skanes et al.¹⁵

Table 1. Comparison of treatment recommendations from the Canadian Cardiovascular Society 2010 and 2012 atrial fibrillation guidelines

CHADS ₂ SCORE	RECOMMENDATION
2010 guidelines	
• 0	No treatment or ASA
• 1	ASA or OAC
• ≥2	OAC
2012 guidelines	
• 0 (age ≤65 y, male sex, and no vascular disease)	No treatment
• 0 (either female sex or vascular disease)	ASA
• 0 (age >65 y or female sex with vascular disease)	OAC
• 1	OAC
• ≥2	OAC

ASA—acetylsalicylic acid, CHADS₂—congestive heart failure, hypertension, age ≥75, diabetes mellitus, and stroke or transient ischemic attack, OAC—oral anticoagulant.

Data from Skanes et al.¹⁵ and Cairns et al.¹⁶

to stroke prevention, with less intracranial bleeding. However, there has been more documented gastrointestinal bleeding with dabigatran and rivaroxaban than with warfarin.^{17–19} Despite their relative convenience for patients,²⁰ these medications have had slow uptake for a variety of reasons, including high price, the lack of post-marketing surveillance data, and concern about the lack of treatments to manage bleeding.²¹

Previous studies have found long delays in the implementation of new guideline recommendations in practice.^{22–24} In this study, we sought to determine the proportion of patients with AF in primary care achieving guideline-concordant stroke prevention based on both the previous (2010)¹⁶ and updated (2012)¹⁵ guideline recommendations. Although cognizant that the 2012 guidelines were published around the time of our chart review, we wondered how many patients would be affected by these new guidelines. We hypothesized that the newer recommendations would increase the measurable “care gap” in stroke prevention therapy in primary care.

METHODS

Study design

This study was a retrospective cohort chart review conducted in March 2012 using electronic medical record (EMR) data from a primary care practice. The study was approved by the research ethics board at the University of Toronto in Ontario (protocol no. 27059).

Context

The study was performed in a large urban community family practice in downtown Toronto spread across 2 locations, with 14 family physicians and more than 18000 rostered patients. Through Ontario's primary care reform initiatives, providers are remunerated by capitation when patients are rostered to the practice. In addition, the practice receives salary support from the Ontario Ministry of Health for allied care providers such as nurses, nurse practitioners, pharmacists, dietitians, diabetes educators, and social workers (known as a *family health team*). As part of routine care, patients taking warfarin had the opportunity to see the practice pharmacist or trained nurse for anticoagulation management.

This practice used the Practice Solutions EMR for all clinical notes, billing, and scheduling for all physicians and allied health professionals. Most of the data entry is free text; structured coding of diagnoses is optional. When viewing a patient chart, the current medical concerns, past medical history, and active treatments are easily visible. Currently, there are no standardized decision support tools embedded in the practice's EMR.

In Ontario, the provincial government is the single payer for physician and hospital services. Patients do not copay for hospitalizations or for visits to their primary care practices. Laboratory tests and other investigations are also covered under the health plan. For those older than 65 years and those on social assistance, many prescription medications are covered under the Ontario Drug Benefit plan. At the time of this study, new antithrombotics such as dabigatran and rivaroxaban were not yet covered by the Ontario Drug Benefit plan. Acetylsalicylic acid (325-mg dose) was included in the formulary, as were warfarin and clopidogrel.

Identification of patient cohort

Two approaches were used to identify patients with AF. First, all electrocardiograms (ECGs) conducted between January 1, 2006, and January 1, 2012, were examined by an abstractor looking for ECGs that were identified as having AF. Next, an automated search of the practice's EMR system was conducted, scanning the problem list, past medical history list, consultation notes, physician notes, and billing codes. As the practice's EMR did not use structured data in these sections, a free-text search was developed to cover most probable permutations for describing AF, including variations in nomenclature (Table 2).

Data collection

A multidisciplinary team consisting of pharmacists, internists, cardiologists, family physicians, and nurses collaborated to develop an abstraction manual. The data

Table 2. Search terms for identifying atrial fibrillation in the electronic medical record

SCANNED ITEMS	SEARCH TERMS
Problem list	a fib, afib, a-fib, atrial fib, 427, a. fib, a. fib, fibrillation, a.f., flutter, parox, AF-, AF:
Past medical history	a fib, afib, a-fib, atrial fib, a. fib, a.fib, fibrillation, a.f., flutter, parox, AF-, AF:
Text notes	afib, a-fib, atrial fib, a. fib, a.fib, fibrillation, a.f., atrial flutter
Billing code	427

elements included demographic characteristics such as sex and age; a list of current cardiac medications including anticoagulants and antiplatelets; the total number of medications; relevant current and past medical history including presence of diabetes, stroke or transient ischemic attack, hypertension, and vascular disease; number of visits to the family physician and cardiologist in the past year and past 5 years, and how many of these were for AF; the number of visits to the emergency department or hospitalizations for AF, congestive heart failure, or stroke; if patients were taking warfarin, how often their INRs were recorded, and how many times they were in the reference range; CHADS₂ or CHA₂DS₂-VASC score, if recorded; and reason for not taking OACs when they should have been, if recorded.

An abstractor was trained in use of the EMR system and was made aware of the various ways data were entered and could therefore be extracted. A family physician investigator and member of the practice (A.V.) double-checked the relevant data for determining whether stroke prevention treatment was concordant with guidelines. A sample of 15 charts was reviewed by a family physician for accuracy of data extraction, with 100% concordance. In addition to any CHADS₂ scores reported in the charts, the family physician used clinical data available at the time of abstraction to determine up-to-date CHADS₂ scores.

Analysis

Categorical variables for patient factors were compared using McNemar tests or χ^2 tests as appropriate.

RESULTS

There were 204 patients identified as having AF, representing 1.1% of the total practice (**Table 3**). Of patients with AF, 92.4% visited their family physicians within the past year and 69.1% visited their cardiologists during this time. When assessing the reason for their visits in the past year, 30.6% of all visits were for AF, and during the past 5 years, 62.4% visits were for AF. Of all patients taking OACs, 86.3% were taking warfarin, 12.6% were

Table 3. Population characteristics: N = 204.

CHARACTERISTIC	VALUE
Female sex, %	53.4
Mean age (range), y	71.3 (37-103)
Mean medications (range)	6.6 (0-25)
Mean active medical problems (range)	5.1 (0-17)
Rate control medications, %	61.3
Diabetes, %	13.2
Coronary artery disease, %	14.7
Hypertension, %	37.3
History of CVA or TIA, %	8.3
Congestive heart failure, %	10.8
Have cardiologists, %	78.9
CHADS ₂ score, n (%)	
• 0	66 (32.4)
• 1	69 (33.8)
• 2	44 (21.6)
• 3	15 (7.4)
• 4	7 (3.4)
• 5	2 (1.0)
• 6	1 (0.5)

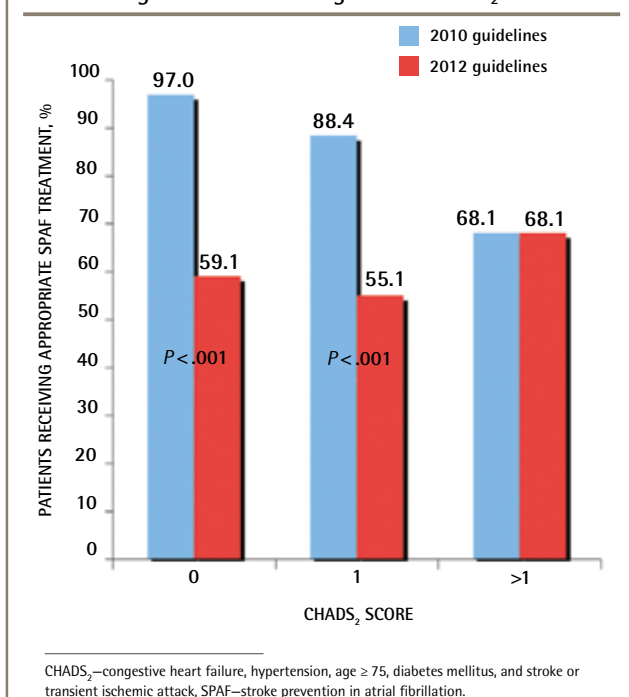
CHADS₂—congestive heart failure, hypertension, age ≥ 75 , diabetes mellitus, and stroke or TIA, CVA—cerebrovascular accident, TIA—transient ischemic attack.

taking the newer OAC dabigatran, and 1.1% were taking rivaroxaban.

Sixty-six patients (32.4%) had a CHADS₂ score of 0, 69 patients (33.8%) had a CHADS₂ score of 1, and 69 patients (33.8%) had a CHADS₂ score of 2 or greater.

Of the highest-risk patients (CHADS₂ score > 1), 68.1% were taking OACs, which is concordant with both the 2010 and 2012 guidelines and an additional 8.7% (6 of 69) had documented reasons why they were not taking OACs. The main reasons for patients not taking OACs were high bleeding risk and patient preference. For patients who had CHADS₂ scores of 0, 64 patients (97.0%) were receiving appropriate stroke prevention in AF (SPAF) treatment according to the 2010 guidelines (**Figure 2**). When the 2012 guidelines were applied, 39 patients (59.1%) were receiving appropriate SPAF treatment ($P < .001$). For those with CHADS₂ scores of 1, the change in guidelines meant going from 88.4% receiving appropriate SPAF treatment to only 55.1% being adequately treated ($P < .001$).

Of all patients with AF, 48 (23.5%) had documented CHADS₂ scores. Of all patients with AF, 153 (75.0%) had AF documented on the problem list. Overall, having AF on the problem list or a documented CHADS₂ score was not associated with improved processes of care or optimal prescribing. However, there was a trend toward

Figure 2. Concordance of the 2010 and 2012 atrial fibrillation guidelines according to the CHADS₂ score

significance when only the highest-risk patients were assessed (ie, CHADS₂ score ≥ 2). In this population, 76.6% of patients with documented AF were taking appropriate therapy versus 42.9% who did not have documented AF ($P = .08$).

DISCUSSION

In this primary care setting that uses EMRs and point-of-care anticoagulation clinics, we found that a high proportion of patients with AF had adequate stroke prevention therapy. In particular, the proportion of patients taking appropriate anticoagulation therapy according to the 2010 guidelines was substantially higher than in other studies.^{6,7,24,25} However, we also found that 39.2% of patients were not receiving treatment in accordance with the new guidelines.

Family physicians often make the diagnosis of AF and have most frequent contact with patients with AF; therefore, they are the most likely to initiate anticoagulation treatment and provide ongoing monitoring and periodic reassessment of stroke risk.²⁶ Educational efforts aimed at primary care practitioners appear to increase adherence to OACs.^{27,28} There might also be a specific need for non-biased educational efforts regarding the new OACs. Given that several studies have shown poor uptake of guidelines,^{22,23} carefully designed and implemented knowledge translation initiatives will likely be necessary to further improve guideline concordance. Knowledge

translation initiatives that simultaneously address the patient, physician, and practice levels while engaging interdisciplinary teams^{29,31} seem to be effective. Other initiatives that have been successful include provincial health databases to notify physicians and patients that follow-up care is needed,³² use of electronic data management systems to issue guideline-specific reminders to physicians,^{31,33} and dashboard assistance within EMRs (ie, electronic clinical decision support).³⁴ Finally, identifying the reason—clinical or otherwise—that a patient might not be receiving the correct anticoagulation therapy might also shrink the care gap.³⁵


Similar to other EMR chart reviews,³⁶ we found that a quarter of patients with AF were not identified by the problem list or the past medical history as having AF. We did not find that such patients were less likely to have adequate stroke prevention therapy, possibly because these patients had long-standing, well-controlled AF that the physicians did not transfer to their EMRs, as it was not an active issue. Nevertheless, to facilitate future chart audits and quality assurance or improvement, continued efforts to improve EMR data entry are necessary. Specifically, use of a search engine optimized for assessing free text in EMRs would increase the accuracy of identifying at-risk patients.³⁷ Also, it has been shown that the use of algorithms or rules for inferring patient problems is a more accurate method for identifying patients with certain medical conditions compared with relying on the EMR problem list.³⁸

Limitations

The results might not be generalizable, given that the population studied was relatively young and part of a large urban family practice with ready access to cardiologists. These factors likely contributed to the higher guideline concordance found in this practice compared with what has been previously reported. Although substantial effort was made to identify patients with AF in this practice, it is possible that some patients with AF were missed. It is also possible that documentation was poor for contraindications to OACs, which would falsely increase the apparent discrepancy between guideline recommendations and observed practices. For instance, although the 2012 guidelines recommend use of a bleeding risk score such as HAS-BLED (hypertension [systolic blood pressure > 160 mm Hg], abnormal renal or liver function, stroke [caused by bleeding], bleeding, labile INR, elderly [age > 65 years], drugs [acetylsalicylic acid or non-steroidal anti-inflammatory drugs] or alcohol [≥ 8 drinks per week]), we were unable to abstract this information.

Conclusion

In an urban family practice setting, we applied the 2010 and 2012 Canadian Cardiovascular Society guidelines to 204 patients with AF. We found that in patients

with CHADS₂ scores of 0 and 1, the rates of guideline-concordant management were significantly lower when applying the 2012 guidelines ($P < .001$). All patients with CHADS₂ scores of 0 and 1 should be reassessed to ensure that they are receiving optimal stroke prevention treatment according to their individualized risk, using new risk stratification tools. Knowledge translation activities targeting primary care providers to address the new quality-of-care gap generated by more stringent recommendations are needed. 

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Contributors

All authors have contributed to the concept and design of the protocol and to drafting the manuscript, and have read the manuscript and given final approval for publication.

Competing interests

None declared

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