Evaluating the potential for pharmacists to prescribe oral anticoagulants for atrial fibrillation

Roopinder K. Sandhu, MD, MPH; Lisa M. Guirguis, BScPharm, PhD; Tammy J. Bungard, BSP, PharmD; Erik Youngson, MMath; Lisa Dolovich, PharmD, MSc ; Jamie C. Brehaut, PhD; Jeff S. Healey, MD, MSc; Finlay A. McAlister, MD, MSc

ABSTRACT

Background: Oral anticoagulant therapy (OAC) to prevent atrial fibrillation (AF)-related strokes remains poorly used. Alternate strategies, such as community pharmacist prescribing of OAC, should be explored.

Methods: Approximately 400 pharmacists, half with additional prescribing authority (APA), randomly selected from the Alberta College of Pharmacists, were invited to participate in an online survey over a 6-week period. The survey consisted of demographics, case scenarios assessing appropriateness of OAC (based on the 2014 Canadian Cardiovascular Society AF guidelines) and perceived barriers to prescribing. Regression analysis was performed to determine predictors of knowledge.

Results: A total of 35% (139/397) of pharmacists responded to the survey, and 57% of these had

APA. Depending on the case scenario, 55% to 92% of pharmacists correctly identified patients eligible for stroke prevention therapy, but only about a half selected the appropriate antithrombotic agent; there was no difference in the knowledge according to APA status. In multivariable analysis, predictors significantly associated with guideline-concordant prescribing were having the pharmacist interact as part of an interprofessional team ($p = 0.04$) and direct OAC (DOAC) self-efficacy (confidence in ability to extend, adapt, initiate or alter prescriptions; $p = 0.02$). Barriers to prescribing OAC for APA pharmacists included a lack of AF and DOAC knowledge and preference for consulting the physician first, but these same pharmacists also identified difficulty in contacting the physician as a major barrier.

Interpretation and Conclusion: Community pharmacists can identify patients who would benefit from stroke prevention therapy in AF. However, physician collaboration and further training on AF and guidelines for prescribing OAC are needed. *Can Pharm J (Ott)* 2018;151:51-61.

Introduction

Atrial fibrillation (AF) is the most common arrhythmia¹ and the leading cause of stroke.² AF-related strokes are associated with significant morbidity² and mortality,^{3,4} and costs are considerable, approximately \$3.6 billion annually in Canada.⁵ Despite robust evidence that oral anticoagulation (OAC) therapy is effective and safe in preventing stroke,^{6,7} and the availability of simple risk schema and guidelines providing strong

recommendations⁸⁻¹⁰ on who would benefit from OAC, fewer than two-thirds of eligible patients are prescribed appropriate therapies.¹¹⁻¹³ The public health consequences of undertreated AF are enormous; thus, alternative strategies to deliver stroke prevention therapy, such as pharmacist-directed interventions, need to be explored.

Pharmacist practices have been evolving over the past century, from medication dispensing to managing drug therapy and prescribing.

Despite robust evidence that oral anticoagulation therapy is effective and safe for stroke prevention in patients with atrial fibrillation (AF), there is a lack of real-world application. The public health consequences of undertreated AF are enormous; thus, exploring alternative strategies to deliver stroke prevention therapy is needed.

Alors qu'il existe de solides données attestant de l'efficacité et de l'innocuité de l'anticoagulothérapie orale pour la prévention des accidents vasculaires cérébraux (AVC) chez les patients atteints de fibrillation auriculaire (FA), on possède peu d'information en situation réelle. En raison des conséquences désastreuses d'un traitement inadéquat de la FA pour la santé publique, il est nécessaire d'explorer d'autres stratégies pour la prestation des traitements permettant de prévenir les AVC.

KNOWLEDGE INTO PRACTICE

- Atrial fibrillation (AF) is the most common arrhythmia and the leading cause of stroke.
- AF-related strokes are associated with considerable morbidity and mortality, yet are highly preventable with oral anticoagulation (OAC) therapy.
- The emergence of direct oral anticoagulants (DOACs) has made it easier, safer and more convenient to initiate OAC than warfarin.
- This study explores pharmacists' current knowledge of stroke prevention in AF and potential barriers to prescribing OAC therapy.
- The majority of pharmacists identified patients eligible for stroke prevention, but decisions regarding which drug therapy to use were lacking. Pharmacists recognized confidence in AF and DOAC knowledge as barriers to prescribing, and pharmacists preferred to contact a physician prior to OAC initiation.
- A strategy to address existing treatment gaps may be prescribing of stroke prevention therapy by community pharmacists, but this requires a framework for physician collaboration and appropriate training about guideline recommendations for OAC therapy.

Since 2007, pharmacists in Alberta have had the opportunity to apply for additional prescribing authority (APA) after at least 1 year of full-time experience in direct patient care and demonstrating their ability to practise and document according to the Standards of Practice for Pharmacists and Pharmacy Technicians.¹⁴ There are numerous studies demonstrating that pharmacist involvement in disease monitoring and optimization of drug therapies for cardiovascular risk factors and heart failure increases adherence to guideline-based targets and improves outcomes.¹⁵⁻¹⁷

In meta-analyses, compared to usual care, pharmacist-directed care or pharmacist collaborative care with nurses or physicians was associated with significant reductions in systolic blood pressure,¹⁸ low-density lipoprotein,¹⁹ improved hemoglobin A1c²⁰ and reduced heart failure hospitalizations.²¹

Pharmacist-led anticoagulation clinics for AF have been shown to improve adequacy of anticoagulation, patient satisfaction and quality of life.²²⁻²⁴ In recent years, randomized clinical trials have shown that compared to warfarin, direct OAC (DOAC) therapies are easier to administer and reduce the risk of stroke/systemic embolism by 23%, total mortality by 11% and intracranial bleeding events by 54%.⁷ The health care burden of stroke due to poor prophylaxis with antithrombotic therapy in AF demands capitalization on existing frameworks to improve

patient outcomes. Given that we now have DOACs that should simplify care delivery (compared to warfarin) and pharmacists legislated to prescribe, we explored the potential for prescribing of antithrombotic therapy for AF by pharmacists, focusing on appropriateness of therapy and potential barriers to prescribing.

Methods

Study design

A cross-sectional Web-based survey of pharmacists in Alberta was conducted from February to March 2016.

Survey questionnaire

The survey questionnaire was constructed to explore community pharmacists' prescribing specific to the appropriateness of antithrombotic therapy (as per the 2014 Canadian Cardiovascular Society AF guidelines) and perceived barriers to care.⁹ It was adapted from 2 prior surveys.^{25,26} The first explored pharmacists' prescribing habits in practice, and the second was a set of cases adapted to explore physicians' knowledge of DOACs in AF. The survey was reviewed by authors of this manuscript, including a physician who was a member of the guideline writing task force and pharmacists and physicians with expertise in AF research. A pharmacist independent from the study investigators completed the survey to provide feedback on the clarity of the questions.

The survey included questions on demographics (sex, highest level of education, year of obtaining license, type of position, work status, APA status), practice characteristics (practice location, practice setting, access to electronic medical records [i.e., the Alberta-wide Netcare electronic record, which includes all laboratory tests, hospital discharge summaries, emergency room visit records and diagnostic imaging]), method of interaction with physicians, practice patterns for prescribing (self-efficacy defined as confidence in ability to extend, adapt, initiate or alter prescriptions), 4 clinical case scenarios (history, physical exam, labs and imaging) and questions to determine reasons for choosing DOAC or warfarin and to identify perceived barriers to prescribing OAC and contacting the patient's physician. Each of the 4 case scenarios asked if antithrombotic therapy should be initiated (yes or no) and which drug would be most appropriate (aspirin, warfarin, DOAC). We also asked

if the patient's physician would be contacted to initiate OAC if the pharmacists did not have APA status, as well as if pharmacists with APA status and an existing relationship with a patient would initiate OAC and, if the answer was "no," whether the physician would be contacted to initiate therapy. The survey also captured practice location categorized by population, setting based on type of pharmacy practice and method of interaction with physicians.

Data collection

The survey was sent to 397 pharmacists, half with APA, randomly selected from a master list obtained through the Alberta College of Pharmacists using a computerized program. The Population Research Laboratory in the Department of Sociology at the University of Alberta sent a presurvey letter approximately 2 weeks prior to the email with the survey link containing information about the study and a \$5.00 coffee card as appreciation of the pharmacist's time and consideration for participating in the study. This was followed by an email with a link to the online survey. Pharmacists received a reminder each week over the 6-week period.

Inclusion and exclusion criteria

Pharmacists included in the study had a practising license with the Alberta College of Pharmacists and had to reside in Alberta. Pharmacists who reported not having regular involvement in patient care in the prior 6 months of survey administration were excluded ($n = 5$), leaving 134 pharmacists for the analysis.

Consent and ethical consideration

This research project was approved by the University of Alberta Ethics Board. Participant consent was voluntary and online submission of the completed survey indicated consent. All data collected were anonymous and used in an aggregated format.

Statistical analysis

Descriptive statistics were used to report the frequencies, percentages, means and standard deviations for the survey responses. Categorical variables were compared using a chi-square test, and a t test was used for continuous variables with significance value of <0.05 . A stepwise regression analysis was performed to identify predictors of knowledge, with entry criterion of $p < 0.10$ and stay criterion of

MISE EN PRATIQUE DES CONNAISSANCES

- La fibrillation auriculaire (FA) est la forme la plus fréquente d'arythmie et également la principale cause d'accident vasculaire cérébral (AVC).
- Les AVC liés à la FA sont associés à une morbidité et à une mortalité considérables; ils sont pourtant hautement évitables grâce à l'anticoagulothérapie orale (ACO).
- L'arrivée des anticoagulants oraux directs (ACOD) a rendu l'ACO plus facile, plus sûre et plus pratique que l'ACO par la warfarine.
- La présente étude vise à évaluer les connaissances actuelles des pharmaciens sur la prévention de l'AVC en présence de FA et à examiner les obstacles potentiels à la prescription d'une ACO.
- La majorité des pharmaciens ont été en mesure de déterminer les patients admissibles à un traitement préventif de l'AVC, mais ont éprouvé des difficultés à choisir le traitement à utiliser. Les pharmaciens ont reconnu que leur degré de confiance à l'égard de leurs connaissances sur la FA et les ACOD constituait un obstacle à la prescription de ces médicaments, et ils ont dit préférer consulter un médecin avant d'instaurer une ACO.
- La prescription d'un traitement préventif de l'AVC par les pharmaciens communautaires pourrait être un moyen de pallier les lacunes actuelles en matière de traitement; cela requiert toutefois l'établissement d'un cadre de collaboration avec les médecins et la mise en place d'une formation adéquate sur les recommandations des lignes directrices en matière d'ACO.

$p < 0.05$. The predictors included in the model were highest level of education, practice location, practice setting, interaction with physicians (fax, phone/face-to-face, interprofessional team), percentage of time involved in patient care services, percentage of time on medication preparatory activities, busyness, frequency of prescribing, warfarin self-efficacy and DOAC self-efficacy. Statistical analyses were performed using SAS v9.3 (SAS Institute, Cary, NC).

Results

Demographics and practice characteristics

A total of 35% (139/397) of pharmacists responded to the survey; of these, 57% had APA. Overall, 67% of the pharmacists were female, 82% had a bachelor's degree and the majority worked full-time (79%) at community pharmacies (71%, Table 1). Pharmacists with APA were more often in a manager/director or clinical practice leader role than pharmacists without APA ($p = 0.03$). All pharmacists had access to Netcare, and 81% used it "routinely" for reviewing lab values, over half for reviewing medical

TABLE 1 Baseline demographics and practice characteristics

Variable	Total (<i>n</i> = 134)	APA (<i>n</i> = 77)	Non-APA (<i>n</i> = 57)	<i>p</i> -Value
Demographics				
Male	44 (33.3)	24 (32.0)	20 (35.1)	0.71
License year				0.19
Pre-1995	33 (26.4)	20 (28.7)	13 (24.1)	
1995-2000	13 (10.4)	9 (12.7)	4 (7.4)	
2001-2005	18 (14.4)	11 (15.5)	7 (13.0)	
2006-2010	25 (20.0)	16 (22.5)	9 (16.7)	
2011-2015	36 (28.8)	15 (21.1)	21 (38.9)	
Highest level of education				0.91
Bachelor's	108 (81.8)	60 (80.0)	48 (84.2)	
PharmD	2 (1.5)	1 (1.3)	1 (1.8)	
Residency	8 (6.1)	5 (6.7)	3 (5.3)	
Advanced academic/research	14 (10.6)	9 (12.0)	5 (8.8)	
Work status				0.24
Full-time	103 (78.6)	64 (84.2)	39 (70.9)	
Part-time	25 (19.1)	11 (14.5)	14 (25.5)	
Casual	2 (1.5)	1 (1.3)	1 (1.8)	
Not working	1 (0.8)	0 (0.0)	1 (1.8)	
Practice characteristics				
Practice location, <i>n</i> (%)				0.18
Large urban ($\geq 100,000$)	72 (54.5)	43 (56.6)	29 (51.8)	
Medium urban ($\geq 30,000$ -99,999)	29 (22.0)	20 (26.3)	9 (16.1)	
Small urban (1000-29,999)	28 (21.2)	12 (15.8)	16 (28.6)	
Rural (≤ 999)	3 (2.3)	1 (1.3)	2 (3.6)	
Practice setting, <i>n</i> (%)				0.15
Community or outpatient	95 (70.9)	50 (64.9)	45 (78.9)	
Community-based team	12 (9.0)	10 (13.0)	2 (3.5)	
Inpatient hospital	19 (14.2)	13 (16.9)	6 (10.5)	
Long-term care	8 (6.0)	4 (5.2)	4 (7.0)	
Current position, <i>n</i> (%)				0.03
Manager/director	43 (32.1)	30 (39.0)	13 (22.8)	
Assistant/associate manager	4 (3.0)	2 (2.6)	2 (3.5)	
Clinical practice leader	6 (4.5)	6 (7.8)	0 (0.0)	
Staff	77 (57.5)	36 (46.8)	41 (71.9)	
Consultant	2 (1.5)	1 (1.3)	1 (1.8)	
Other	2 (1.5)	2 (2.6)	0 (0.0)	
In the last 30 days how would you describe your typical day? <i>n</i> (%)				0.31
Slow	2 (1.5)	2 (2.6)	0 (0.0)	
Slow with busy times	23 (17.2)	17 (22.1)	6 (10.5)	
Busy with slow times	43 (32.1)	22 (28.6)	21 (36.8)	
Busy	31 (23.1)	15 (19.5)	16 (28.1)	

TABLE 1 (continued)

Variable	Total (n = 134)	APA (n = 77)	Non-APA (n = 57)	p-Value
Very busy	32 (23.9)	19 (24.7)	13 (22.8)	
Frantic	3 (2.2)	2 (2.6)	1 (1.8)	
Access to Netcare, n (%)	134 (100.0)	77 (100.0)	57 (100.0)	NA
Interaction with physicians (not mutually exclusive categories), n (%)				
None	2 (1.5)	1 (1.3)	1 (1.8)	0.83
Consult by fax	100 (74.6)	53 (68.8)	47 (82.5)	0.07
Consult by phone	84 (62.7)	45 (58.4)	39 (68.4)	0.24
Consult face-to-face	54 (40.3)	35 (45.5)	19 (33.3)	0.16
Work together in a team	40 (29.9)	29 (37.7)	11 (19.3)	0.02
In a typical month, % time in the following activities (mean, SD)				
Third-party coverage	11.0 (10.5)	9.2 (9.7)	13.3 (11.1)	0.03
Medication activities	34.5 (21.0)	31.6 (21.2)	38.4 (20.3)	0.07
Patient care services	37.7 (21.0)	39.9 (21.2)	34.6 (20.7)	0.15
Management/business	11.5 (14.1)	13.2 (12.2)	9.3 (16.1)	0.12
Other	5.4 (6.9)	6.1 (7.7)	4.4 (5.6)	0.17
Frequency of prescribing, n (%)				0.04
Multiple times a day	50 (37.3)	34 (44.2)	16 (28.1)	
Once a day	23 (17.2)	11 (14.3)	12 (21.1)	
Several times a week	31 (23.1)	20 (26.0)	11 (19.3)	
Several times a month	26 (19.4)	10 (13.0)	16 (28.1)	
Once a month or less	2 (1.5)	2 (2.6)	0 (0.0)	
Zero	2 (1.5)	0 (0.0)	2 (3.5)	

APA, additional prescribing authority; NA, not applicable.

history (i.e., discharge summaries) and almost a third to review imaging. The use of Netcare for medical history was more frequent among pharmacists with APA status compared to those without (61% versus 46%, $p = 0.009$). In terms of interaction with physicians, the most common method was through fax (75%), and pharmacists with APA reported working together with physicians in a defined team more often than pharmacists without APA (38% versus 19%, $p = 0.02$).

Responses to case scenarios

The case scenarios and responses are shown in Table 2. While the majority of pharmacists were able to identify patients who were eligible for stroke prevention therapy, there was difficulty in interpreting a patient (scenario 3) who would be high risk for bleeding. Pharmacists were not familiar with the appropriate antithrombotic agent to use, particularly when aspirin was

applicable (scenario 2), and over half would initiate a drug other than warfarin for valvular AF (scenario 4). There was no difference in anti-thrombotic selection according to APA status. Univariate predictors of knowledge were practice setting ($p = 0.03$), interaction with physician ($p = 0.02$), percent time performing patient care services ($p = 0.01$) and DOAC self-efficacy (confidence in ability to extend, adapt, initiate or alter DOAC, $p = 0.01$). After multivariable analysis, the only significant predictors of knowledge were interaction with physicians ($p = 0.04$) and DOAC self-efficacy ($p = 0.02$).

Barriers to prescribing OAC

Pharmacists were asked to provide reasons they might choose warfarin or DOAC in the case scenarios where OAC was indicated. Cost of therapy (81%) and absence of special authorization (49%) were the most common reasons for

TABLE 2 Responses to case scenarios according to additional prescribing authorization status

Scenario 1: The patient is a 66-year-old male, a teacher who participates in regular physical activity. He has a 5-year history of permanent atrial fibrillation that is asymptomatic. For rate control, he takes metoprolol 25 mg bid. He is not taking any antithrombotic therapy. The rest of his medical history is unremarkable, including no history of diabetes, hypertension or other cardiovascular risk factors. He is taking no other regular medications. He appears fit. Blood pressure is 130/65; pulse is 78 and irregularly irregular. All laboratory work, including complete blood count, electrolytes, urea, creatinine and TSH, is normal. ECG confirms atrial fibrillation at 80 beats per minute but is otherwise unremarkable. Echocardiogram also shows atrial fibrillation but is otherwise unremarkable (normal chamber sizes, normal systolic function and no valvular abnormalities).				
a. Should the patient be on OAC or antiplatelet therapy?	All	APA	No APA	0.17
Yes	95 (70.9)	51 (66.2)	44 (77.2)	
No	39 (29.1)	26 (33.8)	13 (22.8)	
b. If yes, which therapy?				0.46
Aspirin	42 (44.2)	20 (39.2)	22 (50.0)	
Warfarin	12 (12.6)	6 (11.8)	6 (13.6)	
DOAC	41 (43.2)	25 (49.0)	16 (36.4)	
Scenario 2: The patient is a 63-year-old woman. She lives at home with her husband; she is cognitively intact (as is her husband) and is fully independent and active for her age. Medical history includes myocardial infarction 4 years ago, with no residual deficits, and paroxysmal atrial fibrillation. Current medications include ramipril 5 mg daily, atorvastatin 20 mg daily and atenolol 50 mg daily. She recalled taking aspirin in the past but stopped on her own years ago. The patient looks well for her age. Blood pressure is 138/75; pulse is 83 but irregularly irregular. All laboratory work, including complete blood count, electrolytes, urea, creatinine and TSH, is normal. ECG confirms atrial fibrillation at 80 beats per minute and is also consistent with an old posterior myocardial infarction (but is otherwise unremarkable). Echocardiogram also shows atrial fibrillation and mildly decreased posterior wall motion but is otherwise unremarkable (normal chamber sizes, normal systolic function and no valvular abnormalities).				
a. Should the patient be on OAC or antiplatelet therapy?	All	APA	No APA	0.81
Yes	122 (91.7)	71 (92.2)	51 (91.1)	
No	11 (8.3)	6 (7.8)	5 (8.9)	
b. If yes, which therapy?				0.94
Aspirin	52 (42.6)	31 (43.7)	21 (41.2)	
Warfarin	20 (16.4)	11 (15.5)	9 (17.6)	
DOAC	50 (41.0)	29 (40.8)	21 (41.2)	
Scenario 3: The patient is a 64-year-old man. He lives at home with his wife; he is cognitively intact (as is his wife) and is fully independent and active for his age. Medical history includes permanent atrial fibrillation, significant bleeding after dental procedures on 2 occasions and abnormal liver function. Despite efforts made to persuade him to curtail his ongoing alcohol use, he reports drinking 3 to 4 drinks per day. The patient looks well for his age. Blood pressure is 138/75; pulse is 83 but irregularly irregular. All laboratory work, including complete blood count, electrolytes, urea, creatinine and TSH, is normal, except his ALT is 100 and INR is 1.3. ECG confirms atrial fibrillation at 80 beats per minute but is otherwise unremarkable. Echocardiogram also shows atrial fibrillation but is otherwise unremarkable (normal chamber sizes, normal systolic function and no valvular abnormalities).				
a. Should the patient be on OAC or antiplatelet therapy?	All	APA	No APA	0.61
Yes	59 (44.7)	33 (42.9)	26 (47.3)	
No	73 (55.3)	44 (57.1)	29 (52.7)	
b. If yes, which therapy?				0.33
Aspirin	12 (20.3)	7 (21.2)	5 (19.2)	
Warfarin	9 (15.3)	3 (9.1)	6 (23.1)	
DOAC	38 (64.4)	23 (69.7)	15 (57.7)	

TABLE 2 (continued)

Scenario 4: The patient is a 74-year-old woman. She lives at home with her husband; she is cognitively intact (as is her husband) and is fully independent and active for her age. Medical history includes rheumatic fever and mechanical mitral valve replacement, hypertension, paroxysmal atrial fibrillation and ischemic stroke 4 years ago, with no residual deficits. Current medications include hydrochlorothiazide 25 mg daily and atenolol 50 mg daily. She recalled taking aspirin in the past but stopped on her own years ago. The patient looks well for her age. Blood pressure is 138/75; pulse is 83 but irregularly irregular. All laboratory work, including complete blood count, electrolytes, urea, creatinine and TSH, is normal. ECG confirms atrial fibrillation at 80 beats per minute but is otherwise unremarkable. Echocardiogram also shows atrial fibrillation and normally functioning mechanical mitral valve but is otherwise unremarkable (normal chamber sizes, normal systolic function and no other valvular abnormalities).				
a. Should the patient be on OAC or antiplatelet therapy?	All	APA	No APA	0.40
Yes	123 (91.8)	72 (93.5)	51 (89.5)	
No	11 (8.2)	5 (6.5)	6 (10.5)	
b. If yes, which therapy?				0.43
Aspirin	6 (4.9)	2 (2.8)	4 (7.8)	
Warfarin	68 (55.3)	41 (56.9)	27 (52.9)	
DOAC	49 (39.8)	29 (40.3)	20 (39.2)	

Guideline-concordant answers are **italicized in bold font**. For case scenario 1, warfarin or direct oral anticoagulant (DOAC) was considered correct. Values are displayed as *n* (%) and *p*-value calculated using the chi-square test. ALT, alanine aminotransferase; APA, additional prescribing authority; ECG, electrocardiogram; INR, international normalized ratio; OAC, oral anticoagulant therapy; TSH, thyroid-stimulating hormone.

choosing warfarin, while fewer drug-drug/drug-food interactions (81%), lack of blood work (73%) and better safety profile in preventing brain bleeds (45%) were the most common reasons for choosing a DOAC. For pharmacists with APA, the most common barriers to prescribing OAC (warfarin or DOAC) were a preference for contacting the physician prior to prescribing (82%) and lack of sufficient knowledge about AF (51%, Figure 1). Notably, the most common barrier for prescribing was the ability of the pharmacist to get hold of the physician (Figure 2).

Discussion

This is the first survey exploring the practicality of having pharmacists assessing and prescribing stroke prevention therapies in the management of patients with AF. Pharmacists demonstrated a good understanding of when stroke prophylaxis was appropriate in the case scenarios but had difficulty selecting the appropriate antithrombotic agent. Knowledge did not differ among pharmacists with or without APA, yet pharmacists with APA did indicate confidence in their understanding of AF as a major barrier to prescribing OAC therapy when indicated. Pharmacists expressed a preference for contacting the physician prior to prescribing but noted the inability to contact the physician as a major barrier. The most common

reasons for choosing warfarin over DOAC were cost and need for special authorization, while pharmacists preferred DOAC over warfarin because of fewer interactions, safety profile and the lack of need for coagulation monitoring.

The potential burden of AF-associated stroke is already a critical health issue that will only increase, since the prevalence of AF and stroke attributable to AF increases substantially with age; more than a quarter of Canadians over the age of 75 will develop AF.²⁷ Undertreatment is exposing AF patients to a significant risk of fatal or disabling strokes, particularly among patients who are asymptomatic (in whom AF is unrecognized) and those known to have AF but not receiving adequate OAC therapy. To better identify undertreated patients, studies of AF screening are beginning to emerge, including those involving community pharmacies.^{28,29} We recently conducted the first community-based integrated stroke screening program in pharmacies and found a 2.4% prevalence of newly diagnosed AF among participants ≥ 65 years; 60% had suboptimally controlled blood pressure, and 80% were at intermediate or high risk for developing diabetes.²⁹ Only a small fraction of patients in this study were started on OAC therapy despite high thromboembolic risk profiles, a finding consistent with a national screening

FIGURE 1 Identified barriers for pharmacists with additional prescribing authority prescribing oral anticoagulation therapy in atrial fibrillation **FIGURE 2** Identified barriers preventing pharmacists from contacting a physician to prescribe oral anticoagulant therapy (DOAC or warfarin) when indicated

program in Belgium.³⁰ Even among patients with known AF, studies have shown underutilization of appropriate stroke prevention therapy.^{11,12} Closing the treatment gap in AF through pharmacist-based care is a promising approach to reducing stroke burden.

There are increasing data to suggest the benefits of pharmacist involvement in the screening and management of cardiovascular conditions.¹⁵⁻²¹ Effective management of warfarin for stroke prophylaxis in AF has been demonstrated in pharmacist-based anticoagulation clinics.^{22,23} In a recent randomized controlled study among patients with previous stroke,

pharmacist prescribing of antihypertensive and lipid-lowering drugs led to significantly improved short-term risk factor control compared to a nurse-led disease management control group.¹⁶ A similar positive impact has been demonstrated with risk modification among community pharmacists provided with a training program, including review of evidence-based practices and access to experts.¹⁵ There are several reasons why pharmacists are well placed to deliver stroke prevention therapy in the community: 1) pharmacists are highly accessible,³¹ which is important given the constraints on physicians' time with the management of

multiple chronic diseases of patients,^{32,33} as well as a shortage of physicians; 2) pharmacists have expertise in drug therapy, allowing for effective and safe drug choices^{34,35}; and 3) pharmacists are exposed to a segment of the population that may not seek health care in traditional settings.

To allow community pharmacists to reach optimal knowledge regarding standards of practice and confidence in prescribing OAC in AF requires specific training in AF and frameworks for prescribing OAC, along with creating collaborative environments with local physicians. In our survey, most pharmacists with APA preferred to contact a physician prior to initiating OAC therapy, which in part may be explained by a lack of knowledge regarding AF and by the existing power asymmetries in health care,^{36,37} but also emphasizes the importance of establishing collaborative care pathways with physicians. It is not surprising that pharmacists are apprehensive about prescribing OAC therapy, since these decisions are complex even for patients and family physicians who are tasked to use/prescribe antithrombotic medications for a variety of reasons.³⁸

Limitations

Several limitations of this study warrant discussion. First, the response rate was moderate,

despite using an incentive, as in other surveys. For comparison, a 2015 survey of Alberta pharmacists with a specialized diabetes practice had an 8.5% response rate.³⁹ However, unlike the diabetes survey, this sample was randomly drawn from the pharmacist population to reduce bias. Second, there may be a response bias, with only pharmacists who felt comfortable with this research topic responding to the survey—this makes our finding that most respondents felt the need for additional training on AF and OAC options all the more striking. Third, the survey was not validated.

Conclusion

This survey demonstrates that community pharmacists are able to identify AF patients requiring stroke prevention therapy, but additional knowledge of AF (including the selection of the appropriate antithrombotic therapy) is needed to enhance pharmacist confidence, as well as solutions for better physician contact/collaboration. Given the burden of AF-related stroke and the existence of effective treatment, efforts to optimize care delivery via community pharmacists should be pursued. Future studies are needed to identify strategies of pharmacist-based management that are effective and address current barriers to prescribing and optimal care. ■

From the Division of Cardiology (Sandhu, Bungard), Faculty of Pharmacy and Pharmaceutical Sciences (Guirguis), Strategy for Patient-Oriented Research (Youngson) and Division of General Internal Medicine (McAlister), University of Alberta, Edmonton, Alberta; the Leslie Dan Faculty of Pharmacy (Dolovich), University of Toronto, Toronto; the Department of Epidemiology (Brehaut), Ottawa Hospital Research Institute, Ottawa; and the Population Health Research Institute (Healey), McMaster University, Hamilton, Ontario. Contact rsandhu2@ualberta.ca.

Author Contributions: R. K. Sandhu initiated and supervised the project. R. K. Sandhu, L. M. Guirguis, T. J. Bungard, L. Dolovich, J. C. Brehaut, J. S. Healey and F. A. McAlister were responsible for design and methodology. E. Youngson performed the statistical analysis. R. K. Sandhu wrote the final draft. All authors approved the final draft of the manuscript.

Statement of Conflicting Interests: There are no conflicts for any of the authors. J. S. Healey has received research grants and speaking fees from Boehringer-Ingelheim, Bayer, Bristol-Meyers-Squibb, Pfizer, Medtronic and St. Jude Medical and is also the medical director of m-Health Solutions. T. J. Bungard has received honoraria from Bayer, Bristol-Myers-Squibb, Pfizer and Boehringer Ingelheim and unrestricted research grants from Bayer, Bristol-Meyers-Squibb and Pfizer.

Funding: Dr. Sandhu received a grant from the Heart and Stroke Foundation of Canada Emerging Research Leaders Initiative, Canadian Stroke Prevention Network and the University Hospital Foundation. Dr. McAlister is funded by Alberta Innovates-Health Solutions and the University of Alberta/Capital Health Chair in Cardiovascular Outcomes Research.

ORCID iD: L. Dolovich <https://orcid.org/0000-0002-0061-6783>

References

1. Miyasaka Y, Barnes ME, Gersh BJ, et al. Secular trends in incidence of atrial fibrillation in Olmsted county, Minnesota, 1980 to 2000, and implications on the projections for future prevalence. *Circulation* 2006;114:119-25.
2. Marini C, De Santis F, Sacco S, et al. Contribution of atrial fibrillation to incidence and outcome of ischemic stroke: results from a population-based study. *Stroke* 2005;36:1115-9.

3. Wolf PA, Mitchell JB, Baker CS, et al. Impact of atrial fibrillation on mortality, stroke, and medical costs. *Arch Intern Med* 1998;158:229-34.
4. Hylek EM, Go AS, Chang Y, et al. Effect of intensity of oral anticoagulation on stroke severity and mortality in atrial fibrillation. *N Engl J Med* 2003;349:1019-26.
5. Public Health Agency of Canada. 2009: Tracking heart disease and stroke in Canada. Available: www.phac-aspc.gc.ca/publicat/2009/cvd-avc/pdf/cvd-avs-2009-eng.pdf (accessed Oct. 30, 2017).
6. Hart RG, Pearce LA, Aguilar MI. Meta-analysis: antithrombotic therapy to prevent stroke in patients who have nonvalvular atrial fibrillation. *Ann Intern Med* 2007;146:857-67.
7. Dentali F, Riva N, Crowther M, et al. Efficacy and safety of the novel oral anticoagulants in atrial fibrillation: a systematic review and meta-analysis of the literature. *Circulation* 2012;126:2381-91.
8. Camm AJ, Lip GY, De Caterina R, et al. 2012 focused update of the ESC guidelines for the management of atrial fibrillation. *Eur Heart J* 2012;33:2719-47.
9. Macle L, Cairns JA, Andrade JG, et al. The 2014 atrial fibrillation guidelines companion: a practical approach to the use of the Canadian Cardiovascular Society guidelines. *Can J Cardiol* 2015;31:1207-18.
10. January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation. *J Am Coll Cardiol* 2014;64:e1-76.
11. Sandhu RK, Bakal JA, Ezekowitz JA, et al. Risk stratification schemes, anticoagulation use and outcomes: the risk—treatment paradox in patients with newly diagnosed non-valvular atrial fibrillation. *Heart* 2011;97:2046-50.
12. Pilote L, Eisenberg MJ, Essebag V, et al. Temporal trends in medication use and outcomes in atrial fibrillation. *Can J Cardiol* 2013;29:1241-8.
13. Healey JS, Sandhu RK. Are we ready for mass screening to detect atrial fibrillation? *Circulation* 2015;131:2167-8.
14. Yuksel N, Eberhart G, Bungard TJ. Prescribing by pharmacists in Alberta. *Am J Health Syst Pharm* 2008;65:2126-32.
15. Tsuyuki RT, Houle SK, Charrois TL, et al. Randomized trial of the effect of pharmacist prescribing on improving blood pressure in the community: the Alberta Clinical Trial In Optimizing Hypertension (RxACTION). *Circulation* 2015;132:93-100.
16. McAlister FA, Majumdar SR, Padwal RS, et al. Case management for blood pressure and lipid level control after minor stroke: prevention randomized controlled trial. *CMAJ* 2014;186:577-84.
17. Ali M, Schifano F, Robinson P, et al. Impact of community pharmacy diabetes monitoring and education programme on diabetes management: a randomized controlled study. *Diabet Med* 2012;29:e326-333.
18. Santschi V, Chiolerio A, Burnand B, et al. Impact of pharmacist care in the management of cardiovascular disease risk factors: a systematic review and meta-analysis of randomized trials. *Arch Intern Med* 2011;171:1441-53.
19. Charrois TL, McAlister FA, Cooney D, et al. Improving hypertension management through pharmacist prescribing: the rural Alberta clinical trial in optimizing hypertension (Rural RxACTION): trial design and methods. *Implement Sci* 2011;6:94.
20. Evans CD, Watson E, Eurich DT, et al. Diabetes and cardiovascular disease interventions by community pharmacists: a systematic review. *Ann Pharmacother* 2011;45:615-28.
21. Koshman SL, Charrois TL, Simpson SH, et al. Pharmacist care of patients with heart failure: a systematic review of randomized trials. *Arch Intern Med* 2008;168:687-94.
22. Bungard TJ, Gardner L, Archer SL, et al. Evaluation of a pharmacist-managed anticoagulation clinic: Improving patient care. *Open Med* 2009;3:e16-21.
23. Bungard TJ, Koshman SL, Tsuyuki RT. Patient preferences for ongoing warfarin management after receiving care by an anticoagulation management service. *Am J Health Syst Pharm* 2008;65:1498-500.
24. Verret L, Couturier J, Rozon A, et al. Impact of a pharmacist-led warfarin self-management program on quality of life and anticoagulation control: a randomized trial. *Pharmacotherapy* 2012;32:871-9.
25. Makowsky MJ, Guirguis LM, Hughes CA, et al. Factors influencing pharmacists' adoption of prescribing: qualitative application of the diffusion of innovations theory. *Implement Sci* 2013;8:109.
26. Nicholls SG, Brehaut JC, Arim RG, et al. Impact of stated barriers on proposed warfarin prescription for atrial fibrillation: a survey of Canadian physicians. *Thromb J* 2014;12:13.
27. Andrade J, Khairy P, Dobrev D, et al. The clinical profile and pathophysiology of atrial fibrillation: relationships among clinical features, epidemiology, and mechanisms. *Circ Res* 2014;114:1453-68.
28. Lowres N, Neubeck L, Salkeld G, et al. Feasibility and cost-effectiveness of stroke prevention through community screening for atrial fibrillation using iPhone ECG in pharmacies. The SEARCH-AF study. *Thromb Haemost* 2014;111:1167-76.
29. Sandhu RK DL, Deif B, Barake W, et al. High prevalence of modifiable stroke risk factors identified in a pharmacy-based screening programme. *OpenHeart* 2016;3:e000515. Available: <http://openheart.bmj.com/content/3/2/e000515> (accessed Oct. 30, 2017).
30. Proietti M, Mairesse GH, Goethals P, et al. A population screening programme for atrial fibrillation: a report from the Belgian heart rhythm week screening programme. *Europace* 2016;18(12):1779-86.
31. Shiu R SS, Johnson JA, Tsuyuki RT. Quantifying opportunities to affect diabetes management in the community. *Can Pharm J (Ott)* 2006;139:37-8.
32. Turner M, Reason B, McKeag AM, et al. Chronic conditions more than age drive health system use in Canadian seniors. *Healthc Q* 2011;14:19-22.
33. Tarn DM, Paterniti DA, Wenger NS, et al. Older patient, physician and pharmacist perspectives about community pharmacists' roles. *Int J Pharm Pract* 2012;20:285-93.
34. Gallagher P, Barry P, O'Mahony D. Inappropriate prescribing in the elderly. *J Clin Pharm Ther* 2007;32:113-21.
35. Smith SM, O'Kelly S, O'Dowd T. GPs' and pharmacists' experiences of managing multimorbidity: a 'pandora's box'. *Br J Gen Pract* 2010;60:285-94.

36. Bradley F, Ashcroft DM, Noyce PR. Integration and differentiation: a conceptual model of general practitioner and community pharmacist collaboration. *Res Social Adm Pharm* 2012;8:36-46.
37. Weiss MC, Sutton J. The changing nature of prescribing: pharmacists as prescribers and challenges to medical dominance. *Sociol Health Illn* 2009;31:406-21.
38. Dalmau GM, Arderiu ES, Montes MBE, et al. Patients' and physicians' perceptions and attitudes about oral anticoagulation and atrial fibrillation: a qualitative systematic review. *BMC Family Practice* 2016;18:3.
39. Lo A, Lorenz K, Cor K, Simpson SH. Factors affecting number of diabetes management activities provided by pharmacists. *Can J Diabetes* 2016;40:535-42.