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Assessment of atrial fibrillation patients' education needs from patient and clinician perspectives: A qualitative descriptive study

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ABSTRACT

Introduction: Patients' lack of knowledge is a key barrier to therapy adherence. We aimed to gather insights into atrial fibrillation (AF) patients' education needs from patient and clinician viewpoints.

Methods: We conducted a qualitative descriptive study using purposive sampling and semi-structured interviews with AF patients and clinicians recruited from AF clinics. Data from patients and clinicians were analyzed independently and iteratively through inductive qualitative thematic analysis.

Results: Eleven clinicians and 10 patients were interviewed. Three themes emerged from analysis of clinician data: (1) patients' knowledge gaps and misconceptions, (2) clinicians' experiences teaching AF patients, and (3) clinicians' suggestions for AF education programs. Four themes emerged from the patient data: (1) emotional appraisal of the disease, (2) information seeking behavior, (3) knowledge gaps, and (4) education preferences. A key finding was identification of the need for education that addresses patients' unjustified anxieties by emphasizing that AF is not fatal, and that many patients with AF live a normal life. Risk communication was identified as the most challenging aspect of AF education. In synthesizing our findings, we developed evidence-based recommendations for educational strategies for AF.

Conclusion: We found that AF patients have many knowledge gaps and misconceptions, significant emotional education needs, and a positive attitude towards online and classroom education. In synthesizing our findings, we developed evidence-based recommendations which can inform the design of AF patient education programs and initiatives.

1. Introduction

Atrial fibrillation (AF) is the most common clinically significant sustained dysrhythmia, affecting approximately 1% of the world's population [1–4]. Atrial fibrillation confers up to five-fold increase in the risk of stroke, accounting for 15–25% of all ischemic strokes [5–8]. Strokes secondary to AF are more frequently fatal and more debilitating than strokes with other causes [9–11].

Pharmacotherapy is the cornerstone of care for AF patients. However, therapy adherence and persistence has been reported to be poor among this patient population. A systematic review of six studies comprising 1.6 million AF patients reported that one quarter demonstrated sub-optimal adherence [12]. Medication discontinuation rates

among AF patients have been reported to be 18–50% for direct oral anticoagulants (DOACs) over 6–12 months, and 26–62% for warfarin over 1 year [13–20].

Research has identified patients' lack of knowledge as a key barrier to therapy uptake and adherence which is imperative for stroke risk reduction, hemorrhage prevention and better patient outcomes [21–24]. Education is therefore an essential component of care for these patients. Among AF patients taking warfarin, education has been reported to be significantly associated with improved time in therapeutic range. Education has also been shown to facilitate construction of a correct illness representation, improve patients' perceptions of the necessity of their therapy, and reduce unjustified concerns about their medications [25–30]. Despite the value of education in AF patients, the

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best education strategy for them has yet to be determined [31,32].

Identifying patients' education needs is the first step in developing feasible, acceptable, and effective education strategies [33,34]. A thorough educational needs assessment, defined as, "identification of educational objectives that most need to be accomplished in a given instructional situation," [35] is lacking for AF patients. The objective of this study was therefore to gather useful insights into AF patients' education needs from both patient and clinician perspectives.

2. Methods

2.1. Study design

We conducted a qualitative descriptive study using semi-structured interviews with both patients and clinicians. Qualitative descriptive studies answer research questions focused on the who, what, and where of events or experiences to gain insights from informants. This is the method of choice when there are no or few previous studies examining the phenomenon, as in this case [36,37].

2.2. Setting

Participants were recruited from two specialized AF clinics in Vancouver, Canada (Royal Columbian Hospital, Vancouver General Hospital). These clinics care for patients referred by general practitioners and emergency departments after AF is diagnosed. Their staff includes cardiologists, nurses, nurse practitioners, and pharmacists who among many other services, provide education about AF and its management to groups of 20–25 patients. These education sessions involve live oral/slide presentations and typically last 1 h followed by a question and answer period. This study was approved by the University of British Columbia and Fraser Health Research Ethics Boards.

2.3. Sampling strategy

Any patient aged 18 or older who had AF and any clinician who had been involved in the provision of care to AF patients for at least a year was eligible to participate. Purposive sampling was utilized based on patients' years since diagnosis, participation in the clinics' education program, and highest level of education. Clinicians were recruited based on their clinical role (e.g. pharmacist, cardiologist, nurse).

After receiving an invitation letter, interested participants provided written consent to participate and to be audio-recorded during a one-on-one interview. Recruitment started in September 2017 and continued until saturation was reached (in February 2018), defined as recruitment of the last two participants not leading to any new parent codes or adding more insights, as agreed by two investigators (SS and PL) [38].

2.4. Data collection

The patient interview guide was refined in consultation with 10 AF patients prior to starting the study and included the following core questions: 1) What are your opinions about the current clinic education?, 2) What are your commonly used sources of information about AF?, 3) What is it about your condition or medications that you wish you knew more about?, and 4) What are your preferences for and expectations of an education program? The clinician interview guide consisted of the following core questions: 1) What questions do patients frequently ask?, 2) What are your experiences and strategies for teaching AF patients?, and 3) What are your suggestions for educating AF patients? All interviews were conducted by a researcher (SS) in English, in a private room or over the phone, without the presence non-participants.

2.5. Data analysis

Interviews were audio-recorded and field notes were taken. Verbatim transcripts were generated from the audio files within three days of each interview [39,40]. The transcripts were not returned to participants for comments and/or corrections.

The data for patients and clinicians were independently analyzed, using inductive qualitative thematic analysis following the steps recommended by Braun and colleagues [40]. The interviews were first read several times (data immersion), then free-coded, line by line, with as many different codes as relevant (code generation). The homogeneity and heterogeneity between the codes were assessed to summarize them under categories and identify themes (searching for themes) to ensure coherence of data within themes, and clear and identifiable distinctions between themes [40]. Analysis was iterative and performed independently by two researchers (SS and PL), using NVivo software® (QSR International Pty Ltd. Version 11) [41]. The interview guides were revised frequently based on the emerging data for subsequent interviews. We summarized the findings from both perspectives into a set of patient and clinician-informed recommendations for future AF education programs.

3. Results

We interviewed 21 participants (10 patients, three Pharmacists, three Nurse Practitioners, four registered Nurses and one Cardiologist). Patients had an average of eight years of experience with AF and clinicians had an average of 13 years of experience caring for AF patients. Interviews took 29 (SD 8.8) and 23 (SD 9.4) minutes for patients and clinicians, respectively (Tables 1 and 2). Thematic analysis led to emergence of four themes from the patient data: emotional appraisal of the disease, information seeking behavior, knowledge gaps, and education preferences. Three themes emerged from the clinician data: patients' knowledge gaps and misconceptions, clinicians' experiences teaching AF patients, and clinicians' suggestions for AF education

Table 1
Characteristics of the patient participants.

ID	# years since diagnosis	Sex	Current anti-thrombotic	Highest education level	# years of experience with anti-thrombotics	Attended education session?
P1	5	Male	Apixaban	Bachelors	4	No
P2	2	Male	Rivaroxaban	PhD	2	Yes
P3	10	Male	Rivaroxaban	Community college	3	Yes
P4	2	Male	None	PhD	0	Yes
P5	20	Female	Warfarin	High School diploma	2	Yes
P6	7	Female	Warfarin	High School diploma	7	Yes
P7	1	Male	Rivaroxaban	Bachelors	0.5	No
P8	6	Male	Dabigatran	High School diploma	5	No
P9	7	Male	Apixaban	High School diploma	7	Yes
P10	17	Male	None	High School diploma	5	Yes

Table 2
Characteristics of the clinician participants.

ID	Role	Sex	Primary site of practice	# years of experience caring for AF patients
Ph1	Pharmacist	Female	Site 1	6
Ph2	Pharmacist	Female	Site 2	7
Ph3	Pharmacist	Male	Site 3	3
NP1	Nurse practitioner	Female	Site 4	5
NP2	Nurse practitioner	Female	Site 5	5
NP3	Nurse practitioner	Female	Site 1	35
RN1	Registered nurse	Female	Site 5	10
RN2	Registered nurse	Female	Site 1	30
RN3	Registered nurse	Female	Site 1	15
RN4	Registered nurse	Female	Site 1	15
Ca1	Cardiologist	Male	Site 6	10

programs. A summary of themes and representative verbatim quotations are provided below.

3.1. Themes from patient data

3.1.1. Theme 1: emotional appraisal of the disease

Patients talked in detail about anxiety they felt regarding AF with reasons for anxiety including: 1) not knowing what AF is and its consequences, 2) fear of AF-induced heart attack or death, 3) receiving conflicting information and not knowing what information applies to them, and 4) the cardiac nature of the disease.

“Well a heart condition is scary, right? cause it's next to cancer...for ... shortening your life, so of course I was concerned, because well first of all, I didn't even know what AF was and second I didn't know just how...erm, what the, erm, short-term effects versus the long-term effects...I think the anxiety of it, more than anything... not knowing ...not knowing is what scares you, once you know a little bit your anxiety decreases.”

Some patients declared that their anxiety affected their quality of life because they considered quitting their job or avoiding the activities they liked such as taking their annual family trip to Mexico, or riding their bike. This was mostly because patients were not sure how much they could push themselves and therefore tended to hold back for fear of causing an AF episode.

“It started affecting my life in general. I love to ride the bicycle [...] but now I don't feel like it's appropriate to ride hills. I don't know what's gonna happen, I don't know whether the extra strain on my heart is gonna cause me to faint again.”

Based on patients' experiences, anxiety was worst when first diagnosed but subsided as patients learned more about their condition. Patients mentioned that learning that AF is not fatal and that there are thousands of people diagnosed with it seems to help the most in reducing their anxiety.

3.1.2. Theme 2: information seeking behavior

The second theme described how patients seek information about AF and its management. Patients did not usually target medical websites. Rather, they tended to type their question into the Google search box. A few patients mentioned the “Mayo Clinic”, “afibbers.org”, and “Heart & Stroke Foundation” websites. Aside from specific questions on AF, patients commonly browsed the internet to find AF triggers cited by other patients and to seek validation for what they suspect are their own triggers (e.g. monosodium glutamate (MSG), pumpkin soup, or *H. pylori*). Patients also consulted the internet “as new things come up”, usually after experiencing an unusual or unexpected side effect or symptom.

“Pumpkin soup is really good, but their pumpkin soup really threw me out on the INR, and then I looked at it on Google. Yes! Some people say yes,

but we are not too sure.”

All patients discussed the limitations of using the internet to find information on AF such as finding biased, inaccurate, misleading and conflicting information. Aside from the internet, clinicians were also cited as main sources of information for AF by interviewed patients.

3.1.3. Theme 3: knowledge gaps

We identified a number of knowledge gaps when interviewing patients. In general, patients had better knowledge of warfarin than the DOACs. A negative attitude was observed towards warfarin, as not appropriate for use in humans, or is less safe than DOACs (due to its use as rat poison). Patients lacked knowledge about AF triggers and cited many everyday activities for which there is limited or no evidence, as triggers for their AF. They also frequently confused “triggers” with “causes”.

“It all started with me one day at work...I ended up having 5 coffee, by the afternoon ... and when I got home... my heart was just going crazy and I was like “what is this?” [...] And I guess, that was the beginning of me starting to feel it. I never felt it before”.

Patients self-identified knowledge gaps around “symptoms” and “side effects”. They shared stories of feeling confused and anxious when experiencing less common symptoms of AF (e.g. sweating, dizziness) as they did not understand why they were experiencing them and wondered if these were signs of being on the wrong therapy.

3.1.4. Theme 4: education preferences

3.1.4.1. Education setting preferences. Patients preferred the classroom setting because it allows the chance to receive immediate answers to questions, listen to other patients share their experiences and questions, and get a sense of community by getting to know others with the condition.

“As a class is good because people give you comments, opinions, and they have questions and you are...you don't have that question but you find this question interesting, you will learn as if you were asking.”

Some patients considered classroom education “too generic”, leading to confusion about what information applies to them and therefore unnecessary anxiety. Another disadvantage of the classroom setting mentioned was the requirement to be physically present at a specific time, with accompanying parking and commuting issues. When asked about online education, patients liked the convenience and accessibility it offers. Most patients acknowledged the pros and cons of both delivery methods and suggested online education as complementary to classroom education, whereby most of the teaching is done through online education and classroom sessions are focused on questions and answers.

3.1.4.2. Risk communication style preferences. Patients' preferences for risk communication were variable. Some patients considered absolute risk reduction (ARR) and relative risk reduction (RRR) and individualized stroke risk estimates to be “too complicated”, “too deep” or “not meaningful enough” and preferred more descriptive terms such as “lower” or “higher”, while some patients were interested in the numbers as justification of their physicians' decision.

3.1.4.3. Content and design suggestions. Patients preferred not to receive clinical information in abstract form. They would like to know how AF will affect them, what the diagnosis means for them in terms of quality of life, activities they enjoy, and if there is anything they can do to help it. In terms of design, an ideal education program, according to the patients, would be interactive, allowing questions to be asked of an expert, preferably in real-time. Another feature requested by patients was patient testimonials. Patients believed that hearing other people talk about their journey with AF inspired them, gave them hope and reduced their anxiety.

“One good idea is to talk to people who have this treatment, [...] to talk to them, how do you feel now? Did it work for you? My first questions would

be: “were you afraid?” hahahahaha...sure everybody would be afraid.”

3.2. Themes from clinician data

3.2.1. Theme 1: patients' knowledge gaps and misconceptions

Clinicians reported that patients often confuse heart attack with stroke, and AF with heart attack. Knowledge gaps were reported around AF triggers and self-management. Not having a complete knowledge of the AF triggers, patients tend to draw linkages between many different things and their episodes. Commonly-cited was linking activities of daily living (e.g., exercising, laughing) or foods to episodes of AF or International Normalized Ratio (INR) fluctuations, when there is little or no evidence for these associations in the literature.

“Oh they make very strange assumptions, [...] I don't know... a chocolate bar on Tuesday and my INR was 3 on Friday so therefore that chocolate bar changed my INR [...] we all have weird stories from patients of funny things that they think were triggers...”

Clinicians also shared stories about patients who, after diagnosis, stopped engaging in activities they enjoyed such as going on vacation or exercising mostly due to the fear of precipitating an episode despite clinicians' assurance that they could continue living as usual. Patients were also reported to have difficulty recognizing “emergency situations”. Pharmacists at the clinic, whose patient care responsibilities also involves answering clinic patients' questions on the phone, stated that one of the common scenarios they encounter involves a patient experiencing a minor bleeding or AF episode and calling to ask if they should go to the emergency department.

“self-managing ... so when they have symptoms...whether they can manage it by themselves or whether they need to go to the hospital [...] that's the recurring question I get from the patients...how do I manage?...I don't want to use the healthcare system but I...erm...often times do [...], because I'm not always certain if it's doing damage to my heart if I'm...if I don't get help to get it corrected or reversed.”

Regarding anticoagulants, clinicians reported that patients tend to overestimate the bleeding risk and have difficulty weighing their risks against their benefits. Clinicians also pointed out that while patients may have an understanding of certain concepts related to AF management, they do not necessarily understand how the concepts link together. For example, patients find it difficult to link subtherapeutic INR or CHADS2 score to a higher risk of stroke.

One of the most frequently mentioned patient misconceptions by clinicians was that AF is fatal. According to the clinicians, patients think of death either as a direct consequence of AF or an indirect outcome through an AF-induced heart attack. Clinicians considered this misconception to be a major contributor to patients' anxiety.

“...because they think that AF itself can kill them, those flutters, those palpitations and they panic, something is wrong with their heart and it's going to kill them.”

Clinicians reported a significant negative attitude towards warfarin by patients. However, this was not confined to warfarin. According to clinicians, one of patients' frequent medication related questions is whether the pharmacologic anticoagulants can be replaced with natural alternatives (e.g. turmeric). Clinicians believed that the “natural is always better” misconception is the reason behind such inquiries.

“People are willing to take every single natural sup [supplement] there is that promotes blood thinning even though there is no way to know how much blood thinning that's going to confer.”

Clinicians also discussed that patients commonly assume a direct association between their symptom severity and their risk of stroke, therefore believing that the absence of symptoms translates into no risk of stroke. Clinicians found this particularly worrying in patients with asymptomatic AF.

3.2.2. Theme 2: clinicians' experience teaching AF patients

3.2.2.1. Stroke and bleeding risk communication. Clinicians, based on their experience, identified stroke and bleeding risk communication as

the most challenging aspect of teaching AF patients about their condition and its management because it: 1) involves educating patients to take medications that do not completely eliminate risk, 2) requires communication of bleeding risks in a way that is accurate but also does not unduly scare patients and cause intentional non-adherence, 3) is accompanied by technical terms and calculations which are not readily understood by patients or interest them, and 4) requires more time than clinicians can afford to spend with patients.

Clinicians expressed preference to use CHADS65 [42] over CHA2DS2-VASc score [43] in stroke risk communications with patients due to its simplicity. Patients' individual risk of stroke is, however, hardly ever communicated to them because of patients' perceived lack of interest and/or their inability to properly comprehend it. Individualized risk of stroke, medication-specific ARR, RRR or bleeding risk are only communicated to patients in cases of extreme unjustified fear of bleeding, poor understanding that medications' benefit in stroke risk reduction far exceeds the risk of bleeding, or when patients are resistant to taking medications. Participants reported that they usually try to adjust the risk communication to each patients' understanding, education level, and level of interest and resistance to therapy.

3.2.2.2. Patients' emotional education needs. Clinicians discussed patients' anxiety in great depth and listed several reasons for it, the majority of which related to patients' knowledge gaps and misconceptions. According to clinicians, AF patients find the unpredictability of AF very worrying, as they never know when the next episode will occur. Patients worry about the impact of AF on their life and whether their diagnosis means they must stop doing activities they enjoy. Patients' misconceptions about the ability of AF to cause a heart attack or death were also identified by clinicians as one of the most common reasons for anxiety.

“...and just unpredictability that's a large thing ...that AF is unpredictable, they don't...they don't know when to expect it, so they do have anxiety just on the uncertainty of when they might get another episode”

Clinicians perceived a direct positive correlation between symptom burden and anxiety. They also stated that anxiety is more profound when a patient is newly diagnosed but subsides over time as they learn more about their condition and its management. Clinicians mentioned that in their experience, education significantly reduces patients' anxiety.

“those patients are very, first diagnosed, that are very symptomatic have a lot of anxiety around their AF. Helping them understand, palpitations is part of their AF symptoms, not everybody feels palpitations, but that that in itself isn't a risk for patients dying.”

3.2.3. Theme 3: clinicians' suggestions for an education program

Clinicians believed that an education program for AF patients must ensure that sources of patient anxiety are addressed by emphasizing that AF is not fatal, does not lead to heart attack, is manageable and that AF patients can continue living their life as before. Communication of the AF prevalence was also suggested, because knowing that many other people have the same condition and live a normal life can, in clinicians' experience, would help with patients' anxiety.

“I think, just supportiveness, that this is a chronic condition, that, erm, if, if properly managed, should not impact your quality of life and your enjoyment, [...]because I watch people when they come in and they are that anxious, and I say to them, this is not life threatening, this is a chronic condition, it seems to bring down their anxiety a little, yes you can travel, yes you can take your dog for a walk.”

It was suggested that teaching patients about the spectrum of AF (from asymptomatic and paroxysmal to persistent and symptomatic) ensures that patients do not associate the intensity of their symptoms with their risk of stroke, and do not fear death when they go into AF. Moreover, clinicians believed that education programs should ensure that patients understand the chronic, progressive, and unpredictable nature of AF to prevent unrealistic expectations for cure and ultimately

disappointment.

Offering patient testimonials or narratives as a component of AF education was frequently suggested. Clinicians believed that hearing other patients' stories is not only a powerful teaching technique, but an effective anxiety-relieving strategy. Some clinicians, however, expressed concern that anecdotal evidence might not be the best educational tool since not everybody goes through the same experience. For example, the nonoccurrence of stroke in someone with good adherence to their anticoagulant therapy does not mean that all adherent patients can expect a similar outcome.

3.3. Synergy of clinician and patient data

Interviewing both AF patients and clinicians provided rich data on the education needs of AF patients and led to identification of many knowledge gaps and misconceptions. Patient knowledge gaps were easier to identify through clinician interviews than with patients. To summarize our findings and provide recommendations for future AF educational and behavioral change initiatives, identified knowledge gaps were mapped across interviews with both patients and clinicians under two established information-processing and health behavior models: the Health Belief Model (HBM) and the Common Sense Model (CSM) (Fig. 1) [44,45]. In the HBM model, a majority of the identified knowledge gaps fell under the “perceived barrier” component which includes patient opinions of the tangible and intangible costs of the advised action, in this case taking anticoagulants. Patient-perceived barriers identified in our study that can be addressed through education were: incorrect beliefs about the safety of oral anticoagulants compared to natural alternatives, poor grasp of their absolute risk of stroke and its relation to their stroke risk factors, and subsequently misconceptions about the stroke prevention efficacy vs. bleeding risk associated with oral anticoagulant therapy. In the CSM model, a majority of the knowledge gaps fell under the “understanding consequences” component. It seems that work is needed to help patients understand the

consequences of AF and nonadherence to their medications and also clarifying that AF does not lead to heart attack or cardiac arrest. Table 3 summarizes our clinician-and patient-informed recommendations based on the findings of this research. These recommendations are not intended as a full curriculum for an AF patient education program but are meant to provide guidance on addressing the common issues identified in this research which may not be obvious to clinicians in the normal course of teaching patients about AF and its treatments.

4. Discussion

To our knowledge, this study was the first to offer patient and clinician-informed recommendations for educating AF patients based on a rigorously conducted education needs assessment, in contrast to previously published papers [46] whose recommendations were anecdotal. A key finding of this study was the identification of emotional education needs among AF patients — the need for education that not only conveys clinical information but also addresses patient anxiety. While anxiety is a well-known issue among AF patients, it has always been analyzed in the context of “patients' experience with AF” and seldom regarded as an education target [47–51]. In the present study, both groups attributed anxiety to misconceptions and poor knowledge and regarded education as potentially helpful in reducing it. This aligns with pooled evidence from the literature which suggests education has a small but positive impact on AF patients' anxiety and depression over one year [52].

A recent study assessing rural patients' perception of tele-health found similar results to ours, that AF patients have a positive attitude towards the use of technology to address knowledge gaps and provide emotional support (particularly early on after the diagnosis) [53]. It also confirmed patients frequently rely on the internet to find information and are concerned about the reliability of this information.

The results from the clinician interviews added a new dimension to our findings [54]. They identified risk communication as the most

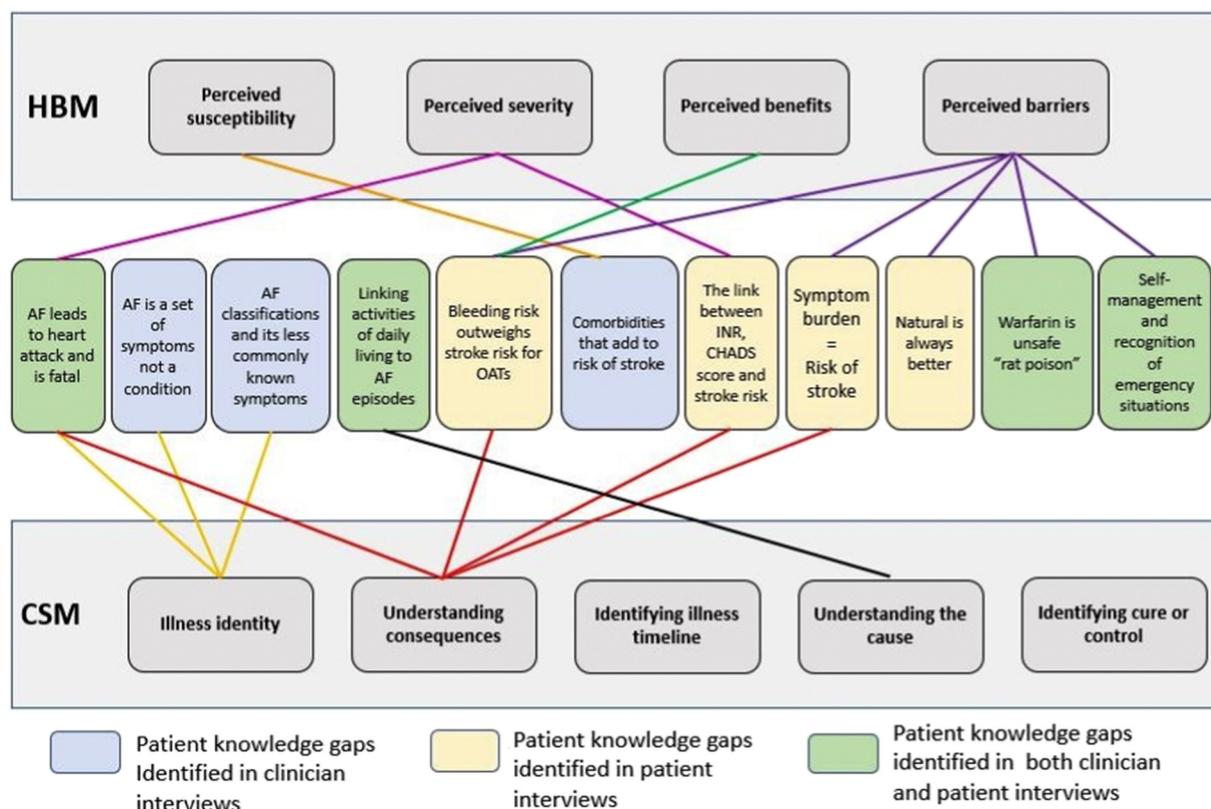


Fig. 1. Summarizing and mapping of the identified knowledge gaps under the health belief model (HBM) and the common-sense model (CSM).

Table 3
Patient- and clinician-informed recommendations for educating AF patients.

Recommendation	Strategy/justification for the recommendation	The clinician theme (CT) and patient theme (PT) number(s) from which the recommendation emerged
AF patient education programs should, in addition to conveying the clinical information pertaining to AF and its management, address patients' emotional needs.	Teach patients about the spectrum of AF (from asymptomatic and paroxysmal to persistent and symptomatic). Emphasize that wherever they currently are on the spectrum, AF will still not cause their heart to stop and is not itself a fatal condition.	CT 1, 2, 3 PT 1
	Educate patients on the less common symptoms of AF and side effects of medications. To prevent anxiety when they are experienced.	PT 3
	Communicate the prevalence of AF. Knowing they are not alone in suffering from AF helps reduce anxiety.	CT 3
	Ensure that patients know they can still have a normal life and continue doing the activities they enjoy and talk as specifically as possible about the ones patients may have questions or concerns about.	PT 1 CT 2, 3
Correct/prevent potential misconceptions and knowledge gaps	Convey the pathophysiology of AF and its relation (or lack thereof) to AF symptoms, to ensure that AF is understood as a condition and not merely as a set of symptoms.	PT 3
	Explain that risk of stroke (and bleeding) is totally unrelated to symptom severity, and hence anticoagulants should not be discontinued when symptoms subside.	CT 2
	Emphasize on warfarin as a viable and non-poisonous therapeutic option and correcting the conception of warfarin as "rat poison".	PT 3 CT 1
	Emphasize more on consequences of AF and non-adherence as well as patients' perceived barriers. Majority of the identified knowledge gaps, from both patient and clinician results, fell under these components of the CSM and the HBM models.	PT 3 CT 1
	Adjust the risk communication conversation to patients' level of understanding, interest, resistance to therapy and education background.	PT 4 CT 2
Individualize risk communication	Explain how what you are teaching relates to the specific patient.	PT 4
Do not provide clinical information in abstract form	When skillfully used, testimonials can be a powerful education technique and an effective anxiety-relieving strategy.	PT 1, 4 CT 3
Include patient testimonials or stories.		

challenging aspect of AF education and suggested that it is best to adjust the level of risk communication to patients' interest, education level, understanding, and resistance to therapy. This approach compares with the data from patients indicating great variability in their communication preferences. The variety in patients' preferences for risk communication and the diversity of techniques available highlight the need for more research on this topic [55,56].

4.1. Limitations

The patients' comments on their preferences for education delivery (classroom versus online education) were likely influenced by their experience receiving education at the AF clinics. Patients in other jurisdictions may have different preferences depending on their past experiences with education. Also, participants had relatively longstanding AF and considerable experience with therapy and we expect that more newly-diagnosed patients may have had more knowledge gaps or needs than we identified.

4.2. Future practice and research implications

Education is embedded in many health care services offered to patients. In addition to influencing AF education programs, these study findings could be applied during individualized patient counselling and shared decision making. They can also be used to inform the design and delivery of novel AF education formats such as tele-health services, virtual clinics, and decision aids. As always, similar research at other settings and in other AF patient subgroups (e.g., younger patients, patients in rural areas, other ethnicities, levels of literacy, etc.) could enhance our understanding of patients' educational needs and identify other opportunities to improve the education provided to AF patients.

5. Conclusion

This study provides in-depth insights into AF patients' education needs through elicitation of patient and clinician perspectives. Atrial fibrillation patients were found to have many knowledge gaps and misconceptions, significant emotional education needs, variable preferences for risk communication, and a positive attitude towards online and classroom education. A set of clinician- and patient-informed recommendations are offered from the findings of this research which can be used by clinicians who are involved in caring for and/or educating AF patients.

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Conflict of interest notification

None of the authors have any conflicts to declare.

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