HRS/NSA 2014 survey of atrial fibrillation and stroke: Gaps in knowledge and perspective, opportunities for improvement

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BACKGROUND The prevalence of atrial fibrillation (AF) is substantial and increasing. Stroke is common in AF and can have devastating consequences. Oral anticoagulants are effective in reducing stroke risk, but are underutilized.

OBJECTIVE We sought to characterize the impact of stroke on AF patients and their caregivers, gaps in knowledge and perspective between physicians and patients, and barriers to effective communication and optimal anticoagulation use.

METHODS A survey was administered to AF patients with and without history of stroke, caregivers of stroke survivors, and physicians across the range of specialties caring for AF and stroke patients.

RESULTS While AF patients (n = 499) had limited knowledge about stroke, they expressed great desire to learn more and take action to reduce their risk. They were often dissatisfied with the education they had received and desired high-quality written materials. Stroke survivors (n = 251) had poor functional outcomes and often underestimated the burden of caring for them. Caregivers (n = 203) also wished they had received more information about reducing stroke risk before their survivor's event. They commonly felt overwhelmed and socially isolated. Physicians (n = 504) did not prescribe anticoagulants as frequently as recommended by guidelines. Concerns about monitoring anticoagulation and patient compliance were commonly reported barriers. Physicians may underestimate patient willingness to take anticoagulants.

CONCLUSION We identified significant knowledge gaps among patients, caregivers, and physicians in relation to AF and stroke. Furthermore, gaps in perspective often lead to suboptimal communication and decision making. Increased education and better communication between all stakeholders are needed to reduce the impact of stroke in AF.

TABLE OF CONTENTS

KEYWORDS Atrial fibrillation; Stroke; Anticoagulation

ABBREVIATIONS **AF** = atrial fibrillation; **TIA** = transient ischemic attack (Heart Rhythm 2015;12:e105–e113)

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1. Background

The worldwide prevalence of atrial fibrillation (AF) is staggering, with an estimated 33.5 million affected individuals, including more than 3 million in the United States alone.[1,2] Furthermore, the incidence is steadily increasing. Between 1990 and 2010, the age-adjusted incidence rates of AF increased by 22% in men and 26% in women.[2] The lifetime risk of developing AF in 40-years-olds in the Framingham Heart Study[3] was approximately 1 in 4.

Stroke is the predominant cause of mortality and morbidity in patients with AF. AF more than quadruples the risk of ischemic stroke and is associated with nearly 1 in 5 such events.[4,5] Furthermore, compared with other ischemic strokes, those occurring in patients with AF are more likely to cause death or severe disability.[6,7]

In patients with AF, oral anticoagulants significantly reduce the risk of ischemic strokes.[8] Furthermore, when

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ischemic strokes occur in patients taking oral anticoagulants, they are less likely to cause death or severe disability.[9] Nevertheless, anticoagulants remain underutilized in patients with AF at increased risk of stroke.[10]

We sought to understand the barriers to the appropriate use of anticoagulation from the perspectives of patients and physicians as well as the barriers to effective communication about this crucial topic. We further aimed to characterize the impact of stroke on AF patients and their caregivers. Lastly, we sought to identify opportunities for decreasing these gaps in knowledge and perspective.

2. Methods

The Heart Rhythm Society conceived the study design and partnered with the National Stroke Association. The study proposal was jointly developed and then submitted to potential sponsors. Boehringer Ingelheim agreed to fund the study as the sole sponsor. According to their standard processes, the Heart Rhythm Society and National Stroke Association appointed a writing group with expertise in AF and stroke, consisting of 2 cardiac electrophysiologists (D.S.F. and L.E.R.) and 2 vascular neurologists (S.E.P. and P.B.G.). The survey was designed by the writing group. The Heart Rhythm Society selected Russell Research, an independent research firm, to administer the survey. Boehringer Ingelheim's legal department reviewed the survey and article for issues related to anticoagulant class only.

Surveys were conducted online or by telephone between May 27 and July 3, 2014. The complete patient, caregiver, and physician questionnaires are available in the Online Supplement. To be included in the study, general practitioners, cardiologists, and electrophysiologists needed to treat $\geq$10 adult AF patients per month. The term *general practitioner* is used to include family practitioner, primary care physician, and internist. Neurologists needed to treat $\geq$10 adult stroke patients per month. All physicians were required to be board certified or eligible and to devote $\geq$70% of their professional time to direct patient care. Lists of potential electrophysiology and neurology respondents were provided by the Heart Rhythm Society and National Stroke Association, respectively. Cardiologists and general practitioners were identified through M3 Global Research, who maintains panels of physicians of various specialties and invites panel members to participate in surveys by e-mail. AF patients with stroke and caregivers were identified by the National Stroke Association. Stroke survivors and caregivers were not identified as pairs, but rather as independent populations. AF patients without stroke were identified through Survey Sampling International and Research Now, both of whom provide population samples for academic or commercial research. Patients and caregivers were provided $10 for completing the survey; physicians were provided $20. Patient, caregiver, and physician response rates were 12.4%, 14.6%, and 5.2%, respectively.

Physicians were asked how they would manage a hypothetical 67-year-old woman with recurrent episodes of paroxysmal AF, hypertension, and no additional medical history. Options included aspirin 81 mg, aspirin 325 mg, aspirin 81 mg plus a second antiplatelet agent, aspirin 325 mg plus a second antiplatelet agent, and oral anticoagulant.

Each section was written by a member of the writing group. Sections were then compiled and edited by the chair (D.S.F.). Each member provided a statement of financial disclosures.

2.1. Statistical analysis

Continuous variables are expressed as means and categorical variables as percentages. The independent samples *t* test and Pearson χ^2 test were used to compare normally distributed continuous and dichotomous variables, respectively. All reported significant differences between groups are at a *P* value of $\leq$.05. At a 95% confidence level, our margins of sampling error were 4.4% for the total patient sample, 6.9% for the total caregiver sample, and 4.4% for the total physician sample. Analyses were performed using SPSS software (version 22.0, SPSS Inc, Chicago, IL).

3. Results

3.1. Patients

Four hundred ninety-nine patients, including 248 with AF but no history of stroke (AF-only group) and 251 with AF plus a history of stroke or transient ischemic attack (TIA) (AF with stroke group) completed the survey. Characteristics of responding AF patients are provided in Table 1, stratified by history of stroke or TIA. Patients in the AF-only group were more likely to have received a college education and to currently be employed than those in the AF with stroke group.

3.1.1. Patients with AF only

General knowledge about stroke and AF. The AF-only group had poor awareness about different types of strokes, including ischemic, hemorrhagic, and TIA (Figure 1A). Only 38% could identify ischemic stroke as a distinct entity. In addition, 32% responded that they could not describe the most common symptoms of stroke. Women, younger (age $<$65 years), and college-educated AF patients were more likely to be aware of different stroke types. College-educated AF patients had greater knowledge about AF in general. For example, 61% of college-educated AF patients were aware that "the majority of AFib-related strokes are caused by a blood clot in the brain" as compared with 48% of those without any college education.

Patient education about AF and related opportunities for learning. Most patients surveyed (87%) were interested in learning all they could about AF and reducing risk of stroke with AF. However, only 48% reported receiving written educational materials on AF and the increased risk of stroke, whereas 80% wished to have such information (Figure 2C). Patients were not well educated about AF-related stroke; only 64% were aware that AF was associated with an increased risk

Table 1 Characteristics of surveyed patients, stratified by history of stroke

Characteristic	Atrial fibrillation only	Atrial fibrillation and stroke	All
n	248	251	499
Demographics			
Sex: male	50	49	49
Mean age (y)	61	63	62
Married	63	58	61
College educated	83	75	79
Employed	33	21	27
Median household income ($)	63,700	51,100	57,800
Ethnic background			
White	88	85	86
Black	5	8	6
Hispanic/Latino	2	2	2
Native American	2	2	2
Asian/Pacific Islander	2	1	1
Mixed ethnicity	0	1	1
Prefer not to answer	1	2	1
Community type			
Urban	21	24	22
Suburban	61	55	58
Rural	18	21	19
Census region			
Northeast	21	21	21
South	35	41	38
Midwest	23	18	21
West	20	20	20

of stroke in the absence of antithrombotic treatment. Sixty-eight percent were not aware that AF-related strokes are associated with worse disability and higher risk of death than other strokes. Many were unaware of the higher stroke risk in women, and there was a common misconception that asymptomatic AF is not associated with an increased risk of stroke.

Thirty-seven percent of AF-only patients surveyed indicated that they had not been informed by their physician of the increased risk of stroke in AF. Furthermore, only 65% of patients reported discussing with their physicians the risk of AF-related stroke with and without medications. Patients claimed to have initiated the latter discussion 47% of the time, which was substantially different from that reported by physicians, who stated that patients initiated the discussion only 10% of the time (Figure 2A).

Medication use. There was a high prevalence of medication use and compliance in this population. Eighty-six percent of those who discussed AF-related stroke with their physician were taking antithrombotic medication. Oral anticoagulants were most commonly prescribed (72%), and 88% of patients indicated that they took their medication with regularity. Reported compliance rates did not significantly differ by sex, age, or level of education.

3.1.2. Patients with AF and stroke

General knowledge about stroke, TIA, and AF. Thirty-five percent of respondents had experienced a TIA only, and 37% had survived multiple strokes. Stroke survivors were slightly more informed about stroke than AF-only patients; they more frequently reported being aware of different types of stroke than AF-only patients (74% vs 55%) and correctly identified more of the potential negative outcomes caused by stroke. However, 61% did not know that they had AF before experiencing their stroke or TIA and 83% wished that they had known more about reducing their risk of stroke. Since being diagnosed with AF, only 49% felt they had done everything that they could to reduce the risk of stroke due to AF and few had joined a support group (15%). Patients with AF and stroke were generally willing to take anticoagulants and reported high rates of compliance (96%).

Outcomes after stroke. Surveyed stroke survivors generally had poor outcomes, with 77% indicating that their life was not the same since experiencing a stroke and 73% stating that life was now worse than they had imagined (Figure 3B). Younger stroke survivors and those without a college education were more likely to state that life was now worse than they had imagined (79% and 81%, respectively, compared with 66% of older patients and 69% of college educated patients). Forty percent did not leave the house as much as they did before suffering a stroke, and 39% said that they experienced depression. It was common for stroke survivors to require assistance with activities of daily living (toileting [15%], feeding [15%], grooming [21%], bathing [31%], dressing [33%], and mobility [41%]; Figure 3A). Women and younger stroke survivors required assistance with a greater percentage of daily activities (mean 15% and 16%, respectively, compared with 8% of men and 7% of older patients). Motor limitations persisted in 80% of survivors. As expected, those who survived a TIA were less likely to experience motor limitations (69% vs 83%), require assistance with activities of daily living (35% vs 40%), or feel like a burden to their caregivers (47% vs 64%) than those who survived a stroke. Stroke survivors were more likely to make healthy lifestyle changes (63% vs 51%) and join a support group (21% vs 2%) than TIA survivors.

3.1.3. Desired educational resources and treatment qualities

When the two groups were queried about their satisfaction with information about AF provided by their physician, only 50% of stroke survivors and 47% of AF-only patients felt very satisfied. Among unsatisfied patients, the most common educational information sources requested were a discussion with a health care provider in the office (especially a physician), written material, direction to Web sites and CDs/DVDs to use at home. In relation to the most important qualities of a treatment to reduce the risk of stroke in AF, the following were listed by the combined group: reducing the risk of stroke caused by a clot (39%), using a treatment with the least side effects (22%), reducing the risk of a brain bleed

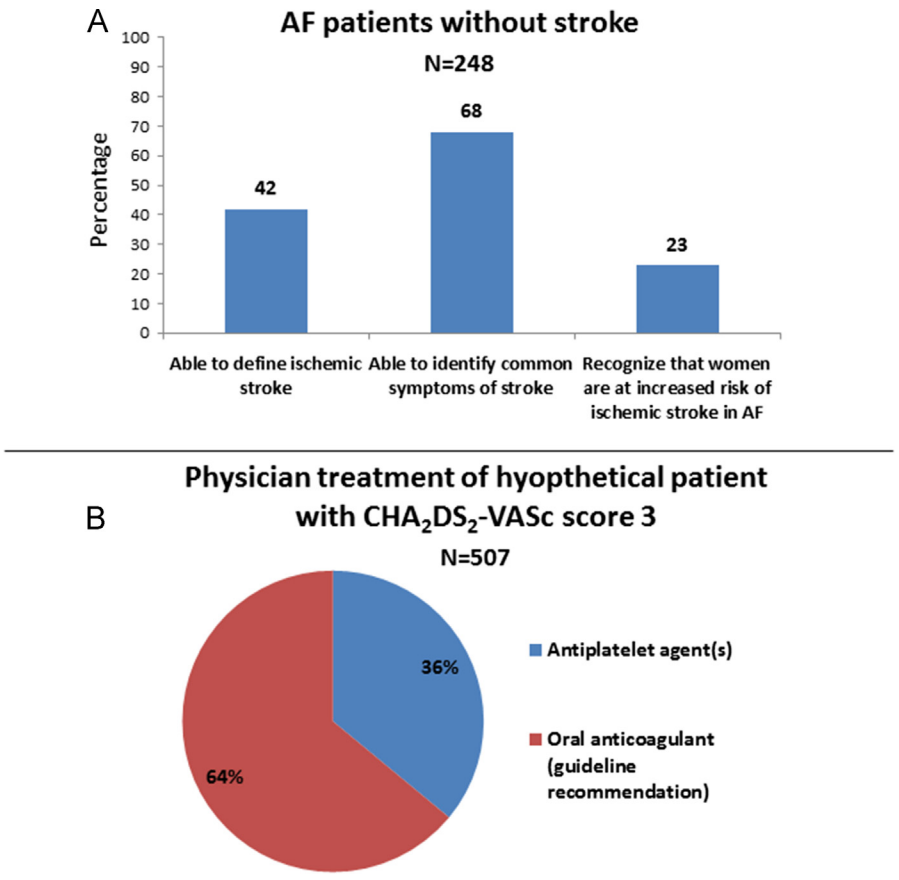

Figure 1 Gaps in knowledge about AF and stroke. **A:** AF patients without a history of stroke had poor understanding of stroke types, symptoms, and risk. **B:** In response to a hypothetical patient with a CHA_2DS_2-VASc score of 3 and no apparent contraindication to anticoagulation, only 64% of physicians responded that they would prescribe an oral anticoagulant, the treatment clearly recommended by professional society guidelines. AF = atrial fibrillation.

(14%), finding an easy-to-use treatment (eg, once daily dosing, 12%), and affordability (11%).

3.2. Caregivers

3.2.1. Demographics

Two hundred three caregivers of stroke or TIA survivors with AF completed the survey. Characteristics of the responding caregivers are provided in Table 2. Caregivers were predominantly women (84%), most frequently married to (44%) or otherwise related to (44%) the stroke survivor. The mean age of caregivers was 58.6 years. The majority of caregivers (56%) were caring for patients who had survived an ischemic stroke, 20% for patients who had survived a hemorrhagic stroke, 10% a combination of ischemic and hemorrhagic strokes; and 19% a TIA. Most (74%) caregivers were caring for a patient who suffered his or her most recent stroke in the past 5 years.

3.2.2. Caregiver responsibilities and stroke survivor disabilities

On average, surveyed caregivers stated that they provide assistance during 47% of the survivors' daily activities (Figure 3A); 14% of caregivers provide assistance 100% of the time. The most common tasks that required assistance were driving, shopping, and taking medications. Within the first six months of suffering a stroke, most caregivers observed motor (92%) and cognitive (81%) limitations in those they were caring for. The most commonly reported limitations persisting beyond six months were impaired balance (65%) and walking (58%). Seven of ten caregivers (70%) felt they needed more physical help to care for their stroke survivor. They also frequently reported needing modifications to the survivor's home (63%), financial assistance (63%), and respite care (62%). As expected, caregivers of stroke survivors were more likely to desire respite care than caregivers of TIA survivors (66% vs 45%, respectively).

3.2.3. Life changes for caregivers and survivors

The vast majority of caregivers (92%) felt they had significantly more responsibilities since becoming a caregiver, and 60% felt their responsibilities were more than they could handle (Figure 3C). More than two-thirds of caregivers (68%) reported a significant change in their relationship with the survivor, and 56% felt socially isolated. Caregivers were more likely to report a change in their relationship with stroke survivors than with TIA survivors (72% vs 50%, respectively).

Caregivers frequently noted significant changes in the stroke survivor's quality of life. More than half (51%)

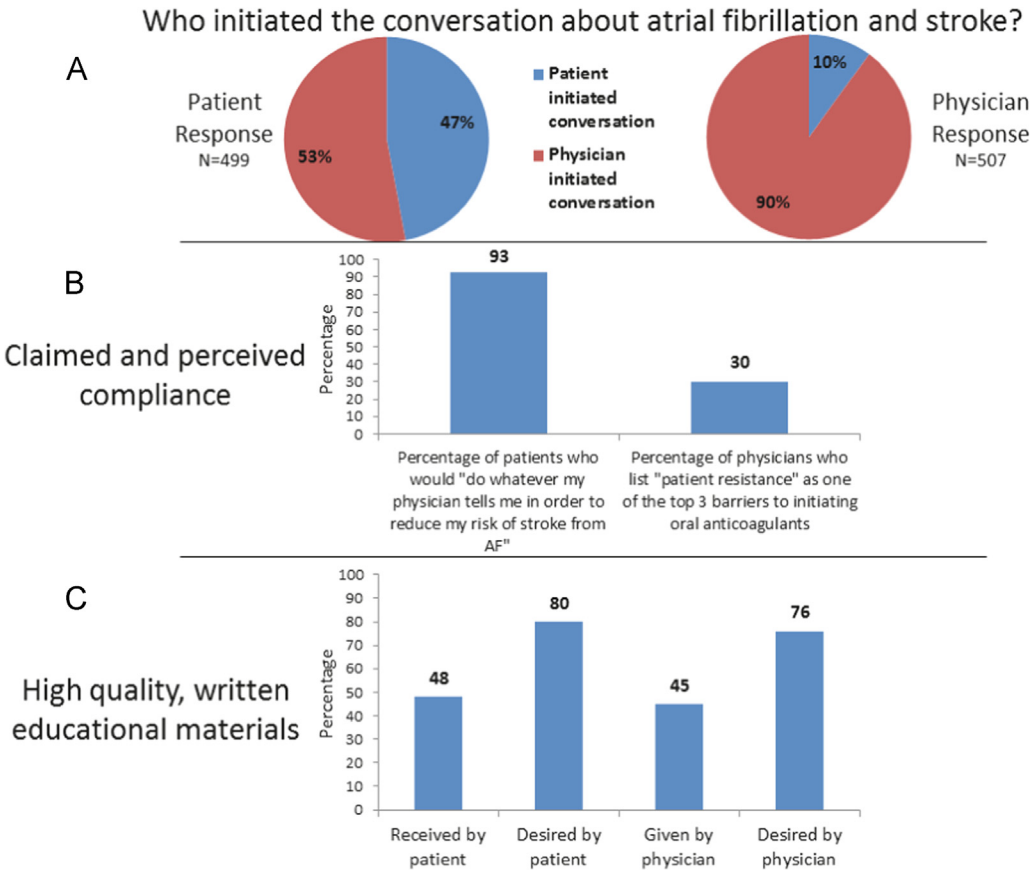

Figure 2 Gaps in perspective between patients and physicians. **A:** While patients frequently responded that they initiated the conversation about AF and stroke, physicians replied that they initiated 90% of such conversations. **B:** While patients reported a great willingness to comply with physician recommendations about stroke prevention, physicians often cited "patient resistance" as a major barrier to prescribing oral anticoagulants. **C:** Both patients and physicians agreed that high-quality, written educational materials are underutilized. AF = atrial fibrillation.

reported survivor depression after stroke. Sixty-two percent indicated that the survivor in their care does not leave the house as much since having a stroke, and 86% indicated that living with stroke is worse than the survivor imagined.

Encouragingly, 98% of caregivers reported urging the survivor to focus on improving his or her health after stroke and 32% actually observed improvement in the survivor's health.

3.2.4. Caregiver perceptions of prestroke education about AF

The majority of caregivers surveyed (89%) wished that they had learned more about the increased risk of stroke in AF before stroke occurrence. Only 39% of caregivers responded that the survivor in their care was informed of an increased risk of stroke with AF beforehand. However, among those caregivers who actually attended physician visits before the stroke, 78% responded that their survivor had been informed of the increased risk.

More than 90% of caregivers correctly identified common symptoms of stroke (eg, sudden trouble speaking and sudden numbness/weakness of one side of the body). However, only 47% of caregivers reported being very satisfied with the information they received from their survivor's physician. The majority (69%) felt the need to seek additional information from other sources, most commonly the website of AF and stroke associations (77%).

3.3. Physicians

3.3.1. Physician characteristics

Respondents to the survey included 151 general practitioners, 202 cardiologists, 101 electrophysiologists, and 53 neurologists. Characteristics of responding physicians are provided in Table 3, stratified by specialty. Electrophysiologists reported treating the most AF patients per year (n = 215) and neurologists the least (n = 98). Neurologists reported a history of stroke in 53% of their AF patients compared to only 10% reported by electrophysiologists.

3.3.2. Physician perceptions of stroke, AF patients, and barriers to anticoagulation

Virtually all physicians (97%) responded that AF-related ischemic stroke can have devastating consequences. Interestingly, 90% of physicians responded that their AF patients underestimate the potential impact of AF-related stroke and 79% reported that many AF patients are in denial about stroke risk (Figure 2B). While cardiologists (31%) and electrophysiologists (35%) identified bleeding risk as the major barrier to prescribing anticoagulation, neurologists (53%) and general practitioners (36%) frequently cited monitoring of anticoagulation as the most significant barrier. Neurologists were more frequently concerned about hemorrhagic stroke (62%) and reversibility of anticoagulants (49%) than other physicians.

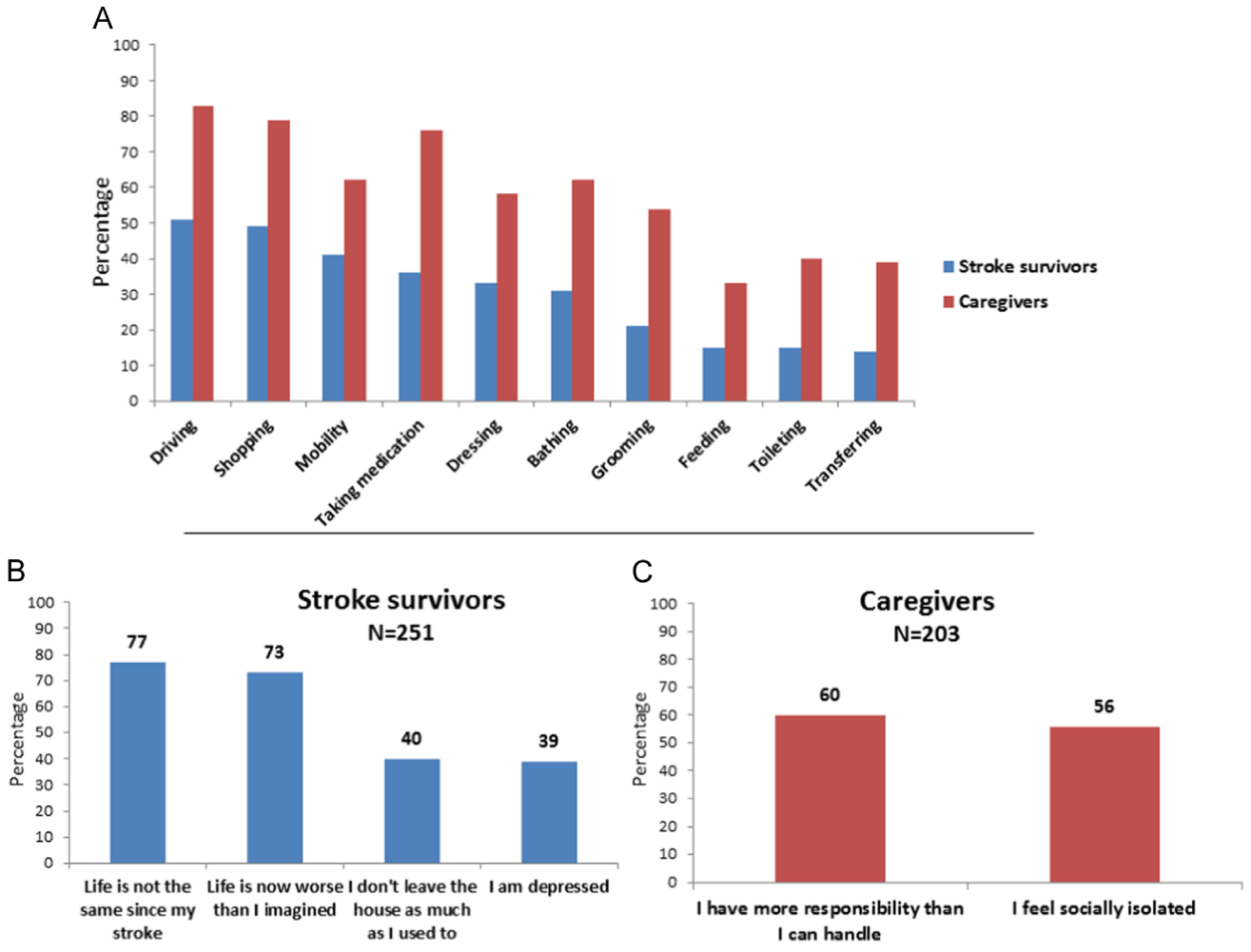

Figure 3 Impact of stroke on atrial fibrillation patients and their caregivers. **A:** The percentage of stroke survivors (blue) and caregivers (red) reporting the need for assistance with various activities of daily living is displayed. For each activity, more caregivers than stroke survivors responded that assistance was needed. **B:** Patients reported a profoundly negative impact of stroke on their lives. The percentage agreeing with each statement is displayed. **C:** Caregivers also reported a profound impact of stroke on their lives.

3.3.3. Differences in practice patterns between physician specialties

All physicians responded that they prescribe oral anticoagulants to some of their AF patients, while 79% also sometimes prescribe antiplatelet agents. Electrophysiologists prescribe anticoagulants for the greatest percentage of their AF patients (88%), and general practitioners for the lowest (73%). In response to the hypothetical patient with a CHA_2DS_2-VASc score[11] of 3 and no contraindication to anticoagulation, 64% of respondents recommended an oral anticoagulant and 36% either aspirin or dual antiplatelet therapy (Figure 1B). Electrophysiologists (77%) and cardiologists (66%) were more likely to prescribe anticoagulants to this patient than neurologists (62%) and general practitioners (55%).

3.3.4. Physician desire for better educational resources

While the majority of physicians responded that the average patient does not understand the risk of AF-related ischemic stroke, 22% stated that the primary challenge in educating AF patients is teaching them that the benefits of anticoagulation outweigh the risks. Most physicians (>80%) responded that they personally discuss these risks and benefits with patients when selecting a treatment option. In addition, 45% provide patients with written educational materials, 36% have a nurse or educator discuss AF with patients, and 20% direct patients to educational websites (Figure 2C). The majority of physicians would like to have better educational materials to aid in their discussion of AF, ischemic stroke, and treatment options. Seventy-six percent want brochures, pamphlets, or posters; 44% desire web-based animations or illustrations; 33% want interactive videos; and 25% desire on-demand Frequently Asked Questions. Younger physicians (age <45 years) were more likely to want web-based animations or illustrations than older physicians.

4. Discussion

4.1. Principal findings

Critical gaps in knowledge were identified in AF patients and, to a lesser extent, their treating physicians. AF patients underestimate the devastating impact of stroke on their lives and those of their caregivers. AF patients are more motivated

Table 2 Characteristics of surveyed caregivers.

n	203
Demographics	
Sex: male	16
Mean age (y)	59
Married	75
College educated	87
Employed	38
Median household income ($)	60,700
Ethnic background	
White	88
Black	4
Asian/Pacific Islander	3
Hispanic/Latino	2
Prefer not to answer	2
Mixed ethnicity	1
Community type	
Urban	17
Suburban	55
Rural	28
Census region	
Northeast	25
South	33
Midwest	26
West	17
Relationship to patient	
Spouse	44
Other family member	44
Friend	4
Paid caregiver	4
Other	4

to learn about preventing stroke and comply with prescribed antithrombotic therapy than physicians realize. Better education and more effective communication between patients and physicians are needed to decrease the impact of stroke in AF.

4.2. Gaps in patient and physician knowledge

In AF patients surveyed, there was lack of knowledge about stroke, including difficulty distinguishing stroke types, lack of familiarity with stroke symptoms, and lack of awareness of increased stroke risk associated with AF. Similar fundamental gaps in AF patient knowledge have been reproducibly demonstrated in populations of different age, ethnicity, and socioeconomic status throughout the United States and the world.[12–19]

More than one-third of physicians responded that they would prescribe antiplatelet agents rather than oral anticoagulants for a hypothetical patient with a CHA_2DS_2-VASc score of 3 and no apparent contraindication to anticoagulation. The 2014 AHA/ACC/HRS Guideline for the Management of Patients with Atrial Fibrillation[20] clearly recommends oral anticoagulants for those with CHA_2DS_2-VASc scores ≥ 2. General practitioners were least likely to prescribe oral anticoagulants to the hypothetical patient and have previously been shown to be more likely than specialists to overestimate both the efficacy of antiplatelet agents and the risk of hemorrhage from oral anticoagulants.[21] Importantly, neurologists and general practitioners frequently cited monitoring of anticoagulation as a barrier to prescribing oral anticoagulants. This could be due to either higher rates of vitamin K antagonist prescription (as opposed to novel anticoagulants) or less access to anticoagulation clinics. Lack of robust infrastructure for managing anticoagulation, such as an anticoagulation clinic, has been associated with lower prescribing rates of vitamin K antagonists.[22] In addition, novel anticoagulants have been demonstrated to have superior efficacy and/or safety in several large randomized clinical trials.[23–26] Unfortunately, deficiencies in patient and physician knowledge are not unique to AF, but rather have been reported in a variety of stroke populations.[27–30]

Table 3 Characteristics of surveyed physicians, stratified by specialty

Characteristic	Primary care physicians*	Cardiologists	Cardiac electrophysiologists	Neurologists	All
n	151	202	101	53	507
Demographics					
Sex: male	75	91	89	74	84
Mean age (y)	46	48	47	45	47
Years in practice					
1–9	25	33	36	45	33
10–19	47	33	35	30	37
>19	28	34	30	25	30
American Board of Medical Specialties status					
Certified	97	98	97	91	97
Primary work location					
Private practice	85	63	41	49	64
Hospital	12	36	51	49	33
Skilled nursing facility or long-term acute care	0	1	2	0	1
Other	3	0	5	2	2
Practice characteristics					
Mean atrial fibrillation patients treated per year	108	187	215	98	160
Mean percentage of professional time devoted to patient care	97	94	92	92	94

*Includes internal medicine, primary care, and family practice.

4.3. Underestimation of the impact of stroke in AF

The impact of stroke on surveyed AF patients was profound, with limitation of a wide range of activities, loss of independence, and high rates of depression. The significant majority of patients reported that stroke was worse than they had imagined. Caregivers of stroke survivors were also deeply impacted. Caregivers frequently reported overwhelming responsibility, inadequate resources, social isolation, and even changes in their relationship with their stroke survivor. These findings are not unexpected as the degree of disability caused by stroke has been inversely correlated with caregiver quality of life, and strokes associated with AF are among the most severe.[6,7,30] Interestingly, stroke survivors may underestimate the burden of caring for them (Figure 3A).

4.4. Gaps in perspective between patients and physicians

Patients were frequently dissatisfied with the education provided by their physicians. While physicians perceived that they initiate the conversation about stroke in AF on almost every occasion, patients felt they were equally likely as their physician to initiate such a conversation (Figure 2A). While survivors frequently replied that before their stroke they had not been informed by their physician of the increased stroke risk associated with AF, caregivers often contradicted this assertion. Possible explanations include limited patient retention of communicated information and recall bias, which frequently complicates retrospective health studies.[31] While physicians frequently cited concerns about patient compliance as a barrier to prescribing oral anticoagulants, patients reported willingness to take any action necessary to prevent stroke. Physicians have been shown to have limited ability to predict patient compliance with other prescribed treatments.[32]

4.5. Opportunities to improve knowledge, communication, and outcomes

Patients and caregivers are eager for knowledge about stroke associated with AF and treatments to reduce that risk. The most commonly requested sources of information were direct discussion with the physician and high-quality written materials. Patients have been shown to quickly forget much of what is verbally communicated in the office.[33] Written materials and other learning aids may improve patient retention.[34] Written materials can also be used to educate caregivers unable to attend physician appointments. Physicians also frequently expressed a desire for written educational materials. Such informational handouts have been developed by professional societies and are readily available (Table 4). Patients, caregivers, and physicians should be made aware of these documents and their use facilitated. In addition, educational campaigns to increase public awareness of AF and stroke are needed. The value of such programs has been demonstrated across different patient populations, including children.[17,21,35]

Table 4 Recommendations for decreasing gaps in knowledge and perspective and for diminishing stroke risk in AF

Patients

1. Learn the common symptoms of stroke (available at www.stroke.org/understand-stroke).
2. Understand the negative impact of stroke on your quality of life and the quality of life of loved ones who are forced into the role of caregivers.
3. Learn how AF can increase your risk of stroke and the ability of oral anticoagulants to reduce that risk.
4. Convey your desire for knowledge and willingness to follow treatment recommendations to your physician.

Caregivers

1. Attend physician visits with AF patients and ask about reducing stroke risk.
2. Encourage AF patients to comply with prescribed treatment for their benefit and for yours.

Physicians

1. Know and comply with treatment recommendations from professional society guidelines (available at http://resources.hrsonline.org/provider.html).
2. Understand that patients are highly motivated to reduce their risk of stroke from AF and usually compliant with prescribed treatments.
3. Obtain high-quality written materials to educate patients and caregivers about AF and stroke. These can be downloaded from professional society websites such as www.hrsonline.org/Patient-Resources.
4. Establish infrastructure for managing anticoagulation to diminish barriers to prescribing vitamin K antagonists. Prescribe novel anticoagulants when appropriate.
5. Increase public awareness through participation in educational campaigns.

AF = atrial fibrillation.

Patients should be educated about the impact that stroke can have not only on their lives but also on the lives of their loved ones, who are forced into the role of caregivers. It is possible that if patients understood the enormous burden of being a caregiver, they would be more likely to consider and comply with antithrombotic treatment.

Physician compliance with prescribing oral anticoagulants could be enhanced by greater dissemination of guideline recommendations, access to anticoagulation clinics, and use of novel anticoagulants. Furthermore, physicians should avoid overestimating patient resistance to oral anticoagulation.

4.6. Study limitations

Caregivers reported greater degrees of stroke survivor disability than that reported by stroke survivors themselves. While this likely reflects underestimation by stroke survivors of the actual burden their care imposes on caregivers, it is also possible that we surveyed caregivers of more severely affected stroke survivors. Stroke survivors and caregivers were not identified as pairs, but rather as independent populations. Detailed information was not collected from patients on medical comorbidities and AF management (such as rate vs rhythm control), which may impact perception and level of understanding. The study focused primarily on antiplatelet vs anticoagulant use and frequently did not

distinguish vitamin K antagonists from novel anticoagulants. Our survey is limited by underrepresentation of certain populations, such as paid caregivers, and the possibility that respondents differed from nonrespondents, particularly given moderate response rates. Future studies should include other important stakeholders, such as nurses. Differences in rates of anticoagulation prescription between physician specialties may have been influenced not only by knowledge and adherence to guidelines but also by stroke risk of the treated patient population. For example, if the average CHA_2DS_2-VASc score of patients treated by primary care physicians is lower than that of patients treated by electrophysiologists, a lower rate of anticoagulation use would be appropriate. Lastly, this survey was designed to identify gaps in knowledge and perspective. While intuitive, the interventions we propose to decrease these gaps were not tested in this observational study.

5. Conclusion

We identified significant knowledge gaps in AF patients, caregivers, and physicians in relation to stroke. Furthermore, gaps in perspective often lead to suboptimal communication and decision making. Increased education and more effective communication between all subgroups are needed to reduce the impact of stroke in AF. A summary of our recommendations for patients, caregivers, and physicians is provided in Table 4.

Appendix

Supplementary data

Supplementary material cited in this article is available online at http://dx.doi.org/10.1016/j.hrthm.2015.04.039.

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