Consensus Clinical Decision-Making Factors Driving Anticoagulation in Atrial Fibrillation

Philip K. King, PharmD[a,b,*], Susan M. Fosnight, RPh[c,d], and Jeffrey R. Bishop, PharmD, MS[e]

Guideline-recommended anticoagulation is frequently omitted in high-risk patients with atrial fibrillation (AF) for reasons not fully understood, which may result in suboptimal care. A nationally representative, expert group of physicians (cardiology, neurology, and general medicine), and clinical pharmacists participated in a consensus-seeking, modified Delphi method to identify key clinical decision-making factors driving anticoagulant prescribing in real-world AF patients. Representing >2,500 anticoagulation-related patient encounters per month, 27 of 30 participants completed the study (90% overall response rate). In Round-1, experts rated their level of agreement with factors and suggested modifications or additional factors. Of 66 factors entering Round-1, 21 met and 4 partially met consensus, 41 did not meet consensus, and 7 were newly suggested. Of 32 factors advanced for scoring in Round-2, 16 met consensus criteria. In Round-3, experts were given the option to rescue up to 2 of the 16 nonconsensus factors from Round-2. Including a concom itant need for dual antiplatelet therapy, no factor was successfully rescued into consensus. The most important factors related to risk of infarction rather than bleeding risk or other patient-specific considerations. Among factors not independently addressed in current guidelines, these included baseline hematologic indicators of potential bleeding risk, previous bleeding episodes by specific type, other risk factors for bleeding, and adherence. In conclusion, when determining anticoagulation strategies in AF, there is a need for further research on the clinical implications of these emerging factors as well as the reasons behind divergent opinions toward nonconsensus factors. **(Am J Cardiol 2019;124:1038−1043)**

Guideline-recommended anticoagulation is frequently omitted in high-risk patients with atrial fibrillation (AF) with estimated nonprescription rates from 13% to 38% and significant geographic heterogeneity up to 69%.[1−9] Although direct-acting oral anticoagulant prescribing rates have increased, many at-risk patients are treated with aspirin alone, which is no longer recommended in updated guidelines.[9,10] The primary objective of this research was to determine, by consensus, which key clinical decision-making factors drive anticoagulant prescribing in real-world patients with AF. To achieve this, we engaged a nationally representative, multispecialty group of physicians practicing cardiology, neurology, or general medicine in various practice settings. Advanced specialty clinical pharmacists who are frequently involved in anticoagulant decision-making were also included. We then used a modified Delphi method to engage these content experts to comment on and rate factors important to anticoagulation decision-making.[11,12]

Methods

Content experts were sequentially invited to participate in this Delphi with a goal of enrolling 32 participants with equal representation from cardiologists, neurologists, general medicine physicians, and clinical pharmacy specialists with added qualifications (e.g., clinical specialty residency training, board certification, and high involvement in managing anticoagulation). Delphis with <10 participants are unlikely to adequately represent true consensus and there is general agreement that it is unnecessary, inefficient, and impractical to include >50 participants.[11,13] To ensure a variety of institutions were represented, both large and moderately sized hospitals and clinics were targeted for expert recruitment. Participants were systematically screened for invitation (via e-mail or telephone) on the basis of several factors, including the availability of direct contact information. First, the investigators reviewed authorship in US guidelines related to anticoagulation, AF, or stroke. Second, fellowship directors from institutions with established cardiology/neurology fellowships were invited. Third, if necessary, the authors' own professional networks (including professional associations) were assessed for subjects who met the above criteria for invitation. Higher preference for invitation was given to those with evidence of previous scholarship in anticoagulation. Finally, due to a disproportionately lower number of women practicing in

[a]Department of Pharmacy, Indiana University Health − Adult Academic Health Center, Indianapolis, Indiana; [b]Department of Pharmacy Practice, Butler University College of Pharmacy and Health Sciences, Indianapolis, Indiana; [c]Northeast Ohio Medical University College of Pharmacy, Department of Pharmacy Practice, Rootstown, Ohio; [d]Department of Pharmacy, Summa Health, Akron, Ohio; and [e]Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, Minneapolis, Minnesota. Manuscript received February 20, 2019; revised manuscript received and accepted July 2, 2019.

Funding: One-time scholarship for presentation of preliminary research methodology provided by the American College of Clinical Pharmacy Cardiology Practice Research Network, MERIT16 (Lenexa, KS, United States).

See page 1042 for disclosure information.

*Corresponding author: Tel: (317) 962-3733.

E-mail addresses: philkingpharmd@gmail.com; pkking@butler.edu (P.K. King).

0002-9149/
https://doi.org/10.1016/j.amjcard.2019.07.006

these fields as a whole and to ensure that women were adequately represented, we sought to include a minimum of 25% representation from women based on availability and interest. If unable to participate, clinicians were asked to recommend colleagues of similar experience levels within their local or expanded professional networks. Given the broad number of eligible US clinicians, we enrolled each on a "first-come, first-served" basis until target numbers were met.

A 3-round, modified Delphi method was used whereby the experts were provided with a list of potential decision-making factors for consensus evaluation (Figure 1).[14,15] Each round was completed electronically using the Research Electronic Data Capture survey tool with fully blinded completion of each round done via online survey to minimize risk for external influence on individual responses.[16] Participants were given up to 3 weeks to complete each survey round with reminders at week 1, week 2, and 3 days before the deadline. Within 4 weeks of a round's closure, data were summarized, IRB approval was obtained, and the amended survey and data summary were returned to the group. The total process occurred over approximately 6 months.

The list of factors for initial evaluation was generated by an investigator literature review related to initiating/stopping anticoagulation. After an external expert review period, the resulting list was organized within the survey and submitted to participants in Round-1 (see Supplementary Table S1). The following primary question was asked: "Which factors drive your decision to initiate or withhold anticoagulation in AF?" Round-1 focused on "Seeking Agreement," whereby each participant rated their level of agreement on the importance of each previously identified factor by selecting categories of "disagree," "agree," or "agree with modification" (Figure 1). For a factor rated as "agree with modification," participants recommended specific changes to the wording/phraseology to more appropriately convey how they believed the factor would realistically influence a therapeutic decision. Before Round-2, the investigators reviewed and revised the modified factors. Additional factors considered highly important in clinical practice could be added as a suggestion to be evaluated for consensus in Round-2. "Partial consensus" (agreement ≥60% to <75%) and "full consensus" factors (≥75% agreement) were reconsidered in Round-2. Summarized results were categorized by consensus outcome and returned to the group. Relative proportions of participant responses were listed alongside each factor.

Round-2 focused on "Valuing Factors," whereby participants ranked the relative importance of partial or full consensus factors obtained in Round-1. With 500 available points across all factors and a suggested range limited to 0 to 50 points per factor, participants assigned a specific value to each factor with higher point values identifying the most important factors. Based on the range of scores across all factors, a median overall score was determined. Factors with mean scores above this median score were defined as consensus at the completion of Round-2. In the summary returned to the group, these factors were ranked according to mean scores.

Round-3 focused on "Assessing Agreement," whereby participants reconsidered any Round-2 nonconsensus factors and were given the option to rescue up to 2 factors into the final list. Based on strict criteria, factors were successfully rescued if ≥75% voted in agreement. These were added to the ranked factors meeting consensus through Round-2 to comprise the final list of consensus factors and returned for review.

Participant demographics, clinical practice information, and survey data were summarized using descriptive statistics. To assess clinician subgroup differences in rescue voting, an exploratory post hoc Freeman-Halton extension to the Fisher exact test was used.

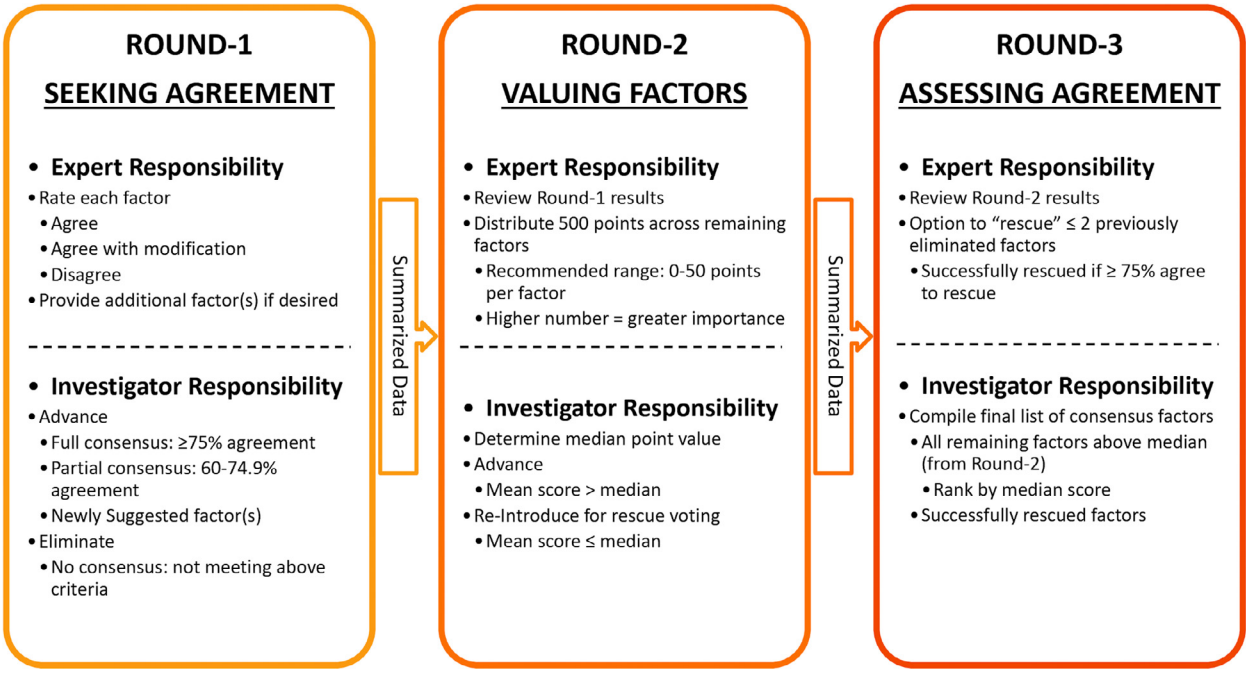

Figure 1. Modified Delphi method criteria for factor advancement and consensus.

Results

Of 103 clinicians screened and recruited, 30 initially agreed to participate, 24 declined invitation, and 49 did not respond. Twenty-seven clinicians participated whereas 2 requested removal after not completing Round-1 and a third did not complete any surveys (90% overall participation; Table 1). Among the 19 physicians and 8 clinical pharmacists with recorded responses, clinician subgroup distribution and participation rates remained similar in each of the 3 rounds. The median postgraduate years of direct clinical experience with anticoagulation-related decision-making were 11 (interquartile range 11 to 22.5) and the majority (59%) maintained practices in both inpatient and outpatient settings. Across all participants, it was estimated that >2,500 patients per month required anticoagulation-related decision-making. In addition to various academic appointments/affiliations, ongoing involvement in professional organizations was evident.

Table 1
Expert panel select demographics (n = 27)

Characteristic*	
Median age (IQR) (years)	42 (37-52)
Women	6 (22%)
Medical specialty	
Cardiology	6 (22%)
Neurology	7 (26%)
General medicine (internal or family medicine)	6 (22%)
Clinical pharmacy	8 (30%)
Estimated number of patients requiring anticoagulation per month	
Total number across all expert participants	2526
Mean number per expert participant (range)	30 (13 to 63)
Main practice setting	
Rural	1 (4%)
Suburban	7 (22%)
Urban	19 (70%)
Academic appointments†	
Full Professor	5 (19%)
Associate Professor	10 (37%)
Assistant Professor	9 (33%)
Adjunct Professor	4 (15%)
Clinical Instructor	3 (11%)
Other	1 (4%)
Professional Organization Involvement (Membership and/or Leadership Role)†	
American College of Cardiology	6 (22%)
American Heart Association	8 (30%)
American College of Chest Physicians	0 (0%)
Society of Critical Care Medicine	1 (4%)
American Stroke Association	6 (22%)
American Academy of Neurology	5 (19%)
American Neurological Association	2 (7%)
Neurocritical Care Society	1 (4%)
American Medical Association	2 (7%)
American Osteopathic Association	1 (4%)
American College of Clinical Pharmacy	8 (30%)
American Society of Health-System Pharmacists	4 (15%)
American Pharmacists Association	0 (0%)
Other	9 (33%)

* Representing 32 unique healthcare and academic institutions, demographic data were available for 27 of 30 participants completing ≥1 round; proportions based on n = 27.

† Some participants simultaneously maintained ≥2 appointments in academic institutions and/or ≥2 memberships/leadership roles in professional organizations.

Overall results are summarized (Figure 2). After the preliminary literature review, 66 factors were introduced into Round-1 (see Supplementary Table S1). In Round-1, 41 factors (62%) failed to meet any consensus criteria and 7 factors were newly suggested. Across full or partial consensus factors, 16 had suggestions for modifications to terminology, yielding 32 factors for advancement into Round-2. None of the 16 nonconsensus factors from Round-2 was successfully rescued in Round-3 (Table 2). Some trends were seen with different clinician subgroups placing higher importance on certain factors that did not reach consensus, including the need for concomitant dual antiplatelet therapy (DAPT), cortical microhemorrhages, minor gastrointestinal bleeding, and the burden of AF. Considering the most rescue votes of 4 (range 0 to 4), an exploratory post hoc analysis revealed no statistical difference among clinician subgroup rescue voting ($p > 0.05$ for each of the 12 factors receiving ≥1 rescue vote; Table 2). Final consensus factors are shown rank-listed by score (Table 3).

Discussion

Regarding anticoagulating patients with AF, a multidisciplinary clinician group of physicians and pharmacists from across the United States completed a modified Delphi method that identified a reliable representation of the importance of specific factors driving this decision-making thought process. This study identified which factors are most commonly considered in the decision of whether or not to anticoagulate AF patients. However, it is important to note that the process used herein did not directly assess how these consensus factors are used. For the multiple nonconsensus factors among clinician subgroups, opportunities exist for further research that seeks to establish their relative clinical importance in real-world settings/subpopulations.

Three basic themes of consensus factors emerged: (1) risk of infarction; (2) hemorrhagic risk; and (3) patient-specific (Table 3). Furthermore, several factors emerged that are not independently addressed in guidelines, including baseline hematologic indicators of potential bleeding risk (e.g., platelets and International Normalized Ratio), previous bleeding episodes by subtype, other bleeding risk factors, and adherence. Concomitant DAPT did not reach consensus, despite receiving the most rescue votes, underscoring a need for continued evaluation of risks and benefits in real-world populations.[1]

According to this group of experts, the most important factors involved in the decision to initiate anticoagulation were related to risk of infarction, not bleeding. The top 3 factors included the CHA(2)DS(2)-VASc stroke risk prediction tool score followed by a history of ischemic stroke or transient ischemic attack.[17] Seven of the 13 remaining factors related to direct or indirect bleeding concerns: recent history of significant gastrointestinal bleeding, baseline thrombocytopenia, history of nontraumatic intracranial bleeding, and a recent history of any major bleeding resulting in hospitalization. Reflecting its increased adoption into practice, the CHA(2)DS(2)-VASc score (rank = 1) proved more important than the CHADS(2) score (rank = 8).[17,18]

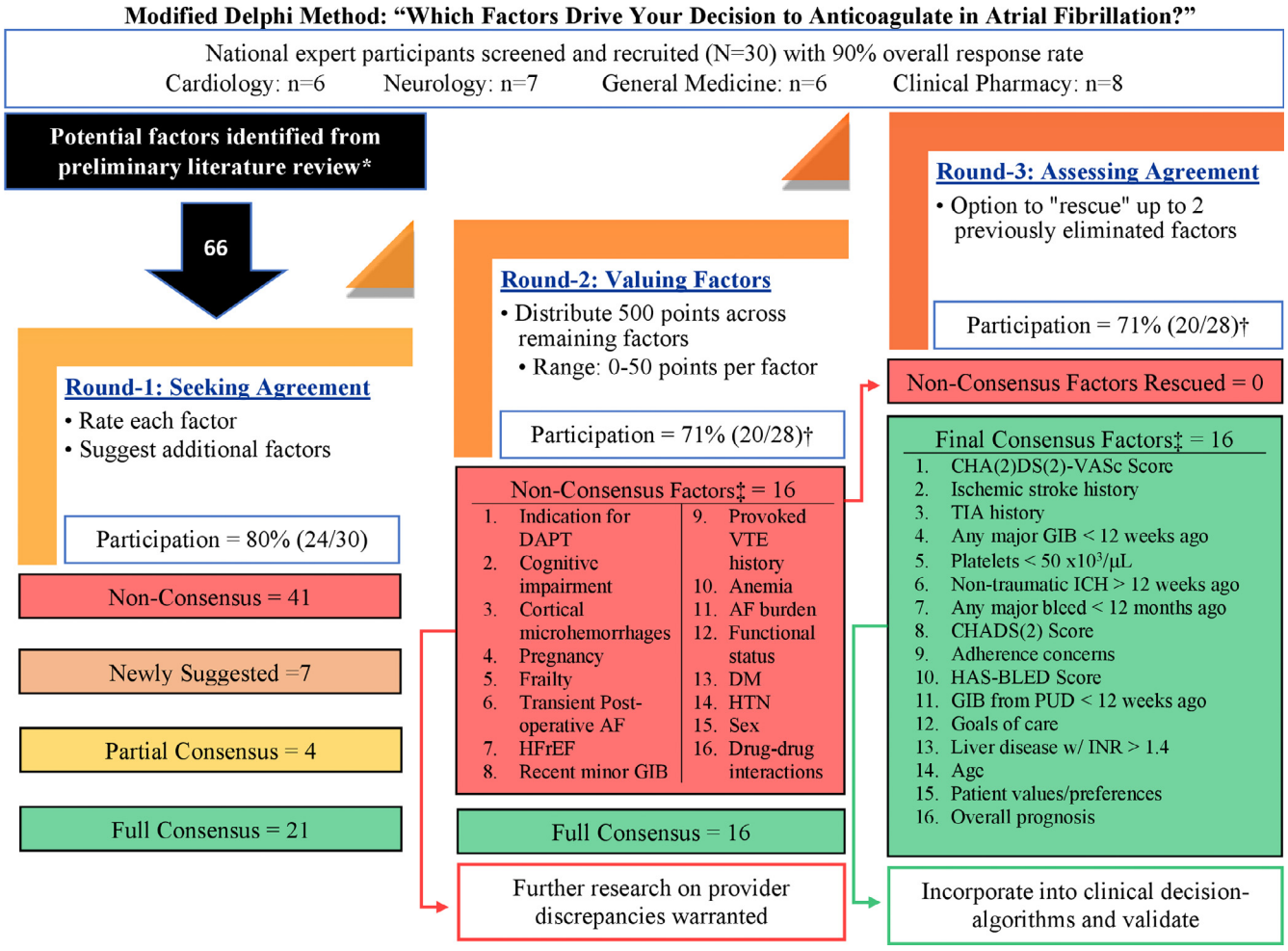

Figure 2. Summary of modified Delphi method to identify consensus factors driving decisions to initiate anticoagulation in atrial fibrillation.
*List of factors was reviewed with minor modifications from external content experts.
†Thirty experts agreed to participate; after not completing Round-1, 2 participants requested removal from the remainder of the study.
‡Exact factor descriptions are listed in Supplementary Table S2.

Only the HAS-BLED bleeding risk prediction score reached consensus.[19] Compared with other shared criteria within the CHA(2)DS(2)-VASc and HAS-BLED scoring systems, the criterion, age, appeared to be more important. In this study, however, specific ages were not defined, but are being studied elsewhere.[20]

Several patient-specific consensus factors included goals of care, overall prognosis, the clinician's perception of a patient's ability to be adherent, and the patient's own values and preferences for stroke versus bleeding risk. Indeed, considering patient preference is 1 of the 3 pillars of evidence-based medicine and is recommended in guidelines.[1,9,10]

Not reaching consensus was the concomitant need for DAPT. Interestingly, the relative lower importance of DAPT is incongruent with actual prescribing patterns, whereby patients stratified by coronary heart disease risk equivalent or not were more likely to receive DAPT plus oral anticoagulation (9.5% vs 1.3%).[2]

The PINNACLE registry on coronary artery disease, hypertension, heart failure, and AF showed that, even in participating cardiology practices, nearly 40% of high-risk AF patients do not receive effective anticoagulation for reasons that are not addressed.[21] This rate of nonprescription is similar to other recent studies.[2,6–8] Moreover, even if anticoagulation is provided, nonconventional dosing (e.g., with direct-acting oral anticoagulants) is surprisingly frequent.[22,23] This underscores the importance of investigating the reasons for these prescribing patterns that may include clinician's value and preferences or other patient-specific factors that are rarely documented in a readily retrievable format (e.g., patient-specific preferences, cost, and absolute or relative contraindications).[2]

This study has several unique strengths. First, the Delphi is an effective method for elucidating factors important to a specific topic by group consensus whereas limiting effects of peer-to-peer persuasion. Added to the strength of a noteworthy high completion rate are the variety of represented specialties, practice settings, US regions, years of experience, and active professional organization/academic involvement. Importantly, factors agreed upon crossed professions, state borders, and other hierarchies of influence. Lastly, this study prospectively evaluated underlying elements of thought

Table 2
Nonconsensus factors eligible for rescue voting in Round-3

Factor*	Rescue votes‡
Need for dual antiplatelet therapy (e.g., following coronary stenting)	4
Cognitive impairment (including dementia and regardless of etiology) with or without caregiver support*	3
Presence of cortical microhemorrhages on magnetic resonance imaging†	3
Pregnancy	2
Frailty (not meeting hospice criteria)*	2
New transient postprocedural AF (terminating <24 hours)*	2
Heart failure with reduced ejection fraction	1
History of GI bleeding not requiring blood transfusion <12 weeks ago (bleeding resolved with modifiable risk factors addressed)*	1
History of provoked venous thromboembolism*	1
Anemia (Hgb <12 mg/dl and not related to ongoing bleeding)*	1
Burden of AF (% of time in AF or frequency of AF recurrences)†	1
Overall functional status†	1
Diabetes (regardless of HbA1c control)	0
Hypertension	0
Sex*	0
Absence/presence of drug interactions (including severity rating)	0

* Several factors were modified from original description (not shown).
† Factor suggested by content experts in Round-1.
‡ $p > 0.05$ for differences in clinician subgroup rescue voting (post hoc Freeman-Halton Extension of Fisher Exact Test) for factors receiving ≥1 vote.

Table 3
Final ranked consensus factors driving decisions to initiate anticoagulation in atrial fibrillation

Consensus Factor*,†,‡	Score		
	Median	Mean	Range
CHA(2)DS(2)-VASc Stroke Risk Prediction Tool score§	45	41	10-90
History of ischemic stroke (including cardioembolic)§	29	32	10-51
History of transient ischemic attack (including suspected cardioembolic etiology)‡,§	25	28	10-50
History of GI bleeding requiring blood transfusion <12 weeks ago (bleeding resolved and modifiable risk factors addressed)‡,¶	25	23	10-35
Baseline thrombocytopenia (platelets < 50×10^3/ul)‡,¶	25	20	0-30
History of nontraumatic intracranial bleeding >12 weeks ago‡,¶	20	24	10-50
Any major bleeding leading to hospitalization <12 months ago‡,¶	20	20	5-50
CHADS(2) Stroke Risk Prediction Tool score§	20	20	0-51
Perceived ability to comply with anticoagulant therapy (i.e., taking > 50% of prescribed doses)‡,‖	20	20	5-40
HAS-BLED Bleeding Risk Prediction Tool Score¶	19	17	0-50
Confirmed peptic ulcer disease resulting in GI bleeding requiring treatment <12 weeks ago‡,¶	15	18	5-30
Goals of care**,‖	15	17	5-50
Advanced liver disease resulting in elevated baseline INR >1.4 with or without esophageal varices‡,¶	15	14	0-40
Age§,¶	15	14	0-35
Patient's values/preferences regarding avoidance of stroke versus bleeding**,‖	14	17	5-40
Overall prognosis**,‖	14	16	0-50

* Thirty experts agreed to participate; after not completing Round-1, 2 experts requested removal from the remainder of the study.
† Factors ranked according to median, mean, and range limit scores; complete factor descriptions are listed in Supplementary Table S2.
‡ Several factors were modified from original description (not shown.)
§ Factor theme = risk of infarction.
¶ Factor theme = hemorrhagic risk.
‖ Factor theme = patient-specific.
** Factor suggested by content experts in Round-1.

processes rather than observational prescribing patterns, which are common in registry data and cross-sectional studies.

This Delphi method, whereas identifying expert insights into important patient-specific factors, has inherent limitations that are important to consider when interpreting the results. First, these results are limited by the expert clinicians who were willing to contribute to this time-intensive process. By excluding nonphysician advanced practice providers, these results may be less generalizable to clinical environments relying heavily on these providers for anticoagulation management. Furthermore, although the participant number may appear to be a limitation, the targeted sample size is consistent with Delphi methodology.[11,13] Finally, by excluding clinicians practicing outside the United States, results may not reflect the practice or factors present in other countries.

In conclusion, a nationally representative, multidisciplinary clinician group completed a rigorous, consensus-seeking process that identified common factors driving anticoagulant decision-making. Factors inadequately studied, or not fully addressed, in current guidelines included baseline hematologic indicators of potential bleeding risk, previous bleeding episodes, and adherence concerns. Though exploratory clinician subgroup comparisons were statistically insignificant, certain nonconsensus factors may be clinically significant to each subgroup and represent a continued gap in the literature. Unexpectedly, it became clear that a major path for future research exists in better understanding the reasons for divergent opinions of certain factors as this is where most of the uncertainty lies. Achieving this may ultimately enhance future clinical decision-making tools.

Disclosures

The authors have no conflicts of interest to disclose.

Acknowledgment

The authors thank American College of Clinical Pharmacy Mentored Research Investigator Training Program, American College of Clinical Pharmacy Cardiology Practice Research Network, and Gregory Gibson, PhD, Kent State University, Department of Sociology.

Content Experts: Cardiology/Electrophysiology: Jordan M. Prutkin, MD, MHS, Geoffrey D. Barnes, MD, MSc, Tyler L. Taigen, MD, Roger B. Chaffee, MD, Walid I. Saliba, MD, Mark A. Iler, MD, Philip M. Dorfman, MD; Neurology: Brian M. Silver, MD, Scott E. Kasner, MD, MSCE, Joao A. Gomes, MD, Nada El-Husseini, MD, MHS, Jodi A. Dodds, MD, Christina A. Wilson, MD, PhD, Colum F. Amory, MD, MPH, Howard S. Kirshner, MD; General Medicine: Mark H. Eckman, MD, MS, Warren Gavin, MD, Rex Wilford, DO, Michael Rich, MD, William Smucker, MD, Linda Ha, DO; Clinical Pharmacy: Vincent F. Mauro, PharmD, Alexander J. Ansara, PharmD, Patrick J. Gallegos, PharmD, Julie A. Murphy, PharmD, Elizabeth Renner, PharmD, Mate M. Soric, PharmD, Jodie M. Fink, PharmD, Matthew Schneiderman, PharmD.

Supplementary materials

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.amjcard.2019.07.006.

1. January CT, Wann LS, Albert JS, Calkins H, Cigarroa JE, Cleveland JC Jr, Conti JB, Ellinor PT, Ezekowitz MD, Field ME, Murray KT, Sacco RL, Stevenson WG, Tchou PJ, Tracy CM, Yancy CW. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol* 2014;64:2246–2280.
2. Hsu JC, Maddox TM, Kennedy K, Katz DF, Marzec LN, Lubitz SA, Gehi AK, Turakhia MP, Marcus GM. Aspirin instead of oral anticoagulant prescription in atrial fibrillation patients at risk for stroke. *J Am Coll Cardiol* 2016;67:2913–2923.
3. Heidenreich PA, Solis P, Estes NAM 3rd, Fonarow GC, Jurgens CY, Marine JE, McManus DD, McNamara RL. 2016 ACC/AHA clinical performance and quality measures for adults with atrial fibrillation or atrial flutter: a report of the American College of Cardiology/American Heart Association Task Force on Performance Measures. *J Am Coll Cardiol* 2016;68:525–568. https://doi.org/10.1016/j.jacc.2016.03.521.
4. Oldgren J, Healey JS, Ezekowitz M, Commerford P, Avezum A, Pais P, Zhu J, Jansky P, Sigamani A, Morillo CA, Liu L, Damasceno A, Grinvalds A, Nakamya J, Reilly PA, Keltai K, Van Gelder IC, Yusufali AH, Watanabe E, Wallentin L, Connolly SJ, Yusuf S. Variations in cause and management of atrial fibrillation in a prospective registry of 15,400 emergency department patients in 46 countries: the RE-LY Atrial Fibrillation Registry. *Circulation* 2014;129:1568–1576.
5. Peterson ED, Pokorney SD. New treatment options fail to close the anticoagulation gap in atrial fibrillation. *J Am Coll Cardiol* 2017;69:2485–2487.
6. Steinberg BA, Gao H, Shrader P, Pieper K, Thomas L, Camm AJ, Ezekowitz MD, Fonarow GC, Gersh BJ, Goldhaber S, Haas S, Hacke W, Kowery PR, Ansell J, Mahaffey KW, Naccarelli G, Reiffel JA, Turpie A, Verheugt F, Piccini JP, Kakkar A, Peterson ED, Fox KAA. GARFIELD-AF. ORBIT-AF Investigators. International trends in clinical characteristics and oral anticoagulation treatment for patients with atrial fibrillation: results from the GARFIELD-AF, ORBIT-AF I, and ORBIT-AF II registries. *Am Heart J* 2017;194:132–140.
7. Proietti M, Laroche C, Opolski G, Maggioni AP, Boriani G, Lip GYH, Gen Pilot Investigators AF. 'Real-world' atrial fibrillation management in Europe: observations from the 2-year follow-up of the EURObservational Research Programme-Atrial Fibrillation General Registry Pilot Phase. *Europace* 2017;19:722–733.
8. Lip GY, Laroche C, Dan GA, Santini M, Sbigniew K, Rasmusen LH, Ioachim PM, Tica O, Boriani G, Cimaglia P, Diemberger I, Hellum CF, Mortensen B, Maggioni AP. 'Real-world' antithrombotic treatment in atrial fibrillation: the EORP-AF pilot survey. *Am J Med* 2014;127:519–529.
9. January CT, Wann LS, Calkins H, Chen LY, Cigarroa JE, Cleveland Jr JC, Ellinor PT, Ezekowitz MD, Field ME, Furie KL, Heidenreich PA, Murray KT, Shea JB, Tracy CM, Yancy CW. 2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients with Atrial Fibrillation. *J Am Coll Cardiol* 2019;25873. https://doi.org/10.1016/j.jacc.2019.01.011.
10. Lip GYH, Banerjee A, Boriani G, Chian CE, Fargo R, Freedman B, Lane DA, Ruff CT, Turakhia M, Werring D, Patel S, Moores L. Antithrombotic therapy for atrial fibrillation: CHEST guideline and expert panel report. *Chest* 2018;154:1121–1201.
11. Hsu CC, Sandford BA. The Delphi technique: making sense of consensus. *Pract Assess Res Eval* 2007;12:1–8.
12. Dalkey NC, Helmer O. *An Experimental Application of the Delphi Method to the Use of Experts*. Santa Monica, CA: Publication RM-727-PR. Rand Corp; 1962.
13. Witkin BR, Altschuld JW. Planning and Conducting Needs Assessment: A Practical Guide. Thousand Oaks, CA: Sage Publications, Inc., 1995:195.
14. Williamson C, Mumma B, Khare RK, Diercks DB. *J Am Coll Cardiol* 2018;61(10 Supplement):E99. https://doi.org/10.1016/S0735-1097(13)60100-X.
15. Miklich MA, Reed BN, Mattingly TJ II, ST Haines. Beliefs and behaviors of professionally engaged pharmacists. *J Am Pharm Assoc* 2016;56:405–411.
16. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009;42:377–381.
17. Lip GY, Nieuwlaat R, Pisters R, Lane DA, Crijns HJ. Refining clinical risk stratification for predicting stroke and thromboembolism in atrial fibrillation using a novel risk factor-based approach: the Euro Heart Survey on Atrial Fibrillation. *Chest* 2010;137:263–272.
18. Gage BF, Waterman AD, Shannon W, Boechler M, Rich MW, Radford MJ. Validation of clinical classification schemes for predicting stroke: results from the National Registry of Atrial Fibrillation. *JAMA* 2001;285:2864–2870. https://doi.org/10.1001/jama.285.22.2864.
19. Pisters R, Lane DA, Nieuwlaat R, de Vos CB, Crijns HJGM, Lip GYH. A novel user-friendly score (HAS-BLED) to assess 1-year risk of major bleeding in patients with atrial fibrillation: the Euro Heart Survey. *Chest* 2010;138:1093–1100.
20. Eckman MH, Lip GYH, Wise RE, Speer B, Sullivan M, Walker N, Kissela B, Flaherty ML, Kleindorfer D, Baker P, Ireton R, Hoskins D, Harnett BM, Aguilar C, Leonard A, Arduser L, Steen D, Costea A, Kues J. Using an atrial fibrillation decision support tool for thromboprophylaxis in atrial fibrillation: effect of sex and age. *J Am Geriatr Soc* 2016;64:1054–1060.
21. Marzec LN, Wang J, Shah ND, Chan PS, Ting HH, Gosch KL, Hsu JC, Maddox TM. Influence of direct oral anticoagulants on rates of oral anticoagulation for atrial fibrillation. *J Am Coll Cardiol* 2017;69:2475–2484.
22. Steinberg BA, Shrader P, Thomas L, Ansell J, Fonarow GC, Gersh BJ, Kowey PR, Mahaffey KW, Naccarelli G, Reiffel J, Singer DE, Peterson ED, Piccini JP. Off-label dosing of non-vitamin k antagonist oral anticoagulants and adverse outcomes: the ORBIT-AF II Registry. *J Am Coll Cardiol* 2016;68:2597–2604.
23. Lip G, Skjøth F, Nielsen P, Kjældgaard J, Larsen T. Effectiveness and safety of standard-dose nonvitamin K antagonist oral anticoagulants and warfarin among patients with atrial fibrillation with a single stroke risk factor: a nationwide cohort study. *JAMA Cardiol* 2017;2:872–881.