Published in final edited form as:

J Thromb Thrombolysis. 2018 April ; 45(3): 403–409. doi:10.1007/s11239-018-1625-2.

Mind the gap: Results of a multispecialty survey on coordination of care for peri-procedural anticoagulation

Jacob E Kurlander, MD, MS^{*,1,2}, Geoffrey D Barnes, MD, MS^{*,1}, Michelle A. Anderson, MD, MSc¹, Brian Haymart, RN, MSc¹, Eva Kline-Rogers, NP¹, Scott Kaatz, DO, MSc³, Sameer D Saini, MD, MS^{1,4}, Sarah L. Krein, PhD, RN^{1,4}, Caroline R. Richardson, MD⁵, James B Froehlich, MD, MPH¹

⁽¹⁾Department of Internal Medicine, University of Michigan Medical School, Ann Arbor, MI

⁽²⁾Veterans Affairs Ann Arbor Health Care System, Ann Arbor, MI

⁽³⁾Division of Hospital Medicine, Henry Ford Hospital, Detroit, MI

⁽⁴⁾Veterans Affairs Ann Arbor Health Services Research & Development Center for Clinical Management Research, Ann Arbor, MI

⁽⁵⁾Department of Family Medicine, University of Michigan Medical School, Ann Arbor, MI

Abstract

Objectives: To understand how physicians from various specialties perceive coordination of care when managing peri-procedural anticoagulation.

Study Design: Cross-sectional survey of cardiologists, gastroenterologists, and primary care physicians (PCPs) in an integrated health system (N=251).

Methods: The survey began with a vignette of a patient with atrial fibrillation co-managed by his PCP, cardiologist, and an anticoagulation clinic who must hold warfarin for a colonoscopy. Respondents' experiences and opinions around responsibilities and institutional support for managing peri-procedural anticoagulation were elicited using multiple choice questions. We examined differences in responses across specialties using chi-square analysis.

Results: The response rate was 51% (n=127). 52% were PCPs, 28% cardiologists, and 21% gastroenterologists. Nearly half (47.2%) of respondents believed that the cardiologist should be primarily responsible for managing peri-procedural anticoagulation, while fewer identified the PCP (25.2%), anticoagulation clinic (21.3%), or gastroenterologist (6.3%; p=0.09). Respondents across specialties had significantly different approaches to deciding how to manage the clinical case presented (p<0.001). Most cardiologists (60.0%) would decide whether to offer bridging without consulting with other providers or clinical resources, while most PCPs would decide after

Address correspondence to: Jacob Kurlander, 3912 Taubman Center, 1500 E. Medical Center Dr., SPC 5362, Ann Arbor, MI 48109-5362, Phone: (734) 647-5944, jkurland@umich.edu.

*Co-primary authors

Animals: This article does not contain any studies with animals performed by any of the authors.

Ethics approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

consulting clinical resources (57.6%). Gastroenterologists would most often (46.2%) defer the decision to another provider. A majority of all 3 specialties agreed that their institution could do more to help manage peri-procedural anticoagulation, and there was broad support (88.1%) for anticoagulation clinics' managing all aspects of peri-procedural anticoagulation.

Conclusions: Providers across specialties agree that their institution could do more to help manage peri-procedural anti-coagulation, and overwhelmingly support anticoagulation clinics' taking responsibility.

Précis:

Physicians across medical specialties disagree about who should be responsible for managing peri-procedural anticoagulation but broadly support the anticoagulation clinic playing a more active role.

Keywords

anticoagulation; bridging; coordination of care; colonoscopy; atrial fibrillation; Endoscopy; correlation of care; warfarin

INTRODUCTION

For patients taking vitamin K antagonists (VKAs) to prevent or treat thromboembolism, interruption in therapy may be necessary around the time of medical procedures. Each year approximately one in six patients receiving VKAs for atrial fibrillation will undergo some type of invasive procedure[1, 2]. These patients are often placed on short acting anticoagulants, such as low-molecular-weight heparin, to minimize the time without therapeutic anticoagulation. This practice of “bridging” is intended to prevent peri-procedural thromboembolic events. However, observational studies[3, 4], a meta-analysis[5], and a 2015 randomized controlled trial[6] have found increased risk of hemorrhagic events during the bridging period and little protection against thromboembolic events.

Several different specialists could be in a position to decide whether to bridge before a procedure, including cardiologists, primary care providers (PCPs), and the specialist performing the procedure. Yet, these specialists are likely to vary in their knowledge, familiarity, and practice patterns regarding bridging. In a prior multi-site survey study, we reinforced findings of others that there is significant variation in peri-procedural anticoagulation decision-making across medical specialties, with PCPs and gastroenterologists recommending potentially inappropriate bridging more frequently than cardiologists[7, 8]. In fact, different specialty organizations have diverging recommendations for atrial fibrillation patients with low-moderate thromboembolism risk (CHA₂DS₂-VASc score 2-4[9]), with the American Society for Gastrointestinal Endoscopy[10] recommending in favor of bridging for these patients and the American College of Cardiology[11] recommending against. Against the backdrop of a risky clinical intervention and substantial variation in practice patterns and recommendations, achieving coordination and agreement among specialists caring for the anticoagulated patient takes on heightened importance.

Accordingly, to further explore perceptions of care coordination, clinical responsibility, and institutional support for managing peri-procedural anticoagulation, we present findings from a multi-site survey of cardiologists, gastroenterologists, and PCPs, focusing on physicians in a single integrated health system, where practice norms are most likely to be shared. Based on prior evidence of communication challenges between physicians when initiating anticoagulation[12], we hypothesized that even in this single-institution there would be poorly delineated lines of responsibility for managing peri-procedural anticoagulation. We also sought to gauge support for anticoagulation clinics playing a more active role in managing peri-procedural anticoagulation, as has been previously suggested[13].

METHODS

Survey sample and distribution

This study was conducted as part of the Michigan Anticoagulation Quality Improvement Initiative (MAQI²), a Blue Cross Blue Shield-sponsored program to improve the quality of anticoagulation care at six health centers in the lower peninsula of the state. For this study we were primarily interested in shared norms of practice related to anticoagulation care. Thus, we focused on a single integrated health system, where all PCPs and consultants are employed by the health center. The primary sampling frame included 251 providers, consisting of all PCPs (including both internal medicine and family medicine), cardiologists, and gastroenterologists in the health system. We obtained email addresses either from administrative staff or by hand searching the health system's website.

Eligible providers were sent an email, including a link to the online survey, inviting them to participate. The email was authored by the site's MAQI² physician champion. Three additional reminder emails were sent to non-responders. As an incentive, participants were offered the opportunity to be entered into a drawing to win one of three \$100 gift cards. The initial email invitations were distributed on July 29, 2015. All surveys were completed by September 8, 2015.

Survey development

The survey was developed iteratively with a core group of five clinicians and pretested with 15 physicians in multiple specialties prior to distribution. It was designed to be administered online using Qualtrics survey software ([qualtrics.com](https://www.qualtrics.com)). The survey questions are shown in Appendix 1. Participants were first presented with the scenario of a 72-year-old man with multiple comorbidities, including non-valvular atrial fibrillation with a low (<5%) annual thrombosis risk (CHADS₂ = 2, CHA₂DS₂-VASc = 4)[9, 11, 14] on warfarin, who is co-managed by a PCP and cardiologist, and followed by an anticoagulation clinic. He is planning to undergo an "open-access" colonoscopy (i.e., without first seeing a gastroenterologist in clinic), and will need to be off anticoagulation at the time of the procedure. Following the scenario, participants were asked about their comfort level with deciding whether bridging is necessary (1-6 Likert-type scale anchored by "very uncomfortable" and "very comfortable"), and whether the cardiologist, gastroenterologist, PCP, or anticoagulation clinic should be primarily responsible for the decision in cases like the scenario. Participants were also asked how well supported they felt by their institutions

in making anticoagulation decisions, and whether they felt their institution could do more to help (1-6 Likert-type scale anchored by “strongly disagree” and “strongly agree”). To ensure the privacy of participants, after completing the initial survey, they were directed to a 2nd survey that included specific demographic details. The demographic information was not linked to the results in the 1st part of the survey.

Analysis

Physicians were excluded from this analysis if they indicated a medical specialty of “other”, if they were not involved in clinical care (i.e., saw 0 patients in clinic each week), or never made decisions about anticoagulation management.

Family medicine and internal medicine physicians were analyzed together as “PCPs.” For questions on institutional support for anticoagulation management and on the support for anticoagulation clinic managing all aspects of anticoagulation care, responses were dichotomized as strongly disagree/disagree/somewhat disagree vs. somewhat agree/agree/strongly agree. We performed chi-square tests to evaluate for differences across medical specialties.

Distribution of the survey was approved by the MAQI² research and publications committee as a quality improvement project and was deemed exempt from IRB approval at the University of Michigan (the MAQI² coordinating center).

RESULTS

Participant characteristics

There were 127 participants, for an overall response rate of 51% (60% for cardiologists, 48% for gastroenterologists, and 45% for PCPs). The largest physician group was PCPs (52.0% of the entire sample), with slightly more internal medicine (29.9%) than family medicine physicians (22.1%) (Table 1). Participants’ average age was 48.3 (SD 12.9) years and a slight majority were male (57.5%). The median number of patients seen by participants in clinic/consultation each week was 40 (range 1-100). Most participants (52.8%) reported being involved in 1-5 anticoagulation decisions per month. Gastroenterologists reported performing a median of 32.5 colonoscopies per month (range 15-85).

Responsibility for bridging decisions

Survey respondents most often identified the cardiologist as the specialist that *should be* primarily responsible for managing peri-procedural anticoagulation (47.2%), followed by the PCP (25.2%), the anticoagulation clinic (21.3%), and the gastroenterologist (6.3%). Perceptions of responsibility for bridging did not differ significantly by respondent specialty ($p=0.09$).

Most cardiologists (68.6%) indicated their own specialty should be responsible for managing peri-procedural anticoagulation, although there were some who reported that the anticoagulation clinic (14.3%) or the PCP (14.3%) should have primary responsibility (Figure 1). Among gastroenterologists, only 7.7% believed their own specialty should be

responsible for managing peri-procedural anticoagulation, and cardiologists were most frequently identified as the specialist who should be responsible (46.2%). PCPs identified the cardiologist (36.4%) and their own specialty (33.3%) in nearly equal numbers as the provider who should manage peri-procedural anticoagulation, with a smaller number identifying the anticoagulation clinic (22.7%). There were significant differences across specialties in the proportion that identified their own specialty as responsible for managing peri-procedural anticoagulation ($p<0.001$).

Management of patient scenario

When asked how they would decide whether to bridge the patient in the scenario, there were significant differences across specialties (Figure 2, $p<0.001$). Most PCPs stated that they would consult clinical or online resources (57.6%) or discuss the case with the patient's other providers (28.8%). In contrast, most cardiologists (60.0%) said they would make the decision on their own without any additional resources or discussion, with a smaller percentage indicating they would consult clinical or online resources (25.7%). Among gastroenterologists, responses were divided among deferring the decision to another provider (46.1%), conferring with the other providers (30.8%), and making the decision alone (19.2%). Tabulated results are found in Appendix 2. Overall, 85.7% of cardiologists and 71.2% of PCPs – but only 34.6% of gastroenterologists – felt comfortable having to decide whether or not bridging anticoagulation is necessary for the patient scenario that was presented without talking to someone from another specialty ($p<0.001$).

Institutional support

A majority of cardiologists, gastroenterologists, and primary care physicians agreed that there were structures in place to help manage peri-procedural anticoagulation (82.9%, 73.1%, 68.2%, respectively, $p=0.29$). However, most gastroenterologists (88.5%) and PCPs (84.9%) agreed that their institution could do more to help manage peri-procedural anticoagulation, while a smaller proportion of cardiologists (51.4%) shared this view ($p<0.001$). A large majority (88.2%) of all participants were supportive of the anticoagulation clinic managing all aspects of peri-procedural anticoagulation (cardiologists 80.0%; gastroenterologists 88.5%; PCPs 92.4%).

DISCUSSION

Management of peri-procedural anticoagulation is complex and inherently involves multiple medical specialties. Little is known, however, about how providers go about making these decisions and, in particular, which specialty should take the lead. For example, as in the clinical scenario presented in this survey, when a primary care provider orders a colonoscopy for an anticoagulated patient whose atrial fibrillation is managed by a cardiologist, who should decide: the PCP, the cardiologist, or the gastroenterologist? This question is consequential since decisions about which patients to offer bridging anticoagulation differ by medical specialty[7, 8], and high quality evidence now suggests that for the majority of patients with atrial fibrillation, bridging with short-acting anticoagulants likely causes net harm[6]. In this study, we found no universal consensus among cardiologists, PCPs, and gastroenterologists about who should be the responsible

party, but the largest proportion, nearly half of all respondents, identified the cardiologist. For their part, almost two-thirds of cardiologists identified themselves as responsible, and the vast majority of them (86%) felt comfortable with this task, indicating that they may be accepting of this role. In contrast, it is clear from this study that gastroenterologists feel ill-equipped to manage peri-procedural anticoagulation.

One previous study of providers from multiple specialties throughout the US evaluated important aspects of coordination of care for peri-procedural anticoagulation[7]. That study found that a majority of both gastroenterologists and cardiologists viewed themselves as the sole decision maker for patients on warfarin undergoing colonoscopy. The same study found that 70% of respondents did not have a standardized protocol in place for managing peri-procedural anticoagulation. This finding is consistent with our results that most participants felt their institution could provide greater assistance with managing peri-procedural anticoagulation. This prior study, however, did not ask about which specialty *should* manage peri-procedural anticoagulation.

Our findings have direct implications for health care leaders working to standardize and improve quality of peri-procedural care. While cardiologists appear to be most prepared and willing to manage peri-procedural anticoagulation, anticoagulation clinics may also be well positioned for this task. Often working under the supervision of cardiologists, anticoagulation clinics are accustomed to using algorithms to standardize medical care, a strategy that allows them to increase time – even if modestly – in therapeutic range[13, 15, 16]. While managing peri-procedural anticoagulation could add significantly to the workload in anticoagulation clinics, interviewed staff from six anticoagulation clinics in the VA healthcare system considered patients requiring interruption of therapy “complex” but noted that their impact on clinical workload was minor compared to patients with complicating factors such as multiple comorbidities, alcohol problems, and difficult living circumstances[17]. If anticoagulation clinics are going to provide incremental value to patients in the peri-procedural period, care protocols will have to be thoughtfully designed and implemented, and they will still have to work closely with physicians across specialties. For patients undergoing invasive procedures, proceduralists must still decide when a procedure requires stopping anticoagulation at all, and if so, when it is safe to resume.

In our survey, most PCPs felt comfortable managing peri-procedural anti-coagulation, but very few would do so without assistance, and most felt their institutions could do more to help. If PCPs are to continue managing peri-procedural anticoagulation, they would clearly benefit from additional resources and support. The creation and dissemination of clear and up-to-date institutional (or ideally multidisciplinary national) guidelines is warranted. This is especially true since various professional society guidelines have differing recommendations for peri-procedural anticoagulation management for low-moderate risk patients with atrial fibrillation. Moreover, healthcare providers across specialties would benefit from automated risk calculators and decision tools integrated into the electronic medical record for precision point-of-care support.

Our study has a number of strengths and limitations. It is the first survey to our knowledge to evaluate normative questions of responsibility for managing peri-procedural anticoagulation

and reflects the views of multiple different medical specialists. While the survey reflects the views only of participants in a single integrated health system, this feature allowed us to investigate shared norms around peri-procedural anticoagulation, which could not have been done in the same way with a multi-site sample. While this limits our ability to generalize to other health systems, it is likely that there is even less consensus about bridging anticoagulation in health systems that are not integrated. Another limitation is that our study was unable to assess how the specialist managing peri-procedural anticoagulation affects patient outcomes.

In conclusion, we found no agreement among cardiologists, gastroenterologists, and PCPs about which specialist should be responsible for managing peri-procedural anticoagulation, a situation which may contribute to undesirable variations in care. Furthermore, the majority of physicians felt that their institution could do more to support them in this task, and almost all agreed with empowering the anticoagulation clinic to manage these decisions. Future research is needed to evaluate such novel approaches to standardizing peri-procedural anticoagulation management.

Acknowledgments

Funding: The MAQI² consortium is supported by Blue Cross Blue Shield of Michigan. Dr. Barnes is supported on the NHLBI grant 2-T32-HL007853-16. The authors have no relevant financial relationships to disclose.

Conflict of interest:

Jacob E Kurlander – Previously received research funding from Ironwood Pharmaceuticals.

Geoffrey D Barnes – Research funding: BMS/Pfizer. Consulting: BMS/Pfizer and Portola.

Michelle A. Anderson - None

Brian Haymart - None

Eva Kline-Rogers - Consultant: Janssen, ACP; Board member: AC Forum

Scott Kaatz - Consultant: Boehringer Ingelheim, Janssen, Daiichi Sankyo, Bristol Myer Squibb/Pfizer; Speaker Honorarium: Boehringer-Ingelheim, Janssen, Bristol Myer Squibb/Pfizer, CSL, Behring

Sameer D Saini - None

Sarah L. Krein - None

Caroline R. Richardson - None

James B Froehlich - Consultant: Merck, Janssen, Novartis; Research Grants: Blue Cross/Blue Shield of Michigan, Fibromuscular Disease Society of America; Scientific Advisory Committee: Boehringer-Ingelheim, Pfizer

Appendix 1.: Patient scenario and survey questions.

Scenario: Now please consider the following scenario. A 72-year old man with hypertension, coronary artery disease, and type 2 diabetes is under the care of a cardiologist and PCP for management of non-valvular atrial fibrillation ($CHADS^2 = 2$, $CHADS^2$ -VASc = 4). His warfarin is managed by the local anticoagulation management service. The patient has an upcoming colonoscopy and will need to discontinue his anticoagulation for the

procedure. The patient will have the procedure without being seen in gastroenterology clinic beforehand.

1. How comfortable or uncomfortable would you feel if you had to decide whether or not bridging* is necessary for this patient without talking to someone from another specialty? You could still consult clinical references such as guidelines or online resources. (Six item response scale anchored by “very uncomfortable” and “very comfortable.”)
2. How would you make the decision about whether or not to bridge this patient? (A. I would usually make the decision on my own without needing any outside resources or providers. B. I would usually defer the decision to another provider. C. I would usually make the decision after discussion with the patient’s other providers. D. I would usually make this decision on my own after consulting clinical/online resources.)
3. In your experience, which provider most often makes the decision whether bridging anticoagulation is necessary in cases like the previous scenario? (Anticoagulation clinic, PCP, cardiologist, gastroenterologist)
4. In your opinion, which medical provider should be primarily responsible for deciding if bridging anticoagulation is necessary in cases like the scenario above? (Anticoagulation clinic, PCP, cardiologist, gastroenterologist)
5. To what extent do you agree or disagree with the following statements? (Strongly disagree, disagree, somewhat disagree, somewhat agree, agree, strongly agree).
 - a. My institution has structures in place to help me manage peri-procedural anticoagulation.
 - b. When I have questions about how to manage peri-procedural anticoagulation for a patient, I know who to contact.
 - c. My institution could do more to help me manage my patients’ peri-procedural anticoagulation.
6. How many times per month are you involved in deciding how to manage peri-procedural anticoagulation for a patient? (Never, less than once a month, 1-5 times per month, 6-10 times per month, 11-15 times per month, 16-20 times per month, more than 20 times per month.)
7. How supportive or opposed would you feel about having the anticoagulation clinic manage all aspects of peri-procedural anticoagulation using institutional guidelines? (Six item response scale anchored by “very opposed” and “very supportive.”)

*Earlier in the survey, bridging was defined as “when a short acting anticoagulant, such as heparin or low-weight molecular heparin (LWMH), is used during a period of warfarin interruption. For a patient who receives no bridging, the INR is allowed to drift down to near normal without substitution of any other anticoagulant agent before the colonoscopy.

Appendix 2.

Process for making decisions about bridging anticoagulation for scenario presented.

	Cardiologists (n=35)	Gastroenterologists (n=26)	Primary care providers (n=66)
I would usually make the decision on my own without needing any outside resources or providers	60.0%	19.2%	6.1%
I would usually defer the decision to another provider	2.9%	46.2%	7.6%
I would usually make the decision after discussion with the patient's other providers	11.4%	30.8%	28.8%
I would usually make this decision on my own after consulting clinical/online resources	25.7%	3.9%	57.6%

p<0.001 for comparison of distribution across specialties

References

1. Garcia D, Alexander JH, Wallentin L, et al. (2014) Management and clinical outcomes in patients treated with apixaban vs warfarin undergoing procedures. *Blood* 124:3692–3698 . doi: 10.1182/blood-2014-08-595496 [PubMed: 25320240]
2. Healey JS, Eikelboom J, Douketis J, et al. (2012) Periprocedural Bleeding and Thromboembolic Events With Dabigatran Compared With Warfarin Results From the Randomized Evaluation of Long-Term Anticoagulation Therapy (RE-LY) Randomized Trial. *Circulation* 126:343–348 . doi: 10.1161/CIRCULATIONAHA.111.090464 [PubMed: 22700854]
3. Steinberg BA, Peterson ED, Kim S, et al. (2015) Use and outcomes associated with bridging during anticoagulation interruptions in patients with atrial fibrillation: findings from the Outcomes Registry for Better Informed Treatment of Atrial Fibrillation (ORBIT-AF). *Circulation* 131:488–494 . doi: 10.1161/CIRCULATIONAHA.114.011777 [PubMed: 25499873]
4. Kim T- H, Kim J- Y, Mun H- S, et al. (2015) Heparin bridging in warfarin anticoagulation therapy initiation could increase bleeding in non-valvular atrial fibrillation patients: a multicenter propensity-matched analysis. *J Thromb Haemost JTH* 13:182–190 . doi: 10.1111/jth.12810 [PubMed: 25472735]
5. Siegal D, Yudin J, Kaatz S, et al. (2012) Periprocedural heparin bridging in patients receiving vitamin K antagonists: systematic review and meta-analysis of bleeding and thromboembolic rates. *Circulation* 126:1630–1639 . doi: 10.1161/CIRCULATIONAHA.112.105221 [PubMed: 22912386]
6. Douketis JD, Spyropoulos AC, Kaatz S, et al. (2015) Perioperative Bridging Anticoagulation in Patients with Atrial Fibrillation. *N Engl J Med* 373:823–833 . doi: 10.1056/NEJMoa1501035 [PubMed: 26095867]
7. Flaker GC, Theriot P, Binder LG, et al. (2016) Management of Periprocedural Anticoagulation: A Survey of Contemporary Practice. *J Am Coll Cardiol* 68:217–226 . doi: 10.1016/j.jacc.2016.04.042 [PubMed: 27386777]
8. Barnes GD, Kurlander JE, Haymart B, et al. (2016) Bridging anticoagulation before colonoscopy: Results of a multispecialty clinician survey. *JAMA Cardiol*. doi: 10.1001/jamacardio.2016.2409
9. Lip GY, Nieuwlaat R, Pisters R, et al. (2010) 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 J* 137:263–272
10. ASGE Standards of Practice Committee, Acosta RD, Abraham NS, et al. (2016) The management of antithrombotic agents for patients undergoing GI endoscopy. *Gastrointest Endosc* 83:3–16 . doi: 10.1016/j.gie.2015.09.035 [PubMed: 26621548]

11. Doherty JU, Gluckman TJ, Hucker WJ, et al. (2017) 2017 ACC Expert Consensus Decision Pathway for Periprocedural Management of Anticoagulation in Patients With Nonvalvular Atrial Fibrillation. *J Am Coll Cardiol* 69:871–898 . doi: 10.1016/j.jacc.2016.11.024 [PubMed: 28081965]
12. Mas Dalmau G, Sant Arderiu E, Enfedaque Montes MB, et al. (2017) Patients' and physicians' perceptions and attitudes about oral anticoagulation and atrial fibrillation: a qualitative systematic review. *BMC Fam Pract* 18: . doi: 10.1186/s12875-016-0574-0
13. Barnes GD, Nallamothu BK, Sales AE, Froehlich JB (2016) Reimagining Anticoagulation Clinics in the Era of Direct Oral Anticoagulants. *Circ Cardiovasc Qual Outcomes* 9:182–185 . doi: 10.1161/CIRCOUTCOMES.115.002366 [PubMed: 26933047]
14. Gage BF, Waterman AD, Shannon W, et al. (2001) Validation of clinical classification schemes for predicting stroke: results from the National Registry of Atrial Fibrillation. *Jama* 285:2864–2870 [PubMed: 11401607]
15. Pokorney SD, Simon DN, Thomas L, et al. (2015) Patients' time in therapeutic range on warfarin among US patients with atrial fibrillation: Results from ORBIT-AF registry. *Am Heart J* 170:141–148, 148.e1 . doi: 10.1016/j.ahj.2015.03.017 [PubMed: 26093875]
16. van Walraven C, Jennings A, Oake N, et al. (2006) Effect of study setting on anticoagulation control: a systematic review and metaregression. *Chest* 129:1155–1166 . doi: 10.1378/chest.129.5.1155 [PubMed: 16685005]
17. Ozkaynak Mustafa, Johnson Sharon A., Tulu Bengisu, et al. (2015) Exploring the effect of complex patients on care delivery tasks. *Int J Health Care Qual Assur* 28:494–509 . doi: 10.1108/IJHCQA-11-2014-0105 [PubMed: 26020430]

Take away points

- This survey of cardiologists, gastroenterologists, and primary care physicians in an integrated health system evaluated perceptions of coordination of care for peri-procedural anticoagulation, a common and complex clinical challenge.
- Physicians did not agree about which specialist should be responsible for managing peri-procedural anticoagulation.
- Most primary care physicians and gastroenterologists believed that their institutions could do more to help them manage peri-procedural anticoagulation.
- There were high levels of support across specialties for having an anticoagulation clinic manage all aspects of peri-procedural anticoagulation, which should be further investigated in future research.

Figure 1. Beliefs about which specialist should be responsible for managing peri-procedural anticoagulation, stratified by specialty of participant. There was no significant difference across specialties.

Figure 2.

How participants would go about making decisions about bridging anticoagulation for patient scenario, stratified by specialty. $p < 0.001$ for chi-square test of difference across specialties.

Table 1.

Participant characteristics.

	All participants (n=127)
Age (mean +/- sd) ^a	48.3 +/- 12.9 years
Gender	
Male ^a	73 (57.5%)
Female	50 (39.4%)
Other	2 (1.6%)
Missing	2 (1.6%)
Race ^a	
White	95 (74.8%)
Black	0
American Indian/Alaska Native	0
Asian/Asian American	22 (17.3%)
Pacific Islander/Hawaiian	0
Other	8 (6.3%)
Missing	2 (1.6%)
Ethnicity	
Hispanic	4 (3.0%)
Non-Hispanic	128 (95.3%)
Missing	2 (1.6%)
Specialty	
Cardiologist	35 (27.6%)
Gastroenterologist	26 (20.5%)
Primary care physician– family medicine	28 (22.1%)
Primary care physician – internal medicine	38 (29.9%)
Year of graduation from medical training	
1950-1969	2 (1.6%)
1970-1989	39 (30.7%)
1990-2009	83 (65.4%)
2010-2014	3 (2.4%)
Patients seen in clinic/consultation per week (median, range)	40 (1-100)
Number of anticoagulation decisions per month	
Less than once a month	42 (33.1%)
1-5 times per month	67 (52.8%)
6-10 times per month	15 (11.8%)
11-15 times per month	2 (1.6%)

	All participants (n=127)
16-20 times per month	1 (0.8%)

^aAge, gender, race and ethnicity are missing for two participants.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript