Impact of an atrial fibrillation decision support tool on thromboprophylaxis for atrial fibrillation

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AHJ paperImpact of an Atrial Fibrillation Decision Support Tool (AFDST) on Thromboprophylaxis for Atrial Fibrillation

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Abstract

Background – Appropriate thromboprophylaxis for patients with atrial fibrillation (AF) remains a national challenge.

Methods– We hypothesized that provision of decision support in the form of an **A**trial **F**ibrillation **D**ecision **S**upport **T**ool (AFDST) would improve thromboprophylaxis for AF patients. We conducted a cluster randomized trial involving 15 primary care practices and 1,493 adults with non-valvular AF in an integrated healthcare system between April 2014 and February 2015. Physicians in the intervention group received patient-level treatment recommendations made by the AFDST. Our primary outcome was the proportion of patients with antithrombotic therapy that was discordant from AFDST recommendation.

Results – Treatment was discordant in 42% of 801 patients in the intervention group. Physicians reviewed reports for 240 patients. Among these patients thromboprophylaxis was discordant in 63%, decreasing to 59% 1 year later (p=0.02). In non-stratified analyses changes in discordant care were not significantly different between the intervention group and control groups. In multivariate regression models assignment to the intervention group resulted in a non-significant trend towards decreased discordance (p=0.29), being a patient of a resident physician (p=0.02), and a higher HASBLED score predicted decreased discordance (p=0.03), while female gender (p=0.01) and a higher CHADSVASc score (p=0.10) predicted increased discordance.

Conclusions – Among patients whose physicians reviewed recommendations of the decision support tool discordant therapy decreased significantly over 1 year. However,

in non-stratified analyses the intervention did not result in significant improvements in discordant antithrombotic therapy.

Key words: atrial fibrillation, anticoagulation, performance improvement, decision support, warfarin, novel oral anticoagulants, aspirin.

Introduction

Atrial fibrillation (AF) is the most common significant cardiac rhythm disorder and is also a powerful common risk factor for stroke: about 15% of all strokes in the U.S. are attributable to AF. With the aging of the U.S. population, the prevalence of atrial fibrillation (AF) will increase substantially from over 2.2 million to more than 3 million by the year 2020.[1]

Numerous randomized trials have established that anticoagulation can significantly reduce the stroke risk posed by AF. However, studies have documented widespread underutilization of this therapy, or, at times, inappropriate use. A recent systematic review comparing current treatment practices for stroke prevention in AF with published guidelines showed underuse of oral anticoagulants in high risk patients in the majority of 54 studies reviewed.[2] Among patients in 29 studies with a history of prior stroke or transient ischemic attack (TIA) who should all be receiving anticoagulant therapy, treatment levels averaged less than 60% (range 19% - 81.3%). Among high risk patients with a $CHADS_2$ score ≥ 2 treatment levels averaged less than 70% (range 39% - 92.3%). While there has been a trend towards improvement in utilization of anticoagulant therapy over the past decade, a recently published study of community-based practices in the Christiana Care Health System in northern Delaware continued to show substantial underutilization with almost one-third of high risk patients ($CHADS_2$ score ≥ 2) never receiving anticoagulant therapy despite the absence of identified barriers to such treatment.[3]

Furthermore, guidelines for thromboprophylaxis in patients with AF focus predominantly on stroke risk as calculated by either the $CHADS_2$ or the CHA_2DS_2VASc scores and do not integrate bleeding risk in an explicit, quantitative manner.[4, 5] As a result, clinicians may still struggle to decide whether oral anticoagulant therapy will yield a net benefit for any given patient.

Our hypothesis was that provision of computerized decision support for individual patient-level decision-making about oral anticoagulant therapy would improve decision-making and thromboprophylaxis for AF patients in our system's primary care network. To explore this hypothesis we tested the incremental impact of adding a quality-improvement (QI) intervention to an educational package (for practice staff and clinicians) using a computerized aid, the **A**trial **F**ibrillation **D**ecision **S**upport **T**ool (AFDST) for individual patient-level decision-making about oral anticoagulant therapy in patients with non-valvular AF.

Methods

We used our health system's clinical data store to identify 9,270 patients with an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), diagnosis of atrial fibrillation (427.31) or atrial flutter (427.32) who did not have diagnoses of mitral valve disease (394.x), aortic valve disease (395.x), heart valve transplant (V42.2) or heart valve replacement (V42.3) in their active problem list. The data pull to form our inception cohort was performed in February of 2014. Since our university hospital is a tertiary/quaternary care center, many patients who are

hospitalized in our health system do not have outpatient care delivered in our system. Thus, only 4,021 of these patients were seen in any of the outpatient practices in our health system. Finally, many patients receiving specialty care in our system do not receive primary care in our system, thus only 1,577 were seen in the Primary Care Network (PCN). Figure 1 details the major steps and the study flow. The institutional review board at the University of Cincinnati approved this study.

Information needed to calculate stroke risk using CHA_2DS_2VASc[6], major hemorrhage using HAS-BLED[7], and intracerebral hemorrhage (ICH)[7], was extracted from the clinical data store using the active problem list and a combination of laboratory values and clinical measurements. Time in therapeutic range, needed to calculate the HAS-BLED score, was determined by interpolating INR values through time over the past one year, similar to the Rosendaal method.[8] Current antithrombotic therapy (oral anticoagulant or antiplatelet therapy) was retrieved from the active medication list. Data were stored on a secure server at our Center for Health Informatics as discrete elements hosted on MYSQL™. SAS data files were created as necessary for statistical analyses using unique coded patient identifiers. Further details are described separately.[9]

ATRIAL FIBRILLATION DECISION SUPPORT TOOL (AFDST) -

Treatment recommendations were made by an **A**trial **F**ibrillation **D**ecision **S**upport **T**ool (AFDST) based on projections for quality-adjusted life years (QALYs) calculated by a decision analytic model that integrates patient-specific risk factors for stroke and hemorrhage and examines strategies of no antithrombotic therapy, aspirin, or oral anticoagulation.[9, 10] The strategy recommended by the AFDST was the one resulting in

the largest expected utility in QALYs. Decision model construction and analysis was done using a standard computer program (Decision Maker, Boston, Massachusetts).

Development and Dissemination of Didactic Materials -

Clinician experts on the team developed a set of major topics and from that a 2-session conference series. This educational package was delivered as 2 didactic noon-conferences on AF with a review of up-to-date anticoagulation guidelines for stroke prevention, and distribution of educational materials (e.g., pocket cards with CHA_2DS_2VASc stroke risk assessment and HAS BLED risk factors). AMA Category 1 PRA credit and/or AAFP Prescribed Credit was provided for conference attendence. Speakers visiting the primary care sites included 3 stroke neurologists, 2 cardiologists, and a general internist (PI) who were co-investigators in this study. Faculty and residents in the Department of Internal Medicine at the University of Cincinnati also had an opportunity to participate in the first of the noon conferences as a Grand Rounds lecture delivered by the PI. All practices (intervention and control groups) participated in the conference series.

Design of the Clinical Trial –

We cluster randomized practices to an intervention and control group. Six practices containing 35 clinicians and 801 patients with AF served as the intervention group, while 9 practices containing 35 clinicians and 692 patients were randomized to the control group.

Physicians and practice managers in the intervention group were provided access to a physician-level and practice-level summary report highlighting patients whose current therapy was discordant with treatment recommendations of the AFDST, along with an

explanation for the recommendation that included the gain or loss in QALE predicted by the decision model and the 2014 ACC/AHA/HRS guidelines.[4] Physicians were encouraged to revisit the anticoagulation decision in these patients, and work flows to facilitate this were developed in collaboration with the UCHealth Quality Manager and local practice leadership. The culmination of this preparatory work was a retreat in which lead physicians and managers from all practices, including both intervention and control group practices, were invited. At the retreat we presented and discussed an early prototype of the report, received feedback and modified the report.

We next developed a secure web site which we used to communicate patient information to the clinicians in the intervention arm. Physicians who had patients with current treatment that was discordant from the AFDST recommendation received an email with a personal login and password to the website. The initial login screen provided an overview of the performance improvement initiative (see Supplemental Figure 1). Clinicians were asked to review and corroborate clinical risk factors and current treatment obtained from the Clarity® database to insure accuracy (Figure 2.) Clinical information obtained from the electronic health record was highlighted by a check mark in the column to the far left, labeled “EPIC”, and by bolding of the text. Detailed definitions for clinical variables and risk factors were provided at the far right of the screen. Clinicians could correct inaccurate information by adding or deleting treatments and/or risk factors. If changes were made, the patient’s recommendation was reanalyzed by the AFDST and reposted. If no changes were required a screen reviewing the confirmed clinical risk factors appeared (see Supplemental Figure 2). From this screen, clinicians could immediately generate a 2-page report. The first page

contained a review of the CHA_2DS_2VASc, $CHADS_2$, and HAS-BLED scores along with the physician's and patient's names (Figure 4). The second page (Figure 4) was the worksheet which reviewed the clinical factors upon which the stroke and bleeding risk scores were calculated, the patient's CHA_2DS_2VASc, $CHADS_2$, and HAS-BLED scores, and the patient-specific projections for quality-adjusted life expectancy with each of three strategies – no treatment, oral anticoagulant therapy, and aspirin. The far right side of the worksheet contained a condensed summary of the 2014 ACC/AHA/HRS guideline. The appropriate recommendation for each patient was highlighted based upon the CHA_2DS_2VASc score. In order to get feedback on the design and functionality of the secure web site and optimize work flow within the practices, we pilot tested the tool and intervention. We used feedback from the pilot to revise our processes and the web site and report design. After completing the pilot phase and updating our processes and report format, we extended the performance improvement project to the remaining 5 practices in the intervention group on April 2, 2014.

Performance Improvement Procedures -

We implemented the following processes for the intervention practices. Our study coordinator reviewed a report from our EHR every Friday summarizing the next week's scheduled visits for patients whose current therapy was discordant with the AFDST treatment recommendation. Practice managers had been instructed to maintain a "tickler file" of printed reports and these were given to the appropriate physician on the morning of a patient's visit. Our study coordinator also received a report from the EHR every Friday that summarized all scheduled patient visits on her list that have been

completed in the prior week. This was used to trigger an email to the physician with a link to a REDCap® survey.

Data Analysis

Our initial power calculations were based on an estimate of 410 patients in each the intervention and the control group. Using a two-tailed alpha of 0.05, for our primary outcome, discordance between decision support tool recommendation and actual treatment, we estimated we would have 80% power to detect a 9.4 percentage-point difference between the two groups before controlling for pre- vs. post-intervention correlations. Since we expected a high pre-post consistency in “appropriate” prescribing within patients (.8 to .9), we adjusted our power estimates. After adjusting for “appropriate” prescribing prior to the intervention, we estimated that we would have 80% power to detect a difference of approximately 4.7 percentage-points between groups.

SAS was used to perform simple descriptive statistical analyses and to develop multivariable regression models. All reported p-values are derived from models in which the provider is a random factor and denominator degrees of freedom are based on numbers of patients. The study alpha was a two-tailed p = .05, unadjusted for multiple tests.

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responsible for the design and conduct of this study, all study analyses, the drafting and editing of the paper and its final contents.

Results

Characteristics of patients and practices in each of the arms of the study are described in Table 1. Results are only reported for patients who were part of the inception cohort formed in 2014. The 84 patients who died over the year were censored from these numbers. For the most part, patients in both groups were demographically comparable and a similar proportion were receiving oral anticoagulant therapy (OAT). There was a slightly higher proportion of faculty members and a lower proportion of residents in the control practices. There was a higher proportion of family medicine and medicine-pediatrics physicians in the control group and a higher proportion of internal medicine physicians in the intervention group.

Changes in discordant prescribing of antithrombotic therapy among physicians who used the AFDST –

Among physicians in the intervention group, we first looked at the impact of whether the physician used the tool and reviewed the AFDST report. Recommendations of the AFDST were reviewed for a total of 240 patients. Among those patients, there was a significant decrease in the proportion with discordant care, declining from 63.3% in 2014 to 58.3% in 2015.

Changes in discordant prescribing of antithrombotic therapy – How did the overall proportion of patients with discordant treatment change between 2014 and 2015?

For the UCHealth PCN practices overall (see Table 2), the proportion of patients whose treatment was discordant with the recommendations of the AFDST dropped from 41.9% (626/1493) to 40.6% (606/1493), *p=0.10*. At baseline, 41.8% (335/801) of the intervention practices' patients had discordant care, while 42.1% (291/692) of patients in the control practices had care that was discordant from AFDST recommendations. At one year follow-up, the proportion of patients with discordant care dropped to 41.1% (329/801) and 40% (277/692) in the intervention and control practices, respectively. When we looked at subgroups based upon the AFDST recommendation, we did not see significant differences. Table 2 further describes whether discordant treatment was due to over or under-treatment. Of greatest interest, discordant care due to under-treatment (aspirin or no oral anticoagulant therapy among patients for whom the AFDST recommended oral anticoagulant therapy) did not change significantly in either the intervention or control practices going from 44.7% to 44.5% (baseline -> 1 year f/u) in the intervention practices (*p=0.59*), and from 44.8% to 43.5% (*p=0.27*) in the control practices.

Table 3 reports how treatment discordance changed over time, stratified by subgroups describing practice and physician characteristics. Practice characteristics included an assessment of their readiness for change and enthusiasm for participating in performance improvement (PI) activities. This assessment was made by the director of performance improvement for the Primary Care Network on a 3-item scale ranging from high enthusiasm to low enthusiasm. There was a provocative but statistically

insignificant trend towards a larger decrease in discordant therapy among the practices with a high level of enthusiasm for PI work. Physician characteristics included faculty type (academic faculty, non-faculty, or resident) and specialty. There was a significant decrease in discordant care among academic faculty. In addition, there was an interesting trend among residents, with discordant therapy decreasing from 44.2% in 2014 to 39.5% in 2015. Although the p-value did not reach statistical significance, the total number of patients cared for by the residents was only 172, the smallest sub-group of the category. When physicians were categorized by specialty (Internal Medicine, Family Medicine, or Medicine-Pediatrics), only the Medicine-Pediatrics physicians had a significant decrease in discordant care, from 47.7% in 2014 to 40.9% in 2015.

Improvement in thromboprophylaxis – What proportion of patients with discordant treatment in 2014 had "appropriate" thromboprophylaxis in 2015?

We next looked at patients who had discordant treatment in 2014 to see what proportion improved and had "appropriate" thromboprophylaxis in 2015. As shown in Table 4, "appropriate" treatment in 2015 was not significantly different between the intervention and control practices. Looking at practice sites, there was an interesting, but statistically insignificant trend towards a clinically meaningful improvement in AFDST-consistent treatment in the Internal Medicine Resident practice, with 25.4% having "appropriate" thromboprophylaxis in 2015. Looking at practice readiness for change and enthusiasm to participate in PI activities, the practices rated as having low enthusiasm had the lowest proportion with AFDST-consistent treatment in 2015, but the differences were not significant. Looking at type of faculty, there was a significantly higher proportion of "appropriate" thromboprophylaxis among resident physicians (25%) and faculty (13%)

compared with non-faculty (7%) physicians. Looking at physician specialty, there was a significantly higher proportion of patients with “appropriate” thromboprophylaxis among Medicine-Pediatrics physicians (21.4%), compared with Internal Medicine (11.8%) and Family Medicine (12%).

Changes in Treatment Recommendations Over Time -

For this analysis we wished to determine how often physicians reacted to changes in patients’ clinical status that resulted in a changed AFDST recommendation over the 1-year follow-up period. For instance, the occurrence of a major bleed and the resultant increase in the HASBLED score could alter the balance of risk and benefit such that oral anticoagulant therapy is no longer recommended. Similarly, if a patient developed new risk factors for stroke, the AFDST recommendation could change from either no antithrombotic therapy or aspirin to oral anticoagulation. Although these events did not occur often, we found that clinicians rarely responded to these significant clinical developments. AFDST recommendations changed from Oral Anticoagulant Therapy to No Antithrombotic Therapy in 11 patients (see Supplemental Table 5). Of the 7 patients who were receiving oral anticoagulant therapy in 2014, treatment was changed to no antithrombotic therapy in 3, to aspirin in 1, and not changed in 3. AFDST recommendations changed from No Antithrombotic Therapy to Oral Anticoagulant Therapy in a total of 34 patients (see Supplemental Table 6). Of the 8 patients who were receiving no antithrombotic therapy in 2014, 2 were switched to oral anticoagulation, 1 was switched to aspirin, and 5 remained on no antithrombotic

therapy. These results underscore that changes in patients' clinical status that warrant a reconsideration of antithrombotic therapy are likely not being recognized or acted upon.

Post-Visit Survey of Primary Care Physicians –

The project coordinator submitted a weekly list of discordant AF patients who had been seen by their primary care provider to the project evaluator. An e-mail containing a link to a REDCap® survey was sent to providers asking them to provide an assessment of the recent patient encounter. Slightly more than half (51.6%) of these surveys were returned by the providers. The survey found that over 70% of these providers received the AFDST recommendations and report prior to the patient visit and almost all of those providers (68.8% of 70.1%) reviewed the report prior to seeing the patient (see Supplemental Table 7). Over half of the providers (51.1%) discussed anticoagulation treatment with their patients, however, only a small percentage (6.3%) actually made a change in therapy at that visit.

Providers were asked to comment on why they did not make recommended changes in antithrombotic therapy. The most frequent explanations were: "patient preferences" (26.7%) and "specialists are managing anticoagulation therapy" (24.4%). Cost was never indicated as a reason for not changing therapy. Interestingly, 9% of respondents indicated that they did not change therapy because they disagreed the decision support tool recommendation. Providers were given an opportunity to make general comments. Several indicated that the tool was cumbersome or could be improved. A number of clinicians mentioned concerns about increased fall risk in some of their elderly patients,

or that the patient was not currently in AF, or that the patient was being managed by a cardiologist and they didn't want to change the cardiologist's treatment decision.

Discussion

A randomized controlled trial examining the impact of implementing the **A**trial **F**ibrillation **D**ecision **S**upport **T**ool demonstrated no significant improvement in discordant antithrombotic therapy compared with a group of control practices that did not receive the tool. However, discordant therapy decreased significantly over a 1-year period of time for patients whose physicians actually reviewed the reports and recommendations of the decision support tool. This suggests that the AFDST can have a beneficial impact on clinical care if it is used.

There are many potential explanations for the less than expected impact of our PI intervention. Most obvious is the nuance and complexity of real-world clinical situations. In interviews with physicians who used the tool, a common explanation for antithrombotic therapy decisions that were discordant with both AFDST and ACC/AHA guideline recommendations was that their patients had many competing medical problems that increased the risk of bleeding and complicated the decision-making process. These competing clinical issues included among others, frailty, a history of frequent falls, and other significant comorbidities that limited life expectancy and/or quality of life. Many of these physicians added however, that even if they didn't change treatment, they found it useful to review their patient's situation. Many indicated that use of the AFDST prompted them to have a discussion about treatment choice with their

patient(s). An unexpected issue was that many primary care physicians indicated they were not making antithrombotic therapy decisions for their AF patients; rather they were deferring these decisions to their cardiologist colleagues. In other cases, patients had been discharged from an inpatient setting already started or not on an antithrombotic therapy and the primary care physicians felt that the decisions had already been made. Another issue we suspect played a role was therapeutic or clinical inertia.[41-44] Clinical inertia is a particular challenge in the management of chronic diseases and may contribute to hesitancy or delays in intensifying therapies. While making an initial therapeutic decision is hard enough, it is even more difficult to get clinicians to reconsider treatment decisions once made. This is what we asked them to do by reviewing the antithrombotic therapy decision in patients with prevalent rather than newly incident AF. Relevant to this point, we found that the treatment recommendation made by the AFDST changed over the 1-year follow-up period in 45 patients. We also found that physicians responded to these changes in the clinical balance of risk factors by changing treatment in only a minority of cases, identifying another important gap in clinical care and decision-making. Prompting physicians to reconsider their thromboprophylaxis decision by targeting decision support exclusively on these fewer but more relevant cases may be a more effective approach. Finally, a number of physicians commented about the difficulty of using a separate, non-integrated web-site for the AFDST. They suggested that it would be more convenient to have the decision support tool fully integrated as part of the EHR.

What have we learned from this study that might improve the useful and effectiveness of the AFDST? First, we must minimize all barriers to the use of decision support tools.

For purposes of the study, we housed the tool in a separate and secure website. However, clinicians want and need to be able to access these tools as part of the natural flow of patient care. Thus, tools such as the AFDST need to be embedded within our electronic health records so they can be accessed seamlessly. Indeed, we are currently doing this, embedding the AFDST as a point of care tool within our Epic EHR installation which will enable clinicians to access the tool in real time, when they need it! We also need to avoid overwhelming our clinicians with too many tasks and too much information at once. Some of the physicians in our study were asked to review as many as 40 patients with prevalent AF. Can we better target high yield clinical situations and only generate alerts or clinical reminders in those cases? As discussed above, these situations may include notifying clinicians when the risk factor profile has changed and their current approach to thromboprophylaxis is no longer optimal instead of burdening physicians with a long list of every patient who might conceivably benefit from revisiting the thromboprophylaxis decision. In addition, the strength of the AFDST recommendation is related to the magnitude of the gain or loss in quality-adjusted life expectancy were optimal thromboprophylaxis used. Generating clinical reminders or alerts only when the potential clinical benefit exceeds a higher, predetermined threshold might be a better approach. Are primary care physicians the right audience for providing decision support for AF thromboprophylaxis? We took the approach of providing decision support broadly for a wide swath of clinicians. Some of our primary care physicians, particularly non-faculty providers were not comfortable making these decisions. Given the likely decline in the numbers of patients taking warfarin for AF thromboprophylaxis in the era of 4 new oral anticoagulants, perhaps we should retool

our pharmacy-based coumadin clinics, and turn them into thromboprophylaxis consultation services. Indeed, funneling patients to a small number of highly trained and experienced clinicians, such as our clinical pharmacists who have been staffing anticoagulation clinics and providing them with decision support tools such as the AFDST may be a more effective strategy.

Conclusions

A randomized controlled trial examining the impact of implementing an AFDST found that among patients whose physicians actually reviewed the reports and recommendations of the decision support tool, discordant therapy decreased significantly over a 1-year period of time. However, in non-stratified analyses the intervention did not result in significant improvements in discordant antithrombotic therapy. These findings suggest next steps we must take to decrease barriers to the convenient and more effective use of the AFDST, perhaps by improving its integration into the EHR as a fully embedded application; by better targeting high yield clinical situations (i.e., generating best practice alerts within the EHR only when evolution in clinical risk factors results in a recommendation change by the decision support tool) instead of asking physicians to review all AF patients with discordant therapy; and finally to consider targeting additional clinician groups as decision makers, such as cardiologists and clinical pharmacists in addition to primary care physicians; and focusing on decision-making for incident rather than prevalent AF, when initial therapeutic decisions are first being made.

Author Contributions: MHE, GYHL, REW, FLF, DK, CA, AL, AC, JK participated in the conception and design of the project; MS, LA, NW, BS, JK, PB, RI, DH, BMH were responsible for acquisition of data; MHE, AL, LA were responsible for data analysis and interpretation; MHE drafted the original article; MHE, GYHL, REW, SB, MS, NW, BK, MLF, DK, PB, RI, DH, BMH, CA, AL, LA, DS, AC, JK contributed to critical revisions, intellectual content, and approved the final draft.

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Figure Legends -

Figure 1. Experimental design and study flow.

Figure 2. Epic data verification screen for a single patient.

Figure 3. Title page for patient report.

Figure 4. Patient report containing review of clinical data and risk factors, CHA_2DS_2VASc, $CHADS_2$, and HAS-BLED scores, AFDST treatment recommendation, and AHA/ACC/HRS guideline

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Figure 1

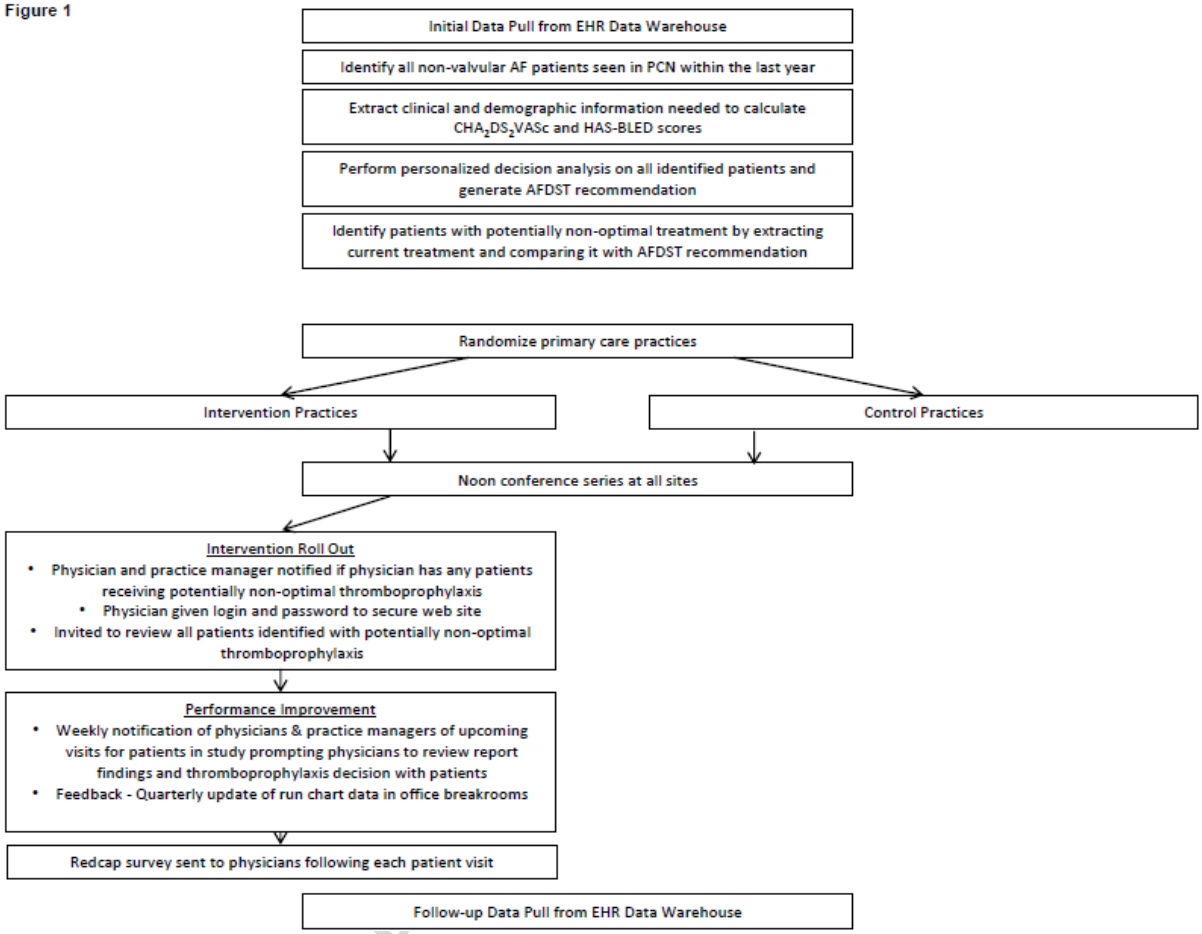

Figure 2

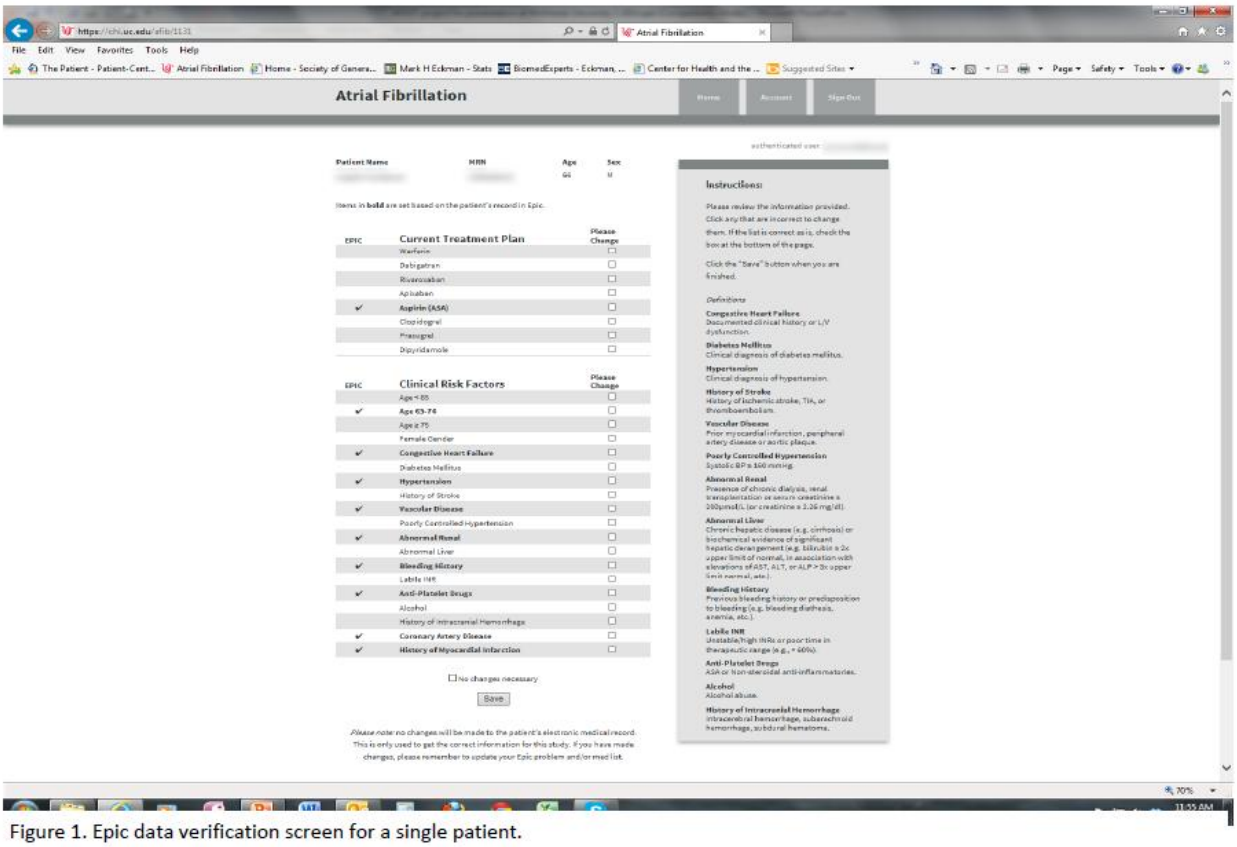

Figure 1. Epic data verification screen for a single patient.

Figure 3

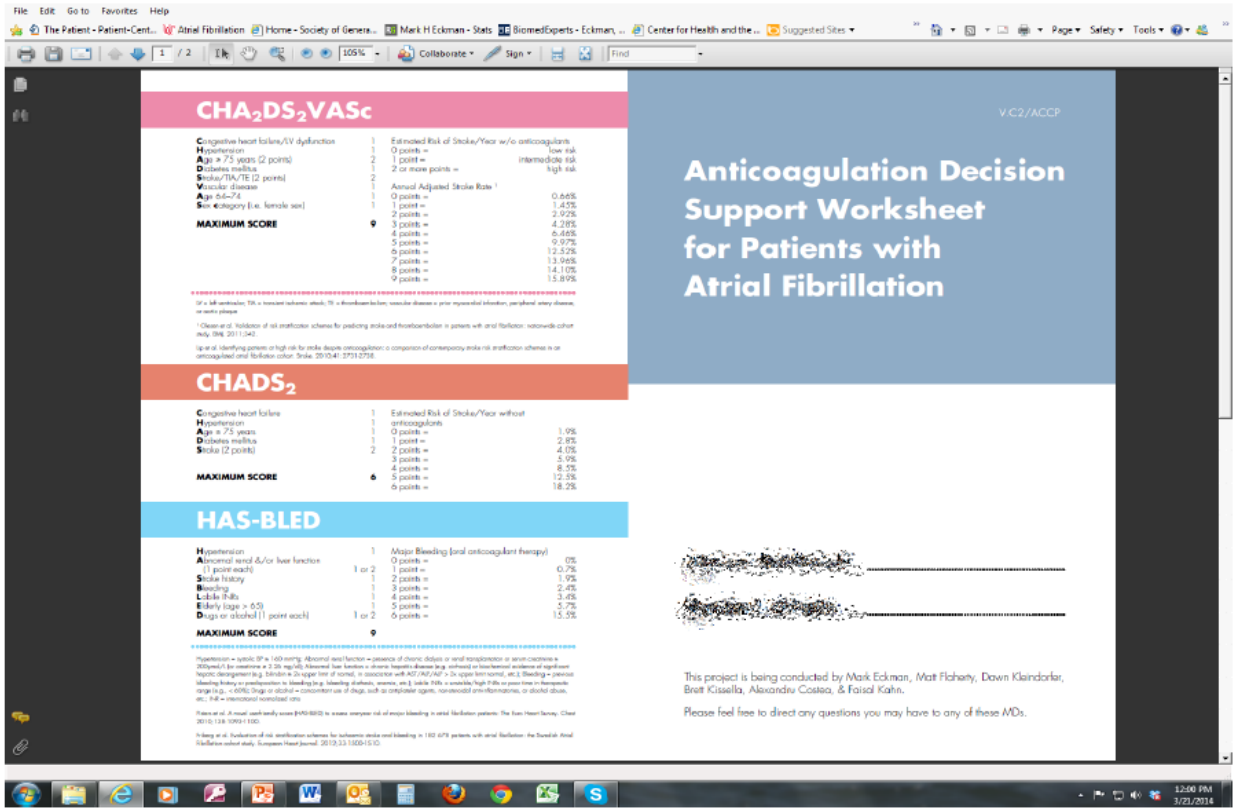

Figure 2. Title page for patient report.

Figure 4

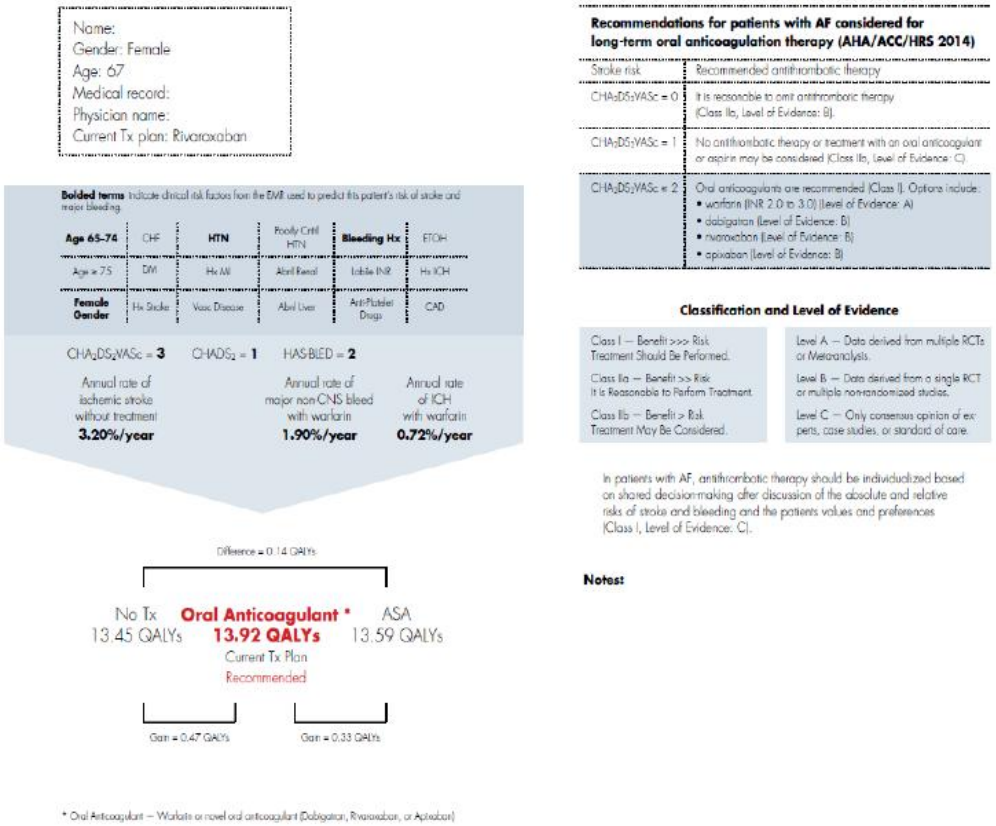

Figure 3. Patient report containing review of clinical data and risk factors, CHA_2DS_2VASc, $CHADS_2$, and HAS-BLED scores, AFDST treatment recommendation, and AHA/ACC/HRS guideline.

Table 1. Patient and Practice Characteristics			
	Intervention Practices	Control Practices	
Patient Characteristics			
Number	801	692	
Age (mean)	70.2	69.8	(*p=0.56*)
Female (%)	44	48	(*p=0.19*)
CHA_2DS_2VASc (mean)	3.60	3.74	(*p=0.14)*
HAS-BLED (mean)	2.07	2.18	(*p=0.06)*
Proportion receiving oral anticoagulant therapy (%)	50	50	(*p=0.92)*
Practice Characteristics			
Faculty (%)	37	47	(*p=0.05)*
Non-Faculty (%)	12	24	"
Residents (%)	51	29	"
Internal Medicine	88	13	(*p<0.0001)*
Family Medicine	9	37	"
Medicine-Pediatrics	4	50	"

Table 2. Antithrombotic Therapy discordant from AFDST recommendations				
	Antithrombotic Therapy			
	Discordant in 2014		Discordant in 2015	
	(%)	(n)	(%)	(n)
All Practices	41.9	626/1493	40.6 (*p=0.10)*	606/1493
Intervention Practices	41.8	335/801	41.1 (*p=0.51)*	329/801
Control Practices	42.1	291/692	40.0 (*p=0.07)*	277/692
Aspirin or No Anticoagulant Therapy Among Patients for whom OAT was recommended				
Intervention Practices	44.7	296/663	44.5 (*p=0.59)*	300/674
Control Practices	44.8	253/565	43.5 (*p=0.27)*	247/568
Antithrombotic Therapy Among Patients for whom No Antithrombotic Therapy was recommended †				
Intervention Practices	60.0	30/50	59.1 (*p=0.65)*	26/44
Control Practices	43.2	19/44	32.5 (*p=0.56)*	13/40
Oral Anticoagulant Therapy Among Patients for whom No Antithrombotic Therapy was recommended †				
Intervention Practices	22.7	15/66	21.1 (*p=0.56)*	12/57
Control Practices	14.3	8/56	10.9 (*p=1.00)*	6/55

†Although the denominators for both of these sections are patients for whom no antithrombotic therapy was recommended, the numbers may be slightly different since recommendations are not made unless the strategy, in this case "No Antithrombotic Therapy" generates a gain of ≥ 0.1 QALYs. Since the comparator strategies are different in these two groups (antithrombotic therapy for the middle rows and OAT for the bottom rows), the composition of patients in the denominators may be slightly different.

Table 3. Antithrombotic Therapy discordant from AFDST recommendations – by subgroup				
Intervention Group	Antithrombotic Therapy			
	Discordant in 2014		Discordant in 2015	
	(%)	(n)	(%)	(n)
Practice Rating (readiness for change) –				
high enthusiasm	41.1	353/859	39.2 (*p=0.09)*	337/859
moderate enthusiasm	42.9	166/387	41.1 (*p=0.25)*	159/387
low enthusiasm	43.3	107/247	44.53 (*p=0.51)*	110/247
Faculty type –				
Faculty	42.0	407/970	40.0 (*p=0.04)*	388/970
Non-faculty	41.6	142/341	43.4 (*p=0.24)*	148/341
resident	44.2	76/172	39.5 (*p=0.14)*	68/172
Faculty Specialty –				
Internal Medicine	42.4	390/919	42.1 (*p=0.75)*	387/919
Family Medicine	38.8	150/387	37.2 (*p=0.27)*	144/387
Medicine-Pediatrics	47.7	84/176	40.9 (*p=0.01)*	72/176
Among Patients for whom AFSDT Report was reviewed	63.3	152/240	58.3 (*p=0.02)*	140/240

Table 4. “Appropriate” Thromboprophylaxis in 2015, among patients with Discordant Care in 2014

	Concordant in 2015 (%), (n)	
All Practices	13.1	82/626
Treatment Group –		*(p=0.79)*
Intervention Practices	13.4	45/335
Control Practices	12.7	37/291
Practice Site –		(*p=0.08*)
A	10.9	15/138
B	9.9	7/71
C	0	0/2
D	11.6	5/43
E	11.1	2/18
Resident Practice	25.4	16/63
Practice Rating (readiness for change) –		(*p=0.27*)
high enthusiasm	14.4	51/353
moderate enthusiasm	13.2	22/166
low enthusiasm	8.4	9/107
Faculty type –		(*p=0.001*)
Faculty	13.0	53/407
Non-faculty	7.0	10/142
resident	25.0	19/76
Faculty Specialty –		(*p=0.05*)
Internal Medicine	11.8	46/390
Family Medicine	12.0	18/150
Medicine-Pediatrics	21.4	18/84
Among Patients for whom AFSDT Report was		(*p=0.74*)
Reviewed	12.7	20/152
Not Reviewed	14.0	26/183