Evaluation of Clinical Decision Support to Improve Care for Patients with Atrial Fibrillation at Increased Stroke Risk: 2-Year Results

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BACKGROUND

- Atrial fibrillation (AF) is associated with a 5-fold increased stroke risk due to the high risk of clotting leading to thromboembolic events.[1]
- An individual's risk of stroke is measured by CHA_2DS_2-VASc score, which is a composite measure of the presence of age, history of cardiovascular comorbidities and acute events, non-cardiovascular comorbidities, and sex, with weights for each criterion.
- Guidelines recommend the use of oral anticoagulants for stroke prevention in patients with AF with a CHA2DS2-VASc score ≥2 in men or ≥3 in women.[2,3]
- However, in the real world, rates of nontreatment for patients with elevated stroke risk range from 2-51%.[4]
- In September 2020, Baylor Scott & White Health implemented a clinical decision support tool to aid providers in outpatient settings caring for patients with a high-risk of stroke as measured by the CHA2DS2-VASc score, and no active anticoagulation.

OBJECTIVES

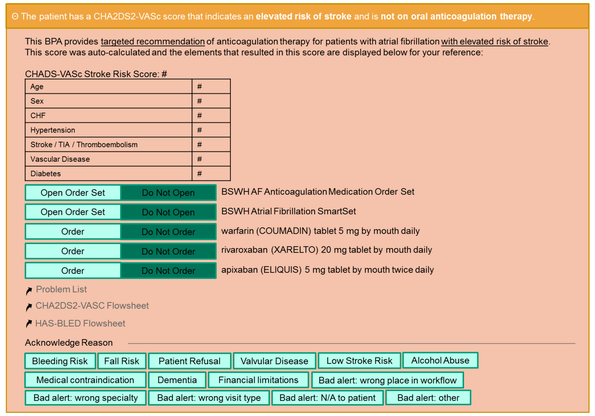
- The objectives of this study were to:
  - To discuss the use of an interactive CDS alert that prompts providers caring for AF patients with high stroke risk
  - To evaluate the impact of the CDS alert on anticoagulant prescribing rates during a pre and post intervention period

METHODS

- **Study Design:** Time series analysis
- **Time Period:** April 2020 - December 2022
- **Data Source:** EPIC EHR Data
- **Inclusion criteria**: (1) age ≥18 years with; (2) AF diagnosis; (3) ≥1 outpatient encounter during the study period
- **Primary outcome**: Weekly proportions of study patients with an active order for an anticoagulant medication who meet the following additional criteria:
  - High-risk CHA2DS2VASc (≥2, males; or ≥3, females)
  - ≥1 outpatient encounter in the measured study week
- **Secondary outcome**: Proportions of CDS interventions with specific provider responses and acknowledgement reasons during the post-implementation period

INTERVENTION

- **CDS tool**: pop-up alert displayed to providers in outpatient settings caring for patients with a high- risk CHA_2DS_2VASc and no active anticoagulation
- Uses an automated calculator to determine patients' CHA_2DS_2VASc score
- Contains several actions including:
  - A link to an anticoagulant medication order set
  - A link to a more comprehensive AF SmartSet
  - A short list of the common anticoagulant orders
  - Activity links (problem list, flowsheets)
- Captures several acknowledgement reasons to assess providers' response(s) to the CDS tool
- Implementation: September 2020



RESULTS

Table 1. Anticoagulation Prescribing Rates

Pre-BPA		
Week #	Patient Count	Patients with an Active Anticoagulant Order
Week 01	8,986	5,081 (56.54%)
Week 02	9,322	5,292 (56.77%)
Week 03	9,883	5,596 (56.62%)
Week 04	10,066	5,580 (55.43%)
Week 05	10,805	6,099 (56.45%)
Week 06	9,220	5,167 (56.04%)
Week 07	11,103	6,225 (56.07%)
Week 08	11,174	6,314 (56.51%)
Week 09	11,195	6,292 (56.20%)
Week 10	10,701	6,025 (56.30%)
*Week 11**	*9,418*	*5,368 (57.00%)*
*Week 12**	*10,678*	*6,022 (56.40%)*
Week 13	10,280	5,818 (56.60%)
Week 14	10,323	5,756 (55.76%)
Week 15	10,078	5,731 (56.87%)
Week 16	10,274	5,875 (57.18%)
Week 17	10,426	5,884 (56.44%)
Week 18	10,499	5,870 (55.91%)
Week 19	10,696	6,099 (57.02%)
Week 20	10,366	5,912 (57.03%)

Post-BPA		
Week #	Patient Count	Patients with Active Anticoagulant Order
Week 21	9,564	5,503 (57.54%)
Week 22	10,870	6,318 (58.12%)
Week 23	10,752	6,083 (56.58%)
Week 24	10,773	6,076 (56.40%)
Week 25	10,797	6,147 (56.93%)
Week 26	10,564	6,060 (57.36%)
Week 27	10,563	6,021 (57.00%)
Week 28	10,226	5,980 (58.48%)
Week 29	10,454	5,966 (57.07%)
Week 30	10,896	6,349 (58.27%)
Week 31	11,146	6,382 (57.26%)
Week 32	7,652	4,394 (57.42%)
Week 33	11,289	6,578 (58.27%)
Week 34	11,294	6,560 (58.08%)
Week 35	11,309	6,539 (57.82%)
Week 36	7,773	4,524 (58.20%)
Week 37	8,831	5,183 (58.69%)
Week 38	12,403	7,220 (58.21%)
Week 39	14,317	8,270 (57.76%)
Week 40	12,687	7,402 (58.34%)
Week 50	10,809	6,380 (59.02%)
Week 60	11,111	6,735 (60.62%)
Week 70	10,804	6,566 (60.77%)
Week 80	11,117	6,890 (61.98%)
Week 90	11,218	6,891 (61.43%)
Week 100	10,198	6,503 (63.77%)
Week 110	10,569	6,647 (62.89%)
Week 120	10,145	6,490 (63.97%)
Week 130	10,560	6,852 (64.89%)
Week 135	10,947	7,037 (64.28%)

Fig 1. Weekly Anticoagulation Rates by Study Period

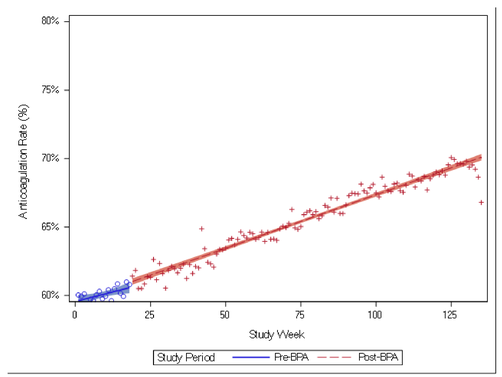


Table 2. Results of Segmented Linear Regression Analysis of Weekly Anticoagulation Rates

Variable	Coefficient	Standard Error	p-value
Constant (β_0)	59.6%	0.3%	<0.0001
Baseline trend/slope (β_1)	0.06%	0.03%	0.0502
Change in level (β_2) Immediately post-BPA	0.38%	0.30%	0.2167
Change in trend/slope (β_3) Comparison of pre-BPA slope to post-BPA slope	0.02%	0.03%	0.4266

RESULTS

Table 3. Provider Responses to CDS

Variable	Post-BPA
Count of BPA-eligible encounters	172,550
BPA Action	
Single Order	41 (0.02%)
Complete Order	33 (0.02%)
Incomplete Order	8 (<0.01%)
Medication OrderSet Accessed	53,868 (31.2%)
Acknowledgement	39,751 (23.04%)
Bleeding risk	11,710 (6.79%)
Fall risk	7,194 (4.17%)
Patient refusal	4,307 (2.50%)
Valvular disease	79 (0.05%)
Low stroke risk	5,956 (3.45%)
Alcohol abuse	69 (0.04%)
Medical contraindication	820 (0.48%)
Dementia	855 (0.50%)
Financial limitations	134 (0.08%)
Bad alert	7,641 (4.43%)
Wrong place in workflow	557 (0.32%)
Wrong specialty	2,248 (1.30%)
Wrong visit type	961 (0.56%)
Wrong role	1,394 (0.81%)
Other feedback	2,491 (1.44%)

- Before the intervention, rates increased at a weekly trend of 0.06%, (SE=0.03%, P=0.0502). Immediately after BPA implementation, rates increased by 0.38%, (SE=0.30%, P=0.2167) and by 0.02%, (SE=0.03%, P=0.4266) over the 117-week period following implementation. None of these increases were statistically significant.
- The alert was displayed in 172,550 encounters, 53,868 (31%) of which resulted in the provider accessing the AF order sets, whereas 39,751 (23%) resulted in an acknowledgement reason for no anticoagulation.

LIMITATIONS

- Retrospective study subject to incomplete documentation of diagnoses and/or anticoagulant use in the EHR.

CONCLUSIONS

- Anticoagulant prescribing rates following implementation of clinical decision support were slightly higher than baseline anticoagulation rates, but the trends were not statistically significant.

REFERENCES

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