

## Free Clinical Decision Support App Helps Clinicians Manage Anticoagulation Medications During Surgery



Management of  
Anticoagulation in the  
Peri-Procedural Period

### The Problem

Patients receiving chronic anticoagulant therapy who undergo surgical or invasive medical interventions are at increased risk of bleeding. However, withholding anticoagulants for these patients increases the risk of clotting due to the underlying conditions for which anticoagulation was originally prescribed. While the medical literature contains expert guidance for the use of anticoagulants during invasive procedures, a simplified reference guide to anticoagulant use that clinicians can quickly refer to when planning these procedures has been lacking.

### The Approach

In 2013, the Atlantic Quality Innovation Network of New York (AQIN-NY) and the New York State (NYS) Anticoagulation Coalition launched the Peri-Procedural Task Force to develop the Management of Anticoagulation in the Peri-Procedural Period (MAPPP) Guide to promote standardized evidence-based prescribing during invasive procedures. Approximately 5,000 printed copies of this guide have been distributed to more than 100 hospitals across NYS.

The MAPPP tool supports CMS's commitment to achieve the National Quality Strategy and the CMS Quality Strategy that support the three-part aim of improving health, improving care, and lowering costs using innovative techniques, by using technology to put critical evidence-based information into the hands of clinicians when they need it.

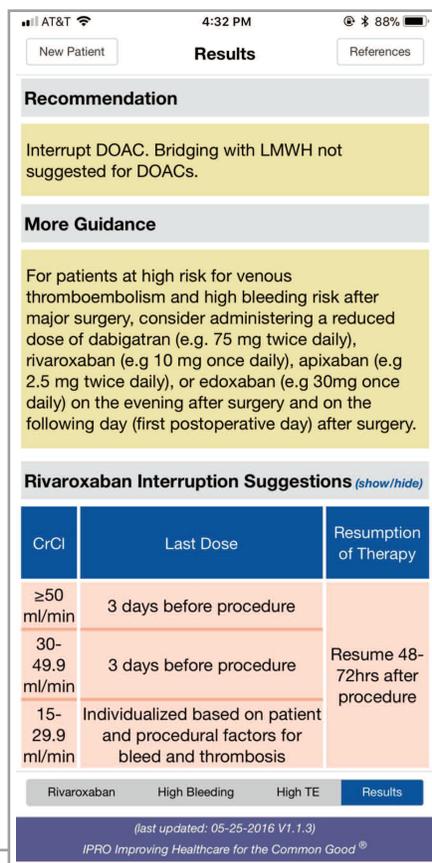
In 2016, the MAPPP guide content was updated and adapted into a mobile and web-based application (MAPPP app) that permits clinicians to easily determine whether, when, and how to stop and restart the use of warfarin, direct oral anticoagulants, and antiplatelets during elective surgery and other invasive procedures. The app provides individualized patient guidance for management of anticoagulant medications based on patient thromboembolic risk and specific procedural bleeding risk, and is an educational resource for providers.

AQIN-NY has distributed the MAPPP app to care transition communities and members of the NYS Anticoagulation Coalition, and posted the application on the AQIN website. The tool is currently available on the Apple App Store and on Google Play for Androids. The AQIN-NY team has educated physicians and provider staff across NYS on the MAPPP app, supported its integration into clinical decision support (CDS) at selected healthcare systems, and developed a process for incorporating the app into electronic health record CDS across multiple inpatient and outpatient vendor systems.

The supporting evidence for the underlying assessment and medical recommendations provided in the MAPPP app was published in the *Journal of Thrombosis and Hemostasis*.<sup>1</sup>

## Results/Clinical Outcomes<sup>2</sup>

- There were 353 new users of the app globally in its first full calendar quarter of use (April–June 2016), primarily in the US (276; 78.18%) and in the project’s home state of New York (168; 47.59%).
- App acquisition trended upwards through Q3 2017, accruing 2,866 total global new users, dominated by use in the US (2,013; 70.24%) and New York, in particular (1,067; 37.23%).
- The app was downloaded and used for at least one episode (a user interaction that resulted in the app presenting a recommendation page based on the drug, bleeding risk, and thromboembolic risk selected by the user) in 51 different countries during the measurement period.
- Users completed nearly 10,000 episodes, exceeding 2,000 episodes in each of the most recent calendar quarters.
- Overall, utilization was highest in the US (6,748; 67.73%), and New York in particular (3,618; 36.31%).
- Globally, episodes were spread approximately evenly between new users (4,571; 45.88%) and returning users (5,392; 54.12%).



A CMS Special Innovation Project is underway to integrate the MAPP app as pre-surgical visit active clinical decision support into three electronic health record systems using SMART on FHIR technology with the goal of reducing 30 day post-procedure bleeding, thromboembolic and death events.

Left: Sample screenshot of a MAPP App Recommendation

Details of Completed Episodes of Use

Bleeding Risk	Thromboembolic Risk	Apixaban	Dabigatran	Edoxaban	Rivaroxaban	Warfarin	Total	Row Percent
High	High	526(5.28%)	368(3.69%)	132(1.32%)	650(6.52%)	1324(13.29%)	3000	30.11
	Moderate	215(2.16%)	169(1.7%)	35(0.35%)	319(3.2%)	560(5.62%)	1298	13.03
Low	Low	118(1.18%)	72(0.72%)	25(0.25%)	137(1.38%)	238(2.39%)	590	5.92
	High	189(1.9%)	99(0.99%)	29(0.29%)	256(2.57%)	430(4.32%)	1003	10.07
Moderate	Moderate	327(3.28%)	234(2.35%)	52(0.52%)	435(4.37%)	615(6.17%)	1663	16.69
	Low	200(2.01%)	84(0.84%)	21(0.21%)	151(1.52%)	343(3.44%)	799	8.02
Minimal	High	100(1%)	55(0.55%)	30(0.3%)	124(1.24%)	188(1.89%)	497	4.99
	Moderate	80(0.8%)	69(0.69%)	21(0.21%)	115(1.15%)	174(1.75%)	459	4.61
Low	Low	148(1.49%)	91(0.91%)	53(0.53%)	160(1.61%)	202(2.03%)	654	6.56
	Total	1903	1241	398	2347	4074	9963	
Percent		19.10	12.46	3.99	23.56	40.89		

Values represent number of times a drug-bleeding risk-thromboembolic risk combination was selected by users, with a total 9,963 episodes. Nearly one third of completed episodes (30.11%) involved patients with the greatest risk for thromboembolic events who were undergoing procedures with the highest risk of bleeding. This suggests that users are more frequently employing the MAPP App for the management of more complex cases.

1. Spyropoulos, A.C., et al., Perioperative Management of Patients on a Vitamin K Antagonist or a Direct Oral Anticoagulant Requiring an Elective Procedure or Surgery. J Thromb Haemost, 2016.

2. Data was extracted from Google Analytics to characterize new users and completed episodes for the period from April 1, 2016, through September 30, 2017.

The MAPP app, an instructional webinar, and patient educational materials can be found at: <http://mapp.ipro.org/>

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