



Interventions to Reduce Off-Label Direct Oral Anticoagulant (DOAC) Dosing

Michigan Anticoagulation Quality Improvement Initiative (MAQI²)

Executive Summary: Direct Oral Anticoagulant (DOAC) dosing is complicated, and dosing errors can lead to adverse events. The Michigan Anticoagulation Quality Improvement Initiative (MAQI²) has been working on interventions to reduce off-label DOAC dosing since 2018. Our latest approach is an Epic-based dashboard which screens the EHR for patients with dosing errors. A trained nurse or pharmacist can review the dashboard and alert prescribers to have doses adjusted. Four hospitals are now using the dashboard, but we hope to expand to more hospitals in the future through development of an EHR independent version.

Problem & Importance

- Direct oral anticoagulants (DOACs) are now the most common newly-prescribed anticoagulants. 
- The most common complication associated with anticoagulants is bleeding. Anticoagulants are the leading medication class responsible for ED visits in older adults. 
- DOAC prescribers must take into account various patient factors (age, weight, renal function, indication, and medications) for proper dosing. 
- A meta-analysis of 18 DOAC studies found that on average, prescribing errors occurred in 20% of patients.
- Problem Statement:** The complicated dosing of DOACs leads to off-label dosing and potential for adverse events.

What We Measured

Baseline:

- 10% of patients prescribed a DOAC in MAQI² participating sites were put on an inappropriate dose.

SMART Target:

- By the end of 2021, less than 6% of patients will be on an inappropriate DOAC dose.

Gap to Close (Target Minus Baseline):

- 4 percentage points

Understanding the Current State



Complicated dosing → Off-label dosing → Bleeding/ clotting events

Before we started our initiative, there was no process of identifying off-label dosing and contacting providers.

Analysis & Interventions to Improve

(2018) In response to this problem, our team at MAQI² developed dosing tables for each DOAC. We trained abstractors at participating MAQI² hospitals to manually compare prescribed dose with the recommended dose from the tables. If incorrect dosing was found, they would contact their clinical champion to contact prescribers about adjusting the dose. 

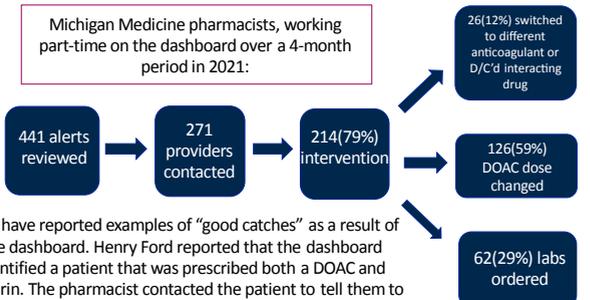
(2019) We then improved this by incorporating dosing table logic into our MAQI² database with automated alerts if entered doses didn't match recommended doses. 

(2020) To increase our impact to patients outside of our registry, we developed a DOAC Dashboard to identify and screen patients prescribed DOACs. This dashboard, built directly into the Epic EHR, allows for the near real-time screening of an entire health system's population of patients for DOAC safety concerns. 

Results & Outcomes Achieved

- Our overall efforts are associated with a reduction of inappropriate dosing from 10% in 2017 to 6.5% in 2021.
- The DOAC dashboard has been implemented at 4 MAQI² hospitals with the potential safety oversight of over 60,000 patients prescribed DOACs by 6,500 providers in 2021 alone.

Michigan Medicine pharmacists, working part-time on the dashboard over a 4-month period in 2021:



- Sites have reported examples of "good catches" as a result of the dashboard. Henry Ford reported that the dashboard identified a patient that was prescribed both a DOAC and warfarin. The pharmacist contacted the patient to tell them to stop taking the dangerous combination of anticoagulants.

Sustain & Spread

- We believe that the DOAC Dashboard could impact care state-wide, and even at a national level. 
- However, the current dashboard is built within the Epic-EHR environment and cannot currently be implemented in non-Epic systems. 
- We are working to develop a "universal" DOAC Dashboard that could work within other EMR systems. 
- This model would allow for more health systems to implement the DOAC Dashboard. 

Keys to Success

- Dedicated administration, faculty, and staff who are motivated to improve DOAC safety
- Availability of a MAQI² funded Epic programmer
- MAQI² faculty and staff knowledgeable about DOAC prescribing
- Funding from Blue Cross Blue Shield of Michigan

Team Members and Contacts

Geoff Barnes, MD; Jim Froehlich, MD; Michael Lanham, MD; Eva Kline-Rogers, NP; Brian Haymart, RN; Debbie DeCamillo, RN; Tina Alexandris-Souphis, RN; Amy DeLellis, BA; Linda Perry, RN; Liza Renner, PharmD; Nghi Ha, PharmD

Contact: Brian Haymart (khaymart@med.umich.edu)