Population Health Case Study: Implementation of the Anticoagulation Quality Improvement Analyzer (AQuIA) Tool

Kathleen Deering, PharmD[1]; Dana Villines, MA[2]; Aarti Patel, PharmD, MBA[3]; Jacqueline Pesa, MSEd, PhD, MPH[3]; Manoj Duggal, MD[2]

Description

- Atrial fibrillation (AF) is a common age-related arrhythmia associated with a substantial economic burden to the healthcare system.
- Many health care organizations are looking toward population health management (PHM) strategies that include technology and analytics; however, PHM tool development and performance assessment can be complex and beyond available resources
- The Anticoagulation Quality Improvement Analyzer (AQuIA) is a freely available, user-friendly AF condition specific software tool that inputs and analyzes EHR and/or claims data to generate reports showing practice patterns, resource utilization, and quality measure attainment.
- The tool performs standard descriptive analytics and does not make any adjustments for severity or confounders (e.g., Charlson Comorbidity Index) which should be taken in context as the user's results are compared over time.
- Additionally, the results are only as accurate as the input data.

Aim

- Identify quality gaps and facilitate PHM efforts in a large health care system through the use of AQuIA.

Methods

- A real-world case study was conducted using AQuIA with outpatient EHR data from the Advocate Health Care System (Advocate) evaluating the utility of AQuIA to identify gaps in care and facilitate PMH efforts.
- AQuIA generates reports at the population- and patient-level reports around AF specific to key areas such as stroke (CHA_2DS_2-Vasc and $CHADS_2$) and bleed risk (HAS-BLED), anticoagulant treatment status and INR management.
- The following are the risk factors for the CHA_2DS_2-Vasc, $CHADS_2$, and HAS-BLED risk assessments.
  - CHA_2DS_2-VASc risk index: C=**C**ongestive heart failure (CHF)/Left ventricular dysfunction (LVD); H=**H**ypertension(HTN); A=**A**ge (≥75); D=**D**iabetes; S_2=**S**troke/Transient ischemic attack (TIA)/thromboembolism (prior); V=**V**ascular disease; A=**A**ge 65-74; and S=**S**ex category (female);
  - $CHADS_2$ risk index: C=**C**HF; H=**H**TN; A=**A**ge(≥75); D=**D**iabetes; S_2=**S**troke/TIA (prior);
  - HAS-BLED risk index: H=**H**TN; A=**A**bnormal kidney and/or liver function; S=**S**troke; B=**B**leeding; L=**L**abile INR; E=**E**lderly (age >65); D=**D**rugs (antiplatelet) and/or alcohol
- AQuIA was downloaded onto an approved Advocate computer.
- The Advocate staff cleaned, organized, and uploaded their EHR datasets into AQuIA.
- The dataset included all patients ≥18 years of age with an outpatient AF visit between January 1, 2016 and December 31, 2017 in Advocate.
- In order for AQuIA to provide complete metrics on the patient population of interest, key variables are required from the EHR datasets. The following tables highlight the data files and variables datasets. The following tables highlight the data files and variables needed for all the screens and reports to be populated by AQuIA.

Medication Records:

Variable	Variable Format
Patient ID	A-N (30 c)
Date of Service (Fill Date)	Date[1]
NDC Code	A-N (11 c)
Days Supply *(OPTIONAL)*	Numeric
Quantity *(OPTIONAL)*	Numeric
Provider ID *(OPTIONAL)*	A-N (30 c)

Medical Records:

Variable	Variable Format
Patient ID	A-N (30 c)
Date of Service	Date[1]
Provider ID	A-N (30 c)
Procedure Codes (4 fields for CPT, CPT II, HCPCS) *(OPTIONAL)*	A-N
Diagnosis Codes (5 fields for ICD9, ICD10)	A-N (30 c)[2]
Organization Costs *OPTIONAL*	N

Laboratory Records:

Variable	Variable Format
Patient ID	A-N (30 c)
Date Performed	Date[1]
LOINC Codes *(OPTIONAL)*	A-N
Test Name	A-N
Test Result	A-N

Demographic/Vital Records:

Variable	Variable Format
Patient ID	A-N (30 c)
Gender	Alpha (eg, 'Female')
Date of Birth	Date[1]
Race *(OPTIONAL)*	Alpha (eg, 'Caucasian')
Allergy *(OPTIONAL)*	Alpha
Date Vital Performed *(OPTIONAL)*	Date[1]
Vital Name *(OPTIONAL)*	A-N
Vital Result *(OPTIONAL)*	A-N

Date formats included: mm/dd/yyyy, mm-dd-yyyy, m/d/yyyy, or m-d-yyyy and these with time stamp
The decimal point (.) can either be present (xxx.xx) or implied (xxxxx)
Abbreviations: A-N = alpha-numeric; c = characters; N = numeric

Results

- AQuIA allowed Advocate clinicians to assess their AF patient population risks and treatment patterns. These assessments are not typically conducted within Advocate and were found to be extremely valuable, especially in evaluating patients at high risk of stroke and their treatments.

EHR Data Insights

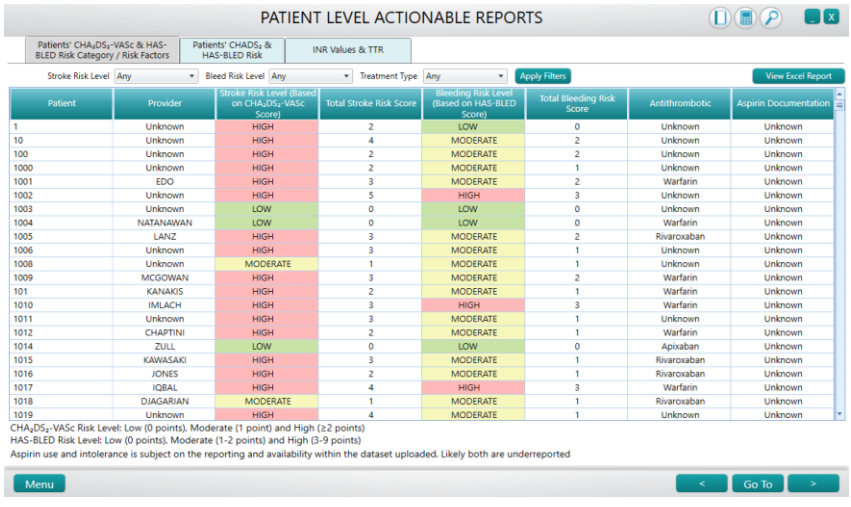
- Ease of use of the tool was complicated by Advocate's current use of two separate EHR systems for inpatient and outpatient medical data.
- There was a need for some manipulation because of the different data sources to obtain the medical, laboratory, medication, vitals and demographic data and the formats could be variable amongst them.
- It was found that the INR data in the EHR was incomplete. The anticoagulation clinic conducts point of care INRs. These values are not captured in the Advocate laboratory data.
  - The HAS-BLED bleed risk score incorporates labile INR data as a risk factor. Due to the incomplete nature of INR captured in Advocate's EHR, HAS-BLED risk scores may be underestimating bleed risk.

Resources/Departments Involved

- To help facilitate the use and success of uploading data into AQuIA within Advocate, it is recommended to have the involvement of a clinician champion and quality department.
  - A clinician champion can help drive the process of getting access to the tool and data and using the data to improve the quality of care.
  - A "data expert" should be involved in the request and formatting of the data; therefore, the Quality department may be a good source to get the data pulled and formatted.

Advocate Findings

- It was found that Advocate's EHR data limitations impacted the learnings generated from AQuIA rather than the functionality of tool.
  - Because of incomplete INR data, clinicians were not able to gather a full picture of INR control for patients treated on warfarin.
- In terms of actionable data, the tool identified 80% of patients with a high $CHAD_2S_2$-VASc score (≥2, indicating high stroke risk), compared to 25% with a high $CHADS_2$ score (≥2, indicating high stroke risk).
  - This was largely driven by the age and gender of the population (mean age, 74 years; 56% female in the population ≥ 75).



Conclusions

AQuIA elucidated the current outpatient anticoagulation practice patterns for Advocate AF patients. Additionally, it demonstrated the increased number of patients at risk for stroke when utilizing the $CHAD_2S_2$-VASc versus the $CHADS_2$, which could result in a different treatment decision. Finally, the use of this tool emphasized the importance of complete data to ensure interpretable and meaningful results.

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[1] EPI-Q, Inc; [2] Janssen Scientific Affairs, LLC.; [3] Advocate Health System