Improving the Patient Experience with Data Analytics and Care Coordination

November 16, 2016
Novant Health

- Not-for-profit, integrated health system that spans communities in the Carolinas, Virginia and Georgia
- 500 locations including 15 medical centers
- Over 2,200 providers
- Over 24,000 employees and physician partners
- Nationally recognized for quality and safety measures
- HIMSS Stage 7 Ambulatory Award
Attribution Processes
Attribution Processes

• Complicated, multi-level issues
• Patients need to be attributed to PCP, provider, clinic, PFP plan
• Dynamic (change PCPs, pass away, move)
• Difficult to have workflows to capture attribution without manual backend processes
• Leverage check-in process to make sure PCP field is updated
Attribution Processes

• Specialist attribution requires use of care team
• Functionality will automatically assign specialty attribution based upon visits to that specialist
• Attributed to the provider-level, clinic-level and NH region
• Built HM modifiers for several payers and have automated processes to do attribution
• Aetna, Anthem, BCBS, Blue Medicare, CareFirst, Carolina Access, Cigna CAC, HealthSpring, Humana, NH team members, United Healthcare Medicare, state employee health plan
Attribution Processes

• Defined protocol and guidelines around when patients can be de-attributed to a PCP
• Medical group convened a group to develop clear guidelines for clinic managers, quality personnel and providers to follow to determine when to de-attribute the patient from a provider’s panel
BPAs and Embedded Decision Support
Best Practice Alerts (BPAs)

- 90 BPAs currently live in the EHR system
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BASE AMB HIB VACCINATION DUE
BASE AMB HEPATITIS B VACCINATION DUE
BASE AMB HEPATITIS A VACCINATION DUE
BASE AMB MMR VACCINATION DUE
BASE AMB MENINGOCOCCAL CONJ. VACCINE(MCV4) DUE
BASE AMB IPV VACCINATION DUE
BASE AMB DTAP VACCINATION DUE
Base AMB LUNG CANCER SCREENING
BASE AMB DIABETES AND HGBA1C OVER 7
BASE AMB DIABETES HGBA1C OVER 7 HM MODIFIER
BASE AMB DIABETES HGBA1C UNDER 7
BASE AMB DIABETES HGBA1C UNDER 7 MODIFIER
BASE AMB DIABETES LDL OVER 100
BASE AMB DIABETES LDL OVER 100 MODIFIER
BASE AMB DIABETES LDL UNDER 100
BASE AMB DIABETES LDL UNDER 100 MODIFIER
BASE DIABETES AND NO HGBA1C
BASE DIABETES AND NO LDL
BASE AMB CHF AND NO EF
BASE AMB CHF AND >50 EF 2+ YEARS AGO
BASE AMB CHF EF<50 AND NO ECHO ORDERED IN PAST YEAR
BASE AMB CHF EF<50 AND NO BETA BLOCKER PRESCRIBED
BASE AMB CHF EF<40 AND NO POTASSIUM RESULT 6 MONTHS
BASE AMB CHF EF<50 AND NO CREATININE RESULT 6 MONTHS
BASE AMB CHF EF<35 AND NO CARDIAC CONSULT ON FILE
BASE AMB CHF AND NON NUMERIC EF
BASE HYPERTENSION DX & ANNUAL CREATININE/POTASSIUM
Base AMB PHQ9 Due
Base AMB Medicare Wellness
NMG AMB CAROTID ULTRASOUND
NMG AMB THYROID ULTRASOUND
NMG AMB AORTIC ULTRASOUND
CHRONIC CONDITION MANAGEMENT Base
Base AMB Sickle Cell and Doppler
Base AMB Sickle Cell and due for Echo and BNP
Base AMB Sickle Cell and Gallbladder US
BASE HEMOTOLOGY REFERRAL
Base AMB Sickle Cell Disease Eye Exam
Base AMB Sickle Cell Disease, 3 yrs of age and is due for Labs
BASE AMB SICKLE CELL DISEASE
BASE AMB HEMOPHILIA A-FACTOR VIII
BASE AMB HEMOPHILIA A 3 YR LABS
Base AMB Sickle Cell Dx Age 2 yrs
BASE AMB HEMOPHILIA B FACTOR IX DEFICIENCY
BASE AMB BLEEDING DISORDERS
AMB BASE IRON CHELATION
BASE AMB HEMOPHILIA B 3 YR LABS
BASE SICKLE DISEASE AND DUE FOR HGB ELECTROPHORESIS
AMB BASE IRON CHELATION AND REFERRAL TO OPHTAMOLOGY AND AUDIOLOGY
BASE AMB ZOSTER VACCINE 60+
Base AMB COPD ONE TIME SPIROMETRY
BASE PNEUMO VACC DUE 2-64 HIGH RISK
BASE TSH EVERY 1 YEAR
BASE TSH EVERY 3 MONTHS
BASE NO TSH RESULTS
AMB BASE WARFARIN AND NO PTINR 5WK
BASE AMB TOBACCO STATUS NOT ASSESSED
BASE NMG AMB RECOMMENDS DIABETES GOALS
BASE PNEUMO VACC HIGH RISK
BASE PNEUMO VACC MED RISK
AMB BASE PNEUMO 13 MED RISK
AMB BASE PNEUMO PCV13 HIGH RISK
BASE AMB BMI FOLLOWUP
AMB BASE DTAP/TDAP/TD VACCINATION DUE
BASE NMG ZIKA QUESTION
BASE AMB FALL RISK ASSESSMENT
AMB BASE FALL RISK ASSESSMENT
NMG AMB FALLS WARNING
EHR Registries

- 51 registries currently built in the EHR system

ACO Registry
Adult Asthma Registry
Adult Diabetes Registry
Adult HIV Registry
Adult Hypertension Registry
Adult Obesity Registry
Asthma Registry
Cancer Population Registry
Care Gaps Registry
Chronic Kidney Disease Registry
Chronic Kidney Disease w/ Dialysis Registry
Chronic Liver Disease Registry
Class I Obesity Registry
Class II Obesity Registry
Class III Obesity Registry
Congestive Heart Failure Registry
COPD Registry
Coronary Artery Disease Registry
Coronary Artery Disease with Diabetes Registry
Cystic Fibrosis Registry
Diabetes Registry
Diabetes with At Risk Composite Score Registry
Elderly Diabetes Registry
High Risk-General Registry
Human Immunodeficiency Virus Registry
Hypertension Registry
Medicare Advantage (HCC)
NMG Registry
Obesity Registry
Osteoporosis Registry
Pediatric Asthma Registry
Pediatric Diabetes Registry
Pediatric HIV Registry
Pediatric Hypertension Registry
Pediatric Obesity Registry
Prediabetes Registry
Tobacco Registry
Tobacco User with Asthma Registry
Tobacco User with COPD Registry
Wellness Registry: Female 13-29
Wellness Registry: Female 30-49
Wellness Registry: Female 50-69
Wellness Registry: Female 70+
Wellness Registry: Male 13-29
Wellness Registry: Male 30-49
Wellness Registry: Male 50-69
Wellness Registry: Male 70+
Wellness Registry: Pediatric 1-4
Wellness Registry: Pediatric 5-12
Wellness Registry: Pediatric Less than 12 Months
Wellness Registry: All
Advanced Analytics and SlicerDicer with BI
SlicerDicer

- Self-service reporting tool
- Allows providers to sift through large amounts of patient population data with just a few clicks
- Easy to view patient population trends
- Currently live for all 2,000 ambulatory providers
- Non-provider quality improvement leaders can use as well
- Ability to perform on any payor attribution
SlicerDicer: By the Numbers

Clarity
12.4 Terabytes

Cogito Data Warehouse
3.2 Terabyte

300 Mil Rows
Loaded Nightly

900K Bitmap Builds
Nightly

750K Grouper Builds
Nightly

215 Gigabyte
SlicerDicer Data

Average Load Time
4 Hours
Predictive Modeling
Benefits of Predictive Modeling

• Four examples
  – All cause 30-day readmission
  – Hospital admissions and ED visit (1 year prediction)
  – Early Detection of Sepsis
  – Risk of no-show appointment
Predictive Modeling: Setting Expectations Up Front

What a Predictive Model Is and Is Not
- Accuracy
- Domain of applicability

Assumptions, Dependencies, and Limitations
- Applicable population(s)
- Data limitations
- Data consistency and cleanliness
- Cadence of updates

Have an Actuation Plan
- Do not simply create more data!

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Training Population (40K Patients)

- Patients with sufficient data, representative of entire patient population
  - 18 years of age or older;
  - Member of Cigna CAC population (all of whom are attributed to a Novant Health PCP);
  - North Carolina resident;
  - Alive at the time of the prediction
Selected Predictive Variables

**Behavioral (social history)**
- Alcohol use
- Illicit drug use
- Tobacco use

**Demographics**
- Age
- Ethnic group
- Has PCP
- Marital status
- Medicaid status
- Medicare status
- Sex

**Lab Results**
- ANC
- Anion gap
- BUN
- Creatinine
- Hematocrit
- Hemoglobin A1c
- LDL
- Platelet count
- Potassium
- TSH

**Medications**
- Number of medications
- Analgesics: narcotics
- Antiasthmatics
- Antidepressants
- Antidiabetics
- Antihypertensives
- Antipsychotics
- Calcium blockers
- Hypnotics
- Stimulants
- Ulcer medications

**Diagnoses**
- Anemia
- Atrial fibrillation
- Cancer
- Chronic liver disease
- COPD
- Cirrhosis
- Dementia
- Hepatitis
- HIV/AIDS
- Hypertension
- IVD
- Obesity

**Utilization**
- Ambulatory visits
- ED Visits
- Hospitalizations

**Surgery**
- Ambulatory surgery
- Inpatient surgery
Model Results in a Risk Score Ranging from 0 – 100%

100% = high probability of admission

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Population Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;65</td>
<td>2% of population</td>
</tr>
<tr>
<td>38-65</td>
<td>5% of population</td>
</tr>
<tr>
<td>18-37</td>
<td>15% of population</td>
</tr>
<tr>
<td>&lt;18</td>
<td>78% of population</td>
</tr>
</tbody>
</table>

0% = low probability of admission
Readmission score distribution

To help organizations focus case management resources on the most at-risk patient populations, Epic's readmission model identifies patients with risk factors that contribute to a higher probability of readmission. This information enables organizations to more strategically allocate resources to screen and enroll patients in programs such as BOOST and RED, which try to reduce hospital readmissions in the face of case management resource constraints.

Model Performance

We validated the model using Novant's data from 193,716 encounters spanning from May 2013 to July 2016. The model had a C-stat of .74, compared to a C-stat of .69 exhibited by LACE+. At a threshold of 50 percent of total patients flagged by the model, 80 percent of the readmissions that actually occurred were identified. That's 30 percentage points higher than readmissions identified without using a model.
Operationalizing the Model

When using this model to drive workflows, it’s useful to specify thresholds at which certain interventions apply. These thresholds can be adjusted according to the resources available and processes surrounding readmission prevention. The baseline readmission rate in our validation set was 11 percent. A readmission score of 11 can be interpreted as the baseline risk for readmission. A score of 22 can be interpreted as a patient at double the baseline risk for readmission. The table below shows (for particular scores) a suggested interpretation, the percentage of patients that fall into that group, and the percentage of total readmissions that the particular group accounts for.

<table>
<thead>
<tr>
<th>Score</th>
<th>Interpretation</th>
<th>Percent of population in group</th>
<th>Percent of total readmissions in group</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 11</td>
<td>Lower than baseline risk</td>
<td>60</td>
<td>29</td>
</tr>
<tr>
<td>11 to 22</td>
<td>1 to 2 times baseline risk</td>
<td>27</td>
<td>37</td>
</tr>
<tr>
<td>22 to 33</td>
<td>2 to 3 times baseline risk</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>&gt; 33</td>
<td>More than 3 times baseline risk</td>
<td>5</td>
<td>16</td>
</tr>
</tbody>
</table>
Distribution of Risk Scores

Number of Patients

- 770,749
- 182,503
- 59,097
- 28,447
- 16,028
- 10,174
- 6,673
- 4,434
- 2,915
- 1,187

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Operationalizing: Future Areas for Implementation

• Additionally exploring options for integration within
  – Patient chart (e.g., Snapshot)
  – Hospital discharge reports for care coordination team
Using Data to Improve Patient Outreach and Outcomes – Annual Health Reminders
Using Patient Portal to Reach Our Patients

• Over **654,000** users active on MyNovant portal
• Send annual health reminder through portal (“birthday letter”)
  – Part of population health strategy
  – Began with practices in North medical neighborhoods
  – Letters are generated via MyChart and address age and sex related screening items (Health Maintenance)
  – Patient phone calls - update to Health Maintenance (override and enter the completed date)
• Includes
  – Pap, Colonoscopy, Mammogram, DTAP Vaccine, Pneumococcal Vaccine 19-64 yrs., Hep A Vaccine, Hep B Vaccine, HIB Vaccine, Rotavirus Vaccine, HPV Vaccine, Influenza Vaccine, TDAP/TD Vaccine, IPV Vaccine, Varicella Vaccine, Meningococcal Vaccine, MMR Vaccine, Pneumococcal Conjugate Vaccine, Pneumococcal Polysaccharide Vaccine, Dexa Scan
Dear Lauren:

In addition to providing remarkable care to help you feel better when you are sick, we also want to help you prevent illnesses and injury from occurring in the first place. With this in mind, our system indicates that you are due for the following:

**Influenza Vaccine**

If you have already had these tests done previously or at another location, or you are unable to have these tests performed, please let us know so we can update your records. We appreciate you teaming with us on this information. If we can assist you in providing these services or scheduling an appointment, please call us at your earliest convenience.

Sincerely,

Sent on behalf of Dr. Capps
Using Data to Improve Patient Outreach and Outcomes – A1c Testing
Improvement in NH team member A1c testing through care coordination

• Identified diabetic NH team members who did not have A1c testing completed in past year through dashboard reports
• Care coordinators reviewed charts to find scanned reports with A1c values and abstracted into Epic
• Care coordinators called patients and/or their PCP to gather additional information
• Many patients actually did not have diabetes due to coding errors
Improvement in NH team member A1c testing through care coordination
Using Data to Improve Patient Outreach and Outcomes – Medication Adherence
Program overview

• **Aim**: Develop interventions to optimize medication therapy and improve patient outcomes

• **Currently receive data from third-party pharmacy claims vendor**:  
  – Medication Adherence Report (weekly)  
    • Low medication adherence: when the proportion of days covered is below 80% across select disease states  
    • New to therapy: new maintenance medications are prescribed  
  – Drug Utilization Review (monthly)  
    • Gaps in care: identifies opportunities to close gaps in medication therapy when treating chronic disease  
    • Safe and appropriate utilization: identifies opportunities to discontinue unsafe and clinically inappropriate therapy

• Review patient charts to determine accuracy of claims data

• Reach out to prescribers for patients potentially needing intervention
Interventions

• Focus on Novant Health team members/dependents with poorly controlled diabetes (HgA1C >8) and reported to have challenges with adherence
  – N=163
  – Clinical pharmacists conduct chart review to verify adherence/therapeutic issues
  – Alerts PCP via Epic staff message when patients are identified for inclusion
  – Contacts patient directly to identify barriers to adherence and provide counseling
  – Documented in Epic
  – If needed, collaborate with provider to resolve barriers to adherence, optimize medication treatment plan and/or help patients be successful in reaching goals
Metrics

• Cost benefit
  – Documentation of pharmacist’s interventions with associated estimated cost savings
  – Using i-Vents within Epic

• In-system utilization
  – Capture patients transitioned from outside pharmacy to NH pharmacy
  – Still fine tuning method for reporting
Using Data to Improve Patient Outreach and Outcomes – Closing Immunization Gaps
NHmg integration with Epic functionality

- Potential for performance revenue increased over the past 4 years and projected to continue to increase as a percent of our total revenue
- Integration with Epic is key to be able continue to survive in these programs
  - Payer attribution to identify population though Healthy Planet
  - Gap analysis to reach out to patients to close
  - Risk scores identify which patients need more focus

NHmg P4P Revenue
Commercial Payer

<table>
<thead>
<tr>
<th>Year</th>
<th>Potential P4P Revenue</th>
<th>Total P4P Rev (Proj)</th>
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<tbody>
<tr>
<td>2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td></td>
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<tr>
<td>2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td></td>
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</tbody>
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Questions?

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