Our Company – “Hard” Medicaid

- Country’s largest specialty health plan
- 850,000+ Plan Members
- Nearly $1B in services funded annually
- Provide 22 services Medicaid does not
- 1,000+ Contracted Providers
- Pioneered managed BH Medicaid in NC
- 1 in 4 NC Medicaid enrollees
- 92 cents of each dollar = member services
- HQ in Charlotte, NC / 20 County Area
- 840 teammates
Why analytics are important to us – Competitive Advantage

Two Overriding Metrics out of 1,000’s of Variables / Combinations
• Member Outcomes
• Member Cost

Advanced mathematics and statistics are used to target healthcare interventions and improve outcomes

Cost management naturally follows.
RADAR: Antipsychotics & Risk of Crisis

Erin Drucker, MA, MSPH
Senior Data Scientist
Data Sciences/Business Analytics (DSBA)
Study Population: Medicaid Members with Filled Antipsychotics (2016):

1,854 (9.8%) CI Members filled an Antipsychotic prescription and experienced Crisis

18,977 CI Members (all) experienced at least one Crisis event

46,020 CI Members filled at least one Antipsychotic prescription in 2016

Inclusion Criteria:
- CI Members who received at least one BH service between October 1, 2015 and June 30, 2017.
- Qualifying BH Diagnosis of Schizophrenia, Bipolar or Major Depression Disorder (MDD).
- At least one antipsychotic prescription fill date within the study period (MPR > 0).
- Age 15-65
Antipsychotic Adherence Cycle (Hypothesis):

Diagnosis – Schizophrenia, Bipolar, Depression

Age → Antipsychotic Non-Adherence

Substance Use Disorder

Antipsychotic Prescription

Adverse Side Effects (esp. rapid weight gain, lethargy, etc.)

Increased Risk: Metabolic Syndrome

Crisis Event (ED, Inpatient, other)

Peer Support and/or ACTT Services

Antipsychotic Adherence
Additional Considerations:

• Age (Child vs. Adult)
• Smoking
• Total time prescribed antipsychotic
• Drug Route (Oral vs. Long Acting Injectable)
• Drug Type
• Diabetes, other physical comorbidities
• Violence and/or Trauma (recent or historical)
• Veteran Status
• Family Supports
• Housing
• Transportation
Antipsychotic Adherence Cycle: Final Model

- Diagnosis – Schizophrenia, Bipolar, Depression
- History of Suicide Attempt/Ideation or other Violence
- Substance Use Disorder (SUD)
- Medication Possession Ratio
- Crisis Event (ED, Inpatient, other)
- Medication Patterns: Non-Adherence & Count
- Factor Analysis: Physical Diagnoses
- Service Utilization: Peer Support, CST and/or ACTT
- Age & Other Demographics
Opportunities and Challenges: Pre-DSBA Solution

- Report from Third Party Vendor would arrive one week later (April 25, 2016)
- List was not ordered/prioritized by most at risk or members most likely to impact.
  - Average time for pharmacist to review list and contact all ‘non-adherent’ was 3 weeks (i.e. completed list May 16, 2016).
- Report included false positives due to reporting lag.
Opportunities and Challenges: DSBA Solution

**DSBA Improvements:**
- First registry included members flagged ‘non-adherent’ and members with recent history of ‘non-adherence’.
- New indicators for SUD, physical DX, and drug route (assist with med review).
- Includes tracking system for measuring effectiveness.
- Registry is now ordered to prioritize members most at risk for ED, Inpatient, or other intensive crisis event.
- Stratification system in place to target interventions.

**Timeline:**
- **May 2015:** DSBA Department created, began AMA project
- **January 2016:** First version of DSBA Registry created
- **April 2016:** Replaced 3rd Party Vendor Report
- **September 2016:** Began design for new provider intervention
- **December 2016:** DSBA Model & Registry Improvements Complete
## Finished Product: Pharmacy View

### Sample Pharmacy View Pre-DSBA, Report Date = March 22, 2016

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank (Unknown)</th>
<th>Fill Date</th>
<th>Expected Fill Date</th>
<th>NA Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jane Doe</td>
<td>3</td>
<td>12/22/2015</td>
<td>1/21/2016</td>
<td>2/20/2016</td>
</tr>
</tbody>
</table>

### Sample Pharmacy View DSBA Solution, Report Date = March 22, 2017

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>MPR</th>
<th>Risk Components</th>
<th>Existing CC?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jane Doe</td>
<td>3</td>
<td>0.61</td>
<td>SUD, Schiz, Violence, MPR, Age, 3Antipsychs</td>
<td>No</td>
</tr>
<tr>
<td>John Doe</td>
<td>28</td>
<td>0.40</td>
<td>SUD, MPR, PrevCrisis</td>
<td>Yes, Jane Smith</td>
</tr>
<tr>
<td>Jim Smith</td>
<td>427</td>
<td>0.93</td>
<td>Schiz, Circ, IDD, Age</td>
<td>No</td>
</tr>
</tbody>
</table>
Technology Overview: Modelling Process

- **Medication Possession Ratio (Fixed):**
  - \( \text{MPR} = (\text{Number of days with medication})/(\text{Number of days in measurement period}) \)
  - Cut Point validated using ROC & ED/Inpatient/Other Crisis services as outcome

- **Multiple Logistic Regression:**
  - Outcome = Crisis event (Y/N). Crisis is defined as ED, Inpatient, or Mobile Crisis claim within a defined three-month period.
  - Covariates = Service History, Gender, Age, Race, BH Diagnosis, SUD, Physical Comorbidity Groups (factor analysis), ‘Violence’, Adherence History, Antipsychotic Type, Route, & Count, MPR

- **Study Design:**
  - Cross Sectional, includes five (5) three-month periods of possible member representation.

*Note: All statistical analysis performed using SAS EG.*
Technology Overview: Medication Possession Ratio

- Valid Cut Point: 0.626 (0.524, 0.749)
- Outcome = 'Crisis' (N=9,894)
  - Crisis = 0 (n=8,755)
  - Crisis = 1 (n=1,139)
- Sensitivity = 52.9%
- Specificity = 53.0%

Technology Overview: Medication Possession Ratio

- V
- O
Technology Overview: Multiple Logistic Regression Analysis

Odds Ratios with 95% Wald Confidence Limits

Sensitivity = 61.9%
Specificity = 75.5%
# Technology Overview: Multiple Logistic Regression Analysis

<table>
<thead>
<tr>
<th>Effect</th>
<th>Unit</th>
<th>OR Estimate</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schizophrenia</td>
<td>1.0</td>
<td>1.474</td>
<td>1.235 1.759</td>
</tr>
<tr>
<td>IDD</td>
<td>1.0</td>
<td>0.701</td>
<td>0.480 1.026</td>
</tr>
<tr>
<td>Previous Period Crisis</td>
<td>1.0</td>
<td>2.747</td>
<td>1.809 4.170</td>
</tr>
<tr>
<td>Count Antipsychotics</td>
<td>1.0</td>
<td>1.487</td>
<td>1.367 1.618</td>
</tr>
<tr>
<td>SUD w/in 90</td>
<td>1.0</td>
<td>9.801</td>
<td>7.633 12.585</td>
</tr>
<tr>
<td>Circulatory</td>
<td>1.0</td>
<td>1.338</td>
<td>1.050 1.706</td>
</tr>
<tr>
<td>Clozapine w/in 90</td>
<td>1.0</td>
<td>0.4341</td>
<td>0.195 1.145</td>
</tr>
<tr>
<td>Violence w/in 180</td>
<td>1.0</td>
<td>4.341</td>
<td>2.898 6.503</td>
</tr>
<tr>
<td>MPR ≤ 0.626</td>
<td>1.0</td>
<td>1.378</td>
<td>1.169 1.624</td>
</tr>
<tr>
<td>Age ≤ 25</td>
<td>1.0</td>
<td>3.065</td>
<td>2.600 3.613</td>
</tr>
</tbody>
</table>
## Limitations & Strengths

<table>
<thead>
<tr>
<th>Limitation</th>
<th>Strength/Solution</th>
</tr>
</thead>
</table>
| Cross Sectional design does not allow conclusions about causal associations.| 1. Study period divided into 90 day periods. (Assume crisis and exposure are connected within a 90 day period.)  
2. New ETL process to track change in MPR & Risk Score between reporting periods. |
| Data received 3rd Monday of the month for previous month.                   | Adherence is no longer the focus. Model uses claims to find diagnosis/service/pharma connections to crisis event. |
| Heavy reliance on claims data.                                             | Claims are complete for Medicaid members.                                        |
Improved Capability: Antipsychotic Registry & Interventions

- New Registry In-Use Since February 2017
  - Using MPR & weights from logistic model to order members by risk of *crisis*.

- IT Projects:
  - DSBA: Optimization of Model with Medical/Pharmacy.
  - CI: Automate letters via Provider Direct.
  - BIW: Replicate registry as a canned report for ease of use.
    - ETL Process for using risk score/MPR change in future analysis.
  - SharePoint: Creating a dynamic registry for improved collaboration.
    - Pharmacy Med Reviews
    - Care Coordination – Current Care Coordinators & Population Health
Finished Product: Business/SharePoint Process

Member Profile → Risk Score = First Tier

- Pharmacy Med Review
  - CCD = Yes → Current CC Outreach
  - CCD = No → Contact CC/Pop Health if Qualified

- Chart Med Review, Contact Member or Other

All contact dates & notes (discrete data entry) stored in SharePoint for DSBA analysis.
Step 1. Data availability & reporting gap – no contact.

Step 2. Pharmacy Dept. contacts members not available or not at risk (NA)

Step 3. At risk (NA) members contacted by Pharmacy Dept.

Step 1. At risk members (Crisis) contacted by Pharmacy/CCD Dept.

Step 2. Targeted CCD & letters sent to Providers/Prescribers via Provider Direct

Step 3. Members at low risk for crisis not contacted.

Value: Pre vs. Post Outreach
Impact & Accomplishments: Immediate & Projected

- Pharmacy required contacts reduced (reduction of specialized FTE time).
- Med Reviews trigger CCD involvement directly from registry use.
- Targeted mailings for prescribers, pharmacies, and/or members at risk.
  - Increased provider involvement/accountability for outcomes.
  - Targeted interventions mean the right people are contacted ASAP for the right outcome!
- Goal is to reduce rate of crisis (incidence & cost) among members prescribed an antipsychotic.
- First predictive model within Cardinal Innovations to use pharmacy, physical, & behavioral claims to predict behavioral health outcome.
  - Company movement toward integrated health care
Discussion: Process, Success, and ‘Pain’ Points

If at first you don’t succeed … Try something different

Unexpected Results … Keep your message on point!

Top Down Acceptance … is sometimes hard to earn

SME Engagement … positively correlated with project success

Company Policy Roadblocks … Be prepared to play the game

Operationalization … Think scalable & sustainable!
Appendices
Works Cited (Partial List):


