How Clinical Analytics Can Help Create a Successful ACO
Leveraging your Current Data Assets to Drive Continuous Improvement

Jeremy Orr MD, MPH   Chief Medical Officer, Optum Analytics
EMR data and data that drives change

**Fee-for-service**
- Transactional
- **Service-centric**
- Physician-focused

**Fee-for-value**
- Predictive
- **Health-centric**
- Multi-disciplinary
Where we are now …

HITECH brought us from paper islands of data to digital islands of data…but

• Data is still in silos
• EMR data is a mess
• Hearing about risk, ACOs, but factually and culturally still in Fee for Service
... where we want to go

Leverage ALL data sources
DATA DRIVEN

Connect analytics and care management
CONTINUOUS IMPROVEMENT

Rinse and Repeat
All data sources ... claims data is not enough
The data silo challenge

A Single, Normalized, Longitudinal Patient Centric View

- Outbound Claims
- Post-Adjudicated Claims
- Socio-Demographic Data
- Emerging Data Sources
- Emerging Data Sources
- Care Management Data

EMR 1
EMR 2
## The challenges of EMR data

<table>
<thead>
<tr>
<th>LOCAL NAME</th>
<th>LOCAL CODE</th>
<th>LOCAL NAME</th>
<th>LOCAL CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>lisinolpril</td>
<td>53004</td>
<td>lisinopril 20MG</td>
<td>206330</td>
</tr>
<tr>
<td>lisinop 20mg</td>
<td>47650</td>
<td>LISIONOPRIL 20MG</td>
<td>201887</td>
</tr>
<tr>
<td>lisinopril</td>
<td>84479</td>
<td>lisinopril 20MG</td>
<td>170309</td>
</tr>
<tr>
<td>lisinoporil</td>
<td>114142</td>
<td>LISIONOPRIL 20MG TABLETS</td>
<td>2619</td>
</tr>
<tr>
<td>lisinoprel</td>
<td>56844</td>
<td>Lisinopril 40</td>
<td>252035</td>
</tr>
<tr>
<td>lisinoprel 20mg</td>
<td>62959</td>
<td>lisinopril 40 mg</td>
<td>247971</td>
</tr>
<tr>
<td>LISIONOPRIL</td>
<td>238488</td>
<td>LISIONOPRIL 40 MG</td>
<td>223018</td>
</tr>
<tr>
<td>Lisinopril</td>
<td>233787</td>
<td>lisinopril 40 mg</td>
<td>584065</td>
</tr>
<tr>
<td>lisinopril 10mg</td>
<td>82991</td>
<td>LISIONOPRIL 40 MG TABLET</td>
<td>185906</td>
</tr>
<tr>
<td>LISIONOPRIL 30MG</td>
<td>88777</td>
<td>LISIONOPRIL 40MG</td>
<td>99596</td>
</tr>
<tr>
<td>lisinopril 10 mg</td>
<td>244861</td>
<td>LISIONOPRIL 40 MG TABLETS</td>
<td>51301</td>
</tr>
<tr>
<td>LISIONOPRIL 10 MG</td>
<td>180608</td>
<td>lisinopril 5 mg</td>
<td>252165</td>
</tr>
<tr>
<td>lisinopril 10 mg</td>
<td>180607</td>
<td>LISIONOPRIL 5 MG</td>
<td>234939</td>
</tr>
<tr>
<td>LISIONOPRIL 10 MG TABLET</td>
<td>235592</td>
<td>LISIONOPRIL 5 MG TABLET</td>
<td>239699</td>
</tr>
<tr>
<td>lisinopril 10mg</td>
<td>129260</td>
<td>LISIONOPRIL 5.0 mgmTABLETS</td>
<td>6035</td>
</tr>
<tr>
<td>LISIONOPRIL 10MG</td>
<td>7667</td>
<td>lisinopril 5mg</td>
<td>17488</td>
</tr>
<tr>
<td>LISIONOPRIL 10MG TABLETS</td>
<td>4217</td>
<td>LISIONOPRIL 5MG TABLETS</td>
<td>103221</td>
</tr>
<tr>
<td>lisinopril 20</td>
<td>229320</td>
<td>LISIONOPRIL MG TABLETS</td>
<td>9413</td>
</tr>
<tr>
<td>LISIONOPRIL 20 MG</td>
<td>229300</td>
<td>LISIONOPRIL TAB  2.5 MG U/D</td>
<td>924303</td>
</tr>
<tr>
<td>lisinopril 20 mg</td>
<td>227878</td>
<td>LISIONOPRIL TAB  5 MG U/D</td>
<td>924305</td>
</tr>
<tr>
<td>LISIONOPRIL 20 MG TABLET</td>
<td>189126</td>
<td>lisinopril tab 10 mg</td>
<td>127775</td>
</tr>
<tr>
<td>lisinopril 20mg</td>
<td>253427</td>
<td>LISIONOPRIL TAB 10 MG U/D (PRINIVIL)</td>
<td>924306</td>
</tr>
<tr>
<td>lisinopril Tablet 5 mg</td>
<td>238564</td>
<td>LISIONOPRIL TAB 20 MG U/D</td>
<td>924307</td>
</tr>
<tr>
<td>lisinopril tbs</td>
<td>125490</td>
<td>LISIONOPRIL TAB 40 MG (EXP) (ZESTRIL)</td>
<td>924311</td>
</tr>
<tr>
<td>lisinoprol</td>
<td>17600</td>
<td>lisinopril tablet 20 mg</td>
<td>82047</td>
</tr>
<tr>
<td>lisinoril</td>
<td>83965</td>
<td>LISIONORRIL</td>
<td>92141</td>
</tr>
</tbody>
</table>
Most EMR data is unstructured

<table>
<thead>
<tr>
<th>Types of Notes Analyzed</th>
<th>Types of Extracted Data</th>
<th>Examples of Extracted Data Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Outpatient Office Visits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Consultation Reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Operative (Procedure) Reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Admission Notes (often with H&amp;P)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Discharge Summaries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nursing notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Emergency room notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pathology notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Radiology notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cardiology notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Numeric fields</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BP, BMI, HbA1c, height, weight, ejection fraction ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• HEENT: Negative. Neck supple. Chest clear ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Medications including OTC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Including strength, route, frequency, form</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Facts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Smoking status, family history, cancer stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Signs and Symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nausea, cough, fatigue, diarrhea, dizziness ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Weight/Height</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pulse/Respiratory Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pain Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LVEF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• EDSS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV1, FVC, TLC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BI-RADS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• HER2/ER/PR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bone Density</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Glasgow Coma Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• PSA – total &amp; free</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Diabetes Family HX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Smoking Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Belonephobia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Leveraging clinical data to get true pop health

Diabetes Patients by Coded v. Clinical Evidence

<table>
<thead>
<tr>
<th>DM Evidence Type [Up to End of Time Period]</th>
<th>Percentage of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dx/PL</td>
<td>30%</td>
</tr>
<tr>
<td>Lab</td>
<td>25%</td>
</tr>
<tr>
<td>Dx/PL, Lab, Med</td>
<td>15%</td>
</tr>
<tr>
<td>Dx/PL, Med</td>
<td>10%</td>
</tr>
<tr>
<td>Dx/PL, Lab</td>
<td>5%</td>
</tr>
<tr>
<td>Med</td>
<td>3%</td>
</tr>
<tr>
<td>Lab, Med</td>
<td>1%</td>
</tr>
</tbody>
</table>

# of patients: 89,101
Why is the right data so important?

Good Data = Actionable Opportunity

Based upon 40 million person clinical benchmark database
Identifying outliers and decreasing variance

![Scatter plot showing Pay-for-Value and Fee-for-Service categories with varying costly DM Rx ratio. The graph displays the distribution of data points across the categories, highlighting outliers.](image)

Displaying 183 / 183 Most
The challenges in transitioning to value-based care

- “Which patients are at high risk?”
- “What conditions exist in my population?”
- “What’s happening to my patients outside of my four walls.”
- “Are my patients getting better?”

- “Who is managing the patient?”
- “What is the optimal treatment plan for the patient?”
- “Where am I on the quality standards?”
- “What is my bonus?”
- “How do I compare with my colleagues?”
Cornerstone and diabetes

Figure 1
Clinical Result

2010 vs 2011

Patients with A1C>9, LDL >130, or BP>140/90 in 2010

Follow-up appointments (no protocols) 2011

27.9% improved in 2011
Cornerstone and diabetes

Figure 2
Impact on Entire CHC Diabetic Population

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patients with A1C&gt;9, LDL &gt;130, or BP&gt;140/90</strong></td>
<td>32.5%</td>
<td>27.9%</td>
</tr>
<tr>
<td><strong>All Type 1 and Type 2 Diabetes</strong></td>
<td>16.5% Reduction in High-Risk Diabetic Patients</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3
Financial Analysis


Expenses  Profit  Payment
The big data phenomenon

Information is at the Center of a New Wave of Opportunity...

44x
as much Data and Content Over Coming Decade

2020
35 zettabytes

1 in 3
Business leaders frequently make decisions based on information they don’t trust, or don’t have

1 in 2
Business leaders say they don’t have access to the information they need to do their jobs

80%
Of world’s data is unstructured

83%
of CIOs cited “Business intelligence and analytics” as part of their visionary plans to enhance competitiveness

60%
of CEOs need to do a better job capturing and understanding information rapidly in order to make swift business decisions

© 2012 IBM Corporation
Big data vs. good data

**Big Data**
- Claims
- Clinical
- Socio Demographic

**Good Data**
- Mapped
- Normalized
- Validated
The golden age of predictive analytics
Modern predictive analytics in health care

**OLD models**

- **SIZE**
  - Limited digital health care data

- **SOURCES**
  - Usually claims data
  - Usually *inpatient* data only

- **QUALITY**
  - Poor data fidelity
  - No way to access unstructured data

**MODERN models**

- **SIZE**
  - Large sets of digital health care data

- **SOURCES**
  - Clinical (EMR) + claims + socioeconomic + care management data
  - Data from all care settings (inpatient, outpatient, ED, etc.)

- **QUALITY**
  - Excellent – cleaned, normalized, validated
  - Natural language processing (NLP) to access unstructured data

- **Predictive abilities**
  - Poor predictive abilities (c-stats of <0.7)
  - Good predictive abilities (c-stats of 0.7-0.8+)
# Case study – Large IDN reduces heart failure hospital admissions

## Clinical Results
- **65% reduction in HF admissions**
- Decrease in ER utilization
- **Increase in patient wellness** (i.e., patients moved down in their percentile risk score in the predictive model over time)
- Enhanced care coordination model with expanded primary care delivery team
- **30% decrease in all-cause readmissions**
- Decrease from 14.4% to 2% in Heart Failure readmission rates

## Improvements
- Avoidance of readmission penalties
- Improved access for new patients
- Increase in clinic efficiencies
- Ability to care for larger panel sizes
- Efficient resource allocation for caregivers

## Financial Gains
Across the pilot sites where our predictive model was employed and operational changes were made, **this system achieved an annualized cost savings of ~$445K.**

They projected that if they applied this model to all of their providers across Aurora Health Care in which they take on 100% of the risk for the care of their patients, they would achieve a **cost savings near $32M.**
The data silo challenge

A Single, Normalized, Longitudinal Patient Centric View

- Outbound Claims
- Post-Adjudicated Claims
- Socio-Demographic Data
- Emerging Data Sources
- Care Management Data

EMR 1
EMR 2
Key capabilities needed

- **Risk/Value-Based Contracts**
  - Advanced Clinical Risk Prediction
  - Advanced Care Management
  - Cost/Risk Analytics (Predicted Cost, Total Spend, Leakage, Etc.)
  - HCC RAF/Risk Score Optimization
  - Mobile Patient Education & Remote Monitoring

- **PCMH**
  - Clinical Integration (HIE, Registries)
  - Basic Clinical Analytics (Clinical Stratification)
  - Patient Relationship Management
  - Transition Management

- **P4P**
  - Patient Registries & Gaps-In-Care Management
  - Tasking and Alerting for Physicians in the EMR
  - Physician Management (Scorecards, Dashboards, etc.)
  - Measure Reporting (ACO, PQRS, HEDIS, Etc.)
Community wide care management

Web Based Care Management Platform

- Patient Engagement
- Home Nurses
- Social Workers
- Post Acute Care Center
- Web Access to Affiliates

EMR 1

EMR 2
ACO starter kit

Data-Driven culture based on Good Data

**Insight**
- REGISTRIES
  - Which patients?
  - Cost analysis
  - Predictive models
  - Focused opportunities

**Action**
- CARE COORDINATION
  - Who is going to work with them?
  - Longitudinal Care Plan Assessments

**Measure**
- ANALYSIS
  - What’s working?
  - Variance identification
  - Are our patients getting healthier?

**Improve**
- PROCESS IMPROVEMENT
  - Care Process design
  - Systematic approach
  - Continual focus

The cycle continues with insights leading to actions, measures, and improvements.
… where we want to go

Leverage ALL data sources
DATA DRIVEN

Connect analytics and care management
CONTINUOUS IMPROVEMENT

Rinse and Repeat