Turning Data into Information: The Power of Clinical and Business Intelligence
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DISCLAIMER: The views and opinions expressed in this presentation are those of the author and do not necessarily represent official policy or position of HIMSS.
Conflict of Interest

Michael Buck, PhD
Bert Reese

Have no real or apparent conflicts of interest to report.
Learning Objectives

- Outline current examples of how data is being used
- Describe how to evaluate and target high risk populations
- Identify the resources that are available
Actionable Information in NYC: Primary Care Information Project (PCIP)

Mission

• Improve quality of care in medically underserved areas through health information technology

• “Clinical Action Arm” bureau of the NYC Department of Health and Mental Hygiene

• Promote new models of care focusing on prevention and public health priorities

• Develop new tools in population health management

• Transition providers from paper charts to an EHR

Success

- Over 16,000 providers joined PCIP and the Regional Extension Center (NYC REACH), including more than:
  - 1095 independent practices
  - 63 community health centers
  - 54 hospitals & outpatient clinics
  - Millions of patients
  - 70 EHR vendor systems
Data -> Information -> Action

Data

- We receive eClinicalWorks EHR data on 3000 providers, caring for ~1.8 M patients per year, ~350,000 encounters per month, data on 5M+ patients since 2009. Have worked with Epic, Greenway, MDLand, other EHR vendors.

- Using Medicaid claims data – to analyze and create dashboards to reach non-eClinicalWorks providers
- Commercial claims data (Emdeon)
- Health information exchange data (Query Health)

Information

- We turn raw data into usable, targeted, actionable information and use it to drive public health focused interventions

Action

- Dashboards: over 20,000 sent in 2013
- On-site QI: over 4,000 site visits in 2013
- PCMH: PCIP sites are 439 out of 1051 total sites in NYS (42%)
- Pay for Quality Programs: Health eHearts, Health eQuits
- Community Engagement activities
Infrastructure to Retrieve EHR Data: The Hub Population Health Network

"The Hub" allows secure exchange of aggregate data with PCIP practices on the eClinicalWorks EHR

➢ Send out queries
➢ Receive patient counts overnight

The Hub currently covers:

• 650+ practices
• ~1.9 M patients per year
• 7 M visits per year
Building the NYC Macroscope Surveillance System

- **NYC Macroscope goal**: Create and validate a system using data from primary care EHRs for population health surveillance for chronic disease

- **Approach**: Compare cleaned EHR-based estimates to gold standard examination survey (NYC HANES 2013) and telephone survey (Community Health Survey 2013), at population and individual levels

<table>
<thead>
<tr>
<th>Preliminary Comparisons</th>
<th>2012 NYC Macroscope</th>
<th>2012 CHS</th>
<th>2004 NYC HANES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=640,860</td>
<td>N=7,004</td>
<td>N=1,261</td>
</tr>
<tr>
<td>Obesity</td>
<td>29.5</td>
<td>25.4</td>
<td>28.2</td>
</tr>
<tr>
<td>Hypertension Diagnosis</td>
<td>30.7</td>
<td>30.9</td>
<td>30.9</td>
</tr>
<tr>
<td>Hypertension Treatment</td>
<td>76.4</td>
<td>70.4</td>
<td>70.2</td>
</tr>
</tbody>
</table>

This work has been made possible by the financial support of the de Beaumont Foundation, Robert Wood Johnson Foundation, the Robin Hood Foundation, the CDC and the NY State Health Foundation.
What can we do with EHR data? Examining neighborhood variations in risk factors

Anticonvulsants
Percent Prescribed
- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- N/A (No Data)

Antidepressants
Percent Prescribed
- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- N/A (No Data)

Antihypertensives
Percent Prescribed
- 63 - 68
- 69 - 74
- 75 - 80
- 81 - 86
- N/A (No Data)

Antipsychotics

Benzodiazepines
Percent Prescribed
- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- N/A (No Data)

Sedatives
Percent Prescribed
- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- N/A (No Data)

Rx of Med Classes with Elevated Falls Risk in 2013 among Older Adults (65-100)
What can we do with EHR data? Evaluating city-wide policy change

Quarterly HIV Testing Trends in New York City, by Age Group

Ages targeted by the HIV testing law of 2010 improved most
The Bronx improved most (targeted by Bronx Knows)
# Changes in HIV Testing During Baseline, Year 1 and Year 2 of the 2010 NYS Testing Law Implementation

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>OR (CI)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Year 1</td>
<td>Year 2</td>
</tr>
<tr>
<td><strong>Improvement (Crude)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Quarter</td>
<td>1.2 (0.9, 1.5)</td>
<td>1.5 (1.0, 2.2)</td>
<td>1.1 (1.0, 1.3)</td>
</tr>
<tr>
<td>First Quarter</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Improvement (Adjusted)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Quarter</td>
<td>1.4 (0.8, 2.3)</td>
<td>2.0 (1.3, 3.1)</td>
<td>1.1 (0.9, 1.5)</td>
</tr>
<tr>
<td>First Quarter</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Org Type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHC / Hospital</td>
<td>4.5 (1.4, 14.6)</td>
<td>3.6 (2.0, 6.4)</td>
<td>3.8 (2.1, 6.8)</td>
</tr>
<tr>
<td>Small Practice</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Borough</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bronx</td>
<td>3.3 (0.7, 14.8)</td>
<td>10.3 (4.6, 23.2)</td>
<td>12.3 (6.1, 24.6)</td>
</tr>
<tr>
<td>Brooklyn</td>
<td>2.5 (0.8, 7.6)</td>
<td>3.6 (1.3, 10.2)</td>
<td>5.0 (1.9, 13.7)</td>
</tr>
<tr>
<td>Manhattan</td>
<td>7.1 (2.1, 24.0)</td>
<td>14.0 (6.2, 31.7)</td>
<td>13.8 (6.7, 28.2)</td>
</tr>
<tr>
<td>Queens</td>
<td>3.3 (0.7, 15.2)</td>
<td>9.3 (4.1, 20.7)</td>
<td>13.8 (7.1, 26.8)</td>
</tr>
<tr>
<td>Staten Island</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ages 13-17</td>
<td>4.8 (3.2, 7.0)</td>
<td>4.6 (2.0, 10.5)</td>
<td>3.5 (1.4, 8.8)</td>
</tr>
<tr>
<td>Ages 18-64</td>
<td>6.9 (4.2, 11.3)</td>
<td>6.4 (4.1, 9.9)</td>
<td>5.1 (3.5, 8.0)</td>
</tr>
<tr>
<td>Ages 65-100</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Baseline Performance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV tested 1+ patients</td>
<td>N/A</td>
<td>17.0 (4.7, 61.6)</td>
<td>7.6 (2.3, 25.6)</td>
</tr>
<tr>
<td>No HIV tests done</td>
<td></td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>
H1N1 Syndromic Surveillance

% of Influenza-Like-Illness Visits

Report Date
Feedback to Providers

Provider-level feedback compared to community peer averages produces a “professional pride” incentive to increase performance.
Feedback to Providers

Provider-level feedback compared to community peer averages produces a “professional pride” incentive to improve performance.
Feedback to Providers

Provider-level feedback compared to community peer averages produces a “professional pride” incentive to increase performance.
Launched Quality Improvement Initiative

DASH To The Top – Diabetes Prevention, A1C, Smoking, and Hypertension

This quality improvement initiative focuses on improving:

<table>
<thead>
<tr>
<th>Measures</th>
<th>PCIP Baseline</th>
<th>PCIP 2015 Goals</th>
<th>National Target*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Prevention – Referrals to Diabetes (DPP)</td>
<td>120</td>
<td>3,000</td>
<td>-</td>
</tr>
<tr>
<td>A1C Poor Control (A1c &gt; 9%)</td>
<td>10%</td>
<td>9%</td>
<td>16.1</td>
</tr>
<tr>
<td>Smoking Cessation Interventions</td>
<td>37%</td>
<td>40%</td>
<td>21.1%</td>
</tr>
<tr>
<td>Hypertension Blood Pressure (BP &lt; 140/90)</td>
<td>65%</td>
<td>70%</td>
<td>61.2%</td>
</tr>
</tbody>
</table>

How?

- Supporting 102 practices in workflow redesign for chronic care management, EHR optimization, quality improvement, and documentation for revenue cycle management.
- Chronic Care Best Practices workflow includes activities to enhance patient care before, during, and after visits.

Source: Hub Population Health Query System ; *Healthy People 2020 Targets
### A Best Practices Curriculum for improving ABCS

<table>
<thead>
<tr>
<th>QI Curriculum Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Patient lists</td>
</tr>
<tr>
<td>2 Patient outreach</td>
</tr>
<tr>
<td>3 Medication taking/adherence</td>
</tr>
<tr>
<td>4 Planned visits</td>
</tr>
<tr>
<td>5 Referrals for patient education/self-management</td>
</tr>
<tr>
<td>6 Clinical decision support</td>
</tr>
<tr>
<td>7 Dashboards/Public health reporting</td>
</tr>
<tr>
<td>8 Evidence based guidelines</td>
</tr>
</tbody>
</table>

**NOTE:** Incorporates Meaningful Use (MU) and quality improvement frameworks such as Chronic Care Model (CCM) and Patient Centered Medical Home (PCMH)
Created additional dashboards to prioritize patient follow-up and process measures

Your Practice Hypertension Panel Summary
October 2014

Hypertension Trend

Community average this month for BP Controlled 140/00: 51%  
Community average this month for future appointments scheduled: 55%

- % of hypertensive patients with blood pressure < 140/90
- % patients seen with future appointment scheduled

October 2014

<table>
<thead>
<tr>
<th>Last Blood Pressure</th>
<th>Stage 2 (&gt;150/100)</th>
<th>Stage 1 140-159/90-99</th>
<th>Controlled BP &lt;140/90</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive patients seen</td>
<td>15</td>
<td>53</td>
<td>138</td>
<td>206</td>
</tr>
<tr>
<td>Antihypertensive meds prescribed</td>
<td>15</td>
<td>50</td>
<td>122</td>
<td>187</td>
</tr>
<tr>
<td>Voice enabled patients</td>
<td>15</td>
<td>53</td>
<td>138</td>
<td>206</td>
</tr>
<tr>
<td>Future appointments scheduled at point of care</td>
<td>12</td>
<td>40</td>
<td>98</td>
<td>150</td>
</tr>
</tbody>
</table>

Source: Hub Population Health Query System
EHR data provides real-time surveillance capabilities for program planning

1) Number of adult hypertension patients with scheduled appointments

2) Practices with highest % of HTN patients scheduled

3) Sum of practices reporting by week

4) Top UHFs with the highest number of HTN patients scheduled

5) Map of HTN patients scheduled by UHF
Supporting practices in revenue cycle management is a key engagement strategy

### Revenue Cycle Management

<table>
<thead>
<tr>
<th>Insurance</th>
<th>HCPCS/CPT Codes</th>
<th>ICD-9 Code</th>
<th>Payment</th>
<th>2015 Physician Quality Reporting System (PQRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare</td>
<td>G0436 (3-10 minutes)</td>
<td>305.1</td>
<td>$15.37 - $17.95</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>G0437 (&gt; 10 minutes)</td>
<td>V15.82</td>
<td>$29.96</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>99406 (3-10 minutes)</td>
<td>305.1</td>
<td>$10.00</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>99407 (&gt; 10 minutes)</td>
<td>305.1</td>
<td>$19.00</td>
<td></td>
</tr>
<tr>
<td>Commercial Insurances</td>
<td></td>
<td></td>
<td>$12.00 - $23.00</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>99406 (3-10 minutes)</td>
<td>V15.82</td>
<td>$15.00 - $32.00</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>99407 (&gt; 10 minutes)</td>
<td>V15.82</td>
<td>$19.00</td>
<td></td>
</tr>
</tbody>
</table>

**Must Append Modifier 25 to E/M Code**

**Registry reporting only:** Must use Measure #402: G9458, G9459 & G9460.

Payments are subject to doctors' contract. For more information, contact your insurance carriers.
Acknowledgements

Co-contributors from PCIP
- Sheila Anane
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- John Taverna
- Laura Jacobson
- Lauren Schreibstein
- PCIP Hub Team
- PCIP HQIN Team
- eClinicalWorks Hub Team

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2. The Macroscope work was made possible by the financial support of the de Beaumont Foundation, Robert Wood Johnson Foundation, the Robin Hood Foundation, the CDC and the NY State Health Foundation
Michael Buck, PhD
mbuck@health.nyc.gov
All Adult NYC Patients: 1,317,438 (n=660 practices, 2229 providers)

Seen by primary care, not specialist: 766,655

Retained after quality inclusion criteria:
715,901
(n=393 practices, 953 providers)

2010 Census: 6,180,203 NYC adults

CHS 2013 estimates 4,229,808 NYC adults (20+)
saw their primary care provider in the past year.

Macroscope annual adult pop coverage: ~12%
Macroscope annual adult primary care patient coverage: ~17%
Next Steps for the NYC Macroscope

- Division of Epidemiology and PCIP partnering to summarize indicator comparisons between NYC Macroscope, 2013 CHS, 2013/2014 NYC HANES.
- Full report describing indicator performance and retaining final metrics for the NYC Macroscope Surveillance System due Dec 2015
- CDC-funded chart review of NYC Macroscope patients in the NYC HANES sample ongoing
- RWJF PHSSR full chart review study application pending but preliminary signs positive
- Ongoing discussion design evaluation of trend performance and uncertainty

Hypertension
Estimates for NYC Macroscope vs. CHS In-Care Population
NYC Macroscope estimates weighted using inarouchs

Hypertension Total Prevalence Statistics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
<th>Criteria</th>
<th>Different?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Difference</td>
<td>4.11</td>
<td>5.00</td>
<td>No</td>
</tr>
<tr>
<td>Mean Standardized Difference</td>
<td>1.13</td>
<td>1.96</td>
<td>No</td>
</tr>
<tr>
<td>Mean Relative Difference</td>
<td>16.4</td>
<td>15.00</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Correlation
0.986
✓ A successful EMR implementation is just the starting point in becoming a Data Driven Company.

✓ The cycle time of converting data to action is the measurement of success.

✓ From understanding Data comes Innovation.
The Data Journey
Moving From a Technology Driven Company to a Data Driven Company
Cycle Time is the Key

Data ➔ Information ➔ Knowledge ➔ Action
Three Types of Data

- Retrospective
- Dynamic
- Predictive
Keys to Success

- Recognize that Healthcare is a data driven

- Teach your organization to self service their own Data
New Clinical Value from the EMR

• Driving Clinical Process Improvements
• Standardizing best practices through protocols, order sets, and advanced analytics
• Identify and focus on high risk patients in real time
• Advanced analytics driving new clinical improvements
• Real time clinical algorithms and alerting (Sniffers)
• Better understanding of the clinical workflow
• Focus on improving care for high risk patients (Heart Failure, Pneumonia, Sepsis)
Innovation – Technology Enablers

• Innovation:
  – Mobile Nurse Manager Rounding
    • Consistent, standardized approach to inpatient customer satisfaction with automated escalation (HCAHPS improvement)
  – Automated Discharge Follow up Calls
    • Improved transition of care, early identification of issues, improved readmission performance

• Technology and Data to improve clinical performance
  – Early Warning – Detection System
    • Vital Sign Alert System (Med/Surg and OB)
Innovation – Technology Enablers, cont.

• Technology and Data, cont
  – Glycemic Control – Acute Care
    • Glucomander integration for all Inpatients
  – Sepsis Sniffer – automated detection of potential sepsis
  – Inpatient Scheduling – patient engagement with plan of care
  – MyChart Bedside – patient engagement through IP patient portal
  – Patient Monitor – eICU for critically ill patients
  – Pharmacist review of ambulatory and discharge prescriptions
  – Display of C3 metrics in patient list (real time monitoring of clinical performance)
Questions?