Pediatric Population Health Outcomes
Using Condition-Specific Registries

Session 73, February 12, 2019

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VP, CMIO & CIO
Children’s National Medical Center
Conflict of Interest

Brian Jacobs, MD

Has no real or apparent conflicts of interest to report.
• Pediatric Demographics in the Washington DC Metropolitan Region
• Principles of Health Registry Development
• Data Quality Challenges
• Delivering on a Population Health Corporate Goal
• Lessons Learned for the Future
Learning Objectives

• Recognize what is required to construct and implement a condition-specific pediatric registry that conforms to accepted, evidence-based guidelines of care.

• Evaluate the value achieved and challenges encountered through implementing these population health technologies.

• Identify possible data integrity challenges and best practices to overcome these challenges with successful outcomes.
Children’s National Medical Center

1870

Today

- $1.3 B Budget Health System

In FY 17:
- Discharges – 15,554
- Emergency Room Visits – 120,648
- Outpatient Visits – 560,810
- Surgery Cases – 17,535

Serving over 219,000 patients annually

- 313-bed acute care hospital
- 2 pediatric emergency departments
- Level I trauma center
- Critical care transport program
- Community-based primary care network
- Primary care offices in DC and MD
- 7 regional outpatient centers
- Ambulatory surgery center
- School nurse program
- Medical collaborations across the region
- Mobile health services

Serving over 219,000 patients annually
Population Health Efforts at Children’s National

Regional Pediatric Population:
- 125 K Children in DC
- 1.9 M Children in VA
- 1.4 M Children in MD

Children’s IQ Network:
- 65 Practices
- 340 Independent Providers
- ~450K unique children

Children’s National:
- ~220K unique children
Data Sources to Enterprise Data Warehouse

- CNMC Billing
- Cerner IP, ED, OR Specialty Clinics
- eCW Primary Care
- Greenway Primary Care
- Immunization Registries
- Payer Claims
- Schools
- Epic PSV
- Population Health Registries

Enterprise Data Warehouse

- > 3M Encounters
- > 660,000 Unique Children
Core Principles in Registry Development

- Executive Leadership
- Published Peer-Reviewed Evidence
- Consensus
- Measure Selection
  - Objective
  - Structured
  - Available
- EHR Workflow Integration
  (Cerner, eClinical Works, Greenway)
# Population Health Registries

<table>
<thead>
<tr>
<th>Asthma</th>
<th>Cardiomyopathy</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Action Plan Complete</td>
<td>• Echocardiogram</td>
<td>• HbA1C Screening</td>
</tr>
<tr>
<td>• Medication Management</td>
<td>• Outpatient Vital Signs</td>
<td>• HbA1C &lt; 7.5%</td>
</tr>
<tr>
<td>• Lung Function Testing</td>
<td>• Outpatient EKG</td>
<td>• HbA1C &lt; 9.0%</td>
</tr>
<tr>
<td>• Asthma Control Test</td>
<td>• Routine Holter Monitor</td>
<td>• HbA1C ≥ 10.0%</td>
</tr>
<tr>
<td>• Influenza Vaccination</td>
<td>• Routine Labs</td>
<td>• Lipid Panel</td>
</tr>
<tr>
<td>• Tobacco Screening &amp; Cessation</td>
<td>• Blood Pressure Control</td>
<td>• LDL &lt; 100 mg/dL</td>
</tr>
<tr>
<td>• Tobacco Exposure Screening</td>
<td>• Blood Pressure &gt; 130/90 mm Hg</td>
<td>• LDL ≥ 130 mg/dL</td>
</tr>
<tr>
<td>• Outpatient Visit</td>
<td>• Body Mass Index</td>
<td>• Microalbumin Screening</td>
</tr>
<tr>
<td>• ED Visit</td>
<td>• Outpatient Visit</td>
<td>• Thyroid Function Screening</td>
</tr>
<tr>
<td>• Hospital Visit</td>
<td>• ED Visit</td>
<td>• Celiac Screening</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Blood Pressure Measurement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Blood Pressure &gt; 130/90 mm Hg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Body Mass Index</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pneumonia Vaccination</td>
</tr>
</tbody>
</table>

- Blood Pressure Control: Blood Pressure > 130/90 mm Hg
- Blood Pressure Measurement: Blood Pressure > 130/90 mm Hg
Population Health Registries

<table>
<thead>
<tr>
<th>IBD</th>
<th>Epilepsy</th>
<th>Sickle Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Nutrition Assessment/Counseling</td>
<td>• Brain MRI</td>
<td>• Antibiotic Prophylaxis</td>
</tr>
<tr>
<td>• Tuberculosis (TB) Testing</td>
<td>• DMV Notification</td>
<td>• Blood Pressure &lt; 140/90 mm Hg</td>
</tr>
<tr>
<td>• Hepatitis B Vaccination</td>
<td>• Diastat Prescription</td>
<td>• Chronic Transfusions – Labs</td>
</tr>
<tr>
<td>• Varicella Vaccination</td>
<td>• Electroencephalogram</td>
<td>• Chronic Transf – Audiology Exam</td>
</tr>
<tr>
<td>• Eye Exam</td>
<td>• ED Visit</td>
<td>• Chronic Transf – Ferritin</td>
</tr>
<tr>
<td>• Adolescent Depression Screening</td>
<td>• Emergency Seizure Action Plan</td>
<td>• Chronic Transf – Neuro Testing</td>
</tr>
<tr>
<td>• Blood Pressure Measurement</td>
<td>• Felbamate Labs</td>
<td>• Chronic Transf – T2 Level</td>
</tr>
<tr>
<td>• Routine Labs</td>
<td>• Hospital Visit</td>
<td>• Chronic Transf – Viral Testing</td>
</tr>
<tr>
<td>• Body Mass Index</td>
<td>• Motor Vehicle Education</td>
<td>• Eye Exam</td>
</tr>
<tr>
<td>• Routine Urinalysis</td>
<td>• Outpatient Visit</td>
<td>• Genetic Counseling: 12 Years</td>
</tr>
<tr>
<td>• 6 MP and Imuran Labs</td>
<td>• Reproductive Education</td>
<td>• Genetic Counseling: New Condition</td>
</tr>
<tr>
<td>• Methotrexate Labs</td>
<td>• Routine Labs</td>
<td>• Hydroxyurea Treatment</td>
</tr>
<tr>
<td>• Contraceptive Education</td>
<td>• Surgical Referral</td>
<td>• Hydroxyurea Treatment Education</td>
</tr>
<tr>
<td>• Outpatient Visit High Risk</td>
<td></td>
<td>• Meningococcal Vaccination</td>
</tr>
<tr>
<td>• Outpatient Visit Low Risk</td>
<td></td>
<td>• Pain Assessment</td>
</tr>
<tr>
<td>• ED Visit</td>
<td></td>
<td>• Pain Assessment Follow Up</td>
</tr>
<tr>
<td>• Hospital Visit</td>
<td></td>
<td>• Pneumococcal Vaccination</td>
</tr>
<tr>
<td>• Bone Mineral Testing</td>
<td></td>
<td>• Proteinuria Screening</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• RBC Phenotyping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Spirometry Evaluation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stroke Prevention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Well Visit</td>
</tr>
</tbody>
</table>
Question 1

Which of the following factors contribute to data quality challenges in population health:

1. Inconsistent structured documentation during a clinic encounter
2. Narrative documentation
3. Mapping errors from the EHR to the data warehouse
4. All of the above

https://live.eventbase.com/polls?event=himss19&polls=5128
Data Quality is Challenging!

- Health quality measure performed, but not in accessible system (e.g. retail pharmacy immunization at CVS)
- Measure performed but not documented (e.g. discussion on seizure action plan)
- Care ordered but not carried out (e.g. ordered Valproate, no show in lab)
- Measure documented in an unstructured (narrative) manner
- Mapping from EHR to EDW is inaccurate & requires correction
- Mapping from EDW to Registry is inaccurate & requires correction
Perceived vs. Reported Value

Reported

- Division Reported Value: 90%
- Captured in EHR: -8%
- Lab Out of CNHS: -14%
- Data Warehouse Gap: -5%
- Registries Value: 62%

Perceived

- Documented in incorrect location: -4%
- Documented in non-structured format: -4%
- Lab Not Completed in CNHS: -4%
- Regional Population Community Drs.: -10%
- Date Not in EDW: -2%
- Data Not Mapped: -6%
**2018 Corporate Goal**

**Definition:** Advance quality outcomes in selected population health diagnoses across the continuum of care through electronic health registry data.

**Rationale:** Through 6 population health registries: asthma, cardiomyopathy, diabetes, inflammatory bowel disease, epilepsy, and sickle cell, improve the outcome in each registry by 10% from baseline for each health condition.

### FY18 Incentive Goal Metrics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Threshold</strong></td>
<td>Improve outcomes of care using 3 registries.</td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td>Improve outcomes of care using 4 registries.</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>Improve outcomes of care using 5 registries.</td>
</tr>
</tbody>
</table>
Question 2

Which factor(s) below are most predictive of clinician participation in population health?

1. Integration of Registry Measures Into Clinician Workflow
2. Distribution of Starbucks Gift Cards
3. Importance of Displayed Health Measures
4. Answers 1 & 3

https://live.eventbase.com/polls?event=himss19&p polls=5129
Registries integrated into EHR daily work
Ambulatory Summary View
(Sickle Cell Disease)
Ambulatory Workflow View

Sickle Cell Disease
## Patient Registry Measure Status

<table>
<thead>
<tr>
<th>Appt Date</th>
<th>Patient Name</th>
<th>24 Hour Holter</th>
<th>Measure Name</th>
<th>Outpatient Visit</th>
<th>Routine Lab Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-23-2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>01-24-2018</td>
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<td>01-26-2018</td>
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<td>01-30-2018</td>
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<tr>
<td>02-02-2018</td>
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<td>02-08-2018</td>
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<td>02-09-2018</td>
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<td>03-06-2018</td>
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<td>03-08-2018</td>
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<td>05-02-2018</td>
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<td>05-18-2018</td>
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<td>06-14-2018</td>
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</tr>
</tbody>
</table>

- **Patient Name**: FREEMAN, HICKS
- **Appt Date**: 01-26-2018
- **Measure Name**: 24 Hour Holter
- **Status**: Not Met
Registry Measure View
Cardiomyopathy

Population
22,289 Persons
368,341 Unassigned Persons
37% Complete

Quality Score
51.89

12\% Met
Outpatient Electrocardiogram
215 Persons Qualified
188 Persons Not Met
12\% Completed

27\% Met
Routine 24 Hour Holter Monitor
215 Persons Qualified
155 Persons Not Met
27\% Completed

52\% Met
Routine Lab Work
215 Persons Qualified
96 Persons Not Met
52\% Completed

76\% Met
Blood Pressure Control
215 Persons Qualified
31 Persons Not Met
83\% Completed

85\% Met
Outpatient Vital Signs
215 Persons Qualified
31 Persons Not Met
83\% Completed

26\% Met
Body Mass Index
215 Persons Qualified
188 Persons Not Met
92\% Completed

76\% Met
Blood Pressure \(\geq 130/90\) mm Hg
215 Persons Qualified
31 Persons Not Met
99\% Completed

99\% Met
Emergency Department Visit
215 Persons Qualified
1 Persons Not Met
0\% Completed
2018 Population Health Registries Dashboard

Cardiomyopathy (Baseline vs. Now)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Registry Population</th>
<th>Number of People Met</th>
<th>% of People Met</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>July 3, 2017</td>
<td>March 12, 2018</td>
<td></td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>420.0</td>
<td>85.0</td>
<td>16.6%</td>
</tr>
<tr>
<td>24 Hour Holter</td>
<td></td>
<td></td>
<td>30.6%</td>
</tr>
<tr>
<td>Outpatient Visit</td>
<td>300.0</td>
<td>99.0</td>
<td>54.8%</td>
</tr>
<tr>
<td>Routine Lab Work</td>
<td>801.0</td>
<td>82.0</td>
<td>58.6%</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td>36.6%</td>
</tr>
</tbody>
</table>

Registry Performance

Measure Performance

Data Steward
Center for Pediatric Informatics

Data Source
HealthRegistries

Data Refresh Date
3/12/2018
## Corporate Goal Performance

### 2018 Population Health Registries Dashboard

#### Baseline (July 3, 2017) vs Current

<table>
<thead>
<tr>
<th>Condition</th>
<th>Measure Name</th>
<th>Registry Population</th>
<th>% of People Met</th>
<th>Goal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>June 30, 2018</td>
<td>July 3, 2017</td>
<td>June 30, 2018</td>
</tr>
<tr>
<td><strong>Asthma</strong></td>
<td>Influenza Vaccine +</td>
<td>52,102</td>
<td>13.2%</td>
<td>27.4%</td>
</tr>
<tr>
<td></td>
<td>Optimal Medication Management</td>
<td>25,553</td>
<td>73.0%</td>
<td>71.1%</td>
</tr>
<tr>
<td></td>
<td>Tobacco Exposure Screening +</td>
<td>55,557</td>
<td>27.0%</td>
<td>43.3%</td>
</tr>
<tr>
<td><strong>Cardiomyopathy</strong></td>
<td>24 Hour Holter</td>
<td>97</td>
<td>16.6%</td>
<td>35.1%</td>
</tr>
<tr>
<td></td>
<td>Outpatient Visit</td>
<td>113</td>
<td>54.8%</td>
<td>69.0%</td>
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<tr>
<td></td>
<td>Routine Lab Work</td>
<td>92</td>
<td>38.5%</td>
<td>31.5%</td>
</tr>
<tr>
<td><strong>Diabetes</strong></td>
<td>Hb A1c Testing +</td>
<td>1,668</td>
<td>68.0%</td>
<td>62.1%</td>
</tr>
<tr>
<td></td>
<td>Lipid Panel Screening +</td>
<td>1,273</td>
<td>65.6%</td>
<td>55.9%</td>
</tr>
<tr>
<td></td>
<td>Microalbumin Screening +</td>
<td>663</td>
<td>30.2%</td>
<td>49.3%</td>
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<tr>
<td><strong>Epilepsy</strong></td>
<td>Emergency Seizure Action Plan</td>
<td>1,597</td>
<td>0.0%</td>
<td>4.7%</td>
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<tr>
<td></td>
<td>Safety Monitoring Labs</td>
<td>5,625</td>
<td>29.3%</td>
<td>25.1%</td>
</tr>
<tr>
<td></td>
<td>Screening for Surgery</td>
<td>2,987</td>
<td>2.1%</td>
<td>5.2%</td>
</tr>
<tr>
<td><strong>Inflammatory Bowel Disease</strong></td>
<td>Bone Mineral Density</td>
<td>893</td>
<td>20.0%</td>
<td>31.0%</td>
</tr>
<tr>
<td></td>
<td>Outpatient Visit +</td>
<td>507</td>
<td>75.7%</td>
<td>66.9%</td>
</tr>
<tr>
<td></td>
<td>Reproductive Education +</td>
<td>37</td>
<td>0.0%</td>
<td>37.8%</td>
</tr>
<tr>
<td><strong>Sickle Cell Disease</strong></td>
<td>Hydroxyurea Treatment Ed.</td>
<td>615</td>
<td>39.8%</td>
<td>32.2%</td>
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<tr>
<td></td>
<td>Pneumonia Vaccination-Comprehensive</td>
<td>1,527</td>
<td>23.3%</td>
<td>46.4%</td>
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<tr>
<td></td>
<td>Stroke Prevention</td>
<td>477</td>
<td>27.0%</td>
<td>50.5%</td>
</tr>
</tbody>
</table>

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**Data Steward**
Center for Pediatric Informatics

**Data Source**
Health Registries

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**Data Refresh Date**
6/30/2018
Lessons Learned

Data Integrity
- Onboarding Data
- Data Validation & Quality
- External Scanned Data
- Data Steward Resources

Clinician Adoption
- Clinician Workflow Adoption
- Structured Clinician Documentation
- Community Physician Engagement

Patient Engagement
- Care Coordination
- Care Coaching
- Patient Outreach Resources
Question 3

According to a 2016 survey, which of the following is a true statement?

1. <20% of healthcare organization revenue is now associated with risk-based contracting
2. 45% of healthcare executives rank population health as moderately to critically important
3. 30% of health care organizations have at least one risk based contract
4. None of the above

https://live.eventbase.com/polls?event=himss19&polls=5130
Conclusions

- Essential health data from information systems can be aggregated to power robust population health analytics.
- Data quality is challenging and should be appropriately resourced.
- Condition-specific pediatric health registries can be utilized to identify opportunities to improve care.
- Integrating these opportunities into clinicians workflows results in improved health measure compliance.
- Further improvements will likely require:
  - Empowering patients with this information through enhanced communication tools
  - Health coaching and care coordination
Questions

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