Emergency Care Quality Imaging Benchmarks in a Statewide Collaborative: Estimated Excess and Associated Spending


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- Beaumont Hospital – Royal Oak
- Beaumont Hospital – Troy
- Children’s Hospital of Michigan, DMC
- Detroit Receiving Hospital, DMC
- Helen DeVos Children’s Hospital
- Henry Ford Allegiance Hospital
- Henry Ford Hospital
- Holland Hospital
- Hurley Medical Center
- Huron Valley Hospital, DMC
- Lakeland Health
- MidMichigan Medical Center
- Munson Medical Center
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Disclosures

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  • www.medicqi.org

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  • Career development award
Background and Objectives

1. Describe the building of a large scale quality collaborative to drive practice change.
2. Report real world baseline performance across key ED quality measures.
3. Estimate excess imaging and associated spending.
Background

Learning Collaborative

Est. 2015

Practice Change
Collaborative Sites

15 hospitals
- community & academic
- rural & urban
- pediatric & adult

25,000 – 125,000 ED visits annually at each site
- 23% pediatric (< 18 years old)
~22% of all ED visits in Michigan
Methods: Structure

- Michigan Cardiovascular Consortium
- Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative
- Michigan Bariatric Surgery Consortium
- Michigan Surgical Quality Collaborative
- Michigan Anticoagulation Quality Improvement Initiative
- Michigan Oncology Quality Consortium
- Hospital Medicine Safety Consortium
- Michigan Trauma Quality Improvement Project
- Michigan Urological Surgery Improvement Collaborative
- Michigan Radiation Oncology Quality Consortium
- Michigan Arthroplasty Registry Collaborative for Quality Improvement
- Michigan Spine Surgery Improvement Collaborative
- Michigan Value Collaborative
- Anesthesiology Performance Improvement and Reporting Exchange
- Michigan Pharmacists Transforming Care and Quality Consortium
- Michigan Emergency Department Improvement Collaborative
- Integrated Michigan Patient-Centered Alliance on Care Transitions

http://www.valuepartnerships.com/
Methods: Quality Measurement

1. Adult minor head injury
   - Canadian Head Rule
   - CT appropriateness

2. Pediatric minor head injury
   - PECARN Rule
   - CT overuse & utilization

3. Pediatric respiratory illness
   - Asthma, bronchiolitis, croup
   - CXR utilization

4. Adult suspected pulmonary embolism
   - Chest CTs
   - Diagnostic yield
Methods: Data Sources

**Automated Electronic Data**
- Every ED visit
  - Patient demographics
  - Chief complaints
  - Vital signs
  - Triage score
  - Timestamps
  - Procedure codes
  - Diagnostic codes
  - Disposition
  - Provider

**Manual Chart Abstraction**
- Specific to core quality initiatives
  - Minor head injuries (symptoms, findings)
  - CT scans for suspected PE
  - Pediatric respiratory illnesses

**On Demand Real Time Reports via Web Platform**

**Coordinating Center Customized Reports**
Methods: Analysis Steps

Step 1
- Analyzed MEDIC registry data from 6/1/16 – 10/31/17
- Prior to when quality improvement efforts began
- Report site level baseline performance and variation

Step 2
- Calculate the Achievable Benchmark of Care (ABC™)* for each quality measure
- Objective, reproducible, data-driven method for determining quality improvement targets across a population of performance

Methods: Analysis Steps

Step 3
• Calculate reduction in imaging studies for each quality measure based on meeting ABC\textsuperscript{TM} target

Step 4
• Calculate associated spending related to avoided imaging studies projection
• Price estimates from the \textit{Healthcare Bluebook} website*

Step 5
• Use direct standardization to extrapolate these findings to a typical ED with 20% children
• Express as avoidable imaging and excess spending for every 10,000 annual ED visit volume

## Results: MEDIC Baseline Performance*

<table>
<thead>
<tr>
<th>Quality Initiative</th>
<th>Collaborative (%)</th>
<th>Site Median, % (Range)</th>
<th>ABC™ Benchmark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adult Head Injury</strong> (Canadian Rule)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CT Appropriateness</td>
<td>40.9</td>
<td>47.7 (24.3 – 58.6)</td>
<td>55.5</td>
</tr>
<tr>
<td><strong>Pediatric Head Injury</strong> (PECARN Rule)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT Overuse</td>
<td>10.3</td>
<td>9.9 (5.8 – 16.8)</td>
<td>5.8</td>
</tr>
<tr>
<td>Intermediate Risk CT Utilization</td>
<td>23.4</td>
<td>22.7 (9.5 – 54.4)</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Pediatric Respiratory Illnesses</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CXR Utilization</td>
<td>38.1</td>
<td>44.0 (9.0 – 62.1)</td>
<td>18.5</td>
</tr>
<tr>
<td><strong>Adult Pulmonary Embolism</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT Diagnostic Yield</td>
<td>8.7</td>
<td>8.4 (7.5 – 14.3)</td>
<td>10.7</td>
</tr>
</tbody>
</table>

* Data from 6/1/16 – 10/31/17
## Results: MEDIC Projected Excess and Savings Over 1 Year if ABC™ Benchmark Achieved*

<table>
<thead>
<tr>
<th>Quality Initiative</th>
<th>Count of 2017 Imaging Studies in the MEDIC Registry</th>
<th>Number of Potentially Avoidable Studies in 2017</th>
<th>Range of Potentially Avoidable Spending in 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adult Head Injury</strong> (Canadian Rule)</td>
<td></td>
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<tr>
<td><em>CT Appropriateness</em></td>
<td>2,422</td>
<td>1,083</td>
<td>$325,983 – 747,270</td>
</tr>
<tr>
<td><strong>Pediatric Head Injury</strong> (PECARN Rule)</td>
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<tr>
<td><em>CT Overuse</em></td>
<td>TOTALS: 1,519 head CTs 3,308 CXRs 4,254 PE chest CTs</td>
<td>TOTALS: $3.59 – 5.02 million</td>
<td>$13,244 – 30,360 $117,992 – 270,480</td>
</tr>
<tr>
<td><em>Intermediate risk CT utilization</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pediatric Respiratory Illnesses</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>CXR utilization</em></td>
<td>5,890</td>
<td>3,308</td>
<td>$135,628 – 231,560</td>
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<tr>
<td><strong>Adult Pulmonary Embolism</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>CT Diagnostic Yield</em></td>
<td>17,884</td>
<td>4,254</td>
<td>$2,994,816 – 3,743,520</td>
</tr>
</tbody>
</table>

* Calculated based on Healthcare Bluebook range of “fair prices” for Michigan as follows: CPT code 70450 (non-contrast head CT) = $301-690; CPT code 71275 (CT chest angiography) = $704-880; CPT code 71020 (2-view CXR) = $41-70
Results: Projected Excess Imaging Per Individual ED Over 1 Year

The graph shows the number of imaging studies potentially avoidable per individual ED visit volume. The x-axis represents ED annual visit volumes (in 10,000 visit increments), while the y-axis represents the number of imaging studies potentially avoidable.

- **PE CT**: The dark blue line indicates the number of PE CT imaging studies potentially avoidable.
- **CXR**: The orange line represents the number of CXR imaging studies potentially avoidable.
- **Head CT**: The blue line shows the number of head CT imaging studies potentially avoidable.

Key points:
- At 10K visits, PE CT has 42 potentially avoidable studies.
- At 20K visits, CXR has 14 potentially avoidable studies.
- At 250K visits, PE CT has 421 potentially avoidable studies.
- At 100K visits, Head CT has 136 potentially avoidable studies.

The graph demonstrates a clear trend: as the ED visit volume increases, the number of potentially avoidable imaging studies also increases.
Results: Projected Savings Per Individual ED Over 1 Year*

* Calculated based on Healthcare Bluebook range of “fair prices” for Michigan as follows: CPT code 70450 (non-contrast head CT) = $301-690; CPT code 71275 (CT chest angiography) = $704-880; CPT code 71020 (2-view CXR) = $41-70
Limitations: Assumptions and Implications

1. MEDIC data sources are valid and high quality
   - Analysis relies on diagnostic/procedural codes and human abstractors

2. 15 EDs in Michigan are representative
   - National and individual ED case mix and practice patterns may vary

3. Avoidable imaging projections are theoretical
   - Providers may respond to quality improvement intervention differently

4. Excess spending projections are theoretical
   - Prices vary, savings vary
1. Substantial opportunity for avoiding low value imaging studies in EDs.
2. If ABC™ targets can be safely achieved, result would be significant health care savings.

* Manuscript accepted, soon to be in press

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