8/17/18

Improving the Care of Patients with Suspected Appendicitis

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Professor of Pediatrics and Emergency Medicine
Abdominal pain

• Appendicitis is most common surgical condition in children.
• Nearly 2000 patients present to our ED/UC every year with abdominal pain and suspicion for appendicitis.
• 1/3 of patients will present with perforation
  • Higher in children with Medicaid
In 2013, the National Surgery Quality Improvement Program – Pediatric (NSQIP-P) presented data on the comparative use of CT amongst like Children’s Hospitals.
<table>
<thead>
<tr>
<th>Preoperative Diagnostic Evaluation (All Patients)</th>
<th>Outlier Status</th>
<th>Quartile</th>
<th>Measure (+/- 95% CI or IQR)</th>
<th>Peer Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Diagnostic Imaging Rate (US or CT)*</td>
<td></td>
<td>4</td>
<td>100.0% (78.5 - 100.0)</td>
<td>90.6%</td>
</tr>
<tr>
<td>CT Scanning Rate*</td>
<td>L</td>
<td>4</td>
<td>41.1% (28.5 - 53.7)</td>
<td>16.2%</td>
</tr>
<tr>
<td>US Rate*</td>
<td>N/A</td>
<td>2</td>
<td>72.5% (52.0 - 93.0)</td>
<td>94.7%</td>
</tr>
<tr>
<td>Compliance with American College of Radiology Imaging Guidelines</td>
<td>L</td>
<td>3</td>
<td>31.7% (17.5 - 46.0)</td>
<td>75.0%</td>
</tr>
<tr>
<td>Ultrasound Diagnostic Success Rate</td>
<td></td>
<td>3</td>
<td>72.9% (60.3 - 85.5)</td>
<td>79.8%</td>
</tr>
</tbody>
</table>
## Baseline CT Utilization Rates

<table>
<thead>
<tr>
<th>Patient Location</th>
<th>2013-2014 In-House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anschutz Campus</td>
<td>25%</td>
</tr>
<tr>
<td>Network of Care</td>
<td>66%</td>
</tr>
<tr>
<td>System-wide</td>
<td>35%</td>
</tr>
</tbody>
</table>
Project Aim

Reduce unnecessary imaging in patients undergoing appendectomy surgery and achieve a system-wide CT use ≤20%, (with no change in negative and missed appendicitis rates)

<table>
<thead>
<tr>
<th></th>
<th>Baseline (2013-2014)</th>
<th>Target</th>
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<tbody>
<tr>
<td>CT utilization in patients undergoing appendectomy surgery</td>
<td>35%</td>
<td>≤ 20%</td>
</tr>
</tbody>
</table>
“Imaging Gently” Improvement Project

Multidisciplinary team/Governance:
• Surgery (Jen Bruny MD)
• Radiology (John Strain MD)
• ED/UC (Lalit Bajaj MD, Kevin Carney MD)
• Process Improvement (Jesse Herrgott, RN)
• Data (Matthew Kopetsky/Brad Ewald)

Activities
• Internal collection of data from Epic/Clarity
• Creation of real time data dashboard
• Extensive Process Mapping
• Time series studies
• Assessment and revision of Clinical Care Pathway
**High Level Process**

1. Diagnose
2. Treat
3. Recover

**Detailed process**

- **1333** Pt arrives to ED/UC
- **1333** Check-in
- **1335** Triage
  - Temp: 37.2°C
  - BP: 150/96
  - 5 days of symptoms
- **1338** Roomed
- **1400** H&P
  - Anorexia, vomiting, diarrhea 3 days of symptoms, RLQ pain, + heel tap, + Operator, + fever
- **1400** Order CBC, US, UA, NPO, Morphine
- **1407** Exam read and resulted by radiologist. Provider read result.
  - Appendiceal visualized and normal. Tip obscured.
  - Recommended CT for further work-up if clinically necessary.
- **1407** Pt re-examined.
  - Denies pain.
  - Wants to PO.
- **1456** RN in to start PIV, draw labs, get urine, and give morphine.
  - PO challenge successful. RN ordered to D/C.
- **1458** RN to send labs and call radiology
- **1513** CBC resulted
  - WBC: 9.89
  - ANC: 8.21
- **1530** US exam complete and pt back in room
- **1533** Pt re-examined.
  - Denies pain. Wants to PO.
- **1540** PT challenge successful. RN ordered to D/C.
- **1545** D/C home