Utilizing Electronic Health Record Data to Determine the Health of the Medication Process after the Relocation of a Children’s Hospital

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Hospital Relocation

- Hospital Relocation
  - Rare event
  - Very complex
  - High potential for interruption of operations
  - High risk to patients, staff, and providers
  - Human interest story
    - News reports common
  - Not scientifically studied
Hypothesis

• Electronic Health Records (EHR) can
  – Measure impact of a hospital’s relocation on patient care
    • “Health of the Organization”
  – Provide proxy measures after a hospital’s relocation to determine
    • Health of complex work flow
    • Effectiveness of communication
Study Setting: Johns Hopkins Children’s Center

Old building
180 beds

New building
205 beds
Changes to Medication Delivery with Relocation

• Medication storage
  – Old facility
    • Medications stored in each unit’s medication room
    • Automatic dispensing cabinets in medication room
    • Medication rooms not close to all patient rooms
  – New facility
    • Medications stored in patient server
      – outside the patient room (general care floors)
      – Inside the patient room (intensive care units)
    • Automatic dispensing cabinets remain in medication room
    • Exception: Pediatric inpatient psychiatric unit
Changes to Medication Delivery due to Relocation

• Delivery frequency for standing orders
  – Old facility
    • One batch of a 24 hour medication supplies
  – New facility
    • Frequency of dispensing for standing orders increased from one to three daily batches
    • Preparation:
      – Increased pharmacy staffing
      – Optimal delivery routes determination in the large new facility
      – Extensive staff training
Study Design

• Medication process as a PROXY for the "Health of the Organization"
  – Time from ordering to FIRST dose administration

• Study duration:
  – Day of relocation: April 29th, 2012

• Two groups
  – “PRE”- relocation:
    • Admission after February 14th, 2012
    • Discharge before April 29th, 2012
  – “POST”- relocation:
    • Admission after April 29th, 2012
    • Discharge before July 15th, 2012
Population and Data

• Included:
  – 0 to 21 years of age
  – admitted during study duration

• Excluded:
  – Admission before April 29th, 2012
  – Discharged after relocation

• Number of Admissions:

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,494</td>
</tr>
<tr>
<td>PRE</td>
<td>2,135</td>
</tr>
<tr>
<td>POST</td>
<td>2,233</td>
</tr>
<tr>
<td>Excluded</td>
<td>126</td>
</tr>
</tbody>
</table>
# Medication Time by Medication Type

<table>
<thead>
<tr>
<th>Medication Type</th>
<th>Total Duration in min.</th>
<th>PRE in min.</th>
<th>POST in min.</th>
<th>Change in min.</th>
<th>Tasks</th>
<th>Tasks PRE</th>
<th>Tasks POST</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time Sensitive</strong></td>
<td>186</td>
<td>181</td>
<td>191</td>
<td>10 (+5.5%)</td>
<td>14,018</td>
<td>7,008</td>
<td>7,010</td>
</tr>
<tr>
<td><strong>Not Time Sensitive</strong></td>
<td>439</td>
<td>435</td>
<td>442</td>
<td>7 (+0.4%)</td>
<td>52,336</td>
<td>25,741</td>
<td>26,595</td>
</tr>
<tr>
<td><strong>All Medications</strong></td>
<td>385</td>
<td>381</td>
<td>390</td>
<td>9 (+2.4%)</td>
<td>66,354</td>
<td>32,749</td>
<td>33,605</td>
</tr>
</tbody>
</table>
## Medication Time by Specialty Groups

<table>
<thead>
<tr>
<th>Services</th>
<th>Total Duration in min.</th>
<th>PRE in min.</th>
<th>POST in min.</th>
<th>Change (min)</th>
<th>Tasks PRE</th>
<th>Tasks POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery Services</td>
<td>337</td>
<td>331</td>
<td>342</td>
<td>11 (+ 3.3%)</td>
<td>20,122</td>
<td>10,467</td>
</tr>
<tr>
<td>General, Pediatrics</td>
<td>329</td>
<td>304</td>
<td>357</td>
<td>53 (+17.4%)</td>
<td>16,698</td>
<td>7,705</td>
</tr>
<tr>
<td>Pediatrics Subspecialty</td>
<td>429</td>
<td>439</td>
<td>419</td>
<td>-20 (- 4.6%)</td>
<td>20,453</td>
<td>10,773</td>
</tr>
<tr>
<td>Neonatology</td>
<td>307</td>
<td>315</td>
<td>299</td>
<td>-16 (- 3.2%)</td>
<td>7,588</td>
<td>3,823</td>
</tr>
<tr>
<td>Psychiatry</td>
<td>1,475</td>
<td>1,669</td>
<td>1,323</td>
<td>-346 (-20.7%)</td>
<td>1,493</td>
<td>837</td>
</tr>
<tr>
<td>All Services</td>
<td>385</td>
<td>381</td>
<td>390</td>
<td>9 (+ 2.4%)</td>
<td>66,354</td>
<td>33,605</td>
</tr>
</tbody>
</table>
### Medication Time by Patient Location

<table>
<thead>
<tr>
<th>Location</th>
<th>Total Duration in min.</th>
<th>PRE in min.</th>
<th>POST in min.</th>
<th>Change in min</th>
<th>Tasks PRE</th>
<th>Tasks POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICU</td>
<td>277</td>
<td>123</td>
<td>327</td>
<td>204 (+165.5%)</td>
<td>7,738</td>
<td>4,222</td>
</tr>
<tr>
<td>NICU</td>
<td>288</td>
<td>304</td>
<td>273</td>
<td>-31 (-10.2%)</td>
<td>6,070</td>
<td>3,122</td>
</tr>
<tr>
<td>Floors</td>
<td>381</td>
<td>379</td>
<td>384</td>
<td>5 (+1.3%)</td>
<td>51,053</td>
<td>25,424</td>
</tr>
<tr>
<td>Psychiatry</td>
<td>1,475</td>
<td>1,669</td>
<td>1,323</td>
<td>-346 (-20.7%)</td>
<td>1,493</td>
<td>837</td>
</tr>
<tr>
<td>All Locations</td>
<td>385</td>
<td>381</td>
<td>390</td>
<td>9 (+2.4%)</td>
<td>66,354</td>
<td>33,605</td>
</tr>
</tbody>
</table>
Discussion

• Medication process remained fairly stable
  – despite a larger floor plan and longer routes
• Time from ordering to first dose administration increased by 9 minutes
• Time sensitive medication remained fairly stable
  – Some localized negative effects were observed
• Medication process
  – Improved on the psychiatry floor
  – Worsened in the pediatric intensive care unit (PICU).
• Psychiatry
  – benefited from immediate access of their most commonly-prescribed medications now stored in the ADC
Discussion

- Significant delay in medication process in PICU
  - Largest changes during relocation
  - Reduced Communication
    - Moving from a very crowded space to a large, generous space
    - Retiring a non-HIPAA compliant voice-over-IP communication device
  - Bed capacity increased from 32 to 40 bed spaces
    - But only 32 beds were opened initially
    - Pre-Relocation: isolation closed one bed in a two-bed room
  - Nurse ratio of 2:1
    - Before had a nurse present in the room all the time
    - After nurse in room 50%
Limitations

• Complexity of the medication order to administration process

• Evaluation of other processes, like:
  – Time to consultation
  – Time to testing
  – Time to interventions

• Short observation period
Conclusion

• Changes in the medication process
  – proxy for the impact of a hospital relocation process
  – may be helpful to measure the impact of other events such as surges secondary to disasters on workflow and communication
  – Potentially can be done real-time

• Our methodology identified problems by location and enabled hospital leadership to intervene
Thank you for your attention