A LEAN Look at Hospital Readmissions

Marisha Burden, MD and Steven Kolpak, MD
Tuesday Morning Conference,
December 22, 2009
Outline

• Case presentation
• The Current System
• Literature Review
• Lean
• Readmissions Project
• Conclusion and Discussion
Case Presentation

• 76 yo Hispanic female
  – COPD
  – Diet controlled diabetes
• No PCP x several years
• Admitted for COPD exacerbation
• Treated with steroids, albuterol, ipratropium
• HbA1c noted to be 10
• Sugars poorly controlled during hospital stay
  and patient started on lantus
Case Presentation

• HD # 4
  – Patient’s sugars better controlled with Lantus
  – Nutritionist consultation
  – Diabetic teaching before discharge
  – F/U with PCP in 1 week
The Following Day - At Home

- Unaware how to check her FSBS and cannot get glucometer to work
- Patient did not give herself her insulin as she did not know how
- No available PCP appointment
- Wait listed
- Returns to WIC
- Readmitted for poorly controlled blood sugars
Where did we fail?

- Limited formal disease specific education
- Limited pharmacist to patient counseling
- Often inaccurate medication reconciliation
- Poor transition of care from inpatient to outpatient setting
- No standardized approach
- Little communication between providers
- Rapid follow up visits difficult to obtain
30-day Unrelated Readmission Rate

- 30-Day Readmission Rate
- Linear(30-Day Readmission Rate)

Month of Discharge

Percent of patients readmitted to Denver Health within 30 days
30-day Related Readmission Rate*
*excludes dialysis, death first admit, rehabilitation, radiation therapy, chemotherapy

![Graph showing the 30-day related readmission rate over time, with a linear trend line.](image-url)
## Top 25 Readmission Principle Diagnosis

<table>
<thead>
<tr>
<th>DX Rank</th>
<th>DX Code</th>
<th>DX Description</th>
<th>Pt Gnt</th>
<th>% Total</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>755</td>
<td>Symptoms involving respiratory system and other chest symptoms</td>
<td>197</td>
<td>12%</td>
<td>12%</td>
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<tr>
<td>2</td>
<td>269</td>
<td>DIABETES MELLITUS</td>
<td>98</td>
<td>11%</td>
<td>23%</td>
</tr>
<tr>
<td>3</td>
<td>425</td>
<td>Heart failure</td>
<td>86</td>
<td>9%</td>
<td>32%</td>
</tr>
<tr>
<td>4</td>
<td>577</td>
<td>Diseases of pancreas</td>
<td>51</td>
<td>6%</td>
<td>37%</td>
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<tr>
<td>5</td>
<td>491</td>
<td>Chronic bronchitis</td>
<td>46</td>
<td>5%</td>
<td>42%</td>
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<tr>
<td>6</td>
<td>671</td>
<td>Chronic liver disease and cirrhosis</td>
<td>45</td>
<td>5%</td>
<td>47%</td>
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<tr>
<td>7</td>
<td>485</td>
<td>PNEUMONIA, ORGANISM UNSPECIFIED</td>
<td>37</td>
<td>4%</td>
<td>51%</td>
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<tr>
<td>8</td>
<td>493</td>
<td>Asthma</td>
<td>36</td>
<td>4%</td>
<td>50%</td>
</tr>
<tr>
<td>9</td>
<td>270</td>
<td>Disorders of fluid, electrolyte, and acid-base balance</td>
<td>34</td>
<td>4%</td>
<td>64%</td>
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<tr>
<td>10</td>
<td>291</td>
<td>Alcohol-induced mental disorders</td>
<td>33</td>
<td>4%</td>
<td>68%</td>
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<tr>
<td>11</td>
<td>36</td>
<td>SEPTICEMIA</td>
<td>30</td>
<td>3%</td>
<td>66%</td>
</tr>
<tr>
<td>12</td>
<td>682</td>
<td>Other cellulitis and abscess</td>
<td>28</td>
<td>3%</td>
<td>69%</td>
</tr>
<tr>
<td>13</td>
<td>427</td>
<td>Cardiac arrhythmias</td>
<td>28</td>
<td>3%</td>
<td>72%</td>
</tr>
<tr>
<td>14</td>
<td>584</td>
<td>Acute renal failure</td>
<td>26</td>
<td>3%</td>
<td>75%</td>
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<tr>
<td>15</td>
<td>579</td>
<td>Gastrointestinal hemorrhage</td>
<td>26</td>
<td>3%</td>
<td>78%</td>
</tr>
<tr>
<td>16</td>
<td>76</td>
<td>HEPATITIS</td>
<td>26</td>
<td>3%</td>
<td>81%</td>
</tr>
<tr>
<td>17</td>
<td>410</td>
<td>Acute myocardial infarction</td>
<td>22</td>
<td>2%</td>
<td>83%</td>
</tr>
<tr>
<td>18</td>
<td>599</td>
<td>Other disorders of urethra and urinary tract</td>
<td>21</td>
<td>2%</td>
<td>86%</td>
</tr>
<tr>
<td>19</td>
<td>782</td>
<td>General symptoms</td>
<td>21</td>
<td>2%</td>
<td>88%</td>
</tr>
<tr>
<td>20</td>
<td>572</td>
<td>Liver abscess and sequelae of chronic liver disease</td>
<td>20</td>
<td>2%</td>
<td>90%</td>
</tr>
<tr>
<td>21</td>
<td>403</td>
<td>Hypertensive chronic kidney disease</td>
<td>20</td>
<td>2%</td>
<td>92%</td>
</tr>
<tr>
<td>22</td>
<td>415</td>
<td>Acute pulmonary heart disease</td>
<td>19</td>
<td>2%</td>
<td>94%</td>
</tr>
<tr>
<td>23</td>
<td>818</td>
<td>Other diseases of lung</td>
<td>18</td>
<td>2%</td>
<td>96%</td>
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<tr>
<td>24</td>
<td>996</td>
<td>Complications peculiar to certain specified procedures</td>
<td>16</td>
<td>2%</td>
<td>98%</td>
</tr>
<tr>
<td>25</td>
<td>530</td>
<td>Diseases of esophagus</td>
<td>15</td>
<td>2%</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Top principle dx for index admission of patients that were readmitted*
## Readmissions by Payer Class

<table>
<thead>
<tr>
<th>Financial Class</th>
<th>Admits</th>
<th>Readmits</th>
<th>% Readmits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHS Total</td>
<td>215</td>
<td>32</td>
<td>14.86%</td>
</tr>
<tr>
<td>CICP Total</td>
<td>1528</td>
<td>202</td>
<td>13.22%</td>
</tr>
<tr>
<td>CICP Pending Total</td>
<td>176</td>
<td>14</td>
<td>7.95%</td>
</tr>
<tr>
<td>Commercial Total</td>
<td>350</td>
<td>18</td>
<td>5.14%</td>
</tr>
<tr>
<td>Dept of Safety Total</td>
<td>444</td>
<td>66</td>
<td>14.86%</td>
</tr>
<tr>
<td>DHMP Total</td>
<td>126</td>
<td>11</td>
<td>8.73%</td>
</tr>
<tr>
<td>Medicaid Total</td>
<td>966</td>
<td>246</td>
<td>24.95%</td>
</tr>
<tr>
<td>Medicaid Choice Total</td>
<td>975</td>
<td>229</td>
<td>23.49%</td>
</tr>
<tr>
<td>Medicaid Pending Total</td>
<td>428</td>
<td>141</td>
<td>32.94%</td>
</tr>
<tr>
<td>Medicare Total</td>
<td>2279</td>
<td>381</td>
<td>16.72%</td>
</tr>
<tr>
<td>NULL Total</td>
<td>12</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Other Total</td>
<td>28</td>
<td>5</td>
<td>17.86%</td>
</tr>
<tr>
<td>Other Government Total</td>
<td>48</td>
<td>7</td>
<td>14.58%</td>
</tr>
<tr>
<td>Self Pay Total</td>
<td>725</td>
<td>62</td>
<td>8.55%</td>
</tr>
<tr>
<td>Workers/ Comp Total</td>
<td>7</td>
<td>1</td>
<td>14.29%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>8327</td>
<td>1415</td>
<td>16.99%</td>
</tr>
</tbody>
</table>
Readmissions

<table>
<thead>
<tr>
<th>Age-Group</th>
<th>Number of Persons with an Initial PQI Admission (January-June)</th>
<th>At Least One PQI Readmission within 3 Months</th>
<th>At Least One PQI Readmission within 6 Months</th>
<th>At Least One Readmission of Any Kind within 6 Months</th>
<th>Hospital Cost of PQI Readmissions within 6 Months ($million)</th>
<th>Hospital Cost of All Readmissions within 6 Months ($million)</th>
<th>Population (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-18</td>
<td>48,006</td>
<td>5.6%</td>
<td>9.2%</td>
<td>22.4%</td>
<td>51</td>
<td>136</td>
<td>10.6</td>
</tr>
<tr>
<td>19-64</td>
<td>106,640</td>
<td>11.7%</td>
<td>17.4%</td>
<td>32.5%</td>
<td>215</td>
<td>592</td>
<td>25.3</td>
</tr>
<tr>
<td>65+</td>
<td>191,005</td>
<td>16.1%</td>
<td>23.0%</td>
<td>40.1%</td>
<td>463</td>
<td>1,181</td>
<td>5.7</td>
</tr>
<tr>
<td>Total</td>
<td>345,651</td>
<td>13.3%</td>
<td>19.4%</td>
<td>35.3%</td>
<td>729</td>
<td>1,909</td>
<td>41.5</td>
</tr>
</tbody>
</table>

Source: Calculations from Healthcare Cost and Utilization Project (HCUP) statewide files using linked cost/charge ratios (see text). 


b. This includes all PQI readmissions. Less than 1 percent of persons with initial PQI admission are missing a cost estimate. No imputation was made in those cases.

Friedman, B and Jayasree, B. The Rate and Cost of Hospital Readmissions for Preventable Conditions. Med Care Res Rev 2004; 61; 225.
Rehospitalizations among Medicare Patients

Rehospitalizations Among Patients in Medicare Fee-for-Service Programs


Conditions Associated with the Largest Number of Re-hospitalizations

- **Medical**
  - Heart Failure – 26.9%
  - Pneumonia – 20.1%
  - COPD – 22.6%
  - Psychoses – 24.6%
  - GI problems – 19.2%

- **Surgical**
  - Cardiac stent placement – 14.5%
  - Major hip or knee surgery – 9.9%
  - Other vascular surgery – 23.9%
  - Major bowel surgery – 16.6%
  - Other hip or femur surgery – 17.9%

### Why were they readmitted?

<table>
<thead>
<tr>
<th>Condition at DC</th>
<th>Most Frequent Reason for Readmit</th>
<th>Second Most Frequent Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart failure</td>
<td>Heart Failure</td>
<td>PNA</td>
</tr>
<tr>
<td>PNA</td>
<td>PNA</td>
<td>Heart Failure</td>
</tr>
<tr>
<td>COPD</td>
<td>COPD</td>
<td>PNA</td>
</tr>
<tr>
<td>Psychoses</td>
<td>Psychoses</td>
<td>Drug Toxicity</td>
</tr>
<tr>
<td>GI problems</td>
<td>GI problems</td>
<td>Nutrition/metabolic</td>
</tr>
</tbody>
</table>

CMS Targets Readmissions

• CMS proposes to reduce reimbursement to re-hospitalized patients in 2010
  – Heart Failure
  – Pneumonia
  – Acute MI

• To create payment incentives to reduce the rates of re-hospitalization
### Readmission by Payer Source

**TABLE 4** Persons with at Least One Prevention Quality Indicator (PQI) Readmission within 6 Months

<table>
<thead>
<tr>
<th>Age-Group</th>
<th>Medicare</th>
<th>Medicaid</th>
<th>Private Insurance</th>
<th>Self-Pay</th>
<th>No Charge</th>
<th>Other (include missing)</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-18</td>
<td>26.7</td>
<td>21.8</td>
<td>12.6</td>
<td>9.9</td>
<td>7.9</td>
<td>9.2</td>
<td></td>
</tr>
<tr>
<td>19-64</td>
<td>32.6</td>
<td>23.6</td>
<td>21.6</td>
<td>16.1</td>
<td>24.4</td>
<td>17.4</td>
<td></td>
</tr>
<tr>
<td>65+</td>
<td>23.2</td>
<td>23.6</td>
<td>21.6</td>
<td>16.1</td>
<td>24.4</td>
<td>17.4</td>
<td></td>
</tr>
</tbody>
</table>

**Race/Ethnic Group (exclude if missing)**

<table>
<thead>
<tr>
<th>Age-Group</th>
<th>White</th>
<th>Black</th>
<th>Hispanic</th>
<th>Asian and Pacific Islander</th>
<th>Native American</th>
<th>Other and Unknown</th>
<th>All (include missing)</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-18</td>
<td>7.1</td>
<td>11.7</td>
<td>12.6</td>
<td>10.1</td>
<td>10.4</td>
<td>12.5</td>
<td>9.2</td>
<td></td>
</tr>
<tr>
<td>19-64</td>
<td>16.4</td>
<td>20.5</td>
<td>18.1</td>
<td>11.8</td>
<td>16.1</td>
<td>16.8</td>
<td>17.4</td>
<td></td>
</tr>
<tr>
<td>65+</td>
<td>22.8</td>
<td>26.0</td>
<td>25.2</td>
<td>20.7</td>
<td>24.9</td>
<td>21.6</td>
<td>23.0</td>
<td></td>
</tr>
</tbody>
</table>

Note: Estimated standard errors are not shown. The pooled standard error of the average in any line is very low, less than .002 (or 0.2 percent). Any cell value more than 0.6 percent different from the line average is outside the 99 percent confidence interval of the average.


Friedman, B and Jayasree, B. The Rate and Cost of Hospital Readmissions for Preventable Conditions. Med Care Res Rev 2004; 61; 225.
Readmissions with no Bill for PCP

Does increased access to primary care reduce hospital readmissions?

- Multicenter randomized controlled trial
- VA’s
- Chronically ill patients (DM, CHF, COPD)
- Usual care vs. intensive primary care intervention

Components of Intervention
- 3 days before dc, primary nurse assessed needs, developed list of medical problems, educational materials, patient given pager numbers
- PCP visited patient in hospital
- F/u appointment made in 1 week
- Patient called 2 days after dc
- F/u w/ pcp and nurse

Does increased access to primary care reduce hospital readmissions?

- Patients severely ill
- Extremely poor quality of life scores
- Intervention group had significantly higher readmission rates (0.19 vs 0.14 per month, P=0.005)
- More days during their rehospitalization (10.2 vs 8.8)
- Patients more satisfied with care

Pharmacist Education at DC

- Randomized control study of patients 80 years and older
- Comprehensive Med list at admission
- Drug Review and advice given to physician
- Patients educated and monitored throughout hospital stay
- Pharmacist communication w/ PCP
- Follow up call 2 months later

Pharmacy Education

• Intervention group
  – 16% reduction in all visits to the hospital
  – 47% reduction in visits to the ER
  – Drug related readmissions were reduced by 80%
  – After inclusion of the intervention costs, the total cost per patient was $230 lower than that in control group

• If implemented, the addition of pharmacist to health care teams would lead to major reductions in morbidity and health care costs

Care Coordination Programs (CCP)

- Evaluate if CCPs reduced hospitalizations and Medicare expenditures
- Eligible fee-for-service Medicare patients
- 15 programs
- Nurses provided patient education and monitoring (mostly via telephone)

Care Coordination Programs (CCP)

- 13 of 15 programs showed no significant differences in hospitalizations
- 2 “successful programs”
  - 1-in person contact per month
  - Need to target patients not low or high risk
  - Education on meds
  - Coordinators worked closely w/ hospital and physicians
- None of the 15 programs generated net savings

Comprehensive Discharge Planning & Home Follow-up Helpful

- Randomized clinical trial
- Advanced practice nurses
- Intervention group received comprehensive discharge planning and home follow-up designed for elders
- By week 24, control group patients more likely than intervention group to be readmitted (37.1% vs 20.3%)
- Total Medicare reimbursements $1.2 million vs $0.6 million

Care Transitions

- Randomized control trial
- Identified at time of hospitalization
- Community-dwelling adults >65 yrs
- Received
  - Tools to promote cross-site communication
  - Encouragement for more active role
  - Continuity across settings and a “transition coach”

Care Transitions

- Lower rehospitalization rates at:
  - 30 days (8.3 vs 11.9)
  - 90 days (16.7 vs 22.5)
- Lower rehospitalization rates for same condition for original admission at:
  - 90 days (5.3 vs 9.8)
  - 180 days (8.6 vs 13.9)
- Mean hospital costs lower for intervention patients at 180 days

Ideal World

- Front load primary care visits
- 24-Hour Availability/response programs
- Medication management
- Case Management
- Disease specific management programs
- Patient/caregiver education
- Telehealth
The Reason for Our Project

• To reduce our 30-day readmission rate for inpatient medical service
  – 10/08-9/09 baseline=16.9%
• Minimize the impact of CMS reimbursement reductions for readmissions
• Exclusions: OB, dialysis, chemo, radiation therapy, death on index admit
LEAN at Denver Health

- Lean process originated at Toyota in the 1930’s
- MIT researchers analyzed it and brought it to the U.S. in 1988
- Focus on:
  - Value as defined by the end user or customer
  - Continuous improvement
  - Eliminating wastes of all kinds—"getting lean"
Denver Health Current State

– Little to no disease specific education for patients during hospitalization or at discharge
– Fragmented and non-standardized discharge process
– No “Captain of the ship” for patient discharge
– Limited patient education regarding discharge medications
– Limited mental health resources in Denver
– Poor outpatient access to care
What We Did

• Broke down process from admission through follow-up
• Pulled out the “wastes” in the process
Our Target State

• Patient leaves hospital with full understanding of disease process and treatment plan.
• Patient leaves hospital with all appropriate medications and supplies
• Patients have an understanding of, and timely access to appropriate outpatient care
# Our Action Plan

<table>
<thead>
<tr>
<th>Lean Event</th>
<th>Type</th>
<th>Team Lead</th>
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<tbody>
<tr>
<td>IP Disease specific patient education</td>
<td>RIE</td>
<td>CNE</td>
</tr>
<tr>
<td>Inter-professional Discharge Process</td>
<td>RIE</td>
<td>Hospitalist</td>
</tr>
<tr>
<td>OP Disease Specific DM</td>
<td>RIE</td>
<td>General Internist</td>
</tr>
<tr>
<td>Clean/Accurate D/C Med List</td>
<td>RIE</td>
<td>Pharmacist</td>
</tr>
<tr>
<td>Post D/C Appointment Access</td>
<td>RIE</td>
<td>Appointment Center Leadership</td>
</tr>
<tr>
<td>Medical “311”</td>
<td>RIE</td>
<td>MBB</td>
</tr>
<tr>
<td>Readmission Activation Team</td>
<td>RIE</td>
<td>CSW</td>
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<tr>
<td>Appropriate Admission Status</td>
<td>RIE</td>
<td>UM</td>
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<td>Discharge Expectations</td>
<td>RIE</td>
<td>Hospitalist</td>
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<tr>
<td>“Get the Face Sheet Right”</td>
<td>RIE</td>
<td>MBB</td>
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<tr>
<td>Care Team Standard Work</td>
<td>RIE</td>
<td>Nursing Leadership</td>
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<tr>
<td>Improving PCP Discharge Communication</td>
<td>RIE</td>
<td>General Internist</td>
</tr>
<tr>
<td>On Demand Access</td>
<td>VSA</td>
<td>MBB</td>
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## Our Goals

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline</th>
<th>Target</th>
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<tbody>
<tr>
<td>Heart Failure Readmission Rate</td>
<td>24.1%</td>
<td>19.3%</td>
</tr>
<tr>
<td>Pneumonia Readmission Rate</td>
<td>14.9%</td>
<td>11.9%</td>
</tr>
<tr>
<td>Acute Myocardial Infarction</td>
<td>15.9%</td>
<td>12.7%</td>
</tr>
<tr>
<td>Medicine “All Cause” Re-Admit Rate</td>
<td>16.9%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Medicine Readmissions</td>
<td>1,463</td>
<td>1,170</td>
</tr>
</tbody>
</table>
Case Presentation

- 76 yo hispanic female with history of COPD and diet controlled diabetes
- No PCP visit in several years
- Admitted for COPD exacerbation
- Treated with steroids, albuterol, ipratropium
- HbA1c noted to be 10
- Sugars poorly controlled during hospital stay and patient started on lantus
Case Presentation

• During Hospital Stay (starting on Day 1)
  – Patient receives disease specific education for both her diabetes and her COPD throughout her stay
  – Pharmacist reviews and ensures patient on correct medications while in hospital and educates patient on medications
  – Patient begins checking her own blood sugars with the aid of nursing and learns how to deal with her diabetes
  – Nutritionist evaluates and educates patient
  – Discharge team with team lead ensures all aspects of patients discharge complete (check list)
  – Appointment made with pcp in <5 days (discharge clinic)
  – Post discharge phone call in 24-48 hours by care provider
5 days later...

- Patient follows up with pcp
- Patient satisfied by her care
- Readmission avoided