The Impact of a Focused Factory on Intraoperative Cost Per Case in Elective Total Knee Replacement Surgery.

Hope L. Johnson MSN, RN, CNOR
Lehigh Valley Health Network, Hope_L.Johnson@lvhn.org

Follow this and additional works at: http://scholarlyworks.lvhn.org/patient-care-services-nursing

Part of the Nursing Commons

Published In/Presented At
The Impact of a Focused Factory on Intraoperative Cost Per Case in Elective Total Knee Replacement Surgery

Hope Johnson, DNP, MBA, RN, CNOR, NEA-BC
Perioperative Services, Lehigh Valley Health Network, Allentown, Pennsylvania

AIM/OBJECTIVES
Does performing surgery in a focused factory setting decrease intraoperative cost per case in patients undergoing elective total knee replacement?

Primary Objective
Determine link between surgical setting and intraoperative cost per case

Secondary Objectives
- Identify intraoperative cost per case
- Interpret data outcomes to inform leadership on future business decisions

BACKGROUND
- 3 basic concepts were woven throughout: (a) There are multiple ways to compete other than just providing the lowest cost; (b) Factories were not able to perform well in all areas; (c) The notion that simplicity and repetition bred competence.
- Market demands are very evident in healthcare – especially in these times of value based care.
- Creating focused factories can seek to meet more demands of the market.
- Repetition and concentration in one area allow the workforce and managers to become effective and experienced at tasks.
- The Institute of Medicine recognized the traps of focusing on many tasks in healthcare. In 2001, their report “Crossing the Quality Chasm: A New Health System for the 21st century” called for health systems to be reinvented.

THEORETICAL FRAMEWORK
- Theory of Disruptive Innovation
  - First described by Christensen and Bower in 1995
  - Related to the need for a concept which described complicated, expensive products and services converted into simpler ones
  - Originated in the field of technology as “disruptive technology”
  - Elaborated on by Christensen and Raynor in 2003 and renamed “Disruptive Innovation”
  - 3 Concepts: (a) Disruption is relative; (b) Disruptive innovation does not imply replacement; (c) Disruptive innovation is not destruction
  - Applicable to the focused factory concept in healthcare
  - Attracts customers; forces value; yet the eradication of the traditional environment is unseen

METHODOLOGY
Study Design: Quantitative retrospective longitudinal comparative study
- Comparing surgical site (independent variable) to intraoperative cost per case (dependent variable) in elective total knee replacement surgery
- Analysis using descriptive statistics to identify if cost per case is affected by surgical site

Setting: 981-bed Community based Magnet® health network in Northeastern Pennsylvania
- Community based tertiary care hospital with 700 beds indicated as Site A
- Orthopedic surgical specialty hospital with 22 beds indicated as Site B

Sample: Patients receiving total knee replacement surgery at either facility from March 2014 through March 2015 (n=851)
- Exclusion criteria
  - Patients with previous history of knee surgery for total joint replacement
  - Patients with traumatic knee injury within 90 days of surgery
  - Patients with active infectious disease processes at time of surgery

RESULTS
Table 1. Contrast of Median Between Surgical Location (N=851)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Site A (n=638)</th>
<th>Site B (n=213)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median IQR</td>
<td>$5,072.66</td>
<td>$5,374.20</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Median IQR</td>
<td>$4,900.82</td>
<td>$4,804.69</td>
<td></td>
</tr>
<tr>
<td>Median IQR</td>
<td>$4,804.69</td>
<td>$4,804.69</td>
<td></td>
</tr>
<tr>
<td>Median IQR</td>
<td>$4,804.69</td>
<td>$4,804.69</td>
<td></td>
</tr>
</tbody>
</table>

Data truncated (1%) to control for outliers
- Two sample t-test indicated delta of $162.83 between site mean cost per case (p=0.015)
- Mann-Whitney U test indicated delta of $247.97 between site median cost per case
- Cost per case lower in the focused factory setting
- Procedural physician cost per case across surgical locations indicated minimal variation with means within $24.00
- Linear regression indicated procedural physician was best predictor of cost per case, not surgical location

PRACTICE RECOMMENDATIONS
- Further research needed to investigate practice variation among procedural physician
- Healthcare organizations should identify and control variation in total joint implant cost
- The ability to provide increased efficiency and satisfaction for patients at similar or lower cost within the focused factory will create a successful platform for organizations to shift paradigms for care delivery amidst healthcare reform

Note: Delta between costs per case medians is $267.97