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

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BACKGROUND

- Skinner (1974) published an article in Harvard Business Review, The Focused Factory, that described a manufacturing strategy framework to show how different competitive strategies required different operational structures.
- 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 work force 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.

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

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

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



RESULTS

- 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

Variable	Site A (n=638)		Site B (n=213)		p-value
	Median	IQR	Median	IQR	
Cost per Case	\$5,072.66	\$4900.82-\$5374.54	\$4,804.69	\$4463.20-\$5199.42	<0.001

Note: Delta between costs per case medians is \$267.97

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

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