Minimizing Cost Flow for Colorectal Surgery in Michigan

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Introduction

Surgical site infections (SSI) are a known cause of increased morbidity and cost following colectomy.¹⁻³ Recent work has shown that 6 perioperative care measures are associated with SSI in colectomy patients: (1) Surgical Care Improvement Project-2 antibiotics, (2) postoperative normothermia, (3) oral antibiotics with bowel preparation, (4) perioperative glycemic control, (5) minimally invasive surgery, and (6) short operative duration.^{6,7} The presence of these criteria individually was associated with reduced rates of SSI following colectomy.⁶⁻⁷ Given the association between SSI and cost, we hypothesized that when measured together, these perioperative care elements would be predictive of cost per patient. We conducted a retrospective study using data from the Michigan Surgical Quality Collaborative (MSQC) to understand the cost per patient whose care was considered low compliance in these elements (0-2

elements) versus those with high-compliance care (3-6 elements).

Methods

Using MSQC data, which are collected from 73 participating hospitals in the state of Michigan, we identified adult patients (≥ 18 years of age) undergoing elective colectomies from fiscal year 2012 to fiscal year 2014. We then refined our study population to those patients who had associated Blue Cross Blue Shield of Michigan (BCBSM) episodic payment data at the patient level.

The selected population was stratified into 2 groups based on compliance with the 6 care measures listed above. A patient's care was considered to be high compliance if he or she had 3 to 6 elements and low compliance if he or she had 0 to 2.

A 2-stage approach was used to adjust BCBSM episodic payments for variation in payment attributable to case mix and hospital-level contractual differences. Stage 1

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used a method for claims price standardization developed by ArborMetrix, and stage 2 incorporated for case mix and hospital-level clustering.

Results

We identified a total of 3387 adult patients undergoing colectomy in the MSQC data set. Of these, 332 (9.8%) had BCBSM episodic data and were included in our analysis. Of these 332 patients, 33 (9.9%) had only 0 to 2 care elements (“low compliance”), while 299 (90.1%) had 3 to 6 care elements (“high compliance”). Total episodic payment data were collected across both stratifications (Figure 1). Low compliance with perioperative care had an average episodic cost of \$20 952, while high compliance had a total episodic cost of \$15 490. This showed a \$5462 reduction in cost with high compliance cases ($P < 0.01$).

Total episodic payments were divided into multiple categories: total facility base payment, total professional payment, and its subcategories (prior 30-day spending, surgical procedure, base payment, and total post discharge).

In moving from high-compliance to low-compliance cases, the total episodic costs decreased by 26.1% (\$20 952; \$15 490), the total facility base payments decreased by 20.4% (\$14 960; \$11 899), and the total professional

payments decreased by 42.7% (\$5166; \$2956). The subcategories also showed a trend toward decreased cost for higher bundled care. Prior 30-day spending decreased by 42.1% (\$1096; \$635), surgical procedure spending decreased by 58.3% (\$1478; \$616), base payment decreased by 16.9% (\$13 720; \$11 400), and total postdischarge payment decreased by 49.8% (\$970; \$487). Additional subcategories also showed a decrease in cost trend with higher compliance (Figure 1).

Conclusion

This retrospective analysis of colectomy patients demonstrates that high compliance with at least 3 of 6 perioperative care elements is associated with decreased cost following elective colectomy in adults with private insurance. One possibility for this cost difference may be SSI, as the 6 care measures have previously been shown to be associated with SSI,⁶⁻⁷ and SSI increases costs following colectomy.¹⁻³ However, further work is necessary to investigate the pathway between these perioperative care elements and the ultimate cost per patient.

We recognize that the study should be interpreted with limitations. Our study population size was only 332 patients who had private health insurance. Due to our small sample, we were unable

FIGURE 1.

to perform a statistical analysis of the cost breakdown in paragraph 3 of the results. In addition, more than 90% of our study population fell into the “high-compliance” group, limiting our sample of those patients who received poorly compliant care. By selecting a smaller number of patients with the most robust cost data, we were able to study a smaller but more reliable cohort of colectomy

patients. This work provides initial data to suggest that compliance with standardized perioperative care elements may be associated with cost. Future work includes understanding cost associations in those populations with an increased risk of complications from less compliance. It is also important to have larger and more diverse populations to further our understanding of the relationships presented.

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