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Eliminating Unnecessary Practice Variation in Laparoscopic Appendectomy and Laparoscopic Cholecystectomy

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Background

This study aims to decrease unnecessary practice variation regarding consumable surgical dry goods while limiting disruption to surgeon technique and maintaining patient outcomes and safety standards. Because each surgeon creates his own DPC, there is variation in supplies used for the same procedure. This variation, along with outdated cards, creates opportunities for cost savings in the operating room suite. This study focused on two high volume procedures with a wide range of case costs (Figure 1). Past efforts to decrease variability have included standardization of instrumentation, waste reduction, and consolidation to more cost-effective alternatives in an item-by-item approach. Here, focus was placed on only items for which the hospital is charged, referred to as dry goods or consumables. Increasing standardization and consolidating dry goods to more cost-effective alternatives within these DRGs will lead to process and inventory improvement. These steps will increase efficiency and decrease variation, leading to better costs.

Methodology

Both quantitative and qualitative analysis was completed to eliminate unnecessary practice variation. Data collection was inclusive for APPEL and CHOLEL in CY13. For each DRG, data included total consumable item usage for each surgeon at the Cedar Crest, Muhlenberg, and 17th Street locations.

We eliminated any statistical outliers in case cost. Analysis was focused on high-volume surgeons. Items associated with anesthesia and non-standardizable consumables were eliminated. Unweighted and weighted usage frequencies were calculated for each item using the equations shown in Figure 2.

All items used in less than 10% of cases or by fewer than 10% of surgeons were eliminated. We consulted with a General Surgery STC to determine function and necessity of remaining items.

We created a new “Core DPC.” The “pull” list was composed of items used in at least 30% of cases and “have available” included items used between 10% and 30%. Unique “situational kits” allow necessary groups items to be pulled according to patient needs. A separate pediatric DPC was developed for APPEL.

The “Find and Replace” Method calculated savings by replacing certain items with more cost-effective equivalents. Waste reduction was included. “Core DPC” savings were calculated for the same number of procedures based on the estimated cost of the new DPC. Waste reduction was not included. All savings were calculated based on costs for CY13.

Results and Statistics

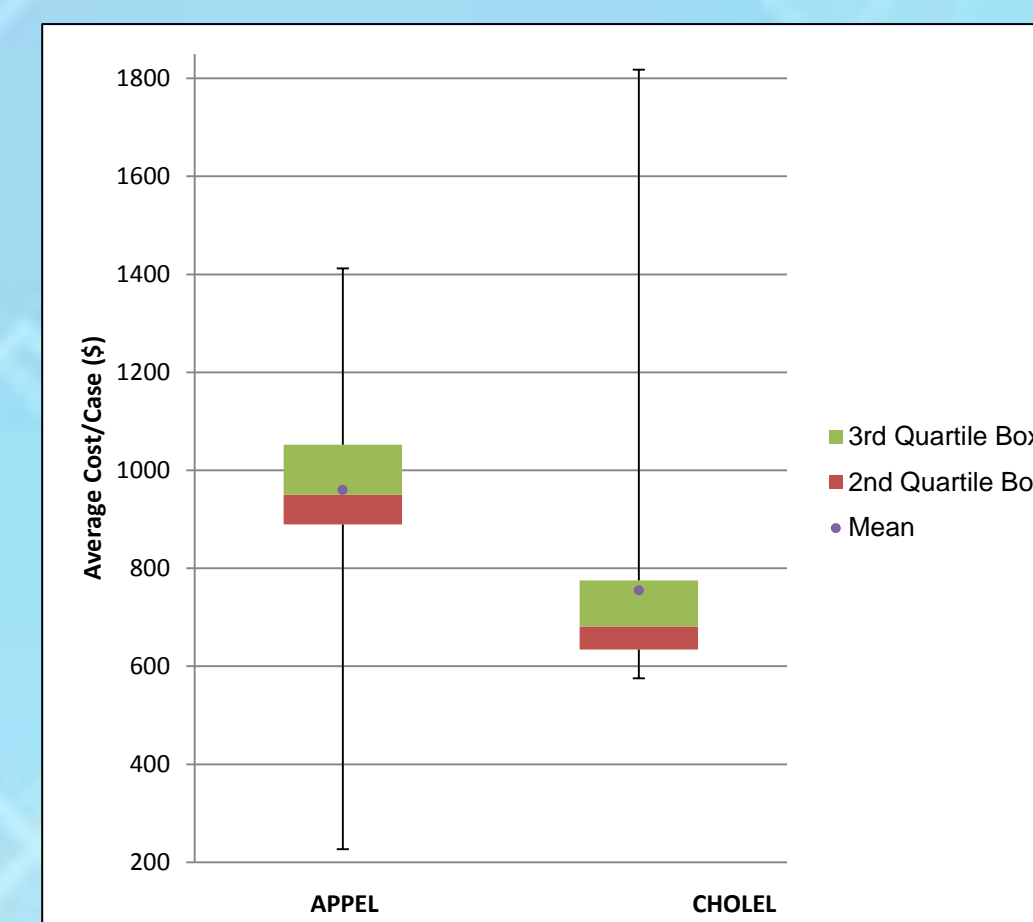


Figure 1. Box plot of average cost per case per surgeon for CY13.

For APPEL, 503 cases were performed in CY13 with an average cost per case of \$959.43. Of 50 DPCs on file, 27 DPCs were in use. For CHOLEL, 1096 cases were completed in CY13 with an average cost per case of \$753.78. Only 32 of 51 DPCs were active.

The relationship between site and average cost per case was analyzed using a one-way ANOVA. For CHOLEL, a marginally significant relationship, $F(2,29) = 2.39$, $p=.11$, was found when comparing CC and MH. This may indicate administrative and procedural discrepancies between sites that contribute to variability.

Table 1. “Find and Replace” Cost Analysis Breakdown

Item Category	CHOLEL	APPEL	Total
CATH	\$0.00	\$84.06	\$84.06
IMP	\$359.63	\$1,414.54	\$1,774.17
NEED	\$28.04	\$12.82	\$40.86
PHAR	\$163.75	\$112.80	\$276.55
SOLU	\$43.26	\$0.00	\$43.26
SSUP	\$6,782.99	\$15,580.21	\$22,363.21
Waste	\$656.88	\$3,194.98	\$3,851.86
Total Annual Savings	\$8,034.55	\$20,399.41	\$28,433.96
% Reduction	1.07%	4.33%	2.33%
Savings/Case	\$7.33	\$40.56	n/a

Table 2. “Core DPC” Cost Analysis Breakdown

DPC	CHOLEL	APPEL	APPEL(PED)	Grand Total
Avg. CY13 Cost/Case	\$682.99	\$989.67	\$751.78	n/a
New Cost/Case	\$595.50	\$885.74	\$701.99	n/a
Savings/Case	\$87.49	\$103.93	\$49.79	n/a
CY13 Yearly Cost	\$748,554.36	\$380,033.28	\$96,979.62	\$1,225,567.26
New Yearly Cost	\$652,673.13	\$340,123.47	\$90,556.71	\$1,083,353.31
Total Annual Savings	\$95,881.23	\$39,909.81	\$6,422.91	\$142,213.95
% Reduction	12.81%	10.50%	6.62%	11.60%

Unweighted Frequency =
$$\frac{\text{total \# each item used CY13}}{\text{total \# cases CY13}}$$

Weighted Frequency =
$$\frac{\sum \frac{\text{total \# each item used by surgeon CY13}}{\text{total \# cases by surgeon CY13}}}{\text{total \# active surgeons}}$$

Figure 2. Formulas to calculate unweighted and weighted usage frequencies.

Recommendations

The current software used to manage DPCs allows for a global find and replace function, so we suggest immediate initiation of the “Find and Replace” Method. Success of this method would build support for more extensive standardization efforts.

“Core DPC” implementation is much more involved, and a conscious effort must be made to ensure that DPCs are continually revised to reflect current usage data, changes in personnel, and new technology. Because LVHN is such an extensive network, DPC maintenance infrastructure must be network-wide. DPC “clean-up” has been attempted here before and changes have not been lasting. In order to perpetuate standardization, physicians must be involved throughout the entire process. High-volume-low-cost surgeons from multiple sites should be consulted before any changes occur.

A standardization process focused on usage frequencies lends itself to automated analysis, provided that qualitative overview occurs before final changes are made. The standard work for this analysis has been created for application to other DRGs. Comparing LVHN procedure costs to those of similar institutions will identify the initial focus for subsequent work. Specialties like orthopedics and cardiology are also targets for cost reduction.

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