Improving the value of care for appendectomy through an individual surgeon-specific approach

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Purpose: Standardized care via a unified surgeon preference card for pediatric appendectomy can result in significant cost reduction. The purpose of this study was to evaluate the impact of cost and outcome feedback to surgeons on value of care in an environment reluctant to adopt a standardized surgeon preference card.

Methods: Prospective observational study comparing operating room (OR) supply costs and patient outcomes for appendectomy in children with 6-month observation periods both before and after intervention. The intervention was real-time feedback of OR supply cost data to individual surgeons via automated dashboards and monthly reports.

Results: Two hundred sixteen children underwent laparoscopic appendectomy for non-perforated appendicitis (110 pre-intervention and 106 post-intervention). Median supply cost significantly decreased after intervention: $884 (IQR $705–$1025) to $388 (IQR $182–$776), p < 0.001. No significant change was detected in median OR duration (47 min [IQR 36–63] to 50 min [IQR 38–64], p = 0.520) or adverse events (1 [0.9%] to 6 [4.7%], p = 0.062). OR supply costs for individual surgeons significantly decreased during the intervention period for 6 of 8 surgeons (87.5%).

Conclusion: Approaching value measurement with a surgeon-specific (rather than group-wide) approach can reduce OR supply costs while maintaining excellent clinical outcomes.

Level of Evidence: Level II.

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Value-based surgical care (outcomes per dollars spent) emphasizes both quality and efficiency in the care of surgical patients. Rising costs, regulatory requirements, and consumer demand are encouraging hospitals and providers to evaluate the value of care provided by measuring costs, tracking outcomes, and providing these data to the public [1–4]. Meanwhile, surgeon preference for differing supplies in the operating room (OR) has been shown to contribute to significant variability in the costs of operations without apparent differences in outcomes [5–7].

While the importance of measuring costs is widely accepted, relatively few studies have examined the effect of surgeon decision-making on healthcare expenditures [8]. Most surgeons desire to limit costs, yet few have knowledge of hospital costs for each procedure they perform or how their costs compare to that of their colleagues [8,9]. Recent work suggests that surgeons may choose a lower-cost surgical supply in the OR when presented with costs of potential alternatives [10–12]. The limitation of these studies is that the majority evaluated surgeon behavior after providing aggregated data on a periodic basis [11,12], while few have measured changes in practice patterns when surgeons were presented real-time, patient-level cost data [10].

Acquisition of patient-level cost data by surgeons is difficult in most healthcare systems as costs are either not available or aggregated over time or departmentally, rather than provided at the patient-level [1,8,13,14]. We have previously shown that institution of a clinical practice guideline (CPG) for perforated appendicitis resulted in a decrease in variability of care, improvement in clinical outcomes, and decrease in overall cost of care [14,15]. This CPG did not incorporate any intraoperative changes, such as standardization of OR equipment or incentives for OR cost reduction. Variability in surgical technique and OR supplies for laparoscopic procedures is common [16–19]. Prior publications have reported that standardization of intraoperative device utilization with a unified surgeon preference card resulted in significant cost reduction for pediatric appendectomy [19,20]. As supplies consist of the greatest
Within Tableau software, a database management software that extracts from a digital record, hospital length of stay (LOS), and full supply cost data for individual surgeons via automated dashboards and monthly reports. The intervention was real-time feedback of OR supply cost data to each surgeon, procedure and patient outcomes for children undergoing appendectomy before and after an intervention to provide surgeons with patient-level, real-time cost data.

1.1. Subjects and setting

The study population consisted of all children treated for non-perforated appendicitis by laparoscopic appendectomy at the Monroe Carell Jr. Children’s Hospital at Vanderbilt, a 271-bed, freestanding, tertiary referral center affiliated with Vanderbilt University Medical Center in Nashville, TN during a 6-month period before intervention (January 1, 2016 to June 30, 2016) compared to a 6-month period following intervention (October 1, 2016 to March 31, 2017). All children 18 years of age or younger who underwent laparoscopic appendectomy during these time periods were prospectively identified and tracked within Tableau software, a database management software that provides interactive data visualization and analytics. To decrease bias in our two patient cohorts, children were excluded if the laparoscopic case was converted to open or if perforated appendicitis was identified. The OR supply costs for laparoscopic appendectomy represented 20.9% of total hospital costs before the intervention (Table 2). There was a significant reduction in OR supply costs following the intervention ($884 [IQR $705–$1025] pre-intervention to $388 [IQR $182–$776], p = 0.023)
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