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Implementation of national practice guidelines to reduce waste and optimize patient value



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ABSTRACT

Background: The financial health care crisis has provided the platform to drive operational improvements at US health care facilities. This has led to adoption of lean operation principles by many health care organizations as a means of eliminating waste and improving operational efficiencies and overall value to patients. We believe that standardized implementation of national practice guidelines can provide the framework to help to reduce financial waste.

Materials and methods: We analyzed our institutional preoperative electrocardiogram (ECG) ordering practices for patients undergoing elective surgery at our institution from February–March, 2012 to identify utilization and review compliance with American Heart Association guidelines. We then implemented an ECG ordering algorithm based on these guidelines and studied changes in ordering patterns, associated cost savings and hospital billing for the same period in 2013.

Results: From February–March 2012, 677 noncardiac surgical procedures were performed at our institution, and 312 (46.1%) had a preoperative ECG. After implementation of our evidence-based ECG ordering algorithm for the same period in 2013, 707 noncardiac surgical cases were performed, and 120 (16.9%) had a preoperative ECG. Preoperative ECG utilization dropped 63% with an annual institutional cost savings of \$72,906 and \$291,618 in total annual health care savings. Based on our data, US-wide implementation of our evidence-based ECG ordering algorithm could save the US health care system >\$1,868,800,000 per year.

Conclusions: Here, we demonstrate that standardized application of a national practice guideline can be used to eliminate nearly \$2 billion per year in waste from the US health care system.

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Introduction

US annual health care expenditures exceed \$3 trillion and account for over 17% of the national gross domestic product.¹ Approximately \$1.2 trillion dollars is estimated to be due to medical waste and rework.² The largest contributor to waste is believed to be unnecessary medical diagnostic testing, resulting in up to \$500 billion in annual health care expenditures.² In response to this financial crisis, the US legislature has passed several measures in an attempt to gain control of skyrocketing health care costs, including passage of the Patient Protection and Affordable Care Act (ACA).³ The ACA mandates a reduction in federal health care spending of approximately \$196 billion dollars per year. It further dictates that \$113 billion of these annual spending reductions will come from federal hospital reimbursements.

The financial health care crisis has provided the initiative to drive operational improvements at U.S. health care facilities.⁴ This has led to adoption of lean operation principles by many organizations as a means of reducing waste and improving operational efficiencies and value to patients. Lean operational principles were derived from the Toyota Management System, a program focused on reducing operational inefficiencies and eliminating waste as a means of delivering improved customer value.⁵ Appropriate implementation of Lean principles requires an understanding of operational costs, utilization and capacity for products and services provided by an organization. These measures can be difficult to predict in the health care setting as costs are poorly understood and capacity requirements and utilization rates are complicated by high variability in clinical ordering because of individual provider practices. Evidence-based medical practices and national practice guidelines have been developed as a means to improve health care outcomes; however, adoption into clinical practice is often slow and highly variable.^{6–9} Aside from the demonstrable impact on health care quality, we hypothesized that standardized implementation of nationally accepted standard of practice recommendations would provide a framework to reduce financial waste and better quantify service utilization requirements.

To test this hypothesis in the perioperative care setting, our team chose to focus our lean implementation efforts on preoperative electrocardiogram (ECG) testing for elective noncardiac surgical cases. The 2007 American College of Cardiology (ACC)/American Heart Association (AHA) guidelines for the perioperative evaluation and care of patients undergoing noncardiac surgical procedures provide peer-reviewed evidence-based recommendations for preoperative cardiovascular testing of elective noncardiac surgery patients.¹⁰ Our team evaluated our current ECG ordering practices in this population and sought to study both physician compliance and the financial impact of implementing a standardized preoperative ECG ordering algorithm based on the 2007 ACC/AHA guidelines.

Materials and methods

Cost analysis data

Our institution has previously published on the value driven outcomes (VDO) tool developed to better understand the detailed costs associated with the delivery of care.¹¹ Using the VDO framework, we mapped out the costs associated with performance of a preoperative ECG. These included both fixed and variable costs to include capital equipment costs associated with ECG machine acquisition, disposable and reusable products (paper, leads, lead patches, gel) and the fully loaded cost of ECG technician time. Although not always intuitive, a true cost analysis should be based on total cost to perform a procedure, including both fixed and variable costs. Although capital equipment does represent a sunk cost, this allows better future capital acquisition planning and represents a portion of the total cost of care.

Total facility cost per ECG was calculated as follows: total fixed costs (annual personnel and equipment costs/total ECG annually) + (variable cost per ECG (paper, gel, pads) × total ECG). Because physician costs to read and interpret an ECG are highly variable based on physician capacity, efficiency, and salary, these were not calculated for this study.

Preoperative ECG utilization, billing, and reimbursement

Our financial data warehouse was queried for the total number of patients undergoing elective noncardiac surgical procedures at our institution for a 25-d period from February–March, 2012. The de-identified data were further sub-divided into patients who underwent preoperative ECG testing and those who did not. Patients whose status was listed as “inpatient” at the time of the ECG were excluded from the analysis as no additional billing or reimbursements are rendered under the CMS DRG payment system for these services. The data warehouse also provided total billing per ECG to the payer on behalf of the facility as well as total reimbursement per ECG by payers.

Prospective ECG ordering algorithm study

We sought to prospectively study the implementation of a standardized preoperative ECG ordering algorithm created by our research team that was adapted from the 2007 ACC/AHA published guidelines (Fig. 1). We then implemented a strict preoperative ECG ordering process that required all preoperative ECG orders for elective cases to follow the ordering algorithm. If a physician opted to deviate from ordering guidelines, he or she was required to make an annotation in the chart explaining the reason for deviation. Primary oversight for the preoperative process was conducted by our preoperative anesthesia service. Our hospital had previously established a preoperative anesthesia service for elective surgical cases in an effort to improve outcomes through a standardized preoperative patient evaluation process. The

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