

# Impact of Anesthesia-Guided Preoperative Testing on Hospital Expenses and Surgical Adverse Events: A Before & After Retrospective Cohort Study

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## BACKGROUND

The concept of the Perioperative Surgical Home (PSH) was introduced to improve efficiency and cost-effectiveness in our current healthcare delivery system while reducing surgical- and anesthesia-related complications. In this model, anesthesiologists lead the coordination and management of surgical patients through the pre-, intra-, and postoperative process<sup>1,2</sup>. Through the adoption of PSH concepts, leading institutions have benefited through documented savings and improved outcomes<sup>3,4,5</sup>. We present our experience in implementing an anesthesia-centered preoperative evaluation program as an introduction to the PSH model.

In 02/2012, this program was initiated in the preoperative anesthesia clinic at a single institution (Tampa General Hospital, Tampa, FL) in conjunction with a urology group. Adult patients scheduled to undergo elective urologic surgery were evaluated by anesthesiologists, and all necessary preoperative evaluations were determined by the anesthesia team in lieu of the surgeon's standard preoperative orders (complete blood count, comprehensive metabolic panel, prothrombin time, activated partial thromboplastin time, chest radiograph, and 12-lead electrocardiogram). However, urology specific labs (urinalysis and blood type and crossmatching) were obtained at the surgeon's discretion.

## METHODS

After receiving Institutional Review Board approval, we performed a retrospective chart review to identify adult patients who had undergone elective urologic surgery with a preoperative anesthesia clinic evaluation 1 year before (02/2011 - 01/2012) and after (02/2012 - 01/2013) program implementation. We collected and analyzed data regarding patient demographics, number of tests and labs performed preoperatively and on the day of surgery, number of case delays and cancellations, and adverse events (Timeframe: Entire Perioperative period until 48 hours post-op). All data were analyzed to represent outcomes before and after the implementation of the Surgical Home using SPSS 17.0 (SPSS Inc, IL). The normality and variance of the group distributions for continuous variables was assessed using the Kolmogorov-Smirnov test and comparisons were then completed using the Wilcoxon Rank Sum test. Results were expressed as frequency (%), mean +/- standard deviation, or median(range). A p value of 0.05 was considered statistically significant.

## RESULTS

### Patients

During the study period, 1020 patients were identified with 504 in the before and 516 in the after implementation groups. The groups were similar except for a statistically significant difference in age.

### Laboratory Evaluation and Testing

The quantity of laboratory evaluations and tests performed per patient was significantly lower after enacting the "orders per anesthesia" protocol. Sixty-five percent of patients received an EKG, stress test or chest-xray as part of their pre-operative evaluation prior to the implementation of our program while only 10 percent of patients received one of these tests after implementation (Figure 1a). The number of patients that did not require a pre-operative blood draw nearly doubled after implementation of our program (Figure 1b).

**Figure 1. Quantity of Tests & Labs Performed Before & After Implementation of the "Labs Per Anesthesia" Initiative**

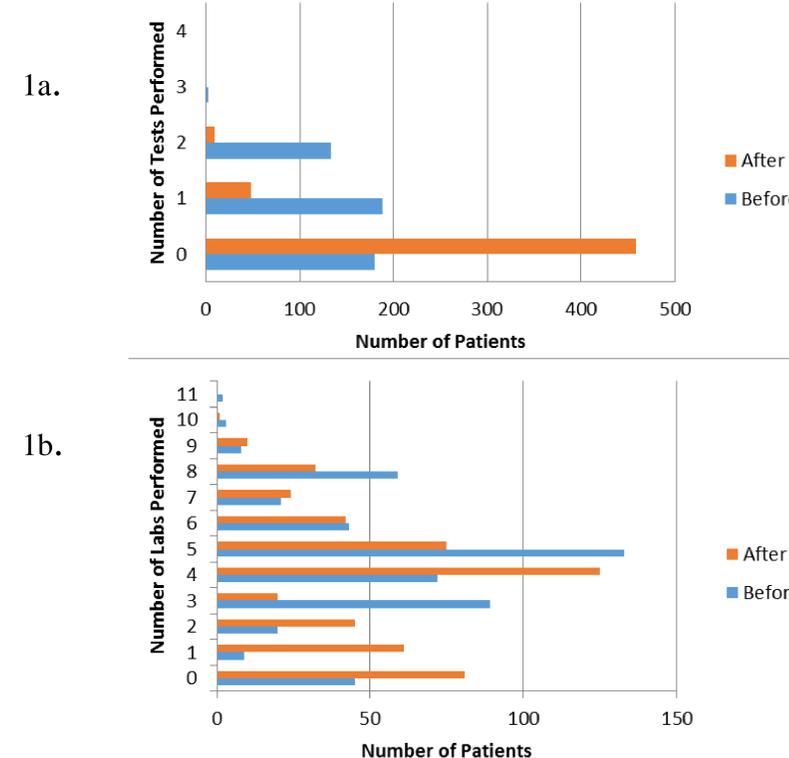


Figure 1a. Quantity of Tests performed before and after implementation of the "labs per anesthesia program. 1b) Quantity of labs performed before and after implementation of the "labs per anesthesia" program

### Patient Outcomes

Adverse events were defined as any unplanned anesthesia-related outcome that occurred during the perioperative period through 48 hours postoperatively. Adverse events were divided into 5 categories: respiratory events, unplanned ventilation, cardiac events, central nervous system injury, and death. There were no statistically significant differences between groups.

### Hospital Efficiencies

Hospital efficiency measures were classified as operations delayed due to need for medical clearance, operations cancelled due to need for medical clearance, return to the operating room within 24 hours, unplanned hospital admission exceeding previously planned outpatient recovery or 23-hour observation status, and unplanned intensive care unit admission. No statistically significant differences were seen for any hospital efficiency measures between the groups.

### Financial Outcomes

Protocol implementation resulted in financially significant reductions in both units and hospital charges for all testing procedures (Table 1). Hospital charges were reduced by \$574,098. These differences were maintained when patients were further analyzed within inpatient and outpatient surgery groups.

**Table 1. Units of Service and Hospital Charges Per Encounter: Change After Implementation of the "Labs Per Anesthesia" Program**

|                               | Decrease in Units of Service per Encounter | % Change | Decrease in Hospital Charges per Encounter | % Change | Total Charge Decrease for Post Implementation Group |
|-------------------------------|--|----------|--|----------|---|
| INPATIENT - LAB PROCEDURES    | (8.5)                                      | -37.0%   | (\$1,303)                                  | -28.9%   | (\$157,708)   |
| INPATIENT - X-RAY PROCEDURES  | (0.5)                                      | -42.6%   | (\$207)                                    | -32.4%   | (\$25,034)  |
| INPATIENT - EKG PROCEDURES    | (0.2)                                      | -50.0%   | (\$80)                                     | -51.1%   | (\$9,687)   |
| OUTPATIENT - LAB PROCEDURES   | (2.9)                                      | -64.7%   | (\$544)                                    | -61.4%   | (\$230,611)   |
| OUTPATIENT - X-RAY PROCEDURES | (0.5)                                      | -65.4%   | (\$226)                                    | -57.3%   | (\$95,962)  |
| OUTPATIENT - EKG PROCEDURES   | (0.3)                                      | -84.7%   | (\$130)                                    | -85.0%   | (\$55,096)  |

## CONCLUSION

In this study, we found a significant decrease in the number of laboratory tests, radiologic studies, and electrocardiograms ordered after implementation of our "orders per anesthesia" protocol. Consequently, associated hospital charges were reduced by \$574,098 in the year after adopting the program. Despite reducing the amount of preoperative evaluations performed, there were no significant differences in negative surgical outcomes or hospital efficiency measures between the two time periods. The implementation of only one preoperative aspect of the PSH model allowed our hospital to significantly reduce costs and need for patient testing while maintaining surgical outcomes and perioperative efficiency.

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