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Assessing surgeon behavior change after anastomotic leak in colorectal surgery

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ABSTRACT

Background: Recency effect suggests that people disproportionately value events from the immediate past when making decisions, but the extent of this impact on surgeons' decisions is unknown. This study evaluates for recency effect in surgeons by examining use of preventative leak testing before and after colorectal operations with anastomotic leaks.

Materials and methods: Prospective cohort of adult patients (≥18 y) undergoing elective colorectal operations at Washington State hospitals participating in the Surgical Care and Outcomes Assessment Program (2006-2013). The main outcome measure was surgeons' change in leak testing from 6 mo before to 6 mo after an anastomotic leak occurred.

Results: Across 4854 elective colorectal operations performed by 282 surgeons at 44 hospitals, there was a leak rate of 2.6% ($n = 124$). The 40 leaks (32%) in which the anastomosis was not tested occurred across 25 surgeons. While the ability to detect an overall difference in use of leak testing was limited by small sample size, nine (36%) of 25 surgeons increased their leak testing by 5% points or more after leaks in cases where the anastomosis was not tested. Surgeons who increased their leak testing more frequently performed operations for diverticulitis (45% *versus* 33%), more frequently began their cases laparoscopically (65% *versus* 37%), and had longer mean operative times (195 ± 99 *versus* 148 ± 87 min), all $P < 0.001$.

Conclusions: Recency effect was demonstrated by only one-third of eligible surgeons. Understanding the extent to which clinical decisions may be influenced by recency effect may be important in crafting quality improvement initiatives that require clinician behavior change.

Preliminary data were presented as a podium presentation at the *Academic Surgical Congress*, Las Vegas, Nevada, February, 2015.

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Introduction

Over the last few decades, behavioral economics has challenged traditional understanding of how people make decisions.[1-3] Psychologists, consumer scientists, and economists have shown that people deviate from economically rational decisions in predictable ways, in part because of human limitations on computational power, willpower, and self-interest.[3,4] Many have proposed interventions—termed "nudges" or "choice architecture"—to take advantage of the heuristics and biases highlighted by behavioral economics to improve people's decisions. However, whether behavioral economics can be used to improve the decisions made by clinicians has not been well established.[5]

For example, behavioral economics has highlighted that people disproportionately value events that occurred recently compared to those that occurred further in the past. This so-termed "recency bias" is well recognized in financial domains to explain recent performance of stock markets and are used to guide sales and purchase behaviors.[6] Other disciplines term this decision tendency "recency effect" or "availability heuristic," noting a link between recent events and increased estimation of similar events in the future.[7,8] There is increasing evidence to suggest clinicians' behaviors may also be influenced by availability or recency[9,10] and anecdotally, decisions based on recent personal experience appear pervasive in clinical practice.[11] Quality and surveillance databases may provide a unique opportunity to leverage observational data to evaluate how clinicians change their behavior after recent incidents in clinical settings.

The objective of this study was to evaluate for recency effect by examining surgeon use of anastomotic leak test before and after colorectal cases with anastomotic leaks. Intraoperative leak testing can reduce the risk of anastomotic leaks, rare but potentially life-threating complications, after surgery by up to 50%.[12] However, not all surgeons routinely leak test, suggesting leak testing is not equally valued. Since perceived value may drive behavior, understanding how surgeons change their use of leak testing after anastomotic leaks may be an opportunity to evaluate recency effect in clinical practice. We hypothesized that surgeons might display recency effect by increasing the use of leak testing in operations subsequent to an anastomotic leak.

Materials and methods

This study was determined as not human subjects research by the University of Washington's Institutional Review Board.

Data source and population

The primary cohort was defined by all consecutive adult (≥18 y) patients who underwent elective colon or rectal resection between January 1, 2006 and December 31, 2013 at 44 Washington State hospitals that participate in the Surgical Care and Outcomes Assessment Program (SCOAP). Cases without an anastomosis were excluded. Unique, hospital-specific codes were assigned to each surgeon, so data could be clustered at hospital and surgeon levels. Data from surgeons who performed two or fewer cases, or those who did not have cases within 6 mo of each other to permit evaluation of 6-mo rates, were excluded. In addition, to avoid left-censoring and right-censoring bias, we excluded surgeons who only had cases in the first 6 mo or last 6 mo of their enrollment in SCOAP, respectively. The final cohort included 4854 cases performed by 282 surgeons from 44 hospitals. For each case, sociodemographic, clinical, and operative details were extracted from inpatient medical records by trained chart abstractors at each clinical site. SCOAP metrics and data dictionary are available via a secure page at www.SCOAP.org. A modified Charlson comorbidity index for each patient was calculated.[13]

Definitions

Leak test

Only cases with a testable anastomosis were included (left colectomy, low-anterior resection including sigmoidectomy, and total abdominal colectomy with ileosigmoid and/or rectal anastomosis). Since anastomotic leak testing can be performed by using an endoscope, methylene blue dye, or air and/or saline injection, these methods were combined into the composite definition of "leak test."

Leaks

Anastomotic leaks are rare and can present variably after an operation. Accordingly, we grouped postoperative leak events into a composite term "leak," defined as radiologically demonstrated anastomotic leak or enterocutaneous fistula, postoperative percutaneous drainage of abscess, or unplanned reoperative intervention requiring colostomy and/or ileostomy, abscess drainage, operative drain placement, or anastomotic revision.

Outcomes

The main outcome was change in rate of leak testing by individual surgeons. Since rates depend on number of cases performed during a time period, we limited our evaluation to rates of leak testing 6 mo before and 6 mo following a leak. In addition, our prior evaluation of SCOAP data suggests that the median number of colorectal procedures was five per year per surgeon. Accordingly, we defined higher-volume surgeons as those who performed five or more elective colectomies per year.

Analysis

Longitudinal patterns of leak testing were constructed for each surgeon. Rates of leak testing (95% CI) before and after a leak were determined, stratified by surgeon's case volume and whether a leak test was performed during the case with a leak. We compared change in surgeons' leak testing after a leak to changes in leak testing in cases without a leak using a linear regression based difference-in-difference nonparametric model, clustered at the surgeon level. Our model adjusted for surgeon-specific rates of protective stoma