The American Journal of Surgery (2015) 209, 977-984

The American Journal of Surgery®

Clinical Science

Acceptability of the decision support for safer surgery tool

Wynne E. Norton, Ph.D.[a,*], Patrick W. Hosokawa[b], William G. Henderson, Ph.D.[b], Eric T. Volckmann, M.D.[c], Joyce Pell[c], Majed G. Tomeh, M.S., M.B.A.[d], Robert E. Glasgow, M.D.[c], Sung-Joon Min, Ph.D.[b], Leigh A. Neumayer, M.D.[c], Mary T. Hawn, M.D.[e]

[a]Department of Health Behavior, University of Alabama at Birmingham School of Public Health, 1665 University Boulevard, Birmingham, AL 35294, USA; [b]Department of Biostatistics and Informatics, Colorado School of Public Health, University of Colorado Health Outcomes Program, University of Colorado Denver, Denver, CO, USA; [c]Department of Surgery, University of Utah, Salt Lake City, UT, USA; [d]QCMetrix, Waltham, MA, USA; [e]Department of Surgery, University of Alabama at Birmingham, 1720 2nd Avenue South, Birmingham, AL 35294, USA

KEYWORDS:
Risk estimates;
Delivery science;
Implementation science;
Team-based care;
Clinical decision support tools;
Clinical decision making

Abstract

BACKGROUND: We examined providers' perceptions of the Decision Support for Safer Surgery (DS3) tool, which provided preoperative patient-level risk estimates of postoperative adverse events.

METHODS: The DS3 tool was evaluated at 2 academic medical centers. During the validation study, surgeons provided usefulness ratings of the DS3 tool for each patient before surgery. At the end of the study, providers' perceptions of the DS3 tool were assessed via questionnaire. Data were analyzed using descriptive statistics and independent samples *t* tests.

RESULTS: During the trial, 23 surgeons completed usefulness ratings of the DS3 tool for 1,006 patients. Surgeons rated the tool as "very useful" or "moderately useful" in 251 (25%) of the cases, "neutral" in 469 (46.6%) of the cases, and "moderately unuseful" or "not useful" in 286 (28.4%) cases. At the end of the trial, 32 providers completed the questionnaire; perceptions were relatively neutral, although several aspects were rated quite favorably.

CONCLUSION: The DS3 tool may be most useful for achieving particular tasks (eg, training novice surgeons, increasing patient engagement) or encouraging specific processes (eg, team-based care) in surgical care settings.

This work was funded by grant #5R44NR010653 from the National Institute of Nursing Research Small Business Innovation Grant. Dr Tomeh is the CEO of QCMetrix, Inc, and has potential financial interest in the development of the decision support model discussed in this article. Mr Hosokawa and Dr Norton received consulting fees from QCMetrix, Inc. The remaining authors declare no conflicts of interest.

* Corresponding author. Tel.: +1-205-975-8055; fax: +1-205-934-9325.
E-mail address: wenorton@uab.edu

Manuscript received April 10, 2014; revised manuscript June 4, 2014

Major surgical complications are associated with significant increases in perioperative and late mortality,[1] prolonged length of stay,[2] and marked increases in hospital costs.[3] Significant efforts to reduce surgical complications have been made recently, including (but not limited to) the National Surgical Quality Improvement Program (NSQIP),[4,5] an outcomes-driven quality improvement program initially developed in the Veterans Health Administration and also implemented in

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http://dx.doi.org/10.1016/j.amjsurg.2014.06.037

the private sector with sponsorship from the American College of Surgeons.[6–9] While implementation of NSQIP has demonstrated improvements in both quality of care and surgical outcomes,[4] the benefits of NSQIP are limited by its reliance on risk reporting and adjustment through the use of retrospective data after the operations have been completed versus risk prediction and mitigation through the use of prospective data before the operations being performed.

In an effort to enhance NSQIP capability, the Decision Support for Safer Surgery (DS3) tool was developed to provide preoperative patient-level estimates of risk of postoperative adverse events to surgical care providers.[10] The objective of the original study was to prospectively assess the predictive validity of the DS3 tool by comparing risk estimates provided by statistical models to risk estimates provided by experienced surgeons for 30-day postoperative mortality, overall morbidity, and a range of postoperative complications (eg, cardiac, pulmonary, thromboembolic, renal, and surgical site infection). The prospective observational cohort study included a diverse group of 1,791 general surgery patients from 2 large academic medical centers (University of Alabama at Birmingham [UAB] and University of Utah [Utah]) who were operated on between June 2010 and January 2012. Before each enrolled patient's surgical procedure, attending surgeons provided patient-level estimates of postoperative morbidity and mortality. In addition, a research assistant entered risk data, including patient-level demographics, general medical conditions (eg, functional status, weight, height, body mass index, and American Society of Anesthesiologists class), comorbidities, and operative variables, into the DS3 web-based software system to generate patient-level estimates of postoperative morbidity and mortality based on developed statistical prediction models.[10] The statistical model estimates provided via the DS3 tool performed as well as experienced surgeons in predicting postoperative adverse events across a range of diverse patients and surgical procedures.[11] Moreover, correlations between model estimates and surgeon estimates of postoperative adverse events were statistically significant for each outcome category ($P < .0001$).[11] In sum, the DS3 tool has the potential to improve quality of care and patient outcomes by systematically identifying high-risk patients and, importantly, allowing for steps to reduce perioperative morbidity and mortality.

Although research is needed to demonstrate the impact of the DS3 tool on care processes and patient outcomes, steps can be taken early on to design the tool with dissemination in mind[12] to bridge the anticipated research-to-practice gap. In an effort to accelerate the potential integration of this tool into practice settings, secondary exploratory aims of the study, described herein, were to (1) describe attending surgeons' usefulness ratings of the risk estimates provided in the DS3 tool; and (2) assess surgical care team members' (eg, surgeons, nurses, anesthesiologists, information technologists, and clinic support staff) perceptions of the DS3 tool. As described below, the first aim included 23 surgeons' ratings of the usefulness of the DS3 tool conducted in vivo as part of the original trial. The second aim involved a brief survey administered at the end of the original trial to 32 surgical care team members to assess their perceptions of the DS3 tool.

Methods

Decision support for safer surgery usefulness ratings

Attending general surgeons from 2 academic medical centers (UAB and Utah) were asked to complete a risk assessment of each patient for a list of postoperative adverse events before seeing the risk assessment from the statistical model built into the DS3 tool. Surgeons provided a probability assessment for each adverse outcome (eg, 5%, 10%, etc) and rated the patient's risk assessment for each adverse outcome as low, average, or high. Usefulness of the statistical model risk assessment provided to surgeons was assessed by a single item (ie, "Please rate the usefulness of this risk assessment") administered via paper-and-pencil and measured on a 5-point Likert scale (1 = not useful, 2 = moderately unuseful, 3 = neutral, 4 = moderately useful, 5 = very useful).

Decision support for safer surgery questionnaire

Toward the end of the prospective observational study, a paper-and-pencil questionnaire was administered at each site following a study team debriefing and facilitated discussion. Individuals who completed the questionnaire included surgeons who had been involved in the prospective study (ie, provided risk estimates for patients' postoperative adverse events) and other key members of the surgical care team (eg, nurses, anesthesiologists, information technologists, and clinic support staff), all of whom were identified as key stakeholders by the lead site investigator. Immediately following the debriefing meeting and facilitated discussion, all surgical care team members (eg, surgeons, nurses, anesthesiologists, etc) completed a paper-and-pencil questionnaire to assess their attitudes toward the risk estimates provided by the DS3 tool, described below.

Demographics. Demographic items included age, sex, and race/ethnicity. Participants were asked to indicate their current professional role (ie, surgeon, nurse, anesthesiologist, administrator, information technologist, clinic support staff, or other [open-ended response option]) and years of experience in their field. A single item was used to assess participants' prior experience with and/or knowledge of the DS3 tool and measured on a 5-point Likert scale (1 = none, 5 = a great deal). Categorical or continuous response options were provided, as appropriate.