How Surgeons Can Lead the Delivery of Safe and High Quality Care:

The Checklist and Beyond

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Life is short, the art is long, opportunity fleeting, experience treacherous, judgement difficult.

Hippocrates
“Even if the world was perfect – it wouldn’t be.”

Yogi Berra
### SURGICAL SAFETY CHECKLIST (FIRST EDITION)

<table>
<thead>
<tr>
<th>SIGN IN</th>
<th>TIME OUT</th>
<th>SIGN OUT</th>
</tr>
</thead>
</table>
| □ PATIENT HAS CONFIRMED  
  • IDENTITY  
  • SITE  
  • PROCEDURE  
  • CONSENT | □ CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE | □ NURSE VERBALLY CONFIRMS WITH THE TEAM:  
  □ THE NAME OF THE PROCEDURE RECORDED |
| □ SITE MARKED/NOT APPLICABLE | □ SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM  
  • PATIENT  
  • SITE  
  • PROCEDURE | □ THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE) |
| □ ANAESTHESIA SAFETY CHECK COMPLETED | □ ANTICIPATED CRITICAL EVENTS | □ HOW THE SPECIMEN IS LABELLED  
  (INCLUDING PATIENT NAME) |
| □ PULSE OXIMETER ON PATIENT AND FUNCTIONING | □ SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS? | □ WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED |
| | □ ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT-SPECIFIC CONCERNS? | □ SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT |
| | □ NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS? | |
A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population


ABSTRACT

BACKGROUND
Surgery has become an integral part of global health care, with an estimated 234 million operations performed yearly. Surgical complications are common and often preventable. We hypothesized that a program to implement a 19-item surgical safety checklist designed to improve team communication and consistency of care would reduce complications and deaths associated with surgery.

METHODS
Between October 2007 and September 2008, eight hospitals in eight cities (Toronto, Canada; New Delhi, India; Amman, Jordan; Auckland, New Zealand; Manila, Philippines; Ifakara, Tanzania; London, England; and Seattle, WA) representing a variety of economic circumstances and diverse populations of patients participated in the World Health Organization's Safe Surgery Saves Lives program. We prospectively collected data on clinical processes and outcomes from 3733 consecutively enrolled patients 16 years of age or older who were undergoing noncardiac surgery. We subsequently collected data on 3995 consecutively enrolled patients after the introduction of the Surgical Safety Checklist. The primary end point was the rate of complications, including death, during hospitalization within the first 30 days after the operation.

RESULTS
The rate of death was 1.5% before the checklist was introduced and declined to 0.8% afterward (P=0.003). Inpatient complications occurred in 11.0% of patients at baseline and in 7.0% after introduction of the checklist (P<0.001).

CONCLUSIONS
Implementation of the checklist was associated with concomitant reductions in the rates of death and complications among patients at least 16 years of age who were undergoing noncardiac surgery in a diverse group of hospitals.
<table>
<thead>
<tr>
<th>Name</th>
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<th>Country</th>
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<th>No. ORs</th>
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<td>India</td>
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<td>United Kingdom</td>
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*St. Mary’s Hospital has since been renamed St. Mary’s Hospital–Imperial College NHS Trust.
Effect of A 19-Item Surgical Safety Checklist During Urgent Operations in A Global Patient Population

Thomas G. Weiser, MD,*† Alex B. Haynes, MD,*† Gerald Dziekan, MD,§ William R. Berry, MD,*¶ Stuart R. Lipsitz, Sc.D,¶ and Atul A. Gawande, MD,*†¶ for the Safe Surgery Saves Lives Investigators and Study Group

Objective: To assess whether implementation of a 19-item World Health Organization (WHO) Surgical Safety Checklist in urgent surgical cases would improve compliance with basic standards of care and reduce rates of deaths and complications.

Background: Use of the WHO Surgical Safety Checklist has been shown to be associated with significant reductions in complications and deaths. Before evaluation of this safety tool, concern was raised about whether its use would be practical or beneficial during urgent surgical procedures.

Methods: We prospectively collected clinical process and outcome data for 1750 consecutively enrolled patients 16 years of age or older undergoing urgent noncardiac surgery before and after introduction of the WHO Surgical Safety Checklist in 8 diverse hospitals around the world; 842 underwent urgent surgery—defined as an operation required within 24 hours of assessment to be beneficial—before introduction of the checklist and 908 after introduction of the checklist. The primary end point was the rate of complications, including death, during hospitalization up to 30 days following surgery.

Results: The complication rate was 18.4% (n = 151) at baseline and 11.7% (n = 102) after the checklist was introduced (P = 0.0001). Death rates dropped from 3.7% to 1.4% following checklist introduction (P = 0.0067). Adherence to 6 measured safety steps improved from 18.6% to 39.7% (P < 0.0001).

Conclusions: Implementation of the checklist was associated with a greater than one-third reduction in complications among adult patients undergoing urgent noncardiac surgery in a diverse group of hospitals. Use of the WHO Surgical Safety Checklist in urgent operations is feasible and should be considered.

(Ann Surg 2010;251: 976–980)
WHO Checklist Study

- Pre- and post-intervention did not control for confounders which included ongoing outcomes measurement and feedback.
- Hawthorne Effect
- Implausible that death ↓ from 1.5% to 0.8% and complications ↓ from 11% to 7% with common sense checklist items unrelated to the more severe surgical complications.
- Compliance had no bearing on the extent of improvement in outcomes:
  - 2 hospitals with greatest improvement had least improvement in compliance
  - 2 hospitals with greatest increase in compliance showed no change in outcomes
Effect of a Comprehensive Surgical Safety System on Patient Outcomes

Eefje N. de Vries, M.D., Ph.D., Hubert A. Prins, M.D., Ph.D.,
Regier M.P.H. Crolla, M.D., Adriaan J. den Outer, M.D.,
George van Andel, M.D., Ph.D., Sven H. van Helden, M.D., Ph.D.,
Wolfgang S. Schlack, M.D., Ph.D., M. Agnès van Putten, B.Sc.,
Dirk J. Gouma, M.D., Ph.D., Marcel C.W. Dijkgraaf, Ph.D.,
Susanne M. Smorenburg, M.D., Ph.D., and Marja A. Boermeester, M.D., Ph.D.,
for the SURPASS Collaborative Group†

ABSTRACT

BACKGROUND
Adverse events in patients who have undergone surgery constitute a large proportion of iatrogenic illnesses. Most surgical safety interventions have focused on the operating room. Since more than half of all surgical errors occur outside the operating room, it is likely that a more substantial improvement in outcomes can be achieved by targeting the entire surgical pathway.

METHODS
We examined the effects on patient outcomes of a comprehensive, multidisciplinary surgical safety checklist, including items such as medication, marking of the operative side, and use of postoperative instructions. The checklist was implemented in six hospitals with high standards of care. All complications occurring during admission were documented prospectively. We compared the rate of complications during a baseline period of 3 months with the rate during a 3-month period after implementation of the checklist, while accounting for potential confounders. Similar data were collected from a control group of five hospitals.

RESULTS
In a comparison of 3760 patients observed before implementation of the checklist with 3820 patients observed after implementation, the total number of complications per 100 patients decreased from 273 (95% confidence interval [CI], 259 to 287) to 16.7 (95% CI, 15.6 to 17.9), for an absolute risk reduction of 10.6 (95% CI, 8.7 to 12.4). The proportion of patients with one or more complications decreased from 15.4% to 10.6% (P<0.001). In-hospital mortality decreased from 1.5% (95% CI, 1.2 to 2.0) to 0.8% (95% CI, 0.6 to 1.1), for an absolute risk reduction of 0.7 percentage points (95% CI, 0.2 to 1.2). Outcomes did not change in the control hospitals.

CONCLUSIONS
Implementation of this comprehensive checklist was associated with a reduction in surgical complications and mortality in hospitals with a high standard of care. (Netherlands Trial Register number, NTR1943.)
SURPASS STUDY

- Study group of 6 Dutch hospitals and control group of 5 Dutch hospitals
- All hospitals had been tracking outcomes with same registry
- 3 month baseline
- 11 distinct checklists across all phases of in-hospital surgical care
- Mortality decreased from 1.5% to 0.8%
- Morbidity decreased from 27.3% to 16.7%
- Strong positive relationship to checklist compliance and outcomes
- The 5 control hospitals had unchanged mortality and morbidity.
SURPASS STUDY
INSIGHTS

- Disproves assumption that checklists work for surgeons like they do for pilots
- Checklists should be most effective in ↓ complications related to processes of care such as implants, blood transfusion, SSI
- Rates in SURPASS ↓ for all post-operative complications. This improvement is attributable to improved communication and hand-offs between different types of providers.
- Rates of technical complications dropped to the same extent as other complications. Did checklist reduce distractions?
- This study suggests that the indirect effects of checklist adoption may be more important than actual content.
Surgical team behaviors and patient outcomes

Karen Mazzocco, R.N., J.D.\(^a\).*, Diana B. Petitti, M.D., M.P.H.\(^b\),
Kenneth T. Fong, M.S.\(^c\), Doug Bonacum, M.B.A.\(^c\), John Brookey, M.D.\(^d\),
Suzanne Graham, R.N., Ph.D.\(^e\), Robert E. Lasky, Ph.D.\(^f\), J. Bryan Sexton, Ph.D.\(^g\),
Eric J. Thomas, M.D., M.P.H.\(^f\)

\(^a\)Sharp Metropolitan Medical Campus, Sharp Healthcare, Patient Relations and Concierge Services, San Diego, CA USA; \(^b\)Arizona State University, Tempe, AZ, USA; \(^c\)Kaiser Permanente Program Offices, Oakland, CA, USA; \(^d\)Kaiser Permanente Southern California, Pasadena, CA, USA; \(^e\)Kaiser Permanente Northern California, Oakland, CA, USA;
\(^f\)University of Texas Medical School, Houston, TX, USA; \(^g\)Johns Hopkins School of Medicine, Baltimore, MD, USA

**KEYWORDS:** Operating room; Team behavior; Patient outcomes; Human factors; Behavioral markers

**Abstract**

**BACKGROUND:** Little evidence exists that links teamwork to patient outcomes. We conducted this study to determine if patients of teams with good teamwork had better outcomes than those with poor teamwork.

**METHODS:** Observers used a standardized instrument to assess team behaviors. Retrospective chart review was performed to measure 30-day outcomes. Multiple logistic regressions were calculated to assess the independence of the association between teamwork with patient outcome after adjusting for American Society of Anesthesiologists (ASA) score.

**RESULTS:** In univariate analyses, patients had increased odds of complications or death when the following behaviors were exhibited less frequently: information sharing during intraoperative phases, briefing during handoff phases, and information sharing during handoff phases. Composite measures of teamwork across all operative phases were significantly associated with complication or death after adjusting for ASA score (odds ratio 4.82; 95% confidence interval, 1.30–17.87).

**CONCLUSION:** When teams exhibited infrequent team behaviors, patients were more likely to experience death or major complication.

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<table>
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<th>Risk factor</th>
<th>Unadjusted OR</th>
<th>95% CI on the unadjusted OR</th>
<th>P value (Wald test)</th>
<th>Adjusted OR</th>
<th>95% CI on the adjusted OR</th>
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<td>5.61</td>
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<td>1.06–2.38</td>
<td>0.024</td>
<td>1.51</td>
<td>1.00–2.27</td>
<td>0.049</td>
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</tbody>
</table>

Figure 1  The predicted relationship between Behavioral Marker Risk Index and postoperative complications and death.
SUPPORTING DATA

- OR briefings reduce wrong site surgery
  - Makary (2007) JACS 204:236

- OR briefings reduce operating room delays
Operating Room Teamwork among Physicians and Nurses: Teamwork in the Eye of the Beholder

Martin A Makary, MD, MPH, J Bryan Sexton, PhD, Julie A Freischlag, MD, FACS, Christine G Holzmueller, BLA, E Anne Millman, MS, Lisa Rowen, RN, DNSc, Peter J Pronovost, MD, PhD

A

B

C

J Am Coll Surg 2006;202:746
SUPPORTING DATA

- Communication failure is the most frequent problem in JCAHO sentinel events
  - [http://www.jointcommission.org](http://www.jointcommission.org)
- Poor information transfer delays patient care, wastes surgeon/staff time, and increases adverse events
- The number of distractions in the OR correlates with outcome
- Improving surgical teamwork is associated with an 18% decrease in surgical mortality and is associated with a dose response effect
  - Neily (2010) JAMA 304:1693
HUMAN ADAPTIVE SYSTEMS

• EASY:
  • To see a person or technology
  • To see rules
  • “Let’s have rules” – checklist

• HARD:
  • To see expertise, coordination, adaptation, complexity and resilience

• CHECKLISTS do not identify best practices, improve expertise, provide clinical innovation nor help organizations to stay resilient.
Unskilled and Unaware of It: How Difficulties in Recognizing One’s Own Incompetence Lead to Inflated Self-Assessments

Justin Kruger and David Dunning
Cornell University

People tend to hold overly favorable views of their abilities in many social and intellectual domains. The authors suggest that this overestimation occurs, in part, because people who are unskilled in these domains suffer a dual burden. Not only do these people reach erroneous conclusions and make unfortunate choices, but their incompetence robs them of the metacognitive ability to realize it. Across 4 studies, the authors found that participants scoring in the bottom quartile on tests of humor, grammar, and logic grossly overestimated their test performance and ability. Although their test scores put them in the 12th percentile, they estimated themselves to be in the 50th percentile. Several analyses linked this misattribution to deficits in metacognitive skill, or the capacity to distinguish accuracy from error. Paradoxically, improving the skills of participants, and thus increasing their metacognitive competence, helped them recognize the limitations of their abilities.

Figure 2. Perceived logical reasoning ability and test performance as a function of actual test performance (Study 2).
Self-assessment during a 2-day laparoscopic colectomy course: can surgeons judge how well they are learning new skills?

Sidhu RS, Vikis E, Cheifetz R, Phang, T.

Department of Surgery, Saint Paul’s Hospital, University of British Columbia, 1081 Burrard Street, Vancouver, British Columbia, Canada V6Z 1Y6.

BACKGROUND: The objectives of this study were to (1) establish the utility of an assessment tool for participants in a laparoscopic colectomy course and (2) to determine the accuracy of technical skill self-assessment in this group. METHODS: Twenty-two surgeons enrolled in a 2-day course participated. During the animal laboratory, each participant’s operative performance was videotaped. Participants completed a global rating scale (GRS) instrument to self-assess their performances. By using the same GRS, 2 trained raters independently assessed each performance by videotape review. RESULTS: For the trained raters, the GRS showed excellent interrater reliability ($r = .76$, $P < .001$). There was no correlation between trained rater scores and self-assessment scores. Furthermore, the trained rater scores (mean, 2.62 and 2.99) were significantly lower than the self-assessment scores (4.05, $P < .001$).

CONCLUSIONS: Surgeons consistently overestimated their performance during a laparoscopic colectomy course as measured by reliable GRS. This finding highlights the issue of credentialing and the importance of preceptorship for surgeons completing such courses.

Accuracy of physician self-assessment compared with observed measures of competence: a systematic review.

Davis DA, Mazmanian PE, Fordis M, Van Harrison R, Thorpe KE, Perrier L.

Knowledge Translation Program of the Li Ka Shing Knowledge Institute at St Michael's Hospital, University of Toronto, Toronto, Ontario, Canada.

CONTEXT: Core physician activities of lifelong learning, continuing medical education credit, relicensure, specialty recertification, and clinical competence are linked to the abilities of physicians to assess their own learning needs and choose educational activities that meet these needs. OBJECTIVE: To determine how accurately physicians self-assess compared with external observations of their competence. DATA SOURCES: The electronic databases MEDLINE (1966-July 2006), EMBASE (1980-July 2006), CINAHL (1982-July 2006), PsycINFO (1967-July 2006), the Research and Development Resource Base in CME (1978-July 2006), and proprietary search engines were searched using terms related to directed learning, self-assessment, and self-study. STUDY SELECTION: Studies were included if they compared physicians' self-rated assessments with external observations, used quantifiable and replicable measures, included a study population of at least 50% practicing physicians, residents, or similar health professionals, and were conducted in the United Kingdom, Canada, United States, Australia, or New Zealand. Studies were excluded if they were comparisons of self-reports, studies of medical students, assessed physician beliefs about patient status, described the development of self-assessment measures, or were self-assessment programs of specialty societies. Studies conducted in the context of an educational or quality improvement intervention were included only if comparative data were obtained before the intervention. DATA EXTRACTION: Study population, content area and self-assessment domain of the study, methods used to measure the self-assessment of study participants and those used to measure their competence or performance, existence and use of statistical tests, study outcomes, and explanatory comparative data were extracted. DATA SYNTHESIS: The search yielded 725 articles, of which 17 met all inclusion criteria. The studies included a wide range of domains, comparisons, measures, and methodological rigor. Of the 20 comparisons between self- and external assessment, 13 demonstrated little, no, or an inverse relationship and 7 demonstrated positive associations. A number of studies found the worst accuracy in self-assessment among physicians who were the least skilled and those who were the most confident. These results are consistent with those found in other professions.

CONCLUSIONS: While suboptimal in quality, the preponderance of evidence suggests that physicians have a limited ability to accurately self-assess. The processes currently used to undertake professional development and evaluate competence may need to focus more on external assessment.

JAMA. 2006 Sep 6;296(9):1094-102
“Rigorous outcomes measurement and collaborative quality improvement will be essential for clinical innovation and the development of optimal delivery of surgical care.”

### Agency for Healthcare Research/Quality (AHRQ) Patient Safety Indicators

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<th>Condition</th>
<th>Mortality %</th>
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<td>Post-op Sepsis</td>
<td>22</td>
<td>11</td>
<td>57,800</td>
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<tr>
<td>Post-op Renal Failure</td>
<td>22</td>
<td>9</td>
<td>53,500</td>
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<tr>
<td>Post-op Metabolic/Physiol</td>
<td>20</td>
<td>9</td>
<td>54,800</td>
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<tr>
<td>Post-op dehiscence</td>
<td>9.6</td>
<td>9.5</td>
<td>40,300</td>
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<td>Post-op DVT/PE</td>
<td>6.5</td>
<td>5</td>
<td>21,700</td>
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<tr>
<td>Post-op Hip fx</td>
<td>4.5</td>
<td>5</td>
<td>13,500</td>
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</table>

*JAMA(2003)290:1868*

**July 2008: Cost is $1.5 billion annually**
Determinants of long-term survival after major surgery and the adverse effect of postoperative complications.

Khuri SF, Henderson WG, DePalma RG, Mosca C, Healey NA, Kumbhani DJ; Participants in the VA National Surgical Quality Improvement Program.

Departments of Surgery, VA Boston Healthcare System, MA 02132, USA. shukri.khuri@med.va.gov

OBJECTIVE: The objective of this study was to identify the determinants of 30-day postoperative mortality and long-term survival after major surgery as exemplified by 8 common operations. SUMMARY BACKGROUND DATA: The National Surgical Quality Improvement Program (NSQIP) database contains pre-, intra-, and 30-day postoperative data, prospectively collected in a standardized fashion by a dedicated nurse reviewer, on major surgery in the Veterans Administration (VA). The Beneficiary Identification and Records Locator Subsystem (BIRLS) is a VA file that depicts the vital status of U.S. veterans with 87% to 95% accuracy.

METHODS: NSQIP data were merged with BIRLS to determine the vital status of 105,951 patients who underwent 8 types of operations performed between 1991 and 1999, providing an average follow up of 8 years. Logistic and Cox regression analyses were performed to identify the predictors of 30-day mortality and long-term survival, respectively.

RESULTS: The most important determinant of decreased postoperative survival was the occurrence, within 30 days postoperatively, of any one of 22 types of complications collected in the NSQIP. Independent of preoperative patient risk, the occurrence of a 30-day complication in the total patient group reduced median patient survival by 69%. The adverse effect of a complication on patient survival was also influenced by the operation type and was sustained even when patients who did not survive for 30 days were excluded from the analyses. CONCLUSIONS: The occurrence of a 30-day postoperative complication is more important than preoperative patient risk and intraoperative factors in determining the survival after major surgery in the VA. Quality and process improvement in surgery should be directed toward the prevention of postoperative complications.

Effect of Post-Operative Morbidity on Long-Term Survival

Colorectal cancer
Post operative complication is an independent predictor of time to recurrence (p<.006) and long-term survival (p<.001) when compared to patients without complications.


Gastric Cancer
Infectious complications are independent predictors of 10 year overall survival (58% vs 78% p<.001) and 10 year cancer specific survival (73% vs 86% p<.0003). Similar data for esophageal resection.


HPB
In patients with low clinical risk scores complication following surgery was associated with significant decreases in cancer specific survival (41% vs 33% p<.005)

Association of Surgical Care Improvement Project Infection-Related Process Measure Compliance with Risk-Adjusted Outcomes: Implications for Quality Measurement

Angela M Ingraham, MD, MS, Mark E Cohen, PhD, Karl Y Bilimoria, MD, MS, Justin B Dimick, MD, MPH, Karen E Richards, BS, Mehul V Raval, MD, Lee A Fleisher, MD, Bruce L Hall, MD, PhD, MBA, FACS, Clifford Y Ko, MD, MS, MSHS, FACS

**BACKGROUND:** Facility-level process measure adherence is being publicly reported. However, the association between measure adherence and surgical outcomes is not well-established. Our objective was to determine the degree to which Surgical Care Improvement Project (SCIP) process measures are associated with American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) risk-adjusted outcomes.

**STUDY DESIGN:** This cross-sectional study included hospitals participating in the ACS NSQIP and SCIP (n = 200). ACS NSQIP outcomes (30-day overall morbidity, serious morbidity, surgical site infections [SSI], and mortality) and adherence to SCIP SSI-related process measures (from the Hospital Compare database) were collected from January 1, 2008, through December 31, 2008. Hospital-level correlation coefficients between compliance with 4 process measures (ie, antibiotic administration within 1 hour before incision [SCIP-1]; appropriate antibiotic prophylaxis [SCIP-2]; antibiotic discontinuation within 24 hours after surgery [SCIP-3]; and appropriate hair removal [SCIP 6]) and 4 risk-adjusted outcomes were calculated. Regression analyses estimated the contribution of process measure adherence to risk-adjusted outcomes.

**RESULTS:** Of 211 ACS NSQIP hospitals, 95% had data reported by Hospital Compare. Depending on the measure, hospital-level compliance ranged from 60% to 100%. Of the 16 correlations, 15 demonstrated nonsignificant associations with risk-adjusted outcomes. The exception was the relationship between SCIP-2 and SSI (p = 0.004). SCIP-1 demonstrated an intriguing but nonsignificant relationship with SSI (p = 0.08) and overall morbidity (p = 0.08). Although adherence to SCIP-2 was a significant predictor of risk-adjusted SSI (p < 0.0001) and overall morbidity (p < 0.0001), inclusion of compliance for SCIP-1 and SCIP-2 caused only slight improvement in model quality.

**CONCLUSIONS:** Better adherence to infection-related process measures over the observed range was not significantly associated with better outcomes with one exception. Different measures of quality might be needed for surgical infection. (J Am Coll Surg 2010;211:705–714. © 2010 by the American College of Surgeons)
No Correlation between Risk-Adjusted Outcomes and Process Measure Compliance
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<th>ST CHARLES MEDICAL CENTER - BEND</th>
<th>OHSU HOSPITAL AND CLINICS</th>
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<tbody>
<tr>
<td><strong>Surgery patients who were taking heart drugs called beta blockers before coming to the hospital, who were kept on the beta blockers during the period just before and after their surgery</strong></td>
<td>84%</td>
<td>94%</td>
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<td><strong>Surgery patients who were given an antibiotic at the right time (within one hour before surgery) to help prevent infection</strong></td>
<td>92%</td>
<td>96%</td>
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<tr>
<td><strong>Surgery patients who were given the right kind of antibiotic to help prevent infection</strong></td>
<td>97%</td>
<td>98%</td>
</tr>
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<td><strong>Surgery patients whose preventive antibiotics were stopped at the right time (within 24 hours after surgery)</strong></td>
<td>86%</td>
<td>95%</td>
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<td><strong>Heart surgery patients whose blood sugar (blood glucose) is kept under good control in the days right after surgery</strong></td>
<td>98%</td>
<td>97%</td>
</tr>
<tr>
<td><strong>Surgery patients whose urinary catheters were removed on the first or second day after surgery.</strong></td>
<td>89%</td>
<td>89%</td>
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<tr>
<td><strong>Surgery patients whose doctors ordered treatments to prevent blood clots after certain types of surgeries</strong></td>
<td>71%</td>
<td>93%</td>
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<td><strong>Patients who got treatment at the right time (within 24 hours before or after their surgery) to help prevent blood clots after certain types of surgery</strong></td>
<td>70%</td>
<td>89%</td>
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<td>Measure Description</td>
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</tr>
<tr>
<td>------------------------------------------------</td>
<td>----------------------------------</td>
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</tr>
<tr>
<td>Death Rate for Heart Attack Patients</td>
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<td>No Different than U.S. National Rate</td>
</tr>
<tr>
<td>Death Rate for Heart Failure Patients</td>
<td>No Different than U.S. National Rate</td>
<td>No Different than U.S. National Rate</td>
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<td>Death Rate for Pneumonia Patients</td>
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</tbody>
</table>

**Hospital Readmission Rates Outcome of Care Measures**

<table>
<thead>
<tr>
<th>Measure Description</th>
<th>ST CHARLES MEDICAL CENTER - BEND</th>
<th>OHSU HOSPITAL AND CLINICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Readmission for Heart Attack Patients</td>
<td>No Different than U.S. National Rate</td>
<td>No Different than U.S. National Rate</td>
</tr>
<tr>
<td>Rate of Readmission for Heart Failure Patients</td>
<td>No Different than U.S. National Rate</td>
<td>No Different than U.S. National Rate</td>
</tr>
<tr>
<td>Rate of Readmission for Pneumonia Patients</td>
<td>No Different than U.S. National Rate</td>
<td>No Different than U.S. National Rate</td>
</tr>
</tbody>
</table>
Clinical vs. Administrative Data
Clinical Data tends to tell us more…

<table>
<thead>
<tr>
<th></th>
<th>NSQIP</th>
<th>Admin</th>
<th>% Missed by Admin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Complications</strong></td>
<td>28%</td>
<td>11%</td>
<td>61%</td>
</tr>
<tr>
<td><strong>SSI</strong></td>
<td>13%</td>
<td>1%</td>
<td>97%</td>
</tr>
<tr>
<td><strong>Wound Disruption</strong></td>
<td>6%</td>
<td>1%</td>
<td>83%</td>
</tr>
<tr>
<td><strong>UTI</strong></td>
<td>6%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>3%</td>
<td>3%</td>
<td>0%</td>
</tr>
</tbody>
</table>
A Proactive Surgeon Led Response for Quality Care
To Measure & Improve The System Of Surgical Care

• **First** nationally **validated, risk-adjusted, outcomes-based** program

• Employs a **prospective, peer controlled, audited clinical database**

• Allows valid comparison of outcomes among all hospitals in the program.
Clinically Rich Data

The ACS NSQIP collects Preoperative risk factors, Intraoperative variables, and 30-day postoperative outcomes.

<table>
<thead>
<tr>
<th>Category</th>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEMOGRAPHICS</td>
<td>6 variables</td>
<td></td>
</tr>
<tr>
<td>SURGICAL PROFILE</td>
<td>11 variables</td>
<td></td>
</tr>
<tr>
<td>PRE-OPERATIVE DATA</td>
<td>44 clinical variables</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 laboratory variables</td>
<td></td>
</tr>
<tr>
<td>INTRA-OPERATIVE DATA</td>
<td>16 clinical variables</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 occurrence variables</td>
<td></td>
</tr>
<tr>
<td>POST-OPERATIVE DATA</td>
<td>20 occurrence variables</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 laboratory variables</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 discharge variables</td>
<td></td>
</tr>
</tbody>
</table>
Inception of VA NSQIP

NVASRS

Pilot study at three private-sector hospitals

AHRQ grant 14 academic medical centers

4 community hospitals join

First Collaborative Formed MSQC

2004 ACS expansion of private-sector Initiative—ACS NSQIP

First Hospital Outside America Joins

Over 300 hospitals enrolled

First Hospital Joins

100th Hospital Joins

ACS NSQIP Evolution

Inception of VA NSQIP

NVASRS

Pilot study at three private-sector hospitals

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100th Hospital Joins

ACS NSQIP Evolution
# Quick Comparison Guide to ACS NSQIP Options*

<table>
<thead>
<tr>
<th></th>
<th>Classic (Original ACS NSQIP)</th>
<th>Essentials</th>
<th>Small &amp; Rural</th>
<th>Procedure Targeted</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who is Eligible</strong></td>
<td>Any hospital</td>
<td>Any hospital</td>
<td>Small and rural hospitals</td>
<td>Any hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Small defined as under 1680 cases per year or RUCA definition for rural)</td>
<td></td>
</tr>
<tr>
<td><strong>Best Suited For</strong></td>
<td>Those wanting additional data for research purposes</td>
<td>Those wanting to collect only the essential elements for QI Purposes</td>
<td>Small and rural hospitals</td>
<td>Larger hospitals; Those w/ CPT codes available w/in the hospital</td>
</tr>
<tr>
<td><strong>Number of Variables</strong></td>
<td>Approx. 69 “Clinical” variables</td>
<td>Approx. 46 “Clinical” Variables</td>
<td>Approx. 46 “Clinical” Variables</td>
<td>“Core” set of approx. 46 “Clinical” variables + Procedure specific variables (&quot;Core&quot; set is the same as Essentials)</td>
</tr>
<tr>
<td></td>
<td>(Small reduction to the original ACS NSQIP data set)</td>
<td>(Subset of Classic)</td>
<td>(Same as Essentials)</td>
<td></td>
</tr>
<tr>
<td><strong>Versions Available</strong></td>
<td>General/Vascular Multispecialty</td>
<td>General/Vascular Multispecialty</td>
<td>Multispecialty</td>
<td>General/Vascular Multispecialty</td>
</tr>
<tr>
<td><strong>Case Volume Requirements</strong></td>
<td>G/V = 1680 cases per year (or all cases if less than 1680)</td>
<td>G/V = 1680 cases per year or all cases if less than 1680</td>
<td>Maximum =1680 cases per year</td>
<td>Minimum =1680 cases per year (Exact volume dependent on the # of targeted procedures selected and hospital volume for each of these procedures)</td>
</tr>
<tr>
<td></td>
<td>Multi = 20% total case volume by specialty (minimum 1680 cases or all cases if less than 1680)</td>
<td>Multi = 20% total case volume by specialty (minimum 1680 cases or all cases if less than 1680)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sampling</strong></td>
<td>G/V = 40 cases per 8 day cycle</td>
<td>G/V = 40 cases per 8 day cycle</td>
<td>All cases (100% capture)</td>
<td>15 &quot;Core Cases&quot; per 8 day cycle (use NSQIP standard sampling methodology to select cases)</td>
</tr>
<tr>
<td></td>
<td>Multi= May be more than 40 cases per 8 day cycle - dependent on volume</td>
<td>Multi= May be more than 40 cases per 8 day cycle - dependent on volume</td>
<td></td>
<td>25 &quot;Procedure Targeted&quot; Cases per 8 day cycle (or more if additional FTEs available)</td>
</tr>
<tr>
<td><strong>FTE Requirements</strong></td>
<td>1 FTE</td>
<td>1 FTE</td>
<td>¼ FTE for up to 400 cases</td>
<td>1 FTE (Minimum)</td>
</tr>
<tr>
<td></td>
<td>May be more for Multispecialty-use formula: # cases required/1680 = # FTE required</td>
<td>May be more for Multispecialty-use formula: # cases required/1680 = # FTE required</td>
<td>½ FTE for up to 800 cases</td>
<td>May be more if hospital chooses to collect more than 1,000 &quot;Targeted&quot; procedures per year</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>¼ FTE for up to 1200 cases</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 FTE for up to 1680 cases</td>
<td></td>
</tr>
</tbody>
</table>

*The information is subject to change and may not be the most current.
## Percent of Outcomes Occurring After Discharge (Colectomy)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>% occurring post D/C</th>
<th>Median Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colectomy Length of Stay</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Mortality</td>
<td>18%</td>
<td>10</td>
</tr>
<tr>
<td>Superficial Surgical Site Infection</td>
<td>53%</td>
<td>9</td>
</tr>
<tr>
<td>Deep SSI</td>
<td>45%</td>
<td>10</td>
</tr>
<tr>
<td>Organ Space SSI</td>
<td>39%</td>
<td>11</td>
</tr>
<tr>
<td>Wound Disruption</td>
<td>34%</td>
<td>10</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>7.2%</td>
<td>6</td>
</tr>
<tr>
<td>Cardiac Arrest</td>
<td>55%</td>
<td>5</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td>21%</td>
<td>3</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>15%</td>
<td>6</td>
</tr>
<tr>
<td>DVT/PE</td>
<td>28/38%</td>
<td>10/8</td>
</tr>
<tr>
<td>Bleeding requiring 4u transfusion</td>
<td>6%</td>
<td>1</td>
</tr>
<tr>
<td>Sepsis</td>
<td>27%</td>
<td>4</td>
</tr>
<tr>
<td>Failure to wean/Unplanned Reintub</td>
<td>14%</td>
<td>2</td>
</tr>
<tr>
<td>Urinary Tract Infection</td>
<td>35%</td>
<td>9</td>
</tr>
</tbody>
</table>
Changes in Hospital Ranks After Risk Adjustment for 30-day Mortality

Rank by unadjusted mortality rate (\( \% \)) (1 = lowest rate)

Rank by risk-adjusted mortality rate (O/E ratio) (1=lowest ratio)
**Interpretation of O/E Results**

**HIGH OUTLIER:** If the O/E ratio and the lower range of the confidence interval are >1.0, the hospital’s outcomes are statistically **worse** than expected. Thus, your hospital’s outcomes are “Need Improvement”

**LOW OUTLIER:** If the O/E ratio and the higher range of the confidence interval are <1.0, the hospital’s outcomes are statistically **better** than expected. Thus, your hospital’s outcomes are “Exemplary.”

ACS NSQIP Hospital ID Number
Data Feedback

- Annual NSQIP conference
- Semiannual risk adjusted, benchmarked report
- Real-time, continuously updated benchmarked online reports
- Specific recommendations to outlier institutions
- Site visits available
- Identification and dissemination of best practices
- Able to benchmark with all or like sites
The Oregon NSQIP Consortium

- Patient Safety Commission
  - Report data and outcomes in aggregate
  - Disseminate best practices

- Participating hospitals
  - Kaiser Sunnyside Medical Center
  - Legacy Emanuel Hospital & Health Center
  - Legacy Good Samaritan Hospital
  - OHSU
  - Providence Portland Medical Center
  - Providence St. Vincent Medical Center
  - Sacred Heart Medical Center – Eugene
  - Salem Hospital
The 5 Phases of NSQIP Grief

- Denial: My patients are sicker, my operations harder...
- Anger: (do we really need to give you an example?)
- Bargaining: OK, let me look at that data, I can make some sense of it, its clearly flawed and only I can explain it to you.
- Sadness: Are we killing them? Do we really Suck?
- Acceptance: What should we do now? Help
Utilization of the National Surgical Quality Improvement Program to Improve Vascular Surgical Site Infection Rates

Antonios P Gasparis, MD
Mary Schroeter, RN
Sharon Valentine, RN
Find a process to improve:
Vascular Surgery Surgical Site Infection

NSQIP Data 7/07 – 6/08

Observed Rate: 5.52%
Expected Rate: 3.74%
O/E Ratio: 1.48
Clarify Current Knowledge of the Process: Chart Review

- NSQIP data collection form utilized during review
- Common denominators were sought and not found
- Requested a site visit from NSQIP leadership
- NSQIP provided a 39 page - SSI Survey Tool
- Included best practice & standards of care
- Describe current practice that may contribute to the hospital’s high outlier status for SSI?
## Vascular Surgery

**Lessons Learned – What is important**

<table>
<thead>
<tr>
<th>Vascular Surgery</th>
<th>7/05-6/06</th>
<th>1/06-12/06</th>
<th>7/06-6/07</th>
<th>1/07-12/07</th>
<th>7/07-6/08</th>
<th>1/08-12/08</th>
<th>7/08-6/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Day Mortality</td>
<td>0.47</td>
<td>0.59</td>
<td>0.99</td>
<td>0.97</td>
<td>1.09</td>
<td>0.82</td>
<td><strong>0.64</strong></td>
</tr>
<tr>
<td>30-Day Morbidity</td>
<td>1.42</td>
<td>1.27</td>
<td>1.14</td>
<td>1.15</td>
<td>1.19</td>
<td>1.23</td>
<td><strong>1.03</strong></td>
</tr>
<tr>
<td>Cardiac Complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>0.95</strong></td>
</tr>
<tr>
<td>Pneumonia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>0.79</strong></td>
<td><strong>0.00 L</strong></td>
</tr>
<tr>
<td>Surgical Site Infection</td>
<td>3.36 H</td>
<td>2.20 H</td>
<td>1.05</td>
<td>0.9</td>
<td>1.48</td>
<td>1.31</td>
<td><strong>0.38</strong></td>
</tr>
</tbody>
</table>

**Lessons Learned:**

- SSI reduction has a positive and significant effect on other metrics

**What is Important:**

- Surgeons must develop and agree on the plan of action
- Understanding and agreement of plan among department LIP’s
- Execute plan - make changes as necessary to maintain momentum
- Weekly meetings to review compliance and tackle barriers
82% of NSQIP hospitals had decreased surgical complications.

66% of NSQIP hospitals had decreased mortality.

Hospitals prevented 250-500 complications per year.
Accelerating the Pace of Surgical Quality Improvement

The Power of Hospital Collaboration

Darrell A. Campbell Jr, MD; Michael J. Englesbe, MD; James J. Kubus, MS; Laurel R. S. Phillips, RN, MSN; Charles J. Shanley, MD; Vic Velanovich, MD; Larry R. Lloyd, MD; Max C. Hutton, MD; Wallace A. Arneson, MD; David A. Share, MD, MPH

Hypothesis: A regional collaborative approach is an efficient platform for surgical quality improvement.

Design: Retrospective cohort study.

Setting: Academic research.

Patients: Patients undergoing general and vascular surgical procedures in 16 hospitals of the Michigan Surgical Quality Collaborative (MSQC) were evaluated quarterly to discuss surgical quality, to identify best practices, and to assess problems with process implementation.

Main Outcome Measures: Results among MSQC patients were compared with those among 126 non-Michigan hospitals participating in the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) over the same interval.

Results: A total of 315,699 patients were included in the analysis. To assess improvement, patients were stratified into 2 periods (T1 and T2). The 35,422 MSQC patients (10.7% morbidity in T1 vs 9.7% in T2 [9.0% reduction], P=.002) showed improvement, while 280,277 non-Michigan ACS NSQIP patients did not (12.4% morbidity in T1 and T2, P=.49). No improvements in mortality rates were noted in either group. Overall, the odds of experiencing a complication in T2 compared with T1 were significantly less in the MSQC group (odds ratio, 0.898) than in the non-Michigan ACS NSQIP group (odds ratio, 1.000) (P=.004).

Conclusion: A statewide surgical quality improvement collaborative supported by a third-party payer showed significant improvement in quality and high levels of participant satisfaction.

Arch Surg. 2010;145(10):985-991
Figure 3. Trends in the ratios of observed to expected morbidity between Michigan Surgical Quality Collaborative (MSQC) and non-Michigan American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) hospitals over time (January 2005 through November 2007). There was a significant difference in the slopes of the lines ($P = .001$), with a significant trend toward lower ratios of observed to expected morbidity in MSQC hospitals (slope, $-0.0008$; $P = .008$) vs non-Michigan ACS NSQIP hospitals (slope, $0.001$; $P = .11$).
Pre-op Smoking Cessation

- Benefit mostly shown in orthopedic / spine / plastics literature
  - Data mixed in GS population 1990’s vs 2000’s literature
  - Timing of “last” cigarette is key
  - Cochrane analysis 2005 no specific effect

- Clearly decreases collagen deposition
  - Jorgensen LN, APMIS 2003;115:1-56
  - ePTFE human model

- Prospective trial smoking abstinence \(^1\)
  - 228 incisional wounds (4 groups)
  - Non-smokers, smokers, abstinent +/- nicotine patch
  - Wound infection 12 vs 2 %
  - 4 weeks of abstinence decreases infections

---

Pre-op Bathing

• Antiseptic showers (preoperative)
  • Reduced bacterial counts by $3.5 \times 10^{10}$ from baseline\(^1\)
  • Cochrane Database “no benefit” 2009
  • No consistent evidence that they affect SSIs\(^2,3\)

• Pre-op Staph *aureus* screening\(^4,5\)
  • NEJM (2010)
    • 6771 screened ITT analysis
    • ¼ of population + Staph *aureus*, ~2% MRSA
    • Mupirocin/Chlorhexidine x 5days = 44%↓ post op wound infection
  • JBJS (2010)
    • >7000 pts 4.4% MRSA carriers
    • Preop treatments decreased infection

---

5. Kim, DH et al JBJS 2010;92
Skin Preparations

- Prospectively compared 3 commonly used preps general surgery cases (N=3209)
- **Betadine**® (povidone Iodine 10% in water)
- **Chloroprep**® (chlorhexidine 2% isopropyl alcohol 70%)
- **Duraprep**® (Iodine povacrylex, isopropyl alcohol)
- SSI followed for 30 days post-op, ITT

**Conclusion:**
- Duraprep lowest SSI,
- Iodine solutions 4.8 %, chlorhexidine 8.2%

Swenson, BR, Sawyer RG et al Infect Control Hosp Epidem 2009
“Chlorhexidine-Alcohol vs Povidone Iodine for Surgical-Site Antisepsis”

- PRT 6 hospitals, clean contaminated cases
- 849 patients ITT analysis
- Primary outcome: SSI at 30 days
- Secondary outcome: type of SSI
- Results:
  - Chlorhexidine 9.5% vs Povidone-iodine 16.1%
  - Chlorhexidine better for superficial, and deep infections
  - No difference in organ space infections 4.4% v 4.5%

Darouiche RO. NEJM 2010;362:18-26
Bowel Preps

- 14 trails 4859 patients
  - 1* outcome anastomotic leak
  - 2nd outcome septic episodes

Results:
- No difference in leaks or pelvic abscesses
- If all infections considered slight benefit to no bowel prep (p<.02)

Conclusion: Although this study did not confirm the harmful effect of mechanical bowel preparation (suggested by previous meta-analyses), this meta-analysis including almost 5000 patients, demonstrates with a high level of evidence that any kind of mechanical bowel preparation should be omitted before colonic surgery.

Slim K et al Ann Surg 2009
“Preoperative Oral Antibiotics in Colorectal Surgery Increase the Rate of Clostridium difficile Colitis”

- N=304 patients
- 30 day follow up with ELISA Toxin A/B

**Conclusion:**
- 4.2% incidence in total study
- 2.6% in group with just mechanical preop / iv antibiotics
- 7.4% in group with oral antibiotics mechanical prep and preop iv antibiotics
Emergence of B1/NAP1 Strain

- Produces 16-23 times C. diff. toxins A and B in vitro, represented 50% of isolated strains between 2001-2003
  - Produces a 3rd binary toxin
- Increased risk of relapse
- Less responsive to standard therapies

Major Genes in the Pathogenicity Locus (PaLoc) of Clostridium difficile and Relation to the Genes for Binary Toxin

Figure 2. States with the North American Pulsed Field Type 1 (B1/NAP1) strain of C. difficile confirmed by CDC as of November 15, 2005 (N=16).
Hyperglycemia and Risk of Infection in Surgical Patients

  100 consecutive uninfected diabetic patients
  Elective Surgery

- Serum glucose >220 mg/dl on POD 1
  - Sensitive predictor of subsequent infection (87.5%)
  - Associated with
    - 2.7 times higher rate of infection
    - 5.7 times higher rate of severe infection

Pomposelli (1998)/JPEN 22:71
HYPERGLYCEMIA IN SURGICAL PATIENTS

Impairs Immune System

- Inhibits phagocytosis
- Inhibits microvasculature response to relaxation
- Increases expression of pro-inflammatory cytokines
- Increases WBC apoptosis
- Inhibits monocyte presentation of antigen

Impairs Wound Healing

- Fibroblasts exhibit ↓ in proliferation and migration
- Microcirculation has compromised vasodilatation with ↓ O2 delivery to wound
• Retrospective study of 995 patients who had undergone general and vascular surgery
• 80% had no known diabetes

POI ↑ by 30% for every 40 mg/dl over 110
The Effect of Erythrocyte Blood Transfusions on Survival After Surgery for Hip Fracture

Milo Engoren, MD, Eric Mitchell, MD, Paul Perrin, MD, and Joseph Sferra, MD

Background: Studies in cardiac surgery patients have suggested that allogeneic erythrocyte blood transfusions are associated with an increased long-term mortality. However, studies in patients undergoing surgery for hip fractures have found no effect of transfusion on short-term mortality, but did not evaluate the effects on long-term mortality. The purpose of this study is to analyze the effect of allogeneic erythrocyte blood transfusions on long-term mortality.

Methods: Charts of all patients undergoing surgery for hip fracture (International Classification of Disease 820.0-820.9) between January 1, 2003 and December 31, 2005 were reviewed for demographic, comorbidities, laboratory values, use of and age of transfused blood products. Death was determined from the Social Security Death Index. Survival was analyzed with Cox models and Kaplan-Meier statistics. To control for biases in this retrospective study, a subpopulation was analyzed after propensity matching using Cox modeling.

Results: Thirty-one of the 59 patients (53%) dead at follow-up had received allogeneic erythrocyte transfusions, compared with 59 of 170 survivors (35%) (p = 0.02). However, the increased risk of death was time dependent. Transfusion became a risk factor for death only after at least 90 days after surgery. By Cox modeling, transfusion was associated with an increased risk of death (relative risk = 3.386, 95% CI = 1.255–9.534, p = 0.01; c-statistic = 0.612 ± 0.055; p = 0.03). Seventy-four (32%) of patients were matched using propensity analysis. Similar to the total population, the increased mortality associated with transfusion did not occur for at least 90 days. Using Cox proportional hazard modeling in propensity-matched patients who survived at least 90 days after surgery, transfusion remained a predictor of death (relative risk = 3.766, 95% CI = 1.216–11.626, p = 0.02).

Conclusion: We found that use of allogeneic erythrocyte transfusions to patients undergoing surgical repair of hip fractures was associated with an increased risk of death. This risk started after 90 days from surgery and persisted the length of follow-up.

Key Words: Blood transfusion, Hip fracture, Survival, Mortality.

Table 3: Mortality (%) of Transfused vs. Nontransfused Patients in Propensity-Matched Patients

<table>
<thead>
<tr>
<th>Time Post Surgery</th>
<th>Transfused (n = 37)</th>
<th>Not-Transfused (n = 37)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 d</td>
<td>3 (8)*</td>
<td>0 (0)</td>
<td>0.24</td>
</tr>
<tr>
<td>90 d</td>
<td>4 (11)</td>
<td>1 (3)</td>
<td>0.38</td>
</tr>
<tr>
<td>1 yr</td>
<td>9 (24)</td>
<td>1 (3)</td>
<td>0.01</td>
</tr>
<tr>
<td>2 yr</td>
<td>11 (30)</td>
<td>3 (9)</td>
<td>0.04</td>
</tr>
<tr>
<td>Follow-up</td>
<td>15 (41)</td>
<td>6 (16)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*Values in parentheses indicate percentage.

J Trauma. 2008;65:1411–1415.

Fig. 1. Kaplan-Meier survival curve of all patients: transfused vs. nontransfused (p = 0.02).
Increased Mortality, Postoperative Morbidity, and Cost After Red Blood Cell Transfusion in Patients Having Cardiac Surgery

Gavin J. Murphy, BSc, ChB, MD, FRCS(CTh); Barnaby C. Reeves, BA, MSc, DPhil; Chris A. Rogers, BSc, PhD; Syed I.A. Rizvi, MBBS, MRCS; Lucy Calliford, BSc, MSc, PhD; Gianni D. Angelini, MCh, MD, FRCS, FETCS

Background—Red blood cell transfusion can both benefit and harm. To inform decisions about transfusion, we aimed to quantify associations of transfusion with clinical outcomes and cost in patients having cardiac surgery.

Methods and Results—Clinical, hematology, and blood transfusion databases were linked with the UK population register. Additional hematocrit information was obtained from intensive care unit charts. Composite infection (respiratory or wound infection or sepsis) and ischemic outcomes (myocardial infarction, stroke, renal impairment, or failure) were prespecified as coprimary end points. Secondary outcomes were resource use, cost, and survival. Associations were estimated by regression modeling with adjustment for potential confounding. All adult patients having cardiac surgery between April 1, 1996, and December 31, 2003, with key exposure and outcome data were included (98%). Adjusted odds ratios for composite infection (737 of 8516) and ischemic outcomes (832 of 8518) for transfused versus nontransfused patients were 3.38 (95% confidence interval [CI], 2.60 to 4.40) and 3.35 (95% CI, 2.68 to 4.35), respectively. Transfusion was associated with increased relative cost of admission (any transfusion, 1.42 times [95% CI, 1.37 to 1.46], varying from 1.11 for 1 U to 3.35 for >9 U). At any time after their operations, transfused patients were less likely to have been discharged from hospital (hazard ratio [HR], 0.63; 95% CI, 0.60 to 0.67) and were more likely to have died (0 to 30 days: HR, 6.69; 95% CI, 3.66 to 13.1; 31 days to 1 year: HR, 2.59; 95% CI, 1.68 to 4.17; >1 year: HR, 1.32; 95% CI, 1.08 to 1.64).

Conclusions—Red blood cell transfusion in patients having cardiac surgery is strongly associated with both infection and ischemic postoperative morbidity, hospital stay, increased early and late mortality, and hospital costs. (Circulation. 2007;116:900-908.)

![Figure 4. Kaplan-Meier survival curve showing the cumulative proportion of patients who died over time according to whether patients had had an RBC transfusion. Vertical dotted lines separate the epochs of follow-up time for which hazard ratios were estimated (ie, 0 to 30 days, 31 days to 1 year, and after 1 year).](image-url)
“Efficacy of Protocol Implementation on Incidence of Wound Infection in Colorectal Operations”

- **Introduction:**
  - 26% incidence of SSI in CRS
  - Independent risk factors
    - Obesity, poor antibiotic prophylaxis, hypothermia, poor glycemic control

- **Protocol**
  - Appropriate, timely antibiotics, d/c w/in 24h
  - Intraop-normothermia
  - Improved glycemic control

- **Conclusions:**
  - Implementation of protocol in CRS improved the incidence of SSI by 39%

OHSU Colorectal Surgeries

Surgical Site Infections - NSQIP Data

- **Superficial SSI**: 12.3% (2008) vs 7.7% (2009)
- **Deep SSI**: 1.2% (2008) vs 3.8% (2009)
- **Organ/Space SSI**: 13.6% (2008) vs 7.7% (2009)

Total infection 2008 = 27.1%
2009 = 19.2%

OHSU pre and post implementation of CRS protocol:
Skin preparation, antibiotic prophylaxis, warming, oxygenation
“Every system operates always at its capacity. As soon as there is some improvement, some new technology, we stretch it. Thus safety interventions typically become converted to production; since work is safer, more work is now expected in less time or with fewer resources.”

Woods – Law of Stretched Systems
Burnout and Medical Errors Among American Surgeons

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Objective: To evaluate the relationship between burnout and perceived major medical errors among American surgeons.

Background: Despite efforts to improve patient safety, medical errors by physicians remain a common cause of morbidity and mortality.

Methods: Members of the American College of Surgeons were sent an anonymous, cross-sectional survey in June 2008. The survey included self-assessment of major medical errors, a validated depression screening tool, and standardized assessments of burnout and quality of life (QOL).

Results: Of 7905 participating surgeons, 700 (8.9%) reported concern they had made a major medical error in the last 3 months. Over 70% of surgeons attributed the error to individual rather than system level factors. Reporting an error during the last 3 months had a large, statistically significant adverse relationship with mental QOL, all 3 domains of burnout (emotional exhaustion, depersonalization, and personal accomplishment) and symptoms of depression. Each one point increase in depersonalization (scale range, 0–33) was associated with an 11% increase in the likelihood of reporting an error while each one point increase in emotional exhaustion (scale range, 0–54) was associated with a 5% increase. Burnout and depression remained independent predictors of reporting a recent major medical error on multivariate analysis that controlled for other personal and professional factors. The frequency of overnight call, practice setting, method of compensation, and number of hours worked were not associated with errors on multivariate analysis.

Conclusions: Major medical errors reported by surgeons are strongly related to a surgeon’s degree of burnout and their mental QOL. Studies are needed to determine how to reduce surgeon distress and how to support surgeons when medical errors occur.

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The natural history of recovery for the healthcare provider "second victim" after adverse patient events.

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Comment in:

Abstract

BACKGROUND: When patients experience unexpected events, some health professionals become "second victims". These caregivers feel as though they have failed the patient, second-guessing clinical skills, knowledge base and career choice. Although some information exists, a complete understanding of this phenomenon is essential to design and test supportive interventions that achieve a healthy recovery.

METHODS: The purpose of this article is to report interview findings with 31 second victims. After institutional review board approval, second victim volunteers representing different professional groups were solicited for private, hour-long interviews. The semistructured interview covered demographics, participant recount of event, symptoms experienced and recommendations for improving institutional support. After interviews, transcripts were analyzed independently for themes, followed by group deliberation and reflective use with current victims.

RESULTS: Participants experienced various symptoms that did not differ by sex or professional group. Our analysis identified six stages that delineate the natural history of the second victim phenomenon. These are (1) chaos and accident response, (2) intrusive reflections, (3) restoring personal integrity, (4) enduring the inquisition, (5) obtaining emotional first aid and (6) moving on. We defined the characteristics and typical questions second victims are desperate to have answered during these stages. Several reported that involvement in improvement work or patient safety advocacy helped them to once again enjoy their work.

CONCLUSIONS: We now believe the post-event trajectory is largely predictable. Institutional programs could be developed to successfully screen at-risk professionals immediately after an event, and appropriate support could be deployed to expedite recovery and mitigate adverse career outcomes.

PMID: 19812092 [PubMed - in process]
Physicians down-regulate their pain empathy response: an event-related brain potential study.

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Abstract

Watching or imagining other people experiencing pain activates the central nervous system's pain matrix in the observer. Without emotion regulation skills, repeated exposure to the suffering of others in healthcare professionals may be associated with the adverse consequences of personal distress, burnout and compassion fatigue, which are detrimental to their wellbeing. Here, we recorded event-related potentials (ERP) from physicians and matched controls as they were presented with visual stimuli depicting body parts pricked by a needle (pain) or touched by a Q-tip (no-pain). The results showed early N110 differentiation between pain and no-pain over the frontal area as well as late P3 over the centro-parietal regions were observed in the control participants. In contrast, no such early and late ERP responses were detected in the physicians. Our results indicate that emotion regulation in physicians has very early effects, inhibiting the bottom-up processing of the perception of pain in others. It is suggested that physicians' down-regulation of the pain response dampens their negative arousal in response to the pain of others and thus may have many beneficial consequences including freeing up cognitive resources necessary for being of assistance.

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Faculty Wellness Program

Our mission is to enhance the well-being of faculty with coaching and counseling services.
The relationship between perceived practice quality and quality improvement activities and physician practice dissatisfaction, professional isolation, and work-life stress.

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Abstract

BACKGROUND: The importance of physician well-being has been well-documented. However, little is known about how physicians' self-reported quality improvement (QI) activities and quality of care are related to their practice dissatisfaction, professional isolation, and work-life stress.

METHODS: We surveyed a random sample of 1884 physicians in Massachusetts by mail and assessed their practices' participation in QI activities and quality of care, as well as their feelings of professional isolation, work-life stress, and practice dissatisfaction.

RESULTS: A total of 1345 physicians responded (71.4% response rate). Most respondents reported QI activities in their practices (85%) and subsequent evaluation of these activities (62%). Approximately one-third (33%) reported quality problems in their practice. In linear regression analyses, the presence of quality problems was independently associated with increased professional isolation, work-life stress, and practice dissatisfaction. In contrast, physicians from practices that were involved in the evaluation of QI activities had significantly less isolation, stress, and dissatisfaction. Participation in QI activities was also independently associated with less dissatisfaction. A substantial fraction of physicians reported moderate to severe problems with isolation (17%), work-life stress (31%), and dissatisfaction (27%).

CONCLUSIONS: Substantial practice dissatisfaction, professional isolation, and work-life stress are experienced by physicians and they seem to be inversely correlated with QI activities. Physicians who perceive quality problems in their practices are more likely to experience dissatisfaction, isolation, and stress. Efforts to engage physicians in QI and systems change should assess how these programs affect physicians themselves and the care that they deliver.

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Many Heroes
One Mission