Quality Measurement in Critical Care

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Definition: Medical Quality

Medical quality is the degree to which health care systems, services and supplies for individuals and populations increase the likelihood for positive health outcomes

Institute of Medicine, 1990
ICU Quality Indicators

<table>
<thead>
<tr>
<th>Structure</th>
<th>Process</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| • Physician staffing  
• Nurse-patient ratio  
• Pharmacist on rounds  
• CPOE  
• SBT protocol  
• SWU protocol | • Daily intensivist rounds  
• ICU LOS  
• VAP prevention  
• CRBSI prevention  
• Glycemic control  
• Autopsy/M&M  
• Transfusions  
• Handwashing | • Risk adjusted mortality  
• VAP rate  
• CRBSI rate  
• Rate of resistant infections  
• Pressure ulcers  
• Pt/Family satisfaction |

Is Mortality a Quality Measure?
Maybe:
• Only if appropriate risk-adjustment occurs
• What is impact of palliative care?
• What is impact of ability to transfer in/out?
• Regional differences in end of life care
• How about disease-specific mortality?
• More than 90% of deaths are unrelated to unsafe care

Who is looking at your hospital?
• The public/media
• Agency for Healthcare Research in Quality
• University Healthsystems Consortium (UHC)
• The Joint Commission (TJC)
• Leapfrog Group
• Institute for Healthcare Improvement
• National Quality Forum (NQF)
• Volunteer Hospital Association (VHA)
The 100,000 Lives Campaign: Getting Started

Institute for Healthcare Improvement
Six Changes That Save Lives

• Deployment of Rapid Response Teams...at the first sign of patient decline
• Delivery of Reliable, Evidence-Based Care for Acute Myocardial Infarction...to prevent deaths from heart attack
• Prevention of Adverse Drug Events (ADEs)...by implementing medication reconciliation
• Prevention of Central Line Infections...by implementing a series of interdependent, scientifically grounded steps called the “Central Line Bundle”
• Prevention of Surgical Site Infections...by reliably delivering the correct perioperative antibiotics at the proper time
• Prevention of Ventilator-Associated Pneumonia...by implementing a series of interdependent, scientifically grounded steps called the “Ventilator Bundle”

Leapfrog ICU Standard

“Hospitals fulfilling this standard will operate adult ICUs that are managed by physicians board-certified (or -eligible) in critical care medicine who:
1. are present during daytime hours and provide clinical care exclusively in the ICU; and,
2. at other times can return more than 95% of ICU pages within 5 minutes and, 95% of the time, arrange for a FCCS certified physician or physician extender to reach the ICU patient within 5 minutes.”

Intensivist Staffing

Pronovost et al, JAMA 2002

Physician Staffing Patterns and Clinical Outcomes in Critically Ill Patients: A Systematic Review

Peter J. Pronovost, MD, PhD
Dena C. Spertus, MD, MSc, MPH
Todd Barman, MD
Karen A. Bobrowitz, RN
Terry T. Brownstein, MBA
Tracy L. Young
Intensivist Staffing
(Pronovost et al, JAMA, 2003)

Surgical Care Improvement Project

- National campaign started in 2005
- Initiated by CMS and CDC
- To prevent surgical morbidity and mortality by 25% over 10 years (by 2010)
- Steering committee of 10 organizations
SCIP Participants

1. Agency for Healthcare Research and Quality
2. American College of Surgeons
3. American Hospital Association
4. American Society of Anesthesiologists
5. Association of Perioperative Registered Nurses
6. Centers for Disease Control and Prevention
7. Centers for Medicare & Medicaid Services
8. Department of Veterans Affairs
9. Institute for Healthcare Improvement
10. The Joint Commission

Surgical Care Improvement Project Core Measure Set

<table>
<thead>
<tr>
<th>Set Measure ID</th>
<th>Measure Short Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCIP Inf-1</td>
<td>Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision</td>
</tr>
<tr>
<td>SCIP Inf-2</td>
<td>Prophylactic Antibiotic Selection for Surgical Patients</td>
</tr>
<tr>
<td>SCIP Inf-3</td>
<td>Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time</td>
</tr>
<tr>
<td>SCIP Inf-4</td>
<td>Cardiac Surgery Patients With Controlled 6 A.M. Postoperative Blood Glucose</td>
</tr>
<tr>
<td>SCIP Inf-6</td>
<td>Surgery Patients with Appropriate Hair Removal</td>
</tr>
<tr>
<td>SCIP Inf-8</td>
<td>Urinary catheter removed on Postoperative Day 1 (POD 1) or Postoperative Day 2 (POD 2) with day of surgery being day zero</td>
</tr>
<tr>
<td>SCIP Inf-10</td>
<td>Surgery Patients with Perioperative Temperature Management</td>
</tr>
<tr>
<td>SCIP Card-2</td>
<td>Surgery Patients on Beta-Blocker Therapy Prior To Anesthesia Who Received a Beta-Blocker During the Perioperative Period</td>
</tr>
<tr>
<td>SCIP VTE-1</td>
<td>Surgery Patients with Recommended Venous Thromboembolism Prophylaxis Ordered</td>
</tr>
<tr>
<td>SCIP VTE-2</td>
<td>Surgery Patients Who Received Appropriate Venous Thromboembolism Prophylaxis Within 24 Hours Prior to Surgery to 24 Hours After Surgery</td>
</tr>
</tbody>
</table>

Antibiotics Received within 1 hr Prior to Surgical Incision
Don’t throw stones…

Program Specifics

ACS NSQIP Data Collection Overview

The ACS NSQIP collects data on 135 variables, including preoperative risk factors, intraoperative variables, and 30-day postoperative mortality and morbidity outcomes for patients undergoing major surgical procedures in both the inpatient and outpatient setting. A site’s surgical clinical nurse reviewer (SCN) using a variety of methods including chart abstraction captures outcomes data.

The ACS NSQIP involves four basic steps that are rigorously followed to collect a medical center’s surgical data and then process it in order to improve patient outcomes.
Benchmarking Outcomes

Fig. 1. Depiction of O/E ratios and identification of outlier status as determined by the ACS NSQIP.

NSQIP VA Hospitals 30d Mortality

Khuri, Ann Surg, 2005

Variation in Hospital Mortality Associated with Inpatient Surgery

Amir A. Ghafari, M.D., John D. Birkmeyer, M.D., and Justin B. Dimick, M.D., M.P.H.

Abstract

84,750 Patients from NSQIP database
Incidence of Complication

<table>
<thead>
<tr>
<th>Variable</th>
<th>Very Low Mortality</th>
<th>Low Mortality</th>
<th>Medium Mortality</th>
<th>High Mortality</th>
<th>Very High Mortality</th>
<th>Odds Ratio for Very High Mortality vs Low Mortality (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>2.0</td>
<td>2.4</td>
<td>1.6</td>
<td>2.4</td>
<td>2.1</td>
<td>1.40 (0.79-2.59)</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>6.0</td>
<td>7.1</td>
<td>6.5</td>
<td>7.0</td>
<td>8.1</td>
<td>1.28 (0.99-1.68)</td>
</tr>
<tr>
<td>Unplanned reoperation</td>
<td>3.6</td>
<td>4.3</td>
<td>3.6</td>
<td>4.3</td>
<td>4.6</td>
<td>1.39 (0.94-2.05)</td>
</tr>
<tr>
<td>Acute renal failure</td>
<td>1.9</td>
<td>3.0</td>
<td>1.2</td>
<td>1.7</td>
<td>1.6</td>
<td>1.20 (0.90-1.60)</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>9.5</td>
<td>9.8</td>
<td>9.5</td>
<td>9.4</td>
<td>9.7</td>
<td>1.06 (0.80-1.43)</td>
</tr>
<tr>
<td>Emergency reoperation</td>
<td>9.7</td>
<td>9.7</td>
<td>9.7</td>
<td>9.7</td>
<td>9.7</td>
<td>1.00 (0.75-1.38)</td>
</tr>
<tr>
<td>Respiratory/Neurology</td>
<td>1.2</td>
<td>1.3</td>
<td>1.2</td>
<td>1.4</td>
<td>1.4</td>
<td>1.35 (0.95-1.93)</td>
</tr>
<tr>
<td>Deep wound infection</td>
<td>2.1</td>
<td>1.7</td>
<td>1.7</td>
<td>2.1</td>
<td>1.9</td>
<td>0.92 (0.61-1.43)</td>
</tr>
<tr>
<td>Organ rejection</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>1.00 (0.75-1.38)</td>
</tr>
<tr>
<td>Injury shock</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>1.00 (0.75-1.38)</td>
</tr>
<tr>
<td>Fecal dehiscence</td>
<td>1.9</td>
<td>1.7</td>
<td>1.4</td>
<td>1.7</td>
<td>1.9</td>
<td>1.05 (0.79-1.40)</td>
</tr>
<tr>
<td>Sepsis</td>
<td>9.0</td>
<td>9.0</td>
<td>9.0</td>
<td>9.0</td>
<td>9.5</td>
<td>0.70 (0.43-1.14)</td>
</tr>
</tbody>
</table>

Ghaferi et al. NEJM 2009

Figure 1. Rates of All Complications, Major Complications, and Death after Major Complications, According to Hospital Quintiles of Mortality.

Complication rates were the same, but mortality was different at different hospitals.

Are Hospital Rankings Objective?
Or are hospital rankings subjective?

University Healthsystems Consortium (UHC) Quality and Safety Measures

<table>
<thead>
<tr>
<th>Metric Number</th>
<th>Description</th>
<th>Signal Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS-2</td>
<td>Death in in-hospital OAs</td>
<td>High</td>
</tr>
<tr>
<td>PS-4</td>
<td>Failure to rescue</td>
<td>Moderate-high</td>
</tr>
<tr>
<td>PS-6</td>
<td>Iatrogenic pneumonia</td>
<td>Moderate-high</td>
</tr>
<tr>
<td>PS-7</td>
<td>Selected infections due to medical care</td>
<td>Moderate-high</td>
</tr>
<tr>
<td>PS-8</td>
<td>Postoperative hip fracture</td>
<td>Moderate-high</td>
</tr>
<tr>
<td>PS-10</td>
<td>Postoperative pulmonary embolism or deep vein thrombosis</td>
<td>High</td>
</tr>
<tr>
<td>PS-11</td>
<td>Anomalous pancreas necrosis or perforation</td>
<td>Moderate-high</td>
</tr>
<tr>
<td>PS-12</td>
<td>Birth trauma</td>
<td>High</td>
</tr>
<tr>
<td>PS-13</td>
<td>Obstetric trauma—vaginal with instrument</td>
<td>High</td>
</tr>
<tr>
<td>PS-14</td>
<td>Obstetric trauma—vaginal without instrument</td>
<td>High</td>
</tr>
</tbody>
</table>

UHC Quality Rankings: Objective

Figure 3: Quality and Accountability Scores: Distributions and Characteristics
The example of catheter related bloodstream infection

Epidemiology of CRBSI

• > 5 million central venous catheters inserted each year

• CRBSI occurs with 3-5% of catheters and affects more than 250,000 patients per year in the US

• Mortality: 5-35%
  – 2500 to 20,000 deaths per year

Cost of CRBSI

Table 2—Prior Estimates of the Attributable Morbidity and Cost of CRBSIs*

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Extra ICU LOS, d</th>
<th>Extra Ward LOS, d</th>
<th>Cost per CRBSI, S</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMWR*20</td>
<td>1992</td>
<td>NR</td>
<td>NR</td>
<td>3,517</td>
</tr>
<tr>
<td>Arnow et al*5</td>
<td>1993</td>
<td>NR</td>
<td>NR</td>
<td>4,830</td>
</tr>
<tr>
<td>Pittet et al*14</td>
<td>1994</td>
<td>6.5</td>
<td>6.0</td>
<td>29,680</td>
</tr>
<tr>
<td>D'Agostino et al*14</td>
<td>1999</td>
<td>10.3</td>
<td>2.7</td>
<td>34,598</td>
</tr>
<tr>
<td>Belo et al*25</td>
<td>2000</td>
<td>10.6 (combined)</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Smolin et al*26</td>
<td>2001</td>
<td>14.6</td>
<td>6.5</td>
<td>40,133</td>
</tr>
<tr>
<td>Remaud and Bonn</td>
<td>2002</td>
<td>9.5</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Dinneen et al*27</td>
<td>2004</td>
<td>20</td>
<td>22</td>
<td>66,167</td>
</tr>
</tbody>
</table>

Shorr et al, CHEST 2003
108 ICU’s in Michigan

Interventions:
- Handwashing, full barrier precautions, chlorhexidine prep, avoiding femoral lines, asking about removal on rounds
### Table 1: Rates of Central-venous-Infusion-associated Bloodstream infection from baseline to follow implementation of the study intervention in 2004-2006

<table>
<thead>
<tr>
<th>Study Period</th>
<th>No. of ICUs</th>
<th>No. of Bloodstream Infections per 1000 Catheter-Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>15</td>
<td>2.7 (0.8-4.8)</td>
</tr>
<tr>
<td>April-implmentation</td>
<td>14</td>
<td>1.6 (0.4-4.1)</td>
</tr>
<tr>
<td>May-implmentation</td>
<td>14</td>
<td>1.7 (0.4-4.7)</td>
</tr>
<tr>
<td>June-implmentation</td>
<td>15</td>
<td>0.6 (0.3-1.3)</td>
</tr>
<tr>
<td>July-implmentation</td>
<td>16</td>
<td>1.8 (0.8-3.8)</td>
</tr>
<tr>
<td>August-implmentation</td>
<td>15</td>
<td>0.9 (0.4-1.3)</td>
</tr>
<tr>
<td>September-implmentation</td>
<td>14</td>
<td>1.6 (0.5-3.5)</td>
</tr>
<tr>
<td>October-implmentation</td>
<td>14</td>
<td>1.7 (0.5-4.3)</td>
</tr>
</tbody>
</table>

### CRBSI Reduction Program at UCSF

- **UCSF’s cost is $80,000 per CRBSI**
- **Attributable mortality is 35%**
- **In 2004:** 19,536 patient days, 12,052 line days
  - CRBSI rate = 3.7/1000 line days, 45 CRBSI’s
  - 45 x $80K = $3.6M
  - Expected 16 deaths
- **Program implemented early 2005**
  - Medical center hired 3 patient safety practitioner RN’s
  - Maximum sterile barrier precautions
  - Chlorhexidine skin prep
  - Emphasis on handwashing
  - Implementation of antibiotic impregnated catheters
  - Line removal checklist in ICU
  - Line insertion checklist
CRBSI Reduction at UCSF

- In 2006: 24,408 patient days (20% increase), 12,769 line days
  - CRBSI rate = 1.7/1000 line days, 22 CRBSI's
  - Expected 8 deaths (versus 16 in 2004)
- Expected (@2004 rate) = 47 CRBSI's
- Expected deaths = 16
- Estimated 8 lives saved

2004: 47 CRBSI's x $80K = $3,760,000
2006: 22 CRBSI's x $80K = $1,760,000
____ estimated savings = $2,000,000

Pay for Performance

- Reward quality with financial incentives large enough for structural change
- Effectuate health system changes to reduce errors and improve quality and to reduce cost and improve efficiency of care
- Encourage MD’s to broaden care beyond the office visit (population management)
- Put greater responsibility on MD’s to “get it right the first time”
Pay for Performance Affects YOU!
• Under the rules adopted by the Centers for Medicare and Medicaid Services (CMS), payments will be withheld from hospitals for care associated with treating certain catheter-associated urinary tract infections, vascular catheter-associated infections, mediastinitis after coronary artery bypass graft (CABG) surgery, and five other medical errors unrelated to infections (bed sores, objects left in patient’s bodies, blood incompatibility, air embolism, and falls). The new rules went into effect in October 2008.

ORIGINAL CONTRIBUTION

Quality of Traditional Surveillance for Public Reporting of Nosocomial Bloodstream Infection Rates

Michael T. Liu, MD, MPH
Kara Hua, MD, MPH
Yuef N. Khan, MD, MPH
Karen F. Wroblewski, MD
Tara E. Berkel, MD
Joshua A. Babin, MD
Kate B. Morris, MD, MPH
Robert A. Waterman, MD
William C. Finch, MD

Controversy over the variability of hospital infection rates, determined by the Centers for Disease Control and Prevention (CDC) surveillance definitions, have sparked interest in understanding the quality of patient care delivered by hospitals. However, such comparisons are valid only if surveillance is performed consistently across institutions.

Objective To assess variation in traditional surveillance for hospital infections.

Design, Setting, and Participants We performed a retrospective cohort study of 20 affected centers using the Hospital Inpatient Quality Reporting System (HIQRS) database, focusing on bloodstream infections (BSIs) and urinary tract infections (UTIs). We examined the correlation between the rates of BSIs and UTIs, and assessed whether the rates of BSIs and UTIs were similar across hospitals.

Main Outcome Measure Correlation of central line-associated BSIs and UTIs.

JAMA. 2010;304(18):2037–2040

Variation in Reporting CRBSI

Figure 4. Relative Ranking of 4 Medical Centers

<table>
<thead>
<tr>
<th>Medical Center</th>
<th>Intensive Care Unit</th>
<th>Computer algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

JAMA. 2010;304(18):2037–2040
Postoperative Glycemic Control: Bittersweet...

Intensive insulin therapy

Hyperglycemia is common in critically ill patients, and has been associated with:
1. Neuropathy
2. Skeletal muscle wasting
3. Increased growth hormone concentrations
4. Increased susceptibility to infection
5. Prolonged mechanical ventilation
6. Hyperglycemia impairs neutrophil phagocytosis

Hypothesis: Glycemic control with insulin infusion will decrease the incidence of the above complications

Mortality by Mean Glucose Value

Intensive Insulin Therapy in Critically Ill Patients
(Van den Berghe et al. N Eng J Med 2001)

**Randomization**

<table>
<thead>
<tr>
<th>Blood glucose level when insulin infusion was started</th>
<th>Conventional</th>
<th>Intensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;215 mg/dL</td>
<td></td>
<td>&gt;110 mg/dL</td>
</tr>
<tr>
<td>Infusion adjusted to maintain blood glucose</td>
<td>180 to 200 mg/dL (10.0 and 11.1 mmol/L)</td>
<td>80 to 110 mg/dL (4.4 to 6.1 mmol/L)</td>
</tr>
</tbody>
</table>

Benefits of intensive insulin therapy compared to conventional insulin therapy

- In hospital mortality: 34, 46, 41, 50, 44
Effect on Mortality

A. Intensive Therapy Group (N=120)

B. Subgroup in ICU of Days (N=70)

P = 0.4

P = 0.02

Published last week...

ORIGINAL ARTICLE

Intensive Insulin Therapy and Pentastarch Resuscitation in Severe Sepsis

Frank M. Brunekhorst, M.D., Christoph Engel, M.D., Frank Bloos, M.D., Ph.D., Andreas Meier-Hellmann, M.D., Max Ragaller, M.D., Norbert Weller, M.D., Olmen Moerer, M.D., Matthias Gruendling, M.D., Michael Oppert, M.D., Stefan Grein, M.D., Dirk Olthoff, M.D., Ulrich Jaschinski, M.D., Stefan John, M.D., Rolf Roscic, M.D., Tobias Welle, M.D., Martin Schaufler, M.D., Peter Kern, M.D., Evelyn Kahlst, M.Sc., Michael Kehlertopf, M.D., Christiante Hartog, M.D., Charles Natanson, M.D., Markus Loefler, M.D., Ph.D., and Konrad Reinhart, M.D., for the German Competence Network Sepsis (SepNet)

NEJM 2008:358:125-29
Intensive Insulin Therapy

“After the first safety analysis, involving 488 patients, intensive insulin therapy was terminated early by the data and safety monitoring board, owing to an increased number of hypoglycemic events, as compared with conventional insulin therapy; hypoglycemia was reported in 30 of 247 patients in the intensive-therapy group (12.1%) and in 5 of 241 patients in the conventional-therapy group (2.1%, P<0.001).”

NEJM 2008:358:125-29
Table 3. Outcomes and Adverse Events.*

<table>
<thead>
<tr>
<th>Outcome Measures</th>
<th>Intensive Glucose Control</th>
<th>Conventional Glucose Control</th>
<th>Odds Ratio or Absolute Difference (95% CI)</th>
<th>Statistical Test</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death — no. of patients/prob, %</td>
<td>81/13 (6.2) (71.3)</td>
<td>75/10 (6.0) (74.8)</td>
<td>1.9 (0.60 to 6.12)</td>
<td>Logistic regression</td>
<td>0.02</td>
</tr>
<tr>
<td>At day 42</td>
<td>47/52 (8.8) (25.3)</td>
<td>62/52 (11.9) (51.2)</td>
<td>0.82 (0.35 to 1.92)</td>
<td>Logistic regression</td>
<td>0.67</td>
</tr>
<tr>
<td>Severe hypoglycemia — no. of patients/prob, %</td>
<td>264/720 (3.6)</td>
<td>155/620 (4.9)</td>
<td>1.47 (0.74 to 2.95)</td>
<td>Logistic regression</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

NEJM 2009

But the Joint Commission still wants glycemic control!

The Joint Commission

"TRUST ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE" Measure Information Form

Measure Set: Surgical Care Improvement Project (SCIP)

Patient Population: 30-day mortality rate for patients with/without the SCIP 30-day mortality rate for patients with/without the SCIP 30-day mortality rate for patients with/without the SCIP 30-day mortality rate for patients with/without the SCIP

Performance Measure Name: Postoperative Mortality

Description: For all surgery patients who underwent surgery prior to or on day 30, the probability of death within 30 days from surgery (30-day mortality rate) for patients with/without the SCIP 30-day mortality rate for patients with/without the SCIP 30-day mortality rate for patients with/without the SCIP 30-day mortality rate for patients with/without the SCIP
Cardiac Surgical Patients with Controlled Postoperative Glucose

Association Between Implementation of a Medical Team Training Program and Surgical Mortality

Table 3. Improvements Reported by Medical Team Training Facilities From Structured Interviews

<table>
<thead>
<tr>
<th>Reported Improvements</th>
<th>No. (%) of Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication among operating room staff</td>
<td>36 (47.3)</td>
</tr>
<tr>
<td>Staff awareness</td>
<td>28 (36.3)</td>
</tr>
<tr>
<td>Overall efficiency</td>
<td>48 (62.3)</td>
</tr>
<tr>
<td>Equipment use during surgery</td>
<td>44 (57.3)</td>
</tr>
<tr>
<td>Restricted length of procedures</td>
<td>18 (23.3)</td>
</tr>
<tr>
<td>Improved first-case start times</td>
<td>30 (40.3)</td>
</tr>
<tr>
<td>Other types of efficiency improvements*</td>
<td>6 (8.1)</td>
</tr>
</tbody>
</table>

*For example, required delays for surgical consent, decreased turnover time between cases, reduction in call frequency.
Teamwork Reduces Mortality

**Figure.** Quarters of Risk-Adjusted Surgical Mortality Rate

- **Conclusions**
  - Quality measures are increasingly reported to the public
  - We as surgical and anesthesia providers should take the lead in developing safety initiatives, and in ensuring accurate, risk-adjusted reporting
  - We need to understand variability in outcomes and resource utilization
  - Pay for performance is starting now, but shouldn’t punish accurate reporting
  - Make your case to hospital administration that quality is cost-effective
  - Initiatives like glycemic control are being pushed before strong evidence exists for their adoption