The Surgical Infection Prevention and Surgical Care Improvement Projects

Where we started and where we’re going...

Why focus on surgical quality?

- ~30 million major operations each year in the US
  - Despite advances in surgical and anesthesia technique and improvements in perioperative care, variations in outcomes for patients having surgery are well known
Why focus on surgical quality?

- Among the most common complications
  - Surgical site infections (SSIs) and postoperative sepsis
  - Cardiovascular complications including myocardial infarction
  - Respiratory complications including postoperative pneumonia and failure to wean
  - Thromboembolic complications

Why focus on surgical quality

- Patients who experience a postoperative complication have dramatically increased hospital length of stay, hospital costs, and mortality
  - On average, the length of stay for patients who have a postoperative complication is 3 to 11 days longer
Consequences of Surgical Complications

- Dimick and colleagues demonstrated increased costs:
  - infectious complications was $1,398
  - cardiovascular complications $7,789
  - respiratory complications $52,466
  - thromboembolic complications $18,310.

- Khuri and colleagues demonstrated that, independent of preoperative patient risk, the occurrence of a 30-day complication reduced median patient survival by 69%.


Who Pays for Surgical Complications?

<table>
<thead>
<tr>
<th>Hospital Reimbursement $</th>
<th>Costs of care $</th>
<th>Profit $</th>
<th>Profit margin %</th>
</tr>
</thead>
<tbody>
<tr>
<td>14266 (uncomplicated)</td>
<td>10978</td>
<td>3288</td>
<td>23.0</td>
</tr>
<tr>
<td>21911 (complicated)</td>
<td>21156</td>
<td>755</td>
<td>3.4</td>
</tr>
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</table>

Complications were always associated with an increase in costs to healthcare payors: complications were associated with an average increase in payment of $7645 (54%) per patient.

Surgical Infection Prevention Project

- August 2002, the Centers for Medicare & Medicaid Services (CMS) and the Centers for Disease Control and Prevention (CDC) implemented the Surgical Infection Prevention Project

Medicare Surgical Infection Prevention (SIP) Project Objective

To decrease the morbidity and mortality associated with postoperative infection in the Medicare patient population
Selected Surgical Procedures

- Cardiac
- Coronary Artery Bypass Graft (CABG)
- Colon
- Hip & Knee Arthroplasty
- Abdominal & Vaginal Hysterectomy
- Vascular Surgery:
  - Aneurysm repair
  - Thromboendarterectomy
  - Vein Bypass

These procedures are being evaluated in the Medicare project because there is no controversy over the use of antibiotics for these operations. This does not imply that antibiotic prophylaxis should not be used for other procedures.

Quality Indicators

Quality Indicator #1

- Proportion of patients who receive antibiotics within 1 hour before surgical incision

Because of the longer required infusion times, vancomycin or fluoroquinolones, when indicated for beta-lactam allergy, may be started within 2 hours before the incision.
Efficacy Of Prophylaxis Is Independent Of The Specific Antibiotic

![Graph showing the efficacy of different antibiotics on lesion size and age of lesion at antibiotic injection.]


Quality Indicators
National Surgical Infection Prevention Project

- Quality Indicator #2
  - Proportion of patients who receive prophylactic antibiotics consistent with current recommendations
Antibiotic Recommendation Sources

- American Society of Health System Pharmacists
- Infectious Diseases Society of America
- The Hospital Infection Control Practices Advisory Committee
- Medical Letter
- Surgical Infection Society
- Sanford Guide to Antimicrobial Therapy
- The Johns Hopkins Guide
- Society of Thoracic Surgeons

Quality Indicators

National Surgical Infection Prevention Project

- Quality Indicator #3
  - Proportion of patients whose prophylactic antibiotics were discontinued within 24 hours of surgery end time
Discontinuation of Prophylaxis

- Numerous clinical trials have compared short-term to long-term antimicrobial prophylaxis
  - Many compared single-dose prophylaxis to multiple dose prophylaxis
  - Wide variety of operations using a wide variety of antimicrobial agents
  - Infection rates are the same regardless of duration of prophylaxis
    - Prolonged prophylaxis has been associated with higher rates of infections with resistant organisms (when infection occurs). Prolonged prophylaxis only changes the flora – it does not lower infection rates.

National Surveillance
Antimicrobial Prophylaxis
Antibiotic Timing Related to Incision

Where we started in 2001


Discontinuation of Antibiotics

Patients were excluded from the denominator of this performance measure if there was any documentation of a postoperative infection during surgery or in the first 48 hours after surgery.

CMS


Reporting Hospitals (Voluntary)
Surgical Infection Prevention Project
Ongoing surveillance of a national sample of Medicare patients having surgery.

Surgical Infection Prevention
Hospital Voluntary Self-Reporting, Qtr. 3, 2005

- Based on medical record abstraction from the charts of patients discharged in the 3rd quarter of 2005. Benchmark rates were calculated for all HQA reporting hospitals (N=1609) in the US based on discharges during the 3rd quarter of 2005 using the Achievable Benchmarks of Care™ methodology (http://main.uab.edu/show.asp?durki=14527).

32 Minnesota hospitals voluntarily reporting.
Surgical Care Improvement Project

National Goal

To reduce preventable surgical morbidity and mortality by 25% by 2010
SCIP Steering Committee

- American College of Surgeons
- American Hospital Association
- American Society of Anesthesiologists
- Association of peri-Operative Registered Nurses
- Agency for Healthcare Research and Quality
- Centers for Medicare & Medicaid Services
- Centers for Disease Control and Prevention
- Department of Veteran’s Affairs
- Institute for Healthcare Improvement
- Joint Commission on Accreditation of Healthcare Organizations

Surgical Care Improvement Project (SCIP)

- Preventable Complication Modules
  - Surgical infection prevention
  - Cardiovascular complication prevention
  - Venous thromboembolism prevention
  - Respiratory complication prevention
Surgical Care Improvement Project

Performance measures - Process

- Surgical infection prevention
  - Antibiotics
    - Administration within one hour before incision
    - Use of antimicrobial recommended in guideline
    - Discontinuation within 24 hours of surgery end
  - Glucose control in cardiac surgery patients
  - Proper hair removal
  - Normothermia in colorectal surgery patients

Perioperative Glucose Control

- 1,000 cardiothoracic surgery patients
- Diabetics and non-diabetics with hyperglycemia

<table>
<thead>
<tr>
<th>Glucose (mg/dL)</th>
<th>Cases (%)</th>
<th>Controls (%)</th>
<th>OR</th>
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<tbody>
<tr>
<td>&lt;200 (referred)</td>
<td>35 (41)</td>
<td>651 (72)</td>
<td>1.00</td>
</tr>
<tr>
<td>200-249</td>
<td>21 (25)</td>
<td>154 (17)</td>
<td>2.54</td>
</tr>
<tr>
<td>250-299</td>
<td>11 (15)</td>
<td>63 (8)</td>
<td>2.97</td>
</tr>
<tr>
<td>&gt;300</td>
<td>5 (7)</td>
<td>28 (3)</td>
<td>3.32</td>
</tr>
</tbody>
</table>

Note: OR, odds ratio
Chi-square for linear trend: 16.375, P<.001.

Patients with a blood sugar > 300 mg/dL during or within 48 hours of surgery had more than 3X the likelihood of a wound infection!

Pre-operative shaving

- Shaving the surgical site with a razor induces small skin lacerations
  - potential sites for infection
  - disturbs hair follicles which are often colonized with S. aureus
  - Risk greatest when done the night before
- Patient education
  - be sure patients know that they should not do you a favor and shave before they come to the hospital!

Temperature Control

- 200 colorectal surgery patients
  - control - routine intraoperative thermal care (mean temp 34.7°C)
  - treatment - active warming (mean temp on arrival to recovery 36.6°C)
- Results
  - control - 19% SSI (18/96)
  - treatment - 6% SSI (6/104), P=0.009

Cardiovascular Complication Prevention

Prevention of Cardiac Events

Introduction

- As many as 7 to 8 million Americans that undergo major noncardiac surgery have multiple cardiac risk factors or established coronary artery disease
- More than 1 million cardiac events annually
- Myocardial ischemia either clinically occult or overt confers a 9-fold increase in risk of unstable angina, nonfatal myocardial infarction, and cardiac death

Surgical Care Improvement Project

Performance measure - Process

• Perioperative cardiac events
  • Perioperative beta blockers in patients who are on beta blockers before surgery

Prevention of Cardiac Events

Introduction

• Perioperatively administered beta blockers have the potential to:
  • Decrease myocardial oxygen demand
    • Reduced heart rate
    • Reduced wall tension
    • Reduced contractility
  • Decrease myocardial ischemia and adverse cardiac events
Perioperative Beta blockers

**ACC/AHA Guideline**

- **Class I recommendation**
  - *Beta blockers required in the recent past to control symptoms of angina, symptomatic arrhythmias, or hypertension or other ACC/AHA Class I guideline recommendations*

- **Class IIa**
  - *Patients with known coronary artery disease or major risk factors for coronary disease*

Venous Thromboembolism Prevention

Prevention of Venous Thromboembolism

Introduction

- VTE Remains a major health problem
  - 200,000 new cases annually in US
  - In addition to the risk of sudden death
    - 30% of survivors develop recurrent VTE within 10 years
    - 28% of survivors develop venous stasis syndrome within 20 years
  - The incidence of VTE is more than 100 times greater for patients who have been hospitalized than among community dwelling
  - Incidence increases with age

National Body Position Statements

• Leapfrog¹:
  PE is “the most common preventable cause of hospital death in the United States”
• Agency for Healthcare Research and Quality (AHRQ)²:
  Thromboprophylaxis is the number 1 patient safety practice
• American Public Health Association (APHA)³:
  “The disconnect between evidence and execution as it relates to DVT prevention amounts to a public health crisis.”

¹. The Leapfrog Group Hospital Quality and Safety Survey. Available at: www.leapfrog.medstat.com/pdf/Final/doc

Risk of DVT in Hospitalized Patients

No prophylaxis + routine objective screening for DVT

<table>
<thead>
<tr>
<th>Patient group</th>
<th>DVT incidence</th>
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<tbody>
<tr>
<td>Medical patients</td>
<td>10 - 20 %</td>
</tr>
<tr>
<td>Major gyne/urol/gen surgery</td>
<td>15 - 40 %</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>15 - 40 %</td>
</tr>
<tr>
<td>Stroke</td>
<td>20 - 50 %</td>
</tr>
<tr>
<td>Hip/knee surgery</td>
<td>40 - 60 %</td>
</tr>
<tr>
<td>Major trauma</td>
<td>40 - 80 %</td>
</tr>
<tr>
<td>Spinal cord injury</td>
<td>60 - 80 %</td>
</tr>
<tr>
<td>Critical care patients</td>
<td>15 - 80 %</td>
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</tbody>
</table>
Prevention of Venous Thromboembolism

• Despite the well known risk of VTE and the publication of evidence-based guidelines for prevention, previous medical record audits have demonstrated underuse of prophylaxis


Surgical Care Improvement Project
Performance measures - Process

• Prevention of venous thromboembolism
  • Proportion who have recommended VTE prophylaxis ordered
  • Proportion who receive appropriate form of VTE prophylaxis (based on ACCP Consensus Recommendations) within 24 hours before or after surgery
ACCP Guidelines for VTE Prevention

Prevention of Venous Thromboembolism

The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy

William H. Geerts, MD, FACP, Graham F. Pineo, MD; John A. Bray, MD, David Bergqvist, MD, PhD; Michael H. Larson, MD; Clifford W. Calabria, MD, and Joel G. Ray, MD, MSc

This article discusses the prevention of venous thromboembolism (VTE) and is part of the Seventh American College of Chest Physicians Conference on Antithrombotic and Thrombolytic Therapy: Evidence-Based Guidelines. Grade 1 recommendations are strong and indicate that the benefits do, or do not, outweigh risks, burden, and costs. Grade 2 suggests that individual patients’ values may lead to 2B), or LDUH (Grade 1B). We recommend that patients undergoing hip or knee arthroplasty, or HFS receive thromboprophylaxis for at least 10 days (Grade 1A). We recommend that all trauma patients with at least one risk factor for VTE receive thromboprophylaxis (Grade 1A). In acutely ill medical patients who have been admitted to the hospital with congestive heart failure or severe respiratory disease, or who are confined to bed and have one or more additional risk factors, we recommend prophylaxis with LDUH (Grade 1A) or LMWH (Grade 1A). We recommend, on admission to the intensive care unit, all patients be assessed for their risk of VTE. Accordingly, most patients should receive thromboprophylaxis (Grade 1A).

Geerts WH, et al. CHEST. 2004;126:338S-400S.

Respiratory Complication Prevention
Prevention of Ventilator-associated Pneumonia

• Ventilator-associated pneumonia (VAP) arises more than 48 hours after endotracheal intubation
  • 6-20 fold increased incidence in patients on the ventilator (9-27% of all intubated patients)
  • Approximately half of all VAP cases occur within the first four days of intubation


Surgical Care Improvement Project

Proposed Performance measures - Process

• Prevention of ventilator-associated pneumonia
  • Proportion of patients on ventilator with head of bed elevated 30 degrees*
  • Proportion of ventilator patients put on a rapid weaning protocol (daily sedation vacations and assessments of readiness to extubate)
  • Proportion of ventilator patients who receive peptic ulcer disease prophylaxis

*Withdrawn from consideration at this time.
A Brief History of SCIP

- Aug 02: SIP 7SOW
- Dec '02: CMS CDC meet
- Apr: 1st SCIP SC
- May: Measure categories selected
- Mar: Pilot data tool
- Sep-03: 2nd SC, Pilot contract
- Dec: Pilot measures final
- Oct: Provider launch to surg, anesth, RN's
- Feb: Pilot data accrual ends
- Mar: SCIP VTE to NQF
- Apr: 4th SC JCAHO alignment begins
- Apr: 4th SC, communications plan
- Jul: Hosp provider launch
- Dec: Pilot measures final
- May: Pilot interventions
- Jun: 5th SC
- Oct: Public Launch

Implementation Timeline

- SCIP Infection module (6 measures) in recently released CMS (CART) and JCAHO (performance measurement system) tools for July 2006 discharges
- SCIP VTE (2 measures) and SCIP cardiac measure (1 measure) will be in the October release of tools
National Public Launch of SCIP

- Scheduled for October 23, 2006 in Washington, DC
  - Press conference, news release
  - Representatives of the steering committee along with
    - Consumer representation
    - Targeted health journalists
    - Consumer tip sheet release

Strategies to Improve Processes of Care
What worked to improve antibiotic delivery?

- Assigned responsibility for administration and documentation of antibiotic prophylaxis
  - Often involved transfer of ownership of the process to anesthesia
  - Ensuring the delivery of the antibiotic near or in the OR
  - Use of preprinted protocols for antibiotic selection and duration
  - Antibiotics available in the OR
  - Some incorporated into the ‘time out’
  - Revision of forms to require documentation of antibiotic dose and time

Reduce Complexity
What worked to eliminate razors in the preoperative patients?

- Many hospitals physically removed razors from the operating rooms and holding areas or required them to be signed out
- Clippers had to be readily available and training provided
- Other departments – e.g., preoperative ECGs

What worked to improve glycemic control

- Multidisciplinary teams to address blood sugar control in intensive care units
  - Most hospitals did not limit this work to cardiac surgery patients
  - Required considerable education on the risk of infections and adverse outcomes versus the lower risk of hypoglycemia
  - IV insulin infusions essential – frequent FSBS and issues of use outside of the ICU
  - Adoption of other published protocols such as the Portland Protocol
What worked to ensure normothermia for patients

- Education on the risks of hypothermia
  - Increased infection rates, increased cardiac arrhythmias, increased transfusion requirements
- Warming of the OR (some surgeons needed cooling vests)
- Attention to body temperature prior to going to the OR
  - Many hospitals found that patients were already dropping their body temperature prior to the OR
- Host of mechanical methods to warm patient
- Attention to consistent mechanism of documenting body temperature

Strategies to Improve VTE Prophylaxis

- Hospital policy of risk assessment for all admitted patients
  - Most will have risk factors for VTE and should receive prophylaxis
  - Preprinted protocols for surgical patients
Surgical Care Improvement Project: Why?

Medicare could prevent* up to:
13,027 perioperative deaths
271,055 surgical complications

* Major surgical cases

Summary

- As the SIP project is expanded into the new Surgical Care Improvement Project we need to find ways to make evidence-based processes of care routine
  - We have to quit relying on memory to ensure high quality care
- Recognize that there is now a national commitment to improving outcomes for surgical patients