

## **The Surgical Infection Prevention and Surgical Care Improvement Projects**

*Where we started and where we're going...*



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QIOSC Medical Director

### **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%.**

Dimick JB, et al. *J Am Coll Surg* 2004;199:531-7.  
 Khuri SF, et al. *Ann Surg* 2005;242:326-41.

## Who Pays for Surgical Complications?

Hospital Reimbursement \$	Costs of care \$	Profit \$	Profit margin %
14266 (uncomplicated)	10978	3288	23.0
21911 (complicated)	21156	755	3.4

**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.**

Dimick JB, et al. Who pays for poor surgical quality? Building a business case for quality improvement. *J Am Coll Surg.* 2006;202:933-7.

## **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**

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**SURGICAL INFECTION PREVENTION**  
Medicare Quality Improvement Project

## **Medicare Surgical Infection Prevention (SIP) Project Objective**

**To decrease the morbidity and mortality associated with postoperative infection in the Medicare patient population**

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## 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.

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## Quality Indicators

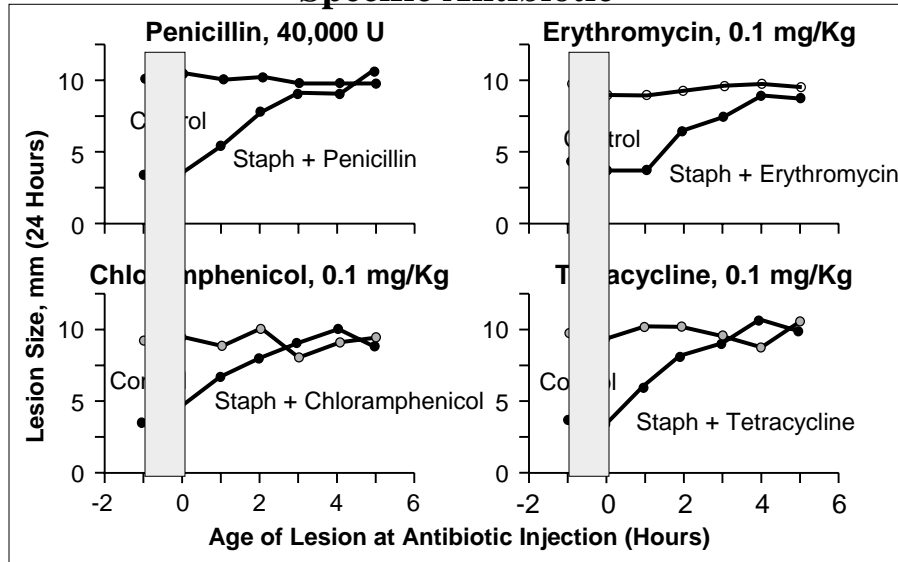
### *National Surgical Infection Prevention Project*

- **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.

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## Efficacy Of Prophylaxis Is Independent Of The Specific Antibiotic



Burke JF. *Surgery*. 1961;50:161.

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## Quality Indicators

*National Surgical Infection Prevention Project*

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

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## **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

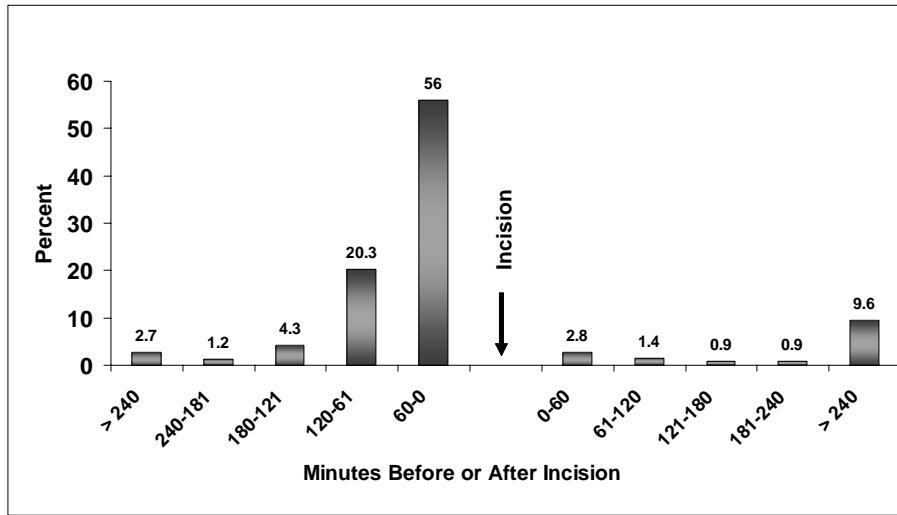
## **Discontinuation of Prophylaxis**

- **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

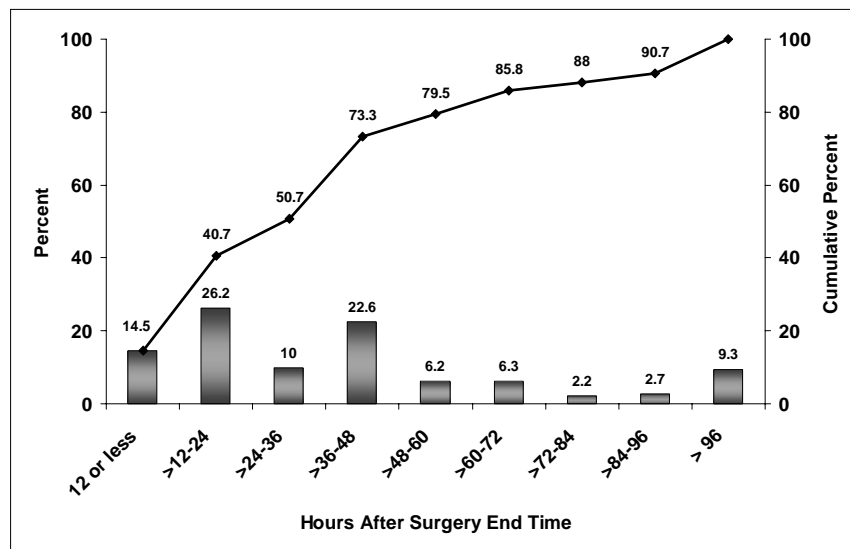
Where we started in 2001



Bratzler DW, Houck PM, et al. *Arch Surg.* 2005;140:174-182.

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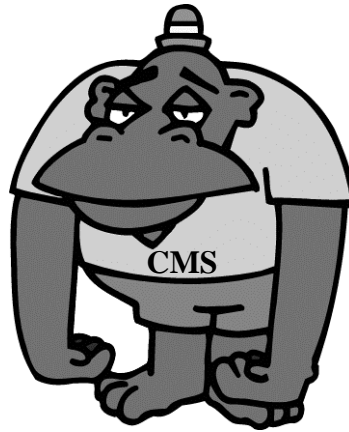
## Discontinuation of Antibiotics



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

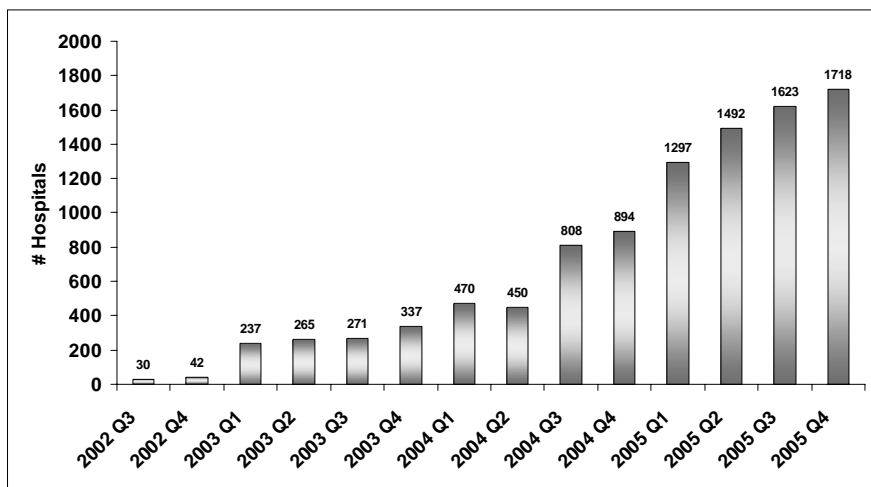
Bratzler DW, Houck PM, et al. *Arch Surg.* 2005;140:174-182.

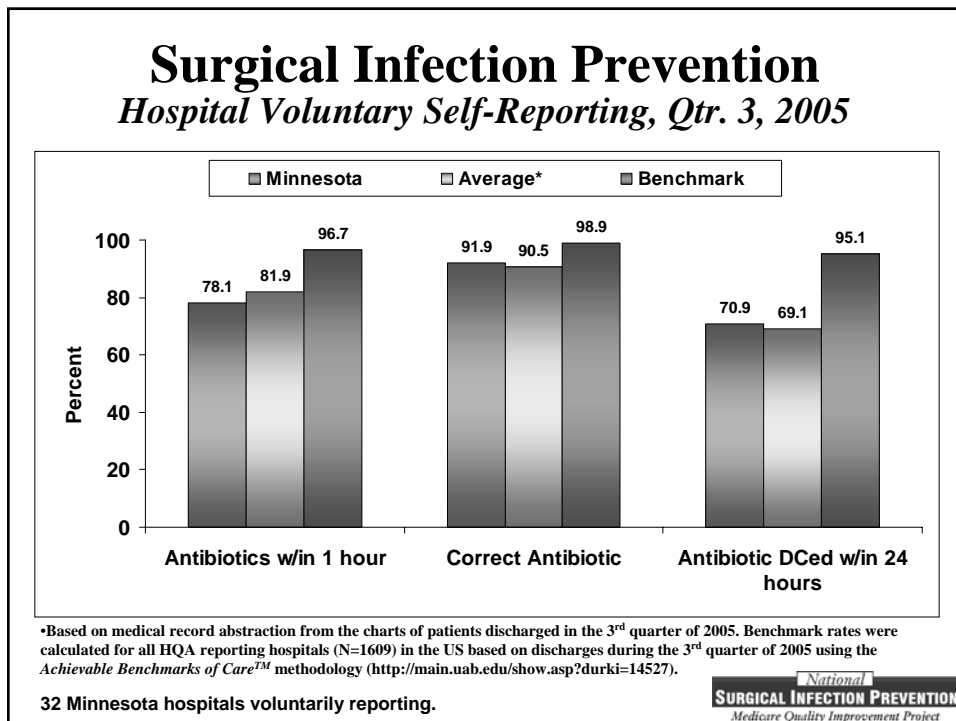
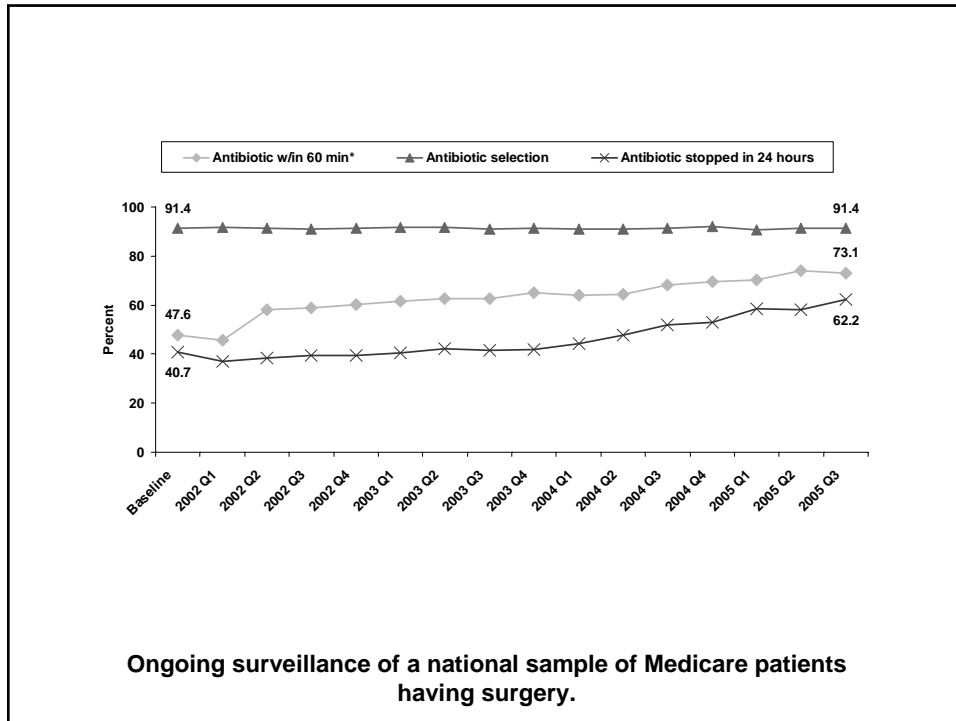
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Polk HC Jr, Birkmeyer J, Hunt DR, Jones RS, Whittemore AD, Barraclough B. Quality and safety in surgical care. *Ann Surg.* 2006;243:439-48.

## Reporting Hospitals (Voluntary) *Surgical Infection Prevention Project*







**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 3**  
GLUCOSE LEVELS AMONG 72 CASES WITH SURGICAL-SITE INFECTIONS AND 902 CONTROLS WITHOUT SURGICAL-SITE INFECTIONS

Glucose (mg/dL)	Cases (%)	Controls (%)	OR
<200 (referrent)	35 (49)	651 (72)	1.00
200-249	21 (29)	154 (17)	2.54
250-299	11 (15)	69 (8)	2.97
≥300	5 (7)	28 (3)	3.32

Abbreviation: OR, odds ratio.  
Chi-square for linear trend=16.375, P<.0001.

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

Latham R, et al. *Infect Control Hosp Epidemiol.* 2001.



## 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!*

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## 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

Kurz A, et al. *N Engl J Med*. 1996.

Also: Melling AC, et al. *Lancet*. 2001. (preop warming)

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## 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

Schmidt M, et al. *Arch Intern Med.* 2002;162:63-69.

Mangano DT, et al. *N Engl J Med.* 1996;335:1713-1720.

Selzman CH, et al. *Arch Surg.* 2001;136:286-290.

## **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**

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**ACC/AHA PRACTICE GUIDELINES**

**ACC/AHA 2006 Guideline Update on Perioperative  
Cardiovascular Evaluation for Noncardiac Surgery:  
Focused Update on Perioperative Beta-Blocker Therapy**

A Report of the American College of Cardiology/  
American Heart Association Task Force on Practice Guidelines  
(Writing Committee to Update the 2002 Guidelines on Perioperative  
Cardiovascular Evaluation for Noncardiac Surgery)

*Developed in Collaboration With the American Society of Echocardiography,  
American Society of Nuclear Cardiology, Heart Rhythm Society, Society of  
Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and  
Interventions, and Society for Vascular Medicine and Biology*

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<http://www.acc.org/clinical/guidelines/perioperiobetablocker.pdf>

## **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***
  - **Patients at high cardiac risk owing to the finding of ischemia on preoperative testing who are undergoing vascular surgery**
- **Class IIa**
  - **Patients with known coronary artery disease or major risk factors for coronary disease**

Fleisher LA, et al. ACC/AHA. <http://www.acc.org/clinical/guidelines/perioperiobetablocker.pdf>

# 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

Goldhaber SZ. *N Engl J Med.* 1998;339:93-104.

Silverstein MD, et al. *Arch Intern Med.* 1998;158:585-593.

Heit JA, et al. *Thromb Haemost.* 2001;86:452-463.

Heit JA. *Clin Geriatr Med.* 2001;17:71-92.

Heit JA, et al. *Mayo Clin Proc.* 2001;76:1102-1110.

## National Body Position Statements

- Leapfrog<sup>1</sup>:  
PE is “the most common preventable cause of hospital death in the United States”
- Agency for Healthcare Research and Quality (AHRQ)<sup>2</sup>:  
Thromboprophylaxis is the number 1 patient safety practice
- American Public Health Association (APHA)<sup>3</sup>:  
“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](http://www.leapfrog.medstat.com/pdf/Final/doc)
2. Shojania KG, et al. Making Healthcare Safer: A Critical Analysis of Patient Safety Practices. AHRQ, 2001. Available at: [www.ahrq.gov/clinic/ptsafety/](http://www.ahrq.gov/clinic/ptsafety/)
3. White Paper. Deep-vein thrombosis: Advancing awareness to protect patient lives. 2003. Available at: [www.alpha.org/ppp/DVT\\_White\\_Paper.pdf](http://www.alpha.org/ppp/DVT_White_Paper.pdf)

## Risk of DVT in Hospitalized Patients

*No prophylaxis + routine objective screening for DVT*

Patient group	DVT incidence
Medical patients	10 - 20 %
Major gyne/urol/gen surgery	15 - 40 %
Neurosurgery	15 - 40 %
Stroke	20 - 50 %
Hip/knee surgery	40 - 60 %
Major trauma	40 - 80 %
Spinal cord injury	60 - 80 %
Critical care patients	15 - 80 %

## 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**

Anderson FA Jr, et al. *Ann Intern Med.* 1991;115:591-595.  
Anderson FA Jr, et al. *J Thromb Thrombolysis.* 1998; 5 (1 Suppl):7S-11S.  
Bratzler DW, et al. *Arch Intern Med.* 1998;158:1909-1912.  
Stratton MA, et al. *Arch Intern Med.* 2000;160:334-340.



## 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, FCCP; Graham F. Pineo, MD; John A. Heit, MD; David Bergqvist, MD, PhD; Michael R. Lassen, MD; Clifford W. Colwell, MD; and Joel C. 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).

(CHEST 2004; 126:338S-400S)

Key words: aspirin; deep-vein thrombosis; fondaparinux; heparin; low-molecular-weight heparin; prophylaxis; thromboembolism; warfarin

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

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## 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

Niederman MS, Craven DE, et al. *Am J Respir Crit Care Med.* 2005;171:388-416.

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## Surgical Care Improvement Project

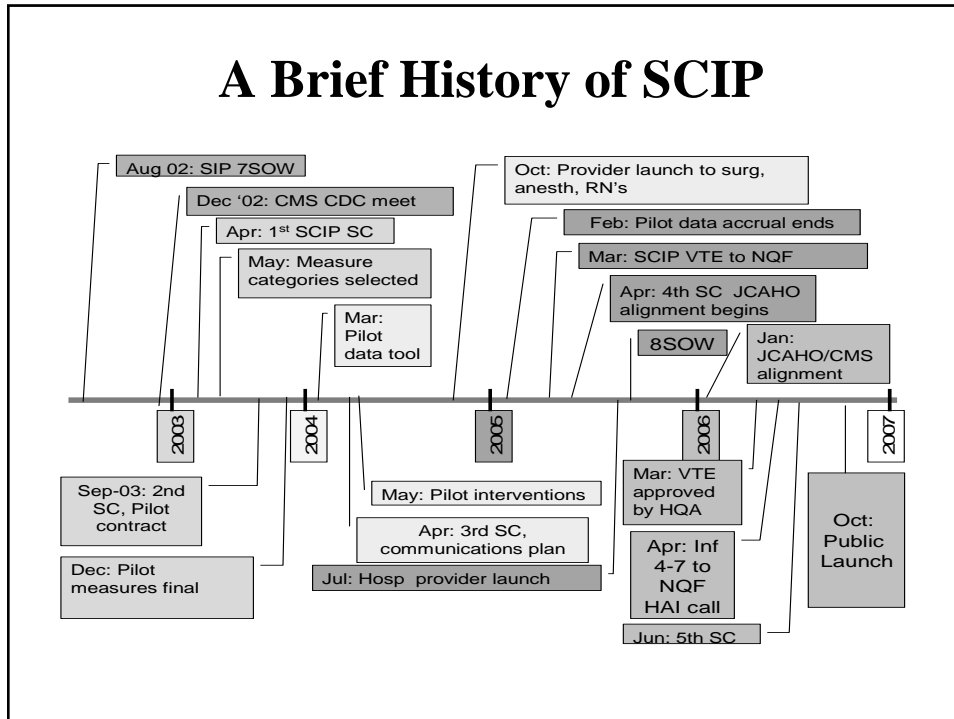
### *Proposed Performance measures - Process*

- **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.

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## A Brief History of SCIP



## 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**

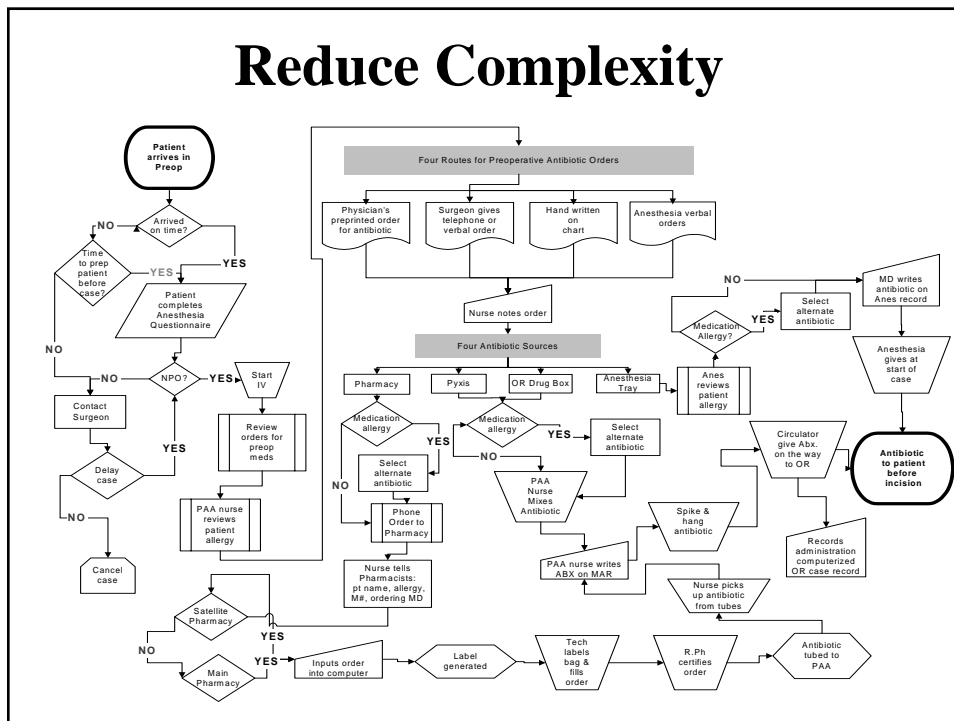
- **Scheduled for October 23, 2006 in Washington, DC**
  - **Press conference, news release**
  - **Representatives of the steering committee along with**
    - **Consumer representation**
    - **Targeted health journalists**
    - **Consumer tip sheet release**

## **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

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## **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**

*National*  
**SURGICAL INFECTION PREVENTION**  
*Medicare Quality Improvement Project*  
[www.medqic.org/sip](http://www.medqic.org/sip)

**SC&P** Surgical Care Improvement Project  
*A National Quality Partnership*  
[www.medqic.org/scip](http://www.medqic.org/scip)