

Surgical Infection Prevention and Surgical Care Improvement

*National Initiatives to Improve Care for Medicare
Patients*

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Opportunity to Prevent Surgical Infections

- **An estimated 40-60% of SSIs are preventable**
- **Overuse, underuse, improper timing, and misuse of antibiotics occurs in 25-50% of operations**

Medicare Surgical Infection Prevention (SIP) Project Objective

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

Project Leadership

- **Steering committee**
 - CMS
 - CDC Division of Healthcare Quality Promotion
 - Infectious Diseases QIOSC
- **National Expert Panel**

National Expert Panel

- American College of Surgeons
- American Hospital Assn.
- APIC
- IDSA
- JCAHO
- Society for Healthcare Epidemiology of America
- Association of PeriOperative Registered Nurses
- Surgical Infection Society
- VHA, Inc.
- American Academy of Orthopedic Surgeons
- American Society of Anesthesiologists
- American Society of Health System Pharmacists
- American Geriatrics Society
- Society of Thoracic Surgeons
- Premier

Among many others....



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.



Surgical Infection Prevention

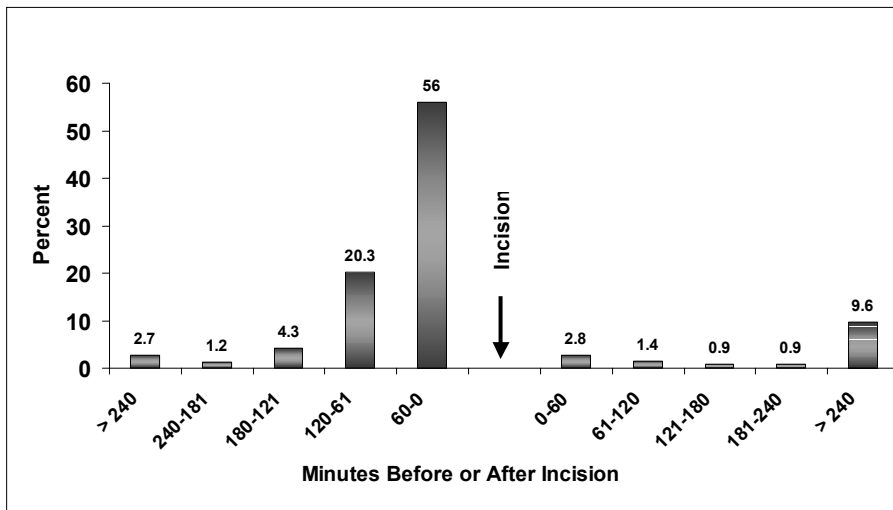
Preliminary Results

	N (%)
Number of cases reviewed	39,086 (100)
General Exclusions	
Surgery of interest not performed	205 (0.52)
Infection present pre-operatively	1,817 (4.7)
Missing antibiotic dates and times	2 (0.01)
Patient on antibiotics prior to admission	1,461 (3.74)
Patient on antibiotics for more than 24 hours pre-op	1,432 (3.66)
Other	36 (0.09)
Cases eligible for analysis	34,133 (87.3)

Bratzler DW, Houck PM, et al. Arch Surg. (In press)

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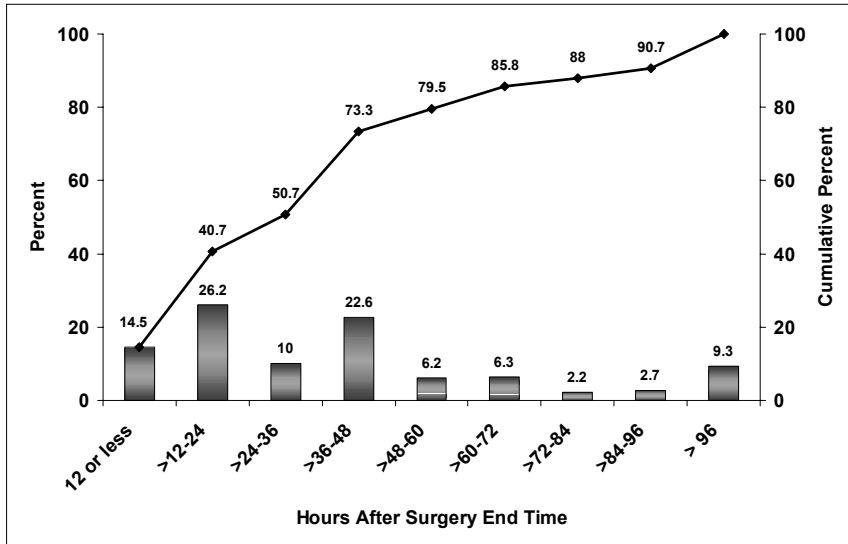
Antibiotic Timing Related to Incision



Bratzler DW, Houck PM, et al. Arch Surg. (In press)

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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. (In press)

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Surgical Infection Prevention Performance Stratified by Surgery¹

Surgery (N)	Antibiotic within 1 hour ² % (95% CI)
Cardiac (3,287)	58.5 (56.8-60.2)
Vascular (1,116)	47.0 (44.0-49.9)
Hip/knee (2,694)	59.7 (58.3-61.2)
Colon (732)	46.0 (43.5-48.4)
Hysterectomy (432)	54.8 (51.4-58.3)
All Surgeries (11,220)	55.7 (54.8-56.6)

¹ All results are weighted to reflect adjustment based on the state-specific sampling scheme.

² Reflects data for only 11 220 cases that had an explicitly documented incision time.

These results include patients who received vancomycin between one and two hours before the incision (N=213).

Cases were excluded from this performance measure if there was insufficient data to determine the time interval between prophylactic antimicrobial dose and surgical incision (N=22,902). In addition, patients undergoing colon surgery who received oral antimicrobials only for prophylaxis were excluded from the denominator (N=11).

Bratzler DW, Houck PM, et al. Arch Surg. (In press)

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Surgical Infection Prevention

Performance Stratified by Surgery¹

Surgery (N)	Correct Antibiotic % (95% CI)
Cardiac (7,843)	95.1 (94.7-95.6)
Vascular (3,140)	91.5 (90.5-92.5)
Hip/knee (14,996)	97.2 (96.7-97.5)
Colon (4,855)	75.8 (74.6-77.0)
Hysterectomy (2,395)	90.2 (89.0-91.3)
All Surgeries (33,229)	92.6 (92.3-92.8)

¹ All results are weighted to reflect adjustment based on the state-specific sampling scheme.

Antimicrobials were considered "prophylactic" if they were given before surgery, given intraoperatively, or given within 24 hours after the end of surgery.

Cases were excluded from this performance measure if no antimicrobials were administered, if no antimicrobials administered were considered "prophylactic," or if there was insufficient data to make the determination on timing (N=336). In addition, because there are no published guidelines for antimicrobial selection for beta-lactam allergic patients undergoing colon surgery or hysterectomy, cases with a documented beta-lactam allergy that did not pass the performance measure for these two operations were excluded from the denominator (N=568).

Bratzler DW, Houck PM, et al. Arch Surg. (In press)



Surgical Infection Prevention

Performance Stratified by Surgery¹

Surgery (N)	Antibiotic Stopped within 24 hours % (95% CI)	Median Time to Discontinuation (Hours)
Cardiac (7,635)	34.4 (33.4-35.5)	40.9
Vascular (2,913)	45.2 (43.4-47.0)	42.7
Hip/knee (14,575)	36.7 (35.9-37.4)	39.0
Colon (4,911)	40.8 (39.5-42.2)	57.0
Hysterectomy (2,569)	77.9 (76.3-79.5)	21.4
All Surgeries (32,603)	40.7 (40.2-41.2)	40.4

¹ All results are weighted to reflect adjustment based on the state-specific sampling scheme.

Antimicrobials were considered "prophylactic" if they were given before surgery, given intraoperatively, or given within 24 hours after the end of surgery.

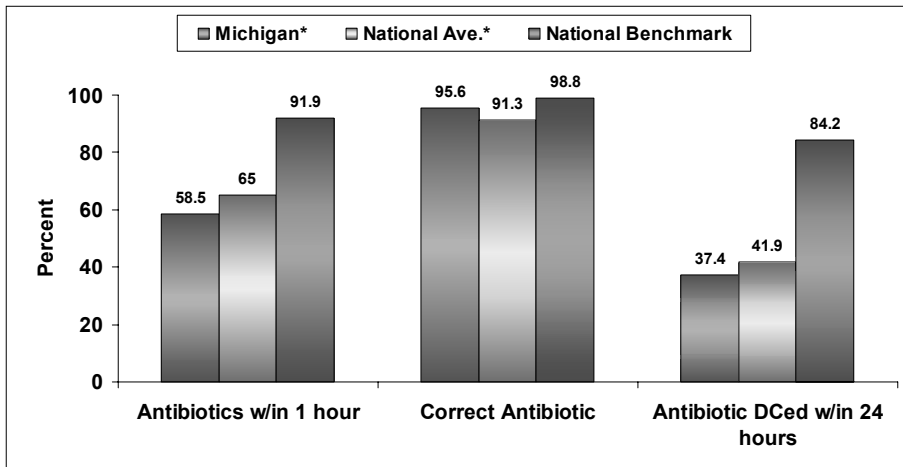
Cases were excluded from this performance measure if no antimicrobials were administered, if no antimicrobials administered were considered "prophylactic," or if there was insufficient data to make the determination of timing (N=344). Any patient with documentation in the medical record of an infection during surgery or within 48 hours after the end of surgery was excluded from the denominator (N=634). In addition, patients who underwent more than one surgical procedure of interest during the hospitalization were excluded from the denominator (N=552).

Bratzler DW, Houck PM, et al. Arch Surg. (In press)



Surgical Infection Prevention

National Baseline Performance

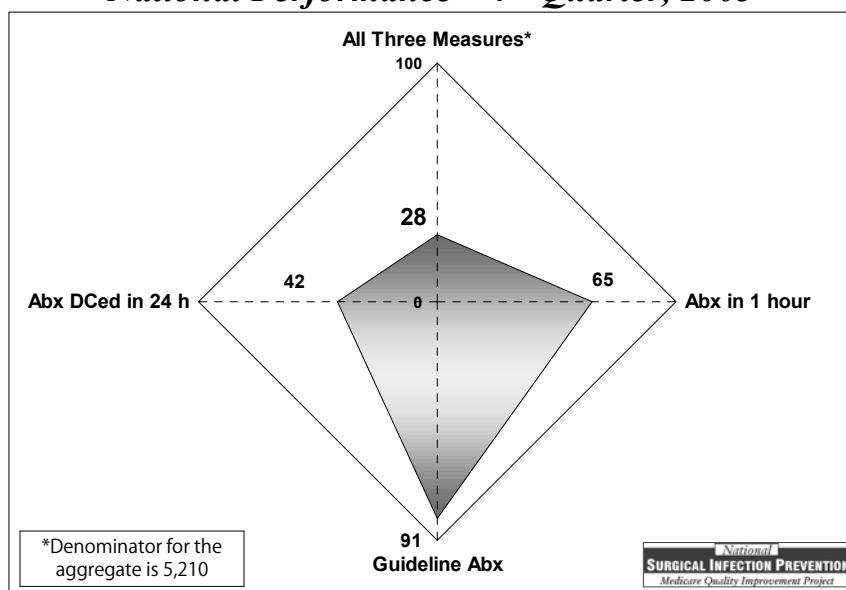


* Based on medical record abstraction from the charts of patients discharged in the 4th quarter of 2003. Benchmark rates were calculated for all hospitals in the US based on discharges during calendar year 2003 using the *Achievable Benchmarks of Care™* methodology (<http://main.uab.edu/show.asp?durki=14527>).

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Surgical Infection Prevention Project

National Performance – 4th Quarter, 2003



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Planning for Evolution of the Surgical Infection Prevention Project



Surgical Care Improvement Project: Why?

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

* Major surgical cases

SCIP Goal

**To reduce preventable
surgical morbidity and
mortality by 25% by 2010**

SCIP Surgical Care Improvement Project
A National Quality Partnership

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Making Surgery Safer



Preliminary Project Overview as of September 14, 2004

**Project overview available at:
www.medqic.org/scip**

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**



SIP/SCIP National Expert Panel

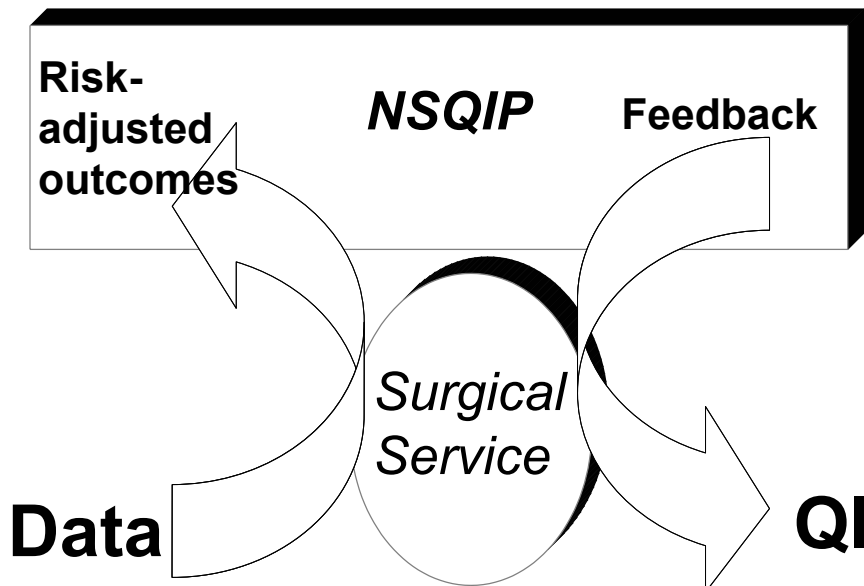
- American College of Surgeons
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- JCAHO
- HICPAC
- Society for Healthcare Epidemiology of America
- Association of PeriOperative Registered Nurses
- American Association of Critical Care Nurses
- American College of Obstetricians & Gynecologists
- Society of Thoracic Surgeons
- Surgical Infection Society
- VHA, Inc.
- American Academy of Orthopedic Surgeons
- American Society of Anesthesiologists
- American Society of Health System Pharmacists
- American Geriatrics Society
- Society of Thoracic Surgeons
- Premier, Inc.
- American Society of Colon and Rectal Surgeons
- Ascension Health
- The Medical Letter
- Sanford Guide
- Surgical Infection Society

THE NSQIP DATABASE

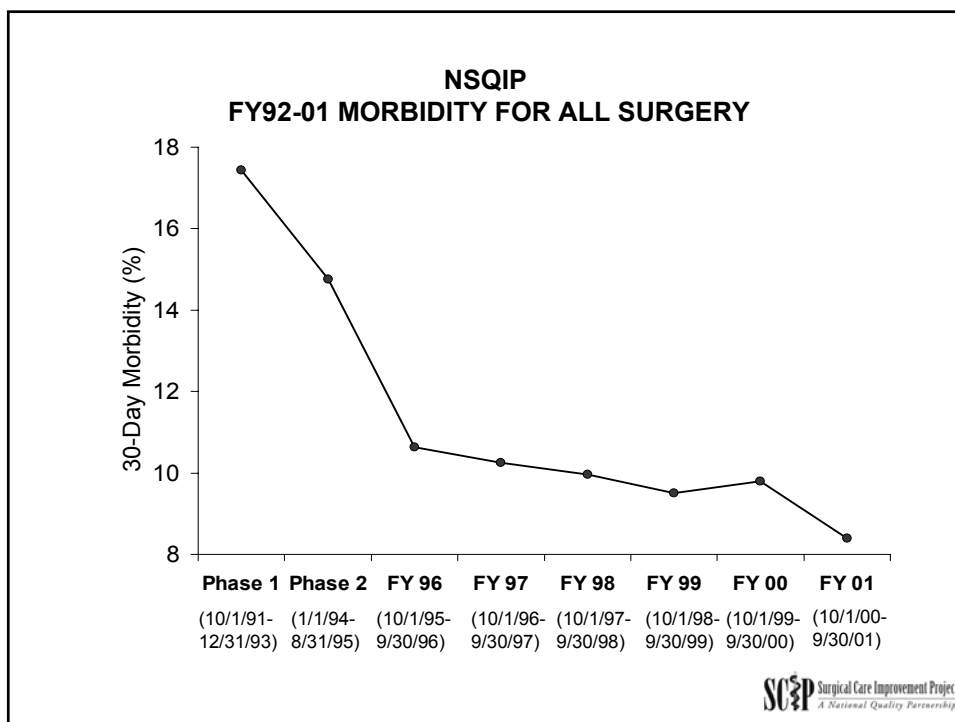
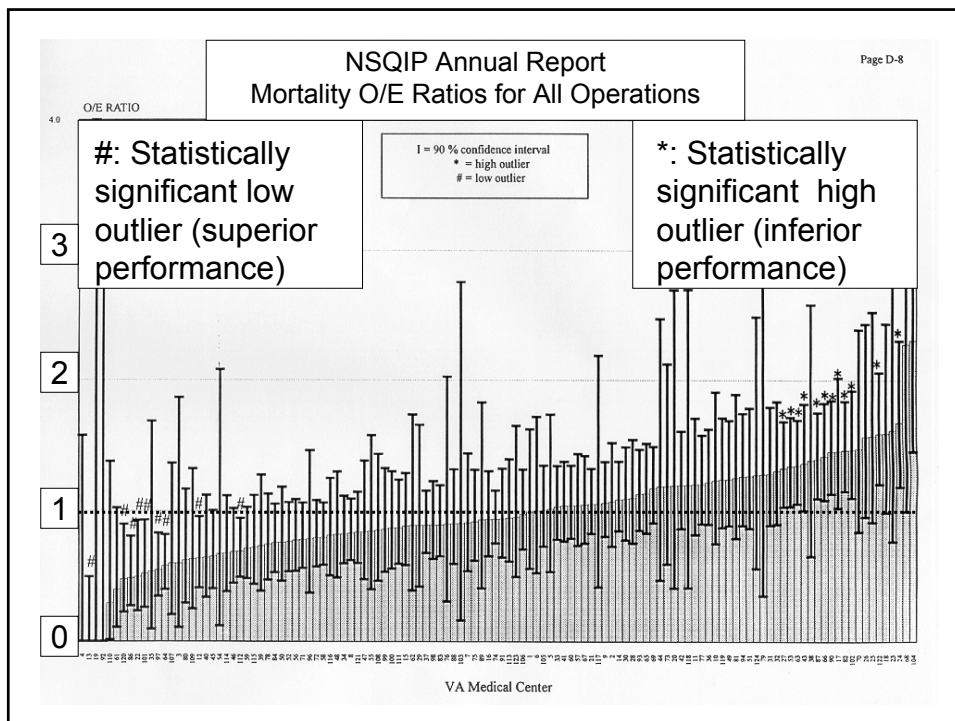
**ALL PATIENTS
UNDERGOING
MAJOR
SURGERY**

- **Preoperative Data**
 - 10 demographic variables
 - 40 clinical variables
 - 12 laboratory variables
- **Intraoperative Data**
 - 15 clinical variables
- **Postoperative Data**
 - 30-day postoperative mortality
 - 20 categories of 30-day postoperative morbidity
 - Length of hospital stay

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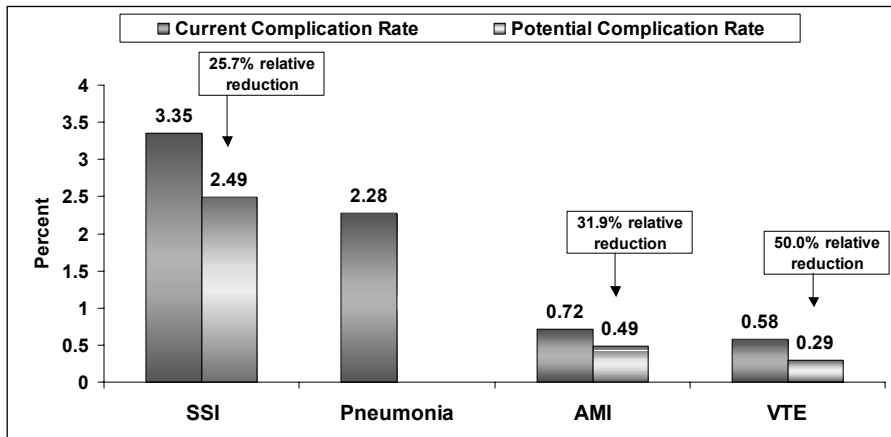
Surgical Care Improvement Project (SCIP)

- **Outcome, Process, and Test Measures**
- **Three State Pilot: OH, OK, KY**
- **Data abstraction tool**
 - **NSQIP, CICSP (VA)**
 - **NHSN (CDC)**
 - **Pilot Process Measures**

Surgical Care Improvement Project (SCIP)

- **Preventable Complication Modules**
 - **Surgical infection prevention**
 - **Cardiovascular complication prevention**
 - **Venous thromboembolism prevention**
 - **Respiratory complication prevention**

Potential to Reduce Perioperative Complications in SCIP



Based on the goal of achieving near-complete guideline compliance to prevent each of these complications as compared to current national rates of guideline compliance for each complication.

Complication	%
Surgical site infection	3.35
Pneumonia	2.28
Failure to wean < 48 hours	1.96
Unplanned intubation	1.74
Urinary tract infection	1.72
Systemic sepsis	1.06
Wound dehiscence	0.87
Cardiac arrest	0.78
Prolonged ileus	0.53
Acute myocardial infarction	0.52
Progressive renal insufficiency	0.45
Bleeding	0.43
Renal failure	0.37
Deep vein thrombosis	0.37
Graft/prosthesis failure	0.27
Stroke	0.27
Pulmonary embolism	0.21
Coma	0.10

30-day postoperative outcomes based on the Department of Veterans Affairs National Surgical Quality Improvement Program (NSQIP).

Best WR, et al. *J Am Coll Surg.* 2002;194:257-266.

Most Common Postoperative Complications

Complication	%
Pneumonia/lung infection	3.5
Urinary tract infection	2.8
Other/unspecified	1.8
Blood stream infection	1.6
Surgical site infection	1.0
Cellulitis	0.6
Abscess	0.2
Bone infection/osteomyelitis	0.05

In-hospital, infectious postoperative complications based on charts (N=24788) reviewed at baseline in the National Surgical Infection Prevention Project.

Most Common Postoperative Complications

Complication	%
Hemorrhage	4.1
Heart failure/pulmonary edema	4.0
Respiratory failure	3.5
Cardiac arrest	1.7
Cerebral infarction/stroke	1.1
Medication reaction	1.0
Shock/cardiovascular collapse	0.9
Myocardial infarction	0.7
Dehiscence of wound	0.5
Deep vein thrombosis	0.5
Pulmonary embolism	0.4
Other/not documented	0.1

In-hospital, non-infectious postoperative complications based on charts (N=24788) reviewed at baseline in the National Surgical Infection Prevention Project.

Surgical Care Improvement Project

Draft performance measures

- **Surgical infection prevention**
 - » **SSI rates during index hospitalization (outcome)**
 - » **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**
 - » *Glucose control in diabetics undergoing non-cardiac surgery (test)*
 - » *Proper hair removal (test)*
 - » *Normothermia in colorectal surgery patients (test)*

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!*

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 (referent)	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 ≥ 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.

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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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Surgical Care Improvement Project

Draft performance measures

- **Perioperative cardiac events**
 - » In-hospital cardiac event rates (outcome)
 - » 30-day readmission rate (outcome)
 - » 30-day mortality rate (outcome)
 - » Perioperative beta blockers in noncardiac vascular surgery patients
 - » Perioperative beta blockers in patients with known coronary artery disease
 - » Perioperative beta blockers in patients who are on beta blockers before surgery

Perioperative Beta blockers

- **Beta blockers offer significant protection against cardiac morbidity in patients undergoing non-cardiac surgery**
 - **For every 100 patients treated**
 - » 13 (NNT 8) will be prevented from having intra- or postoperative ischemia
 - » Approximately 4 (NNT 23) will not have an MI
 - » Approximately 3 (NNT 32) deaths will be prevented

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
- » 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

Eagle KA, et al. ACC/AHA. <http://www.acc.org/clinical/guidelines/peri/dirIndex.htm>.

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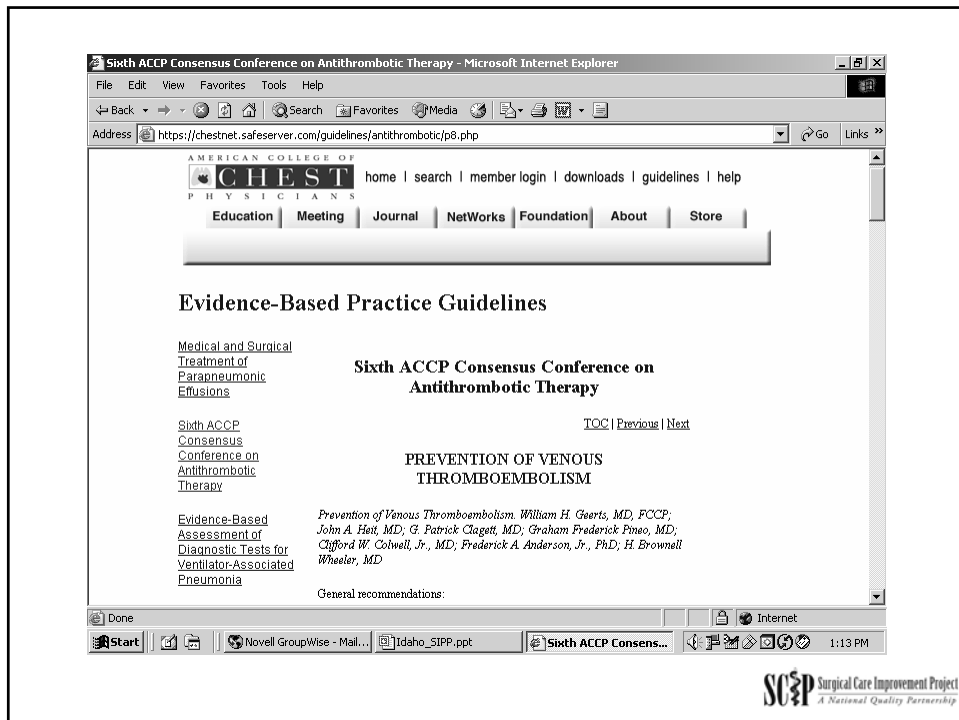
Surgical Care Improvement Project

Draft performance measures

• Prevention of venous thromboembolism

- » Rates of DVT/PE diagnosed during index hospitalization (outcome)
- » Proportion who receive any form of VTE prophylaxis
- » Proportion who receive appropriate form of VTE prophylaxis (based on ACCP Consensus Recommendations)

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Surgical Care Improvement Project

Draft performance measures

- **Prevention of ventilator-associated pneumonia**
 - » **Rate of postoperative pneumonia cases that are diagnosed during index hospitalization (outcome)**
 - » **Proportion of patients on ventilator with head of bed elevated 30 degrees**
 - » ***Proportion of ventilator patients put on a rapid weaning protocol (test)***
 - » ***Proportion of ventilator patients who receive peptic ulcer disease prophylaxis (test)***

Ventilator-associated Pneumonia (VAP)

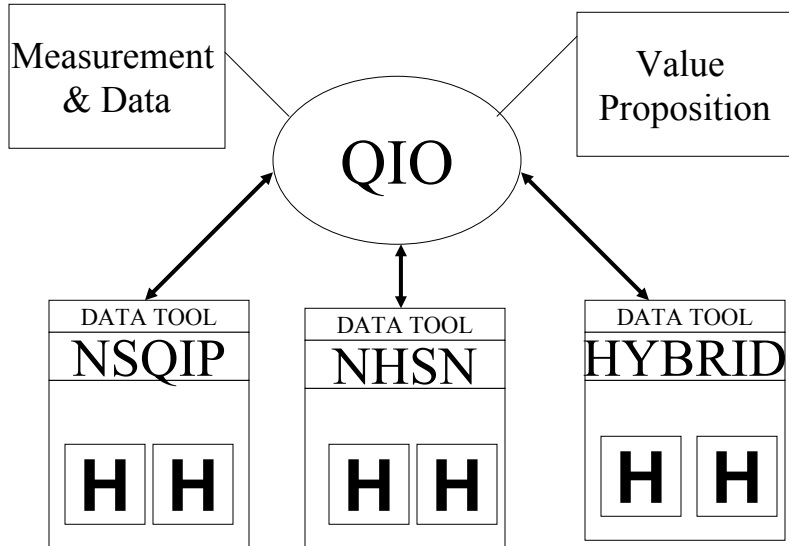
- **Prevention of VAP includes**
 - Hand washing compliance and universal precautions
 - Decreased frequency of vent circuit changes
 - Suspending enteral feedings during patient transport
 - Semi-recumbent position for ventilation

Ventilator-associated Pneumonia (VAP)

- **Semi-recumbent position reduces the frequency and risk for nosocomial pneumonia as compared to supine position**
 - **Elevation of HOB to 30 degrees¹**
 - » 26% absolute risk reduction in clinically suspected nosocomial pneumonia
 - » 18% absolute reduction in microbiologically-confirmed aspiration pneumonia

¹Drakulovic MB, et al. Supine body position as a risk factor for nosocomial pneumonia in mechanically ventilated patients: a randomized trial. *Lancet*. 1999;354:1851-1858.

SCIP QIO Pilot: 3 Data Collection Tools



Step1: Patient Demographics

Patient Name: Nancy Burnes

Demographic Information

Surgeon(s)

ICDDx

Procedures

* Date of Surgery:

2/15/2004

Record Number

123452

* Provider Number:

12345

Date Record Modified:

3/25/2004

* HIC Number:

123456

Unique Hospital ID:

123456789

* First Name:

Nancy

Address:

123 Anywhere St.

Middle Initial:

J

City:

Hometown

* Last Name:

Burnes

State:

OH

* Date of Birth:

7/7/1950

Zip Code:

12345

Sex:

☐ Male

☒ Female

☐ Unknown

Note: * Required fields

First Record

Previous Record

Next Record

Last Record

Add Record

Save Record

Delete Record

Find Record

Next Step

Close

Step1: Patient Demographics

Patient Name: Judy Test

Demographic Information

Surgeon(s)

ICDDx

Procedures

⏪

⏩

⏴

⏵

⏶

⏷

Modify List

Surgeon:

Surgeon

Smith William

Jones Robert

SurgeonUpin

B1234

A1234

First Record

Previous Record

Next Record

Last Record

Add Record

Save Record

Delete Record

Find Record

Next Step

Close

Step1: Patient Demographics
Patient Name: Judy Test

Demographic Information
Surgeon(s)
ICDDx
Procedures

Available ICDDx:

Code	Description
44389	44389: PERIPH VASCULAR DIS NEC
4439	4439: PERIPH VASCULAR DIS NOS
4440	4440: ABD AORTIC EMBOLISM
4441	4441: THORACIC AORTIC EMBOLISM
44421	44421: UPPER EXTREMITY EMBOLISM
44422	44422: LOWER EXTREMITY EMBOLISM
44461	44461: ILIAC ARTERY EMBOLISM
44469	44469: ARTERIAL EMBOLISM NEC
4449	4449: ARTERIAL EMBOLISM NOS
44501	44501: ATHEROEMBOLISM, UPPER EXT
44502	44502: ATHEROEMBOLISM, LOWER EXT
44581	44581: ATHEROEMBOLISM, KIDNEY
44589	44589: ATHEROEMBOLISM, SITE NEC
4460	4460: POLYARTERITIS NODOSA

Add >>
<< Remove

Type the Code >>

Selected ICDDx:

Code	Description
4441	4441: THORACIC AORTIC EMBOLISM

First Record
Previous Record
Next Record
Last Record
Add Record
Save Record
Delete Record
Find Record
Next Step
Close

Step1: Patient Demographics
Patient Name: Judy Test

Demographic Information
ICDDx
Surgeon(s)
Procedures

Available Procedures:

ICD-9 Code	Procedure Name
39.54	Re-entry operation (aorta)
39.55	Reimplantation of aberrant renal vessel
39.56	Repair of blood vessel with tissue patch graft
39.57	Repair of blood vessel with synthetic patch graft
39.58	Repair of blood vessel with unspecified type of patch gra
39.59	Other repair of vessel
39.61	Extracorporeal circulation auxiliary to open heart surgery
39.62	Hypothermia (systemic) incidental to open heart surgery
39.63	Cardioplegia
39.64	Intraoperative cardiac pacemaker
39.71	Endovascular implantation of graft in abdominal aorta
39.72	Endovascular repair or occlusion of head and neck vessel
39.79	Other endovascular repair (of aneurysm) of other vessel

Add >>
<< Remove

Type the ICD-9 Code >>

Selected Procedures:

ICD-9 Code	Procedure Name
39.61	Extracorporeal circulation auxiliary to open he

First Record
Previous Record
Next Record
Last Record
Add Record
Save Record
Delete Record
Find Record
Next Step
Close

OHHybrid

Step2: Measurements

Preop Orders | Medications | Labs | Progress Notes | History and Physical | Anesthesia | Operative | PACU | Postop Orders

Preop Infection Present	Unanswered	Postop Pneumonia Date	
Preop Pneumonia	Unanswered	Pulmonary Embolism	Unanswered
PUD Prophylaxis	☐	Postop UTI	Unanswered
PUD Prophylx contraind	☐	Postop UTI Date	
Preop Sepsis (within 48hrs)	Unanswered	Perioperative MI	Unanswered
Postoperative death	Unanswered	Cardiac arrest w CPR	Unanswered
Date of Death		Arrest w/CPR date	
Surg Site Inf	Unanswered	MI Date	
SSI date		DVT/Thrombophlebitis	Unanswered
SSI Details	Unanswered	DVT/Thrombophlebitis Date	
Preop Vent Dependent	☐	Pulmonary Embolism Date	
Postop ventilator	Unanswered	Discharge Date	
Postop pneumonia	Unanswered	Discharge disposition	Unanswered
Weaning protocol(y/n)	Unanswered		

National

SURGICAL INFECTION PREVENTION

Medicare Quality Improvement Project

www.medqic.org/sip

SC&P Surgical Care Improvement Project

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www.medqic.org/scip