Colorectal OR CUSP

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Acknowledgement to the entire CUSP Team
Background

- SSI is the most common nosocomial infection in the surgical patient
- SSI is the most common complication after colorectal abdominal surgery
- SSI is associated with increased mortality, length of stay and readmission
- An SSI costs between $6,200-15,000/per patient*
- Approximately 320,000 colorectal operations per year, national cost in the 100s of millions of dollars

*Smith et al, Ann Surg, 2004
Wick et al, Archives Surg, 2011
Background
NSQIP report 2009

30-Day Morbidity O/E Ratios for Colectomy
01/01/2009 – 12/31/2009 (depending on protocol)

95% Confidence interval
Low Outlier
High Outlier

(n=12)

(n=10)

Johns Hopkins
CUSP Goals

1. Improve team work and work place safety culture in the perioperative setting with the goal of improving surgical outcomes

2. Integrate safety practices into daily work
# CUSP for Surgery: Applied to SSI prevention

## Comprehensive Unit Based Safety Program

<table>
<thead>
<tr>
<th>Component</th>
<th>Method</th>
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<tbody>
<tr>
<td>1. Science of safety education</td>
<td>Introductory talk to explain the approach to addressing safety at a local level</td>
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<tr>
<td>2. Staff Safety Assessment</td>
<td>Two question survey to team members asking: 1) How will the next patient develop an SSI? 2) What can we do to prevent an SSI?</td>
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<td>3. Senior executive partnership</td>
<td>Senior executive attends CUSP meetings, making resources available to address safety concerns and assist with system-wide barriers</td>
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<td>4. Learning from defects</td>
<td>Teams are trained to use a structured tool to learn from defects</td>
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<tr>
<td>5. Implement teamwork and communication tools</td>
<td>Review unit-level safety data (e.g. SSI) monthly and develop local quality improvement initiatives to improve teamwork, communication and address identified hazards</td>
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Team

Leadership:
• Surgeon Champion
• Anesthesiologist Champion
• CRNA Champion
• Nursing Champion
• Coach
• Hospital Executive
• NSQIP SCR

Members:
• 5 surgeons (>90% of colorectal surgery at hospital)
• 20-30 GI RNs and techs
• 6 CRNAs
• 1 Anesthesiologist
• 2 PACU/post-op RNs
• 1 inpatient ward NP
Results of the two-question survey identifying local staff safety concerns and areas for improvement

<table>
<thead>
<tr>
<th>Safety Issue Identified (% response)</th>
<th>Opportunities to Improve</th>
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<tbody>
<tr>
<td>Infection Control (68%)</td>
<td>Skin preparation; hypothermia; contamination of bowel contents into the wound, antibiotic timing, selection and redosing; length of case;</td>
</tr>
<tr>
<td>Coordination of Care (12%)</td>
<td>Increase utilization of preoperative evaluation center, improve surgical posting accuracy (case name and duration), computer assistance for antibiotic selection and redosing</td>
</tr>
<tr>
<td>Communication and Teamwork (12%)</td>
<td>Improve communication throughout perioperative period, empower team members to speak up, improve compliance with briefings/debriefings, implement teamwork tools</td>
</tr>
<tr>
<td>Equipment/ Supplies (2%)</td>
<td>Accurate temperature probes, point of care glucose monitoring, under body warmers, and sanitizing wipes near anesthesia machine</td>
</tr>
<tr>
<td>Policies/Protocols (2%)</td>
<td>Standardize care/protocols/policies (5), monitor sterile technique policies</td>
</tr>
<tr>
<td>Education/Training (2%)</td>
<td>Ongoing education (with supportive data), development of a SSI prevention checklist</td>
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*Journal of the American College of Surgeons, 2012, in press*
Initial Areas of Focus

• Problem 1: Penicillin-allergic patients were not receiving proper prophylactic antibiotics

• Problem 2: Despite intra-op warmers patients were hypothermic in the recovery room

• Problem 3: Skin preparation was inconsistent

• Problem 4: Bowel instruments were used on skin
Gentamicin

Problem 1: Penicillin-allergic patients were not receiving proper prophylactic antibiotics

Stakeholders: Anesthesia, Surgery
Interventions:

- Increased amount of gentamicin available in the room
- Added dose calculator in anesthesia record
- Educated surgery, anesthesia and nursing in grand rounds

Despite >95% compliance on SCIP
Normothermia

Problem 2: Despite intra-op warmers patients were hypothermic in the recovery room

Stakeholders: Anesthesia, Nursing (Surgery)

- Frequent operating room delays result in 2\textsuperscript{nd} and 3\textsuperscript{rd} cases waiting in prep for hours
- Individual operating rooms do not have thermostat
Normothermia

Interventions:
- Confirmed that temperature probes were accurate (trial comparing foley and esophageal sensors)
- Initiated forced air warming in the pre-operative area
Skin Preparation

Problem 3: Skin preparation was inconsistent

Stakeholders: Nursing, Surgery

- No standardization of operating room skin preparation (no reference document or policy)
- Prep done by residents and medical students
Interventions:
- Chlorhexidine wash cloths given to patients pre-operatively
- Surgical skin preparation standardized to chloraprep (even in patients with ostomies)
- Prep responsibility shifted to circulating nurse from resident
- All nurses trained on chloraprep application
Problem 4: Bowel instruments were used on skin

Stakeholders: Nursing/Techs, Surgery

- No “team members”
- Nurses and techs frequently not familiar with cases
- No education on contamination
Separation of “Dirty” and “Clean” Instruments

Intervention:
- Built separate tray of instruments used for bowel anastomosis
- Extra suction and bovie tip and gloves opened and changed after anastomosis
- Educational sessions with scrub techs and nurses about instrument separation
- Audits and education on the spot
Colorectal SSI Project Intervention Checklist

1. CHLORAPREP WASHCLOTHS AT HOME

2. PRE-OP WARMING: Bair hugger placed on patient in pre-op. Temp on admission to PREP=______________
   Temp when leaving PREP= ________________

3. ROOM TEMPERATURE: warmed to 72 degrees prior to patient arrival

4. ANTIBIOTIC SELECTION
   - Standard: Cefotetan 2gm or Cefoxitin 2gm
   - Penicillin Allergy: Clindamycin plus Gentamicin 5mg/kg

5. SKIN PREPARATION: Chloraprep completed by RN

6. INSTRUMENTS: Clean and dirty instruments separated

Place completed form in "Colorectal Envelope" at Control Desk

Completed By: ____________________________
Date: ____________________________

Complete for Surgeons: Wick, S.Gearhart, J. Efron, Marohn
SSI Rate and Interventions

Quarter 1
- Pre-op warming
- Enhanced sterile technique
- Intervention checklist

Quarter 3
- Skin preparation protocol
- Pre-op wash clothes

Quarter 4
- CUSP kickoff
- Antibiotic deficiencies addressed

Colorectal SSI rate:
- Q3 2009: 42%
- Q4 2009: 17%
- Q1 2010: 29%
- Q2 2010: 26%
- Q3 2010: 16%
- Q4 2010: 20%
- Q1 2011: 19%
- Q2 2011: 18%
<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Operations</td>
<td>278</td>
<td>324</td>
</tr>
<tr>
<td>Overall SSI</td>
<td>27.3%</td>
<td>18.2%*</td>
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<tr>
<td>Superficial SSI</td>
<td>16.9%</td>
<td>13.6%</td>
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<tr>
<td>Deep SSI</td>
<td>1.4%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Organ Space</td>
<td>9.0%</td>
<td>4.0%*</td>
</tr>
</tbody>
</table>

* p<0.05

Journal of the American College of Surgeons, 2012, in press
Bottomline:
We still have work to do
Building Capacity: Armstrong Institute Patient Safety Fellowship

Tracie Cometa, RN         Kevin Driscoll, CRNA

• 16 hrs per week (Jan-June 2012)
• 8 hrs classroom training on patient safety
• 8 hrs protected time for quality improvement projects
Briefing/Debriefing Form

The Johns Hopkins Hospital
Operating Room Briefing/Debriefing Tool

Attending Surgeon to utilize this tool is to prompt open interdisciplinary communication before and after surgery to promote a clear understanding of specifics for each case.

ORMIS Case #___________________ Date ________________

**Briefing – Before Every Procedure**

- Team introductions – first and last names including nurses (Circulator writes on board)
- Do the following match:
  - Patient ID band, Informed Consent (read aloud), Site Marking, OR posting, patient’s verbalization of procedure (if patient awake), other clinically relevant documentation (H&P, clinic note)
  - Do we have any safety, equipment, instrument, implant or other questions or concerns?
  - Have antibiotics been given, if indicated?
  - What are the anticipated times of antibiotic redosing?
  - Is glycemic control/ beta blockers indicated?
  - Is the patient positioned to minimize injury?
  - Has the Prep been applied properly, without pooling and allowed to dry?
  - Have the goals and critical steps of the procedure been discussed?
  - Is the appropriate amount of blood available?
  - Are warmers on the patient?
  - Are the patient name/hist ory number and the surgical specimen name and laterality on the paperwork? (Paperwork: labwork to be independently verified by Surgeon)

**Debriefing – After Every procedure**

- Could anything have been done to make this case safer or more efficient?
- Has the SSI data collection form been completed?
- Are the patient name/ history number and the surgical specimen name and laterality on the paperwork? (Paperwork: labwork to be independently verified by Surgeon)
- Did we have problems with instruments?
- Plan for transition of care to post-op unit discussed? To include:
  - Fluid Management/ blood (all slips in chart)
  - Antibiotics – continue post-op (dosage/interval)
  - PACU intake/ Xrays
  - Pain/ PCA plan
  - New meds needed (immediate periop)
  - Beta blockers (as required)
  - Glycemic control (as required)
  - DVT prophylaxis

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- No follow-up on comments
- Too long
- Same form used in all OR’s (neurosurgery, ortho, general surgery)

Staff had lost faith
Briefing and Debriefing

- Team developed new form based on needs
- RN given protected time to address concerns raised during briefing and debriefing
- Candid discussion with surgeons about effective strategies for briefing/debriefing
- Ongoing observations of briefing to address defects
“I know the names of the personnel I worked with during my last shift.”

SAQ question
And
Results:
Roles Assigned for Briefing/Debriefing

- Surgeon initiates dialogue
  - Introduction all team members
  - Discussion of dirty/clean instruments
- Nursing takes over
  - Equipment
  - Heparin
  - Steroids
  - Antibiotics
  - Etc.
Examples of Defects Addressed by Debriefing

• Surgical scheduler taught to note if “bottom table” is needed during the case

• Pyxis in new clinical building operating rooms stocked with GI peel packs and disposables

• Clarified procedures which should receive chlorhexidine washcloths pre-op

• Developed work flow for inpatients to get appropriate bowel prep and washcloths pre-op

• Surgeon preference cards revised and instrument trays refined
  – Instruments still on cards from retired and departed surgeons
Revision of Laparoscopic GI Surgery Trays

Outcome:
Fewer instruments to count and turnover
Save money and time

Few surgeons knew that the major 1 and 2 were opened for lap cases
Collaboration with Infection Control

- OR observations
- Noted circulating nurse left the room between 30 and 50 times during case for equipment not on case carts
- “Stapler Cart”

Lucy Mitchell RN, SCR, Patricia Lawson RN, ICP, Tracie Cometa RN, Steph Mullens CST
Standardization of perioperative steroid use

- Lucy Mitchell RN SCR
  - Noted 50% SSI rate in patients on steroids
- Pharmacy led audit of perioperative steroid use demonstrated 50-200mg hydrocortisone administered intra-op

### Table 4. Mean Postoperative Total Daily Dose

<table>
<thead>
<tr>
<th>Patient population</th>
<th>n (%)</th>
<th>Hydrocortisone Equivalents (mg)*</th>
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<tbody>
<tr>
<td>No Steroids Upon Admission (n=16)</td>
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<tr>
<td>Received postoperative steroids</td>
<td>7 (44%)</td>
<td>62</td>
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<td>Budesonide (n=10)</td>
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<tr>
<td>Received postoperative steroids</td>
<td>3 (30%)</td>
<td>77</td>
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<tr>
<td>Prednisone (n=24)</td>
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<tr>
<td>Received postoperative steroids</td>
<td>23 (96%)</td>
<td>87</td>
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*Calculated based on a dose equivalence of 1:4 (prednisone: hydrocortisone)
Standardized Steroid Intra and Post-op Orders

Roberto Salvatori, MD
Endocrinology

- Standardized to 50mg hydrocortisone intra-op (surgeon and anesthesia education, included in briefing)
- POE-based post-op orderset with rapid taper
### Engaging Other Providers: Peer Outcome Reports

- Provider specific data compared to peers
- All surgeons performing > 10 colorectal procedures per year
- Sets the stage that problem is preventable and a social problem

#### TARGETTED PROCEDURE MODULE

**Colon and Rectal Combined**

<table>
<thead>
<tr>
<th>Surgeon ID</th>
<th>ACS NSQIP (defined variables) 30-Day Mortality Rate</th>
<th>Superficial SSI</th>
<th>Deep Incisional SSI</th>
<th>Organ/Space SSI</th>
<th>Wound Disruption</th>
<th>Pulmonary Embolism</th>
<th>Urinary Tract Infection</th>
<th>Transfusion Intraop/Postop</th>
<th>Sepsis</th>
<th>Septic Shock</th>
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<tr>
<td>Site Total</td>
<td>9</td>
<td>61</td>
<td>15.4%</td>
<td>2</td>
<td>0.5%</td>
<td>21</td>
<td>5.3%</td>
<td>5</td>
<td>1.3%</td>
<td>10</td>
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<tr>
<td>Comparison</td>
<td>480</td>
<td>1,049</td>
<td>7.2%</td>
<td>206</td>
<td>1.4%</td>
<td>649</td>
<td>4.5%</td>
<td>206</td>
<td>1.4%</td>
<td>130</td>
</tr>
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</table>

comparison: 480 | 3.3% | 1,049 | 7.2% | 206 | 1.4% | 649 | 4.5% | 206 | 1.4% | 130 | 9 | 2.3% | 572 | 3.9% | 2,448 | 16.8% | 755 | 5.2% | 384 | 2.6%
Barriers and Challenges

- Implementing pre-operative warming
  - Greater than 100 emails (April 2011 to present) and still not enough warmers available to warm all patients undergoing colon surgery

- No consistent reporting of process measures (antibiotic compliance, selection, temperature etc)
  - All available data manually abstracted by medical student
  - 5 separate electronic records with different aspect of perioperative information
Barriers and Challenges

• Poor moral in operating room (increased workload and opening new clinical building/operating rooms)

• Management resistant to developing team of providers and scheduling designated providers in rooms

• No sustainable plan for maintaining frontline providers protected time after completion of patient safety fellowship

• Lack of pre-operative education
Recent Initiatives

• Pre-operative SSI education
  – Audit of intervention checklist demonstrated poor compliance with chlorhexidine wash clothes
  – Applied for grant funding to trial nurse-led pre-operative education

• Mechanical bowel preparation with oral antibiotics (rapid implementation of new national guidelines)
Our experience: hospital level interventions (SCIP) pale in comparison to interventions at the work unit level (CUSP)

We embrace local wisdom in the Colorectal OR ‘s
Lessons Learned

• Harm is preventable

• Science of the implementation of quality improvement is under appreciated
  CUSP is one tool for implementation

• CUSP sends a clear message, all provider opinions and ideas are important and essential for improvement

• Better teamwork → better outcomes → better culture and teamwork

• Positive culture empowers frontline staff to take ownership of patient safety and achieve unprecedented improvements