Slashing SSI – Raising the Bar to Lower the Rate

Lindsey Lesher, MPH, Consultant Epidemiologist

May 3, 2016
Surgical Site Infection (SSI): A Few Facts

- Second most common type of healthcare-associated infection (HAI) in U.S. hospitals (290,000 per year)

- Estimated cost: $3.5 – 10 billion per year

- 40-60% considered preventable with appropriate interventions

- A patient with an SSI is:
  - 5 times more likely to be readmitted after discharge
  - 2 times more likely to spend time in intensive care
  - 2 times more likely to die after surgery

Surgery in the U.S.: A Few Facts

• > 15 million surgeries are performed every year [1]

• SSI patient risk factors
  • Obesity
    • 34.9% (78.6 million) of the U.S. population was obese in 2012 (BMI: 30-40) [2]
  • Diabetes
    • 9.3% (29.1 million) of the U.S. population has diabetes[3]
      • Undiagnosed: 8.1 million (27.8% of people with diabetes are undiagnosed)
      • Pre-diabetic: estimated 86 million
  • Age
    • By 2020: estimated 25% of the working population will be age 55 or older

Prevention of SSI must be a top priority

1. AHA/HRET. Surgical Site Infection (SSI) Change Package.
Federal Interest in HAI


http://www.hqinstitute.org/post/value-based-purchasing
Federal Interest in HAI (cont.)

2016 VBP Domain Weighting

- Patient Experience of Care: 25%
- Clinical Processes of Care: 10%
- Efficiency: 25%
- Outcome: 40%

SSI in Minnesota Hospitals

Healthcare-associated infections (HAIs) are infections patients can get while receiving medical treatment in a healthcare facility. Working toward the elimination of HAIs is a CDC priority. The standardized infection ratio (SIR) is a summary statistic that can be used to track HAI prevention progress over time; lower SIRs are better. The infection data are reported to CDC's National Healthcare Safety Network (NHSN). HAI data for nearly all U.S. hospitals are published on the Hospital Compare website. This report is based on 2014 data, published in 2016.

### Minnesota Acute Care Hospitals

#### CLABSIs

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<td>CLABSI</td>
<td>1,579 hospitals</td>
<td>46</td>
<td>3%</td>
<td>5%</td>
<td>0.49</td>
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<td>CAUTI</td>
<td>1,579 hospitals</td>
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<td>20%</td>
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<td>SSI: Abdominal Hysterectomy</td>
<td>1,579 hospitals</td>
<td>50</td>
<td>13%</td>
<td>40%</td>
<td>1.15</td>
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<td>SSI: Colon Surgery</td>
<td>1,579 hospitals</td>
<td>49</td>
<td>0%</td>
<td>6%</td>
<td>1.04</td>
<td>0.98</td>
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<td>MRSA Bacteremia</td>
<td>1,579 hospitals</td>
<td>54</td>
<td>16%</td>
<td>58%</td>
<td>0.37</td>
<td>0.87</td>
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<tr>
<td>C. difficile Infections</td>
<td>1,579 hospitals</td>
<td>54</td>
<td>3%</td>
<td>12%</td>
<td>0.81</td>
<td>0.92</td>
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*The number of hospitals that reported to NHSN and are included in the SIR calculations. This number may vary across HAI types for example, some hospitals do not report central line associated bloodstream infections, or do not perform cesarean or abdominal hysterectomy surgeries.

† Nat'l Baseline is the median state rate by HAI type. See footnotes of this table for specifics.

#### Minnesota Hospitals Reporting SIR to CDC's NHSN, 2014*

- 1,579 hospitals reported SIR data to NHSN.
- Minnesota hospitals reported no significant change in SIRs related to abdominal hysterectomy surgery between 2013 and 2014.
- Not enough data to report how many hospitals had an SIR significantly higher (worse) than 0.83, the value of the national SIR.

#### Minnesota Hospitals Reporting SIR to CDC's NHSN, 2014*

- 1,579 hospitals reported SIR data to NHSN.
- Minnesota hospitals reported no significant change in SIRs related to colon surgery between 2013 and 2014.
- Among the 50 hospitals in Minnesota with enough data to calculate an SIR, 12% had an SIR significantly higher (worse) than 0.98, the value of the national SIR.

#### Minnesota Hospitals Reporting SIR to CDC's NHSN, 2014*

- 1,579 hospitals reported SIR data to NHSN.
- Minnesota hospitals reported no significant change in SIRs related to C. difficile infections between 2013 and 2014.
- Among the 50 hospitals in Minnesota with enough data to calculate an SIR, 12% had an SIR significantly higher (worse) than 0.98, the value of the national SIR.
## SSI in Minnesota Hospitals (cont.)

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<tbody>
<tr>
<td>SSI, Abdominal Hysterectomy&lt;br&gt;Nat’l Baseline: 2008</td>
<td>50</td>
<td>↑ 13%</td>
<td>↑ 40%</td>
<td>↑ 15%</td>
<td>1.15</td>
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Slashing SSI Bundle

Slashing SSI Bundle
Summary of recommendations for patients of all ages having surgery in the OR that involves a skin incision

1. Showering/bathing
- Patients are to be advised to shower or bathe (full body) with either soap (antimicrobial or non-antimicrobial) or an antiseptic agent once the evening before [1-6] and once the morning of the surgical procedure [1].
- Upon admission to the preoperative area, an FDA approved antiseptic solution is to be applied in full strength to the operative site [1, 2, 7].
- Adherence to instructions for preoperative antiseptic showering or bathing at home is to be assessed upon admission to the preoperative area as a part of a preoperative bundle/checklist. If a patient reports that he or she was unable, an antiseptic shower, bath or full body wipe is to be completed pre-operatively.
- Hospital patients requiring surgery are to receive an antiseptic shower, bath, or full body wipe prior to surgery whenever possible.

2. Postoperative wound care
- Surgical sterile dressings are to be left intact 24–48 hours unless there is bleeding or a reason to suspect early infection [2, 8].
- Where postoperative dressing changes are necessary, sterile gloves and dressings should be used [2, 8].
- Patient education on the importance of hand hygiene in preventing SSI is to be provided preoperatively [8, 9].
- Hand hygiene products are provided at the patient bedside [8, 9].

3. Closing trays for class II and higher open surgeries
- For all bowel procedures, clean instruments, water, and gloves/napkins are to be utilized for wound closure [8, 10].
- For all class II and higher clean/contaminated open laparotomies, including extracorporeal bowel Anastomoses, clean instruments, water, and gloves/napkins are to be considered for wound closure.
- The need for closing trays is to be added to the preoperative briefing or timeout script.

4. Antibiotic dosing
- Intra-operative re-dosing of surgical prophylactic antibiotics is to be performed for procedures that last longer than two half-lives of the drug [11-14].
- Intra-operative re-dosing of surgical prophylactic antibiotics is to be performed for procedures involving blood loss >1500mL [11, 14].
- A weight based dosing protocol is to be implemented per guidelines by the American Society of Health-System Pharmacists (ASHP), the Infectious Diseases Society of America (IDSA), the Surgical Infection Society (SIS), and Society for Healthcare Epidemiology of America (SHEA) [7, 11, 12, 14, 15].

5. Glycemic control
- Implement perioperative glycemic control and use blood glucose target levels <200mg/dL for diabetic and non-diabetic patients [1, 16-19].

6. Normothermia
- Maintain normothermia (body temperature ≥ 36°C or 96.8°F) preoperatively, intraoperatively and postoperatively [1, 7, 20-22].

7. OR traffic
- An assessment of OR traffic, with the intent to reduce unnecessary traffic, is performed upon implementation of SSI bundle and periodically thereafter [1, 7, 23-29].

MHA Slashing SSI Bundle

• Bundle elements
  1. Showering/bathing recommendation
  2. Postoperative wound care
  3. Closing trays for class II and higher open surgeries
  4. Antibiotic dosing recommendations
  5. Glycemic control
  6. Normothermia
  7. OR traffic
Concept of the Care Bundle

• What is a bundle?
  • Structured way of improving care processes and patient outcomes
  • Designed around specific set of evidence-based, generally accepted practices

• Why is it important in healthcare?
  • Improves consistency, reliability of care practices
  • Promotes awareness that entire care team must work together
  • Promotes the use of improvement methods to redesign care processes

• How do you do implement it?
  • Redesign of work processes, communication strategies, infrastructure
  • Sustained measurement, vigilance

Institute of Healthcare Improvement (IHI)
Presenters

• Kathleen Steinmann, MT (ASCP), CIC
  • Infection Preventionist
  • Hennepin County Medical Center

• Patricia Dumonceaux, MSN, RN PHN, CIC
  • Infection Prevention and Control
  • CentraCare Health St. Cloud Hospital

• Sharon Kim
  • 4th year Medical Student, joining Mayo’s OB/GYN residency program in 2016
  • Mayo Clinic
Hennepin County Medical Center

SSI Prevention
May 3, 2016

Kathleen Steinmann MT(ASCP), CIC
Why Build a Bundle?
Deep and Organ Space SSIs have a technical process review.
Surgical Site Infections Contributing Factor Analysis

Facilities
- Air Exchanges & Filters
- Cleaning Light Fixtures
  - Balancing Air Pressure

Intra-Op
- Case Length
- Vendor Equipment/Trays
  - Antibiotics
  - Anastomosis
  - Pt Surg. Prep
    - Room Traffic
      - Staff Attire & Personal Effects
        - Colon/Hist Bundle
          - O2 Level
          - Dressing Application

CPD
- New Equipment
- Training
  - Bioburden
    - Instrument Turnover
      - Quality Checks/Missing Items
        - Staff Attire

Vendor Equipment/Trays
- Training
- Std Work
  - IUSS (flash)
  - Unsterile Equipment

Post-Op
- Order Sets/Ordering Process
  - Clinical Follow up
    - Temp Mgmt
  - Dressing Changes
    - Activity Orders

Pre-Op
- Glucose Mgmt. for non-diabetic pt
- Pt selection & optimization
  - Pt Changing process on P4
  - CHG Bathing
    - Incision Care stds
    - Education Reinforcement
      - Wound Documentation
  - Pre-op Education (IP & out pt)

EVS
- Consistent OR Staffing
  - Equipment Sanitization
  - Standard Work
  - Training

Surgical Site Infections
- Go/No Go Process
  - Cleaning Product/Chemical
  - Audit/quality checks/supervision

Priorities
- Interdependent

Antibiotics
- Epic build going live on 21st.
Slashing SSI Bundle

1. Showering/Bathing

2. Postoperative wound

3. Closing instrumentation trays for class II open

4. Antibiotic dosing
   - Management of known MRSA patients
   - Pre-op oral abx for bowel surgeries

5. Glycemic Control

6. Normothermia
Process Measure: **Shower/Bath**

- \( N = \) All elective and scheduled surgery cases

- 2 full CHG bundles given in clinic during pre-op appointment for full body baths (6 wipes each)

- Part of the inpatient surgery checklist
Process Measure: Oxygen

- **N = All eligible patients**

- **Average FiO2 rates of ≥ 0.75 when 0.80 is administered (excluding spontaneous breathing rates)**

**Exclusions:**
- Hx of/on bleomycin
- Open trachea/ potential surgical fire
- Neonates
- Select minor procedures
Process Measure: Glycemic Control

• N = % eligible patients w/FBG day of surgery

• N = % FBG > 180 mg/dl and treated per protocol

Exclusions: Dental, trauma, non-diabetic peds, cases added after 3:00 pm
Process Measure: Normothermia

• N= All >18 y/o eligible patients

• Measure: Pre-warming all patients 30 minutes prior to surgery and maintaining >36 intraoperatively

Exclusions: Dental, eye, trauma, peds, intentional hypothermia pts, select minor procedures
Process Measure: Debrief

N = All surgery cases

- Must be completed by surgeon (not resident)
- Includes review/verification of wound class
- Quality of Debrief Process observation: 20/month by OR Chief

% Compliance With Debrief

- Nov-15
- Dec-15
- Jan-16
- Feb-16
- Mar-16
MHA Roadmap: Post Op Wound Care

• Standardizing who does the dressing change (nursing vs surgeon) and when

• Post-Op and Discharge Orders
  • Wound cares
  • Bathing instructions
  • Diet
  • Activity
MHA Roadmap: Equipment/Environment

- Environmental Services
- CPD
- OR traffic
- OR Attire
7 Habits: OR Attire

1. Surgical mask tied properly when in the room.

2. Surgical mask off when outside the room (not worn around the neck).

3. Hand Hygiene in and out of the room

4. Wear gowns and gloves for isolation rooms. Gowns must be tied at neck and waist.

5. All head hair appropriately covered.

6. Wear proper eye protection in the sterile field and whenever there is a risk for splashing.

7. Jewelry must be removed per the Surgical Services Attire policy
St. Cloud Hospital

Our Journey to reduction of SSI’s in the Family Birthing Unit
Presenters:

- Patricia L. Dumonceaux, MSN, RN, CIC, PHN. Infection Prevention and Control Nurse, St. Cloud Hospital, CentraCare. 
  dumonceauxp@centracare.com

- Melissa C. Erickson, MSN Ed., BSN, RNC-MNN, PHN. Nurse Clinician Family Birthing Center, St. Cloud Hospital, CentraCare. 
  ericksonme@centracare.com
Speaker Disclosure:

- Patricia Dumonceaux – No disclosures
- Melissa C. Erickson –
  - Grant from MHA for the cost of sharing and dissemination of this information
  - Perinatal Expert Consultant for MHA
Special thank you and acknowledgements

- Melissa Stowe BAN, RN, CNOR
- Vivian Koerner, RN, CNOR
- Jodi Specht-Holbrook, MSN, RN, CNOR
- Larry Asplin, MSN, RN, CNOR
- Jim Mahowald, RPH
- Kimberly Schuster, BSN, RN, CWOCN
- Joanie Nei, RN, BSN, CMRP
- Liz Kiffmeyer BSN, RN
- Ellen Simonson BSN, RN, CIC
- Millie Vadnais – Environmental Services
- Dr. Stacia Anderson, OB/Gyn
- Dr. Eric Thompson, OB/Gyn
- WOC Nurse Team
- CHAIN-SCH
- Patient Safety Committee
- MHA for the Grant as well as invite to speak and share
St. Cloud Hospital
Regional Hospital Serving Central Minnesota
A part of CentraCare Health System

- Regional facility serving Central Minnesota
- 489 licensed bed regional medical center
- Three time Magnet hospital (2014)

Family Birthing Center:
- 6-bed private room OB triage unit
- 11 labor/delivery/recovery beds
- 6 antepartum (high risk) beds
- 27 postpartum (mother/baby) beds
- 2 operating rooms
- Approximately 3,000 births per year

- 18 OB/Gyn’s
- 5 delivering Family Practice Providers
- 3 Perinatologists
Why we began this journey...

- In 2011-2012, the FBC cesarean infection rate was noted to be over the NHSN mean. Infection Prevention and Control were concerned enough to consider removing the OR suites from the FBC and only performing cesareans in the main OR.

- The goal was to reduce the SSI rates in cesarean sections
- Keep mothers and infants together after surgical delivery
- Improve Patient Experience
- Mitigate the emotional, social, and/or physical consequences to the families
- Promote bonding of mother and child within the first one to two hours after delivery
- Repair relationships between surgeons, nursing, and administration
Purpose statement

- To improve cesarean section patient experience by reduction of postoperative SSI
Why we do what we do...
What we had already done...

- All SCIP Measures were implemented and reviewed to be compliant *until retirement of the measure*
- CHG Wipes at home and at the hospital admission - 5-2011 – *CentraCare providers; remaining providers in 2012*
- Antibiotics within 60 minutes prior to incision – 9-2011
- Antibiotics after the clamping of the cord – *Late 2012*
- Iodine Paint in the OR – *Prior to 2012*
- Attire – Policy and Compliance *Ongoing, with last edits in 2014*
- Glycemic control of diabetic patients – *On-going*
- Traffic Control (added printers to the OR for bands and labels) *Spring 2014*
Results:

- Little to no change or improvement in our outcomes
Case Review Data FY14

- What our unit data showed of all our SSI’s
  - No other commonalities of OR location, Staff or surgeon were identified

Co-Morbidity

- Smoking
- Previous Cesarean
- Emergent Cases
- Anemia
- BMI

Co-Morbidity
The dressing being pieced together did not create a positive healing environment for the incision and allowed pathogens to enter.
Theory that providers were continuing to perform non-best practices post operatively such as:

- Peroxide wash on day 1 or 2 post op
- Dressing removals too soon or too late
- Aseptic technique not used when performing dressing changes and incision care
- No standardized care
- Showers with or without the dressing
Our proposal to providers:

Change our dressing types to be two options. Go-Live=10-21-14

- All in one clear island dressing
  - For everyone else who has not met criteria
  - Removed at 24 - 48 hours post op
Our proposal to providers cont.: 
Change our dressing types to be two options. Go-Live=10-21-14

Silver silicone foam boarder re-sealable dressing (foam Ag dressing) for patients who meet high risk for SSI

Criteria-
- Uncontrolled Diabetes
- Anemia (Hgb <12), Blood or Hematological Disorders – Severe anemia, Antithrombin C, Protein S, Anticardiolipin, Sickle Cell, etc.
- Body Mass index of 30 or greater
- Smoker
- Multiple Cesareans – History of 2 or greater
- History of wound infections/healing problems – i.e. Seroma and or hematoma formation, infections, dehiscence, etc.
- Oozing incision
- Emergent/Urgent cesarean with ANY of the following:
  - Prolonged rupture of membranes
  - Preterm Premature Rupture of Membranes
  - Diagnosis of Chorio
  - Prolonged labor with ROM and internal monitors
  - Remains in place for up to 7 days
**Dressings and After care**

- **Aseptic technique only**
- **Removal only done as the product manufacturer recommends**

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**POLICY**

1. **PURPOSE:**
   - To implement dressing based on patient risk factors, standardize incision care, and decrease post-op cesarean infections.

2. **DEFINITIONS:**
   - **Aseptic Technique:** Use of surgical practices that restrict microorganisms in the environment and prevent contamination of the surgical wound.
   - **Aseptic Technique** is employed to maximize and maintain asepsis, the absence of pathogenic organisms, in the clinical setting. The goals of aseptic technique are to protect the patient from infection and to prevent the spread of pathogens.

3. **GUIDELINES:**
   - **A. Use Transparent Aseptic Dressing on patients with no risk factors.**
     - Transparent Aseptic Dressing to remain in place for a minimum of 24 hours, with a goal of attaining 48 hours.
     - Remove and replace dressing if less than 24 hours since surgery and dressing is saturated 75% or more. OR if the edges of the dressing are no longer adhered. OR if there is florid bleeding.
     - Change the dressing using aseptic technique.
     - 4. Patient may shower after 24 hours while the dressing is still intact.
     - Do not use other types of dressings on the original dressing except prescriptive pressure dressing.
     - For oozing or actively bleeding incision: Apply pressure dressing.
     - Once the dressing is removed, if there is a skin fold or moisture is collected in the area, repeat step 2.
     - Before removing the dressing, outer layer is saturated with drainage, then remove the outer layer.
     - **B. Use BORDER AG Dressing for patients with any of the following criteria:**
       - Uncontrolled Diabetes.
       - Systemic Infection.
       - Coagulopathy.
       - Anticoagulation Therapy.
       - Laboratory & Clinical Judgement.
       - Poor Wound Healing.
       - 6. History of wound infection and healing problems – i.e. Seroma and or hematoma formation, infections, dehiscence, etc.

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**REFERENCES:**


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**When to call the health care provider**

- If any change in the wound is a concern
- If the drainage from the wound increases
- If you have a sudden increase in pain, or new pain in your wound
- If the area around the wound gets red, swollen or painful to touch
- If the wound color changes from pink or red to a tan, brown or black color
- If you get a fever, or if the wound odor gets worse
- If you have questions

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**Removing your soiled dressing:**

- You may remove the dressing on the 7th day.
- Remove dressing by gently lifting a corner and then peeling away from your wound.

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**Ag** is a dressing that has been approved by your healthcare provider to promote wound healing. This dressing will stick to your wound.

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**Patient Education**

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**Ag** is a dressing that has been approved by your healthcare provider to promote wound healing. This dressing will stick to your wound.

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**Border Ag Dressing**
May use a Pressure Dressing over the either dressing when needed
Concerns raised:

- The cost of the foam Ag dressing at that time was 2394% more in cost / each dressing.
- The cost of the all in one island dressing was about 175% more in cost.
- The cost of the pieced together dressing was very minimal.
The business argument:

- “SSI extended length of stay by 9.7 days while increasing cost by $20,842 per admission these cases of SSI were associated with an additional 406,730 hospital-days and hospital costs exceeding $900 million nationally” (de Lissovoy et al., 2009, p. 387).

- Nationally “Surgical site infections (SSIs) are serious operative complications that occur in approximately 2% of surgical procedures and account for some 20% of health care-associated infections”. http://www.ncbi.nlm.nih.gov/pubmed/19398246

- Median 30-day SSI costs; hysterectomy for endometrial cancer
  - Any SSI $5500/SSI
  - Superficial incisional SSI $9500/SSI
  - Organ/space $20,000/SSI

The cost of the more expensive dressing if used on every cesarean we perform = $17,640.24 in 2014 prices.
One year later...

After noting a >50% reduction in SSI after dressing changes and standardization of incision care...

- It was noted that 85% of our patients met criteria for the foam Ag dressing
- Only 15% had the all in one island dressing
- 200 patients were called to verify compliance and how they liked the dressing, with a positive response from patients
  - A motion was made to use the foam Ag dressing for 100% of our patients and was approved. Go-live July 2015
  - Based on that we changed to using it exclusively, with the exception of a silver allergy.
Our next steps were

- Change Iodine Paint out for Chlorhexidine scrub in the OR pre-op phase.
Change from the CHG wipes to the pre-op CHG Shower for the following reasons:

- The wipes are 2% CHG and the shower bottles are 4% CHG
- The cost of the wipes
  - Inpatient unit was supplying and paying for the cost of the wipes for all the clinics as well as the inpatient population
  - Savings of about $2500.00
- The CHG shower is just as effective and less expensive than the wipes
- The evidence shows that patient pre-op education on taking a good shower, wearing clean clothes, and sleeping on clean sheets also helps.

Edmiston et.al.,(2008). *Journal of the American College of Surgeons*
Edmiston et.al., (2010). *The Association of Perioperative Registered Nurses*
Concerns about Chlorhexidine use and patient compliance

- Cost of CHG shower bottles—Insurance does not cover this.
  - The cost is anywhere from $4-$7.00 for a bottle that will provide enough for two showers.
- Will the patient actually go out and purchase this?
- If the patient chooses to not use the CHG shower, they will be cleansed the CHG wipes when they are admitted.
- For patients visibly soiled a shower will be requested.
- For inpatients scheduled to have a cesarean, the CHG showers will be done based on their condition and ability to shower. Otherwise the CHG wipes will be used.
- Patient education sheet created
Showering To Reduce Germs On Your Skin Before Surgery

Wash with antiseptic solution
Washing your skin with 4% Chlorhexidine Gluconate (CHG) solution will reduce the number of germs on your skin and decrease the chance of infection. Please follow the instructions below to clean your skin before surgery.

- **DO NOT SHAVE** any part of the body (except men can shave their faces) for at least two days prior to surgery.
- Purchase two 4-ounce bottles* of Chlorhexidine Gluconate (CHG) antiseptic soap, also called **Hibiclens** at your local pharmacy. **DO NOT** use this product if you are allergic to CHG.
- Shower the night before AND the morning of surgery with CHG antiseptic soap.
- **DO NOT** use CHG soap near your eyes, ears, mouth or vagina.
- This product may cause discoloration of towels/washcloths.

The night before surgery
- In the shower, wash your body with your regular soap first. Wash and rinse your hair using your normal shampoo and conditioner.
- Make sure you completely rinse the soap, shampoo and conditioner from your hair and body.
- Now wet your entire body. Then turn the water off in the shower or move away from the water spray.
- You will use 1 bottle (4 ounces) for each shower. With a clean wash cloth, apply the antiseptic CHG soap solution to your body starting at the neck. Lather your entire body from the neck down. Continue to stay out of the water spray as you lather. Gently wash your body with the lather.

The morning of surgery
- **DO NOT** wash with regular soap or shampoo and conditioner during this shower. Doing so would decrease the effectiveness of the CHG soap.
- Wet your entire body in the shower, then turn the water off or move away from the water spray.
- You will use 1 bottle (4 ounces) of CHG soap for this shower. With a clean wash cloth, apply the antiseptic CHG soap solution to your body starting at the neck. Lather your entire body from the neck down. Continue to stay out of the water spray as you lather. Gently wash your body with the lather.

- **DO NOT** use CHG soap near your eyes, ears, mouth or vagina.
- Gently scrub the areas where the incision(s) will be located for about 5 minutes. See diagram for location.
- Once you have completed the scrub, rinse the CHG soap off your body completely using shower water.
- If you have burning, redness or itching that does not stop, rinse immediately and do not reapply.
- **DO NOT** wash with regular soap or shampoo and conditioner after you have used the antiseptic CHG soap solution. **DO NOT** apply deodorants, lotions, moisturizers, makeup, powders or sprays. Doing so would decrease the effectiveness of the CHG soap.
- Pat yourself dry with a clean, freshly washed towel.
- Dress in clean, freshly washed clothes.
- Sleep on freshly washed sheets.

*It is OK to buy one 8-ounce bottle and use half the bottle for each shower.*

*[INSTRUCTIONS FOR THE MORNING OF SURGERY ARE ON THE BACK OF THIS SHEET]*
What were some of the problems we experienced?

- CHG Scrub did not allow the previous fenestrated drape to seal.
- During the month this occurred May 2015, we saw a sharp spike in our SSI’s which is directly attributed to the sterile field being broken.
- We tested many drapes after that and ended up replacing that drape with a iodine infused incise drape and the same drape without iodine for those with allergy.
- The iodine infused drape does adhere better than the clear.
Antibiotics

- Pre-op antibiotics (Before 2011)
  - Cefazolin 1 gram or if allergy:
    - clindamycin 900mg and gentamicin 5mg/kg
- Antibiotics at cord clamping (fall 2012)
  - Azthromycin 500mg
- Weight based dosing (January 2014)
  - Ancef 2 gram <120kg
  - Ancef 3 gram >120kg
- Re-dose antibiotics if blood loss greater or equal to 1500mL, or case longer than the half life of the antibiotic given pre-op. (August 2015)
Antibiotics at cord clamping (fall 2012) Azthromycin 500mg

Weight based dosing January 2014

Closing Trays implemented July-August
Closing trays
Prior to fascia closure, the case stops for a change out for all at the table of:

- Gowns
- Gloves
- Instruments
- Sutures
- Drapes (we use a all in one pediatric drape)
- Laps/soft goods
- Light handles
- Cautery
- Suction
- Sterile/warm/ normal saline/water
Implementation and Education:

- During the trial prior to full implementation the Nurse Clinician utilized the PDSA model.
- Present for every case that the trial was performed on.
- Everyday slight adjustments were made to steps, equipment and technique.
- Every circulator either performed a live case with the new process or had a 30-60 minute training session on the process.
Costs of Closing trays:

- How Much did all of that COST?
Actual Cost for 2 OR's

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closing Dry Goods</td>
<td>$35,016</td>
</tr>
<tr>
<td>Dry Goods Pack adjustments</td>
<td>$3,224</td>
</tr>
<tr>
<td>Closing Tray Instruments</td>
<td>$9,148</td>
</tr>
<tr>
<td>Mayo stands</td>
<td>$280</td>
</tr>
<tr>
<td>Medium Tables</td>
<td>$1,000</td>
</tr>
</tbody>
</table>
Closing Dry Goods

- BAG BEDSIDE 12X18 PLASTIC
- COVER MAYO STAND 23X53
- TOWEL OR 17X26 XR BLUE
- GOWN MICROCOOL L
- CAUTERY PUSH BTN EDGE HLST
- CVR LIGHT HNDL SOFT
- NDL CNTR 20CT DBL MAG
- SPNG LAP 18X18 XR PW 5/PK
- Pediatric Laparotomy Drape with adhesive
- DRAPE 44X60
Opening Dry Goods:

- BAG BEDSIDE 12X18 PLASTIC
- BAG POLY 8X10 PIGGYBACK
- CHLORAPREP 26ML ORANGE
- COVER MAYO STAND 23X53
- CVR TBL 50X90
- DRAPE C-SECT PCH FEN
- ORGANIZER TBG/CORD
- TBG SUCT 5MMX12FT W/CONN
- TOWEL OR 17X26 XR BLUE
- GOWN MICROCOOL L
- TOWEL ABS 17X20 WHITE
- WRAP CSR 25X25 2PP WHITE
- BASIN PLACENTA BLUE
- BLADE NO.10 CS RIB
- CAUTERY PUSH BTN EDGE HLST
- CUP URINE COLLECTION
- CVR LIGHT HNDL SOFT
- DRAPE 44X60
- LABEL SHEET CSTM-C SECTION
- MARKER SKIN REG TIP LBL RULER
- NDL CNTR 20CT DBL MAG
- PITCHER 1200CC W/HANDLE
- 3 SPNG LAP 18X18 XR PW 5/PK
- SUCTION TIP POOLE
- SYR EAR/ULCER 2OZ RED
Closing Tray Instruments

- 4 CLAMP CRILE CURVED 5 ½”
- 2 CLAMP CARMALT
- 4 CLAMP KOCKER STRAIGHT
- 1 NEEDLE HOLDER SMALL
- 2 NEEDLE HOLDER MAYO-HEGAR 7 ¼”
- 2 NEEDLE HOLDER HEANEY 8”
- 1 SCISSOR MAY STRAIGHT 6 ¾”
- 1 SCISSOR METZ CURVED 7”
- 2 FORCEP ADSON TISSUE W/TEETH
- 1 FORCEP TISSUE W/TEETH 6” SMALL
- 1 FORCEP RUSSIAN SMALL
- 1 FORCEP RUSSIAN MEDIUM
- 1 FORCEP BICKLE
- 1 RETRACTOR ROUX MEDIUM #2
- 2 RETRACTOR ARMY NAVY
- 1 RETRACTOR RICHARDSON 1 ½” X 2”FBC
- 1 RETRACTOR RICHARDSON 2 X 2 ½”
- 1 RETRACTOR RICHARDSON 2 ½” X 3”
- 1 TOWEL CLIP
- 1 GRADUATE 500cc
Cesarean Opening Instruments

- 4 Clamp Crile Curved 5 ½”
- 2 Clamp Allis
- 4 Clamp Carmalt
- 4 Clamp Kocker Straight
- 2 Clamp Babcock
- 4 Clamp Sponge Forcep Short/Small
- 4 Clamp Sponge Forcep
- 2 Needle Holder Heaney 8”
- 2 Needle Holder Mayo-Hegar 7 ¼”
- 1 Scissor May Straight 6 ¾”
- 1 Scissor May Curved 6 ¾”
- 1 Scissor Bandage
- 1 Scissor Metz Curved 7”
- 2 Handle Scalpel #3
- 2 Towel Clip
- 2 Forcep Tissue W/Teeth 6” Small
- 1 Forcep Debakey Tissue Medium
- 1 Forcep Russian Small
- 1 Forcep Russian Medium
- 1 Retractor Roux Medium #2
- 2 Retractor Army Navy
- 1 Retractor Richardson 1 ½” X 2” Small
- 1 Retractor Richardson 2 X 2 ½”
- 1 Retractor Richardson 2 ½” X 3”
- 1 Retractor Malleable Medium 2” Wide
- 1 Retractor Delee
- 1 Time Out Hood
Other Changes we had to make:

<table>
<thead>
<tr>
<th>Patient Name:</th>
<th>Laps:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergies:</td>
<td>BL:</td>
</tr>
<tr>
<td>Procedure:</td>
<td>CT:</td>
</tr>
<tr>
<td>Support Person:</td>
<td>SN:</td>
</tr>
<tr>
<td>RN:</td>
<td>Atra:</td>
</tr>
<tr>
<td>ST:</td>
<td>SUCTION TIP</td>
</tr>
<tr>
<td>SO/Escort:</td>
<td>CORD BLOOD CONTAINER</td>
</tr>
<tr>
<td>Student/Guest:</td>
<td>PLACENTA TO PATHOLOGY</td>
</tr>
<tr>
<td>Tucked Item:</td>
<td>ANTIBIOTICS</td>
</tr>
<tr>
<td>EBL:</td>
<td></td>
</tr>
</tbody>
</table>

[Image of a marker and a CentraCare logo]
The closing trays add anywhere from 60-120 seconds to each case.

Is there value in giving each surgical patient another minute or two to keep them safe and free of infection?

The overall outcome is about patient safety and experience.

Doing the right thing, for everyone, every time.
Results:

- A pleasant and unexpected surprise – Increased traffic during the 2 month trial did not increase infection rates.
- After our first quarter of closing tray use we achieved a SSI rate of 0.5%.
Consider Future Practice Improvements and Study:

- Glycemic testing and control in Non-diabetic patients – It is unclear if this will beneficial in this population
- YEAST
- Panniculus Retractors
- Standardization of OR cleaning
  - Technique
  - Time to turn over
- Standardization of Provider diagnosis and treatment of post op issues
Total cost to begin process = $98,384
On-going annual cost = $70,457
2012
- Spring: Reduction in OR traffic (traffic control)
- September: Implement preoperative use of CHG wipes in the home for scheduled and before all cesarean sections within the hospital
- Fall: Antibiotic dosing at cord clamping

2013
- Standardize OR environmental cleaning
- Multidisciplinary team meeting case reviews

2014
- Emphasis on proper OR attire and traffic control
- February: Weight based dosing of pre-procedure antibiotics
- October: Standardize wound care; criteria for foam Ag dressing use

2015
- April-May: CHG Prep use in the OR (formally used Iodine paint)
- May 2015: CHG showering and wipe use for unplanned cesarean sections
- May: Foam Ag dressing standard for all cesarean sections
- June: Exclusive use of iodine infused drape
- July: Trial closing trays via Plan-Do-Study-Act (PDSA) model
- August: Re-dosing of antibiotics if blood loss > 1500mL or case longer than half life of pre-operative antibiotics

2016
- Glucose control non-diabetic patient
- Pre- and post-surgical multidisciplinary briefings (April 2016)
- Yeast and skin moisture
- Panniculus retractors
- OR environmental cleaning (Time and Technique)
Thank you!

Questions?
References:


References cont.:


References cont.:


References cont.:  


References cont.:


Wagner, Carol RN, MBA (June 23, 2013). *C-sections SSIs: The Big, Bad and the Ugly*. Presentation was at the WOCN Society's 45th Annual Conference, Seattle, WA.


Using Bundled Interventions to Reduce Surgical Site Infection after Major Gynecologic Cancer Surgery

Sharon Kim, BA, MS4
Megan Johnson, PA-C
Jamie Bakkum-Gamez, MD

Stratis Health & MHA Quality and Patient Safety
May 3, 2016
Disclosures

• None
SSI after Gynecologic Cancer Surgery

- **Morbidity & Mortality** in Ovarian Cancer
  - Organ/Space SSI
    - 1.5-fold increased risk of death
  - Superficial SSI
    - 1.7-fold increased risk of death

- **Cost** in Endometrial Cancer
  - $9,500 per Superficial, $20,000 per Organ/space

- **Pay for Performance** CMS reports institutional data and allows patients to compare hospital performance

SSI causes are multifactorial

- Age
- Obesity
- Malnutrition
- Cancer
- Diabetes
- Immunosuppression
- ASA score
- Disease severity
- Prior operations
- Prior chemotherapy
- Prior radiation
- Biologics

- Nasal/skin carriage
- Virulence
- Adherence
- Inoculum

- Incision site
- Wound classification
- Procedure duration
- Hemostasis
- Drains/foreign bodies
- Dead space
- Urgency of surgery

- Razor shaves
- Intraoperative contamination
- Prophylactic antibiotics
- Preoperative cleansing
- Surgeon skill
- Surgical volume
Mayo Clinic GYN Surgery NSQIP Data

Improvement needed

All gynecologic surgery cases included, regardless of wound type.

Unpublished data
SSI Reduction Bundle

• Surgical Care Improvement Project (SCIP)
  • Not shown to effectively lower SSI rates

• Bundle
  • “A set of evidence-based practices that, when performed collectively and reliably, have been proven to improve patient outcomes”

• Common elements
  • Hair removal
  • Normothermia
  • Glycemic control
  • Gown & Glove change

SSI Reduction Bundle

• Several small scale studies have shown SSI reduction with the synergistic effect of a bundle
  • Most yielded ~50% SSI reduction

• Colorectal Surgery at Mayo
  • SSI reduction bundle for entire surgical episode
    • Overall SSI rate
      • 9.8% → 4% (p < 0.05)
    • Superficial SSI rate
      • 4.9% → 1.5% (p < 0.05)

Quality Improvement Project
Design

• Multidisciplinary Approach

• Inclusion Criteria
  • Laparotomy for Ovarian Cancer with bowel resection
  • Laparotomy for Ovarian Cancer without bowel resection
  • Open Hysterectomy for Uterine Cancer

• Data Sources
  • Mayo Infection Prevention & Control (IPAC)
  • CPT & ICD-9 Codes
  • NSQIP
Goal
Reduce SSI rates by 50%
**Mayo Clinic SSI Reduction Bundle**

<table>
<thead>
<tr>
<th>Pre-operative Processes</th>
<th>“Preventing SSI” pamphlet for patient education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hibiclens® shower night before and day of surgery</td>
</tr>
<tr>
<td></td>
<td>Chlorhexidine cloths at morning admission</td>
</tr>
<tr>
<td>Intra-operative Processes</td>
<td>SCIP compliance with antibiotics administration</td>
</tr>
<tr>
<td></td>
<td>Complete coverage of incisional area with Chloraprep</td>
</tr>
<tr>
<td></td>
<td>Re-dose of cefazolin within 3 - 4 hours after incision</td>
</tr>
<tr>
<td></td>
<td>Sterile closing tray for fascia and skin closure</td>
</tr>
<tr>
<td></td>
<td>Staff glove change before fascia closure, gown change if soiled</td>
</tr>
<tr>
<td>Post-operative Processes</td>
<td>Practice good hand hygiene</td>
</tr>
<tr>
<td></td>
<td>Hand cleansing agent readily available</td>
</tr>
<tr>
<td></td>
<td>Ensure dressing removal within 24 - 48 hours</td>
</tr>
<tr>
<td></td>
<td>Patient shower with Hibiclens® after dressing removal</td>
</tr>
<tr>
<td></td>
<td>Patient education on wound care and infection symptoms</td>
</tr>
<tr>
<td>Post-dismissal Processes</td>
<td>Dismiss patient with 4 oz bottle of Hibiclens®</td>
</tr>
<tr>
<td></td>
<td>Follow-up phone call from nurses</td>
</tr>
</tbody>
</table>

Closing Protocol
(all members of the scrubbed OR team)

• Discuss in preop briefing
• Steps to assure hemostasis, abdominal irrigation, etc completed with instruments from original surgical pan
• When ready to close fascia, all instruments from original surgical pan removed from field
• If drains to be placed, place AFTER opening the closing pan
• All scrubbed change gloves
• If gowns soiled, change gowns as well
• Closing pan opened
• New electrocautery opened (if cautery needed during closure)
• Field re-blocked/toweled off with new towels
Overall SSI Rates
By Month

## Results

### Overall SSI Rates by Procedure

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Pre-Intervention</th>
<th>Intervention</th>
<th>P</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovarian Cancer without BR</td>
<td>13/269 (4.8%)</td>
<td>1/100 (1.0%)</td>
<td>0.12</td>
<td>79.3%</td>
</tr>
<tr>
<td>Ovarian Cancer with BR</td>
<td>12/113 (10.6%)</td>
<td>1/42 (2.4%)</td>
<td>0.19</td>
<td>77.6%</td>
</tr>
<tr>
<td>Uterine Cancer</td>
<td>13/253 (5.1%)</td>
<td>0/48 (0%)</td>
<td>0.23</td>
<td>100%</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td><strong>38/635 (6.0%)</strong></td>
<td><strong>2/190 (1.1%)</strong></td>
<td><strong>0.01</strong></td>
<td><strong>82.4%</strong></td>
</tr>
</tbody>
</table>

BR = Bowel Resection

# Results

## Overall SSI Rates by Infection Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Pre-Intervention</th>
<th>Intervention</th>
<th>P</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 635</td>
<td>N = 190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superficial</td>
<td>11 (1.7%)</td>
<td>0 (0%)</td>
<td>0.08</td>
<td>100%</td>
</tr>
<tr>
<td>Incisional</td>
<td>(1.7%)</td>
<td>(0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep Incisional</td>
<td>2 (0.3%)</td>
<td>0 (0%)</td>
<td>0.99</td>
<td>100%</td>
</tr>
<tr>
<td>(0.3%)</td>
<td>(0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organ/Space</td>
<td>25 (3.9%)</td>
<td>2 (1.1%)</td>
<td>0.05</td>
<td>73.3%</td>
</tr>
<tr>
<td>(3.9%)</td>
<td>(1.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mayo Clinic Gyn NSQIP Decile Ranking

- Odds ratio declined from 1.6 to 0.6
30-Day SSI Rates in Gynecologic Surgery

Implementation of full bundle
30-Day SSI Rates in Gynecologic Surgery
Limitations & Strengths

- Element driving risk reduction in bundle is unknown
- Independent audit of SSI by IPAC
- Strong team champions from each specialty
Future Interventions

- Practice-gap analysis to identify other areas of improvement
- MIS Cases: consider betadine vaginal swab after removing uterus and Ioban use?
- Preoperative oral antibiotics in bowel resection?
- Nasal MRSA screening?

Rollout to Obstetrics & Mayo Clinic Hospital System

- CPC requested the development and implementation of standardized enterprise-wide efforts to reduce SSI
- Roll out date: March 1, 2016
- Prelim Sites: Mayo Clinic enterprise-wide
- Planned first analyses:
  - C-section SSI rates at 3 months
  - Type II wound NSQIP SSI deciles after 6 months (gyn surg)
Summary

• Risk factors for SSI are multifactorial and often non-modifiable
• Implementing a bundle of evidence-based practices resulted in significant and sustained SSI reduction
• Future study necessary to analyze cost:benefit
• Continue to explore areas for future improvement
Acknowledgements

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Questions & Discussion