The MN Slashing SSI Bundle: Raising the Bar to Lower the Rate

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Disclosures

- Dr. Robbins and Glencoe Regional Health Services have received an MHA grant to pilot the SSI reduction bundle presented today.

- Dr. Bakkum-Gamez has no relevant financial disclosures.
Why Care About SSIs?

- It’s the right thing to do
  - Patient benefit
  - Maintain clinical prominence

- Institutional health
  - “Meaningful use”
  - Optimize value of care
  - Pay for Performance 2015 based on 2013 performance
The Cost of SSI

- Mean attributable cost of SSI
  - Ranges from $10,500 - $25,500/SSI

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

Surgical Site Infection: Who Knows Your Dirt?

- CDC/NHSN (National Healthcare Safety Network)
  - CMS (Center for Medicare & Medicaid Services)
- NSQIP (National Surgical Quality Improvement Project)
- MHA (MN Hospital Association)
- Online sites
  - The Leapfrog Group
  - Hospital Safety Score
  - Consumer Reports
- Patients
Readmissions, complications and deaths

Patients who are admitted to the hospital for treatment of medical problems sometimes get other serious injuries, complications, or conditions, and may even die. Some patients may experience problems soon after they are discharged and need to be admitted to the hospital again. These events can often be prevented if hospitals follow best practices for treating patients.

- 30-Day outcomes: Readmission and death rates
- Surgical complications
- Healthcare-associated infections
- American College of Cardiology percutaneous coronary intervention (PCI) readmission measure

In the tables, you can hover over the footnote number to see the footnote text. View more footnote details.
MN Ranking in SSI: Abdominal Hysterectomy: Q2 2012 (NHSN Data)

Hospital Engagement Network (HEN) – 26 networks, nationwide
Goal: To advance the patient safety work associated with the Affordable Care Act
* Indicates that the HEN SIR is statistically different from the estimated national PfP average at $p < .05$
SSI in Colon Surgery in MN: Not Getting Better...

SIR SSI after colon surgery among 43 Minnesota HEN hospitals reporting to NHSN
41 (95%) of 43 hospitals reporting 75% increase
(Q1 2012 - Q1 2014)
Original Purpose of CHAIN SSI Subgroup

- Initiated March 2013
  - Surgeons, infection disease, infection preventionists, wound care specialists, etc
- To develop an action plan and design a tool kit (bundle) for Minnesota hospitals to improve SSI rates for all surgeries
  - Develop recommendations for care during:
    - Preop (example: preop bathing)
    - Intraop (example: closing pans)
    - Postop (example: wound care)
SSI Subgroup Representation

- Mayo Clinic
- Allina Health
- Regions Hospital
- Essentia Health Duluth
- University of Minnesota Medical Center
- District One Hospital
- Park Nicollet Methodist Hospital
- North Memorial Medical Center

Multi-Institutional, multi-disciplinary: A Team Effort
What is a Bundle?

- **Institute for Healthcare Improvement (IHI)**

  **Definition:**
  
  - A structured way of improving the processes of care and patient outcomes OR
  
  - A small, straightforward set of evidence-based practices—generally 3-5—that, when performed collectively and reliably, have been proven to improve patient outcomes
What is our proposed “Bundle”

1. Pre-op showering/bathing
2. Post-op wound care/dressing changes
3. Closing trays for all Class II+ cases
4. Antibiotic dosing recommendations
5. Glycemic control
6. Normothermia
7. Monitor OR traffic in and out of the room
Is this a bundle?
1. Preop Showering/Bathing (Category IB)

- Patients to shower or bathe (full body) with either soap or antiseptic agent the evening before and the morning of surgery
- In preop, an FDA-approved antiseptic solution should be applied in full strength to the operative site
- Assessment of adherence to home showering should be assessed upon preop admission
- If patient was unable to do at home, an antiseptic shower, bath or full body wipe is to be done in preop
- Hospital inpatients requiring surgery should have an antiseptic shower, bath, or full body wipe prior to surgery if possible

2. Postop Wound Care/Dressing Changes

- Preop patient education on importance of hand hygiene in preventing SSI
- Hand hygiene products provided at the patient bedside
- Sterile surgical dressings are to be left intact 24 – 48 hours unless there is bleeding or other indication to remove
- If postop dressing changes are necessary, sterile gloves and dressings should be used

3. Closing Trays

- For all class II+ wounds, including extracorporeal bowel anastomoses, fresh/clean instruments, irrigation, and gloves/gowns are to be utilized for wound closure.
- The need for closing trays should be added to the preoperative briefing or timeout script.

- Idea is to not use dirty instruments on closure.
- What does this include?
  - Open GI or GYN cases.
  - Encourage a healthy dose of caution—if question whether to use closing pan, use one.

Mayo Clinic Closing Protocol (GYN and CRS)

Closing protocol (all members of the scrubbed OR team)

1. Discuss in preop briefing
2. Steps to assure hemostasis, abdominal irrigation, etc completed with instruments from original surgical pan
3. When ready to close fascia, all instruments from original surgical pan removed from field
4. If drains to be placed, place AFTER opening the closing pan
5. All scrubbed change gloves and gowns
6. Closing pan opened
7. New electrocautery opened (if cautery needed during closure)
8. Field re-blocked/toweled off with new towels
Mayo Clinic Closing Pan for Colorectal and GYN Class II+ Wounds

Example closing pan contents:

4 Kocher/straight clamps
2 6-inch Mayo Haeger needle drivers
2 8-inch Mayo Haeger needle drivers
1 medium DeBakey forceps
1 pick-up with teeth
2 Adson forceps
2 bowel pickups
1 short Metzenbaum scissors
1 long suture scissors
2 two-prong retractors

Cost for 4 closing pans in GYN surgery-- $3,033.35
4. Antibiotic Dosing

- Weight-based dosing of preoperative abx per AHSP/SHEA guidelines
- Intra-operative re-dosing abx when procedure lasts longer than two half-lives of the drug
- Intra-operative re-dosing abx when procedure involves EBL>1500cc (consider same for pediatric equivalent of EBL)

### Table 1.
**Recommended Doses and Redosing Intervals for Commonly Used Antimicrobials for Surgical Prophylaxis**

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>Recommended Dose</th>
<th>Half-life in Adults With Normal Renal Function, hr&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Recommended Redosing Interval (From Initiation of Preoperative Dose), hr&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin-sulbactam</td>
<td>3 g (ampicillin 2 g/sulbactam 1 g) 50 mg/kg of the ampicillin component</td>
<td>0.8–1.3</td>
<td>2</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>2 g</td>
<td>1–1.9</td>
<td>2</td>
</tr>
<tr>
<td>Aztreonam</td>
<td>2 g</td>
<td>1.3–2.4</td>
<td>4</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>2 g, 3 g for pts weighing ≥120 kg</td>
<td>30 mg/kg</td>
<td>4</td>
</tr>
<tr>
<td>Cefuroxime</td>
<td>1.5 g</td>
<td>1–2</td>
<td>4</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>1 g&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.9–1.7</td>
<td>3</td>
</tr>
<tr>
<td>Cefoxitin</td>
<td>2 g</td>
<td>0.7–1.1</td>
<td>2</td>
</tr>
<tr>
<td>Cefotetan</td>
<td>2 g</td>
<td>2.8–4.6</td>
<td>6</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>2 g&lt;sup&gt;c&lt;/sup&gt;</td>
<td>50–75 mg/kg</td>
<td>NA</td>
</tr>
<tr>
<td>Ciprofloxacin&lt;sup&gt;f&lt;/sup&gt;</td>
<td>400 mg</td>
<td>10 mg/kg</td>
<td>3–7</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>900 mg</td>
<td>10 mg/kg</td>
<td>2–4</td>
</tr>
<tr>
<td>Ertapenem</td>
<td>1 g</td>
<td>15 mg/kg</td>
<td>3–5</td>
</tr>
<tr>
<td>Fluconazole</td>
<td>400 mg</td>
<td>6 mg/kg</td>
<td>30</td>
</tr>
<tr>
<td>Gentamicin&lt;sup&gt;p&lt;/sup&gt;</td>
<td>5 mg/kg based on dosing weight</td>
<td>2.5 mg/kg based on dosing weight</td>
<td>2–3</td>
</tr>
<tr>
<td>Levofloxacin&lt;sup&gt;f&lt;/sup&gt;</td>
<td>500 mg</td>
<td>10 mg/kg</td>
<td>6–8</td>
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<tr>
<td>Metronidazole</td>
<td>500 mg</td>
<td>15 mg/kg</td>
<td>6–8</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>15 mg/kg</td>
<td>15 mg/kg</td>
<td>4–8</td>
</tr>
</tbody>
</table>

<sup>1</sup> Oral antibiotics for colorectal surgery prophylaxis (used in conjunction with a mechanical bowel preparation)

<sup>2</sup> Neonates weighing <1,000 g should receive a single 7.5-mg/kg dose
5. Glycemic Control (Category IA)

- Perioperative glycemic control with blood glucose target <200mg/dL for diabetic and non-diabetic patients

6. Normothermia (Category IA)

- Maintain normothermia (body temperature ≥ 36ºC or 96.8º F) preoperatively, intraoperatively and postoperatively

References:
Glucose >180mg/dL associated with ~2 fold increase in postop infection in diabetic and non-diabetic general surgery patients.

7. OR Traffic

- Assessment of OR traffic with the intent to reduce unnecessary traffic, performed upon implementation of SSI bundle and periodically thereafter
- Analyze the flow of traffic in and out of the OR and try to reduce unnecessary traffic
- This does not state you must stop all traffic, but be aware of it and try to limit what you can

Why?
- Traffic increases SSI
- Opening OR door disrupts filtered atmosphere
- Door may be open for total of ~20 min/1 hour

Do SSI Reduction Bundles Work?
Do SSI Reduction Bundles Work?

1. Gynecologic Surgery (Nassau University Med Center, East Meadow, NY)
   • 9-item bundle, TAH and supracervical hysterectomies
   • SSI rate: 7.5% → 4.5% post-bundle

2. Vascular Surgery (Netherlands)
   • 4-item bundle (normothermia, hair removal protocol, periop abx, OR discipline)
   • 51% reduction in SSI post-bundle

3. Colorectal Surgery (24 Michigan hospitals)
   • 6-item bundle (SCIP abx, normothermia, oral abx w/bowel prep, glycemic control, MIS, short operative duration)
   • SSI rate 17.5% if only 1 bundle element → 2% if all 6 elements

Stepwise Decrease in SSI Associated with Bundle Use in Colorectal Surgery

Do SSI Reduction Bundles Work?

- Personal experience...Yes!

- Colorectal surgery @ Mayo
  - SSI reduction bundle (pre, intra, and postop elements)
  - Overall SSI baseline 9.4% → 4% after bundle
  - Superficial incisional SSI: dropped to 1.5% (even in setting of bowel resection)

- GYN surgery @ Mayo...

Mayo Clinic
SSI reduction
“Bundle”
----
Preop
Intraop
Postop
-----
Initiative started July 29, 2013

Reduce SSI by 50% (10 → 5%)

Pre-operative Processes

Patient Cleansing
- Hibiclens® shower night before and day of surgery
- Ensure understanding by reading pamphlet “Preventing SSI”
- Ensure SCIP compliance
  1. Right antibiotics
  2. Administer 60 min prior to incision
  3. Discontinued within 24 h
- Ensure re-dose of cefazolin within 3-4 h after incision
- Chloraprep applied – use appropriate amount to ensure complete coverage of incisional area

Antibiotic administration

Intra-operative Processes

Closing protocol at time of fascia closure
- Use Closing tray for closure of fascia and skin
- Glove change by staff before closure of fascia
- Practice good hand hygiene
- Patient shower with Hibiclens® after dressing removal
- Hand cleansing agent readily available
- Signage encouraging hand hygiene
- Purell® hand wipes made available to patients
- Ensure dressing removal within 48 h
- Dismiss patient with 4 oz bottle of Hibiclens®

Post-operative Processes

Patient and Hand hygiene

Post-hospitalization Processes

Patient education on wound care and recognizing infection symptoms
Follow-up phone call from nurses

CMS/Medicare report (30-day SSI): Hysterectomies performed through laparotomy, scope, or robot

<table>
<thead>
<tr>
<th>YR/QTR</th>
<th>Procedure Count</th>
<th>Infection Count</th>
<th>Number Expected</th>
<th>SIR</th>
<th>SIR p-value</th>
<th>95% Confidence Interval</th>
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<tr>
<td>2014Q1</td>
<td>147</td>
<td>0</td>
<td>1.212</td>
<td>0.000</td>
<td>0.298</td>
<td>2.472</td>
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2014Q1 and forward, data submitted to CMS will be combined
Mayo Clinic—6 Month SSI Rates
Gynecologic Surgery
All Type II wounds

Partial bundle in use
Implementation of full bundle—added closing pans
NSQIP: All Mayo GYN surgery cases included, regardless of wound type

GYN IMPROVEMENT 2012-13

Subspecialties 01/01/12 - 12/31/12

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<th>Hospital Odds Ratios</th>
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Subspecialties 01/01/13 - 12/31/13

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<th>Hospital Odds Ratios</th>
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<td></td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>1.39</td>
</tr>
<tr>
<td></td>
<td>0.75</td>
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One Year
SSI Reduction Pilot in Minnesota

- Glencoe Regional Health Services
- Hennepin County Medical Center
- North Memorial Medical Center
- Cuyuna Regional Medical Center
- Grand Itasca Hospital
- Sanford Health Bemidji
In Conclusion...

- We all do our best as surgeons
- SSI rates are relatively high in MN; intervention imperative
- Is there evidence that bundles do work? YES!
- Is there evidence that this specific bundle will work? Not yet
- Will it harm your patients? Unlikely
- Will it affect your practices? Some. But most of the work falls on the patients and the nursing staff
- Vital to success? Surgeon champions and Multi-disciplinary approach
What Else is the MN CHAIN SSI Subgroup Doing?

- Generating National Awareness
  - Drafted position statements reflecting the need for better risk adjustment (currently only adjusted for age and ASA score) for hyst and colon surgery
    - Call for an audit of the adequacy of reporting
    - Call to update the reference/historic data (2006-2008) to allow for more current SIR determination
  - Statements audience: NHSN and CMS
  - Statements to be shared with national societies (ACS, SGO, etc) for edits and endorsement
- **We want your input!** Email or call Marilyn Grafstrom, Minnesota Hospital Association, mgrafstrom@mnhospitals.org
The difference between what we do and what we are capable of doing would suffice to solve most of the world’s problem.”

--Mahatma Gandhi
Questions?

For more information check out the website:
www.mnhospitals.org/ssi