Safety Action Series

Insights and Lessons Learned from Implementing the Prevention of Surgical Site Infections Bundle
Speakers

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Disclosures

➢ Tirun Gopal, MD, FACOG has no real or perceived conflicts of interest to disclose.

➢ Danielle Partee, RN has no real or perceived conflicts of interest to disclose.
Objectives

- Share insights and lessons learned from implementing the Prevention of Surgical Site Infections Following Major Gynecologic Surgery Patient Safety Bundle in one institution.
- Discuss potential challenges and strategies to overcome these obstacles when implementing the bundle.
- Provide examples of successful approaches to implementing the bundle and improving the patient safety culture at a local level.
- Describe the importance of collaboration between physician and nursing staff in creating an environment and protocols that aid in reducing surgical site infections.
Objectives

- Importance of collaboration between physician and nursing staff in reducing SSI
- Time-outs, huddles, debriefs
- Role of RRT in reducing SSI
- Urinalysis in recognizing pre-op UTI in patients getting a Foley catheter.
Inciting risk factors

- Gestational diabetes with poor control
- Poor hygiene- chlorhexidine showers
- Prolonged ruptured membranes
- Group B strep positive culture
  - Prophylaxis with Ancef regardless of last dose of Penicillin.
- Gentamicin treatment of patients with signs of chorioamnionitis.
Risk Factors

• Sepsis protocol is initiated as appropriate
  – Sutter-wide initiative
• Inter-disciplinary collaboration in treatment of chorio-amnionitis.
• Challenge: inordinate personnel traffic: relatives.
• Excess use of electrosurgical units.
  – Some surgeons use these devices more than others.
Pre-Op Check List

• Prophylactic antibiotics
• If Gestational diabetic, how well controlled?
• Urinalysis at the time of Foley insertion
• Clippers vs razors.
• Skin prep.
• Ambient temperature in the OR
Pre-Op Screening

• Women with symptoms or pelvic findings consistent with BV should be evaluated and treated- H&P visit.
  – Not necessary to screen for genital tract infections.

• GC and CT are associated with increased risk for endometritis following pregnancy termination.
  – Covered by Azithromycin 1gm po.
GC/CT

• Challenge:
  – To remember to test for GC/CT in the third trimester in patients:
    • Who had it in the first trimester
    • High risk population
      – Ages 15 through 25
      – Multiple partners
      – Previous history of GC/CT
Pre-Op Correction

• Correction of anemia is indicated to reduce risk for infection.

• Removal of umbilical rings day prior to laparoscopy and cleanse with chlorhexidine.

• Metallic jewelry such as tongue rings can interfere with intubation

• Metallic jewelry can conduct electric current.
Skin Prep

• 4% Chlorhexidine gluconate solution with isopropyl alcohol is superior to povidone-iodine or iodine-alcohol.
  – Pre-op body wash was NOT found to be any more effective in a study of over 10,000 participants.
  – Chlorhexidine may be superior because it is not inactivated by blood or serum.
Study

- Study of 1147 women:
  - Scheduled vs unscheduled CS
  - Obese vs non-obese
  - Skin closure- subcutaneous or staples.
  - Presence of absence of chronic medical conditions.
Study: Results

• Patients were followed for 30 days after surgery.
  – Patients with Chlorhexidine alcohol prep had significantly less infections than the iodine-alcohol group.
  – This was unaffected by the considerations on previous slide (13).
Study: Results (Cont.)

- No significant difference with rates of endometritis
- Hospital readmissions for infection-related complications
- Length of hospital stay
- Use of other healthcare related services
- Rates of wound complications.
- Chlorhexidine group also had the lowest rate of office visits with concerns about the wound.
Vaginal Prep/Gyn Surgery

• Same solution as on the abdomen can be used in the vagina. Chlorhexidine 4% with isopropyl alcohol or PVP.
  – In patients allergic to Chlorhexidine, PVP gel reduces bacterial count for 3 hours as compared to half hour for PVP solution.
  • But there is no difference in infectious morbidity.
Hair Removal

• SIS increased by hair removal vs no hair removal

• Shaving has the highest risk as compared to clipping or depilatory cream
  – Removal of hair just prior to incision is better than advanced removal
Operative Procedure

• Besides meticulous hemostasis
• Irrigation of wound before closure of skin
• Subcutaneous layer closure with plain catgut or Monocryl if deeper than 2 inches
• Closure of skin with subcuticular monocryl vs staples vs absorbable staples.
• Duration of the procedure (gyn)
• Skin-to-skin
Intraoperative

• Good surgical technique reduces SSIs
  – Gentle traction
  – Effective hemostasis
  – Removal of devitalized tissue
  – Obliteration of dead space
  – Irrigation of tissue to avoid excess drying
  – Use of fine, non-absorbable monofilament suture material
  – Judicious use of closed suction drains
  – Wound closure without tension, especially the fascial layer
  – Use of fine, non-absorbable monofilament suture material
  – Judicious use of closed suction drains
  – Wound closure without tension, especially the fascial layer
Gyn Procedure

• Minimally-invasive procedures are substantially better than open procedures.
Wound Healing

• surgical wounds in normal healthy individuals heal by orderly sequence of physiologic events such as
  – Inflammation
  – Epithelialization
  – Fibroplasia
  – Maturation
Wound Healing

• Hematoma and seroma:
  – Hematomas are more common.
  – They usually occur from failure of primary hemostasis.
  – By accumulation, they cause separation of the skin and allow bacteria access to the deeper tissues.
  – Drains may reduce wound infection but this controversial, perhaps to be considered in very obese patients.
Wound Healing

• Abdominal wall closure:
  – Ideal wound closure provides strength and barrier to infection.
  – Closure should be efficient, without tension or ischemia, comfortable for the patient and aesthetic.
  – Wounds have less then 5% of normal tissue strength in the first post-operative week.
Wound Closure

• Suture size should be the smallest to provide strength and reduce infection

• Synthetic sutures are better than natural:
  – Greater uniformity of caliber
  – Greater tensile strength
  – Longer duration of support during healing
  – Greater wound security
  – Less inflammatory response
  – Less theoretical risk of disease transmission from animals
Wound Closure

• **Absorbable vs non-absorbable**
  – Synthetic absorbable sutures are made from polyglycolic acid and degrade within days to weeks
  – Delayed absorbable suture may retain tensile strength for 2 months
  – Less tissue reaction than natural absorbable
  – Synthetic absorbable are broken down by hydrolysis; Natural by proteolysis.
Wound Closure

• Absorbable vs non-absorbable
  – Synthetic non-absorbable sutures retain tensile strength for 2 months and
  – Some synthetics remain in the incision permanently.
  – Non-absorbable sutures are made of cotton, silk or linen and can remain in the tissue indefinitely.
  – Synthetic non-absorbable can retain tensile strength for as long as 300 days.
• But may cause wound sinuses because of longevity.
Wound Closure

- Monofilament sutures are more resistant to infections than multi-filament sutures.
- Triclosan-coated sutures may reduce risk of SSIs but not by itself.
- Separate closure of peritoneum is discouraged because there is more adhesion formation.
- Aggressive lavage is discouraged unless there is gross contamination.
  - Impedes host defenses
Post-operative Diabetes Control

- Challenging in the Obstetrical population
  - Easy in pregestational diabetics- same dose of medication as prior to pregnancy
  - Gestational diabetics:
    - Either half dosage with frequent testing with glucometers
    - Discontinue meds and frequent testing and do sliding scale if it continues to be elevated.
    - Diabetic diet with calories for breast feeding.
Evidence of Risk Post-Op Infection

• Risk of infection increases substantially if the BS level remains elevated.
  – Over 200 = 40% increase
  – Between 150 & 200 = 20% increase.
Pre-Op Antibiotic Prophylaxis

- Anesthesia draws up the antibiotic (Ancef)
  - Dosage based on BMI
- Time-out includes prophylaxis administration
- Time-out includes risk factors including hemorrhage risk
  - High hemorrhage risk increases risk of infection
Antibiotic Selection

- Ancef for penicillin non-allergic patients
- Clindamycin and Gentamicin for penicillin-allergic patients.
- Not continued post-op
Weight-based Dosing of Antibiotics

• Weight > 220 lbs (100Kg) OR

• BMI > 35
  – Increased dose of Cefazolin.
    • This is based on the serum and adipose tissue level of the antibiotic.
Timing of Antibiotic Administration

• Studies have shown clearly that
  – The effect of antibiotic is
    • Dose dependent
    • Time dependent
  – If the dose is greater than 2 hours old, higher risk of infection.
  – If the procedure is more than 2 hours long, the risk of infection increases.
Re-Dosing of Antibiotics

- Duration of procedure > 2 hours
- If the QBL is > 1500ccs.
  - The only procedure this has happened is in PP Hysterectomy.
Debriefs

• We have instituted a policy of debriefs
  – Especially in cases that are not elective.

• We follow the following format:
  1. What went wrong?
  2. What went well?
  3. What could be improved?
     • IF there are items to be improved
     • Which department does it fall under
     • And who will take responsibility
     • This has to be done real-time since otherwise the urgency is diminished and it falls by the wayside.
Debrief

• Recently we have started including:
  – Anesthesia
  – Pediatricians

• And even more recently:
  – Home birth midwives and Doulas
Debriefs

• All Debriefs for the month are collated
• And the information is gathered
  – The items are then discussed in the Department meeting
  – The meeting is attended by:
    • Providers (CNMs and Physicians)
    • Nursing
    • Administration
  – Strategies to institute changes based on information from Debriefs.
Debriefs/Action Items

• These become action Items to be reported in the next meeting.

• Individuals or groups are entrusted with the responsibility for the Action Items
  – They are expected to report back to the Department at the next meeting.
    • Such as skin-to-skin
    • Ambient temperature
    • Sterility of the procedure
    • communication breakdown
    • QBL
QBL

• Whenever the provider perceives that the blood loss is likely to be greater than 500ccs in a vaginal delivery
  • And ALL cases of C Sections
    – QBL is done.
      • There is no EBL!
  • The canister is marked after the amniotic fluid is aspirated.
    – The aspirate following delivery of the baby and placenta is then estimated.
• The physician is required to massage uterus at the end of the procedure, for expression of clots.
The Fallacy of EBL!

• The more blood lost, the lower the estimate.
• The less blood lost, the higher the estimate.
  – Leads to
    • Over transfusion and
    • Under transfusion.
Normal Thermoregulation

- Sweating
  - Active vasodilation
  - Vasoconstriction

- Shivering
Hypothermia During Anesthesia

\[ \Delta \text{Core Temp} \ (°C) \]

Elapsed Time (h)

0

-1

-2

-3

0 2 4 6
Intraoperative Heat Transfer

Convection

Radiation

Evaporation

Conduction
Temperature Monitoring

Core Sites
- Pulmonary artery
- Distal esophagus
- Nasopharynx
- Tympanic membrane thermocouple

Other generally-reliable sites
- Mouth
- Axilla
- Bladder

Sub-optimal
- Forehead skin
- Infrared “tympanic”
- Infrared “temporal artery”
- Rectal

Anesth Analg 2008
Myocardial Outcomes: Frank, et al.

P = 0.04

Morbid Myocardial Outcomes (%)

Core Temperature (°C)

Hypothermic 35.3 ± 0.1

Normothermic 36.7 ± 0.1
Blood Loss

Sample Size (n)

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<th>Study</th>
<th>Normothermic : Hypothermic</th>
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<tbody>
<tr>
<td>Schmied</td>
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<td>43 : 73</td>
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<td>Nathan</td>
<td>73 : 71</td>
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Summary 602 : 647

20% less blood loss per °C
Transfusion Requirement

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<td>Summary</td>
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22% less blood
Transfusion per °C
Wound Infections: Melling, et al.

Wound Infection (%)

\[ P = 0.001 \]

Normothermia is more effective than antibiotics!
Summary: Consequences of Hypothermia

Benefits
- Improves neurologic outcomes after cardiac arrest
- Improves neurologic outcomes after neonatal asphyxia

Major complications
- Increases morbid myocardial outcomes
- Promotes bleeding and increases transfusion requirement
- Increases risk of wound infections and prolongs hospitalization

Other complications
- Decreased drug metabolism
- Prolonged recovery duration
- Thermal discomfort
More Layers Do Not Help Much

Heat Loss (W)

Time (min)

1 Unwarmed
1 Warm
3 Unwarmed
3 Warm
Surgical Care Improvement Project (SCIP)

Patients included (denominator)
- Surgical procedure
- General or neuraxial anesthesia $\geq 60$ minutes
- Not having documented intentional hypothermia

Criteria (numerator), any one of:
- Active intraoperative over-body warming
- Core temp $\geq 36^\circ$ C within 30 min before anesth end time
- Core temp $\geq 36^\circ$ C within 15 min after anesth end time

Comments
- "Core temperature" sites and devices undefined
- A similar "pay-for-reporting" measure effective Jan 2010
The Rule: Monitor and Warm

Monitor core temperature
- General anesthesia >30 minutes
- Large procedures under neuraxial anesthesia

Maintain normothermia: core temp
≥36°C

Forced-air heating
- Best combination of efficacy, cost, and safety
- But any method(s) okay
Prewarming Prevents Hypothermia

![Graph showing temperature changes over time with and without pre-warming.](image)

- **TM (°C)**
- **Time (min)**
- **No Warming**
- **Pre-Warming**
Maximize Benefit/Minimize Risk

1. Hose should always be attached to the blanket or gown
2. Warm air blowing directly on the patient could cause burns
3. Warming blankets and gowns should be dry
4. Team should ensure that maximum warming is assured without compromising sterile field.
Desired Temperature

- High 110+5 (43.1C) (preferred)
- Medium 100+5 (37.6C) (preferred)
- Low 90+5 (33.0C)

- When pre-warming patient allow patient to adjust temp of gown to their comfort level. But not below medium setting.
Barriers

• To QBL:
  – Staffing
  – Lack of physician support
  – Lack of education of importance
Barriers

- To Debriefs:
  - Lack of time
  - Lack of availability of provider
  - Lack of clear leadership
  - Busy unit
  - Depends on time of the day
Skin-to-skin

• Initial challenges:
  – Maintaining sterility during transfer of baby to mother
  – Contact between surgeon and the eager mother
  – Re-gowning and gloving of surgeon
  – Assuring sterility during rest of the procedure
Conclusion

• We have benefited immensely from the following:
  – Debriefs- since we learn so much from these
  – Collaboration with the nursing staff, Doulas and Home birth midwives- because they are closer to patients than we physicians are
  – Using QBL instead of EBL
  – From making sure that the temperature in the OR is maintained regardless of time of the day
  – From Infection Control who have taught us so much about measures to reduce SSI.
Q&A Session

Press *1 to ask a question

You will enter the question queue
Your line will be unmuted by the operator for your turn

A recording of this presentation will be made available on our website:
www.safehealthcareforeverywoman.org
Next Safety Action Series

Maternal Early Warning Signs: Successfully Implementing and Utilizing an Escalation Plan

Monday, August 15, 2016 | 2:00 pm Eastern

Deb Kilday, MSN, RN
Senior Performance Partner, Performance Services – Quality & Safety, Premier, Inc.

Beth McGovern, MSN, RNC-OB, CHSE
Simulation Coordinator, The Valley Hospital

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