An Initiative of the Florida Hospital Association
Hospital Improvement Innovation Network

Surgical Infection Prevention (SIP) Webinar Series #2:
Infection Prevention Strategies in the Intra-operative Period
May 22, 2019
Welcome & FHA Mission to Care HIIN Overview
  - Cheryl Love, RN, BSN, BS-HCA, MBA, LHRM, CPHRM, Director of Quality and Patient Safety and Improvement Advisor, FHA

Surgical Infection Prevention Series: Taking a Deep Dive into Intra-operative Recommendations
  - Linda R. Greene, RN, MPS, CIC, FAPIC, Manager of Infection Prevention, UR Highland Hospital, Rochester, NY

Q&A

Upcoming HIIN Events and Opportunities

Evaluation Survey & Continuing Nursing Education
HIIN Core Topics – Aim is 20% reduction

- Adverse Drug Events (ADE)
- Catheter-associated Urinary Tract Infections (CAUTI)
- Clostridium Difficile Infection (CDI)
- Central line-associated Blood Stream Infections (CLABSI)
- Hospital-onset MRSA Bacteremia
- Injuries from Falls and Immobility
- Pressure Ulcers (PrU)
- Sepsis
  - Surgical Site Infections (SSI)
- Venous Thromboembolism (VTE)
- Ventilator-Associated Events (VAE/IVAC/PVAP)
- Readmissions (12% reduction)
- Worker Safety
SSI Resources, Trainings and Tools

- Mission to Care Website
- HRET HIIN Website
- SSI Change Package
- SSI Top 10 Checklist
- SSI-Colon Prevention Resource Guide
- SOAP UP Resources
- Watch Past Webinars
- HRET HIIN Resource Library
- SSI Podcast Series
- Case Review Templates, Guidelines and more...

Hospital-Acquired Infections (HAIs)

Surgical Site Infection (SSI)
Surgical site infections are infections that occur in the wound created by an invasive surgical procedure.

The HIIN is focused on reducing SSI from:
- Colon surgery
- Abdominal hysterectomies
- Knee replacement
- Hip replacement

Goal: By September 27, 2018, a 20 percent reduction in SSI

Resources to prevent SSI:
- SSI Change Package
- SSI Checklist
- Watch Past Virtual Trainings
- HRET HIIN Resource Library
- Success Stories
- SOAP UP
Designed to reduce multiple forms of harm with simple, easy-to-accomplish activities that cut across several topics to decrease harm.

Focused on four components:

- **SOAP UP**: Hardwire Hand Hygiene
- **GET UP**: Mobilize Patients
- **WAKE UP**: Prevent Over-sedation
- **SCRIPT UP**: Optimize Inpatient Medications
FHA Mission to Care Update:
SSI Colon Rates

Source: HRET Comprehensive Data System, May 20, 2019

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Rate per 100
FHA Mission to Care Update: SSI Hysterectomy Rates

Source: HRET Comprehensive Data System, May 20, 2019

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FHA Mission to Care Update:
SSI Knee Rates

Source: HRET Comprehensive Data System, May 20, 2019

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Source: HRET Comprehensive Data System, May 20, 2019
FHA Mission to Care Update: SSI Hip Rates

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*Access Event Archives ([Recordings | Slides](#)) on the Mission to Care HIIN Website
Surgical Infection Prevention; Taking a Deep Dive into Intra-operative Recommendations

Linda R. Greene, RN, MPS, CIC, FAPIC
Manager, Infection Prevention
UR Highland Hospital
Rochester, NY
linda_greene@urmc.rochester.edu
Objectives

- Identify specific risks during the intra-operative period
- Discuss recent literature linked to risk reduction
- Identify strategies to reduce risks
Polling Question 1

What is your background?

1. Infection Prevention
2. Quality or patient safety
3. Management
4. OR nurse
5. Other
Surgical Risks

Most Common Complications during surgery:

- Surgical site infection
- Postoperative sepsis
- Thromboembolic complications
- Cardiovascular
- Respiratory (pneumonia)
The intra-operative period

Procedural variables that affect risk of SSI:

- Antibiotic prophylaxis
- Duration of Surgical scrub
- Pre-op hair removal
- Choice of pre-op skin preparation - need both fast acting and sustained effect
- Wound class
Variables

Sterilization of instrument and the environment

Foreign material in the surgical site

Surgical technique

Elevated Glucose- high Glucose levels with or without diabetes

Hypothermia – vasoconstriction limits blood flow and oxygen

Observations

- All surgical wounds are contaminated by bacteria but only a few get infected.
- Different operations have different inoculums of bacteria.
- Similar operations performed by the same surgeon in different populations have different rates of infection.
- SSIs have varying degrees of severity.
Bacteria get into wounds
Where are the Pathogens?

Pathogen source for most SSIs is endogenous flora of the patient’s skin, mucous membranes or GI tract.

20% of the skin’s pathogens live beneath the epidermal layer in hair follicles and sebaceous glands.

Any incision can carry some of the bacteria directly to the operative site.
Leading SSI Pathogens

**Gram Positive Bacteria**
- MRSA
- MSSA
- Coag. Negative Staph
- Enterococci
- Streptococci Species

**Gram Negative Bacteria**
- Enterobacter
- Pseudomonas
- Ecoli
- Other Bacteria
- Anaerobic Bacteria
- Fungi

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Etiology

Exogenous sources:

- Hands of care givers
- Exposure to non sterile environment
- Contamination of fluid, supplies or equipment
- Air flow
Etiology

Surgical Site Infections can be attributed to the patient’s own endogenous flora or from exogenous sources.

Example:

- Patient’s skin
- Contamination during surgery
- Oropharyngeal contamination
- Patient’s natural immunity
Risk Factors for SSIs

- Host Factors
  - Obesity
  - Age
  - ASA
  - Cancer
  - Immunosuppression

- Microbial Flora
  - Nasal Carriage
  - Virulence
  - Inoculum

- Surgical / Environmental Factors
  - Procedure
  - Hair Removal
  - Prophylaxis
  - Technique
  - Contamination
  - Urgency

Host

Surgical / Environmental

Microbial Flora

Host Factors
Reviewing what we know

- Most infections are seeded at the time of surgery
- There are several procedural risk factors
- Monitoring of Risk factors may help identify opportunities for opportunities
SSIs

Majority of SSIs are seeded at the time of surgery while the wound is open examples:

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<th>Microorganisms</th>
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<td>Patients own skin flora</td>
<td>Microorganisms colonizing skin or other body parts, infection present</td>
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<td>Surgical Team</td>
<td>Colonized member of team</td>
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<td>Breaks in aseptic technique</td>
<td>Wound contact with unsterile environment</td>
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<td>Sterility failures</td>
<td>High bioburden. Contaminated instruments</td>
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<td>Door openings</td>
<td>Interruption of positive pressure</td>
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<td>Other endogenous flora</td>
<td>Bowel flora, etc.</td>
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Skin Scales
Antibiotics for penicillin allergy?

- Cephalosporin if no immediate hypersensitivity reactions

References:
- Bratzler DW et al. Am J Health Syst Pharm 2013
- Pichichero ME. et al. Ann Allergy Asthma Immunol 2014
Antibiotics for MRSA

- Patients with a hx or known methicillin-resistant staphylococcus aureus (MRSA)
  - Single preoperative dose of vancomycin is recommended plus Cephalosporin

Bratzler DW et al. Am J Health Syst Pharm 2013
Schweizer M.et al. BMJ 2013
Key Takeaways

- The theory that hair is a source of microbial contamination dates back to the late eighteenth century. Various studies have shown that bacteria can gather on human hair and affix itself to it and that it is difficult to disinfect.

- Current guidelines for perioperative hair removal recommend leaving hair in place at a proposed surgical site whenever possible. When removal is deemed to be absolutely necessary, clipping of hair is favored instead of shaving, with the aim of reducing minor skin injury and the risk of bacterial colonization and subsequent surgical site infections.

- There is scant supporting evidence regarding clipping compared with no hair removal and subsequent effects on surgical site infections. More research is necessary to determine if clipping or no hair removal is the best option for various patient populations.

- Innovative methods, such as the use of a vacuum-assisted hair collection device with clippers, may help with some of the challenges associated with proper hair removal techniques.
Perioperative personnel should use sterile technique when donning and wearing sterile gowns, gloves, and surgical helmet systems.

II.c.2. The parts of the gown that should be considered sterile include

- the front of a sterile gown from the chest to the level of the sterile field and
- the gowns sleeves from the cuff to 2 inches above the elbow, circumferentially.

II.c.3. The parts of the surgical gown that should be considered contaminated or unsterile include

- the neckline, shoulders, and axillary regions;
- the gown back; and
- the sleeve cuffs after the scrubbed team member’s hands pass through and beyond the cuff.
**II.d.4.** Scrubbed team members should wear two pairs of sterile surgical gloves (ie, double glove). When two pairs of gloves are worn, a **perforation indicator system** should be used. *[1: Strong Evidence]*

**II.e.1.** Surgical gloves worn during invasive surgical procedures should be changed

- after each patient procedure[^10,70]; *[1: Strong Evidence]*
- every 90 to 150 minutes[^50,59,69,71-73]; *[2: High Evidence]*
- when a visible defect or perforation is noted or when a suspected or actual perforation from a needle, suture, bone, or other object occurs[^22,71]; *[2: High Evidence]*
- immediately after direct contact with methyl methacrylate[^40,74-77]; *[3: Moderate Evidence]*
- after touching optic eye pieces on the operative microscope[^78]; *[3: Moderate Evidence]*
- after touching a fluoroscopy machine[^79]; *[3: Moderate Evidence]*
- after touching a surgical helmet system hood or visor[^80-82]; *[4: Limited Evidence]* and
Are there gaps between policy and practice?
Direct Observation

One of our most powerful tools is direct observation:

Examples:

- Patients surgical scrub were performed either by a PA or RN that were not sufficient.

- Long sleeves on when prepping, but gown was flapping loose and touched prep area. Gowns worn while prepping should be tied to prevent inadvertently grazing the prepped area.

- Insufficient number of prep sticks used to cover operative area. Found provider prepping patient did not perform in sterile fashion. Prep stick touched non sterile areas and was brought back to “sterile” area.
Observations Continued

- Clipping of surgical site was done on OR table. Hairs were pushed on floor and some left on the sheet or on patient’s limb.

- Gloves should be changed after patient has been draped, again prior to touching the implant, and every 60 to 90 min. throughout case.

- Turnover started when patient was still in the room.

- Anesthesia was noted to have removed his mask and peering over the operative drape.
Polling Question 2

Do you routinely perform audits and direct observation of cases periodically?

1. Yes

2. No
Challenges

- Time
- Turnover
- Surgeon preference
- Adherence factors
Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017

Sandra I. Berrios-Torres, MD; Craig A. Umscheid, MD, MSCE; Dale W. Bratzler, DO, MPH; Brian Leas, MA, MS; Erin C. Stone, MA; Rachel R. Kelz, MD, MSCE; Caroline E. Reinke, MD, MSHP; Sherry Morgan, RN, MLS, PhD; Joseph S. Solomkin, MD; John E. Mazuski, MD, PhD; E. Patchen Dellingler, MD; Kamal M. F. Itani, MD; Ellie F. Berbari, MD; John Segreti, MD; Javad Parvizi, MD; Joan Blanchard, MSS, BSN, RN, CNOR, CIC; George Allen, PhD, CIC, CNOR; Jan A. J. W. Kluymans, MD; Rodney Donlan, PhD; William P. Schecter, MD; for the Healthcare Infection Control Practices Advisory Committee

**IMPORTANCE** The human and financial costs of treating surgical site infections (SSIs) are increasing. The number of surgical procedures performed in the United States continues to rise, and surgical patients are initially seen with increasingly complex comorbidities. It is estimated that approximately half of SSIs are deemed preventable using evidence-based strategies.
Topics

Core:
- Antibiotic Prophylaxis
- Glycemic control
- Normothermia
- Tissue oxygenation
- Skin Preparation

Arthroplasty
- Transfusion
- Immunosuppresive therapy
- Anticoagulation
- Orthopedic space suit
- Antimicrobial prophylaxis with drains
- Biofilm
## Recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Strength of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARENTERAL ANTIMICROBIAL PROPHYLAXIS</strong></td>
<td>Category IB</td>
</tr>
<tr>
<td>Administer antimicrobials only when indicated based on published guidelines.</td>
<td></td>
</tr>
<tr>
<td>Time administration such that bactericidal concentration is established in</td>
<td></td>
</tr>
<tr>
<td>serum and tissues at initial incision.</td>
<td></td>
</tr>
<tr>
<td>For caesarean sections, administer the appropriate agent prior to skin</td>
<td>Category IA</td>
</tr>
<tr>
<td>incision (versus at cord clamping).</td>
<td></td>
</tr>
<tr>
<td><strong>NONPARENTERAL ANTIMICROBIAL PROPHYLAXIS</strong></td>
<td>Category II</td>
</tr>
<tr>
<td>Consider use of triclosan-coated sutures.</td>
<td></td>
</tr>
<tr>
<td><strong>GLYCEMIC CONTROL</strong></td>
<td>Category IA</td>
</tr>
<tr>
<td>Implement perioperative glycemic control using blood glucose target levels ≤</td>
<td></td>
</tr>
<tr>
<td>200 mg/dL in both diabetic and non-diabetic patients.</td>
<td></td>
</tr>
<tr>
<td><strong>NORMOTHERMIA</strong></td>
<td>Category IA</td>
</tr>
<tr>
<td>Maintain perioperative normothermia.</td>
<td></td>
</tr>
<tr>
<td><strong>OXYGENATION</strong></td>
<td>Category IA</td>
</tr>
<tr>
<td>Administer increased fraction of inspired oxygen intraoperatively and in the</td>
<td></td>
</tr>
<tr>
<td>immediate post-operative period following extubation for all patients with</td>
<td></td>
</tr>
<tr>
<td>normal pulmonary function undergoing general anesthesia with endotracheal</td>
<td></td>
</tr>
<tr>
<td>intubation.</td>
<td></td>
</tr>
</tbody>
</table>
Evidence Based Practices

Compendium of Strategies - 2014
WHO - 2016
Compendium of Strategies 2014

2 levels of recommendations

Basic – Recommended for all hospitals

Special – Consider if there is still a problem based on surveillance data or risk assessment
Basic Practices

- Maintain intra-operative temp > 35.5
- Use an alcohol containing skin prep unless contraindicated
- Use a surgical safety checklist
- Maintain post-operative blood glucose ≤ 180 mg/dL.
  - Cardiothoracic surgical procedures (High)
  - Non-cardiac procedures (Moderate)
- Use impervious wound protectors in GI and biliary procedures

Surgical Technique

- Surgical technique involves
  - handling tissue
  - applying hemostasis
  - maintaining blood supply
  - using surgical instruments
  - approximating tissue
  - performing efficiently
Surgical Technique

- May have to look beyond the bundle
- Sterile fluids
- Soaking
- Wound closure technique
- Intra-operative management
Complex Practice Setting
Quality Initiative: Traffic
Quality Initiative: Traffic

- Ritter, et al., 1975
  - # of CFUs cultured from a clean operating room
    - Empty – 13
    - Doors Open – 25
    - 5 or more people in the room at any given time – 447
Consecutive cardiac surgeries, electronic door monitors

- Mean frequency of Door opening was 92.9 per case
- Doors were open for a mean frequency of 10.7% of each hour
- Average time of door closure was 20 seconds
- Trend toward increased rates of door opening among patients who developed SSIs
Measurement of Foot Traffic in the Operating Room: Implications for Infection Control

Raymond J. Lynch, MD, MS  (Am J Med Qual. 2009;24:45-52)

<table>
<thead>
<tr>
<th>Service</th>
<th>Number of Cases</th>
<th>Number of Door Openings</th>
<th>Case Length, min</th>
<th>Mean Door Openings per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>5</td>
<td>1172</td>
<td>315</td>
<td>48</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>5</td>
<td>679</td>
<td>255</td>
<td>42</td>
</tr>
<tr>
<td>Orthopedic total joint</td>
<td>5</td>
<td>488</td>
<td>157</td>
<td>40</td>
</tr>
<tr>
<td>Orthopedic spinal fusion</td>
<td>2</td>
<td>312</td>
<td>204</td>
<td>50</td>
</tr>
<tr>
<td>Plastic surgery—breast reduction</td>
<td>4</td>
<td>238</td>
<td>145</td>
<td>25</td>
</tr>
<tr>
<td>General surgery</td>
<td>7</td>
<td>182</td>
<td>96</td>
<td>19</td>
</tr>
<tr>
<td>All specialties</td>
<td>28</td>
<td>3071</td>
<td>195</td>
<td>37</td>
</tr>
</tbody>
</table>
Measurement of Foot Traffic in the Operating Room: Implications for Infection Control

Raymond J. Lynch, MD, MS (Am J Med Qual. 2009;24:45-52)

Figure 4. Reasons for entering/exiting room during operations, by specialty.
30 consecutive orthopedic procedures
- Interval sampling of airborne micro-organisms in the operating room
- Samples collected from the area around the wound in sterile fashion
- Measured traffic flow and reasons for entry throughout cases
- Strong positive correlation between
  - Rate of traffic flow and CFU/m³ ($r = 0.74, p < 0.001$)
  - Number of people in the operating room ($r = 0.24, p = 0.04$)
Findings show relationship between door openings and OR pressure during joint arthroplasty


December 21, 2015

- Doors open average of 9.5 minutes per case

- Loss of positive pressure

- 77 of 191 cases had doors open long enough to defeat positive pressure
• Enhancing air quality by reducing airborne contamination has been shown to be of great importance, especially in relation to implant surgery.

• Suggested levels be maintained at <10 CFU/m during implant surgery, and that clinical benefits can be expected by reducing it to 1 CFU/m

• Very low levels of clinically relevant coagulase-negative staphylococci can initiate a device-related infection
Quality Initiative: Traffic

- Audit Sheet Developed and Observer Identified
- First Traffic Audit Has Been Performed
  - Total Duration (Wheels in to Wheels out) 6:21
  - Total Number of Door openings (i.e. closed behind) 155!!
- Mean # people in room at any given time 10.5

<table>
<thead>
<tr>
<th>Event</th>
<th>Total Count</th>
<th>Door #</th>
<th># of times opened</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room Entry</td>
<td>8</td>
<td>A</td>
<td>51</td>
<td>Wash, pass through</td>
</tr>
<tr>
<td>Induction</td>
<td>8</td>
<td>B</td>
<td>65</td>
<td>Equipment</td>
</tr>
<tr>
<td>Skin Prep</td>
<td>11</td>
<td>C</td>
<td>18</td>
<td>Pass through</td>
</tr>
<tr>
<td>Incision</td>
<td>10</td>
<td>D</td>
<td>16</td>
<td>Anes- (blood sample)</td>
</tr>
<tr>
<td>Start of Closure</td>
<td>8</td>
<td>Total count</td>
<td>155</td>
<td></td>
</tr>
</tbody>
</table>
Traffic Control

Tracers in OR

Primary Hip observed- 27 different entries into OR room

Hysterectomy Davinci  - 31 entries
CAUSES OF INCREASED OPERATING ROOM TRAFFIC

- EQUIPMENT
  - Missing/Broken
  - Flash Sterilization
  - Radiology
  - Pyxis/Meds

- STAFF/PEOPLE
  - Anesthesia checks (CRNA, Residents)
  - Need Photo Taken
  - Students
  - Vendors
  - Surgeon change/Co-Surgeons
  - Can’t touch phones
  - Curiosity
  - Second opinions

- FAMILY
  - Present for induction
  - Family update

- POLICIES/PROCEDURES
  - Blood/labs
  - Missing consent/partial
  - Shift change/Breaks
  - Lack of signage
  - Inpatient/OR EMR differs

TRAFFIC in the Operating Room
Strategies
Temperature in OR

Joint replacement Consensus:

Based on the available evidence, it appears that OR temperature is an important environmental factor that needs to be optimally controlled during surgical procedures.

There is an indirect link between the OR temperatures and the potential for subsequent SSIs/ periprosthetic joint infections.
OR HVAC

Do Departmental staff understand what the air handling and ventilation Requirements are for their area?

Is there a recent report that verifies that the pressure gradients are correct and is the report annotated if corrections were needed?

When surveyors ask OR management about air exchanges, temp and humidity, they will not be impressed with the answer “engineering handles that”
<table>
<thead>
<tr>
<th>Function of Space</th>
<th>Pressure Relationship to Adjacent Areas (n)</th>
<th>Min. Outdoor ach</th>
<th>Min. Total ach</th>
<th>All Room Air Exhausted Directly to Outdoors (j)</th>
<th>Air Recirculated by Means of Room Units (a)</th>
<th>RH (%), %</th>
<th>Design Temperature (°/°F/°C)</th>
<th>Current Reference Standard</th>
<th>Referenced Standard</th>
<th>Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SURGERY AND CRITICAL CARE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classes B and C operating rooms, (m), (n), (o)</td>
<td>+</td>
<td>4</td>
<td>20</td>
<td>●</td>
<td>●</td>
<td>30-60</td>
<td>68-75/20-24</td>
<td>●</td>
<td>2010 FGI</td>
<td>Yes</td>
</tr>
<tr>
<td>Classes B and C operating rooms, (m), (o)</td>
<td>+</td>
<td>4</td>
<td>20</td>
<td>●</td>
<td>●</td>
<td>20-60</td>
<td>68-75/20-24</td>
<td>●</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Operating/Surgical cystopic rooms, (m), (n), (o)</td>
<td>+</td>
<td>4</td>
<td>20</td>
<td>●</td>
<td>●</td>
<td>30-60</td>
<td>68-75/20-24</td>
<td>●</td>
<td>2010 FGI</td>
<td>Yes</td>
</tr>
<tr>
<td>Operating/Surgical cystopic rooms, (m), (o)</td>
<td>+</td>
<td>4</td>
<td>20</td>
<td>●</td>
<td>●</td>
<td>20-60</td>
<td>68-75/20-24</td>
<td>●</td>
<td>2010 FGI</td>
<td>Yes</td>
</tr>
<tr>
<td>Delivery room (Caesarean) (m), (n), (o)</td>
<td>+</td>
<td>4</td>
<td>20</td>
<td>●</td>
<td>●</td>
<td>30-60</td>
<td>68-75/20-24</td>
<td>●</td>
<td>2010 FGI</td>
<td>Yes</td>
</tr>
<tr>
<td>Delivery room (Caesarean) (m), (o)</td>
<td>+</td>
<td>4</td>
<td>20</td>
<td>●</td>
<td>●</td>
<td>20-60</td>
<td>68-75/20-24</td>
<td>●</td>
<td>2010 FGI</td>
<td>Yes</td>
</tr>
<tr>
<td>Sterile service area</td>
<td>N/R</td>
<td>2</td>
<td>6</td>
<td>●</td>
<td>●</td>
<td>N/R</td>
<td>N/R</td>
<td>●</td>
<td>2010 FGI</td>
<td>N/A</td>
</tr>
<tr>
<td>Recovery room</td>
<td>N/R</td>
<td>2</td>
<td>6</td>
<td>●</td>
<td>●</td>
<td>30-60</td>
<td>70-75/21-24</td>
<td>●</td>
<td>2010 FGI</td>
<td>N/A</td>
</tr>
<tr>
<td>Recovery room</td>
<td>N/R</td>
<td>2</td>
<td>6</td>
<td>●</td>
<td>●</td>
<td>20-60</td>
<td>70-75/21-24</td>
<td>●</td>
<td>2010 FGI</td>
<td>N/A</td>
</tr>
<tr>
<td>Critical and intensive care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
Polling Question 3

Do you have policies that guide actions for HVAC disturbances during a case?

1. Yes
2. No
Airborne Microorganisms

Is there a relationship between levels of airborne microorganisms in the operating room and the risk of peri-prosthetic joint infections (PJIs)?

Recommendation:

Yes. High-quality evidence indicates that there is a proportional relationship between intra-operative levels of airborne microorganisms (colony-forming units or CFUs) and the incidence of PJIs.

https://www.arthroplastyjournal.org/prosthetic-joint-infection
Airborne Contamination

Four of these 5 level of evidence I studies demonstrate statistically significant correlations between levels of airborne CFUs (measured either by active air sampling at or near the incision site or by wound washout) and the incidences of PJIs

https://www.arthroplastyjournal.org/prosthetic-joint-infection
Neurosurgery Reduction Project

- Identified implants and instrumentation as risk factors
- Looked at door openings, especially at implant
- Reviewed instrumentation and kerrison cleaning
- Purchased new kerrisons
- Vendor policies
Measure: Observed infections/predicted infections (Standardized Infection Ratio). Data Source: CDC/NHSN.

Analysis

FY18 SIR: 4.103
- 8 infections
- Statistically High (p value 0.0011)

FY19 YTD SIR: 1.287
- 3 infections
- 63% infection reduction
Project Updates

- New cleanable Kerrisons – intra-op
- Antibiotic prophylaxis update-

- **Ongoing Projects:**
  Glucose control and Hemoglobin A 1C protocol
Instrumentation


- Sudden increase in surgical site infection rate following 'clean' surgery.
- 15 orthopedic patients following metal insertion
- 5 ophthalmology patients who developed endophthalmitis

Findings:
- Lapses in sterilization
- Lack of pre - cleaning by OR staff

Conclusions:
- Collaboration
- Cooperation
- Standardization
Instrumentation

- Preparation for decontamination of instruments should begin at the point of use
- During the procedure, the scrub person should remove gross soil from instruments by wiping the surfaces with a sterile surgical sponge moistened with sterile water

Every case, Every patient, Every time?
# Selected Elements of Surgical Care Bundle from Literature

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate antimicrobial prophylaxis</td>
<td>Antimicrobial (triclosan) sutures</td>
</tr>
<tr>
<td>Weight-based dosing</td>
<td>Smoking cessation</td>
</tr>
<tr>
<td>Glycemic control</td>
<td>Staphylococcal surveillance (cardiothoracic and orthopedic procedures)</td>
</tr>
<tr>
<td>Normothermia</td>
<td>Oral antibiotics plus mechanical bowel preparation (colorectal)</td>
</tr>
<tr>
<td>Appropriate hair removal</td>
<td>Minimally invasive surgery</td>
</tr>
<tr>
<td>Supplemental O₂ (colorectal procedures)</td>
<td>Short duration of surgery</td>
</tr>
<tr>
<td>Use of wound edge protectors</td>
<td>Glove change prior to fascia and skin closure</td>
</tr>
<tr>
<td>Dedicated wound closure tray for fascia and skin</td>
<td>Limit traffic in the operating room</td>
</tr>
<tr>
<td>Pre-operative 4% CHG shower or 2% CHG cleansing</td>
<td>CHG cleansing of surgical wound</td>
</tr>
<tr>
<td>70% alcohol with 2% CHG perioperative skin preparation</td>
<td>Keep sterile dressing intact for first 48 hours</td>
</tr>
</tbody>
</table>

[https://www.dhs.wisconsin.gov/hai/ssi-prevention.htm](https://www.dhs.wisconsin.gov/hai/ssi-prevention.htm)
### Ortho SSI – Action Plan

<table>
<thead>
<tr>
<th>Identified Concerns</th>
<th>Action Plan</th>
<th>Responsible Person(s)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>High traffic in OR</td>
<td>• Assess one hour traffic patterns in ORs for various surgical services</td>
<td>IP&amp;C Procedural Services Leadership</td>
<td>• 15 observations completed</td>
</tr>
<tr>
<td></td>
<td>• Educate OR Staff and use of traffic signs</td>
<td></td>
<td>• Completed</td>
</tr>
<tr>
<td>Vendor concerns: attire, traffic, proximity to sterile field</td>
<td>• Education of vendors through vendormate</td>
<td>IP&amp;C and Procedural Services</td>
<td>Education Sheet sent out to all vendors</td>
</tr>
<tr>
<td>Variation in practices among surgeons</td>
<td>Standardize: skin prep, lavage solution, drains, draping, urine culture,</td>
<td>Ortho Division Head</td>
<td>Standardization implemented</td>
</tr>
<tr>
<td></td>
<td>use of vancomycin powder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff unfamiliar with surgeon B’s instrumentation</td>
<td>Facilitate training and establish a dedicated team for surgeon B, including</td>
<td>Procedural Services Leadership</td>
<td>• Dedicated team established</td>
</tr>
<tr>
<td></td>
<td>in-service by vendor to familiarize staff with instrumentation.</td>
<td></td>
<td>• In-service provided</td>
</tr>
<tr>
<td>Sub-optimal scrub procedure and skin prep</td>
<td>Assist procedural services leadership in organizing an in-service</td>
<td>IP&amp;C and Procedural Services Leadership</td>
<td>Presented to OR Council</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Education presented at Surgical Grand Rounds</td>
</tr>
<tr>
<td>Concerns related to pre-operative patient cleanliness (pre-op</td>
<td>Collaborate with leadership from Pre &amp; Post Procedural Services to</td>
<td>IP&amp;C and Pre &amp; Post Procedural Services</td>
<td>Spinal fusion patients bathed in pre-op (CHG wipes)-implemented</td>
</tr>
<tr>
<td>bathing)</td>
<td>facilitate adequate pre-op bathing prior to admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate/inconsistent use of protection devices to prevent</td>
<td>Use of appropriate protector trays, use of corner protection pieces to</td>
<td>Sterile Reprocessing Department</td>
<td>• Educated staff on consistent use of protector trays</td>
</tr>
<tr>
<td>tears in the wrapping of instrument trays</td>
<td>further protect integrity of wrapping, and weigh trays to ensure they are</td>
<td></td>
<td>• Implemented use of corner protection pieces</td>
</tr>
<tr>
<td></td>
<td>under 25lb weight limit and work with vendors to further break down trays</td>
<td></td>
<td>• Purchased scale- arrived</td>
</tr>
<tr>
<td></td>
<td>as needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

The intra-operative period can be complex with several opportunities for improvement.

Standardizing practice, audits and implementation of evidence based practices are important foundational elements.
Questions ?
Upcoming Virtual Events

In-Person Meeting:
May 30-31 | Orlando, FL – Infection Prevention Boot Camp
Jun. 5 | Orlando, FL – Preventing Post-Surgical Harm

Virtual Events:
FHA HIIN Surgical Infection Prevention (SIP) Webinar Series:
• Apr. 26, 2019 - #1: Pre-operative Strategies for Prevention of SSI ([Recordings](#) | [Slides](#))
• May 22, 2019 - #2: Intra-operative Strategies for Prevention of SSI (Event archive will be available)
• Jun. 25, 2019 - #3: Post-operative Strategies for Prevention of SSI

FHA Monthly Quality Hot Topics
• Jun. 4, 2019 [NEW DATE] - Hot Topics Virtual Meeting #8: Post-Legislative Session Review of Bills Impacting Clinical Care and Quality Reporting

Check the weekly [MTC HIIN Upcoming Events](#) for details and registration
Eligibility for Nursing CEU requires submission of an evaluation survey for each participant requesting continuing education: https://www.surveymonkey.com/r/SIP-05-22-19

- Share this link with all of your participants if viewing today’s webinar as a group (*Survey closes after June 2, 2019*)
- Be sure to include your contact information and Florida nursing license number
- FHA will report 1.0 credit hour to CE Broker and a certificate will be sent via e-mail (Please allow at least 2 weeks after the survey closes)
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