Pre- and Intra-Operative Interventions to Reduce Surgical Site Infections (SSIs) in ASCs: A Surgeon’s Perspective

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Vice President for Medical Affairs & Chief Medical Officer
Health Services Advisory Group (HSAG)

Wednesday, July 18, 2018
Before We Begin

Housekeeping

Please do not put us on hold.

Write any questions into the “chat” box.
  – Discussion portion is at the end of the presentation.
  – Participants will be muted until the discussion.

We will respond to questions via email if we run out of time in today’s webinar.

Recording and the presentation from today’s webinar will be posted on the HSAG events website by next week.
Howard Pitluk, MD, MPH, FACS
Vice President for Medical Affairs & Chief Medical Officer, HSAG

From 1979 through 1998, Dr. Pitluk was engaged in the full-time practice of general and vascular surgery, as well as consulting in critical care. His clinical practice included the entire spectrum of surgical disease ranging from disorders of the endocrine, gastro-intestinal, and vascular systems and their surgical correction. In addition to his clinical duties, Dr. Pitluk’s professional commitment encompassed peer review, case review in quality of care issues, and being actively involved in the teaching of both medical students and surgical residents as an Assistant Clinical Professor of Surgery at Case-Western Reserve University College of Medicine in Cleveland, Ohio. In 2001, he completed his Master’s degree in Public Health (MPH) at the University of Arizona and joined HSAG the designated federal Quality Innovation Network-Quality Improvement Organization (QIN-QIO) for the state of Arizona. His responsibilities include chart review, standard of care assessment of medical records, and quality improvement activities for hospitals, physician providers, and healthcare stakeholders at both the federal and state levels. He has authored over two dozen articles in peer reviewed medical publications and is an active speaker around the country on topics related to quality improvement and healthcare delivery. Dr. Pitluk holds board certification by the American Board of Surgery, and is a Fellow of the American College of Surgeons.
HSAG’s QIN-QIO Territory

Nearly 25% of the nation’s Medicare beneficiaries

HSAG is the Medicare QIN-QIO for Arizona, California, Florida, Ohio, and the U.S. Virgin Islands.
Ambulatory Surgery Center
Special Innovation Project (ASC SIP)

Knock Out Infections
ASC Infection Prevention Initiative
Introduction to SSIs

- SSIs are infections of the incision, organ, or tissue space that occur after surgery.
- Surgical patients initially seen with more complex comorbidities and the emergence of antimicrobial-resistant pathogens increase the cost and challenge of treating SSIs.
- The prevention of SSI in the ASC setting is increasingly important as the number of surgical procedures performed in ASCs continues to rise.

Centers for Disease Control and Prevention (CDC). Surgical Site Infections (SSIs). Available at: https://www.cdc.gov/hai/ssi/ssi.html. Accessed on: July 3, 2018
Public reporting of process, outcome, and other quality improvement measures in ASCs is now required by the Centers for Medicare & Medicaid Services (CMS) with reimbursements for treating certain SSIs being reduced or denied.

It has been estimated that approximately half of SSIs are preventable by application of evidence-based strategies.

Prior studies showing significant lapses in infection control practices at ambulatory surgery centers suggest that quality improvement efforts may facilitate reducing SSIs following ambulatory surgery.

This webinar is intended to help providers in the ASC setting better understand their role in preventing SSIs.
Webinar Objectives

- Learn best practices for pre- and intra-operative interventions to reduce SSIs and improve patient outcomes.
- Describe evidence-based recommendations for pre-op bathing and skin prep, hair removal, normothermia, glycemic control, oxygenation, and antimicrobial prophylaxis.
ASC Quality Collaboration

• The CMS Surgical Infection Prevention performance measure states, “SSIs occur in up to 5 percent of clean extra-abdominal surgeries and up to 30 percent of clean contaminated procedures.”*

• The ASC Quality Collaboration (ASC QC) is a cooperative effort of organizations and companies interested in ensuring that ASC quality data is measured and reported in a meaningful way.

SSI Prevention (The Basics)

Preoperative strategies to eliminate SSIs
• Aseptic techniques
• Hair removal with clippers only when necessary
• Resolving malnutrition
• Smoking cessation
• Diabetes control before surgery

Perioperative interventions to eliminate SSIs
• Intraoperative glycemic control
• Maintaining normothermia
• Adequate hydration
• Optimal oxygenation
• Minimizing hematomas, devitalized tissue, and dead space
1. Resources

Hair Removal

- Hair should be removed with clippers—never with razors.
- Hair should be removed outside of the operating room (OR), such as in Preop.
  - Never remove hair in the OR, as this contaminates the surgical field.
- Consider a vacuum-assisted hair removal device if some surgeons/staff members continue to remove hair in the OR.
- Consider surgical tape as a possible source of contamination—and do not reuse it on other patients.

Surgical Site Skin Prep/Antiseptic Prophylaxis

• Advise patients to shower or bathe (full body) with soap (antimicrobial or nonantimicrobial) or an antiseptic agent on at least the night before the operative day.

• The goal of surgical skin antisepsis, frequently referred to as prepping the skin, is to remove soil and transient (temporary) microorganisms living on the skin that could pose a risk for SSIs.

• A Cochrane Database of Systematic Reviews article reviewed 11 randomized-controlled large trials, and the conclusions found no difference in SSIs in hair removal versus no hair removal.

• Perform intraoperative skin preparation with an alcohol-based antiseptic agent unless contraindicated. Plastic adhesive drapes add nothing.

• Alcohol-based solutions that contain 0.5 percent to 1 percent chlorhexidine gluconate (CHG) have been found to have a persistent antimicrobial activity that is equal to, or greater, than that of CHG alone.

• The next most effective scrubbing agents are CHG, iodophors, and triclosan.
Contra-Indications to Standard Preps for Select Procedures

• If it is near the eyes:
  – Alcohol-based preps would not be appropriate nor would CHG products due to the risk of corneal damage.

• If it is near the ears:
  – Alcohol-based preps would not be appropriate nor would CHG products due to the risk of ototoxicity/potential deafness.
Contra-Indications to Standard Preps for Select Procedures (cont.)

- If prep includes mucous membranes:
  - No alcohol-based products should be used.
  - CHG products should be used with caution.

- If the skin is not intact:
  - Alcohol-based preps should not be used.

- If the site includes a lumbar puncture or contact with the meninges:
  - CHG preps would not be appropriate due to the risk of neurotoxicity.
Antibiotic Prophylaxis

• Overall, clean surgeries are at low-risk of infection and do not require prophylaxis.
• On the other end of the spectrum, patients with a load of contamination (dirty wounds) or infection should be considered for treatment of infection, not prophylaxis.
• Prophylaxis should be given in cardiovascular, neurologic, orthopedic, and thoracic surgical procedures because of potential complications should an SSI occur.
• No other clean surgeries require prophylaxis.
# Surgical Antimicrobial Prophylaxis

Table I. Preferred Empiric Agent by Surgical Type

<table>
<thead>
<tr>
<th>Surgical Type</th>
<th>Preferred Agent</th>
<th>Beta-lactam allergy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Surgery/Vascular/Thoracic</td>
<td>Cefazolin</td>
<td>Vancomycin¹</td>
</tr>
<tr>
<td>Cardiac Surgery with prosthetic material</td>
<td>Cefazolin + vancomycin</td>
<td>Vancomycin¹</td>
</tr>
<tr>
<td>Cardiac device insertion (e.g., pacemaker implantation)</td>
<td>Cefazolin</td>
<td>Vancomycin¹</td>
</tr>
<tr>
<td>Gastroduodenal</td>
<td>Cefazolin</td>
<td>Vancomycin¹ + gentamicin</td>
</tr>
<tr>
<td>Biliary Tract</td>
<td>Cefazolin</td>
<td>Metronidazole + Levoflaxacin</td>
</tr>
<tr>
<td>Colorectal, appendectomy</td>
<td>Cefazolin + metronidazole</td>
<td>Metronidazole + Levoflaxacin</td>
</tr>
</tbody>
</table>

1. Clindamycin can be used as an alternative to vancomycin. Clindamycin and vancomycin are recommended alternative agents to cefazolin for patients with beta-lactam allergies. According to our 2015 hospital-wide antibiogram, 81 percent of MSSA isolates were susceptible to clindamycin, while 100 percent were susceptible to vancomycin. If practical, we recommend vancomycin as the preferred choice for those with beta-lactam allergies.

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*Original Author/Date: Holubar M. MD MS, Mui E. PharmD, Deresinski S. MD, Meng L. PharmD, Tompkins L. MD, PhD, June 2, 2016.
Surgical Antimicrobial Prophylaxis (cont.)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Preferred Agent</th>
<th>Beta-lactam allergy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other General Surgery</td>
<td>Cefazolin</td>
<td>Vancomycin(^1)</td>
</tr>
<tr>
<td>(e.g. hernia repair, breast)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td>Cefazolin</td>
<td>Clindamycin(^1) + gentamicin</td>
</tr>
<tr>
<td>Gynecological (e.g. hysterectomy)</td>
<td>Cefazolin</td>
<td>Clindamycin(^1) + gentamicin</td>
</tr>
<tr>
<td>Head &amp; Neck</td>
<td><strong>Clean (incision through skin):</strong> Cefazolin</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Clean-contaminated:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ear/sinonasal procedure:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cefazolin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Procedures w/ oral mucosa breach: Cefazolin + Metronidazole</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Contaminated:</strong> Cefazolin + metronidazole</td>
<td></td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>Cefazolin</td>
<td>Vancomycin(^1)</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>Cefazolin</td>
<td>Vancomycin(^1)</td>
</tr>
<tr>
<td>Plastic Surgery</td>
<td>Cefazolin</td>
<td>Vancomycin(^1)</td>
</tr>
<tr>
<td>Urology(^2)</td>
<td>Cefazolin(^{a})</td>
<td>Gentamicin(^{2a}) + Clindamycin(^{2b})</td>
</tr>
<tr>
<td><em>These are empiric recommendations when no pre-op urine culture data is available or cultures were negative.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urology(^2)</td>
<td><strong>Open/laparoscopic involving intestine</strong> (clean-contaminated, e.g., radical cystectomy with ileal conduit):</td>
<td>Gentamicin(^{2a}) + Clindamycin(^{2b})</td>
</tr>
<tr>
<td></td>
<td>• Cefoxitin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If prosthetic material involved in urologic procedures, should add one-time dose of gentamicin</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Open/laparoscopic</strong> (clean: skin incision, does not involve GU tract):</td>
<td>Gentamicin(^{2b})</td>
</tr>
<tr>
<td></td>
<td>• Clindamycin(^{2b})</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Open/laparoscopic involving intestine</strong> (clean-contaminated, e.g., radical cystectomy with ileal conduit):</td>
<td>Gentamicin(^{2a}) + Clindamycin(^{2b})</td>
</tr>
<tr>
<td></td>
<td>• Metronidazole + Levofloxacin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If prosthetic material involved in urologic procedures, should add one-time dose of gentamicin if not already given</td>
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Information from previous slide:
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2. Urology notes
   • a Ciprofloxacin is a reasonable alternative. However, according to the 2015 SHC antibiogram, more *E. coli* isolates were susceptible to aminoglycosides than fluoroquinolones
   • b If significant concern for MRSA, vancomycin should be considered as an alternative to clindamycin. According to our 2015 hospital wide antibiogram, only 50% of MRSA isolates are susceptible to clindamycin, while 100% were susceptible to vancomycin. In addition, clindamycin has limited urinary penetration. However, vancomycin infusion should be started 60–120 minutes prior to incision to allow for complete drug administration.

3. If cultures will be obtained intra-operatively, prophylactic antibiotics should be withheld.


*Original Author/Date: Holubar M. MD MS, Mui E. PharmD, Deresinski S. MD, Meng L. PharmD, Tompkins L. MD, PhD, June 2, 2016.


Hypothermia and SSI

• Following surgery hypothermia of 1.9⁰ Celsius can triple the risk for bacterial SSI.

• Thermoregulatory vasoconstriction decreases oxygen in the tissues thereby lowering the immune system’s ability to fight infections.

• Mechanisms include:
  
  – Vasoconstriction -> significant peripheral decrease of tissue oxygen levels -> impaired function of neutrophils and macrophages -> decrease in collagen deposition -> delayed wound healing

Hypothermia and Hypovolemia in SSI

- Tissue oxygen delivery is key to intrinsic antimicrobial mechanisms
- Decreased body temperature, circulating volume, and oxygen concentrations lower oxygen delivery

— *Decreases in subcutaneous oxygen increase the incidence of surgical site infection.*
— *Maintaining normothermia and adequate perfusion are important interventions that increase subcutaneous oxygen and help to prevent surgical site infection.*
— *The use of increased fractions of inspired oxygen or hyperoxia may also provide significant benefit.*
Oxygenation

- Hyperoxia exerts significant effects on multiple, well-recognized, and previously tested cellular and immunologic parameters.
- Most importantly, the functional capacity of the innate immune response, reflected by an increase in potent killing reactive oxygen species (ROS), is significantly increased by the provision of high oxygen concentrations \textit{in vitro}.
- Oxygen partial pressures and wound tissue oxygen concentrations have been shown to correlate with oxidative killing and, thus, help to predict SSI rates.
- Even without great increases in wound oxygen tensions, increasing systemic and pulmonary oxygen may beneficially influence inflammatory mediators and ROS formation for intracellular killing of bacteria.

• Elevated blood glucose (BG) levels impair neutrophil function and cause an overproduction of reactive oxygen species, free fatty acids (FFA), and inflammatory mediators.

• These pathophysiologic changes contribute to:
  – Direct cellular damage
  – Vascular and immune dysfunctions
Patients undergoing ambulatory surgery or procedures of short duration (less than 4-h operating room time) with hyperglycemia (greater than 180 mg/dl, 10 mMare) are appropriate candidates for SC rapid-acting insulin analog treatment. Advantages of subcutaneous rapid-acting insulin analogs include ease of administration, low rate of hypoglycemia, and efficacy in correcting hyperglycemia.63
CMS measures for Calendar Year (CY) 2019
Payment Determination

- ASC-1 Patient Burn
- ASC-2 Patient Fall
- ASC-3 Wrong Site, Wrong Side, Wrong Patient, Wrong Procedure, Wrong Implant
- ASC-4 All-Cause Hospital Transfer/Admission
- ASC-8 Influenza Vaccination Coverage among Healthcare Personnel
- ASC-9 Endoscopy/Polyp Surveillance: Appropriate Follow-Up Interval for Normal Colonoscopy in Average Risk Patients


CMS measures for CY 2019
Payment Determination (cont.)

• ASC-10 Endoscopy/Polyp Surveillance: Colonoscopy Interval for Patients with a History of Adenomatous Polyps—Avoidance of Inappropriate Use

• ASC-11 Cataracts: Improvement in Patient’s Visual Function within 90 Days Following Cataract Surgery

• ASC-12 Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy

• ASC-13 percentage of patients having surgical procedures under general or neuraxial anesthesia of 60 minutes or more in duration who are normothermic within 15 minutes of arrival in the post-anesthesia care unit (PACU) (for 2020)

ASC Quality Reporting Program Support Contractor (ASCQR Program SC)
As the ASCQR Program SC, HSAG supports activities under the ASCQR Program, including providing technical support and feedback to assist ASCs with quality data reporting.

ASCQR Program SC
3000 Bayport Drive, Suite 300
Tampa, FL 33607
866.800.8756
oqrsupport@hsag.com

ASCQR Program Website
www.qualityreportingcenter.com
This site contains numerous resources concerning reporting requirements, including reference and training materials, tools for data submission, educational presentations, and deadlines.
Thank you!

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Contact your ASC Infection Preventionist for Questions
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Please complete the evaluation at for (1) continuing education credit at:

https://goo.gl/othNLS

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