SSI in ERAS

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SSI Overview
- Infection within 30 days postop involving
  - purulent discharge (laboratory confirmation optional)
  - organism isolated from aseptically obtained culture
  - s/s: swelling, redness, or tenderness
- Types of SSI
  - superficial incisional (skin or subcutaneous tissue)
  - deep incisional (deeper soft tissue/fascia)
  - organ/space (involving manipulated anatomy)


SSI Overview
- Colectomy: 5% to 26%, 20% of HAI
- longer LOS, reduced QOL, higher mortality (2-11x)
- 90,000 readmissions annually
- Cost: $10K-$25K
- Public Reporting of QI measures
- Reimbursement
- SSIs are preventable

**SSI: Guidelines**

- CDC guidelines 8/2017
  - Preoperative shower (full body) with soap
  - Preoperative IV antimicrobial prophylaxis
  - Skin preparation with an alcohol-based agent
  - Intraop, a blood glucose target <200mg/dL
  - Intraop, normothermia
- WHO guidelines for safe surgery 2009
  - Preoperative assessment
  - Reduced preoperative hospitalization
  - Weight reduction (for obese patients)
  - Tobacco cessation
  - Control of hyperglycemia
  - Restoration of body defenses
  - Decreased endogenous bacterial contamination
  - Hair removal
  - Antimicrobial prophylaxis
  - Asepsis and antisepsis of skin and instruments
  - Meticulous surgical technique and minimization of tissue trauma
  - Maintenance of normothermia during surgery
  - Short operating time
  - Wound surveillance

**ACS 5/10 update**

- Preoperative fasting
- Smoking cessation
- MRSA screening
- Bowel preparations
- Glucose control <140 mg/dL
- Hair removal
- Skin preparation
- Hand wash
- Antibiotic prophylaxis
- Intraoperative Normothermia
- Wound protection
- Infective trauma
- Gloves
- Topical Antimicrobial
- Supplemental O2
- Wound care

**Summary**

- Glycemic Control
- Normothermia
- Bowel Preparation

**Glycemic Control:**

**The Stress Response and Catabolism**

- Insulin Resistance
  - Anxiety, Pain
  - Hypoxia
  - Hypothermia
  - Tissue trauma
  - Medications/fasting/blood loss/immobility

- Onset and Duration
  - POD 1 70% reduction in insulin sensitivity
  - Effect lasts for up to 3 weeks

- Most pronounced with CVD, Obesity, Cancer, and Diabetes

**Undiagnosed DM is at greatest risk**

- McGill (493 nondiabetic patients)
- 19% impaired fasting glucose
- 6% provisional dx of DM
- > in 40y+
- CC Anesthesia Database 20%, undiagnosed DM or IFG

**Impact**
- IFG (>125mg/dL) or RBG>200mg/dL
- 16% higher in hospital mortality
- Longer LOS
- Higher ICU admission rate/transitional care
- Associated with post-traumatic chronic pain
- Cardiac surgery: 20% decrease in insulin sensitivity, doubles the risk of serious complications (mortality, MI, CVA, ARF, SSI)
  - “the diabetes of the injury”

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**Preoperative Carbohydrate Treatment lowers insulin resistance**

- Preoperative Carbohydrate Treatment (PCT)-Insulin response
  - Increased liver glycogen reserves (44%, p<0.001)
  - Decreased protein catabolism, improved anabolic signaling in skeletal muscle
  - Metabolism of fats/carbohydrates
  - Improved patient well being

- Meta-analysis (21 RCT, 1685 pts)
  - Significant reductions in insulin resistance with PCT
  - No difference in postoperative N/V
  - No difference in pulmonary or overall surgical complications
Normothermia

- RCT warming (mean T 36.6°C) vs no warming (mean T=34.7°C)
  - n=200 colorectal patients
  - SSI (6% vs 19%, p=0.009)
  - LOS 2.6 days shorter with normothermia, p=0.01
- RCT perioperative warming (2 hrs pre and post)
  - SSI 13% vs 27%
  - Overall complications 32% vs 54%, p=0.027
- Role of blood transfusion?

Normothermia

- Retrospective cohort n=296
- Multiple interpretations of hypothermia
  - Nadir/time at nadir/time <36°C/mean temp
- No association with 30-day SSI (OR1.17; 95% CI, 0.76-1.81; P = 0.48)
- BMI (odds ratio, 1.39; 95% CI, 1.10-1.76; P = 0.007)

Other benefits...

- Predictable drug metabolism
- Improves cardiac fxn
- Prevents hypothermic coagulopathy
- Attenuates the catecholamines response
- Attenuates protein breakdown and nitrogen loss
Enhanced Recovery After Surgery: Acceleration of Positive Outcomes

Bowel Preparation: the great debate

- Decreased stool burden
- Improved handling of tissue
- No difference in anastomotic leak
- Reduction of SSI
- SSI
- No benefit
- Dehydration
- Electrolyte derangements
- Poor patient tolerance
- Anastomotic leak?

Combination prep is key to success

Michigan Surgical Quality Collaborative
- 967 paired cases (n = 1914)
  - Total SSI (5.0% vs 9.0%, P = 0.0001)
  - Organ SSI (1.6% vs 3.1%, P = 0.024)
  - Superficial SSI (3.0% vs 6.0%, P = 0.001)
  - C. difficile colitis (0.5% vs 1.8%, P = 0.01)

ACS-NSQIP
- 4999 colectomies
  - SSI (3.2% vs 9.0%, P<0.001)
  - Leak (2.8% vs 5.7%, P = 0.001)
  - readmit (5.5% vs 8.0%, P=0.03)

SSI bundles are effective

- Institution for Healthcare Improvement (IHI)
- >3 evidence based interventions
- Meta-analysis 23 studies
  - 40% risk reduction SSI (p < 0.001)
  - 44% risk reduction superficial SSI (p < 0.001)
  - 34% risk reduction organ/space (p = 0.048)

Core measures:
- Glycemic control
- Normothermia
- Asepsis

Key Elements of ERAS

- Preoperative
  - Education
  - Hydration
  - Carbohydrate loading
  - Rx to prevent PONV
  - Non-opioid analgesia
  - Bowel preparation

- Intraoperative
  - Non-opioid analgesia
  - Regional anesthesia
  - Minimize incisions
  - Avoid fluid overload
  - Avoid hypothermia

- Postoperative
  - Non-opioid analgesia
  - Avoid NG tubes
  - Early ambulation
  - Early feeding
  - Ostomy education
Why does ERAS get all the credit?

- Reinforces implementation of SSI bundle
- Interventions align with SSI reduction practices
- Multidisciplinary team
- Compliance to an established pathway
- Root cause analysis, continuous auditing

Thank you

CHG

- Effective at reducing bacterial counts on skin surface

BUT...

Metaanalyses

- 9,520 pts: reduction in colonization, no difference in SSI
- 10,655 pts: SSI rate chlorhexidine bathing vs. placebo vs. soap (7.1% vs. 9.1% vs. 5.1%)
- 17,932 pts: SSI vs. soap vs. placebo vs. no bathing (RR 0.90, P=0.19)
