

**UAMS MEDICAL CENTER
TRAUMA SERVICES MANUAL**

SUBJECT: Surgical Site Infection Reduction/Wound Closure Bundles

REVIEWED: N/A

PAGE: 1 of 4

RECOMMENDATION(S): Dr. J Margolick

APPROVAL: 5/6/2021

CONCURRENCE(S): Trauma Faculty

EFFECTIVE: 5/6/2021

PURPOSE:

- Reduce incidence of surgical site infection (SSI) in trauma and emergency general surgery patients
- Standardize abdominal fascia and wound closure for emergent laparotomies
- Stratify wound management based on intermediate, high and very high risk of SSI
- Record and analyze SSI incidence in the trauma and emergency general surgery patient populations

BACKGROUND:

Improvements in OR ventilation, antibiotic prophylaxis, surgical techniques and sterilization have reduced SSI recurrence over the past decade in the United States.¹ Between 2015 and 2019, the Surgical Care Improvement Project (SCIP) reported a 9% reduction in the ratio of SSI –to–predicted SSI.² However, SSI remains a substantial cause of morbidity, increased length of hospitalization and mortality. The CDC estimates an SSI associated mortality rate of 3% with 75% of those deaths attributed directly to the SSI.¹

Several SSI reduction techniques have proven effective, including; smoking cessation, nutrition optimization, modified immunosuppressive therapy, colon prep, minimally invasive techniques and attention to intra-operative glycemic control. Unfortunately, it is not possible to optimize these factors for most trauma and emergency general surgery cases and these patients have a uniquely high risk of SSI. Potential SSI reduction interventions in emergency surgery patients include tension free wound closure, avoidance of intra-operative hyperglycemia, conservative transfusion strategies and avoidance of unnecessary traffic through the operating room.

Data supporting the use of negative pressure wound therapy (NPWT) as an adjunct for SSI reduction has been variable. A 2018 meta-analysis suggests NPWT substantially reduces SSI rates in the obstetric, orthopedic and colorectal patients.³ However, randomized clinical trials in the hepatobiliary population have demonstrated no significant difference in SSI rates with the use of NPWT.⁴ Randomized clinical trials of clean contaminated wounds after colorectal surgery have shown variable SSI reduction effects of NPWT. A 2018 meta-analysis suggests there is a substantial benefit to NPWT in reducing SSI after open general surgery and colorectal cases.⁵ Similarly, a recent RCT of 176 patients undergoing incisional hernia repair found a significant decrease of SSI (8% to 0%) with the use of prophylactic incisional wound VACs.⁶ Unfortunately, data specific to trauma and emergency laparotomies are largely limited to evaluating open abdomen management and the ubiquitous Abthera VAC system. Research in prophylactic NPWT is still in the early phases, however findings from obstetric, colorectal, vascular and hernia surgery have been extrapolated and NPWT has gained acceptance as an adjunct to SSI reduction after emergency laparotomies.

There is insufficient evidence to recommend primary skin closure (PSC) over delayed primary closure (DPC) in most contaminated or dirty wounds and systematic reviews document high study heterogeneity.⁷ A 2014 systematic review suggested there may be minimal decrease in SSI with DPC.⁸ However; a more recent, small RCT found that primary skin closure significantly reduced SSI in patients with hollow viscus perforation.⁹ A prospective, multicenter, double blind randomized controlled trial in the Netherlands (STITCH Trial),

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demonstrated a significant decrease in incisional hernias one-year post laparotomy when the fascia was closed with a 2-0 PDS suture using 5 mm bites interspaced every 5 mm compared to 1 cm bites interspaced every 1 cm with a #1 looped PDS. Unfortunately, this study did not demonstrate a difference in SSI rates.¹⁰ The 'STITCH Protocol' is thought to reduce abdominal wall ischemia by taking small bites of fascia with a smaller needle. UAMS currently does not have 2-0 PDS readily available and the findings may not be applicable to many of our EGS and trauma patients. However, a reasonable compromise may be to use the 0 PDS on a CT-1 needle when possible rather than the larger looped #1 PDS.

There are many SSI risk factors, which cannot be modified during emergency surgery. However, there are several practical recommendations by The American College of Surgeons 2016)¹¹ that can be utilized in our patient population:

- Avoid hyperglycemia
- Avoid hair removal (unless it will interfere with surgery, in which case, clippers should be used)
- Pre-incision antibiotic prophylaxis based on local antibiogram data and operative procedure
- Antibiotics should be re-dosed according agent half-life or for every 1500 ml of blood lost
- Prophylactic Vancomycin should not be used in MRSA negative or low risk patients
- Intra-operative normothermia whenever possible
- Use of wound protectors whenever possible
- Changing gloves before closure
- Using new instruments for closure
- Supplemental oxygen (FiO₂ 80%) during and immediately after surgery under general anesthesia
- Use of NPWT over stapled skin after colorectal or vascular surgery
- Mupirocin topical antibiotic application can decrease SSI compared to standard dressing

Consensus guidelines on a SSI reduction bundle requires an acknowledgement of the generally low level of evidence for any particular intervention. SSI reduction bundles must also consider the practicality of interventions, particularly for patients requiring complex, staged abdominal closure. Perhaps the most useful feature of a SSI reduction bundle is the standardization of wound closure techniques and the implication of prospective SSI surveillance.

GUIDELINE: *For use in EGS and Trauma patients undergoing a Laparotomy.*

Clean wound

- Change gloves
- Fresh instruments

Clean contaminated wound + low risk patient (Hemodynamically stable non-smoker patient without diabetes, steroid use or immunosuppression)

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- Change gloves
- Fresh instruments

Clean contaminated wound + high risk patient

- Change gloves
- Fresh instruments
- Incisional VAC for 4 days

Contaminated wound, any patient

- Change gloves
- Fresh instruments
- Incisional VAC for 4 days

Dirty wound, any patient

- Change gloves
- Fresh instruments
- Wound VAC for 4 days or longer to facilitate secondary intention

Fascial Closure

- 0 non-looped PDS in a running fashion or surgeon discretion according to surgical characteristics and fascial integrity.

Documenting SSIs

- Please email JMargolick@uams.edu should a patient develop an SSI post laparotomy with the following information
 - o Name, MRN, Date or OR, Procedure, whether or not the SSI reduction bundle was used or not

DEFINITIONS:

Clean wound: Clean operative field, no inflammation

Clean-contaminated wound: Respiratory, alimentary, genital or urinary tract organs are entered in a controlled fashion

Contaminated wound: Open, acute wounds, breaks in technique or gross spillage, necrotic

Dirty wound: Old traumatic wound, devitalized tissue, existing infection, wet gangrene, perforated or purulent abscesses, gross spillage.

Surgical Site infection: an infection related to an operative procedure that occurs at or near the surgical

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incision within 30 days of the operation, or 90 days if a prosthetic mesh is used.

New instruments: used only for closing fascia. Kept apart from the other instruments and covered with a sterile towel throughout case or opened at the time of closing

Change of gloves: New outer or single layer gloves. No need to re-scrub

Incisional VAC: Skin is closed with staples, Adaptic gauze is placed over the skin and a VAC is then placed to 100 mg Hg of negative suction

Wound VAC: Skin is left open, a VAC is placed into the wound. Skin is allowed to heal by secondary intention

REFERENCES:

- 1) Berrios-Torres S, Umscheid CA, Bratzler DW. Centers for Disease Control and Prevention Guidelines for the Prevention of Surgical Site Infection. *Jama Surg* 2017; 152(8): 784-791
- 2) National Healthcare Safety Network, Centers for Disease Control and Prevention. Surgical Site Infection (SSI) Event. www.cdc.gov/nhsn/pdfs/pscmanual/9pscscscurrent.pdf
- 3) Dellinger EP, Hausman SM, Bratzler DW et al. Hospitals collaborate to decrease surgical site infections. *Am J Surg* 2005; 190(1) 9
- 4) Kang SI, Oh HK, Kim MH et al., Systematic Review and Meta-analysis of Randomized controlled Trials of the Clinical Effectiveness of Impervious Plastic Wound Protectors in Reducing Surgical Site Infections in Patients Undergoing Abdominal Surgery. *Surgery* 2018; 164(5), 939
- 5) Shahebaly MS, McKeivitt K, Stephens I et al., Negative Pressure Wound Therapy for Closed Laparotomy Incisions in General and Colorectal Surgery: A Systematic Review and Meta-Analysis. *Jama Surg* 2018 153(11), e183467
- 6) Bueno-Lledo J, Franco-Bernal A, Garcia-Voz-Median MT et al., Prophylactic Single Use Negative Pressure Dressing in Closed Surgical Wounds After Incisional Hernia Repair: A randomized, controlled Trial. *Annals of Surgery* 2021; 273(6), 1081-1086
- 7) Bhangu A, Singh P, Lundy J et al., Systematic Review and Meta-Analysis of Randomized Clinical Trials Comparing Primary vs Delayed Skin Closure in Contaminated and Dirty Abdominal Incisions. *JAMA Surg* 2013; 148(8), 779-786
- 8) Siribumrungwang B, Noorit P, Wilasrusmee C et al., A Systematic Review and Meta-Analysis of Randomised Controlled Trials of Delayed Primary Wound Closure in Contaminated Abdominal Wounds. *World J. Emerg Surg* 2014; 49(9), <https://doi.org/10.1186/1749-7922-9-49>
- 9) Singh PK, Saxena N, Poddar D et al., Comparative Study of Wound Healing in Primary versus Delayed Primary Closure in Contaminated Abdominal Surgery. *Hellenic J Surg* 2016; 88, 314-320f
- 10) Deerenberg EB, Harlaar DJ, Steyerberg EW et al., Small Bites versus Large Bites for Closure of Abdominal Midline Incisions (STITCH): A double-blind, multicentre, randomized controlled trial. *The Lancet* 2015, 386, 1254-1260
- 11) Ban KA, Minei JP, Laronga C et al., American College of Surgeons and Surgical Infection Society: Surgical Site Infection Guidelines, 2016 Update. *JACS* 2017; 224(1), 59-74

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