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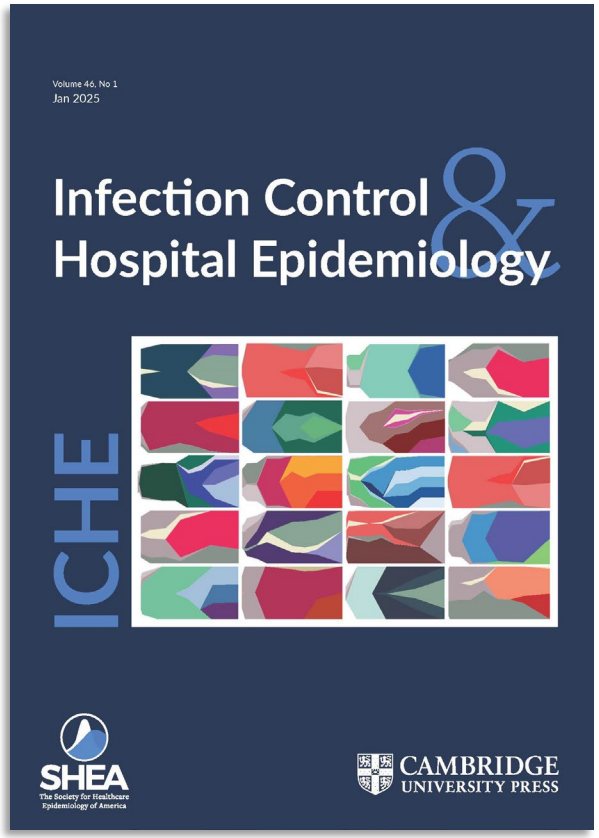

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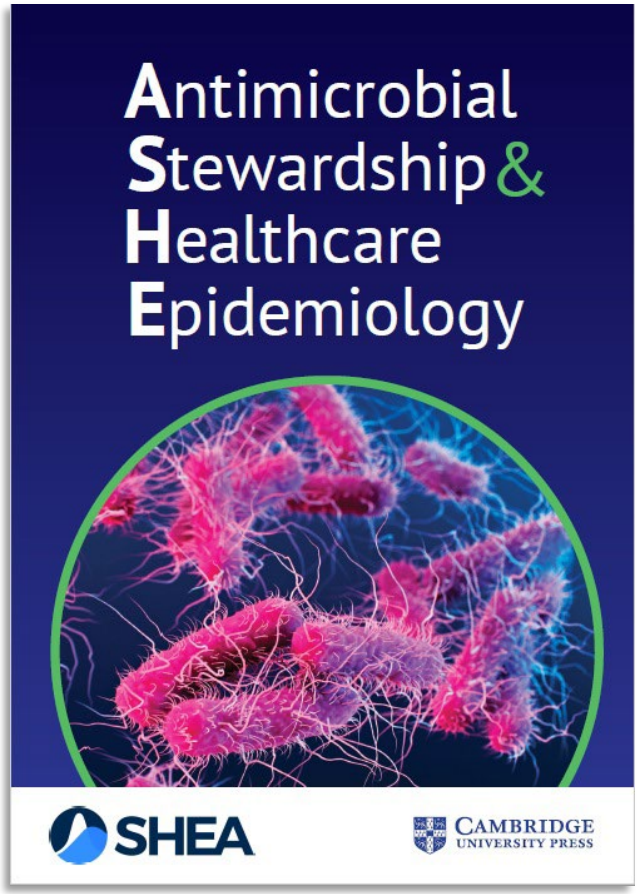

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SHEA Webinar

Town Hall 2025

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July Town Hall Panelists:

Dr. Marci Drees
ChristianaCare

Dr. Trish Perl
UT Southwestern Medical Center

Dr. Matthew Linam
Emory University

Dr. Erica Shenoy
Mass General Brigham

Invited Panelist:

Michael Calderwood, MD, MPH

Chief Quality Officer at Dartmouth Hitchcock

Associate Professor of Medicine at the Geisel School of Medicine

Mass General Brigham

SHEA Town Hall

Surgical Site Infections in 2025

Erica S. Shenoy, MD, PhD
Chief of Infection Control, Mass General Brigham
Physician, Division of Infectious Diseases, Massachusetts General Hospital
Associate Professor, Harvard Medical School

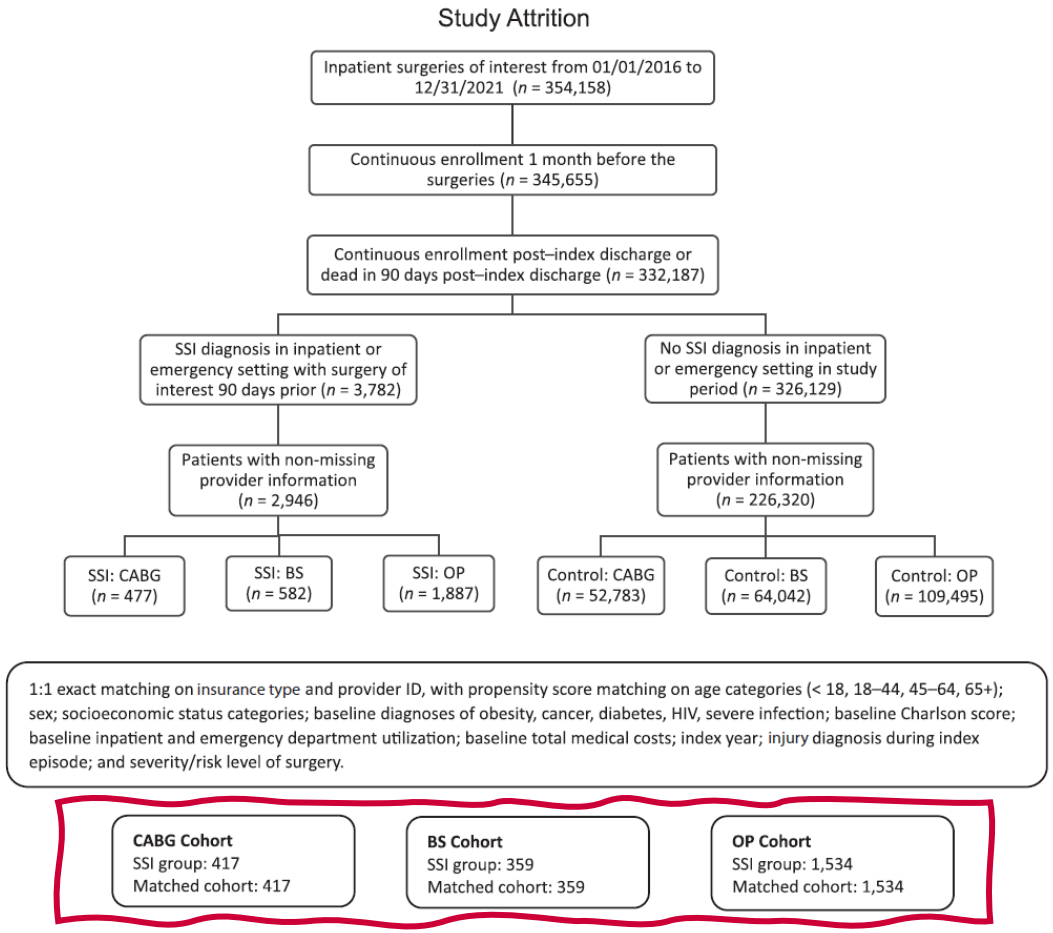
July 2025

One approach to measuring the burden of surgical site infections

Patients with SSIs have longer index LOS, higher readmission rates, total medical costs, and mortality

- Retrospective observational cohort study using claims data from 2016-2021 for patients who developed a subset of SSIs: coronary artery bypass graft (CABG), bariatric surgery for obesity (BS), and orthopedic procedures (OP)

- Propensity score matching used for patients with SSI to patients without SSI; compared
  - Index length of stay
  - Post-discharge outcomes: 30-day readmission rates, 30-day ED visit rates, repeat surgery rates
  - 12-month mortality
  - Total medical costs for index episode, 6 months, and 1 year post-discharge



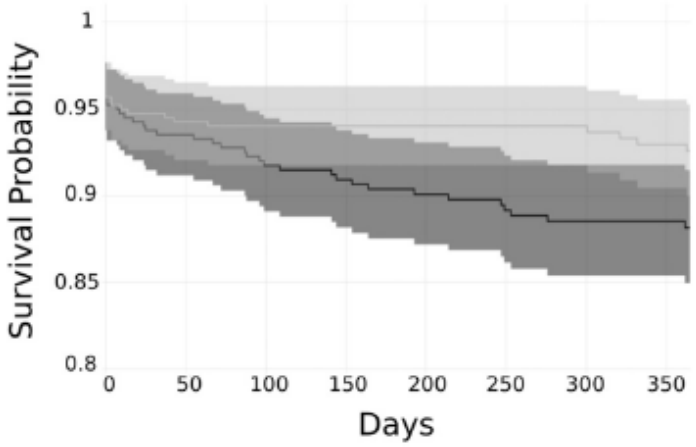
Shambhu S, Gordon AS, Liu Y, Pany M, Padula WV, Pronovost PJ, Hsu E. The Burden of Health Care Utilization, Cost, and Mortality Associated with Select Surgical Site Infections. Jt Comm J Qual Patient Saf. 2024 Dec;50(12):857-866. doi: 10.1016/j.jcjq.2024.08.005. Epub 2024 Aug 24. PMID: 39384467.

Length of Stay and Post-Discharge Utilization: CABG

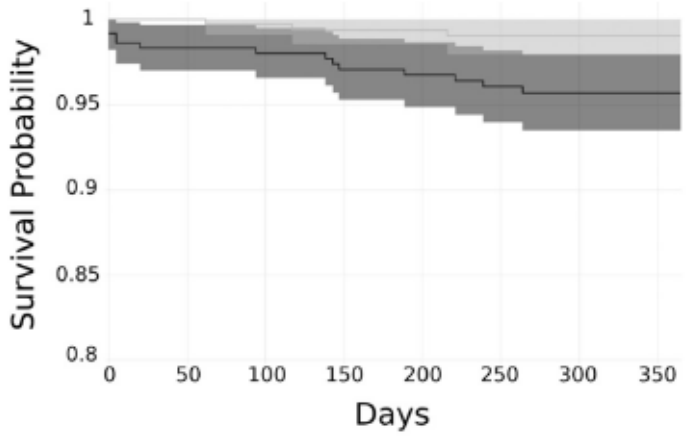
	CABG Cohort ($n = 834$)	
	aOR/aDD* (CI)	p Value
SSI was diagnosed during index stay (among SSI cohort), n (%)	316 (75.8)	
↑ Index admission LOS, aDD	6.27 (3.54–9.00)	< 0.0001
LOS among the subset in which SSI was diagnosed during index stay, aDD	7.93 (4.47–11.38)	< 0.0001
Discharge status, aOR		
LTCH/SNF/IRF	1.67 (1.15–2.44)	0.008
Home	0.87 (0.65–1.18)	0.372
Death	1.07 (0.55–2.09)	0.834
Other (hospice, etc.)	0.65 (0.42–0.99)	0.046
↑ Readmission within 30 days post–index discharge, aOR	2.83 (1.98–4.04)	< 0.0001
Readmission among the subset in which SSI was diagnosed during index stay, aOR	1.25 (0.791–1.976)	0.340
Readmission LOS, aDD	15.50 (4.07–26.92)	0.009
ED visit within 30 days post–index discharge, aOR	1.18 (0.74–1.89)	0.482
ED visits among the subset in which SSI was diagnosed during index stay, aOR	1.29 (0.71–2.32)	0.402
↑ Operating room within 90 days post–index discharge, aOR	3.69 (2.47–5.50)	< 0.0001

Mortality: higher for OP, not for CABG or BS, though survival curves showed a trend for CABG and BS

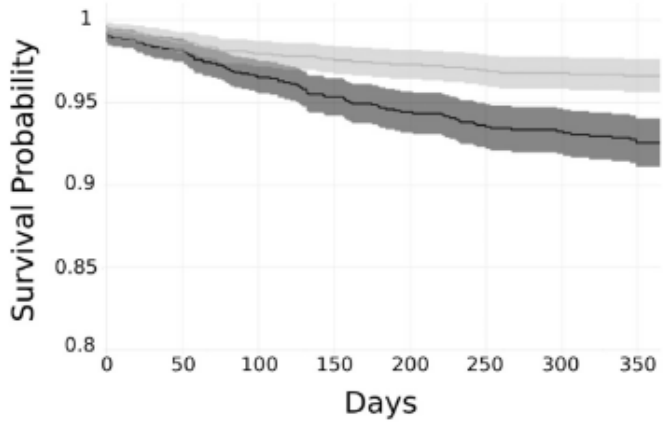
a. Coronary artery bypass graft (CABG)



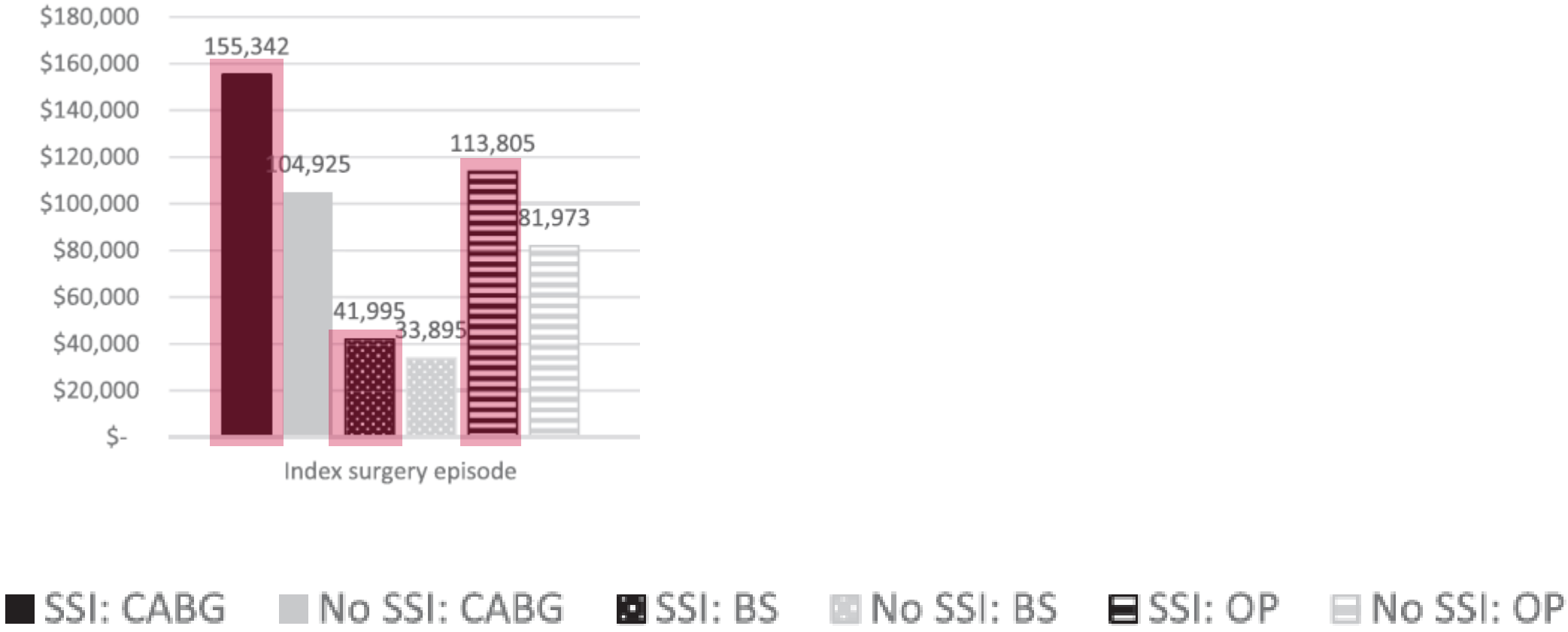
b. Bariatric surgery (BS)



c. Certain orthopedic procedures (OP)



Total Medical Costs: Higher for SSI cohort



Take aways/limitations

- Increase LOS, readmission, re-operation consistent with multiple prior studies
- Lack of mortality finding across all groups not totally consistent with prior studies (which have documented mortality increase)
- Higher costs/admission consistent with prior studies; this study goes further looking at costs within 1 year post-discharge

- Based on claims data not NHSN
- Medicare population

- *Beyond patient level outcomes of morbidity and mortality, LOS impact may be an important lever to push improvements at our institutions*

So, what to do?

- We know there are evidence-based practices (the compendium!) that can reduce the risk of SSIs in our patients and prevent a substantial portion of SSIs

- Many questions came through in advance, and we will do our best to get through those- some may be covered in Dr. Calderwood's remarks, and some we can address in the panel discussion to follow

Mass General Brigham

Dartmouth Health

Dartmouth GEISEL SCHOOL OF MEDICINE

SHEA/IDSA/APIC Practice Recommendation

Strategies to prevent surgical site infections in acute-care hospitals: 2022 Update

Michael S. Calderwood MD, MPH[1,a], Deverick J. Anderson MD, MPH[2,a], Dale W. Bratzler DO, MPH[3], E. Patchen Dellinger MD[4], Sylvia Garcia-Houchins RN, MBA, CIC[5], Lisa L. Maragakis MD, MPH[6], Ann-Christine Nyquist MD, MSPH[7], Kiran M. Perkins MD, MPH[8], Michael Anne Preas RN, MS, CIC[9], Lisa Saiman MD, MPH[10], Joshua K. Schaffzin MD, PhD[11], Marin Schweizer PhD[12], Deborah S. Yokoe MD, MPH[13] and Keith S. Kaye MD, MPH[14,b]

Key Updates in 2022 SSI Compendium

Michael S. Calderwood, MD, MPH

Chief Quality Officer, Dartmouth Hitchcock Medical Center and Clinics

Associate Professor of Medicine, Dartmouth Geisel School of Medicine

Staff Physician, Section of Infectious Disease and International Health

Essential practices	
1	Administer antimicrobial prophylaxis according to evidence-based standards and guidelines. (Quality of evidence: HIGH)
2	Use a combination of parenteral and oral antimicrobial prophylaxis prior to elective colorectal surgery to reduce the risk of SSI. (Quality of evidence: HIGH)
3	Decolonize surgical patients with an anti-staphylococcal agent in the preoperative setting for orthopedic and cardiothoracic procedures. (Quality of evidence: HIGH) Decolonize surgical patients in other procedures at high risk of staphylococcal SSI, such as those involving prosthetic material. (Quality of evidence: LOW)
4	Use antiseptic-containing preoperative vaginal preparation agents for patients undergoing cesarean delivery or hysterectomy. (Quality of evidence: MODERATE)
5	Do not remove hair at the operative site unless the presence of hair will interfere with the surgical procedure. (Quality of evidence: MODERATE)
6	Use alcohol-containing preoperative skin preparatory agents in combination with an antiseptic. (Quality of evidence: HIGH)
7	For procedures not requiring hypothermia, maintain normothermia (temperature >35.5 °C) during the perioperative period. (Quality of evidence: HIGH).
8	Use impervious plastic wound protectors for gastrointestinal and biliary tract surgery. (Quality of evidence: HIGH)
9	Perform intraoperative antiseptic wound lavage. (Quality of evidence: MODERATE)
10	Control blood glucose level during the immediate postoperative period for all patients. (Quality of evidence: HIGH)
11	Use a checklist and/or bundle to ensure compliance with best practices to improve surgical patient safety. (Quality of evidence: HIGH)
12	Perform surveillance for SSI. (Quality of evidence: MODERATE)
13	Increase the efficiency of surveillance by utilizing automated data. (Quality of evidence: MODERATE)
14	Provide ongoing SSI rate feedback to surgical and perioperative personnel and leadership. (Quality of evidence: MODERATE)
15	Measure and provide feedback to healthcare personnel (HCP) regarding rates of compliance with process measures. (Quality of evidence: LOW)
16	Educate surgeons and perioperative personnel about SSI prevention measures. (Quality of evidence: LOW)
17	Educate patients and their families about SSI prevention as appropriate. (Quality of evidence: LOW)
18	Implement policies and practices to reduce the risk of SSI for patients that align with applicable evidence-based standards, rules and regulations, and medical device manufacturer instructions for use. (Quality of evidence: MODERATE)
19	Observe and review operating room personnel and the environment of care in the operating room and in central sterile reprocessing. (Quality of evidence: LOW)

A consultant medical librarian utilized a comprehensive search strategy for PubMed and Embase, pulling **abstracts from January 2012-August 2021** (papers published since prior review for 2014 SSI Compendium)

Each abstract reviewed by at least 2 reviewers with selection of which to review as full text

Intent to highlight **practical recommendations to assist acute-care hospitals** in implementing and prioritizing SSI prevention efforts

	Essential practices
1	Administer antimicrobial prophylaxis according to evidence-based standards and guidelines. (Quality of evidence: HIGH)
2	Use a combination of parenteral and oral antimicrobial prophylaxis prior to elective colorectal surgery to reduce the risk of SSI. (Quality of evidence: HIGH)
3	Decolonize surgical patients with an anti-staphylococcal agent in the preoperative setting for orthopedic and cardiothoracic procedures. (Quality of evidence: HIGH) Decolonize surgical patients in other procedures at high risk of staphylococcal SSI, such as those involving prosthetic material. (Quality of evidence: LOW)
4	Use antiseptic-containing preoperative vaginal preparation agents for patients undergoing cesarean delivery or hysterectomy. (Quality of evidence: MODERATE)
9	Perform intraoperative antiseptic wound lavage. (Quality of evidence: MODERATE)
10	Control blood glucose level during the immediate postoperative period for all patients. (Quality of evidence: HIGH)

There were **19 ESSENTIAL PRACTICES that should be implemented in all hospitals**

<u>Today, I want to discuss 6 with important updates</u>

Prophylactic Antibiotics

SURGICAL PERSPECTIVE

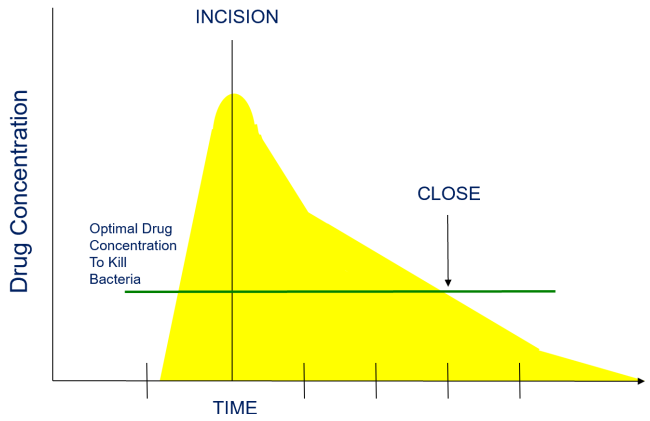
Perioperative Antibiotic Prophylaxis: Surgeons as Antimicrobial Stewards

Miranda, David MD[a]; Mermel, Leonard A. DO, FACP, FIDSA, FSHEA[b,c]; Dellinger, Patchen E MD, FACS, FIDSA, FSHEA[a,*]

Author Information

Journal of the American College of Surgeons 231(6):p 766-768, December 2020. | **DOI:** 10.1016/j.jamcollsurg.2020.08.767

- Important to select the correct antibiotic, delivered at the right time, given at the optimal dose, and re-dosed during lengthy procedures and/or procedures with excessive blood loss.
  - **<u>Antibiotics should be discontinued immediately after a patient's incision is closed in clean and clean-contaminated surgical procedures.</u>** We found no evidence that continuing antibiotics after a patient's incision has been closed prevents surgical site infections. This is even true when drains are present. **Continuing antibiotics after incision closure increases the patient's risk of *C. difficile* infection, acute kidney injury, and antimicrobial resistance.**



Aligns with 2017 CDC Guidelines and 2018 WHO Guidelines.

The 2016 ACS/SIS Guidelines also made this recommendation with exceptions for implant-based breast reconstruction, joint arthroplasty, and cardiac procedures.

Prophylactic Antibiotics

- Important to select the correct antibiotic, delivered at the right time, given at the optimal dose, and re-dosed during lengthy procedures and/or procedures with excessive blood loss.

Reduces SSI, post-operative ileus, anastomotic leak, and 30-day mortality with NO increase in *C. difficile* infections (*JAMA Netw Open* 2018;1:e183226 and *Ann Surg* 2019;270:43)

  - **<u>For patients undergoing elective surgery involving the colon, we also emphasized the need for oral antibiotics in addition to parenteral (IV) antibiotics, rather than mechanical bowel preparation without oral antibiotics.</u>** Patients who get mechanical bowel preparation without oral antimicrobial agents have more complications.

Aligns with 2016 ACS/SIS Guidelines and 2018 WHO Guidelines.

Not discussed in 2017 CDC Guidelines.

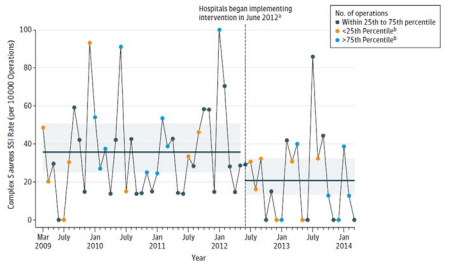
Prophylactic Antibiotics

- For patients undergoing cesarean delivery or hysterectomy, **anti-septic containing preoperative vaginal preparation agents should be used to reduce the risk of endometritis**.

- **Importance of taking a full allergy history**, as the CDC has reported that 10% of the population reports a penicillin allergy, but <1% of the population is truly allergic. It is important to understand the nature of the allergy, as this listed allergy can lead to use of less effective antibiotics to prevent SSIs. Many patients with a self-reported beta-lactam allergy can safely receive a beta-lactam antibiotic as prophylaxis.

- **Surgical teams should not routinely use vancomycin for antimicrobial prophylaxis.** We recommend reserving vancomycin for specific clinical situations such as a patient who is known to be colonized with methicillin-resistant Staphylococcus aureus (MRSA), particularly if the surgery involves prosthetic material, and in the setting of proven outbreaks (increased observed SSI cases) due to MRSA.

Pre-Operative Decolonization



- In the pre-operative setting, **we reclassified decolonization of surgical patients with an anti-staphylococcal agent for cardiothoracic and orthopedic procedures from an Additional Approach to an Essential Practice**.
  - Focused on both MRSA and MSSA
  - Also discussed decolonization in other procedures at high-risk of staphylococcal SSI (such as procedures with prosthetic material)
  - Strongest data recommend up to 5 days of twice daily intranasal mupirocin and daily bathing with chlorhexidine gluconate (CHG)
  - Universal decolonization is easier to operationalize than screen-and-treat
  - Newer data suggest that intranasal povidone-iodine may be as effective as mupirocin, with CHG bathing night before and day of surgery (*Infect Control Hosp Epidemiol* 2014;35:826, *JAMA Surg* 2015;150:390, and *J Trauma Emerg Surg* 2018;44:787)

Intra-Operative Wound Lavage

- **Reclassified prophylactic intraoperative incisional wound irrigation with povidone-iodine after fascial closure from an Additional Approach to an Essential Practice; however, we also discuss the need to ensure the sterility of the antiseptic used.**
  - Recommendation based on two large meta-analyses (*Cochrane Database Syst Rev* 2017;10:CD012234 and *Surg Infect* 2017;18:508)
  - Since publication of the 2022 Compendium, multiple studies have been published with similar findings, including a systematic review and network meta-analysis that included 41 RCTs and showed an overall 40% lower relative risk of SSI, with no benefit from saline irrigation relative to no irrigation (*JAMA Surgery* 2024;159:792).
  - In the Compendium, we recommended additional study of antibiotic irrigation versus dilute povidone-iodine irrigation in a randomized controlled trial focused on intra-abdominal surgery that is contaminated or dirty.

Intra-Operative Wound Lavage

- **Many institutions are using sterile prep solution containing 5-10% povidone-iodine mixed with normal saline in the operating room using the Rothman protocol.** This avoids concerns about sterile and non-sterile solutions being mixed in the operative environment.
- **There are also pre-prepared sterile povidone-iodine solutions**, but these are expensive and don't have an FDA indication for SSI prevention with wound lavage.
- While we appreciate the operational challenges related to the availability and cost of sterile solutions of povidone-iodine and U.S. regulations and safety concerns limiting the mixing of sterile and non-sterile solutions in the operative environment, we believe that intra-operative would lavage with sterile povidone-iodine can be performed safely and effectively.

Practical stepwise protocol for sterile povidone-iodine irrigation.

Rothman protocol for sterile povidone-iodine intraoperative rinse
1. Mix 30 mL of sterile 10% povidone-iodine (from sterile catheter pack; manufactured by Aplicare, Meriden, CT) with 1 L of 0.9% saline in a sterile splash basin
2. Prior to fascial closure, pour in the diluted 0.3% povidone-iodine solution described above into the wound
3. Leave to soak for up to 3 min
4. Suction away any remaining povidone-iodine solution
5. Rinse with 1 L normal saline

Management of Hyperglycemia

- Continued to emphasize importance of controlling blood glucose level in immediate post-operative period (post-operative day 1-2), but **revised recommendation to focus on monitoring and maintaining a post-operative blood glucose level between 110 and 150 mg/dL in those who are hyperglycemic, *regardless of diabetes status***.
    - Lower than the goal of <180 in the 2014 guideline, based on updated data supporting this new range (*Ann Surg* 2013;257:8 and *BMC Endocr Disord* 2018;18:42). **This new range aligns with 2016 ACS/SIS Guidelines.**
    - Continuous insulin infusion protocols lead to better control than subcutaneous insulin (sliding scale) strategies, but continuous insulin infusion requires more intensive monitoring.
    - More intensive post-operative blood glucose control targeting levels <110 mg/dL has been associated with a risk of significantly lowering the blood glucose level and increasing the risk of stroke or death.

Discussion

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