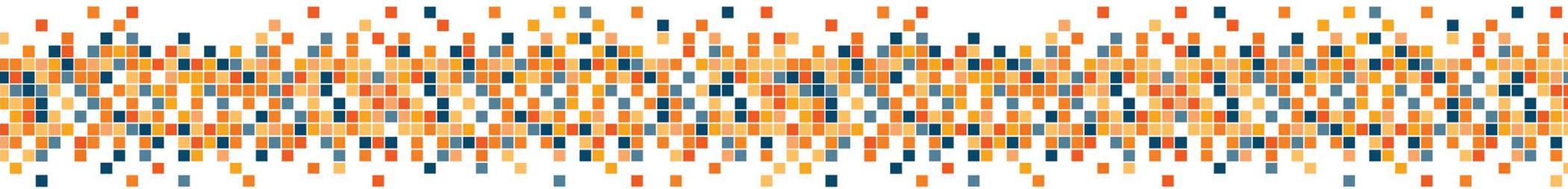


Post-Op Wound Contamination: How can new dressing technology reduce this risk?

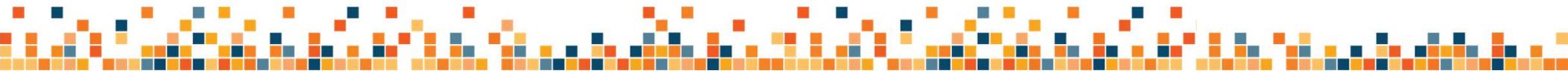
Presented by: Matt Stahl, BSN, RN

October 9th, 2019



Disclaimer

Matt Stahl, BSN, RN is an employee of Eloquest Healthcare, Inc.



Poll #1



Items for Discussion

1. Surgical site infection (SSI) prevalence, risk factors, and prevention resources
2. The guidelines' direction for post-operative incision management
3. Attributes of an ideal post-operative dressing
4. Overview of new incision management technology, how it mitigates contamination risk and supports best practices



Introduction



Problem: Hospital-Acquired Infections after Surgery

Surgical Site Infections (SSI)...

- Tied with healthcare-associated pneumonia as the most frequently occurring HAI in the U.S.¹
- Approximately 2% of inpatient surgical procedures result in an SSI²
- Cost to treat a single SSI: **\$19,000 - \$22,000**²

Up to 60% of SSIs are preventable!!³



Problem: Hospital-Acquired Infections after Surgery

American Journal of Infection Control 47 (2019) 1225–1232



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Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org



Major Article

Impact of patient comorbidities on surgical site infection within 90 days of primary and revision joint (hip and knee) replacement



Charles E. Edmiston Jr., PhD^a, Abhishek S. Chitnis MPharm, PhD^{b,*}, Jason Lerner PT, MBA, MSc^c, Ekoué Folly MPH^b, Chantal E. Holy PhD^b, David Leaper DSc, MD, ChM, FRCS, FACS, FLS^d

^a Department of Surgery, Medical College of Wisconsin, Milwaukee

^b Real World Data Sciences, Medical Devices Epidemiology, Johnson and Johnson, New Brunswick, NJ

^c Health Economics and Market Access Analytics, DePuy Synthes, Raynham, MA

^d Newcastle University, Newcastle upon Tyne, and University of Huddersfield, United Kingdom

Key Words:

Total knee replacement
Total hip replacement
Surgical site infection
Comorbidity
Post-operative complications

Background: The frequency of primary and revision total knee and hip replacements (pTKRs, rTKRs, pTHRs, and rTHRs, respectively) is increasing in the United States due to demographic changes. This study evaluated the impact of preoperative patient and clinical factors on the risk of surgical site infection (SSI) within the 90-day period after primary and revision total joint replacements (TJR).

Methods: A retrospective observational cohort study was designed using the IBM MarketScan and Medicare databases, 2009–2015. Thirty-four comorbidities were assessed for all patients, and multivariable logistic regression models were used to evaluate factors associated with higher odds of SSI after adjusting for other patient and clinical preoperative conditions.

Results: The study included a total of 335,134 TKRs and 163,547 THRs. SSI rates were 15.6% and 8.6% after rTKR and rTHR, respectively, compared with 2.1% and 2.1% for pTKR and pTHR, respectively. Comorbidities with the greatest adjusted effect on SSI across all TJRs were acquired immunodeficiency syndrome (odds ratio [OR], 1.58; 95% confidence interval [CI], 1.06–2.34; $P = .0232$), paralysis (OR, 1.56; 95% CI, 1.26–1.94; $P < .0001$), coagulopathy (OR, 1.48; 95% CI, 1.36–1.62; $P < .0001$), metastatic cancer (1.48; 95% CI, 1.24–1.76; $P < .0001$), and congestive heart failure (OR, 1.39; 95% CI, 1.30–1.49; $P < .0001$).

Conclusions: SSI occurred most commonly among patients after revision TJR and were related to many patient comorbidities, including diabetes, congestive heart failure, and coagulopathy, which were significantly associated with a higher risk of SSI after TJR.

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Problem: Hospital-Acquired Infections after Surgery

Research

Original Investigation

Financial Impact of Surgical Site Infections on Hospitals The Hospital Management Perspective

John Shepard, MBA; William Ward, MBA; Aaron Milstone, MD, MHS; Taylor Carlson, BS; John Frederick, BS;
Eric Hadhazy, MS; Trish Perl, MD, MSC

RESULTS The daily total charges, mean LOS, and 30-day readmission rate for patients with an SSI compared with patients without an SSI were \$7493 vs \$7924 ($P = .99$); 10.56 days vs 5.64 days ($P < .001$); and 51.94 vs 8.19 readmissions per 100 procedures ($P < .001$). The change in profit due SSIs was \$2 268 589.

CDC National HAI Progress Report, 2017 - National

SSI: Abdominal Hysterectomy

↓ -11%

LOWER COMPARED TO NAT'L
BASELINE

U.S. hospitals reported no significant change in SSIs related to abdominal hysterectomy surgery between 2016 and 2017

5% Among the 599 hospitals in U.S. with enough data to calculate an SIR, 5% had an SIR significantly higher (worse) than 0.89, the value of the national SIR.

SURGICAL SITE INFECTIONS

When germs get into an area where surgery is or was performed, patients can get a surgical site infection. Sometimes these infections involve only the skin. Other SSIs can involve tissues under the skin, organs, or implanted material.

SSI: Colon Surgery

↓ -9%

LOWER COMPARED TO NAT'L BASELINE

U.S. hospitals reported no significant change in SSIs related to colon surgery between 2016 and 2017

7% Among the 1,811 hospitals in U.S. with enough data to calculate an SIR, 7% had an SIR significantly higher (worse) than 0.91, the value of the national SIR.

SURGICAL SITE INFECTIONS

When germs get into an area where surgery is or was performed, patients can get a surgical site infection. Sometimes these infections involve only the skin. Other SSIs can involve tissues under the skin, organs, or implanted material.

CDC National HAI Progress Report, 2017 – California

SSI: Abdominal Hysterectomy

13%

NO CHANGE COMPARED TO NAT'L
BASELINE

California hospitals reported no significant change in SSIs related to abdominal hysterectomy surgery between 2016 and 2017

4% Among the 55 hospitals in California with enough data to calculate an SIR, 4% had an SIR significantly higher (worse) than 0.89, the value of the national SIR.

SURGICAL SITE INFECTIONS

When germs get into an area where surgery is or was performed, patients can get a surgical site infection. Sometimes these infections involve only the skin. Other SSIs can involve tissues under the skin, organs, or implanted material.

SSI: Colon Surgery

2%

NO CHANGE COMPARED TO NAT'L BASELINE

California hospitals reported no significant change in SSIs related to colon surgery between 2016 and 2017

8% Among the 189 hospitals in California with enough data to calculate an SIR, 8% had an SIR significantly higher (worse) than 0.91, the value of the national SIR.

SURGICAL SITE INFECTIONS

When germs get into an area where surgery is or was performed, patients can get a surgical site infection. Sometimes these infections involve only the skin. Other SSIs can involve tissues under the skin, organs, or implanted material.

Reference: <https://gis.cdc.gov/grasp/PSA/HAIreport.html>. Accessed 8/6/19.

CDC National HAI Progress Report, 2017 – California

HAI Type	# OF FACILITIES THAT REPORTED DATA TO CDC'S NHSN, 2017 [†]	2017 STATE SIR VS. 2016 STATE SIR	2017 STATE SIR VS. 2017 NATIONAL SIR	2017 STATE SIR VS. NATIONAL BASELINE [‡]	2017 STATE SIR	2017 NATIONAL SIR
SSI: Abdominal Hysterectomy	296	████████ 2%	████████ 2%	████████ 13%	0.88	0.89
SSI: Colon Surgery	317	████████ 2%	↑ 9%	████████ 2%	0.98	0.91

Reference: <https://gis.cdc.gov/grasp/PSA/HAIreport.html>. Accessed 8/6/19.



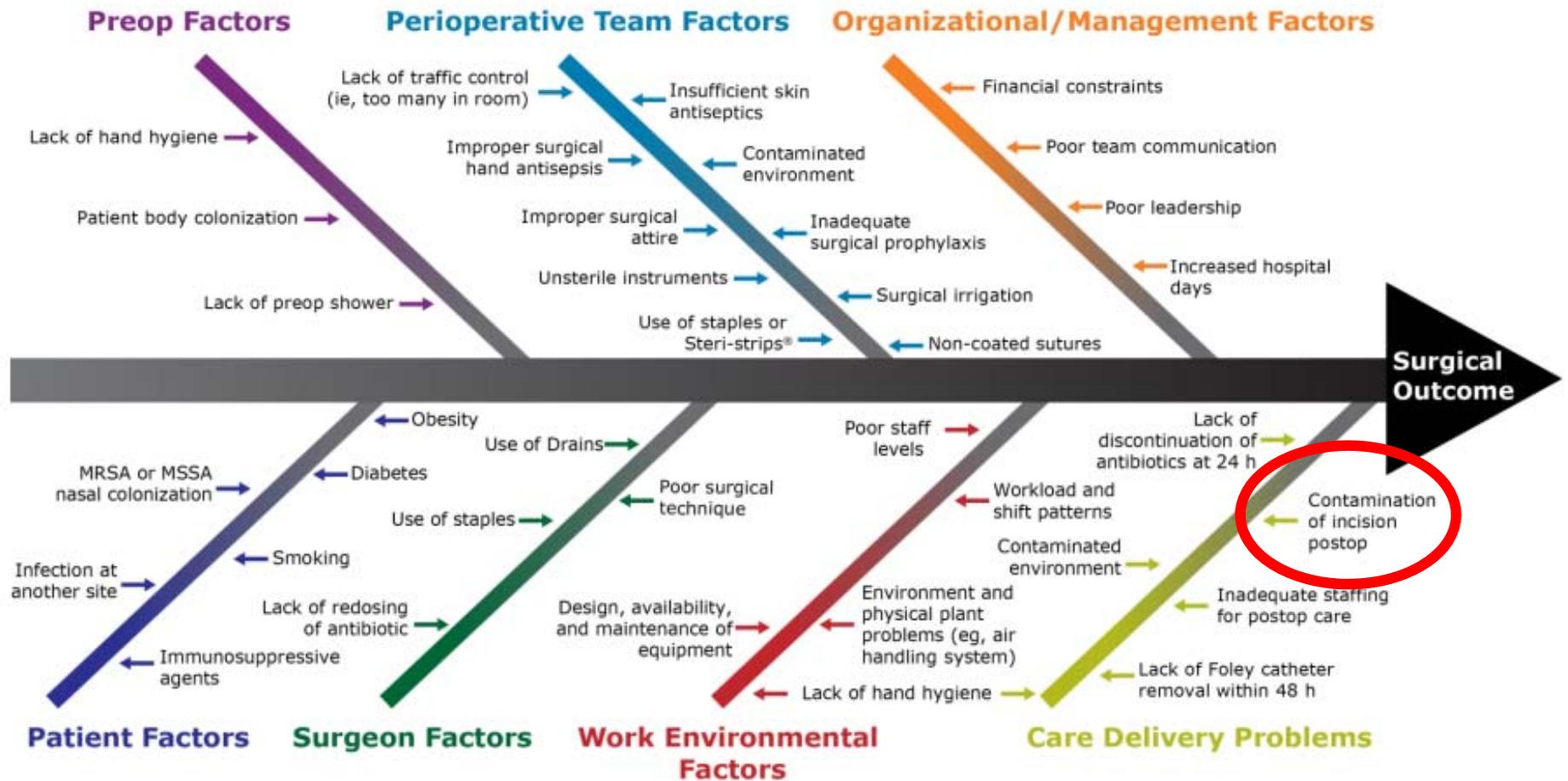
Complexity of SSIs

“...all surgical wounds are contaminated to some degree at closure – the primary determinant of whether the contamination is established as a clinical infection is related to host (wound) defense”

Belda et al., JAMA 2005;294:2035-2042



Surgical Factors



Spencer, M. Available at www.7sbundle.com. Accessed April 5th, 2018.

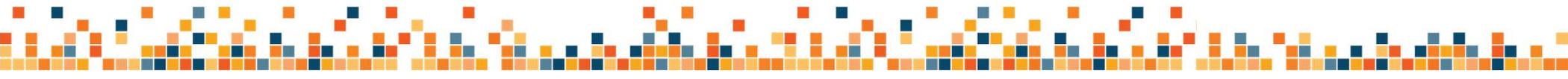
Risk Factors

Sources of Infection

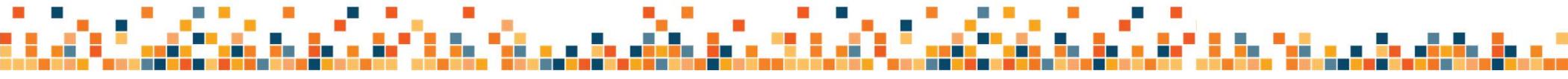
- Most SSIs develop as a result of **endogenous flora** found on or within the patient's skin, mucous membranes, or hollow organs
- Microorganisms causing SSIs can also originate externally – from members of the surgical team, air in the OR, and any tool, instrument or material brought to the sterile field during an operation⁴



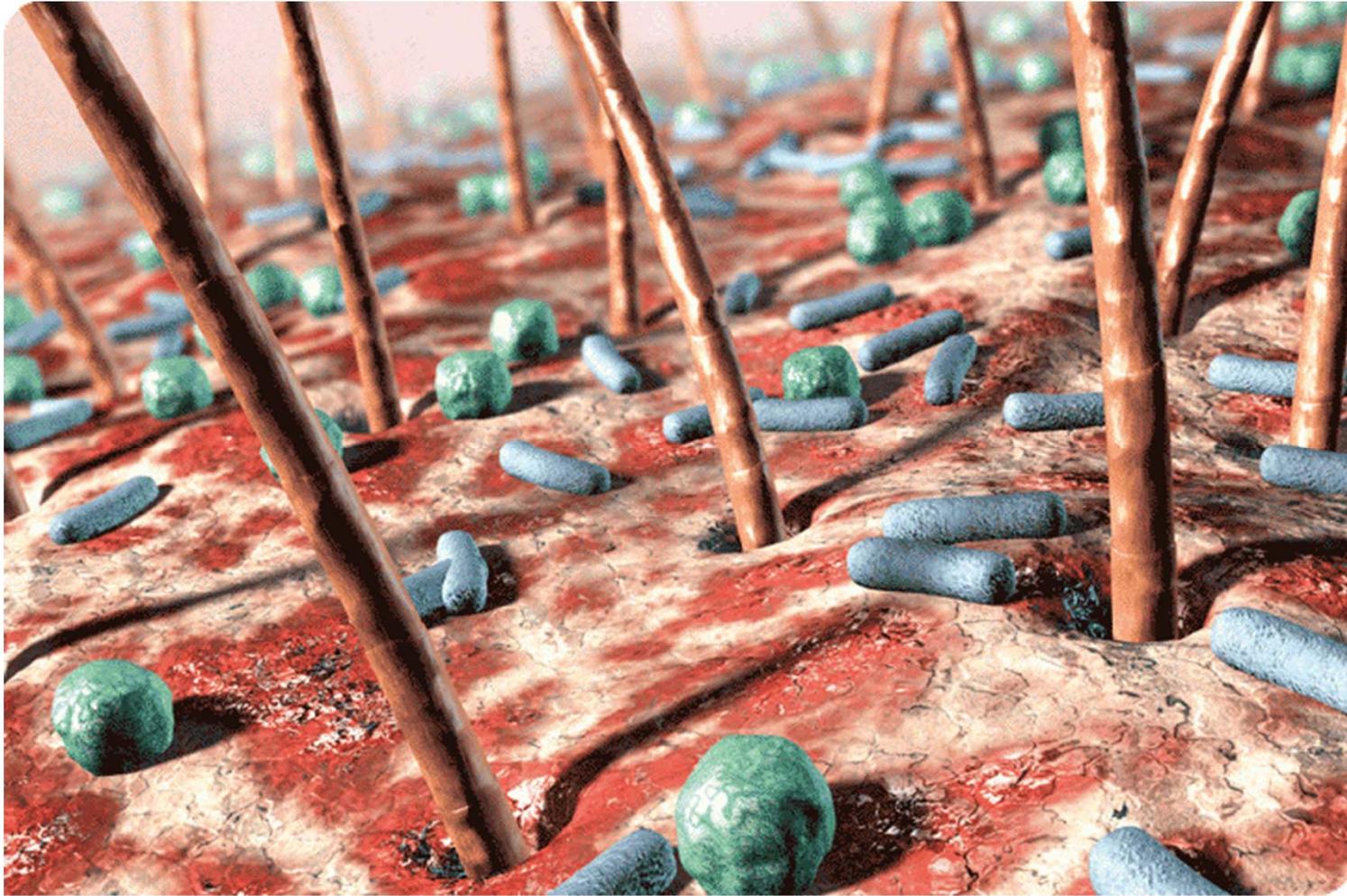
CHG's Mechanism of Action - Video



Skin Antisepsis

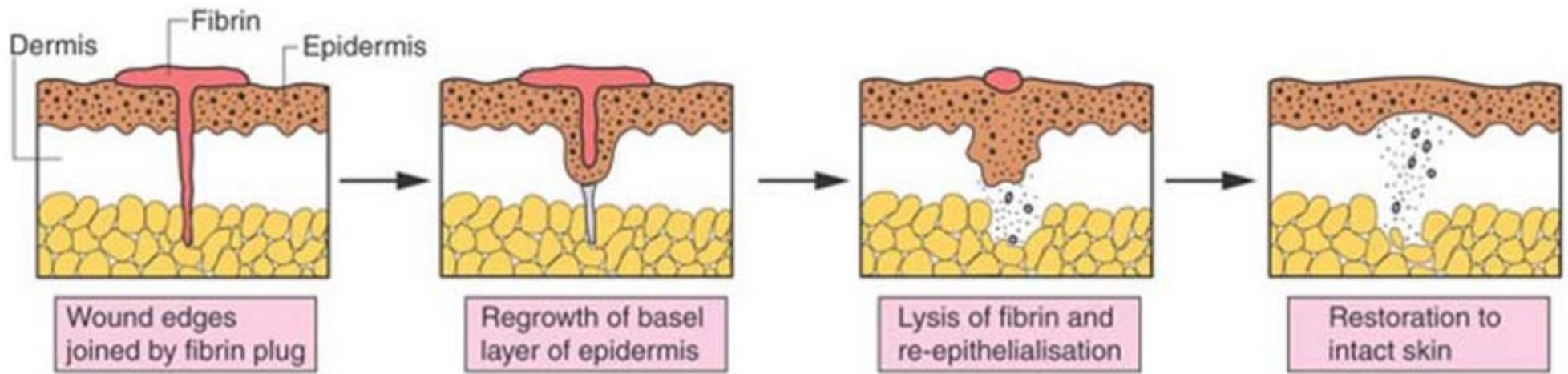


Endogenous Flora



Risk Factors

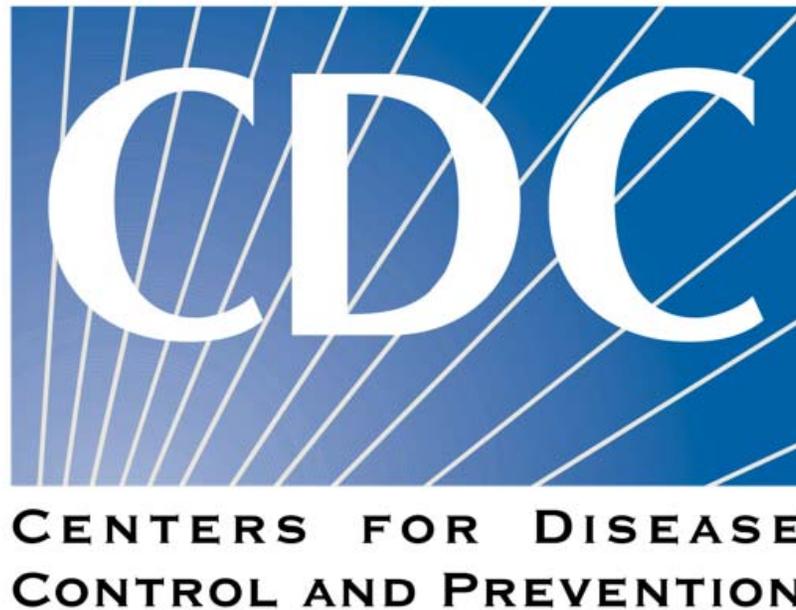
Healing by Primary Intention:



Risk Factors



Post-Op Guidelines



Current Guidelines and Guidance Documents

Guideline/Guidance	Methods	Conclusions
<p>CDC Guideline for Prevention of SSI, 2017 https://jamanetwork.com/journals/jamasurgery/fullarticle/2623725 Accessed October 9, 2018.</p>	<p>Outcome-based, randomized controlled studies from 1998–2014.</p>	<p>Randomized controlled trial evidence suggested uncertain trade-offs between the benefits and harms regarding antimicrobial dressings applied to surgical incisions after primary closure in the operating room for the prevention of SSI. (No recommendation/unresolved issue).</p>
<p>WHO Global Guidelines on the Prevention of SSI, 2016 http://apps.who.int/iris/bitstream/handle/10665/250680/9789241549882-eng.pdf;jsessionid=9AAB8F406232C1294A363043D58CAF6F?sequence=1 Accessed October 9, 2018.</p>	<p>10 randomized controlled trials studied the following types of advanced dressings: hydrocolloid; hydroactive; silver-containing (metallic or ionic); and polyhexamethylene biguanide (PHMB) dressings vs. standard dry absorbent dressings.</p>	<p>Low quality evidence showed advanced dressings applied on primarily closed incisional wounds do not significantly reduce SSI rates compared to standard wound dressings, and advanced dressings should not be used as a preventive measure to reduce the risk of SSI (conditional recommendation).</p>
<p>American College of Surgeons and Surgical Infection Society Guidelines for Prevention and Treatment of SSI, 2016</p>		<p>No recommendations regarding choice of post-operative dressings.</p>
<p>National Institute for Health and Care Excellence (NICE) Surgical Site Infections: Treatment and Prevention, 2017 (UK) https://www.nice.org.uk/Guidance/CG74 Accessed October 9, 2018</p>	<p>Use of best available evidence to answer clinical questions, with the following hierarchy: meta-analyses of randomized controlled trials, cohort studies, experimental or observational studies.</p>	<p>Cover surgical incisions with an appropriate interactive dressing at the end of the operation. No robust evidence to guide choice of dressing to prevent surgical site infection.</p>



Current Guidelines and Guidance Documents

Guideline/Guidance	Methods	Conclusions
Society for Healthcare Epidemiology of America/Infectious Disease Society of America: Strategies to Prevent Surgical Site Infections in Acute Care Hospitals: 2014 Update https://www.jstor.org/stable/10.1086/676022		Post-operative wound dressings not addressed.



Current Guidelines and Guidance Documents



GUIDELINES FOR PERIOPERATIVE PRACTICE

5 Guideline Topics:

1. Aseptic Practice
2. Equipment and Product Safety
3. Patient and Worker Safety
4. Patient Care
5. Sterilization and Disinfection

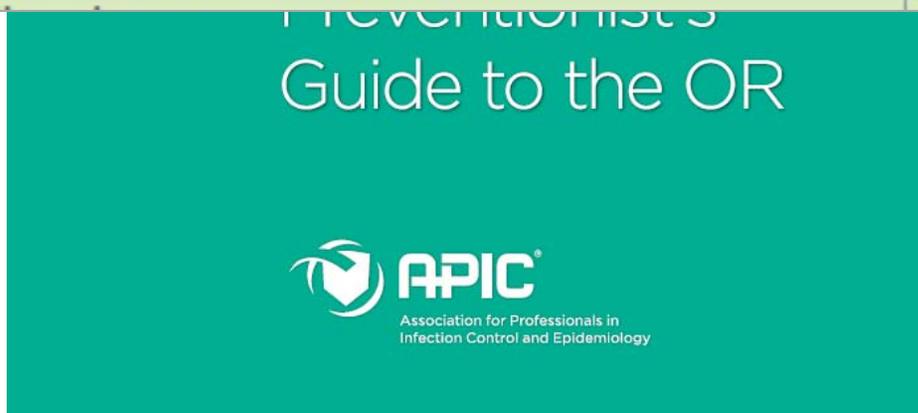
Reference: <https://www.aorn.org/Guidelines/About-AORN-Guidelines>. Accessed 11/12/18.

Current Guidelines and Guidance Documents



TABLE 2. STRATEGIES DETERMINED TO BE UNNECESSARY IN THE PREVENTION OF SURGICAL SITE INFECTIONS

Strategy	Strength of Evidence
Antimicrobial prophylaxis after surgical closure (clean and clean-contaminated procedures)	Category IA
Topical antimicrobial agents applied to the surgical incision	Category IB
Autologous, platelet-rich plasma	Category II
Antimicrobial sealant following intraoperative skin preparation	Category II



CentraCare Case Study

Reduction of Surgical Site Infections in the Cesarean Section Patient through Incision Care

Problem:

1. Surgical site infections continued to remain higher than the NHSN (National Healthcare Safety Network) mean, despite implementation and compliance in all SCIP measures, up to and including chlorhexidine (CHG) wipes prior to scheduled cases, and one time use in urgent or emergent cases when able.
2. Most of the infections were superficial.
3. There was not a standardized approach to incision care from dressing type, use and application, post-operative care, showering, etc.

https://www.mnhospitals.org/Portals/0/Documents/patientsafety/SSI/CentraCare_CsectionIncisionCareProtocol.pdf



CentraCare Case Study

Review:

1. In-depth review of every infection for previous 3 years
2. Common co-morbidities identified
3. In-depth literature review performed
4. Consulted with WOC Nurse group and Infection Prevention and Control Nurses
5. Cost comparison with an antimicrobial wound care dressing compared to the average national cost of one infection.



CentraCare Case Study

Learnings:

1. After one year of implementation and incision care standardization, a 50% reduction in superficial SSIs was observed
2. Patients were overall very satisfied with their experience with incision care
3. Physicians expressed a significant level of satisfaction with how the incisions were healing and appearing at the two week incision check appointment



“Stretch” Guidelines



“Stretch” Guidelines

Patient Safety Tool: Kaiser Permanente's Infection Control "Plus" Measures

- Tuesday, September 24th, 2013 [Print](#) | [Email](#)

[SHARE](#) [Tweet](#) [Share 0](#)

Oakland, Calif.-based Kaiser Permanente offers a complimentary infection control resource for infection preventionists assessing or expanding infection prevention practices.

The 2013 Infection Prevention and Control "Plus" Measures Toolkit, developed by Sue Barnes, RN, leader of the national infection prevention and control program at Kaiser Permanente, provides a comprehensive set of infection prevention practices and supporting evidence.

 KAISER PERMANENTE.

Infection Prevention and Control “PLUS” Measures Toolkit

2013

Developed by: Sue Barnes, RN, CIC, National Infection
Prevention and Control Program Leader
Kaiser Permanente

**The toolkit is posted on the following KP website
which is accessible internally and externally:**

[http://nursingpathways.kp.org/national/quality/infectioncon
trol/toolkit/index.html](http://nursingpathways.kp.org/national/quality/infectioncontrol/toolkit/index.html)

7 S Bundle|SSI|Surgical Site Infection|Surgery|Surgical Infection
Prevention|HAIs|Working Toward Zero

7 S Bundle Steps #1 Safe Operating Room # 2 S



7S
Bundle



“Stretch” Guidelines

Patient Safety Tool: Kaiser Permanente's Infection Control "Plus" Measures

- Tuesday, September 24th, 2013 [Print](#) | [Email](#)

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Infection Prevention and Control “PLUS” Measures Toolkit

2013

Developed by: Sue Barnes, RN, CIC, National Infection Prevention and Control Program Leader
Kaiser Permanente

The toolkit is posted on the following KP website which is accessible internally and externally:

<http://nursingpathways.kp.org/national/quality/infectioncontrol/toolkit/index.html>

7 S Bundle|SSI|Surgical Site Infection|Surgery|Surgical Infection Prevention|HAIs|Working Toward Zero

7 S Bundle Steps #1 Safe Operating Room # 2 S

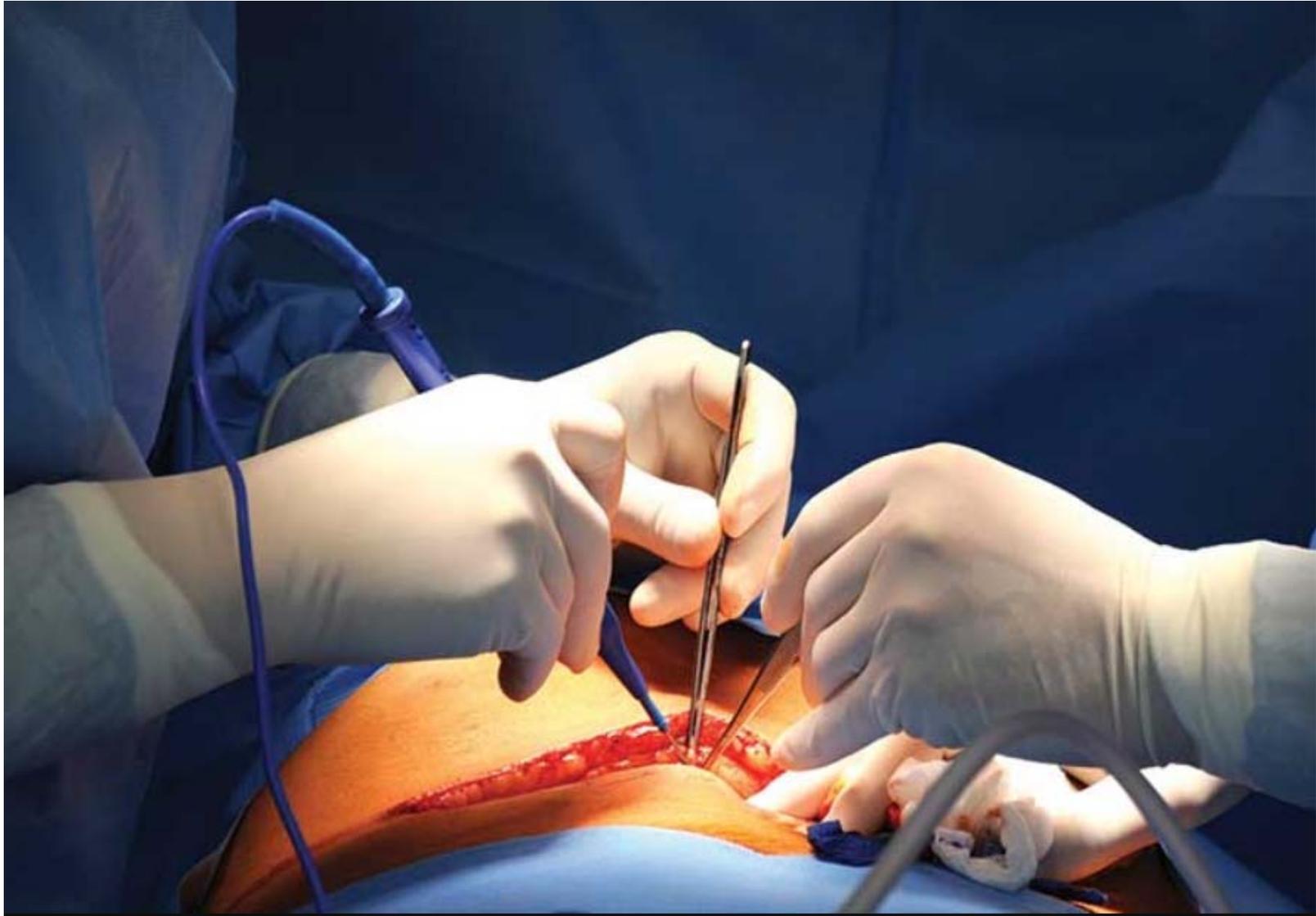
7S Bundle



Poll #2



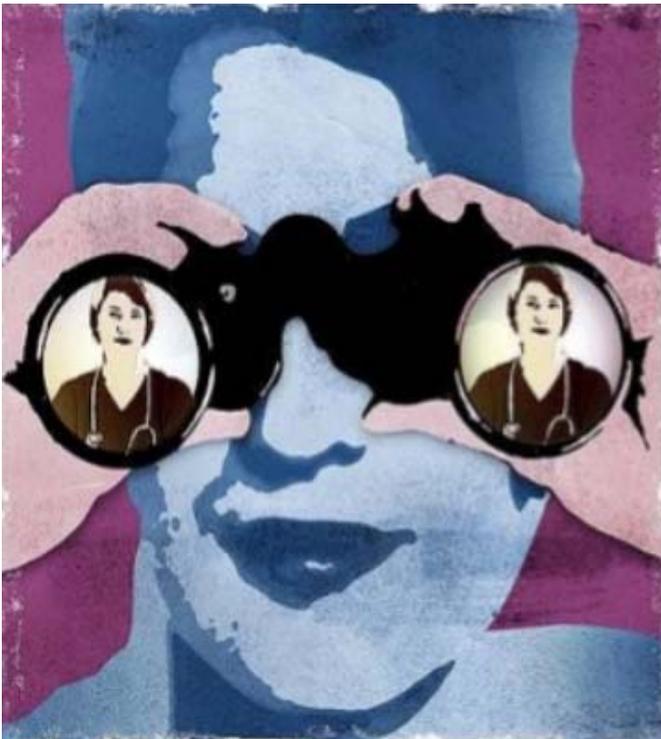
IP – Surgical Team Relationship



IP – Surgical Team Relationship

Two areas of expertise Infection Preventionists can contribute:

1. SSI Surveillance
2. Performance Improvement & Implementation Science



Assessment of the Surgical Site

The *AJIC* article, “Strategies to prevent surgical site infections in acute care hospitals: 2014 update” designates daily observation as the “gold standard”:

“The direct method with daily observation of the surgical site by the physician... registered nurse, or infection prevention and control (IPC) professional starting 24-48 hours postoperatively is the most accurate method for surveillance.”



Poll #3



Challenges Still Exist

- Current post-op dressing options fail to provide an optimal mix of essential components
- No evidence that the use of dressings containing silver reduce the rates of SSI⁵



What can be done to facilitate surgical site protection, monitoring and provide the optimal healing environment for post-op sites at risk for complications?



2016 Cochrane Review



**Cochrane
Library**

Cochrane Database of Systematic Reviews

Dressings for the prevention of surgical site infection (Review)

Dumville JC, Gray TA, Walter CJ, Sharp CA, Page T

Dumville JC, Gray TA, Walter CJ, Sharp CA, Page T.
Dressings for the prevention of surgical site infection.
Cochrane Database of Systematic Reviews 2014, Issue 9. Art. No.: CD003091.
DOI: 10.1002/14651858.CD003091.pub3.

www.cochranelibrary.com

Dressings for the prevention of surgical site infection (Review)
Copyright © 2015 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

WILEY

Ideal Post-Op Dressing Attributes

Components of the ideal postoperative dressing include⁵:

- Ability to absorb and contain exudate without leakage
- Impermeability to water and bacteria
- Suitability of use with different types of wound closures
- Avoidance of wound trauma during dressing changes
- Lower frequency of required dressing changes



New Clinical Data

ARTICLE IN PRESS

American Journal of Infection Control 000 (2019) 1–5



Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org



Major Article

Preliminary analysis of the antimicrobial activity of a postoperative wound dressing containing chlorhexidine gluconate against methicillin-resistant *Staphylococcus aureus* in an in vivo porcine incisional wound model

Thriveen Sankar Chittoor Mana MD^a, Curtis Donskey MD^b, Neal Carty PhD^c, Larry Perry RN^d, David Leaper MD^e, Charles E. Edmiston Jr, PhD^{f,*}

^a Department of Medicine, Case Western Reserve University School of Medicine, Cleveland, OH

^b Geriatric Research, Education and Clinical Center, Louis Stokes Cleveland Veterans Affairs Medical Center, Cleveland, OH

^c Avery Dennison, Chicago, IL

^d Pluris Research, Franklin, TN

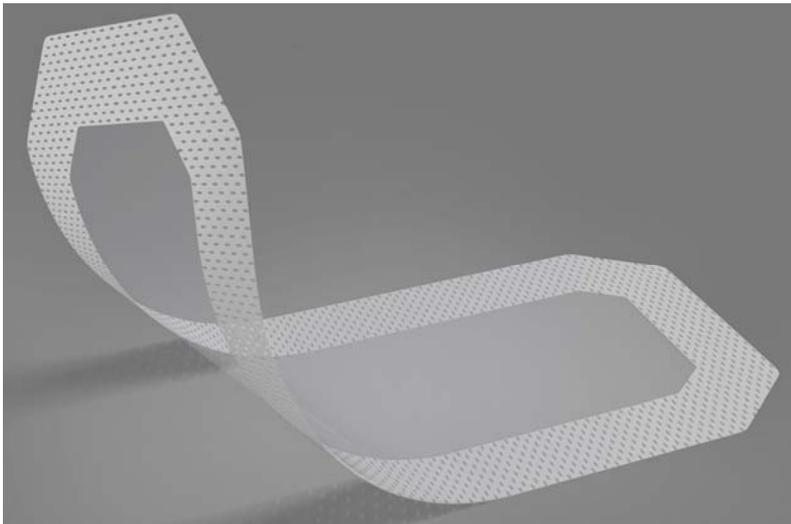
^e Institute of Skin Integrity and Infection Prevention, University of Huddersfield, Huddersfield, United Kingdom

^f Department of Surgery, Medical College of Wisconsin, Milwaukee, WI

New Clinical Data - Methods

Comparison of 3 post-operative dressings:

- Transparent adhesive CHG dressing
- Placebo transparent adhesive dressing (no CHG)
- Standard of care: Gauze dressing & tape



New Clinical Data - Methods

Description of study procedure:

1. Skin prepped with 2% CHG/70% IPA solution
2. Eight linear, full-thickness incisions made on each animal
3. Closed with sutures
4. Each wound inoculated with MRSA
5. Postoperative wound dressing applied & left on for 72 hours



New Clinical Data - Methods

Results:

- Three days postoperatively, MRSA could not be detected in any of the 8 wounds treated with the transparent adhesive CHG dressing
 - All 8 were below the experimental limit of detection
- Microbial recovery from wounds treated with the placebo dressing was $4.2 \log_{10}$ cfu/g
- Microbial recovery from wounds treated with gauze dressing was $3.2 \log_{10}$ cfu/g
- Statistically significant



Poll #4



Deprivation Is a Risk Factor for Surgical Site Infection

[Linda McKinley](#), RN, BSN, MPH, CIC

Infection Control Practitioner, Madison VA Hospital

[Mary Duffy](#), RN

VA Surgical Quality Improvement Program Coordinator, Madison VA Hospital

[Kathy Matteson](#), RN, MSN, CIC

Infection Preventionist, Madison VA Hospital

[Christopher J. Crnich](#), MD, MS

Assistant Professor of Medicine, University of Wisconsin School of Medicine and Public Health

Methods

Jump to Section

Go

A case control study was conducted to evaluate if indicators of material (homelessness, inadequate self-hygiene, and unsanitary home environment) and social health (substance abuse and diagnosed mental health disorder) deprivation was a significant risk factor for SSI at the Madison VA Hospital. Cases were defined as any surgical patient who developed an NHSN-defined deep and organ/space SSI between April, 2011 and September, 2011. Controls were selected by matching to cases by month of surgery and surgical specialty. Indicators of material and social health deprivation were abstracted from electronic health record. Bivariate analyses of the relationship between measures of deprivation and SSI were performed using the Fischer's exact test.

Results

Jump to Section

Go

9 case and 17 control patients were included in this study. Analyses were stratified by the presence of material deprivation alone or any combination of material or social health deprivation. Subjects with an SSI had significantly higher risk of material deprivation (OR = 32.0, 95% CI 2.2 – 1558.0, P = 0.0009) and combined material/social health deprivation (OR = 8.6, 95% CI [not calculable], P = 0.0034) than subjects without a SSI.

Conclusions

Jump to Section

Go

Despite the small sample size of our study, we found that measures of material and social health deprivation were strongly associated with SSI in our patient population. This relationship may be confounded by relationships with other health behaviors already known to be associated with SSI (e.g., smoking, diabetes control, obesity, etc.) and deserves further study. If material/social health deprivation is affirmed as an independent risk factor for SSI in subsequent studies, these preliminary data suggest a need for innovative strategies for minimizing the risk of surgery-related complications in this at-risk patient population.



Integration with ERAS

- As you're striving to decrease post-op infection risk, there's limited control of patient hand hygiene once they go home...



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5. Dumville, J.C., Gray, T.A., Walter, C.J., et al. (2016). Dressings for the prevention of surgical site infection. *Cochrane Database Syst Rev*, 12, CD003091.



A person wearing a dark blue suit jacket, a light-colored shirt, and a dark tie is holding a white rectangular sign with both hands. The sign has the word "QUESTIONS?" written on it in a bold, dark blue, sans-serif font. The background is a plain, light grey color.

QUESTIONS?



**THANK
YOU!**



Contact Info

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