Safety Action Series

National Improvement Challenge on Surgical Site Infections Winning QI Programs
Janet Osborne, MD  
Chief, Gynecology Oncology  
Carilion Clinic

Donna Sams, RN  
Senior Director, OB and GYN Quality Assurance  
Carilion Clinic

Linda Fan, MD, FACOG  
Director, Gynecologic Specialties Division  
Department of Obstetrics and Gynecology, Reproductive Medicine  
Yale School of Medicine

Heidi Rillstone, RN  
Performance Manager, Perioperative Services

Keziah Summers, BSN, SRNA  
Student Registered Nurse Anesthetist,  
York College of Pennsylvania/WellSpan Health Nurse Anesthetist Program

Adriane Burgess, PhD, RN  
Clinical Research Specialist,  
WellSpan Health

Susan Khalil, MD, FACOG  
Director of Research,  
Jamaica Hospital Medical Center

Amirah Abdallah, MD  
Resident,  
Jamaica Hospital Medical Center
Disclosures

- Janet Osborne, MD has no real or perceived conflicts of interest.
- Donna Sams, RN has no real or perceived conflicts of interest.
- Linda Fan, MD, FACOG has no real or perceived conflicts of interest.
- Heidi Rillstone, RN has no real or perceived conflicts of interest.
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Objectives

➢ Learn about the National Improvement Challenge issued by the Council on Patient Safety in Women’s Health Care.

➢ Hear from the winners of the Surgical Site Infection cycle. Through their presentations you will:

  • Learn how each of the winning institutions successfully utilized the Council’s patient safety materials to drive process improvement around the prevention of surgical site infections after gynecologic surgery.
  • Gain valuable insight on ways that your institution can successfully implement the Council’s tools to drive culture change, increase collaboration, and improve outcomes.
  • Hear real world challenges to successful QI program implementation and discover methods for overcoming these challenges.

➢ Find out how your institution can get involved in the next cycle of the challenge.
National Improvement Challenge

Improving Quality and Safety in Clinical Care

Through the NIC, the Council seeks to

➢ Foster a culture of collaboration, teamwork, patient safety, and communication between clinicians and patients to promote the Council’s mission: safe health care for every woman

➢ Increase widespread implementation of the safety tools disseminated by the Council.

➢ Encourage the development of patient safety and quality improvement projects.
Submission Evaluation Criterion

• Submissions were evaluated and voted on by members of the Council

• Overall evaluation of submission:
  – Documentation of improved structures, processes, or outcomes.
  – Use of Council developed materials.
  – Demonstrated interdisciplinary collaborative engagement.
Enhanced Recovery after Hysterectomy and Patient Safety Bundle
Carilion Clinic – Who are we?

- Carilion Clinic is a physician led multi-hospital health system in southwest VA. Our flagship hospital, Carilion Roanoke Memorial Hospital, located in Roanoke VA, has 850 beds and a 72 bed Emergency Department
  - Second largest hospital in VA
  - Trauma 1 Facility with >84,000 encounters/year
- Partnership with Virginia Tech culminated with the opening of The Virginia Tech Carilion School of Medicine in 2010
- Full service OB/GYN residency program includes 15 general OB/GYN faculty and 9 subspecialty faculty. We have OB/GYN representation in Maternal Fetal Medicine, Human Genetics, Reproductive Endocrinology, GYN Oncology, URO Gynecology and fellowship trained Adolescent Gynecology
- Open medical staff – includes 9 private practice Ob/Gyn’s
- 3X Magnet certified hospital with >50% of RN’s possessing a BS or higher degree
Hysterectomy SSI Reduction

Background

• Organizational awareness of Colorectal and Hysterectomy SSI rates exceeding national benchmark

• Established Multidisciplinary, Multi-departmental collaborative to
  – Develop a standardized care pathway
  – Reduce Colorectal and Hysterectomy SSI
  – Improve outcomes
  – Provide superior care

• Initiated Enhanced Recovery Protocol with colorectal surgery—significant improvement and outcomes noted

• 2017 OB/GYN Department adopted utilization of Enhanced Recovery Protocol for all GYN major surgeries
What is Enhanced Recovery?

- *Attenuation* of pathophysiologic changes occurring after surgery
- Using *alternative strategies of management*
- Replace traditional but *untested practices* of peri-operative care
- Primary goal: to *hasten recovery*

Why use Enhanced Recovery Bundle?

• Evidence-based and best-practices

• Reduces surgical stress, maintains normal physiology, enhances mobilization

• Reduces complications

• Reduces LOS

• Cost savings
# Enhanced Recovery After Surgery

## Key Components

<table>
<thead>
<tr>
<th>Pre-operative</th>
<th>Intra-operative</th>
<th>Post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-admission counseling</td>
<td>Active warming/room temp</td>
<td>Early oral nutrition</td>
</tr>
<tr>
<td>Early discharge planning</td>
<td>Antibiotic prophylaxis</td>
<td>Early ambulation</td>
</tr>
<tr>
<td>Reduced fasting</td>
<td>Surgical techniques</td>
<td>Early catheter removal</td>
</tr>
<tr>
<td>Carbohydrate loading</td>
<td>Avoid NG tubes &amp; drains</td>
<td></td>
</tr>
<tr>
<td>Pre-warming</td>
<td>Goal directed peri-operative fluid therapy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multi-modal anti-emetic prophylaxis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multi-modal pain management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VTE prophylaxis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Audit of compliance &amp; outcomes</td>
<td></td>
</tr>
</tbody>
</table>

### Active Patient Involvement
- Whole Team Involvement
Hysterectomy SSI Reduction

Safety Bundle Work

Preoperative:

- Identified risk criteria
- Standardized pre-habilitation and pre-surgical instructions and education, including post-operative education

- Nutrition
- Exercise
- Oral Case
- Patient Safety
- Skin Prep
  
- Preventive Pain Management
- Wound Management
- Glucose Screening
- Incentive Spirometry/Smoking Cessation

- Order Set revisions included standardized selection and timing
  – Prophylactic antibiotics
  – Pre and intraoperative skin preparation
- Implemented OR temperature management/monitoring
Hysterectomy SSI Reduction

Intraoperative
- Utilize organization standard ‘time outs’
  - Patient ID
  - Procedure Validation
  - Prophylaxis Validation
- Antibiotic Dosing
- Risk Factors
- Medical History

Reporting/Systems Learning
- Initiated extensive education for office staff, surgery schedulers and clinical preop, intraop. and post op care staff
- Created Hysterectomy SSI Dashboard to monitor metrics/outcomes
- Included SSI Reduction/Enhanced Recovery Protocol utilization in annual OB/GYN department performance scorecard
- Utilize NSQIP methodology and provider reporting for tracking post discharge SSI
- Provide monthly updates/data reports to providers
Hysterectomy SSI Reduction

Data Metrics/Outcomes

Utilization of Enhanced Recovery Order Set

Key to improvement is the utilization of standardized enhanced recovery order set. Employed and non-employed surgeons adaptation has resulted in ongoing improvement. Availability of pharmaceuticals has directly impacted Anesthesia compliance.

NSQIP SSI Hysterectomy Rates

Enhanced Recovery process was initially implemented in late 2016, with full provider implementation in June 2017. National target was exceeded in April, May and June, due to one SSI for each of these months.
It Takes a Village....

- Surgeon & anesthesiologist champion
- Institutional support
- Project manager
- Nursing leadership
- Pharmacy
- IT

- Education
  - Patient
  - Nursing
    - Pre-op, Intra-Op, Post-op
  - Surgeons
  - Anesthesiologists
  - Residents

- Monitoring and statistical reporting
Carilion SSI – Hysterectomy Team

**Project Sponsor & Chief Quality Officer:** Dr. Ralph Whatley

**Project Physician Leader:** Dr. Janet Osborne

**Project Quality Leaders:** Debbie Copening and Donna Sams

**Premier Inc:** Deb Kilday, Richard Ashe

**OR Services:**
- Dr. Sandy Fogel, Medical Director of OR Services
- Gary Scott, VP of Surgical Services CMC
- Stephen Lovern, Senior Director of CMC ORS
- Cindy Hodges, Perioperative Quality Specialist
- Chris Kurtz, Lori Peggins, Mary Edwards

**Gynecology Representatives:**
- Dr. Eduardo Lara-Torre, Gynecology Section Chief
- Dr. David Iglesias, Gynecologic Oncology
- Dr. Donna Mussgrave, Physicians to Women
- Dr. Kim Malloy, OB/GYN resident
- Sara Dooley, RN – Quality Services

**Anesthesiology:**
- Dr. Neil MacDonald, Chair Anesthesia

**Nursing & Education:**
- Becky Dooley, Debbie Hodges, Margaret Perry,
- Jessica Redden, Jane Sawvell, Mary Ward,
- Julie Wright
- Missy Hobbs, Beverly Sturgill
- Karen Lowdon, Jason Hoffman

**Pharmacy:**
- Jennifer Martin, Chris Rhea, Jami Salzberg

**Information Technology:**
- Mariana Salamoun, Jim Jones, Robert Davis

**Data & Analytics:**
Yale GYN SSI Reduction Project:

An Effective and Sustainable Healthcare Initiative for Reducing the SSI Rate in Hysterectomy Using a Gynecology Specific Bundle

Linda L. Fan, MD
Director, Division of Gynecology Specialties
Department of Obstetrics, Gynecology, and Reproductive Medicine
Yale School of Medicine

Heidi Rillstone, RN
Performance Manager
Surgical Services
Yale New Haven Hospital
Yale SSI Reduction Project
Yale New Haven Hospital: Background information

- Academic Medical center
- 1541 beds
- Ave ~770 “abdominal” hysterectomies yearly
  - Range 713-812
- Perioperative Services
  - 64 Operating rooms
  - 5 perioperative areas, different cost centers

- Anesthesia
  - Attendings
  - CRNA
  - Residents

- Many categories of surgeons:
  - Specialty surgeons (GYN Oncology, REI, MIGS, Urogyn)
  - Community surgeons (18% of cases)
  - Residents
### CMS Compare Website 2012

<table>
<thead>
<tr>
<th>Infection Category</th>
<th>Yale-New Haven Hospital</th>
<th>Benchmark Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central line-associated bloodstream infections (CLABSI)</td>
<td>Better than U.S. National Benchmark</td>
<td></td>
</tr>
<tr>
<td>Catheter-associated urinary tract infections (CAUTI)</td>
<td>Worse than U.S. National Benchmark</td>
<td></td>
</tr>
<tr>
<td>Surgical site infections from colon surgery (SSI: Colon)</td>
<td>No Different than U.S. National Benchmark</td>
<td></td>
</tr>
<tr>
<td>Surgical site infections from abdominal hysterectomy (SSI: Hysterectomy)</td>
<td>Worse than U.S. National Benchmark</td>
<td>SIR 2.19</td>
</tr>
<tr>
<td>Methicillin-resistant <em>Staphylococcus Aureus</em> (MRSA) Blood Laboratory-identified Events (Bloodstream infections)</td>
<td>No Different than U.S. National Benchmark</td>
<td></td>
</tr>
<tr>
<td><em>Clostridium difficile</em> (C.diff.) Laboratory-identified Events (Intestinal infections)</td>
<td>Worse than U.S. National Benchmark</td>
<td></td>
</tr>
</tbody>
</table>

*Slide 21*
The starting point...

YNHH Hysterectomy Quarterly SSI Rates

CY13 SSI rate 4.7%
CY12 SSI rate 3.6%


Jan 2012 – Sep 2014
More than 50% were Deep/Organ Space

Classifications of SSIs:
- Superficial - involves only skin and subcutaneous tissue of the incision
- Deep - involves the deep soft tissues (e.g., fascial and muscle layers) of the incision
- Organ/space - involves any part of the body (excluding skin, fascia or muscle layers) that is opened or manipulated during the operative procedure

January – June 2014

Organ Space
- NCDx13
- B. fragilis x2 patients
- E. coli x2
- Enterococcus sp.
- Enterococcus sp., S. viridans
- MRSA
- S. aureus
- S. viridans, B. fragilis

Superficial
- E. Cloacae, B. fragilis
- E. coli x2
- S. aureus
- NCDx8
- Mixed flora

Organ Space
- Candida albicans
- Enterococcus sp.

YSC

50.0%
50.0%
n=2
n=2

Superficial

Organ Space

62.9%
37.1%
n=22
n=13

SRC
The Trans-Abdominal SSI Committee

**Leadership**
- TRI-CHAIR
  - Gynecologic Surgeon—MD
  - Anesthesiology—MD
  - Nursing Leader
- Sponsor
  - Senior VP/CQO YNHH
  - Surgical Director of Performance and QI
- Expert Content
  - Hospital epidemiology/ID
    - Attending
    - Infection prevention nursing team

**Team**
- Team
  - Surgeon
    - Attending
    - Resident
  - Anesthesia
    - Attending
    - CRNA
  - Perioperative
    - Nursing managers/leads
    - Educators
  - NSQIP

**AIM:** Reduce the number of SSIs to “as expected” for transabdominal surgeries by end of FY2015
Abdominal Hysterectomy SSI

YNHH Abdominal Hysterectomy Overall SIR (2006-2008 Baseline) Trends 95% CIs
CY 2012 - CY 2016

- SIR higher than predicted
- SIR same as predicted
- SIR lower than predicted
Abdominal Hysterectomy SSI *CMS Standardized Infection Ratio CY2012 – CY2016

YNHH Abdominal Hysterectomy CMS SIR (2006-2008 Baseline) Trends 95% CIs CY 2012 - CY 2016

*SIR higher than predicted  SIR same as predicted  SIR lower than predicted

*CMS SIR Excludes all superficial incisional SSIs.
Yale SSI Project Highlights: What worked well?

• **Tri-Chair Leadership Structure**
  – Oversight
  – Frontline practitioner/surgeon involvement
  – Stakeholder buy-in
  – Communication

• **GYN Specific Bundle**
  – Based on Institutional data

• **Frontline feedback**
  – Consistent and standardized process
  – Sustainability
Yale SSI Project Highlights: What worked well?

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The GYN SSI Bundle

**Preoperative**
- Chlorhexadine Wipes, Day of
- Preoperative Warming
- Standard Antibiotic Regimen

**Intraoperative**
- Standardized Prep
- Maintenance of Normothermia
- Antibiotic Redosing

**Postoperative**
- Sterile Dressing 24-48 hours

Timely Feedback in SSI Cases

No ABX > 24 hours
Yale Guideline for Antibiotic Prophylaxis for Hysterectomy, 2014

- Pharmacy, Hospital Epidemiology/infection control, Gynecology

- **Cefazolin 2 gms (no 1 gm dosing)**
- **Unless > 120 kg, then 3 gm dosing**

- **Automated reminder of anesthesia at 3 hours for re-dosing of Ancef**

- **Metronidazole 500 mg, in addition, for cases of known or suspected GYN malignancy**
  - Cefazolin “push” over 2-3 min
  - Metronidazole can be given IV over 20 min
### Anaerobes in Abdominal Hysterectomy-Related SSIs

**YNHH, 2012 - 2014**

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Number of Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacteroides fragilis</em></td>
<td>10</td>
</tr>
<tr>
<td><em>Enterococcus</em></td>
<td>7</td>
</tr>
<tr>
<td><em>E. Coli</em></td>
<td>6</td>
</tr>
<tr>
<td>Meth-sensitive <em>S. aureus</em></td>
<td>6</td>
</tr>
<tr>
<td><em>viridans Streptococci</em></td>
<td></td>
</tr>
<tr>
<td><em>Group B Streptococcus</em></td>
<td></td>
</tr>
<tr>
<td><em>Candida</em></td>
<td></td>
</tr>
<tr>
<td><em>MRSA</em></td>
<td>3</td>
</tr>
<tr>
<td>Mixed flora</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>7 (1 anaerobic)</td>
</tr>
</tbody>
</table>

Of patients whose SSI wounds were cultured and yielded organisms, anaerobes were recovered from **11/39 (28.2%)**

- John Boyce, MD
- Yale Hospital Infection Control
Anaerobes and cancer cases were correlated

- At Yale, 2012 through Q2 2014
  - 8 (+) anaerobe in 21 (+) SSI pts (+) cancer (38.1%)
  - 3 (+) anaerobe in 18 (+) SSI pts (-) cancer (16.7%)

- Conclusion: Anaerobes were a problem among patients with cancer who undergo complex hysterectomies

- If bowel surgery performed, categorized under colon surgery

- John Boyce, MD
Yale Hospital Infection Control
Yale Standardized Surgical Prep

• **Chloroprep standardized**
  – All GYN surgery abdominal prep
  – Labor and birth abdominal prep

• **Hibiclens as vaginal prep**
  – Standardized since 2014
  – Use of disposable sponge sticks
  – No reports of adverse side effects

• **Abdominal-Perineal Prep**
  – Established standard
  – Video
    • Residents
    • Attendings
    • OR Staff
  – Health stream
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Ongoing SSI Evaluation and Feedback

- Evaluation of progress and status
  - Use *process metrics* and *SSI cases* to monitor compliance with measures
  - Monthly processes in place
  - Multidisciplinary review of successes and missed opportunities

- Feedback to team
  - Multidisciplinary
  - Successes and misses
  - Formal and informal processes
Evaluation: Monthly Process Metrics

- Defined process metrics from bundle components
  - Compliance with pre-op warming, intra-op warming, antibiotics, CHG wipes, and prep choice pulled from Epic documentation
  - Intra-op prep application technique observed

- Feedback occurs
  - 1:1 informal ‘cup of coffee’
Evaluation: Monthly SSI Data Review

- SSI events are reviewed monthly and evaluated against bundle components
- Information validated by team members

- Feedback via formal process
- Collate themes from SSI cases for future work

<table>
<thead>
<tr>
<th>Surgeon</th>
<th>OR Room</th>
<th>Emer</th>
<th>Prior Location</th>
<th>Windclass</th>
<th>Pre OP Warming</th>
<th>Bair paws</th>
<th>CHG Wipes</th>
<th>Prep</th>
<th>Upper Body Warming</th>
<th>Lowerbody, Full Underbody OR Lithotomy</th>
<th>% &lt;36</th>
<th>abx choice</th>
<th>Min prior to incision</th>
<th>BMI</th>
<th>Redosed</th>
<th>Duration</th>
<th>Closure</th>
<th>Infection Date</th>
<th>Infection Type</th>
<th>PATOS</th>
<th>Organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX</td>
<td>SP07</td>
<td>Y</td>
<td>EP47</td>
<td>CC</td>
<td>Y</td>
<td>chloraprep</td>
<td>N</td>
<td>Lower body 0</td>
<td>already on antibiotics received dose 2g Cefazolin before incision</td>
<td>0:20</td>
<td>29</td>
<td>Y</td>
<td>4:03</td>
<td></td>
<td></td>
<td>midline incision with #1 PDS in a running fashion. closed the skin of all the wounds with staples</td>
<td>10/20/2017</td>
<td>superficial</td>
<td>N</td>
<td>No culture</td>
<td></td>
</tr>
<tr>
<td>XXXX</td>
<td>SRC 12</td>
<td>Y</td>
<td>3SOUTH</td>
<td>D</td>
<td>N</td>
<td>chloraprep</td>
<td>Y</td>
<td>N</td>
<td>24% already on antibiotics received dose 2g Cefazolin before incision</td>
<td>0:29</td>
<td>22.8</td>
<td>Y</td>
<td>3:56</td>
<td></td>
<td></td>
<td>closed the fascia of the right lower quadrant port site and the umbilical port site with 0 Vicryl sutures in a figure-of-eight fashion, closed the midline hand port site with #1 PDS in a running fashion</td>
<td>10/20/2017</td>
<td>Organ Space</td>
<td>Y</td>
<td>mixed</td>
<td></td>
</tr>
</tbody>
</table>
Monthly SSI Data Review: Compliance/Misses

FY2017 Abdominal Hysterectomy SSI Overall Compliance with SSI Bundle

- CHG Compliance Morning of Surgery: 100%
- Pre-operative Warming compliance: 100%
- Overall Forced Air Warmer used: 83%
- Overall Antibiotic Compliance: 83%

n= 6 SSIs
FY2017: Less than 1% SSI and Sustaining

• 6 Abd. Hysterectomy Surgical Site Infections

- Superficial Infections: 83%
- Organ Space Infections: 17%
Yale SSI Project Highlights: What worked well?

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• **GYN Specific Bundle**
  – Based on Institutional data

• **Frontline feedback**
  – Consistent and standardized process
  – Sustainability
WellSpan York Hospital

- Serves a population of 520,000+ in south central Pennsylvania.
- 580 bed level 1 trauma center
- Nationally recognized teaching hospital
Background: Understanding the Problem

• ABH SSI
  – Rates of SSI following hysterectomy range from 1.6% to 1.1% for superficial and deep space infections respectively
  – Rising incidence with an estimated 50% of infections considered preventable
  – Infectious agent origin
    • Patient’s skin
    • Vaginal canal

(Lake, McPencow, Dick-Biascoechea, Martin, and Erekson, 2013; Berríos-Torres et al., 2017; Lachiewicz, Moulton & Jaiyeoba, 2015)
### What Propelled Us Forward

<table>
<thead>
<tr>
<th>Variable</th>
<th>N=8 ABH SSI</th>
</tr>
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<tbody>
<tr>
<td>Age</td>
<td>M=52 y (26-79)</td>
</tr>
<tr>
<td>BMI</td>
<td>M =29.5</td>
</tr>
<tr>
<td>Indication for Abdominal Hysterectomy</td>
<td>• Cancer staging (n=2)</td>
</tr>
<tr>
<td></td>
<td>• Dysfunctional Bleeding (n=2)</td>
</tr>
<tr>
<td></td>
<td>• Menorrhagia fibroids (n=1)</td>
</tr>
<tr>
<td></td>
<td>• Pelvic pain post ablation syndrome (n=1)</td>
</tr>
<tr>
<td></td>
<td>• Positive endometrial biopsy (n=1)</td>
</tr>
<tr>
<td></td>
<td>• Adenocarcinoma insitu (n=1)</td>
</tr>
<tr>
<td>Laparoscopic or Robotic</td>
<td>6</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>2</td>
</tr>
<tr>
<td>Readmissions</td>
<td>All 8 patients were readmitted due to SSI</td>
</tr>
</tbody>
</table>
Objective of the Project

• Create a formal workgroup responsible for reviewing these cases at the service line level

• Decrease rates of SSI

• Create standardized preoperative infection prevention procedure
  — Preoperative Assessment
  — Outpatient facilities
  — Short Stay
# Quality Improvement Workgroup

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adriane Burgess PhD, RNC-OB, CCE</td>
<td>Clinical Research Specialist WellSpan Health Women’s &amp; Children’s Service Line</td>
<td>WellSpan Health</td>
</tr>
<tr>
<td>Jason Lowe, PhD, CRNA, PHRN</td>
<td>York College of PA WellSpan Health Nurse Anesthesia Program Director</td>
<td>WellSpan Health</td>
</tr>
<tr>
<td>Seth Goldberg, BSN, RN, CEN, SRNA</td>
<td>Student Registered Nurse Anesthetist WellSpan Health</td>
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<tr>
<td>Keziah Summers, BSN, RN, SRNA</td>
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</tr>
<tr>
<td>Kimberly Cornwell, BS, MT(ASCP), CIC</td>
<td>Infection Preventionist WellSpan Health</td>
<td>WellSpan Health</td>
</tr>
<tr>
<td>Marlyse Charney, RRT, MPH, MS, CIC</td>
<td>Infection Preventionist WellSpan Health</td>
<td>WellSpan Health</td>
</tr>
<tr>
<td>Megan Fish, MD</td>
<td>OB/GYN Resident WellSpan Health</td>
<td>WellSpan Health</td>
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</table>
The Process

<table>
<thead>
<tr>
<th>Variables Reviewed</th>
<th>BMI</th>
<th>Abdominal dressing type</th>
<th>Assistant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nutritional Screen</td>
<td>Indication age</td>
<td>Circulator</td>
</tr>
<tr>
<td></td>
<td>Immunodeficiency</td>
<td>Active problems</td>
<td>Scrub Tech</td>
</tr>
<tr>
<td></td>
<td>Smoker</td>
<td>Surgery START TIME</td>
<td>Case level</td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
<td>Surgery END TIME</td>
<td>Procedure type</td>
</tr>
<tr>
<td></td>
<td>Antibiotic prior to surgery</td>
<td>Last oral intake</td>
<td>EBL</td>
</tr>
<tr>
<td></td>
<td>Antibiotics postoperative</td>
<td>Number in room</td>
<td>H&amp;H preoperative</td>
</tr>
<tr>
<td></td>
<td>Time antibiotics to surgery time</td>
<td>Preoperative outpatient CHG bathing</td>
<td>Intraperitoneal medications</td>
</tr>
<tr>
<td></td>
<td>Temperature at admission to the PACU</td>
<td>Physician performing surgery</td>
<td>Transfusion after surgery</td>
</tr>
<tr>
<td></td>
<td>Blood glucose preadmission</td>
<td>Hair removal</td>
<td>H&amp;H prior to transfusion</td>
</tr>
<tr>
<td></td>
<td>Medications</td>
<td>Skin preparation</td>
<td>Bowel preparation</td>
</tr>
</tbody>
</table>
The Process

- Chart reviews completed.
- The Plan-Do-Study-Act (PDSA) cycle model was utilized as a framework to guide the project.
- Relationships built and invited key point people to support our efforts.
- Hospital and office policies were reviewed for evidence based interventions that have been shown to reduce SSI.
The Process

• **Tracer methodology** employed - A patient scheduled for hysterectomy was followed beginning with the initial outpatient office visit.

• Calls to the patient from the **Prehospital Assessment Service** (PHAS) and Short Stay Unit (SSU) were monitored.

• Surgical experience of the patient was observed to identify gaps in the process.

• **Compared** our findings to the safety bundle.
Antimicrobial Pre Surgery Bath

3 total baths
- 1 the night before
- 1 the morning of
- 1 inpatient using Sage wipes prior to the surgery
Education Booklet

• Created an education booklet on infection prevention
• Provided office education
• Standardized education on use of CHG wash
• Shaving prior to surgery
• Use of lotions and perfumes
Barriers to Implementation

- Cost - $5.66
  - Bottle and 3 sponges
- Ease of Use
- Access
- Non-health system offices
- Provider and nurse buy in
- Standardization of education
Follow Up and Next Steps

• Pre-op warming
• Collecting outcome data on use and provision of CHG
• Monitoring infection rates
• Workgroup review of cases
• NSQIP collaboration
Quality Improvement in Surgical Site Infection in Major Gynecologic Surgery: Focus on Hysterectomy

Susan Khalil, MD
Amirah Abdallah, MD (PGY 3)
Department of Obstetrics & Gynecology
Jamaica Hospital Medical Center
January 2018
PDSA

- **Quality Improvement Tools Utilized:**
  - Fishbone-map out the factors contributing to SSI
  - Brainstorming monthly at SSI Committee meetings.
  - Process map on GYN abdominal surgery procedures, inpatient and outpatient.
  - Continuous improvement
  - Teamwork
  - Aim statement: Reduce hysterectomy SSI to less than national average within one year.
DMAIC: Define, Measure, Analyze, Improve, Control
Plan: Background

The development of superficial and deep surgical site infections is multifaceted. Involves both host-factors and factors related to the procedure.
Risk Factors

• Host factors
  – Modifiable are optimized pre-operatively if feasible

• Institution/System factors
  – Documentation of correct wound class
  – Changes in wound class
  – Team engagement in ensuring sterile technique during procedure
Procedure Factors

- Abdominal wall procedures
- Total hysterectomies (over subtotal hysterectomies)
- Duration of surgery
- Peri-operative hospital stay
- Hematomas
- Other non-gynecologic procedures performed with hysterectomy
- Excessive bleeding during surgery
- Transfusions
- Low post-operative hemoglobin
- Inappropriate use of perioperative antibiotics.
### Table 1. Antimicrobial Prophylactic Regimens by Procedure

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Antibiotic</th>
<th>Dose (single dose)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysterectomy</td>
<td>Cefazolin^1</td>
<td>1 g or 2 g IV</td>
</tr>
<tr>
<td>Urogynecology procedures, including those involving mesh</td>
<td>Clindamycin^1 plus gentamicin or quinolone^1 or aztreonam</td>
<td>600 mg IV</td>
</tr>
<tr>
<td></td>
<td>Metronidazole^1 plus gentamicin or quinolone^1</td>
<td>500 mg IV</td>
</tr>
<tr>
<td>Laparoscopy</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Laporatomy</td>
<td>None</td>
<td></td>
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<tr>
<td></td>
<td>None</td>
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</tr>
<tr>
<td>Hysteroscopy</td>
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<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Laporotomy</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Hysteroscopy</td>
<td>Doxycycline^1</td>
<td>100 mg orally, twice daily for 5 days</td>
</tr>
<tr>
<td>Hysterosalpingogram or Chromotubation</td>
<td>IUD insertion</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Induced abortion/dilation and evacuation</td>
<td>Doxycycline</td>
<td>100 mg orally 1 hour before procedure and 200 mg orally after procedure</td>
</tr>
<tr>
<td></td>
<td>Metronidazole</td>
<td>500 mg orally twice daily for 5 days</td>
</tr>
</tbody>
</table>

Abbreviations: IV, intravenously; IUD, intrauterine device

* A convenient time to administer antibiotic prophylaxis is just before induction of anesthesia.
* Acceptable alternatives include cefazolin, cefoxitin, cefuroxime, or ampicillin-sulbactam.
* A 2 g dose is recommended in women with a body mass index greater than 35 or weight greater than 100 kg or 220 lb.
* Antimicrobial agents of choice in women with a history of immediate hypersensitivity to penicillin.
* Clavulanic acid or levofoxacin or moxifloxacin
* If patient has a history of pelvic inflammatory disease or procedure demonstrates dilated fallopian tubes. No prophylaxis is indicated for a study without dilated tubes.
ACOG PB 120

The following recommendations are based on good and consistent scientific evidence (Level A):

- Antimicrobial prophylaxis is recommended for all cesarean deliveries unless the patient is already receiving appropriate antibiotics (eg, for chorioamnionitis) and that prophylaxis should be administered within 60 minutes before the start of the cesarean delivery.

- For cesarean delivery prophylaxis, a single dose of a targeted antibiotic, such as a first-generation cephalosporin, is the first-line antibiotic of choice, unless significant drug allergies are present.

- Antibiotic prophylaxis is indicated for patients with preterm PROM to prolong the latency period between membrane rupture and delivery.

- Antibiotic prophylaxis should not be used for pregnancy prolongation in women with preterm labor and intact membranes. This recommendation is distinct from recommendations for antibiotic use for preterm PROM and GBS carrier status.
Redosing Guidelines

### Table 1

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>Adult Dose</th>
<th>Pediatric Dose</th>
<th>Half-Life in Adults</th>
<th>Recommended Redosing Interval From Initial Dose</th>
<th>Initial Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>3 g</td>
<td>50 mg/kg</td>
<td>1.2-1.3 hr</td>
<td>2</td>
<td>50 mg/kg</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>2 g</td>
<td>50 mg/kg</td>
<td>1.1-1.6 hr</td>
<td>2</td>
<td>50 mg/kg</td>
</tr>
<tr>
<td>Ceftrixone</td>
<td>2 g</td>
<td>60 mg/kg</td>
<td>1.5-2.3 hr</td>
<td>2</td>
<td>60 mg/kg</td>
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<tr>
<td>Cefuroxime</td>
<td>1.5 g</td>
<td>50 mg/kg</td>
<td>1.5-1.7 hr</td>
<td>2</td>
<td>50 mg/kg</td>
</tr>
<tr>
<td>Cefotetan</td>
<td>2 g</td>
<td>40 mg/kg</td>
<td>2.5-4.0 hr</td>
<td>6</td>
<td>40 mg/kg</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>2.5 g</td>
<td>50-75 mg/kg</td>
<td>5.6-10.0 hr</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Cefazolin</td>
<td>1 g</td>
<td>15 mg/kg</td>
<td>3-7</td>
<td>3-7</td>
<td>15 mg/kg</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>2 g</td>
<td>40 mg/kg</td>
<td>2.5-4.0 hr</td>
<td>6</td>
<td>40 mg/kg</td>
</tr>
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<td>15 mg/kg</td>
<td>3</td>
<td>3</td>
<td>15 mg/kg</td>
</tr>
<tr>
<td>Ceftarol</td>
<td>2 g</td>
<td>40 mg/kg</td>
<td>2.5-4.0 hr</td>
<td>6</td>
<td>40 mg/kg</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>5 mg/kg</td>
<td>2.5 mg/kg</td>
<td>2</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>500 mg</td>
<td>15 mg/kg</td>
<td>6-8</td>
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<td>NA</td>
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<tr>
<td>Metronidazole</td>
<td>500 mg</td>
<td>15 mg/kg</td>
<td>6-8</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>400 mg</td>
<td>10 mg/kg</td>
<td>8-15</td>
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<td>NA</td>
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<tr>
<td>Piperacillin</td>
<td>3.375 g</td>
<td>10 mg/kg</td>
<td>0.7-1.2</td>
<td>2</td>
<td>10 mg/kg</td>
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<tr>
<td>Vancomycin</td>
<td>15 mg/kg</td>
<td>10 mg/kg</td>
<td>4</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Note: Doses are rounded to the nearest whole number. When doses differed between studies, usual opinion used the most common recommended dose.  
A maximum pediatric dose should not exceed the usual adult dose.  
For antimicrobial with a short half-life, dosing interval used before long procedures, reducing the dosing interval is recommended at the time of operating room admission.  
Nondosing intervals marked as "not applicable" (NA) are based on usual surgical prophylaxis.  
Although not discussed in detail, in patients weighing >100 lb (45.5 kg), 40 mg/kg.  
In patients weighing <100 lb (45.5 kg), 40 mg/kg.  
In patients weighing <100 lb (45.5 kg), 40 mg/kg.  
Due to the narrow therapeutic index, doses should be adjusted according to the patient's actual body weight.  
In patients weighing >100 lb (45.5 kg), 40 mg/kg.  
In patients weighing <100 lb (45.5 kg), 40 mg/kg.
Infection Control Surveillance

• Informed of cases for review as they are detected by Infection Control Department

• Cases are discussed monthly
Data Review of Hysterectomies

• A retrospective review was performed on 424 consecutive cases
• All hysterectomies for benign indications from 8/1/2011 through 8/31/2014 were included for review.
Review of Data for Hysterectomy

- Average age was 43 years (range 38-72).
- Average BMI was 30.1 kg/m² for the entire group.
- BMI was 30 for those with a SSI (range 23-42).
- A total of 32 surgical site infections were detected.
- Twenty-seven were superficial-site SSI and 5 were deep-space SSI.
- Hysterectomies via laparotomy accounted for 24 of the cases:
  - 20 superficial SSI, and 4 deep-space SSI.
  - 13 were total hysterectomy (TAH), and 11 were supracervical hysterectomies (SCH).
  - 1 deep-space SSI associated with TAH, the remaining 3 deep-space SSIs were in SCHs.
• Laparoscopic hysterectomies accounted for 6 SSI (all superficial).
  – 3 were performed via LAVH
  – 2 via laparoscopic supracervical hysterectomy
  – 1 TLH

• Two vaginal hysterectomies comprised the remaining SSI (one superficial and one deep-space SSI).
  – One deep-space SSI required surgical intervention.
• Negative pressure wound care was not used in any SSI’s.
• Eleven required nursing services after discharge.
• None required ICU admission
Presentation At This Institution

• Utilization of MIS for appropriate cases
• Optimization of risk factors
• Identification of risk factors
• Cost-effective interventions for at risk cases when identified
PDSA

Plan

Do

Act

Study
System-Wide Efforts

• Standardize resident training on sterile technique, aseptic technique in wound care.
• Standardize nursing and resident education on prep for surgical procedures with a focus on abdomino-pelvic prep.
• Pre-operative chlorhexidine abdominal prep on all patients
• Nasal swab for all patients
• Review and update of hospital protocol for antibiotic prophylaxis for procedure by pharmacy department with collaboration from all involved specialties.
Department Review of Cases

- Procedures: c-section and hysterectomy; or other cases of SSI in gynecologic procedures
- Tracking of all SSI
- Indication for procedure, clinical course during labor (c-sections)
- Prophylactic antibiotics:
  - Time of administration
  - Type of antibiotic
  - Adequate redosing
  - Wound class-ensure adequate documentation of wound class
  - Changes in wound class are communicated during the case or after the procedure has concluded to the entire team in the operating room.
Optimizing Risk Factors

- Instituting chlorhexidine wash the night prior and morning of surgery for all patients undergoing abdominal surgery.
- Nasal swab prior to surgery for all patients.
- Review prior to procedure for host factors: pre-op conference checklist
  - Colonization with MRSA
  - Hematocrit pre-op
  - Pre-existing infections
  - Surgical approach
  - Medical optimization (i.e. glucose control)
Detection of SSI in the Clinical Setting

• Outpatient management if feasible
• Surgeon initiated post-operative evaluation, within short timeframe with compliance difficulties.
• When detected in E.D. setting:
  – Evaluation by team that performed the procedure
  – Determination if a SSI is present (superficial or deep), or if it is natural course of wound healing.
  – Communication with ED team, if an SSI exists or it is not an infection.
  – System wide template for describing a wound, available on EPIC
  – Clinical criteria and evaluation that is standard, so that extraneous lab studies or imaging studies are not sent on false-positives.
Seroma
Seroma
Managing High Risk Cases for SSI

- External application of negative pressure wound therapy (wound vac)
- Leaving infected procedures open
- Clean closure method
- Silver impregnated dressing
- Leaving dressing on for laparotomy cases, for 48 hours
- Use of MIS when feasible for procedure
- Post-operative wound check within one week of procedure
P.I. Project: Clean Closure

- **Inclusion criteria:**
  - All colon surgeries performed at JHMC by general surgery
  - All total and supracervical hysterectomies, with or without salpingo-oophorectomy performed via laparotomy at JHMC by gynecology
  - All c-sections on higher risk patients for SSI, including (due to resource limitations)
    - BMI greater than 40
    - Emergent c-section
    - PPROM
    - PROM
    - Fetal demise requiring hysterotomy
    - Chorioamnionitis
    - Prolonged rupture of membranes, as defined by greater than 24 hours of ROM
    - Prior wound infection following surgery
P.I. Project: Clean Closure

• After assuring hemostasis, but before closure of the fascia the following steps are required:
  1. Instruments, sponges, suction tips, and devices, including electrocautery are removed from the surgical field.
  2. All surgical personnel at the operative field change their gloves and gown.
  3. The operative field is re-draped with freshly opened sterile towels or half-sheets.
  4. A sterile closing tray is opened onto an unused sterile surface and only those instruments, and suture are used for the remainder of the procedure.

• Fascial and skin closure techniques are left to the discretion of the operating surgeon.
Sample: Abdominal Closure Tray Contents

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Items included in the closing tray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparotomy pads</td>
<td></td>
</tr>
<tr>
<td>Suction tip (1)</td>
<td></td>
</tr>
<tr>
<td>Suction tubing (1)</td>
<td></td>
</tr>
<tr>
<td>Electrocautery unit and holster (1)</td>
<td></td>
</tr>
<tr>
<td>Retractors–Richardson and double-ended (“army-navy”; 2)</td>
<td></td>
</tr>
<tr>
<td>Malleable retractor (3)</td>
<td></td>
</tr>
<tr>
<td>Needle drivers (4)</td>
<td></td>
</tr>
<tr>
<td>Kocher clamps (2)</td>
<td></td>
</tr>
<tr>
<td>Forceps (6)</td>
<td></td>
</tr>
<tr>
<td>Tonsil and mosquito clamps (6)</td>
<td></td>
</tr>
<tr>
<td>Asepto syringe (1)</td>
<td></td>
</tr>
<tr>
<td>Pitcher for irrigation fluid (1)</td>
<td></td>
</tr>
<tr>
<td>Needle box (1)</td>
<td></td>
</tr>
</tbody>
</table>


Slide 79
### JHMC IC Dept., Hospital Acquired SSI: Abdominal Hysterectomy 2017

Infection Rate = (# of SSI / # of Abdominal Hysterectomy Surgeries as per ICD-9CM Codes) * 100

<p>| Standardized Infection Ratio (SIR) = # of SSI / # of Expected SSI |
|---|---|---|---|---|---|---|---|---|---|---|---|</p>
<table>
<thead>
<tr>
<th><strong>Risk Category</strong></th>
<th><strong>Measure</strong></th>
<th><strong>DEC, 2016</strong></th>
<th><strong>JAN</strong></th>
<th><strong>FEB</strong></th>
<th><strong>MAR</strong></th>
<th><strong>1Q</strong></th>
<th><strong>APR</strong></th>
<th><strong>MAY</strong></th>
<th><strong>JUN</strong></th>
<th><strong>2Q</strong></th>
<th><strong>3Q</strong></th>
<th><strong>4Q</strong></th>
<th><strong>YTD 2017</strong></th>
<th><strong>2016</strong></th>
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<th><strong>2014</strong></th>
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<td># of SSI Surgeries</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>7</td>
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<tr>
<td>Hyst. Surgery Risk Category 2, 3</td>
<td># of SSI Surgeries</td>
<td>1</td>
<td>2</td>
<td>6</td>
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</tr>
</tbody>
</table>
Acknowledgements: Team Jamaica!

• Council on Patient Safety for this honor

• Team Jamaica:
  – SSI Committee: Dr. Paksima, Dr. Konda, Dr. Chan, Mr. Lynch, Mr. Flanz, Dr. Raoof, Dr. Morisco, Mery Mohamed, Dr. Inglis, Dr. Zeitoun, All the OBGYN residents at Jamaica Hospital.
References


• Young H, Bliss R, Carey JC, Price CS. Beyond core measures: identifying modifiable risk factors for prevention of surgical site infection after elective total abdominal hysterectomy.


Q&A Session
Press *1 to ask a question

You will enter the question queue
Your line will be unmuted by the operator for your turn

A recording of this presentation will be made available on our website:
www.safehealthcareforeverywoman.org
National Improvement Challenge
Cycle 4: Safe Reduction of Primary Cesarean Birth

Declaration of Intent
Due February 5, 2018

Full Application
Due June 15, 2018

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