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Reduction in C-Section Surgical Site Infections

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ProHealth Waukesha Memorial
 Regional Tertiary Care Hospital
 21 bed Level III NICU
 34 bed LDRP unit
 301 Inpatient beds
 40,000 ED visits/yr

ProHealth Oconomowoc Memorial
 Community Hospital
 12 bed LDRP
 Level II Nursery
 76 inpatient beds
 17,000 Ed visits/yr

~ 2,000+ births/year


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Objectives

- Discuss best practices to reducing surgical site infections and the application of those practices to patients undergoing cesarean section.
- Describe one healthcare system’s efforts to implement those best practices in patients undergoing cesarean section.

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Surgical Site Infections (SSI)

- Most Common and Most Costly healthcare associated infection (HAI) in the US (HIIN, 2018; NHSN, 2019)
 - Estimated annual cost of \$3.3 billion
- Superficial, Deep, or Organ Space 
- Abd Hyst, Colorectal – required

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WI SSI CS Numbers

- Hospitals submit SSI Data to National Healthcare Safety Network (NHSN) which produces a Standard Infection Ratio (SIR)
 - Abd. Hyst and Colorectal SSI data are required
- WI Data – 29 hospitals reporting (28 with some sort of medical school affiliation)
 - 10 critical access, 19 acute care
 - 10 (25 beds), 9 (26-200 beds), 10 (201+ beds)
 - 2 Northern, 7 Northeastern, 7 Southern, 11 Southeastern, 2 Western

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SSI CS SIR

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Evidence Based Care Bundles

- IHI "A bundle is a structured way of improving the processes of care and patient outcomes: a small, straightforward set of evidence-based practices — generally three to five — that, when performed collectively and reliably, have been proven to improve patient outcomes." <http://www.ihl.org/Topics/Bundles/Pages/Default.aspx>
 - Systematic Review – Surgical Care Bundles reduced the risk of SSI in colorectal patients by 55% (CI: 0.39-0.77, p=0.0005). (Tanner, et al 2015)
 - Relative Risk Reduction 82.4% (p=.01) for patients with Gyn Cancer when an evidence based SSI reduction bundle was implemented. (Johnson, et al, 2016)
 - DISINFECT Initiative: 56% reduction in SSI (CI0.37-0.85, P=0.01) after bundle implemented in Gyn Onc cases (Taylor, et al, 2016)
 - SSI Gyn Odds Ratio reduced by 50% with implementation of SSI Bundle (Bakkum-Gomez, 2014)
- AHRQ recommends a bundle contain 5-7 elements

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SSI Prevention Guidelines

- AWHONN (2011) Perioperative Care of the Pregnant Woman
- IDS/SHEA (2014) Strategies to Prevent Surgical Site Infections in Acute Care Hospitals
- WHO (2015) Recommendations to Prevent Maternal Peripartum Infections
- WHO (2016 Lancet) Recommendations to Prevent Surgical Site Infections [series]
 - Full guideline published in 2018
- ACOS (2017 J Am Coll Surg) Surgical Site Infection Guideline, 2016 Update
- WI DPH (2017) Supplemental Guidance for the Prevention of Surgical Site Infections: An Evidence-Based Perspective [rev. 8/2017]
- CDC (2017 JAMA Surgery) Prevention Guidelines for the Prevention of Surgical Site Infection
- ACOG/ASA/AWHONN(2017) Consensus Bundle on Prevention of Surgical Site Infections After Major Gynecologic Surgery
- ACOG (2018) Practice Bulletin: Prevention of Infection after Gynecologic Procedures

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Oct 2015 CS Team Convened, Reviewed Bundles and Best Practices

Nov 2015 Announcement of Bundle (Staff/Department Meetings)

Winter 2016 RN Group reviewing barriers to implementation; Vendor education; In-services on Workflow

March 2016 Go Live

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Team Members

- OB from all major groups
- OB Anesthesia
- FP with CS privileges
- CNS, Women's Health Serviceline
- LDRP Manager
- LDRP RN from each shift
- OB Surgical Tech
- LDRP Educator
- Infection Prevention
- SSI Team liaison from main OR
- Later Added: Surgery manager and LDRP manager from sister campus

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Infectious Morbidity After Cesarean Delivery: 10 Strategies to Reduce Risk

Kelley Conroy, MD,¹ Angela F. Koenig, BA,¹ Yan-Hong Yu, MD, PhD,² Amy Courtney, RN, MPH,¹ Hee Joong Lee, MD, PhD,² Errol R. Norwitz, MD, PhD¹

10 Strategies to Prevent Postcesarean Infectious Morbidity

- Shower with 4% chlorhexidine gluconate the night before elective surgery
- If necessary, clip rather than shave pubic hair
- Avoid unnecessary vaginal examinations in labor
- Avoid unnecessary instrumentation in labor (including fetal scalp electrodes and intrauterine pressure catheters)
- Prep the skin with an antiseptic agent (chlorhexidine-alcohol skin preparation) immediately prior to surgery
- Administer appropriate intravenous antibiotic prophylaxis within 60 min prior to incision
- Avoid manual removal of the placenta and fetal membranes
- Avoid closure of the skin with staples
- Maintain strict glycemic control in women with diabetes
- Consider early removal of bladder catheters postoperatively

2012 Reviews in Obstetrics and Gynecology

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MN Hospital Association-2014

- SSI Bundle presentation "Raising the Bar to Lower the Rate" that impacted Gyn SSI Rates, especially superficial infections (Bakkum-Gomez, 2014)
 - Pre-Op Shower
 - Patient Education
 - Post Op Wound care (Dressing, hand hygiene, Hibiclens®)
 - "Isolation" Closing tray (gown, gloves, instruments, etc...)
 - Glycemic Control
 - Normothermia
 - OR Traffic Control
 - Antibiotic Dosing (weight based, redose)

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Basics Before Bundles

- Optimize patient pre-operatively
 - Preop showering, Pericare in labor
 - No shaving
 - CHG wipes on Admission/Prior to CS
 - Remove US gel with alcohol before applying CHG
- Normothermia –Pre/Intra/Post OP
- Antibiotic dosing
- Surgical Attire
- Surgical Hand Scrub
- Skin Prep Standardization
 - Surface Area Coverage for product?
 - Scrub v Paint
 - Remove US gel with alcohol before applying CHG (Lucas, Witter, 2014)
- Gowning/Gloving Techniques
 - Double Gloving
- Sterile Processing Indicators
- Surgical Masks & Hats
- Midroom Use
- Traffic in OR
- Redosing Antibiotics
- Surgical Awareness and Movement in OR
- Time Outs
 - Patient Safety Checklist
- Counts, Stop the Line.....

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Initial Bundle

Admission/LD

- CHG wipes
- Warming Measures-IV, Bair Hugger
- Antibiotics – weight based+
- Pericare

PreAdmit: CHG instructions; no shave 3 days CS and inductions

IntraOP

- Warming Measures-Bair Hugger, irrigation
- Traffic patterns
- Adequate Skin Prep Coverage
- Closing procedure
- Surgical attire, hand asepsis, gloving

Post OP

- T_a ≥ 96.8
- P.O₂ (>90%)
- Dressing 24-48hr
- Incision Care – return demo

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Work Teams

Barrier Reduction

- RN Team worked to identified barriers to implementation and solutions
- Education rolled out
 - Bair Hugger PreOp and IntraOp
 - Review: Pericare and CHG Wipes
 - Surgical Skin Prep
 - Weight based Abx dosing
 - New Traffic Patterns for OR
 - Use oxygen, Pox>90%
 - Pt Ed: Hand Hygiene and Incision Care

Outreach Education

- Education to physicians and offices re: pre-op teaching
- New closing procedures (Surgeons and Surgical Techs)
- New Traffic Patterns in OR
- Weight Based Abx Dosing
- Review of Surgical attire and hand asepsis policies
- Dressing for 24-48 hr

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Oct 2015 CS Team Convened, Reviewed Bundles and Best Practices

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Winter 2016 RN Group reviewing barriers to implementation; Vendor education; In-services on Workflow

March 2016 Go Live

May 2016 New DC instructions

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2016

- Clarifying, Educating, Auditing, Re-Educating, and WAITING.....
- Work out of all SSIs

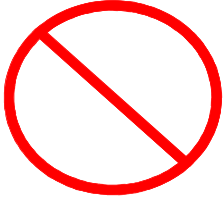
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WHILE WE WAIT....

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Hair Removal

- Do not remove hair unless it interferes with the surgery. Use electric clippers if you must
 - SHEA/IDSA
 - ACOS
 - AORN
 - ACOG
 - AWHONN
 - WHO



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Remote Infections

- Treat remote infections preoperatively (eg UTI, skin infection). Reschedule if elective.
 - SHEA/IDSA
 - ACOG

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Preop Bathing

- Preop bathing the night before surgery.
 - CDC
 - WI DPH
 - ACOG
 - AWHONN
 - WHO
- Bathing with CHG product varies in recommendations
- # of showers prior to surgery varies

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Skin Prep

- Surgical skin prep to contain Alcohol
 - ACOG
 - CDC
 - WI DPH
 - SHEA/IDSA
 - ACOG
 - WHO
- Some recommend CHG-alcohol prep, some simply state dual product as no specific dual product has been shown superior

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Prophylaxis Abx

- Administer Prior to Procedure. Select based on procedure. Timing to ensure adequate tissue concentration (most rec. 60 minutes unless Vancomycin or quinolone).
 - ACOS*
 - CDC
 - WI DPH*
 - SHEA/IDSA*
 - ACOG*
 - AWHONN
 - WHO (120 min)

*Recommend weight based or increase dosing for obese patients

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Abx Redosing

- Redose based on half life of drug from time given pre-op and if blood loss exceeds 1500mL to maintain adequate tissue concentration while incision is open.
 - ACOS
 - WI DPH
 - ACOG
 - AWHONN

Several also state there is no benefit to redose after skin closure & do not support redosing in presence of a drain

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Glycemic Control

- Recommendations for Glycemic Control for all patients regardless of diabetic status
 - ACOS (Target 110-150 mg/dl)
 - CDC (Target <200 mg/dl)
 - WI DPH (Target <200mg/dl; PreOp A1c<6.7; avoid hypoglycemia)
 - SHEA/IDSA (Target Postop 110-180 mg/dl)
 - ACOG (Target <200 mg/dl)
 - WHO (intensive glucose control)

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Wound Protector

- Statements vary from no statement, to use in GI and biliary cases, to use in all open abdominal cases, to include in all cases

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Antimicrobial Suture

- Triclosan coated sutures are suggested for closure of surgical wounds
 - ACOS (clean, clean contaminated Abd cases)
 - CDC
 - WI DPH
 - WHO

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Supplemental Oxygen

- Provide Oxygen (FiO₂ =80% or more) where patient receives general anesthesia w/ET intubation – IntraOp and 2-6 hr Postop
 - ACOS
 - CDC
 - WI DPH
 - SHEA/IDSA
 - WHO
- Greatest benefit seen when normothermia & adequate volume replacement ensured
- Regardless of Pox

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Normothermia

- Maintain normothermia. Preop and Intraop warming.
 - ACOS (intraop warming for all but short, clean cases)
 - CDC
 - WI DPH (consider force air warming)
 - SHEA/IDSA
 - AWHONN
 - WHO

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More Recommendations

- MRSA Screening/Surveillance
- NWT
- Novel dressings
- Adhesive Drapes
- Topical Antibiotics
- Irrigation
- SubQ skin closing
- Airflow, temperature
- Vaginal Cleansing (ACOG)

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Audit Completion Data

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CHG Audit Data

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Intra Op Audit Data

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- RCT in 14 US centers, 2013 women, CS during labor or after ROM.
- Treatment: 500 mg of IV azithromycin + standard antibiotic prophylaxis

RESULTS

- ~50% risk reduction in infection (RR 0.51; 95% CI, 0.38 to 0.68; P<0.001).
- Rate of endometritis (3.8% vs. 6.1%, P = 0.02),
- Wound infection (2.4% vs. 6.6%, P<0.001)

CONCLUSIONS

"Among women undergoing **nonelective cesarean delivery** who were all receiving standard antibiotic prophylaxis, extended-spectrum prophylaxis with adjunctive azithromycin was more effective than placebo in reducing the risk of postoperative infection."

Sept 2016

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Prevention of SSI after Gyn Surgery

- Standard Pre and Post Op education
- Clear responsibilities for team
- OR temps
- Normothermia
- Prophylactic Abx
- Skin Prep
- Assess & Reassess Risk – mitigate where possible
- Monitor & Report SSI

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Prevention of SSI after Gyn Surgery

- Cefazolin administered before incision
 - 4.7%, 120 minutes
 - 2.4%, 31-60 minutes
 - 1.6%, 0-30 minutes
- Implementation site for bundle used 3gm if >100kg or >35 BMI and redosed if >2hr

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Review of Work Out and Audit Data

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2017

- Cefazolin administer within 30 minutes of incision
 - Continue with re-dosing for 1500mL QBL & long cases
- Azithromycin for laboring or ROM>4hr
- Continue Chorio Abx recommendation
 - Limit to 1 dose post op unless clinically symptomatic
- Add surgical glue to DC teaching when needed
- Wound protectors encouraged
- Encourage earlier removal of urinary catheter
- Increase par level of skin prep
- Introduce Antimicrobial suture trial (Fall)

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Ancef Audit Data

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Vaginal Cleansing Before Cesarean Delivery

A Systematic Review and Meta-analysis

Claudia Caissutti, MD, Gabriele Saccone, MD, Fabrizio Zallo, MD, Johanna Quist-Nelson, MD, Laura Filder, MD, Andrea Ciardulli, MD, and Vincenzo Berghella, MD

- Any vaginal cleansing, any antiseptic
- ~ 50% reduction in endometritis
 - (RR=0.52, 95%CI 0.37-0.72, n=4,726)
 - Most noticeable after ROM (RR=0.23, 95% CI 0.10-0.52, n=272)
- ? Standard of Care, Studies from 1997-2016

CONCLUSION: Vaginal cleansing immediately before cesarean delivery in women in labor and in women with ruptured membranes reduces the risk of postoperative endometritis. Because it is generally inexpensive and a simple intervention, we recommend preoperative vaginal preparation before cesarean delivery in these women with sponge stick preparation of povidone-iodine 10% for at least 30 seconds. More data are needed to assess whether this intervention may be also useful for cesarean deliveries performed in women not in labor and for those without ruptured membranes.

Sept 2017 Ob & Gyn

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2018

- Antimicrobial suture
- Option of vaginal cleansing
 - 30 second vaginal prep with 10% PI or CHG
- Postop glucose monitoring in GDM
 - Target <180 mg/dl

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Left Over CHG Audit Data

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IntraOp Audit Data

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SSI CS Quarterly Data

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SSI CS Rolling Annual Rate

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MORE THINGS TO CONSIDER

Published: Sept 2016

Viewpoint ajog.org

Applying surgical antimicrobial standards in cesarean deliveries

Kathryn E. Fay, MD; Lynn Yee, MD, MPH CrossMark April 2018

- “Redosing may be particularly important for the obstetrical population because of the increased rate of renal clearance in pregnancy and the associated unique pharmacokinetics of cefazolin at the time of delivery”
- “Data suggest that 18% and 10% of primary and repeat cesarean deliveries, respectively, have a calculated blood loss of greater than 1500 mL”

“Since 2013, the joint guidelines by the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, the Surgical Infection Society, and the Society for Healthcare Epidemiology of America have described this common principle: “for all patients, intraoperative redosing is needed to ensure adequate serum and tissue concentrations of the antimicrobial if the duration of the procedure exceeds 2 half-lives of the drug or there is excessive blood loss during the procedure”

Prevention of Cesarean Delivery Surgical Site Infections

Ob & Gyn Survey 2019

Sarah K. Shea, MD* and David E. Soper, MD†

*Maternal-Fetal Medicine Fellow, and †Professor and Director, Division of Specialists in Obstetrics and Gynecology, Department of Obstetrics and Gynecology, Medical University of South Carolina, Charleston, SC

- Screen for BV 35-37 w/ GBS swab & treat if positive
- Glycemic Control
- Preop shower with CHG
- CHG-Alcohol for Abd skin prep & CHG vaginal prep
- Only remove hair if needed for visualization
 - Instruct patients to avoid shaving suprapubic region
- Extended spectrum Abx before CS
 - Cefazolin + metronidazole, azithromycin or gent
 - Weight based dosing of Cefazolin
- Redosing of Abx Intraop
- Low transverse skin incision when possible
- Manual Extraction of placenta via umbilical cord traction
- Do not perform intra-abdominal irrigation
- Close SubQ space if >2cm, drain not recommended
- Consider NWPT if high risk for SSI
- Remove dressing within first 24 hours
- Do not continue postop abx prophylaxis
- Have patient return to clinic within in 2 wk of surgery

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Wound Class

AWHONN Perioperative Care of the Pregnant Woman: Evidence Based Clinical Practice Guideline (2011)

pg4 – “Class 1-clean surgical procedure refers to a surgical procedure with an operative clean wound. This includes elective caesarean birth in which the membranes have not been ruptured and there has been no trial of labor.”

AORN Journal Clinical Issues (2015): “Cesarean deliveries with or without ruptured membranes or long labors are Class II procedures unless there is a specific reason to assign a Class III rating...”

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American Society of Anesthesiologists

ASA Codes

<https://www.asahq.org~/media/sites/asahq/files/public/resources/standards-guidelines/asa-physical-status-classification-system.pdf>

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QUESTIONS