Using a multi-faceted active change process and infection prevention to reduce post-op C-section infections

Jeanette Harris MS, MSM, BS, MT/CLS(ASCP), CIC MHS Infection Prevention; Evelyn Hickson, RN, MSN, CNS, WCC Perinatal Clinical Nurse Specialist

Introduction

The Centers for Disease Control and Prevention (CDC) reports the rate of women having C-sections increased 53% from 1996 to 2007[1].

- 32% of all deliveries were by C-section in 2007, and the upward trend continues today[1]
- 48% of women 40-54 giving birth will have a C-section[1]
- Surgical site infection (SSI) rate for C-sections is as high as 3.82%[2,3]
- SSIs can add over $3,500 in additional care to each C-section[2,3]

Four pathogens are responsible for over 56% of OB/GYN surgical site infections, including those in C-sections.

The most common pathogens found in OB/GYN (including C-sections) infected surgeries[2]

Pathogen	% found in SSIs
S. *aureus*	28.3% (21.7% MRSA)[4]
Coagulase Negative Staph.	12.4%
E. *coli*	9.5%
E. *faecalis*	6.3%

Since 2007 we have reduced C-section infections and complications by 96% with a corresponding significant cost savings. An estimated 90 complications have been avoided at Tacoma General since 2008 when the initial infection reduction bundle and vigilance was implemented.

An increase in C-section infections and complications has recently been identified at Good Samaritan.

OB care has a cost cap in the state of Washington. Surgical costs are bundled and reimbursed at a "complicated vaginal delivery rate". No additional costs for OR time or supplies can be added to the care with successful reimbursement by patient insurers. Post-surgical complications and infections most often result in a cost that is absorbed by MultiCare Health System (MHS). Therefore, reducing rates of complications and infections is critical both financially and from a quality of care focus.

At MHS, the current average cost of, patients with complications, are as follows:

Readmitted: added cost to C-section = $25,000. Can be as high as $100,000-$250,000 per patient depending on severity of complication and requirements/time for treatments

Non-readmitted: added cost to a C-section = $5,000. Can run as high as $10-$20,000 depending on severity of complication and requirements/time for treatments

Purpose

To describe a program that has successfully reduced SSIs. C-section patients have a five to twenty-fold greater risk for infection as compared to vaginal delivery. A single readmission due to post-op infection can range from $5,000-$100,000.

Method

This is a proposal for implementation of steps to further reduce C-section infections and complications. Current supplies and costs for C-section surgery supplies to close wound, dressings and tapes used, post-partum care time and supplies were obtained and reviewed. Multiple factors were identified using LEAN (http://www.lean.org/whatslean/principles.cfm) principles:

1. Practices vary from provider to provider as to incisional closure technique.
2. Multiple preference cards (for each provider) are time consuming for nursing staff to set up OR to have provider requests available for each surgery. Increase in staff time for ordering and storage of supplies and increased cost for unused contaminated supplies.
3. Providers continue using dated practices and not moving to newer products that have improved outcomes and increase safety for the patient.
4. Multiple patient injuries have occurred from inappropriate taping and dressing techniques – resulting in need for wound care consult and an increased cost of wound supplies (micro-foam tape used for pressure dressings and the "strapping" technique that is used as well as conventional negative pressure dressings for incisional bolstering.
5. Patient demographics and co-morbidities have changed in the last 10 years, increasing potential for post-operative complications and infections.
6. Injuries to skin are being caused immediately post-op with inappropriate removal of adhesive drapes.
7. Post-surgical practices for major abdominal surgery (C-section) does not parallel those in the adult medical surgical area with comparable length and complexity of surgery.
8. Surgical dressings are being removed at post-op day one and patients are allowed to shower. With the use of staples as closure, there are gaps in the layers of closure and skin flora is allowed to enter a new open surgical incision.
   a. Staples are removed at day 2-3 (at time of discharge – prior to healing ridge formation of the new surgical incision).
   b. Initial bundle changes have made a significant impact on reduction of post C-section infections and complications – but, additional improvements can be implemented to reduce rates even further.
9. Evidence based data is now available showing that new technology in sutures, skin adhesives, dressing materials and incisional closure techniques have the capability to reduce incidence of post-surgical complications and infections beyond our 96% reduction.

Proposed "bundle" includes:

1. Reduction of suture material to "standardize" materials used on fascia/muscle, subcutaneous, dermis and top of skin.
2. Standardization of incisional closure technique to reduce dead space and facilitate healing.
3. Standardization of dressing material based on risk factors and co-morbidities – to decrease patient injury, facilitate healing, promote patient safety and increase patient satisfaction.

Low-risk or standard dressing for C-section patients in the OR (2011)

- Skin prep around incision prior to dressing placement
- Nanocrystalline Silver antimicrobial dressing (cut ½ longer than incision lengthwise and then placed end to end with a little overlap over incision)
- Water/bacteria proof cover dressing
- Skin prep then used around edges of dressing to seal

High-risk dressing for C-section patients in the OR (2012)

- Skin prep around incision prior to dressing placement
- Nanocrystalline Silver antimicrobial dressing (cut ½ longer than incision lengthwise and then placed end to end with a little overlap over incision)
- Canisterless/single use/disposable NPWT system = Smith & Nephew, PICO® Single Use Negative Pressure Wound Therapy System 10" x 4" dressing placed
- Cavilon™ No Sting then used around edges of dressing to seal

Initial review of current practice and materials revealed the following costs

Low-risk patient = $31.68

Patient requiring pressure dressing = $34.20

High risk patient with incisional bolstering with conventional negative pressure – 3 day therapy = $348.62

Proposed changes for incisional closure, dressing and post-partum incisional management:

Low-risk patient = $42.69 (increase of $9.75/patient)

High-risk with incisional bolstering with the PICO negative pressure system – 7 day therapy = $245.30 (savings $103.32/patient)

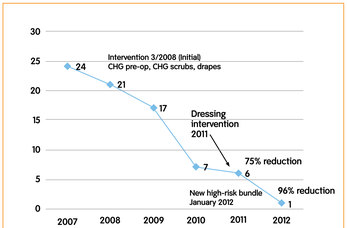
Note: Costs that are still being determined will be overall suture supply and costs for all surgical procedures and repairs required after vaginal delivery with standardization of suture material.

Results

96% infection reduction from January 2007 through 2012. Ninety two C-section SSIs have been avoided since intervention yielding approximate cost savings of $5,000,000 (average of $50,000/readmission). We have stopped the increase of SSI C-sections. Good Samaritan has not had a single C-section infection since we started this bundle there.

Approximate cost savings

- C-S SSI can range from $2,500 to $250,000
- Average readmit = $50,000 and 7 patient days
- One case: 2 readmits, 2 I&D, on-going wound care and clinic visits and costs
- Total added patient days = 25
- Current SSI charges = $250,000 and still not done
- Over the past 4 years 92 post-op C-section infections avoided
- Approximate cost avoidance of $5,000,000+



Number of C-section SSIs 2007-2012

Conclusion

Patient involvement is crucial for success. C-section SSI is avoidable, even in high-risk populations. It is hoped that studies of this type will allow for enhanced clinician education, patient safety, and will prove beneficial to facilities.

References

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Nanocrystalline Silver antimicrobial dressing = ACTICOAT® Flex 7 Silver-coated Antimicrobial Barrier Dressing, Smith & Nephew Wound Management Inc., St Petersburg, FL
Water/bacteria proof cover dressing = OPSITE® Post-Op Visible Waterproof, Bacteria-proof Dressing with See-through Absorbent Pad, Smith & Nephew Wound Management Inc., St Petersburg, FL
Canisterless/single use/disposable NPWT system = PICO Single Use Negative Pressure Wound Therapy System, Smith & Nephew Wound Management Inc., St Petersburg, FL
CHG = SAGE® wipes
Skin prep = Cavilon™ No Sting Skin Barrier

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