

Surgical Site Infection Bundle For Babies: Preliminary Data

Cullen Woodley¹, John Nida, M.D.², Alexis Lonjin¹, Katie Ward², Diane Studzinski², Begum Akay, M.D.³

¹ Oakland University William Beaumont School of Medicine, Rochester Michigan

² Corewell Health East William Beaumont University Hospital, Royal Oak, Michigan

³ Corewell Health Children's at William Beaumont University Hospital, Royal Oak, Michigan

Introduction

Surgical Site Infections (SSIs) are infections that occur in or around the area where a surgery was recently performed. They are estimated to account for 20% of all healthcare associated infection, and lead to an increase in morbidity and mortality. Perioperative care bundles show promise in reducing SSIs in adults but are not often used in neonatal surgery. Infections in babies after surgery are less common than adults but carry significant morbidity in a fragile patient.



We aim to evaluate the effects of a broad perioperative care bundle in patients less than 6 months old undergoing abdominal or thoracic surgeries. We predict that a broad perioperative care bundle will reduce the rates of SSIs in neonates undergoing thoracic and GI surgeries.

Aims and Objectives

1. Identify addressable factors associated with SSI in neonates undergoing gastrointestinal and thoracic surgery
2. Develop a care bundle that targets several areas of peri-operative care to reduce the incidence of SSI
3. Implement and measure the utility, adherence, and effectiveness of the care bundle at reducing SSIs when compared to internal retrospective data and national benchmarks

Methods

The perioperative bundle was developed in a multi-disciplinary fashion and addressed several areas of care:

1. Preoperative Bowel Prep
2. Preoperative Skin Cleansing
3. Antibiotic Timing and Choice
4. Perioperative Temperature Control
5. Intraoperative Skin Preparation
6. Closing Protocols

An SSI bundle checklist was used to help confirm bundle adherence.

Inclusion Criteria

1. Age <6 months or admitted to the NICU at the time of procedure
2. Undergoing Thoracic or GI procedure
3. Wounds classified as Clean, Clean-Contaminated, or Dirty/Infected

Exclusion Criteria

1. Older than 6 months
2. Wounds classified as Clean

Results

Total Patients	n = 44
Pre-Implementation	n = 26
Post-Implementation	n = 18
Overall Age at Birth (days)	
Mean (SD)	239.3 (34.9)
Median (IQR)	256.5 (216.0, 263.0)
Overall Weight at Surgery (grams)	
Mean (SD)	3344.0 (1312.1)
Median (IQR)	3275.0 (2268.5, 4030.0)

	Pre-implementation (N=26)	Post-implementation (N=18)	P value
Diagnosis of SSI, n (%)	3 (11.5)	2 (11.1)	>.999
Preop antibiotic timing <1hr, n (%)	11 (42.3)	14 (77.8)	.030*
Preop cleansing, n (%)	0 (0)	11 (61.1)	<.0001*
Choloraprep intra-op cleanse, n (%)	1 (3.8)	11 (61.1)	<.0001*
Utilization of closing protocol, n (%)	0 (0)	6 (33.3)	.003*
Bundle Utilization	0 (0.0)	15 (83.3)	<.0001*

Conclusions

The SSI rate in both groups was low and did not differ significantly between groups after bundle implementation. Several factors of the bundle saw a significant increase in use and shows that a care bundle is effective at standardizing how providers approach surgical infection control. Lastly, adoption of the bundle was good, but more patients and ultimately more time is needed to appreciate any changes in infection rates.

Limitations

This is only one year of data, and is part of a larger, four year, study. Given that little research has gone into neonatal SSI care bundles, the bundle was developed based primarily on adult studies. Lastly, during data collection we noticed a significant amount of inconsistent charting.

References

1. Surgical site infection (SSI). Centers for Disease Control and Prevention. <https://www.cdc.gov/hai/ssi/ssi.html>. Published November 24, 2010. Accessed September 23, 2022.
2. Sparling KW, Rytman PC, Schoeller PJ, et al. Financial impact of failing to prevent surgical site infections. *Qual Manag Health Care*. 2007;16(3):219-225. doi:10.1097/01.QMH.0000281058.99929.a4
3. Keenan JE, Speicher PJ, Thacker JK, Walter M, Kuchibhatla M, Mantyh CR. The preventive surgical site infection bundle in colorectal surgery: an effective approach to surgical site infection reduction and health care cost savings. *JAMA Surg*. 2014;149(10):1045-1052.
4. Weiser MR, Goron M, Usiak S, et al. Effectiveness of a multidisciplinary patient care bundle for reducing surgical-site infections. *Br J Surg*. 2018;105(12):1660-1667. doi:10.1093/bjs/znz001
5. Hoang SC, Kigile AA, Roth LA, Vrees M, Schechter S, Shah N. Colon and rectal surgery surgical site infection reduction bundle: To improve is to change. *Am J Surg*. 2019;217(1):40-45. doi:10.1016/j.amjsurg.2018.07.008
6. Tanner J, Padley W, Assadian D, Leaper D, Keenan M, Edmondson C. Do surgical care bundles reduce the risk of surgical site infections in patients undergoing colorectal surgery? A systematic review and cohort meta-analysis of 8,515 patients. *Surgery*. 2015;158(1):66-77. doi:10.1016/j.surg.2015.03.009
7. Zywt A, Lau CSM, Stephen Fletcher H, Paul S. Bundles Prevent Surgical Site Infections After Colorectal Surgery: Meta-analysis and Systematic Review. *J Gastrointest Surg*. 2017;21(11):1915-1930. doi:10.1007/s12032-017-0465-9
8. Delgado-Corcoran C, Van Dorn CS, Pribble C, et al. Reducing Pediatric Sternal Wound Infections: A Quality Improvement Project. *Pediatr Crit Care Med*. 2017;18(5):461-468. doi:10.1097/PCC.0000000000001135
9. Caruso TJ, Wang EY, Schwenk H, et al. A Postoperative Care Bundle Reduces Surgical Site Infections in Pediatric Patients Undergoing Cardiac Surgeries. *Jt Comm J Qual Patient Saf*. 2019;45(3):156-163. doi:10.1016/j.jcgs.2018.05.009
10. Poe-Kochert C, Shimborg JL, Thompson GH, Son-Hing JP, Handley CK, Matovich RJ. Surgical site infection prevention protocol for pediatric spinal deformity surgery: does it make a difference? *Spine Deform*. 2020;35(5):931-938. doi:10.1007/s43390-020-00120-6

Table 1: Demographic of the pre- and post-implementation groups.

Table 2: Comparative results of pre- and post-implementation groups. P-values were calculated using Fischer's exact test

Acknowledgements

We would like to thank all the nurses, nurse managers, unit coordinators, residents, and physicians for their input in creating the bundle and ensuring a smooth implementation. Thank you to the Oakland University William Beaumont School of Medicine Statisticians for their support in the analysis as well.