

# Surgical Site Infection Prophylaxis for Lumbar Spine Surgery: An Updated Review



Joshua Falescky MD<sup>1</sup>, David Maduram, MD PhD<sup>1</sup>, Theresa Bowling, MD<sup>1</sup>

<sup>1</sup>Department of Anesthesiology, St. Vincent's Medical Center, Bridgeport CT, USA; St. Vincent's Medical Center, Bridgeport CT, USA

## Introduction

- In those with radiculopathy resistant to conservative measures, surgical intervention may greatly improve patient symptoms.
- Unfortunately in adult spine surgery, surgical site infections (SSI) remain a source of complications, and are associated with greater lengths of stay and significant patient morbidity and mortality.<sup>1</sup>
- A recent uptick of lumbar spine SSIs at our institution led us to explore the available literature with regard to SSI prophylaxis.
- A systematic review was conducted in 2018 and evaluated the utility of SSI prophylactic techniques in adult spine surgery introduced within twenty years prior, such as intraoperative vancomycin powder and single versus multiple dose antibiotics.<sup>1</sup>
- In our investigation, we expand on this review to provide an update on SSI prophylactic techniques with particular emphasis on lumbar spine surgery.

## Review

### METHODS

- A systematic search was conducted, including articles from the following databases:
  - ScienceDirect, PubMed, Cochrane database, Clinicaltrials.gov
- We focused on articles published between 2018 and 2022.
- A total of 11 studies were identified and included in the review. The majority of the studies were retrospective and prospective single center cohort studies.
- Inclusion Criteria:
  - Patients ≥ 18 years of age
  - At least one method of prophylaxis for SSI
  - Lumbar spine surgery with or without instrumentation

### RESULTS

- Similarly to the prior review, most investigated the use of perioperative wound irrigation with povidone-iodine and the use of intraoperative vancomycin powder.

## Review (continued)

- The use of intraoperative povidone-iodine is largely associated with decreased risk of SSI.<sup>2</sup>
- The evidence with regard to intraoperative vancomycin powder and reduction in SSI compared to control groups continues to be mixed, with some studies demonstrating a decrease in SSI and others reporting no difference.<sup>3</sup>
- Several studies focused on preoperative antibiotic administration, particularly with regard to antibiotic timing and dosing. According to these studies, inappropriate dosing (Ex. <2g IV cefazolin) and timing of preoperative antibiotics are associated with increased incidence of SSI.
- Finally, we also looked into two studies that investigated preoperative nasal MRSA screening. In one study, the vast majority of patients who acquired a SSI tested negative for MRSA.<sup>4</sup> The second study showed no difference in MRSA screening on postoperative incision and drainage rates.<sup>5</sup>

Authors	Design	Comparison	Findings	Population (Experimental, Control)
Maciejczak et al. (2019)	Retrospective Cohort	72h cefazolin therapy vs. 1 dose	72h cefazolin decreased SSI risk	1327, 595
Canseco et al. (2021)	Retrospective Cohort	Antibiotics given within 60 min of incision vs. >60 min	Antibiotics after 60 min associated with increased SSI risk	1058, 73
Karamian et al. (2022)	Retrospective Cohort	1g vs. 2g vs. 3g cefazolin therapy based on weight	Patients receiving ≥ 2g cefazolin had decreased SSI risk	258, 2914, 191
Cuello et al. (2021)	Retrospective Cohort	Povidone iodine vs. NS irrigation	Povidone iodine decreased SSI risk	144, 134
Chen et al. (2020)	Case Control	Hydrogen peroxide vs. NS irrigation	<ul style="list-style-type: none"> <li>- Superficial SSI: No difference</li> <li>- Deep SSI: Peroxide significantly decreased SSI risk</li> <li>- Peroxide decreased rate of infection with vancomycin-resistant organisms</li> </ul>	1281, 1345
Lopez et al. (2019)	Prospective Cohort	1g Vancomycin powder + IV antibiotic PPx vs. IV antibiotic PPx alone	No significant difference in SSI risk	150, 150
Lemans et al. (2019)	Retrospective Cohort	Povidone iodine + IV antibiotics vs. IV antibiotics alone	<ul style="list-style-type: none"> <li>- Superficial SSI: Povidone iodine decreased risk</li> <li>- Deep SSI: No difference</li> </ul>	217, 257
		Vancomycin powder + IV antibiotics vs. IV antibiotics alone	Vancomycin powder decreased risk for both superficial and deep SSI	379, 257
Xiong et al. (2022)	Retrospective Cohort	MRSA testing within 90 days of surgery vs. no MRSA testing	No difference in SSI risk	1129, 755

## Discussion

- Given the high volume of spine surgeries performed, there continues to be interest in reducing or minimizing SSI incidence. Newer investigations and studies have been published, but large, high-powered studies continue to be lacking.
- Still, recent evidence continues to demonstrate mixed results with regard to the application of intraoperative vancomycin powder.
- There is moderately strong evidence for the use of povidone-iodine solution.
- There is strong evidence for the proper dosage and timing of IV preoperative antibiotics.
- Interestingly, the data supporting routine preoperative MRSA testing for lumbar spine surgery is not convincing.
- Though the available literature for SSI prophylactic techniques continues to increase, additional studies and higher level of evidence are required to further justify said techniques.

## Acknowledgements & References

Special thanks to Bill Lahiff for assistance with poster authorship and technical support.

1. Yao R, Tan T, Tee JW, Street J. Prophylaxis of surgical site infection in adult spine surgery: A systematic review. *Journal of Clinical Neuroscience*. 2018;52:5-25. doi:10.1016/j.jocn.2018.03.023
2. Lemans JVC, Öner FC, Wijdicks SP, Ekkelenkamp MB, Vogely HC, Kruyt MC. The efficacy of intrawound vancomycin powder and povidone-iodine irrigation to prevent surgical site infections in complex instrumented spine surgery. *The Spine Journal*. 2019;19(10):1648-1656. doi:10.1016/j.spinee.2019.05.592
3. Maciejczak A, Wolan-Nieroda A, Walaszek M, Kolpa M, Wolak Z. Antibiotic prophylaxis in spine surgery: A comparison of single-dose and 72-hour protocols. *Journal of Hospital Infection*. 2019;103(3):303-310. doi:10.1016/j.jhin.2019.04.017
4. Xiong GX, Greene NE, Hershman SH, Schwab JH, Bono CM, Tobert DG. Nasal screening for methicillin-resistant *Staphylococcus aureus* does not reduce surgical site infection after primary lumbar fusion. *The Spine Journal*. 2022;22(1):113-125. doi:10.1016/j.spinee.2021.07.008
5. Adogwa O, Vuong VD, Elsamadicy AA, et al. Does nasal carriage of *Staphylococcus aureus* increase the risk of postoperative infections after elective spine surgery? Do most infections occur in carriers? *World Neurosurgery*. 2018;116. doi:10.1016/j.wneu.2018.05.025
6. Canseco JA, Karamian BA, DiMaria SL, et al. Timing of preoperative surgical antibiotic prophylaxis after primary one-level to three-level lumbar fusion. *World Neurosurgery*. 2021;153. doi:10.1016/j.wneu.2021.06.112
7. Karamian BA, Toci GR, Lambrechts MJ, et al. Cefazolin prophylaxis in spine surgery: Patients are frequently underdosed and at increased risk for infection. *The Spine Journal*. 2022;22(9):1442-1450. doi:10.1016/j.spinee.2022.05.018
8. Carballo Cuello CM, Fernández-de Thomas RJ, De Jesus O, De Jesus Espinosa A, Pastrana EA. Prevention of surgical site infection in lumbar instrumented fusion using a sterile povidone-iodine solution. *World Neurosurgery*. 2021;151. doi:10.1016/j.wneu.2021.04.094
9. Chen H, Yang J-S, Zou P, et al. Safety and efficacy of hydrogen peroxide in controlling blood loss and surgical site infection after multisegmental lumbar spine surgery: A retrospective, case-controlled study. *World Neurosurgery*. 2020;133. doi:10.1016/j.wneu.2019.09.005
10. Delgado-López PD, Martín-Alonso J, Martín-Velasco V, et al. Vancomycin powder for the prevention of surgical site infection in posterior elective spinal surgery. *Neurocirugía (English Edition)*. 2020;31(2):64-75. doi:10.1016/j.neucie.2019.07.003
11. Radcliff KE, Neusner AD, Millhouse PW, et al. What is new in the diagnosis and prevention of Spine Surgical site infections. *The Spine Journal*. 2015;15(2):336-347. doi:10.1016/j.spinee.2014.09.022