

# Prevention of Surgical Site Infection (SSI) after Spine Surgery with an Implementation of SSI Prevention Bundle: A Single Center of 1,014 Cases

Masakazu Toi<sup>1</sup>, Keishi Maruo<sup>2</sup>, Fumihiro Arizumi<sup>3</sup>, Kazuya Kishima<sup>4</sup>, TOMOYUKI KUSUKAWA<sup>5</sup>, Toshiya Tachibana<sup>6</sup>

<sup>1</sup>Department of Orthopaedic Surgery, Hyogo Medical Un, <sup>2</sup>Department of Orthopaedic Surgery, Hyogo College of Medicine, <sup>3</sup>Department Orthopaedic Surgery, Hyogo College of M, <sup>4</sup>Hyogo College of Medecine, <sup>5</sup>Department of Orthopaedic Surgery, Hyogo College o, <sup>6</sup>Department of Orthopaedic Surgery, Hyogo College of Medicine

## INTRODUCTION:

The incidence of surgical site infection (SSI) in spine surgery is more than in other general orthopaedic surgeries. In recent years, SSI prevention Care Bundle has been presented. In this study, we investigated the frequency and risk factors of SSI in our hospital, completed our own SSI prevention Care Bundle, and examined the effects of the implementation.

## METHODS:

This was a retrospective, single-center study. We retrospectively reviewed the data of 1,117 patients who underwent spine surgery in our hospital between January 2014 and July 2021. In total, 1,014 patients (mean age  $65.7 \pm 15.3$  years, 40.7% women) were included, excluding age < 20 years old, local anesthesia (biopsy), SSI surgery at other hospitals, pulling out implant, percutaneous minor surgery such as Balloon kyphoplasty, postoperative hematoma, wound healing failure, pyogenic spondylitis, spinal tumor. The diagnosis of SSI was made within 90 days for patients with instrumentation according to CDC guidelines, and within 30 days for all other cases. The evaluation items included the patient factors (age, sex, BMI, smoking, diabetes mellitus), the surgery-related factors (surgical site, presence of instrumentation, operative time, blood loss, reoperation), season (Spring/Summer/Fall/Winter), and presence of Care Bundle were investigated to identify SSI risk factors. Care Bundle was implemented after April 2017: Bathing or showering with 4% chlorhexidine gluconate before surgery, skin disinfection, high-function space purifier, glove change, iodine-impregnated surgical incise draping, appropriate prophylactic antibiotic change, and preoperative sponge brushing of the cervical spine. Each factor was analyzed univariately, and independent risk factors were identified by logistic regression analysis.

**RESULTS:** The incidence of SSI was 2.0% (0.4% superficial, 1.6% deep). The rate of SSI before the Care Bundle implementation was 3.6%, and significantly decreased to 1.2% after the implementation (Fig 1). Univariate analysis showed a significant difference in smoking (4.47% vs. 1.17%,  $P = 0.001$ ), diabetes mellitus (4.41% vs. 1.36%,  $P = 0.005$ ), presence of instrumentation (2.95% vs. 0.85%,  $P = 0.017$ ), surgical site (posterior cervical 7.29% vs. posterior lumbar 1.41%,  $P = 0.003$ ), with or without spinal endoscopy (0% vs. 2.62%,  $P=0.010$ ), Spring/Summer (2.93% vs. 0.85%,  $P = 0.017$ ). Logistic regression analysis showed a significant difference in the presence of Care Bundle (odds ratio 0.23, 95% confidence interval 0.08-0.66,  $P = 0.006$ ), smoking (odds ratio 4.32, 95% confidence interval 1.15-12.02,  $P = 0.005$ ), diabetes mellitus (odds ratio 2.51, 95% confidence interval 0.92-6.86,  $P = 0.073$ ), with instrumentation (odds ratio 3.35, 95% confidence interval 1.01-11.1,  $P = 0.048$ ), posterior cervical spine surgery (odds ratio 6.41, 95% confidence interval 2.16-19.04,  $P < 0.001$ ), and Spring/Summer (odds ratio 4.35, 95% confidence interval 1.33-14.22,  $P = 0.015$ ) were independent risk factors.

## DISCUSSION AND CONCLUSION:

SSI prevention Care Bundle implementation was effective in preventing infection. Independent risk factors were posterior cervical spine surgery, instrumentation, and spring/summer surgery. In the future, additional preventive measures should be introduced in high-risk cases to prevent SSI.

**Figure 1**  
Surgical Site Infection (SSI) Incidence Before and After Implementation of the Care Bundle.

