

Early Discontinuation of Prophylactic Antibiotics is Safe in Spine Surgery: A Nationwide Cohort Study

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Introduction

While guidelines recommend limiting prophylactic antibiotics to within 24 hours post-surgery, adherence still varies and the impact of strict duration limits on large-scale outcomes requires thorough validation. This study utilized the nationwide Health Insurance Review and Assessment (HIRA) Service database to evaluate the efficacy of prophylactic antibiotic administration discontinued within 24 hours versus prolonged administration in preventing surgical site infections (SSIs) following major spinal procedures.

Materials and Methods

This retrospective nationwide cohort study analyzed data from the 6th to 9th Quality Assessment waves of the HIRA database. The study population consisted of 59,003 patients who underwent spinal decompression, instrumented fusion, vertebroplasty, or kyphoplasty. Patients were categorized into two groups based on the duration of prophylaxis: those discontinued within 24 hours of surgery (n = 9,754) and those receiving antibiotics for more than 24 hours (n = 49,249). The primary outcome was the incidence of SSIs. Multivariate logistic regression was employed to calculate odds ratios (ORs), adjusting for age, sex, comorbidities, hospital type, and antibiotic class.

Results

The overall incidence of SSIs was 1.54%. The SSI rate was significantly lower in the group where antibiotics were discontinued within 24 hours (0.19%) compared to the prolonged administration group (1.80%; p < 0.05). Prolonged antibiotic use was associated with higher odds of SSI (adjusted OR: 15.250; 95% CI: 9.538–24.383). Additional risk factors included tertiary hospital surgery, malnutrition, and combined antibiotic regimens.

Conclusion

Limiting prophylactic antibiotic duration to within 24 hours postoperatively is not associated with increased SSI risk following major spinal procedures.

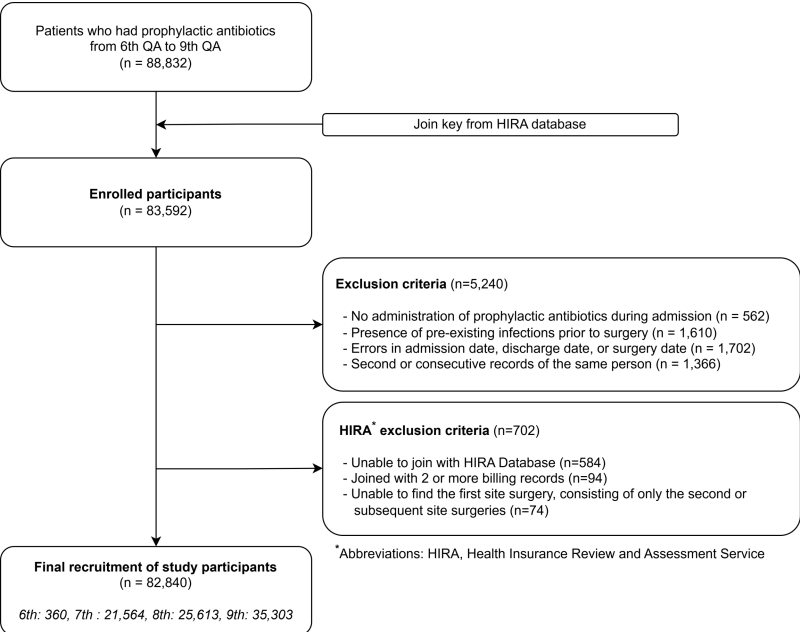


Figure 1. Flow chart of study participants

Table 3. Multivariable logistic regression analysis for each outcome in patients who had either decompression, instrumented fusion, vertebroplasty, or kyphoplasty. [†]

Variables ^{††}	Surgical site infections ^a	Non-surgical site infections ^b	Total postoperative infections ^c
Group			
≥24h discontinuation group	10.732 (7.296-15.785)*	16.062 (13.114-19.671)*	17.823 (14.828-21.422)*
<24h discontinuation group			
Age	1.008 (1.002-1.015)*	1.007 (1.003-1.010)*	1.007 (1.004-1.011)*
Sex, Male	1.150 (1.002-1.320)*	0.924 (0.845-1.009)	0.982 (0.907-1.063)
QA period (6 th , 7 th , 8 th QA vs. 9 th QA)	0.345 (0.297-0.401)*	0.056 (0.049-0.064)*	0.080 (0.072-0.088)*
Antibiotics used			
Other antibiotics only	1.555 (1.055-2.292)*	1.724 (1.355-2.195)*	1.764 (1.427-2.182)*
1 st or 2 nd generation cephalosporin, and other antibiotics both	4.475 (3.877-5.165)*	5.928 (5.418-6.485)*	6.523 (6.011-7.079)*
1 st or 2 nd generation cephalosporin only	Reference	Reference	Reference
Insurance types (Medical aids vs. Health insurance coverage)	0.807 (0.607-1.073)	1.121 (0.948-1.324)	1.029 (0.882-1.201)
Hospital types			
Tertiary	3.029 (2.502-3.666)*	5.658 (4.952-6.464)*	6.005 (5.318-6.780)*
Secondary	2.626 (2.239-3.080)*	1.858 (1.675-2.062)*	2.160 (1.967-2.372)*
Primary	Reference	Reference	Reference
Surgery type			
Decompression	3.795 (2.525-5.704)*	0.957 (0.789-1.160)	1.254 (1.049-1.500)*
Instrumented fusion	4.248 (2.734-6.601)*	0.827 (0.662-1.034)	1.122 (0.914-1.378)
Vertebroplasty and Kyphoplasty	Reference	Reference	Reference
Comorbidity/Medical history			
Diabetes mellitus	1.143 (0.989-1.321)	0.955 (0.871-1.048)	1.004 (0.923-1.091)
Hypertension	1.335 (1.150-1.549)*	1.339 (1.221-1.469)*	1.396 (1.285-1.518)*
Malnutrition	1.831 (1.329-2.521)*	1.260 (0.995-1.597)	1.551 (1.258-1.913)*
Skin or soft tissue infection	1.289 (0.996-1.667)	0.893 (0.745-1.071)	1.022 (0.870-1.201)
Allergy to antibiotics	1.177 (0.748-1.852)	0.934 (0.698-1.248)	0.953 (0.735-1.236)
Operation time (minutes) ^d	1.271 (1.096-1.473)*	1.417 (1.295-1.549)*	1.408 (1.297-1.527)*
The number of concomitant spine surgeries	1.405 (1.245-1.586)*	1.377 (1.271-1.492)*	1.495 (1.390-1.608)*

[†] Values are OR (95% CI), with asterisks (*) added for statistical significance.

^{††} The reference level is the latter (i.e. A vs. B means that B was the reference level).

^a Max-rescaled R-Square = 0.216

^b Max-rescaled R-Square = 0.367

^c Max-rescaled R-Square = 0.382

^d Calculated as a log value due to its exponential distribution of nature.