Cost Burden of Spine Fusion Surgical Site Infections Using a Nationwide Claims Database

Maureen Spencer, M.Ed., BSN, RN, CIC, FAPIC, Charles Edmiston, MS, PhD, CIC, FIDSA, FSHEA, FSIS, FAPIC, Peter Graves, BSN, RN, CNOR

Abstract

Background: Surgical Site Infections (SSIs) have been reported to occur in 0.2% to 16% of spine fusion surgeries (SFS). The Medicare population rate was reported as 8.5% in primary fusions and 12.2% in revisions over a 10-year period. We used a nationwide longitudinal database to accurately assess incidence and payments associated with management of postoperative infection following SFS.

Methods A retrospective, observational cohort analysis involved 210,019 patients who underwent SFS from 2014 to 2018. The data was sourced from a commercial, Medicare, and Medicaid database. The primary objective of the analysis was to assess the rates of superficial/deep incisional SSIs within the specified timeframe of 3 to 180 days after surgery. This assessment was carried out utilizing Cox proportional hazard regression models. In addition to examining infection rates, the study delved into the economic implications of SSIs by evaluating adjusted payments for patients with and without SSIs. The method employed involved the use of generalized linear regression models. The combination of these analytical approaches allowed a comprehensive investigation of both the clinical and economic aspects of SSIs following SFS procedures.

Results: Among the cohort who underwent SFS from 2014 to 2018, 6.6% experienced a SSI. The rate was 1.7% for superficial and 4.9% for deep-incisional. The median time to presentation for these infections was 44 days for superficial SSIs and 28 days for deep-incisional SSIs. Payments for superficial SSIs were$20,800 at 6 months, $26,937 at 12 months, and $32,821 at 24 months. For deep SSIs, the payments were higher at $59,766 at 6 months, $74,875 at 12 months, and $93,741 at 24 months.

Conclusions: These findings underscore the economic burden associated with SSIs following SFS procedures. The risk factors and economic impact highlight the importance of preventive measures and effective management strategies to reduce both the incidence of SSIs and their associated costs.

Objectives

- Describe the three components to a nationwide commercial and Medicaid–Medicare supplemental databases.
- Describe patient baseline comorbidities relative to SSI following spinal fusion surgery.
- Describe the cost of superficial and deep incisional infections after spine fusion surgery using data from a nationwide commercial and Medicare/Medicaid supplemental databases

Disclosures

No disclosures for all authors

Results

IBM® Market Scan® data was analyzed in 210,019 patients undergoing SFSs between 2014 and 2018 and documented 13,813 patients (6.6%) had experienced an SSI, of which 10,296 (4.9%) were deep-incisional SSIs and 3,517 (1.7%) were superficial incisional SSIs (Figure 1). Emergency SFSs were associated with an overall 2-fold higher risk of infection (13.8%) than nonemergent procedures (6.4%). Surgical approach influenced the risk of SSI; posterior procedures had a higher rate than anterior procedures for deep-incisional SSI (8.1% vs 2.9%) and superficial incisional SSI (2.2% vs 1.3%) (Table 1). For the commercially insured patients the incremental payments for superficial SSIs were $20,800 at 6 months, $26,937 at 12 months, and $32,821 at 24 months after the index surgery. The adjusted incremental payments for patients with deep-incisional SSIs were $59,766 at 6 months, $74,875 at 12 months, and $93,741 at 24 months. For the Medicare patient population, the incremental payments for patients with superficial SSIs were $11,044 at 6 months, $17,967 at 12 months, and $24,096 at 24 months after the index surgery. The adjusted incremental payments for patients with deep-incisional SSIs were $48,662 at 6 months, $53,757 at 12 months, and $73,803 at 24 months (Table 2).

Table 3. Summary of SSI Costs From the Database Analysis by Infection Type, Payer, and Time Point

Mean SSI Cost (95% CI)		Deep Incisional	Superficial Incisional
Commercial payers	6 mo	$59,766 ($57,550–$62,030)	$20,800 ($18,394–$23,287)
	12 mo	$74,875 ($72,209–$77,597)	$26,937 ($24,260–$29,700)
	24 mo	$93,741 ($90,045–$97,529)	$32,821 ($29,435–$36,325)
Medicare	6 mo	$48,662 ($45,251–$52,209)	$11,044 ($6,690–$15,716)
	12 mo	$53,757 ($49,955–$57,711)	$17,967 ($12,991–$23,277)
	24 mo	$73,803 ($68,387–$79,457)	$24,096 ($17,508–$31,150)

Table 1b. Patient Demographics at Time of Index Spinal Fusion Surgery by Infection Type

	Overall SSI		Deep Incisional SSI		Superficial Incisional SSI		No Infection	
Variable	No.	%	No.	%	No.	%	No.	%
Surgical approach								
Anterior	4,320	4.2	2,963	2.9	1,357	1.3	98,867	95.8
Anterior and posterior	972	8.4	731	6.3	241	2.1	10,572	91.6
Anterior and posterior and posterior interbody	69	8.2	51	6.0	18	2.1	777	91.8
Anterior and posterior interbody	64	6.3	51	5.0	13	1.3	959	93.7
Posterior	5,769	10.3	4,556	8.1	1,213	2.2	50,265	89.7
Posterior and posterior interbody	526	8.1	384	5.9	142	2.2	5,948	91.9
Posterior interbody	1,655	6.5	1,223	4.8	432	1.7	23,705	93.5
Unknown	438	7.9	337	6.1	101	1.8	5,113	92.1
Database indicator								
Commercial	6,739	4.9	4,806	3.5	1,933	1.4	131,076	95.1
Medicaid	4,495	10.7	3,496	8.3	999	2.4	37,479	89.3
Medicare	2,579	8.5	1,994	6.6	585	1.9	27,651	91.5

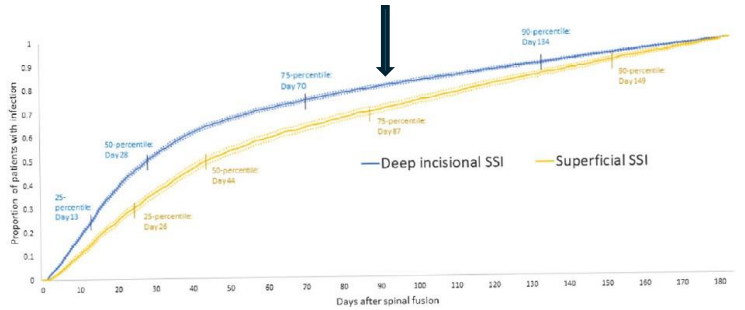

Fig. 2. Time to deep incisional infection and superficial incision infection along with 95% confidence intervals among those with surgical site infections.

NHSN 90-day SSI cutoff for implant surgery

Conclusion

The results of this study highlight the clinical and economic burden associated with SSI following Spine Fusion Surgery (SFS). The incidence and costs of an SSI found in this longitudinal study are considerably higher than those reported in studies that did not incorporate extensive post-discharge follow-up or those reported in studies that used surrogate studies of cost. This analysis also showed that SFS infections often occur after the conventional 30-day postoperative surveillance period (Figure 2). These findings should be factored into future studies assessing the risk of post operative infection in the spinal surgical patient population.

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