

Risk factors for Reoperation and Readmission in Patients Undergoing Spinal Surgery

Keaton Piper; Ian A. DeAndrea-Lazarus BA; Hanna Algattas MD; Kristopher T. Kimmell MD; Yan Michael Li MD, PhD; Kevin

A. Walter MD; G. Edward Vates MD PhD

Department of Neurosurgery, University of Rochester Medical Center



Introduction

Readmission and reoperation are costly and trackable adverse events after spine surgery. We sought to identify risk factors for readmission or reoperation after spine surgery.

Goals

1. Identify factors associated with readmission and reoperation, that may be targeted in the future to more effectively reduce healthcare costs and surgical complications.

2. Develop a means to assess a patient's risk of reoperation and readmission.

3. Present data supporting the effectiveness of the reoperation and readmission risk scoring model.

Methods

The American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) database for years 2012-2014 was reviewed for patients undergoing spinal surgery, based on Current Procedural Terminology (CPT) codes. Clinical factors were analyzed to identify associations with readmission or reoperation.

Results

111,892 patients who underwent spinal surgery were identified. The rate of reoperation was 3.1%, the rate of readmission was 5.2%, and the occurrence of either was a rate of 6.6%. Multivariate binary logistic regression analysis found twenty factors associated with both readmission and reoperation, listed here.

Risk Factors for Reoperation and Readmission of Patient undergoing Spine Surgery						
Pre-operative	Operative	Post-operative				
>60 years old	ASA class 3-5	UTI	Septic Shock			
>10% weight loss in past 6 months	Operation time >3 hours	Unplanned reintubation	Stroke with neurological deficit			
>10% probability of mortality prior to surgery	Blood transfusion	Failure to wean from ventilator	Superficial and deep incisional surgical site infection			
African- American race	Dirty/infected wound	Development of wound dehiscence				
On dialysis		Pulmonary embolism				
Chronic steroid use		Sepsis				

A risk score for each patient was determined by the number of factors present. Patients with a score >7 had a more than 20-fold increased risk of reoperation or readmission compared to patients with a score of 0. A receiver operating characteristic curve of the risk score had an area under the curve of 0.711 (95%, CI 0.705-0.718).

Reoperation and Readmission Risk Score						
Risk score	No. of Patients (% of total)	Reoperation Rate (%)	Readmission Rate (%)	Reoperation or Readmission Rate (%)		
0	28119 (25.13)	0.27	0.44	2.16		
1	31555 (28.20)	0.52	0.89	3.98		
2	28671 (25.63)	0.71	1.35	6.44		
3	13694 (12.24)	0.58	1.04	10.76		
4	6017 (5.37)	0.46	0.74	17.68		
5	2439 (2.18)	0.28	0.39	23.57		
6	901 (0.81)	0.14	0.19	33.19		
7	333 (0.30)	0.08	0.07	43.24		
≥8	163 (0.15)	0.05	0.04	47.85		
Total:	111892	3.08	5.15	6.56		



Conclusions

A risk score based on demographics, pre-operative conditions, operative characteristics, and postoperative complications of spinal surgery predicts the risk of readmission or reoperation. Many of these risks are identifiable prior to surgery. Future surgical decision-making should consider modifiable risk factors in order to reduce healthcare costs and patient complications from readmission and reoperation.

Future Aims

A prospective study directed towards reducing the factors identified here and analyzing the change in reoperation and readmission will help to further validate the findings of ths study.

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