



# Impact of Age on Spinal Fusion in Adult Idiopathic Scoliosis

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## Introduction

Adult Idiopathic Scoliosis (AIS) is a debilitating spinal condition with severe impact on patient's quality of life. Most studies investigating adult idiopathic scoliosis have been single institutional studies with relatively small sample size. Given the aging population and disparities in healthcare, there is need for larger studies examining the role of age on health outcomes following spinal fusion for adult idiopathic scoliosis.

## Methods

A retrospective, cohort study was performed using the Thomson Reuters MarketScan® database, examining patients with idiopathic scoliosis who underwent spinal fusion from 2000-2009. Patients were grouped into age categories (18-44, 45-64 and 65+), gender and insurance type (Medicare, Medicaid and Commercial). Primary outcomes included infection, hemorrhagic events and pulmonary embolism within 90 days of surgery, and re-fusion. Multivariate logistic regression analysis was used to estimate the odds ratio for increasing age, insurance type and gender for each complication, while a Cox proportional hazard model estimated the hazard ratio of re-fusion.

## Learning Objectives

With the aging population, the role of patient age on post-operative healing and outcomes deserves deeper investigation following repair of adult idiopathic scoliosis.

## Results

A total of 8432 patients met the inclusion criteria for this study. Overall, the average age was 53.3 years, with 26.90% males and 39% had a Charlson Comorbidity Score of one or greater, Table 1. Majority of the patients had commercial insurance (66.81%), with 26.03% and 7.16% covered by Medicare and Medicaid, respectively. Increasing age (per 10-year increment) was a significant predictor of hemorrhagic complications, PE, infection and re-fusion, Tables 2&3. Our study showed Kaplan Meier survival rates for re-fusion of 89.7%, 82.7% and 87.9% for the age groups 18-44, 45-64 and 65+ years respectively at 10 years following primary fusion, Figure 1.

**Table 1: Demographics by Age Group**

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	Total	Age Group		
		18-44	45-64	65+
Total - no. (col%)	8,432 (100)	2,164 (100)	4,038 (100)	2,230 (100)
Age				
Mean (SD)	53.3 (18.04)	27.2 (9.17)	56.5 (5.34)	73.0 (5.47)
Insurance Commercial	5,633 (66.81)	1,773 (81.93)	3,860 (95.59)	00 (00.0)
Medicaid	604 (7.16)	391 (18.07)	142 (3.52)	71 (3.18)
Medicare	2,195 (26.03)		36 (0.89)	2,159 (96.82)
Gender Male	2,268 (26.90)	649 (29.99)	986 (24.42)	633 (28.39)
Female	6,164 (73.10)	1,515 (70.01)	3,052 (75.58)	1,597 (71.61)
CHRLSON-no. (col%)				
0	5,144 (61.01)	1,735 (80.18)	2,423 (60.00)	986 (44.22)
1	1,888 (22.39)	324 (14.97)	952 (23.58)	612 (27.44)
2	835 (9.90)	74 (3.42)	411 (10.18)	350 (15.70)
3 or higher	565 (6.70)	31 (1.43)	252 (6.24)	282 (12.65)
FU days mean [SD]	669.6 (664.31)	671.1 (653.9)	644.3 (636.72)	713.9 (718.96)

**Table 2: Outcomes by Age Groups**

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	Total	Age Group		
		18-44	45-64	>65
Total patients - no. (col%)	8,432 (100)	2,164 (100)	4,038 (100)	2,230 (100)
Hemorrhage within 90days no.(col%)	335 (3.9)	56 (2.59)	178 (4.41)	101 (4.53)
Infections within 90days no.(col%)	950 (11.27)	200 (9.24)	456 (11.29)	294 (13.18)
P.E within 90days no.(col%)	262 (3.1)	42 (1.94)	117 (2.90)	103 (4.62)
Pneumonia within 90days no.(col%)	884 (10.48)	203 (9.38)	357 (8.84)	324 (14.53)
Refusion no.(col%)	242 (2.8)	44 (2.03)	142 (3.52)	56 (2.51)

**Table 3: Regression Models**

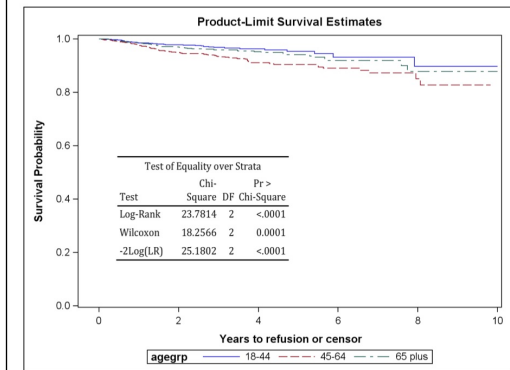
Table 3: Regression Models evaluating the effect of increasing age (per 10 years) on Hemorrhagic complication, Infection and PE within 90 days, and Refusion

	Estimate (95% CI)	Chi-square (P-value)
Hemorrhage	OR: 1.12 (1.02, 1.23)	5.6 (0.0177)
PE	HR: 1.19 (1.06, 1.34)	8.9 (0.0028)
Infection	HR: 1.08 (1.02, 1.15)	7.8 (0.0052)
Refusion	HR: 1.15 (1.03, 1.28)	6.7 (0.0094)

PE= Pulmonary Embolism; OR= Odds Ratio; HR= Hazard Ratio

**Figure 1: Kaplan Meier Survival Estimates for Re-fusion**

Figure 1: Kaplan Meier Survival Estimates for Re-fusion



## Conclusions

In this retrospective cohort analysis, age was associated with increased risk of hemorrhagic events, pulmonary embolism, infection and re-fusion. With the aging population, the role of patient age on post-operative healing and outcomes deserves deeper investigation following repair of adult idiopathic scoliosis.