## Robotic Assistance Does Not Improve Outcomes in Posterior Cervical Fusion Surgery

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INTRODUCTION:

Degenerative disc disease is common, and spinal fusion may be indicated in instances of advanced disease. Fusion surgery typically involves the use of pedicle screws for fixation; however, screw placement can be technically challenging, and screw misplacement and associated complications are common. The aim of this study is to assess the impact of robotic assistance in the setting of posterior cervical fusion surgery.

METHODS: This was a retrospective cohort study utilizing the National Readmissions Database, years 2016-2019. Patients undergoing posterior cervical fusion surgery, both conventional and robotic assisted, were identified via ICD-10 codes. Multivariate regression was performed to compare postoperative outcomes, including complications. Negative binomial regression was performed to assess 30-day readmissions and reoperation, and discharge disposition. Quasi-Poisson regression was performed to assess total charges and length of stay. Patient demographics and comorbidities, measured via the Elixhauser comorbidity index, were both controlled for in our regression analysis.

RESULTS: A total of 139,094 patients undergoing posterior cervical fusion, including 3,808 (2.74%) who underwent a procedure with robotic assistance, were included in our analysis. We found no difference in complications or hospital related outcomes between cohorts; however, robotic-assisted procedures were associated with increased total charges (Odds Ratio (OR) 1.142; p<0.001).

## DISCUSSION AND CONCLUSION:

Robotic assistance does not improve outcomes following posterior cervical fusion surgery. While we found no difference in complications or hospital-related outcomes; however, robotic assistance was associated with significantly greater total charges. Possible long term benefits of robotic surgery were not assessed; however, this study calls into question some of the purported short-term benefits of robotic surgery in the cervical spine including shorter hospital stays and improved patient safety.

Adverse Event		OR 95% C.I Lo	wer 95% C.I Upper							
Medical Complication		0.99 0	903 1.085	0.825						
Respiratory Failure		0.921 0	764 1.11	0.388	Hopsital		OR 95% 0	J. Lower 95% CJ	i Upper	
Putnonary Embolism		1.06 0	624 1.768	0.854						
Preumonia		0.992 0	762 1.291	0.953	Thirty day repaidmission		0.978	0.74)	1.121	0.395
Cardiac Arrest		1.502 0	764 3.204	0.292						
Heart Failure		0.977 0	771 1.238	0.847	Thirty day conception		0.848	0.383	1.000	0.097
Myscardial Marction		0.671 0	349 1.291	0.232	the part of the pa					
Deep Vein Thranbosis		0.725 0	455 1.062	0.098						
Acute Kidney Disease		0.834 0	669 1.04	0.107	Motalty		868.0	0.452	1.738	0.744
Unsingical Infection		0.934 0	766 1.138	0.496						
Stroke		1.023 0	673 1.685	0.93	Rutine Discharge		0.965	0.907	1.026	0.254
Piopia and panesis		0.861	0.72 1.031	0.103						
Osteonyelitsis		1.577 0	675 3.684	0.293	Length of Stay		1.009	0.92	1.106	0.848
Sepsis		0.907 0	703 1.17	0.454						
Surigcal Complication		1.072 0	963 1,204	0.246	I would be a direct a direct		1.048	1.033	1.107	-0.001
Wound Disruption		1.089	0.74 1.602	0.000	realized and states					
Postoperative Infection		1.298 0	869 1,935	0.203						
Mechanical Complication		1.606 1	158 2.225	0.0051	Langte of starty 5-days		1.131	1.001	1,205	-1001
Translusion		1.303 1	005 1.65	0.0461						
Postoperative Shock		1.139 0	572 2.268	0.712	Leigh of stay 7 days		1.101	1.013	1.158	0.024 *
Postoperative Neurological Complication		1.006 0	655 1.541	0.983						
Postoperative Vascalar Complication		1.161 0	567 2.42	0.69	Length of stary 10 days		1.135	1.079	1,265	0.021 *
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	* Adams up of an a	Figure 2: Odds ratice illur patients undergoing somput	trating the higher accumance a pr applicated hoster companet to	Note all to con	International Total Charges		1.142	1.072	1.217	-2.001 *
						18 00 Only with MM sections researed - relations optimized	Figure patients und	1. Odds sales its balance to begoing computer assisted	e higher occurs fusion company	rance of hospital variable of to those with no comp