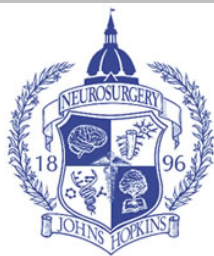




# The Impact of Resident Participation on Elective Neurosurgical Morbidity and Mortality: An Analysis of 16,098 Patients

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## Introduction

In this study, we sought to determine the impact of resident participation on overall 30-day morbidity and mortality following neurosurgical procedures.

## Methods

The American College of Surgeons National Surgical Quality Improvement Program database was queried for all patients undergoing elective neurosurgical procedures between 2006 and 2012. The operating surgeon(s), whether attending-only or resident plus attending, was assessed for influence on morbidity and mortality. Multivariable logistic regression was used to estimate odds ratios for 30-day postoperative morbidity and mortality outcomes of in the attending-only versus resident plus attending cohorts.

Table 1

Elective 30-Day Overall Morbidity						
	Univariable Regression			Multivariable Regression <sup>†</sup>		
	Odds Ratio	95% Confidence Interval	P-Value	Odds Ratio	95% Confidence Interval	P-Value
Attending Only	1.0			1.0		
Attending and Resident	1.85	1.68 – 2.04	<0.001	1.05	0.93 – 1.18	0.442
Elective 30-Day Mortality						
	Univariable Regression			Multivariable Regression <sup>†</sup>		
	Odds Ratio	95% Confidence Interval	P-Value	Odds Ratio	95% Confidence Interval	P-Value
Attending Only	1.0			1.0		
Attending and Resident	1.79	1.24 – 2.60	0.002	1.01	0.64 – 1.58	0.979
Emergent 30-Day Overall Morbidity						
	Univariable Regression			Multivariable Regression <sup>†</sup>		
	Odds Ratio	95% Confidence Interval	P-Value	Odds Ratio	95% Confidence Interval	P-Value
Attending Only	1.0			1.0		
Attending and Resident	1.64	1.27 – 2.10	<0.001	1.04	0.72 – 1.50	0.827
Emergent 30-Day Mortality						
	Univariable Regression			Multivariable Regression <sup>†</sup>		
	Odds Ratio	95% Confidence Interval	P-Value	Odds Ratio	95% Confidence Interval	P-Value
Attending Only	1.0			1.0		
Attending and Resident	1.08	0.75 – 1.55	0.677	0.84	0.49 – 1.41	0.500

Logistic models for 30-day overall morbidity and mortality for patients undergoing neurosurgical procedures.

## Results

The study population consisted of 16,098 patients who underwent elective neurosurgical procedures. The mean age of all patients was 56.8 ± 15.0 years and 49.8% of patients were women. Overall, 15.80% of all patients had at least one postoperative complication. The resident plus attending cohort demonstrated a complication rate of 20.12%, while patients with an attending-only surgeon had a statistically significantly lower complication rate at 11.70% (p<0.001). In the total population, 263 (1.63%) patients died within 30 days of their surgery. Stratified by operating surgeon status, 162 (2.07%) patients died in the resident plus attending cohort versus 101 (1.22%) in the attending-only group, which was statistically significant (p<0.001). Regression analyses compared patients who had resident participation to those with only attending surgeons, the referent group. Following adjustment for preoperative patient characteristics and co-morbidities, multivariable regression analysis demonstrated patients with resident participation in their surgery had the same odds of 30-day morbidity (OR=1.05; 95% CI:0.94-1.17) and mortality (OR=0.92; 95% CI:0.66-1.28) outcomes as their attending-only counterparts.

## Conclusions

Cases with resident participation had higher rates of mortality and morbidity; however, these cases also involved patients with higher co-morbidities. On multivariate analysis, resident participation did not increase the odds of postoperative 30-day morbidity or mortality over attending-only cases in elective neurosurgery.

## Learning Objectives

1. Operations with a resident plus attending demonstrated a complication rate of 20.12%, while operations with an attending-only had a statistically significantly lower complication rate at 11.70% (p<0.001).
2. The death rate of patients in the resident plus attending cohort (2.07%) was statistically significantly higher than the attending-only cohort (1.22%).
3. On multivariate analysis, resident participation did not increase the odds of postoperative 30-day morbidity or mortality over attending-only cases in elective neurosurgery.

## References

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