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

	Univariable Regression			Multivariable Regression[§]		
Elective 30-Day Overall Morbidity						
	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[†]		
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[§]		
	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[†]		
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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