



# Does Resident Involvement in Thyroid Surgery Lead to Increased Postoperative Complications?

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## ABSTRACT

### OBJECTIVES:

To evaluate the impact of resident involvement during thyroid surgery on 30-day postoperative complications.

### STUDY DESIGN:

Retrospective cohort study.

### METHODS:

All patients who underwent thyroid surgery in 2011 were identified from the American College of Surgeons National Surgical Quality Improvement program database. Patient demographics, perioperative details, resident involvement in surgery, and 30-day postoperative complications were extracted. Propensity-score analysis was used to match resident and non-resident cases. Univariate and multivariate analysis were performed to determine the relationship between resident involvement in thyroid surgery and postoperative outcomes.

### RESULTS:

One thousand seven hundred and forty seven patients with and 1,747 without resident involvement were case-matched for patient demographics, perioperative variables, and surgical case type. There was no significant difference ( $p = 0.19$ ) in thirty-day postoperative complication rates of surgeries with and without resident involvement, which were 1.4% and 2%, respectively. Operative time was longer in surgeries with residents than those without residents ( $119 \pm 67$  minutes vs.  $102 \pm 55$  minutes,  $p < 0.001$ ). Cases with resident involvement had an unplanned reoperation rate of 0.9%, which was significantly lower than the rate of surgeries without residents of 2% ( $p = 0.001$ ). Multivariate analysis revealed no significant association between resident involvement and overall complications (odds ratio = 0.70;  $p = 0.18$ ).

### CONCLUSION:

Resident participation in thyroid surgery was not associated with an increased 30-day postoperative complication rate. These findings demonstrate patient safety is not adversely affected by resident participation in thyroid surgery.

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## INTRODUCTION

- Residency provides an avenue for mentorship and a graded operative experience, which is integral in building surgical expertise.<sup>1-3</sup> Although residency is an imperative component of surgical training, the impact of resident involvement in surgery on patient postoperative outcomes is an area of concern.<sup>4</sup>
- The risk of postoperative complications following thyroid surgery has been shown to be inversely associated with a surgeon's case volume.<sup>5,6</sup> Considering a resident's relatively low surgical volume, the effect of resident participation during thyroid surgery on postoperative complications warrants further investigation.
- This study aims to further evaluate the impact of resident participation during thyroid surgery on postoperative complications using the American College of Surgeons National Quality Improvement Program (ACS-NSQIP) 2011 database and propensity-adjusted multivariate analysis.

## METHODS AND MATERIALS

- The 2011 ACS-NSQIP dataset was used to identify all patients who underwent thyroid surgery. The Current Procedural Terminology (CPT) codes used to identify cases included 60210, 60212, 60220, 60225, 60240, 60252, 60254, 60260, 60270, and 60271. Patients were excluded if data for any variable analyzed was not reported.
- The data collected included patient demographics, patient comorbidities, perioperative variables including resident participation, and postoperative complications within thirty days of surgery.
- Two cohorts were created based on the presence or absence of residents during surgery. Propensity score analysis was used to match the cohorts. Univariate analysis was performed to determine if an association between resident involvement in thyroid surgery and postoperative outcomes existed. Multivariate logistical regression analysis was performed to determine risk factors for overall postoperative complications.

**Table 2. Multivariate analysis of risk factors associated with thyroid surgery postoperative complications**

	Odds Ratio [95% CI]	P Value
Resident Present	0.7 [0.417-1.177]	0.18
Age	1.023 [1.002-1.044]	0.03
Diabetes	1.695 [0.904-3.176]	0.1
Hypertension	1.757 [0.956-3.231]	0.07

## RESULTS

- After case matching, no statistically significant difference between cohorts was found for age, body mass index (BMI), sex, race, CPT codes, patient comorbidities, wound classification, ASA classification, or total work relative value unit.
- The total 30-day complication rate was 1.4% without resident involvement and 2% with resident involvement. The difference in total complications rates between the two cohorts was not statistically significant ( $p = 0.19$ ).
- Operative times were significantly longer during surgery with a resident present at 119 minutes (S.D. 66.50 mins.) compared to 102 minutes (S.D. 54.95 minutes) with an attending alone ( $p < 0.001$ ). Cases with resident involvement had an unplanned reoperation rate of 0.9%, which was significantly lower than the reoperation rate without resident involvement of 2% ( $p = 0.001$ ).
- Multivariate analysis revealed no statistically significant association between surgeries with resident involvement and occurrence of postoperative complication ( $p = 0.18$ ).

**Table 1. Univariate analysis of thyroid surgery postoperative complication rates**

	Resident Not Present N=1747	Resident Present N=1747	P Value
Operation Time (min), mean (SD)	102.21 (54.95)	119.22 (66.50)	<0.001
Total Length of Stay (days), mean (SD)	1.48 (1.30)	1.28 (2.63)	0.375
Overall Complications	2	14	0.193
Surgical Complications	1	7	0.763
Any	0.3	0.3	1
Superficial SSI	0.2	0.2	1
Deep SSI	0.1	0	1
Organ Space SSI	0.1	0.1	1
Medical Complications	1	7	0.204
Any	1.7	1.2	1
Pneumonia	0.3	0.3	1
Unplanned Intubation	0.6	0.5	0.49
Pulmonary Embolism	0.1	0	1
Ventilator > 48 hrs.	0.2	0.3	0.754
Urinary Tract Infection	0.6	0.2	0.07
Stroke	0.1	0.1	1
Peripheral Nerve Injury	0.1	0	1
Cardiac Arrest	0.1	0.1	1
Myocardial Infarction	0	0.1	0.5
DVT	0.1	0.1	1
Sepsis	0.1	0.2	0.375
Unplanned Reoperation	2.3	0.9	0.001
Mortality	0.1	0.1	1

Abbreviations: SSI=Superficial Surgical Incision Infection; SSI, Deep Vein Thrombosis (DVT)

## DISCUSSION

- Multiple single institutional studies have shown overall postoperative complication rates do not increase when residents were involved in thyroid surgery.<sup>7-9</sup> The aim of this study was to further evaluate resident influence on surgical outcomes following thyroid surgery using propensity score analysis to control for confounding factors including patient demographics.
- Congruent with previous literature, the present study found no statistically significant difference in the 30-day surgical or medical postoperative complication rates after thyroid surgery with or without resident involvement using univariate analysis. In addition, multivariate logistic regression with propensity-matched analysis revealed resident participation was not a significant risk factor for postoperative complications.
- The propensity-matched analysis has not been conducted in prior literature on resident involvement in thyroid surgery and is a major strength of this study. By using propensity-matched cohorts, the study controlled for differences in patient demographics and comorbidities.
- This study has several limitations primarily related to the variables excluded from the ACS-NSQIP database. The database only reports complications within thirty days of primary surgery. In addition, postoperative hypocalcemia or laryngeal nerve injury are not included in the data set. Finally, no information is included on the extent of resident involvement within each surgery.

## CONCLUSION

- This study found that resident participation in thyroid surgery did not result in increased postoperative complication rates.
- These findings further affirm postoperative surgical outcomes are not adversely affected by resident involvement in thyroid surgery.

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