

Risk factors for 30-day hospital readmission after thyroidectomy and parathyroidectomy in the United States: An analysis of National Surgical Quality Improvement Program outcomes

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Background. The 30-day readmission rate is a quality metric under the Affordable Care Act. Readmission rates after thyroidectomy and parathyroidectomy and associated factors remain ill-defined. We evaluated patient and perioperative factors for association with readmission after thyroidectomy and parathyroidectomy.

Methods. The American College of Surgeons National Surgical Quality Improvement Program Participant Use File (2011) data for thyroid (n = 3,711) and parathyroid (n = 3,358) resections were analyzed. Patient- and operation-related factors were assessed by univariate and multivariate analyses.

Results. Among 7,069 patients, 30-day readmission rate was 4.0%: 4.1% after thyroidectomy and 3.8% after parathyroidectomy. Significant associations for 30-day readmission included declining functional status (odds ratio [OR], 6.4–10.1), preoperative hemodialysis (OR, 2.6; 95% CI, 1.5–4.7), malnutrition (OR, 3.4; 95% CI, 1.2–10.1), increasing American Society of Anesthesiologists class (OR 1.3–4.7), unplanned reoperation (OR, 61.6), and length of stay (LOS) <24 hours (OR, 0.61; 95% CI, 0.45–0.85; all P < .05). Readmission was associated with greater total and postoperative LOS and major postoperative complications, including renal insufficiency (all P < .01).

Conclusion. Thirty-day readmission after cervical endocrine resection occurs in 4% of patients. Discharge within 24 hours of operation does not affect the likelihood of readmission. Risk factors for readmission are multifactorial and driven by preoperative conditions. Decreasing the index hospital stay and preventing major postoperative complications may decrease readmissions and improve quality metrics. (*Surgery* 2014;156:1423-31.)

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RECENT ESTIMATES SUGGEST that 6.6% of the US population has thyroid disease with as many as 50% of asymptomatic patients harboring thyroid nodules, and an estimated 0.86% of the general population has clinical or laboratory evidence of primary hyperparathyroidism.^{1,2} Thyroidectomy and

parathyroidectomy are common operative procedures with >100,000 thyroidectomies and 17,000 parathyroidectomies performed annually.³ These operations are performed by general surgeons and otolaryngologists with or without subspecialty training in both university and community medical centers. The morbidity and mortality of thyroid and parathyroid surgery are estimated to be 3.5% and 0.11%, respectively.⁴ Considering these excellent outcomes, there is a growing literature supporting outpatient thyroid and parathyroid surgery, with same-day discharge as safe and cost effective for properly selected patients.⁵⁻¹²

Hospital readmission has become an area of increasing interest and recently has become a quality metric by which providers and hospitals

Presented at the American Association of Endocrine Surgeons 35th Annual Meeting, April 2014, Boston, Massachusetts.

Accepted for publication August 21, 2014.

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0039-6060/\$ - see front matter

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<http://dx.doi.org/10.1016/j.surg.2014.08.074>

may be measured. Overall, nearly 20% of Medicare patients are rehospitalized within 30 days of discharge. Under the Affordable Care Act, hospitals now face increased scrutiny for excessive readmissions, with the Centers for Medicare & Medicaid Services (CMS) passing recently the Hospital Readmission Reduction Program. In accordance with regulations effective October 1, 2012, any hospital with 30-day readmission rates that fall outside the expected range for these diagnoses face a decrease in their total Medicare reimbursement for fiscal 2013.¹³ Cuts in reimbursement will increase from 1 to 3% in 2014, and the conditions included in the Hospital Readmission Reduction Program are expected to expand to include elective surgery by 2015.¹⁴

Currently, nationwide rates of readmission after thyroidectomy and parathyroidectomy are not well established in published literature. Moreover, reasons for readmission to the hospital after cervical endocrine surgery remain ill-defined. The purpose of this study was to evaluate the contribution of patient- and operation-related risk factors, as well as the influence of discharge within 24 hours of operation on unplanned 30-day hospital readmission after thyroidectomy and parathyroidectomy. We hypothesize that patients with more medical comorbidities, as well as those with postoperative complications, will have a greater rate of hospital readmission within 30 days.

METHODS

Dataset. Patient records for elective thyroid and parathyroid resections were obtained using the 2011 American College of Surgeons National Surgical Quality Improvement Program Participant Use File (ACS NSQIP PUF), which included 442,149 cases from 315 hospitals. The PUF is a nationwide, robust, comprehensive dataset designed to improve the quality of surgical care. NSQIP PUF methodology and risk stratification are described elsewhere.¹⁵ Patients included in the dataset have required 30-day follow-up, which would capture readmissions to a facility other than the facility at which the index procedure was performed.

Patients. A total of 7,069 elective cervical endocrine cases were identified, 3,711 thyroid and 3,358 parathyroid resections. Cases performed on an urgent and emergent basis, as well as those with a preoperative length of stay (LOS) of >0 days were excluded.

Variables were selected in an a priori fashion. Preoperative variables included patient demographics, preoperative diagnosis for index hospitalization, and preexisting medical comorbidities.

Weight loss of >10% body weight served as a proxy for malnutrition. The estimated probability of morbidity and mortality provided in the ACS-NSQIP database are calculated indices based on patient preexisting baseline characteristics, procedural risk factors, and preoperative laboratory results. Postoperative variables of interest included medical and surgical complications and unexpected reoperation within 30 days of the index operation for intervention of any kind. LOS <24 hours was examined, but owing to limitations of the dataset, this parameter includes both patients discharged on the same calendar day of their operation and those with overnight observation. The primary endpoint was unplanned hospital readmission within 30 days of index hospitalization discharge.

Unadjusted variable comparisons as a function of hospital readmission status were performed using the Pearson Chi-square test for categorical data and the Student's *t* test for normally distributed continuous variables or the Mann-Whitney *U* tests for non-normally distributed continuous data. Clinical variables with univariate associations with likelihood for readmission at a significance level of $P < .05$ were then entered into a logistic regression model to determine adjusted association with readmission status. Results of the multivariable regression model are reported as adjusted odds ratios (OR) with 95% CI. In our sensitivity analysis to validate model results, the original model was reestimated after removing sequentially the most significant covariates as measured by the Wald statistic. Thus, the potential for spurious results was reduced if the originally observed effect was not substantially attenuated and remained statistically significant after reestimation.¹⁶ SPSS Version 21.0 (SPSS, Inc, Armonk, NY, 2011) was utilized for all statistical calculations.

RESULTS

The overall 30-day readmission rate after cervical endocrine surgery was 4.0% ($n = 280$). Readmission rates after thyroidectomy and parathyroidectomy were 4.1% ($n = 153$) and 3.8% ($n = 127$), respectively. The frequency of patient demographics and clinical risk factors for all patients undergoing elective thyroidectomy and parathyroidectomy are summarized in [Table I](#). Of particular note, preoperative variables associated with a greater risk of readmission included diabetes, chronic obstructive pulmonary disease, chronic hemodialysis, steroid use, and recent weight loss. Dependent functional status, increasing American Society of Anesthesiologists

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