Predicting operative times is a common tool for structuring surgical schedules and has implications in terms of utilization management, decreasing OR costs, and patient satisfaction; however, it is fraught with inaccuracies. The aim of this study was to evaluate thyroidectomy surgeries across a hospital system to determine the degree of error involved in an established prediction system and identify preoperative variables that correspond to longer operative times. In this retrospective chart review, thyroidectomies within a hospital system were evaluated for demographic data, comorbidities, and ultrasound information (presence of nodules, nodule size, thyroid volume). Analyses were completed to determine preoperative factors with significant correlation (p < 0.05) to inaccurate operative time predictions. 943 surgeries were evaluated from 1/3/2013 to 12/30/2016. Analysis revealed BMI (p = 0.041), hypothyroidism (p = 0.048), multinodular goiter (p = 0.021), and thyroid volume (0.025) were associated with increased operative times. The current results demonstrate objective, preoperative variables which correlate to longer operative times in thyroidectomy surgeries. Correcting these factors can enhance the surgeon’s ability to predict operative duration. Further, incorporation of this information into predictive models can ultimately streamline and improve operative time predictions on a larger scale.

Methods and Materials

Retrospective chart review was conducted utilizing the Geisinger Health System (GHS) EHR to retrieve data from all thyroidectomies performed from 1/3/2013-12/30/2016. Initial data focused on direct comparison of scheduled operative times (based on individual surgeon and documented prep-CPT code) to the post-operatively documented operative time. From this, a mean absolute error was calculated elucidating the degree of inaccuracy with the current predictive model. Secondly, data was extracted from the EHR to include patient characteristics (age, gender, BMI, comorbidities) and thyroid related diagnoses (inflammatory thyroid disease, malignancy, multinodularity). Using NLPhiX’s mining on form-free notes from ultrasounds performed prior to surgeries, critical additional discrete elements to calculate total thyroid volume were added to the data set. The association between patient characteristics and surgical duration was assessed using t-tests for continuous or two level variables while ANOVA was used for three or more level variables. Multivariable linear regression was then used to find all factors associated with surgical duration. Variables were selected using a backwards elimination technique where the significance level for removing effects to the model was set at 0.20. Data was represented as β estimates and standard errors. SAS 9.4 (SAS Institute, Cary NC) was used for all the statistical analyses and a p-value < 0.05 was considered statistically significant. A preliminary regression model was generated utilizing this data to leverage the thyroid volume along with general type of thyroidectomy and preoperative ultrasound data (presence of multinodularity, total thyroidectomy, subtotal thyroidectomy, and total thyroidectomy with neck dissection) leading to more accurately scheduled cases.