Problem Statement
Previous work from bariatric surgery researchers have attempted to quantify the risks of the surgery, but improvements can be made to enable doctors and patients to be more aware of surgical risks. Using 5 years of MBSAQIP data we estimate the 30-day death, 30-day reoperation, 30-day readmission, 30-day venous thrombosis (VTE), and length of hospital stay using high-performing, interpretable machine learning models.

What is Bariatric Surgery?
Bariatric surgery is a procedure that modifies the digestive system to assist in weight loss. There are two popular options currently used: sleeve gastrectomy and gastric bypass.

Analytics Approach
Our approach follows previous work by using MBSAQIP data and considering logistic regression. Our contribution comes from creating separate models for each surgery type to allow for variation in coefficients. We assessed the performance of state-of-the-art architectures but opted to use logistic regression when considering interpretability and performance. Lastly, we add feature selection, regularization, concurrent procedures, and venous thrombosis and length of stay models.

Interpretable and Independent Coefficients
This new approach yields models that include between 10 and 17 risk factors compared to the baseline models, which all use 25 different risk factors. By having fewer risk factors in the model, doctors have better insight into the true risks. This approach allows for certain risks to be greater for the sleeve than the bypass which previously attainable in previous models where the surgery type is used as an input that affects all patients uniformly. For example, in the 30-day death model, patients who have a myocardial infarction are at lower risk from a bypass. Odds ratios of 1 signify no additional risk. Features below the dotted lines are continuous variables.

Impact

Jane, 68
BMI: 40.5
Risk Factors:
Sleep Apnea
Hyperlipidemia
High Blood Pressure
Concurrent Enteral