Intraoperative blood pressure is a correlated with various postoperative outcomes such as acute kidney injury and mortality. Previous studies have shown: 1) assessments of intraoperative blood pressure curves to determine time under a certain mean arterial pressure (MAP) and metrics of blood pressure variability are associated with 30-day postoperative mortality after noncardiac surgery, and 2) the slope of systolic and diastolic blood pressure curves correlate to physiologic vascular stiffness. Using this information as building blocks we have built a model to provide guidance on blood pressure maintenance during surgery.

**Objectives**

We created several models in attempts to find one that would predict in-hospital mortality the best. In addition we utilized methods to tune our model’s hyperparameters and pruned our feature space based on feature importance and cross validation methods. The precision recall curves for each of our models are shown in Figure 1. We had varying degrees of precision and recall across our models as shown in Table 1. The threshold and maximized precision for each model are denoted by X’s.

Figure 1—Precision Recall Curves for Models

The threshold and maximized precision for each model are denoted by X’s.

**Materials and Methods**

After applying exclusion criteria, we obtained a final cohort size of 3032 elevated risk non cardiac surgery patients care for at Johns Hopkins Hospital. Only 3% of patients experienced in-hospital mortality, thus, we used SMOTEENN to rebalance training data to have 47% alive and 53% deceased.

Time-weighted average (TWA) of the mean arterial pressure (MAP): 1) calculated MAP as the average arterial pressure throughout one cardiac cycle 2) calculated TWA as the area above and below several threshold values. Ambulatory arterial stiffness index: calculated as 1 minus the regression slope of diastolic over systolic blood pressure.

**Introduction**

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**Results**

Table 2—Top 10 Features Before and After Pruning

Features in red are features that fell out of the top 10 after pruning while features in green are features that moved up in importance post-pruning.

Table 3—Comparison to Other Similar Models in Literature

These other models either had smaller number of patients, had the type of surgery, had follow up study and used different hemodynamic dataset.

**Conclusion**

This is not the first study that tries to incorporate intraoperative data in predicting the surgery outcome. Intraoperative data has been used in both the cardiac and noncardiac surgeries to improve the risk-stratification model and the inclusion of intraoperative data generally improved the AUC. In a risk-stratification model built with 2901 patients who received cardiac surgery, the AUC improved from 0.75 to 0.79. The AUC also improved from 0.72 to 0.82 in an acute kidney injury prediction model made with 101 patients who received noncardiac surgery. Our Model had a similar AUC with 0.80 while utilizing variables that are more easily obtained. Unfortunately our derived measures for blood pressure and variability and vascular stiffness were not found as important features in our model.

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