

To develop and compare ML models against LR for predicting prolonged LOS and identifying key risk factors in a Middle Eastern bariatric surgery cohort.

Predictive Modeling Of Prolonged Hospital Stay After Bariatric Procedures: Machine Learning And Logistic Regression Approaches In A Middle Eastern Cohort

Juan S. Barajas-Gamboa, MD; Kevin Zhan, BSC; Gabriela Restrepo-Rodas, MD; Juan Cruz Lopez Meyer, MD; Carlos Abril, MD ; Javed Raza, MD ; Alfredo D. Guerron, MD; John Rodriguez, MD; Juan Pablo Pantoja, MD

Methods

- We analyzed data from primary bariatric surgery patients from 2019 to 2023
- Prolonged LOS was defined as having a LOS greater than two standard deviations from the mean
- We developed models to predict prolonged LOS:
 - ✓ ML: Random Forest, XGBoost, Adaboost, Catboost, Naïve Bayes, SVM and MLP
 - ✓ LR models

Baseline Characteristics

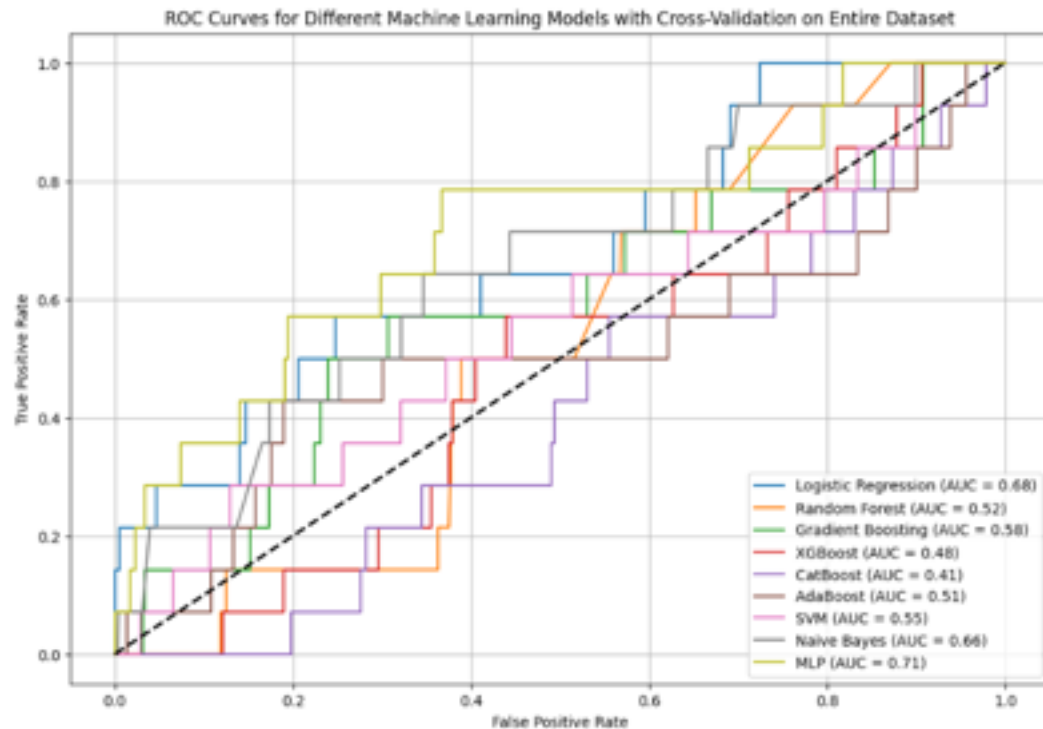
Sleeve gastrectomy (n=1,174)

Roux-en-Y Gastric Bypass (n=583)

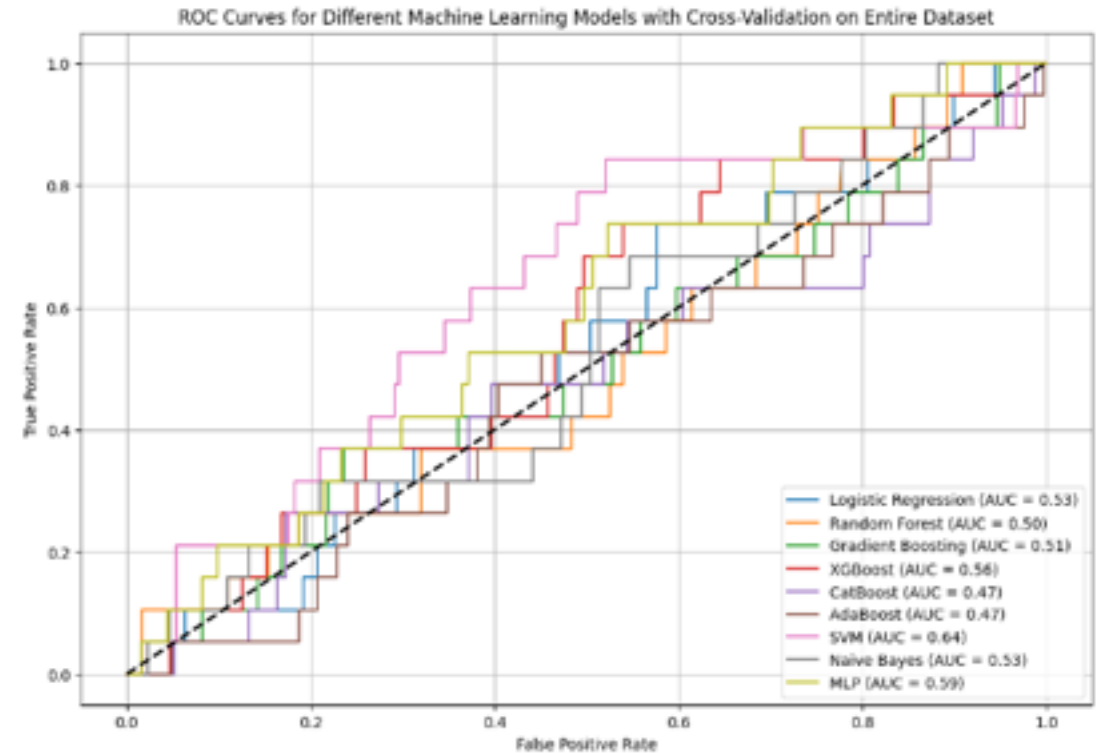
Age	• 32.66 ± 11.05 years	$p < 0.001$	• 38.35 ± 10.62 years
BMI	43.35 ± 6.80 kg/m ²	$P < 0.001$	• 41.03 ± 5.03 kg/m ²
	• Diabetes mellitus, GERD and current smoker showed significant differences		

Machine learning models to predict prolonged LOS by surgical technique

Sleeve gastrectomy (n=1,174)



Roux-en-Y Gastric Bypass (n=583)



- Model performance was assessed using area under the receiver operating characteristic curve (AUC-ROC).

Significant Risk Factors for Prolonged LOS

Sleeve gastrectomy (n=1,174)

Anticoagulation	OR 23.72 (CI 95%: 1.43-394.67)	<0.001
PCS	OR 22.86 (CI 95%: 4.30-121.59)	<0.001
PVT	OR 17.74 (CI 95%: 3.46-90.96)	<0.001
BMI	OR 1.08 (CI 95%: 1.02-1.14)	=0.012

Roux-en-Y Gastric Bypass (n=583)

Severe COPD OR 23.72 (CI 95%: 1.43-394.67) P=0.027

* PCS= previous cardiac surgery; PVT= previous venous thrombosis; BMI= body mass index

Conclusions

- ML models demonstrated **superior** performance in predicting prolonged LOS after primary bariatric surgery
- Both approaches identified common risk factors, while ML models uncovered additional predictors