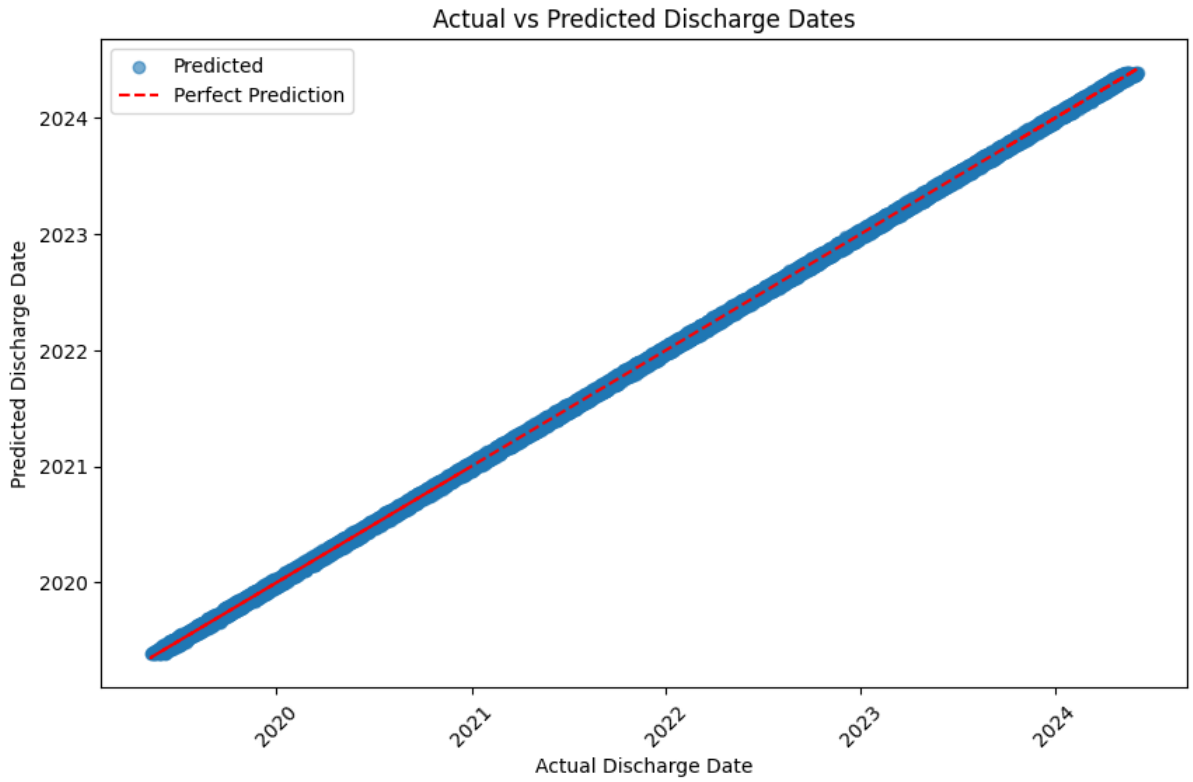
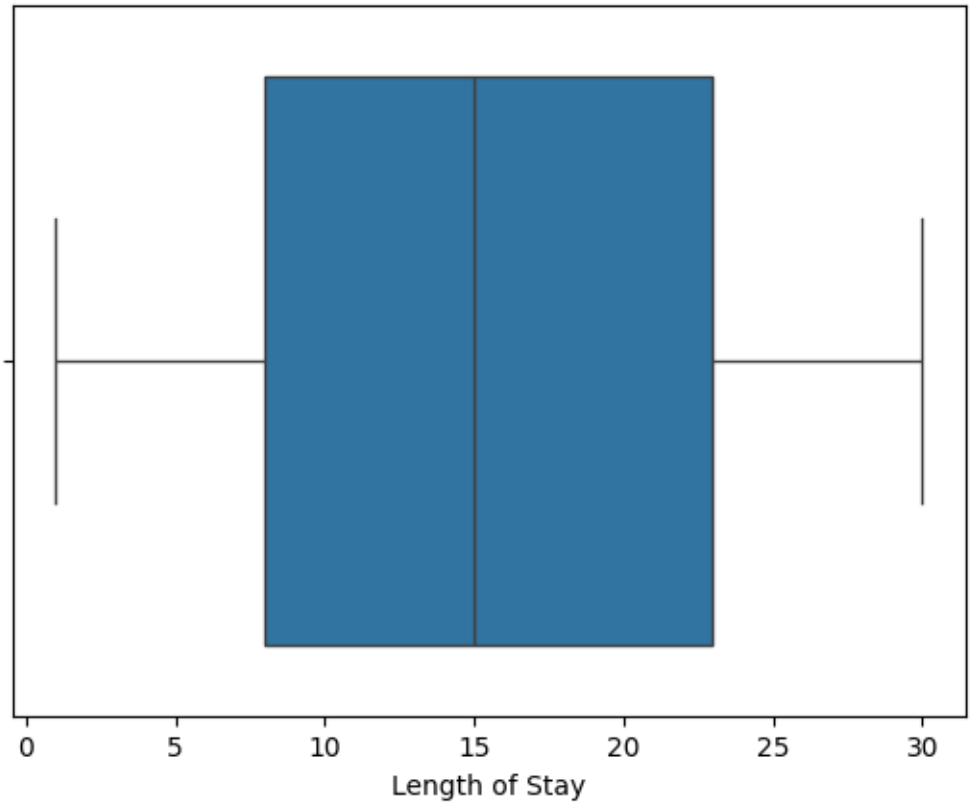
Task 1:

The **red dashed line** represents the perfect prediction line.
The **blue scatter points** (predicted discharge dates) are very close to the perfect prediction line, indicating high accuracy.
Minor deviations suggest small prediction errors.





I am using Length of Stay because date format not suitable for regression model.

Comparison of models for Task 1:

Linear Regression Mean Absolute Error: 7.48

Linear Regression RMSE: 8.63

XGBoost Regression Mean Absolute Error: 7.32

XGBoost Regression RMSE: 8.50

Here we can see XGBoost model gives better performance than linear regression if we do more hyperparameter tuning with more data set then it will give more accurate results.

Business implications and suggestions for hospital bed management.

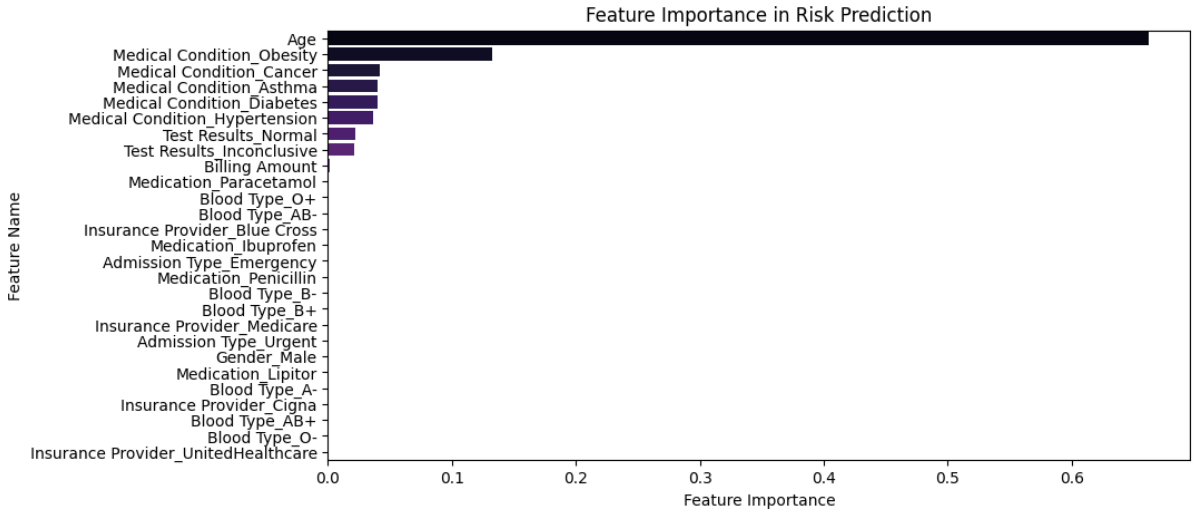
Predicting discharge dates accurately helps hospitals free up beds in advance, reducing waiting times for incoming patients. Efficient bed turnover increases the number of patients treated, boosting hospital revenue while reducing overtime labor costs. Reduced waiting times and timely discharges improve patient experience and increase hospital ratings.

Use predictive models to notify doctors and nurses in advance about patients likely to be discharged. If a model predicts higher patient inflow, hospitals can adjust shift schedules to ensure adequate staff availability.

Task 2:

Feature importance :

Here we can see age column affect more decision of model and medical condition and test result affect after age column. Generally, in real life also age and medical condition decide time to take cure and risk of patient



Confusion matrix:

True Negatives :7790

False Positives: 122

False Negatives: 230

True Positives: 2958

There are more false negatives than false positives, suggesting the model is somewhat more likely to miss positive cases than to generate false alarms