Problem statement:

The cost of readmissions is large, they negatively impact patients’ quality of life and cause undue strain on the medical staff. Additionally, hospital executives are interested in learning more about the diabetic patient profile for historical records and the identified most likely to readmit. The main idea is to create machine learning model for diabetic patients to identify patterns and trends that may increase the probability of readmission. Provide recommendations.

Model:

3 Models were created: Random Forest, Logistic regression, and Decision tree.

The models were evaluated by the number of true positives. The decision tree model has the highest number of true positives, 400, compared to 240 for Random Forest and 200 for logistic regression.

The Decision tree is identified as the most accurate one and was used to find top 100 patients(patients with the highest accuracy)

Findings:

Age

* Prevalent amount of people in the dataset are at the age of 60-70, so we won’t look at the length of the graphs. We will look at the percentages of patients being readmitted or not.
* Patients in the age group of 80-89 have the highest percentage of readmissions (43%) in the full test dataset.
* Our top 100 patients’ dataset indicates that 90% of predicted patients in the same age category of 80-89 were actually readmitted, which proves that this group is at high risk.

Age and Gender

* According to the full data, males in the age range of 70-79 are more likely to be readmitted.
* Our top 100 dataset mostly contains males of the age 70-79, which confirms that this group is at risk.
* For females we can say that the highest percentage of females being readmitted in the full data set is in the age range of 80-89, and the top 100 dataset proves it by having 100% prediction accuracy for females at this age range.

Admission

* In the full dataset, patients with emergency admission type are more likely to be readmitted (42%). Our top 100 dataset mostly contains patients with emergency admission type, which confirms this finding.

Discharged disposition

* 50% of patients from the full dataset transferred to home under care or home health service were readmitted. 90% of patients from the same category in the top 100 dataset that were predicted to be readmitted were readmitted. That means that this is a risk group.

Time

* The percentage of readmissions increases after 6 days in the hospital (55.8%).
* Our top 100 patients dataset indicates that patients staying in the hospital for more than 6 days had a prediction accuracy of 82-100%. This suggests that patients who stay in the hospital for more than 6 days are at high risk of readmission.

Weight

* The prevalent group in the weight category are people with the age of 146-176, however the highest percentage of readmitted patients is in the weight range of 176-206.
* In the top 100 patients the prevalent group is patients in the weight range of 176-206, the group with the highest percentage of readmitted patients in the test dataset. It means that patients in this weight range are more likely to be readmitted.

Based on the patterns and trends identified, here is a potential diabetic patient profile who is at risk of being readmitted:

The patient is likely to be older, falling in the age range of 80-89. However, if the patient is male, he is more likely to be readmitted if he falls in the age range of 70-79. If the patient is female, she is more likely to be readmitted if she falls in the age range of 80-89. According to analysis, race does not play a big difference. This patient is more likely to have an emergency admission type, and after treatment be transferred to home under care or home health service. Also, he is more likely to stay in the hospital for more than 6 days. Finally, it is more likely that this patient falls in the weight range of 176-206.

Recommendations:

* Hospital can consider implementing specific care management programs for patients over the age of 70 to reduce the risk of readmissions. These programs can include social services, and follow-up care coordination and so on.
* Hospital can consider collaborating with primary care providers. This will ensure patients receive appropriate follow-up care after discharge.
* Hospital can consider implementing urgent care management programs for patients with emergency admission types to reduce the risk of readmissions.
* Hospital should make an analysis why patients who stayed there more than 6 days are more likely to be readmitted. It may be the case that they were discharged to early and needed more treatment at the hospital.