Project: Healthcare - Persistency of a drug

Week 10 Deliverables

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Problem Description:

ABC Pharma is facing a significant challenge in understanding the persistency of drug usage as per physician prescriptions. The persistency of drug usage refers to the extent to which patients continue to take their prescribed medications over a specific period of time.

Currently, ABC Pharma Company relies on manual methods to track and analyze drug persistency. This involves reviewing patient records, conducting surveys, and

relying on self-reporting, which can be time-consuming, prone to errors, and lack real-time insights.

To address this challenge, ABC Pharma Company has decided to approach an analytics company to automate the process of identifying drug persistency. The goal is to develop a data-driven solution that can accurately and efficiently track the usage of prescribed medications by patients, enabling ABC Pharma Company to gain valuable insights into the patterns of medication adherence.

Data Understanding:

The target variable in the dataset is the persistency flag. This flag indicates whether a patient was persistent or not in taking their prescribed medication. It serves as the target variable for the analysis, with values such as 'persistent' or 'non-persistent'. Hence the persistency flag is the dependent variable which means other factors determine whether a patient was persistent or non-persistent with the drug.

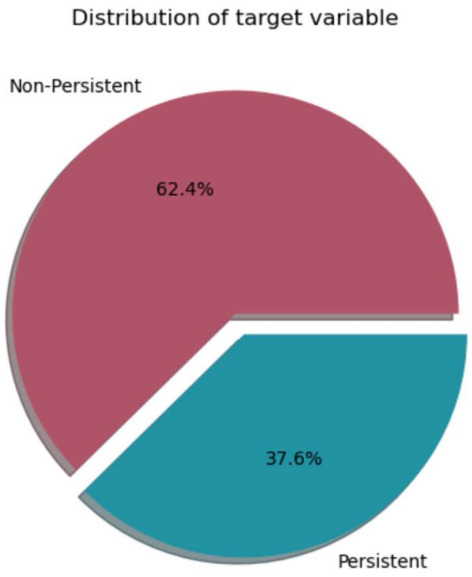
Adherence refers to the extent to which patients follow their prescribed medication regimens. It is an important factor in accessing the effectiveness of treatments and patient outcomes. The adherence-related features in the dataset provide insights into the patient's medication adherence behaviors.

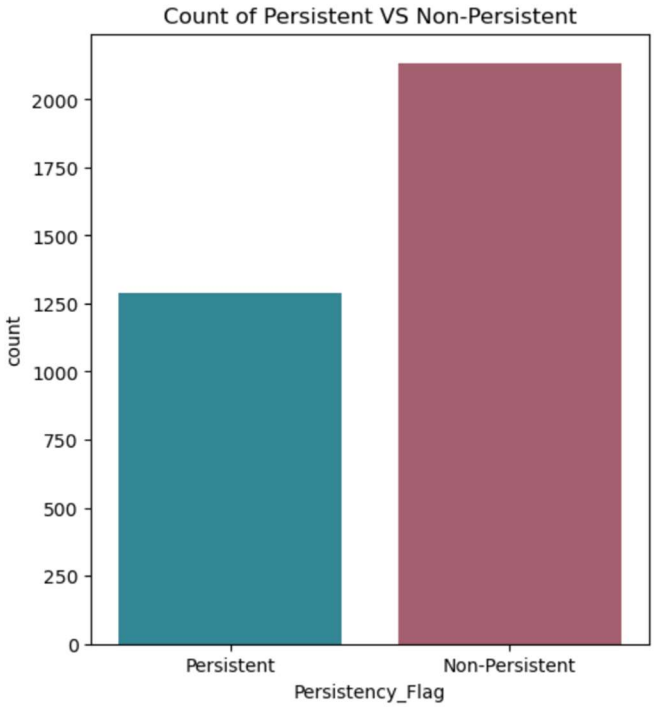
Understanding adherence patterns and factors affecting adherence is crucial for pharmaceutical companies like ABC Pharma to evaluate the effectiveness of their drugs and develop strategies to improve patient adherence. By analyzing the adherence-related features, ABC Pharma can gain insights into medication-taking behaviors, identify potential barriers to adherence, and tailor interventions to improve patient compliance and persistency.

Exploratory Data Analysis:

Persistency rate:

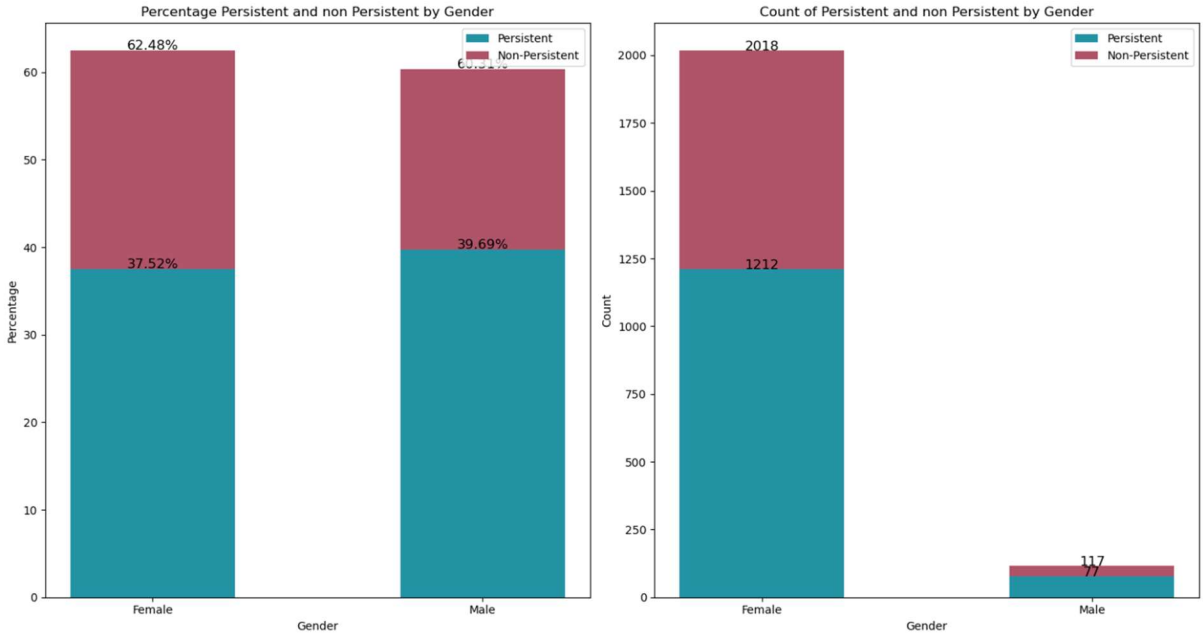
There are 37.6% of patients are persistent in taking prescription drugs while 62.4% are non-persistent.





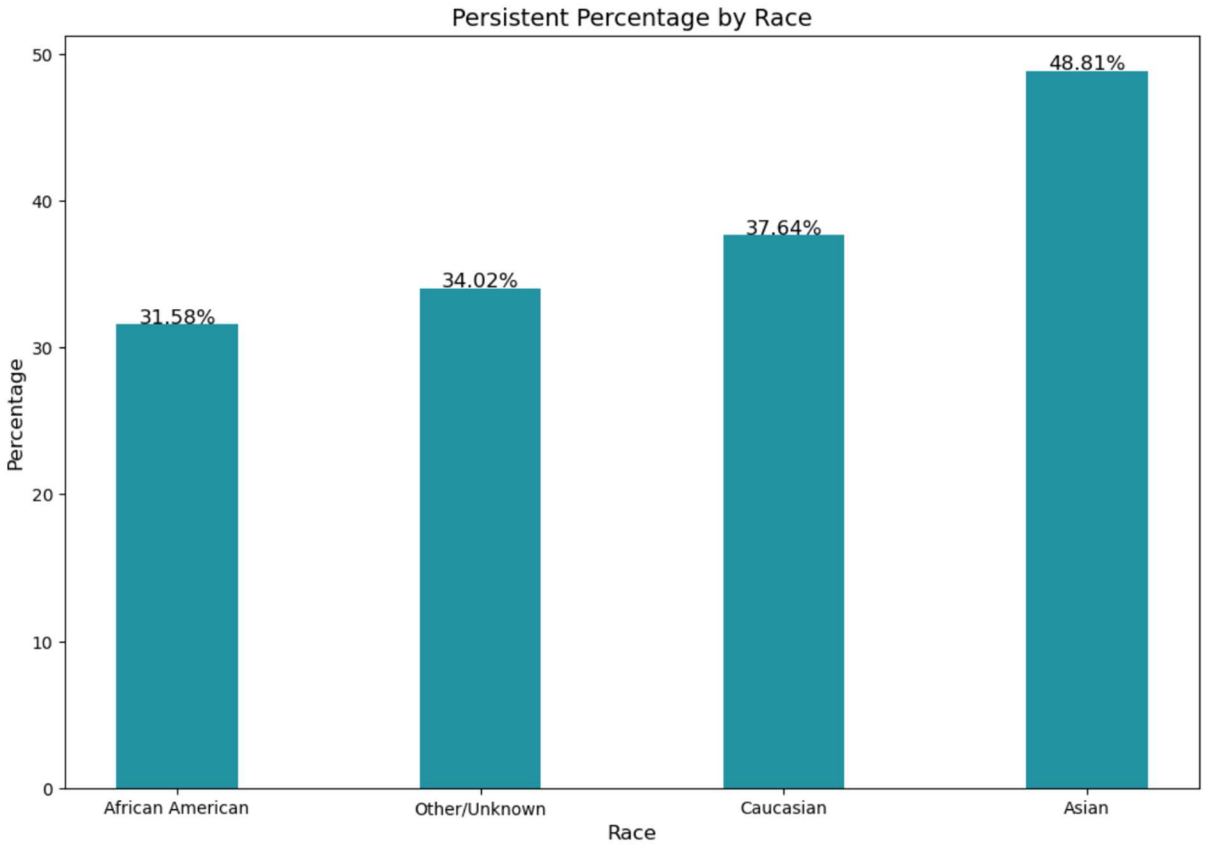
Persistent percentage by Gender

Women patients filled more prescription drugs as compared to men. Men are slightly more persistent than women. Male patients are persistent 39.69% as compared to female patients who are 37.52% persistent.



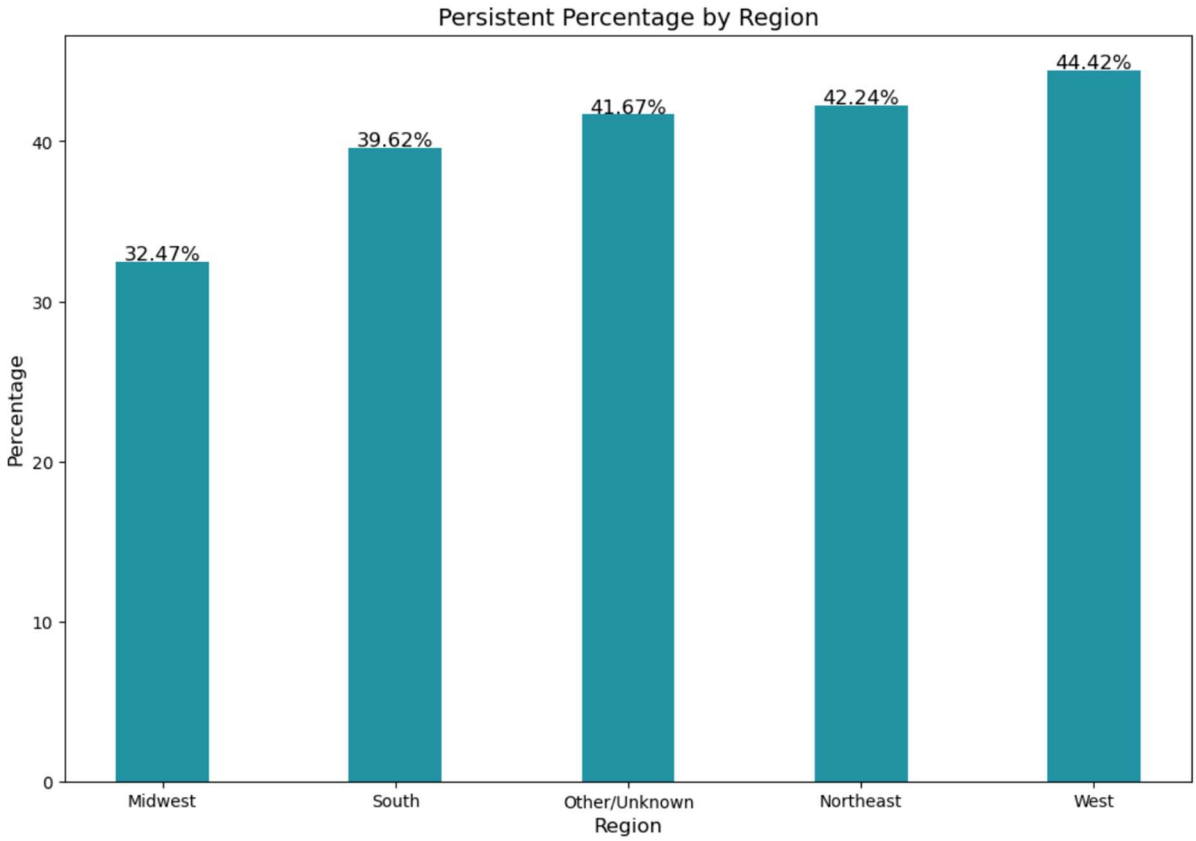
Persistent percentage by Race

The highest percentage (48.81%) of patients who are persistent in taking prescription drugs is among Asians, while the lowest percentage of persistent patients is among African Americans (31.58%).



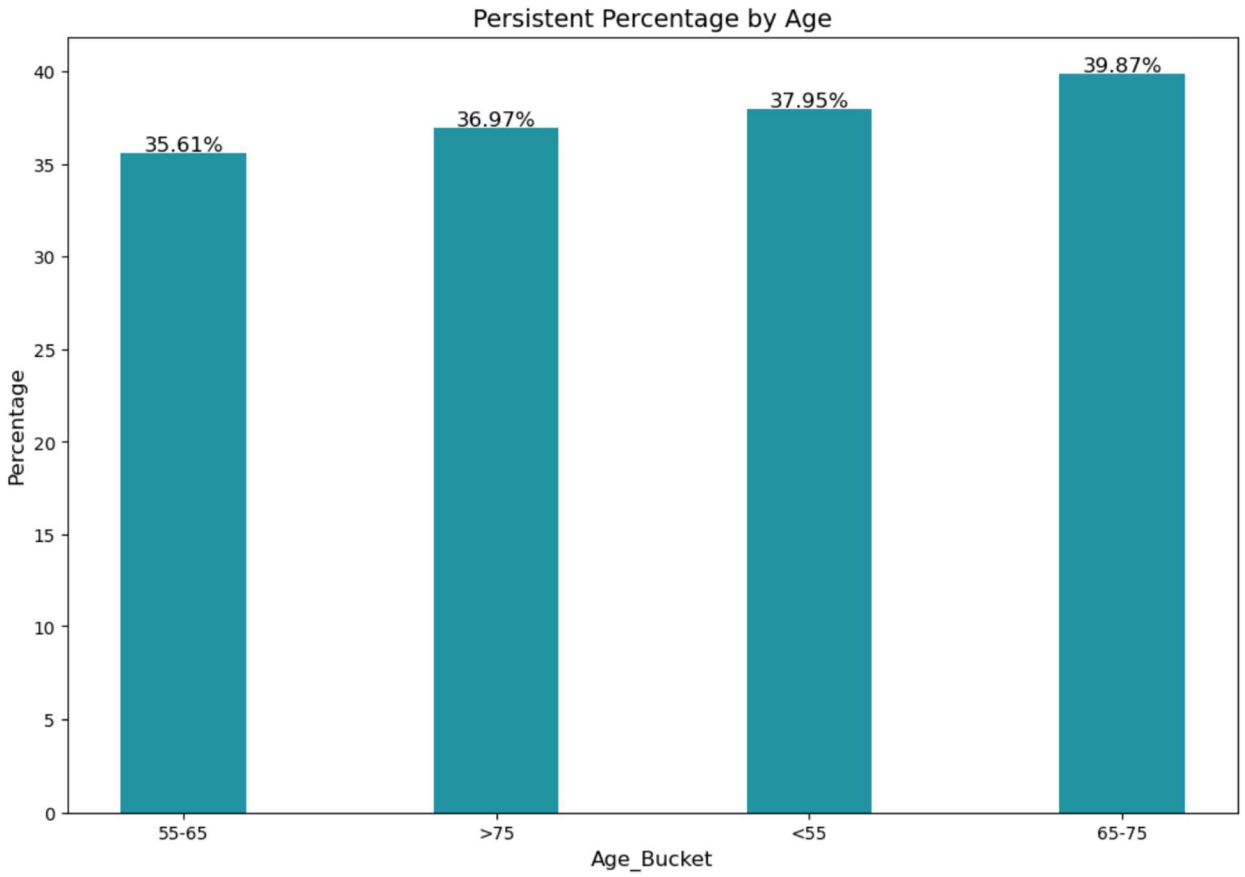
Persistent percentage by region

The highest percentage of persistent patients i.e., 44.42% are from the West region and lowest persistent patients i.e., 32.47% are from Midwest. The persistent customers are 12% higher from the West when compared to Midwest.



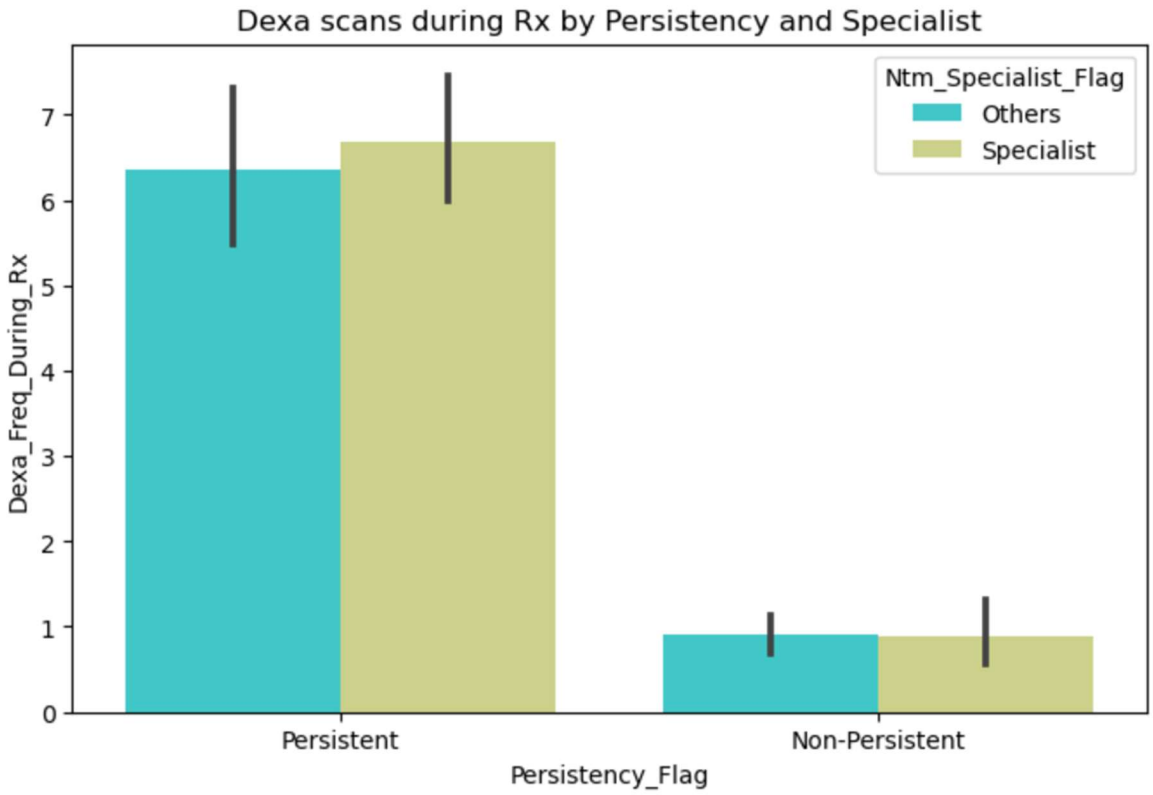
Persistent percentage by Age_Bucket

There is no much difference between Persistent patients across different age buckets. Highest persistent are of age group 65-75 and lowest in the age group of 55-65.



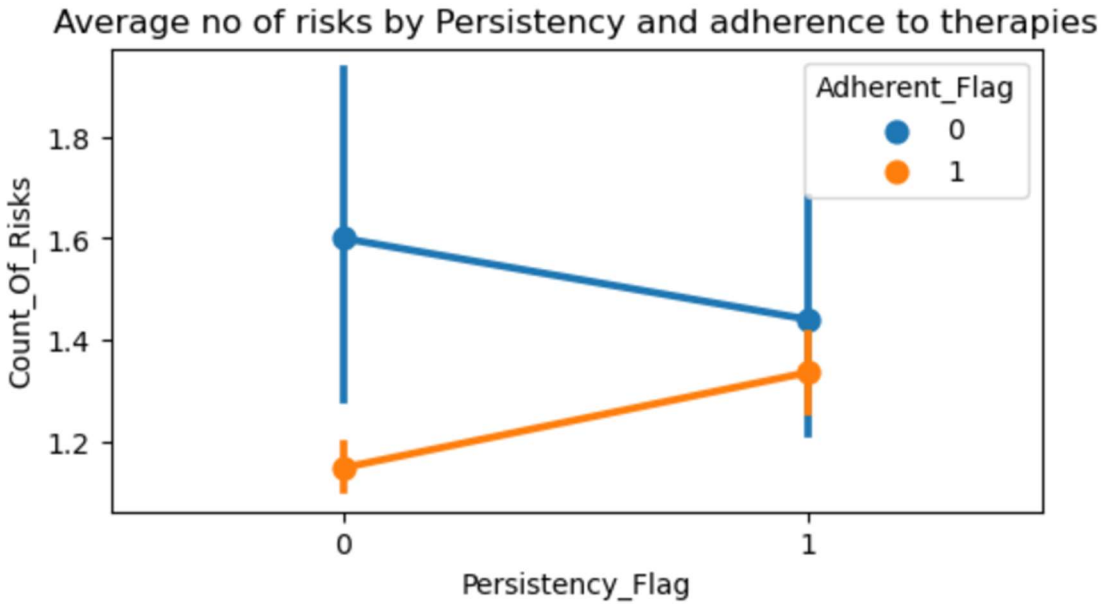
Dexa scans during Rx by persistency and Specialist

Dexa scans during Rx are high for persistent patients who got prescribed by NTM Specialist. There is no difference for NTM Specialist and others in Dexa scans for non-persistent patients.



Count of risks by persistency and Adherent_Flag

The count of risks for Persistent patients are high for non-adherent and low for Adherent patients. Similarly, for Non persistent patients, the count of risks is high when patients are non-adherent.



Data Cleansing:

Null values:

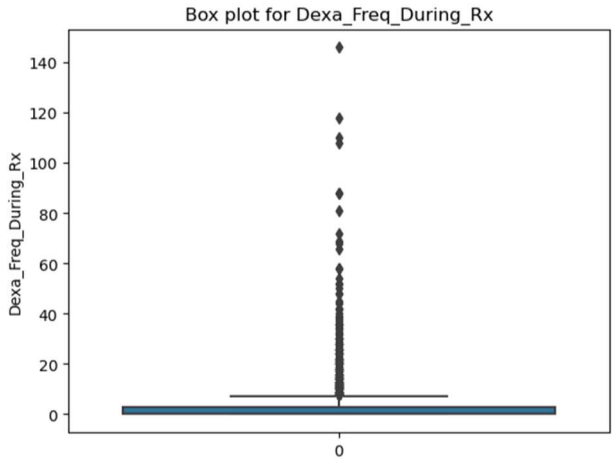
There are no null values in the dataset. So, no need to handle NA or missing values.

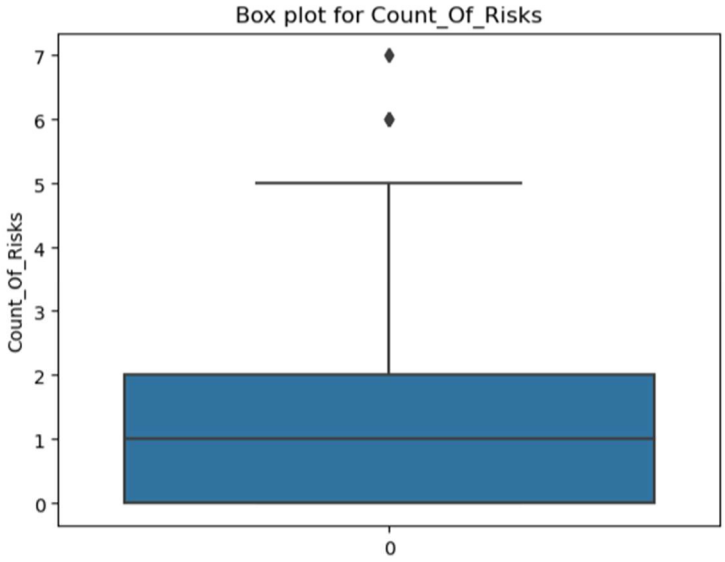
Duplicate values:

There are no duplicate values in the dataset.

Outlier Analysis:

There are outliers for Dexa_Freq_During_Rx(number of DEXA scans taken during Rx) and Count_Of_Risks(count of risks).
Identified Outliers using Inter Quartile range and Box plot and removed the outliers.





Data Transformation:

Deleted Ptid (Patient id) which is not an important feature to understand factors affecting persistency of a drug.

Mapping Categorical values to numeric:

We have converted all the categorical values to numerical values for model training.

1. Converted all Y and N values to 1 and 0.

2. Converted Gender, Ntm_Specialist_Flag, Adherent_Flag and Persistency_Flag to 0 and 1.
3. Converted categorical features with multiple values to numeric using One Hot encoding.

Standardization:

Standardized values using MinMaxScaler(), So there will be no bias in the model.

Final Recommendations:

- Increase the persistency rate for female patients by providing some special discounts or coupons as they are high in filling prescription drugs.
- Higher advertising and marketing in Midwest may increase the persistent rate.
- The patients who got prescribed by NTM Specialist have more dexa scans during Rx. So, if we target NTM Specialist prescription drugs, the persistency rate will increase.
- The number of risks are high for patients who are not adherent to therapies. We can give extra therapy sessions to attract non adherent patients to reduce risks and increase persistency.
- In order to increase sales and profitability for ABC Pharma company, it is important to improve the persistency rate over time. By increasing the persistency rate, the company can achieve higher sales of prescription drugs and ultimately generate more profits.

GitHub Repo link:

https://github.com/bmusham/Ensemble-Elites-Healthcare-Persistency-of-drug/tree/main/Week%2010