
# Week 10 Deliverables

Group Name: The Data Doctors

09-Dec-2023

# Team Details

| | |
|---|---|
| Name: Noah Gallego<br>Email: noahgallego394@gmail.com<br>Country: United States<br>College/Company: California State University Bakersfield<br>Specialization: Data Science | Name: Tomisin Abimbola Adeniyi<br>Email: tomisin_adeniyi11@yahoo.com<br>Country: Nigeria<br>College/Company: N/A<br>Specialization: Data Science |
| Name: Mohammad Shehzar Khan<br>Email: mshehzarkhan@gmail.com<br>Country: Turkey<br>College/Company: Koç University<br>Specialization: Data Science | Name: Ashish Sasanapuri<br>Email: sashrao21@gmail.com<br>Country: India<br>College/Company: N/A<br>Specialization: Data Science |

# Problem Description

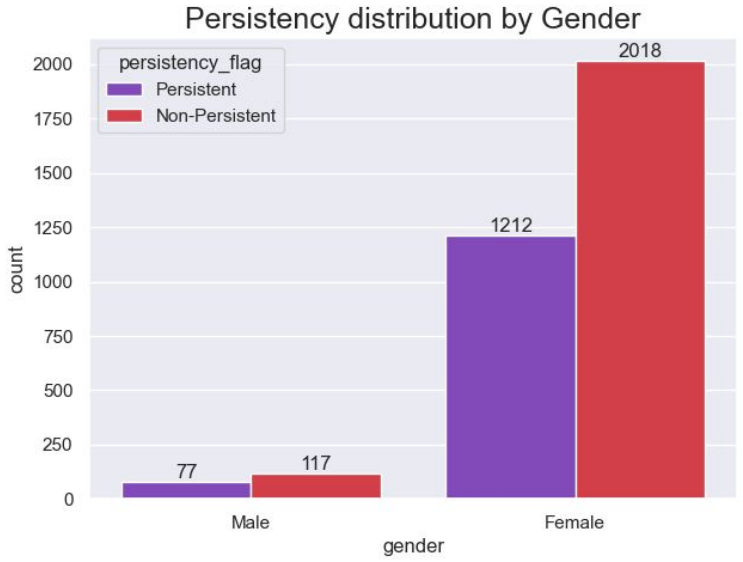
One challenge for all Pharmaceutical companies is to understand the persistence of a drug as per the physician's prescription. To solve this problem ABC Pharma company approached an analytics company to automate this process of identification.

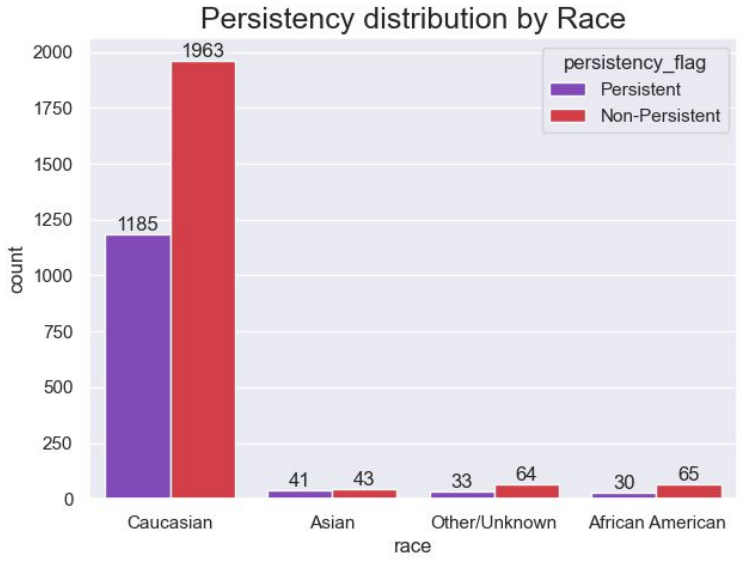
# Exploratory Data Analysis

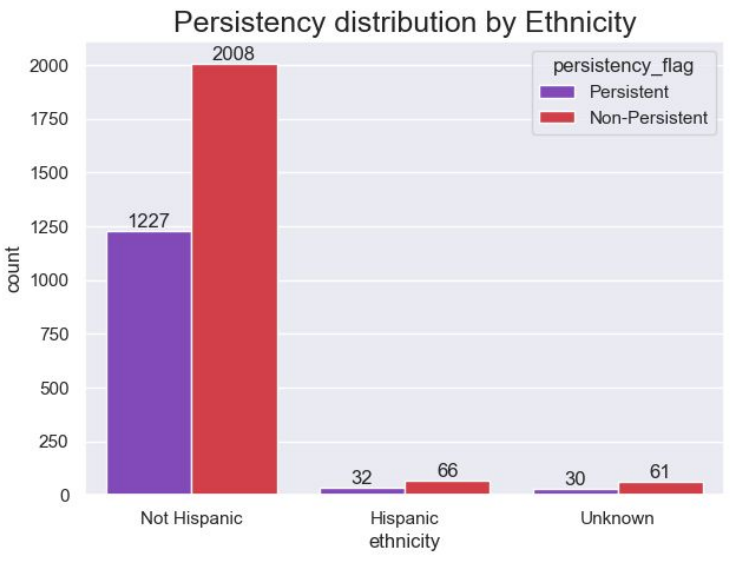

Your Deep Learning Partner

# Demographics

- Features like ‘Gender’, ‘Race’, and ‘Ethnicity’ have been dropped as they tend to induce bias in the data and don’t provide much information regarding impact of persistent of a patient.

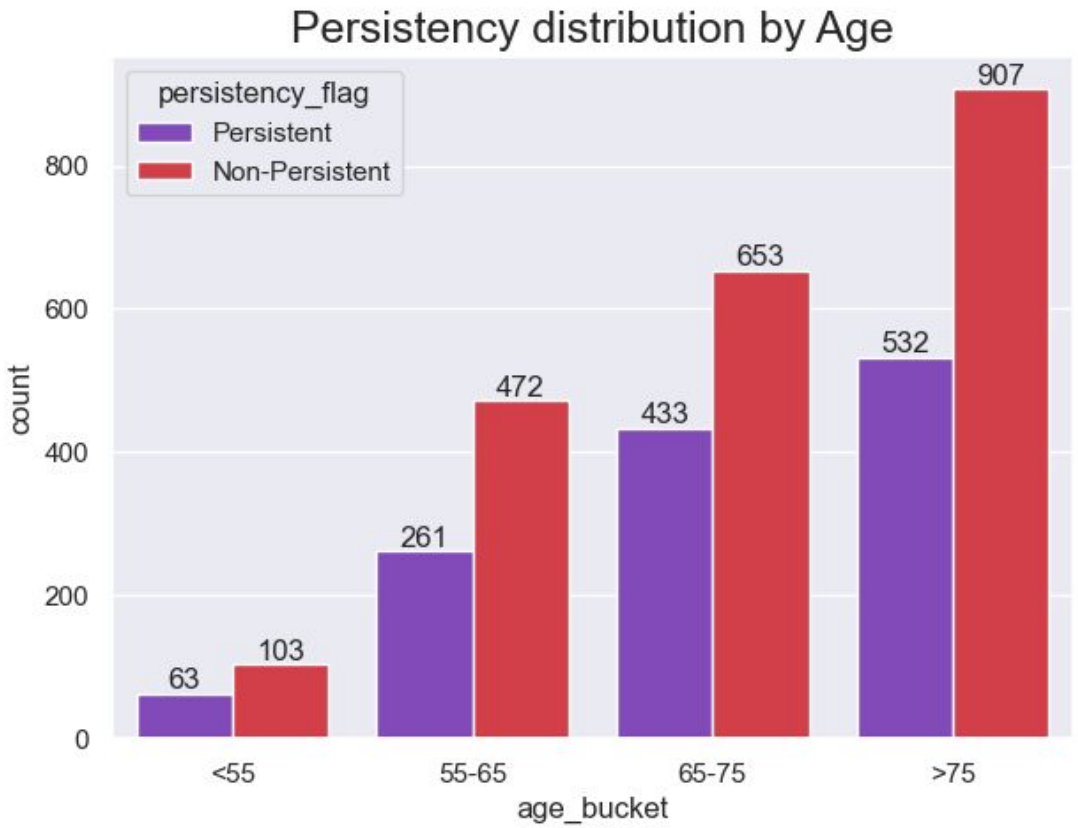


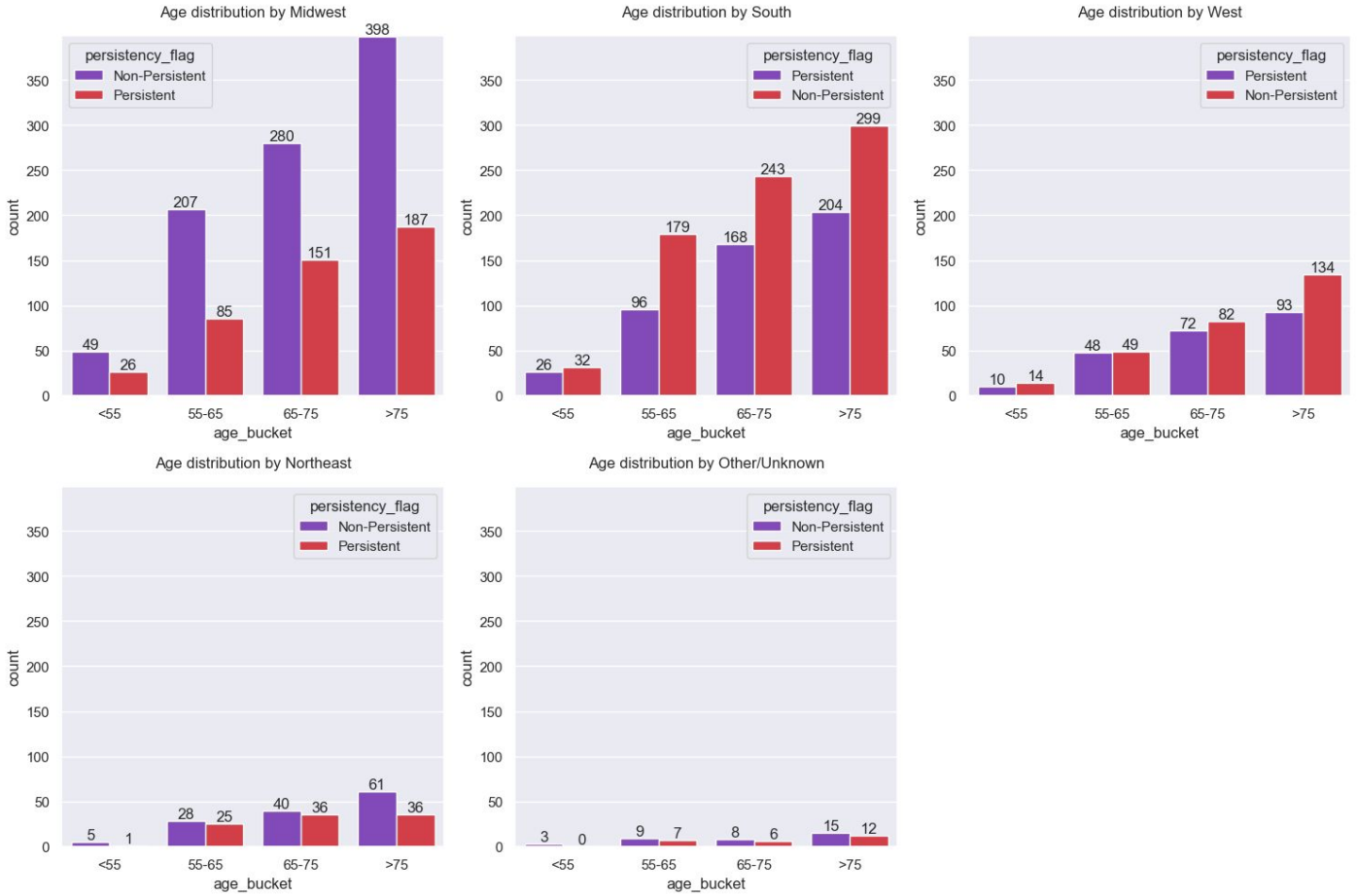
# Demographics

- We can observe that majority of the patients are aged above *55 years* and majority **Non-Persistent** patients fall in the age group of more than *75 years* of age.



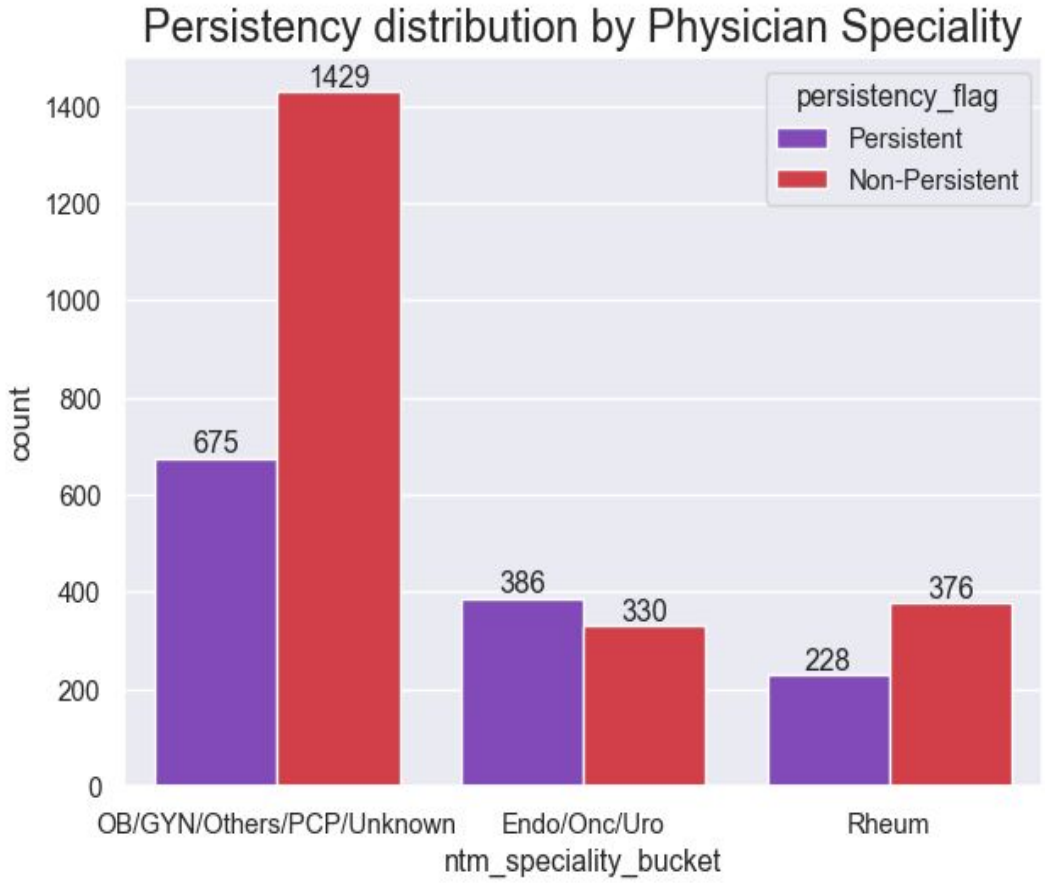
# Demographics

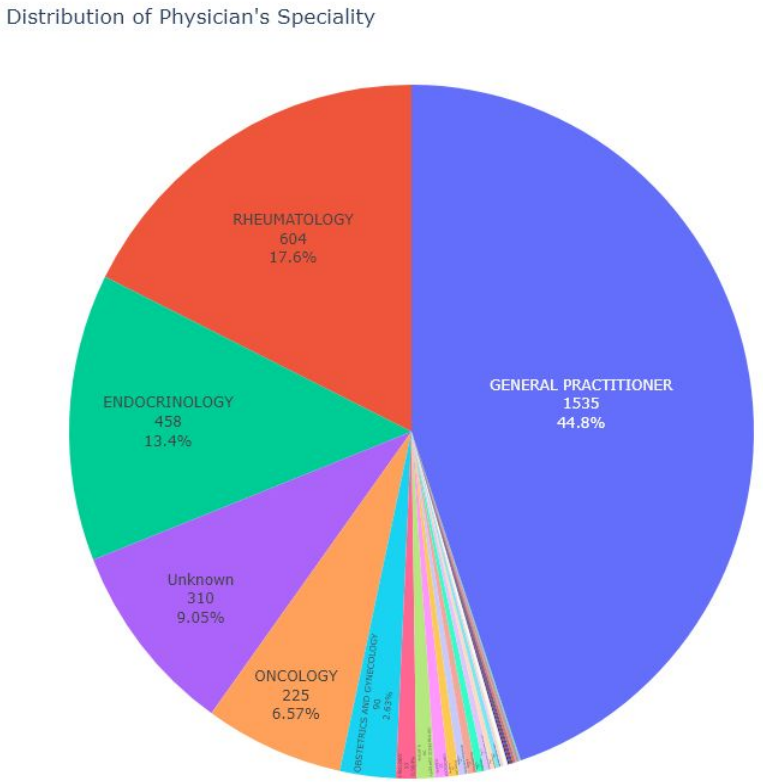
- Most patients fall in the *'Midwest'* and *'South'* regions as observed from the following graphs.



# Physician Attributes

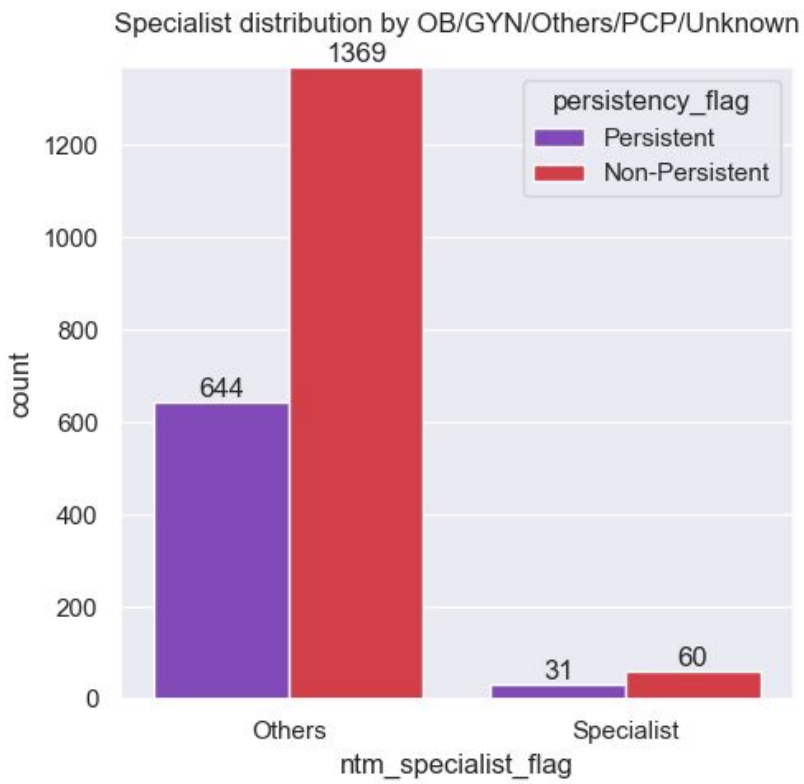
- Around **45%** of Physicians who have prescribed new medication to the patients are *'General Practitioners'*.

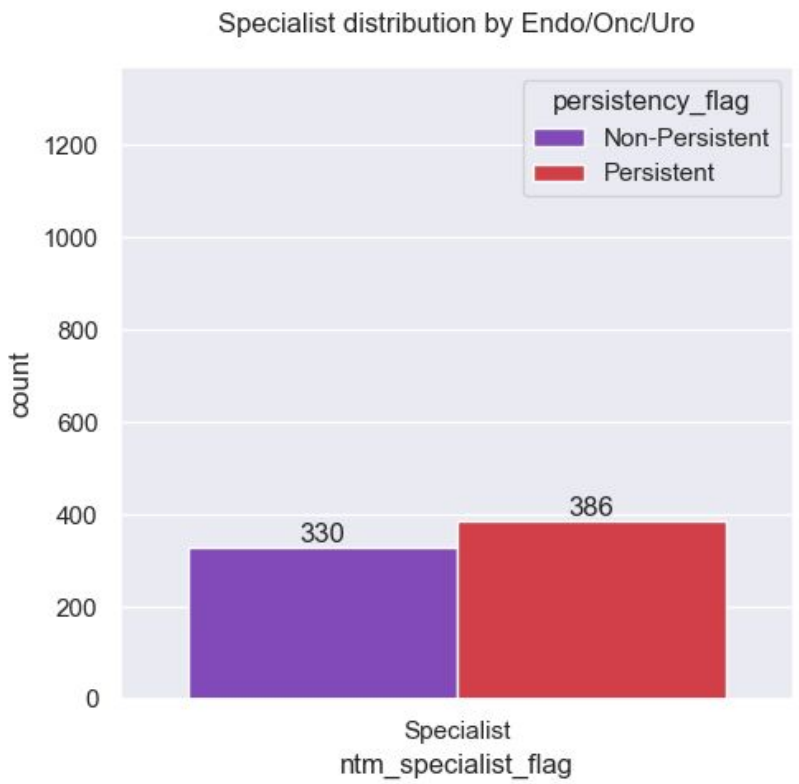


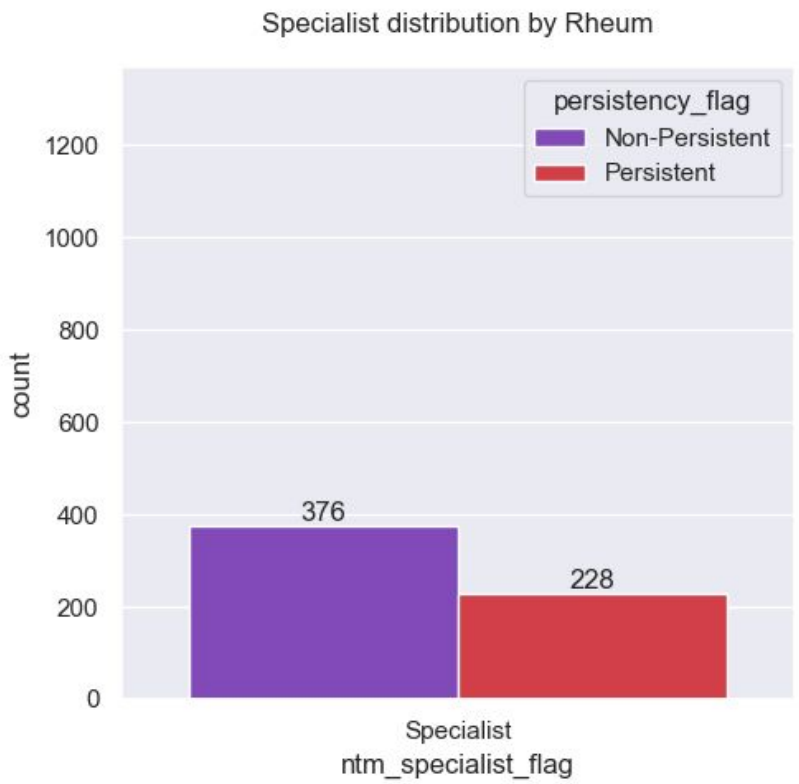



# Physician Attributes

- Majority of the **Non-Persistent** patients have been prescribed the new medication by Physicians who are not *Specialists*.

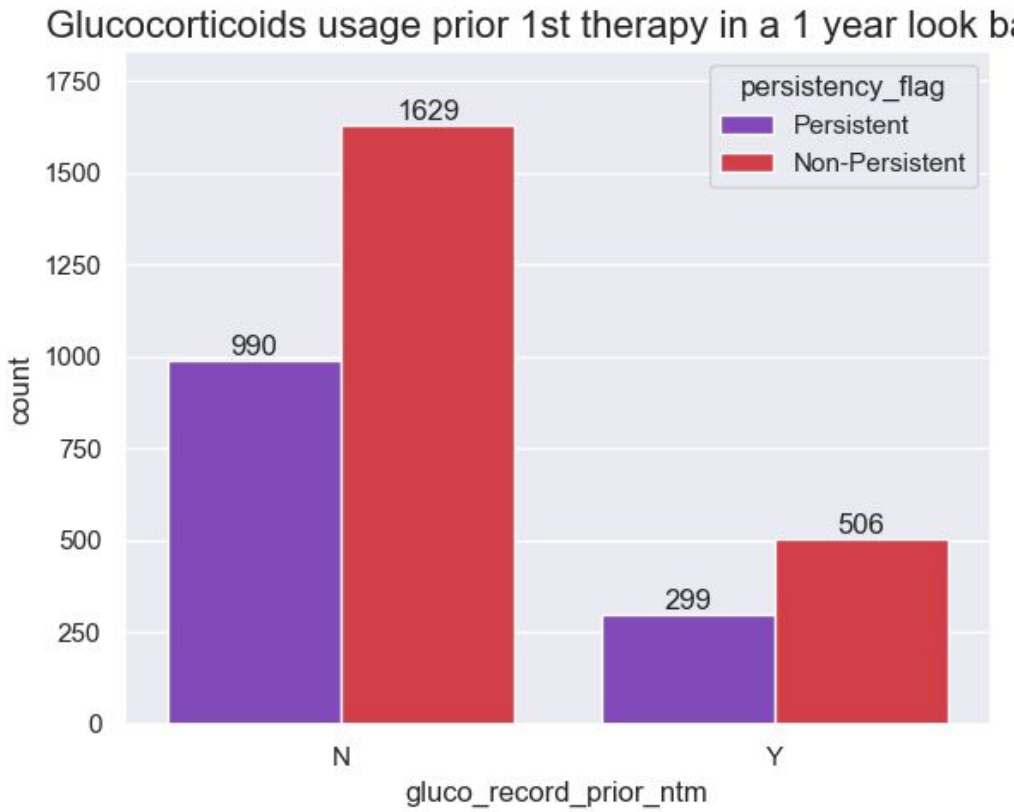


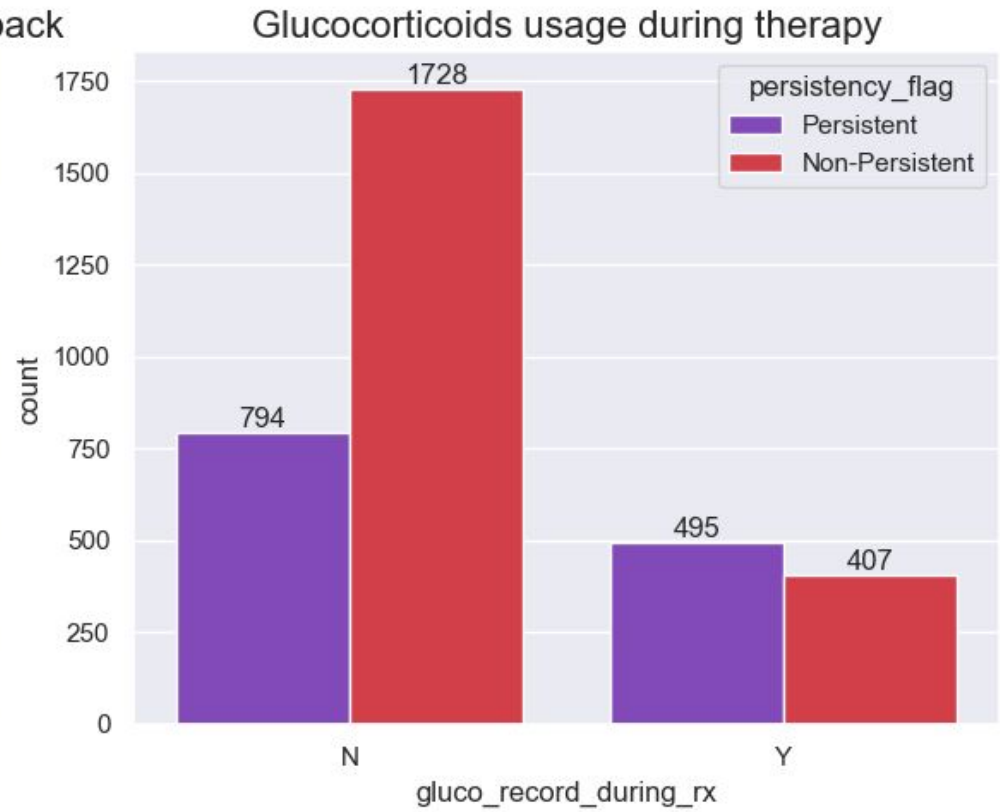



# Clinical Factors

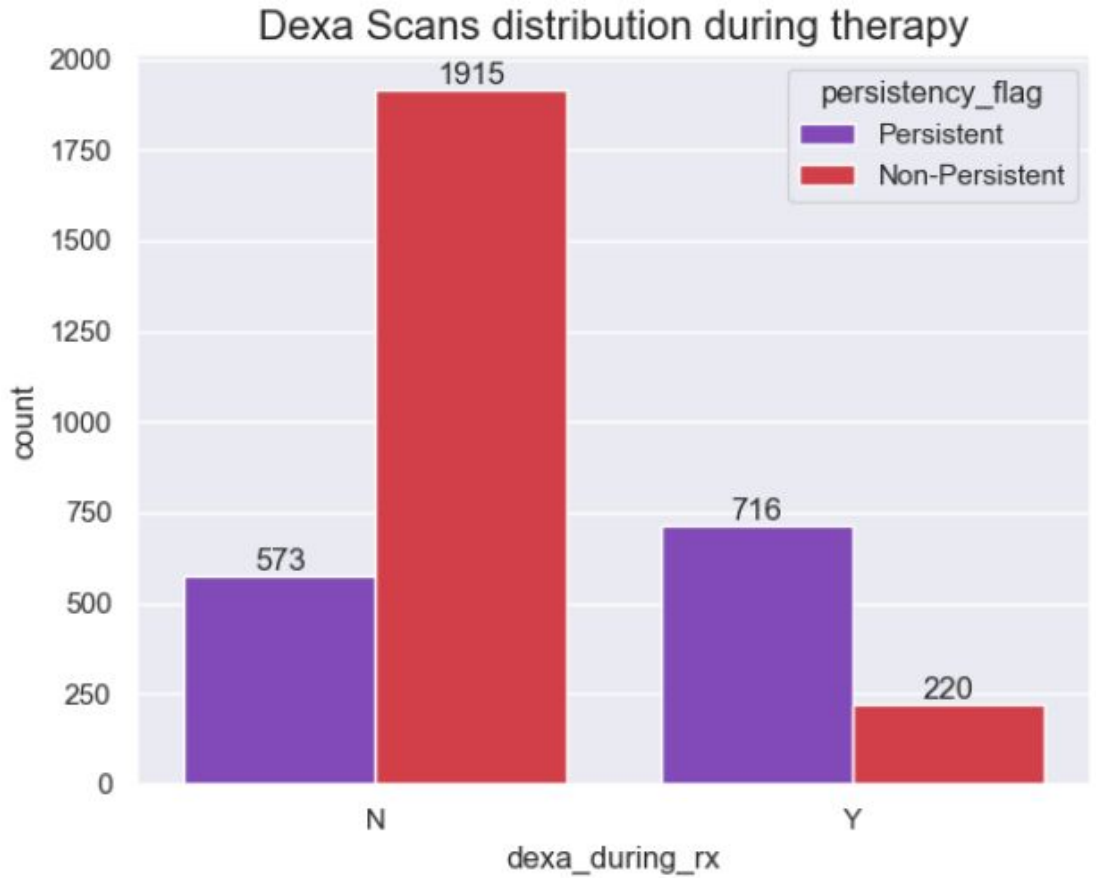
- When we consider the case of usage *Glucocorticoids*, the **Persistent** patients are less compared to **Non-Persistent** patients prior to therapy but vice-versa during therapy. There is increase in the number of patients using *Glucocorticoids* during therapy.



# Clinical Factors

- Based on the below graph, the *Dexa Scans* is part of the therapy and majority of patients who haven't gone through *Dexa Scans* are **Non-Persistent**.



# Clinical Factors

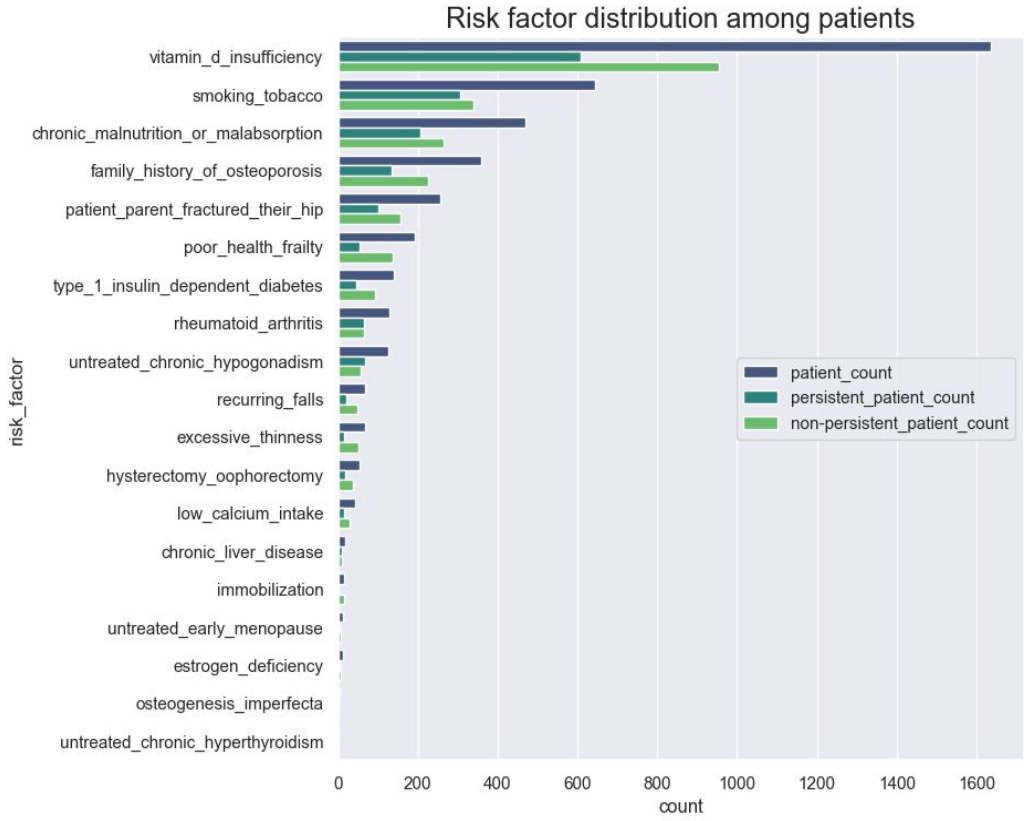
- Some of the features have *'Unknown'* values as one of their categories as given below -

```
risk_segment_during_rx: 1497
tscore_bucket_during_rx: 1497
change_t_score: 1497
change_risk_segment: 2229
```

- As these features have a large number of *'Unknown'* category values, they don't provide much information. Hence, dropping these features will also not impact the outcome of the model.

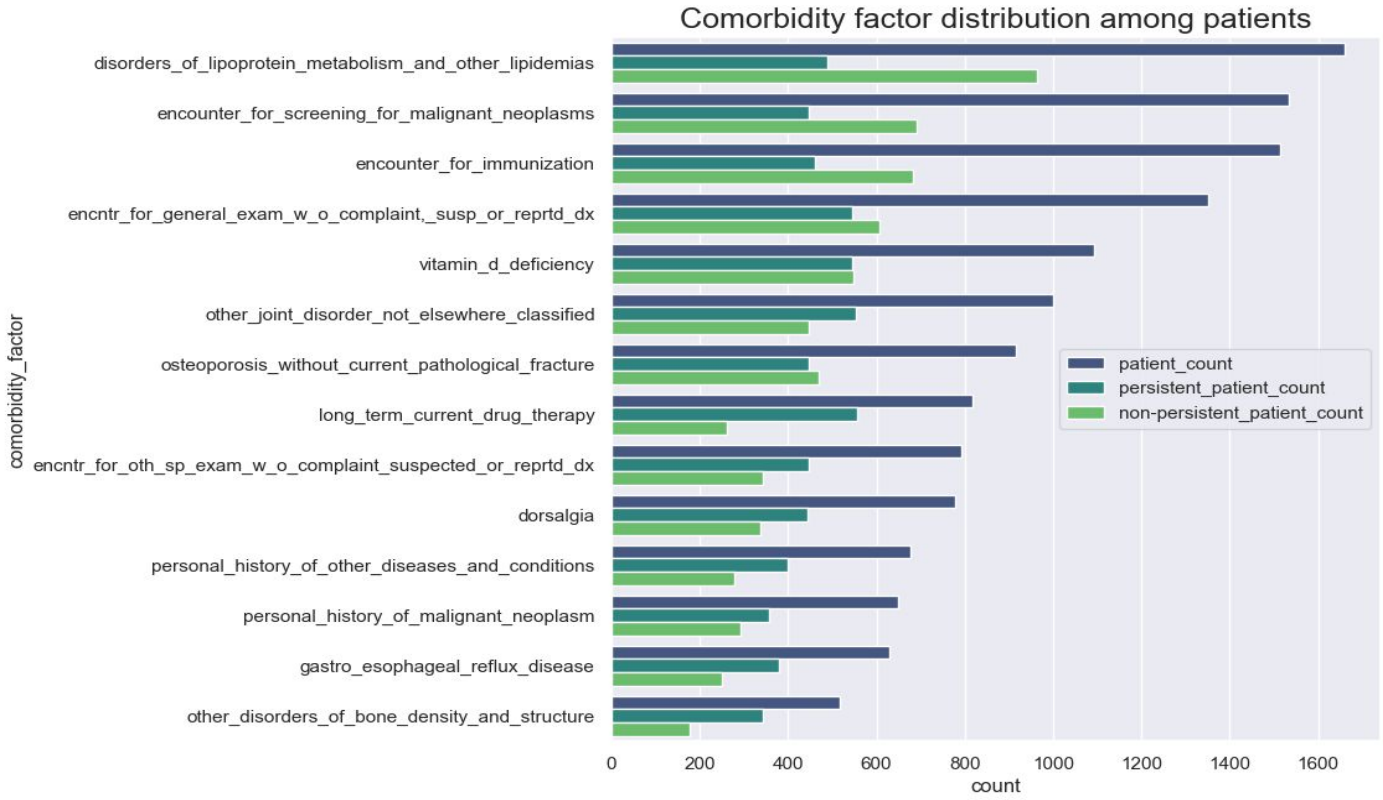
# Disease/Treatment Factors

- Majority of the patients have been susceptible to **Risk Factors** such as *'Vitamin D insufficiency'*, '*smoking tobacco*', *'chronic malnutrition or malabsorption'* and have a *'family history of osteoporosis'*.
- Due to heavy imbalance of data in **Risk Factor** categories, we can reduce dimensionality by reducing the categories capturing less data into a single category.



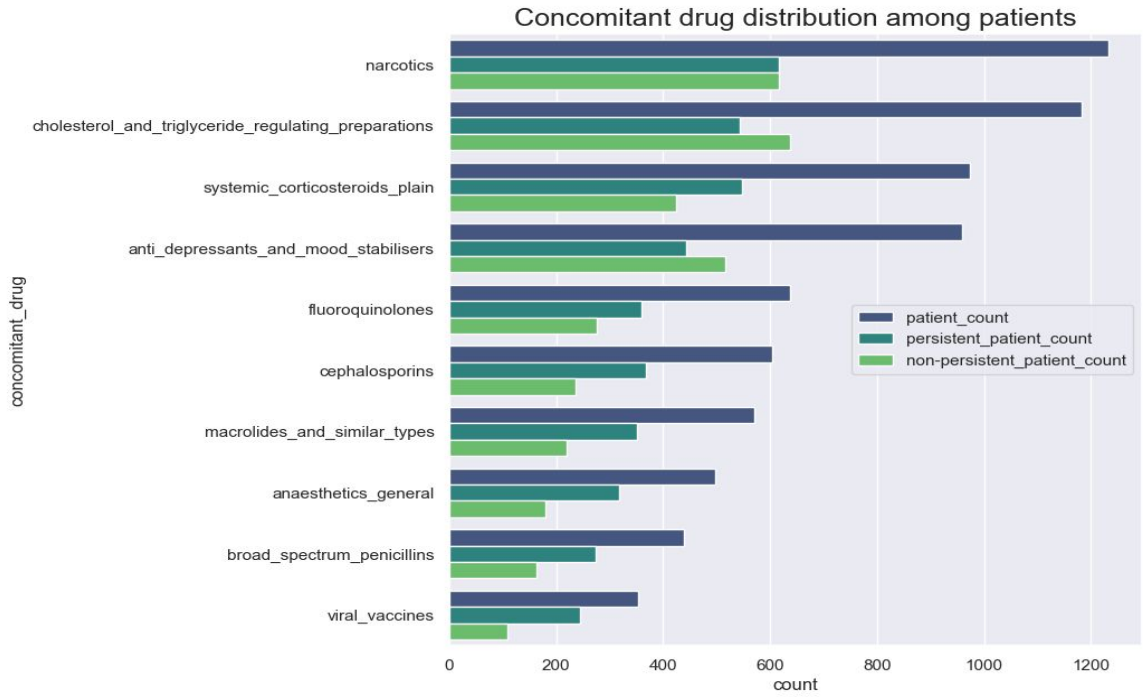
# Disease/Treatment Factors

- There are total 14 **Comorbidity Factors** recorded for each patient.
- The top **Comorbidity Factors** include *disorders_of_lipoprotein_metabolism_and_other_lipidemias*, *encounter_for_screening_for_malignant_neoplasms*, *encounter_for_immunization,* and *encntr_for_general_exam_w_o_complaint,_susp_or_reprtd_dx.*



# Disease/Treatment Factors

- We can see that the graph shows the distribution of patients who have received **Concomitant Drugs** 1 year prior to start therapy.
- The count for **Non-Persistent** patients who have been given **Concomitant Drugs** such as *Narcotics, cholesterol_and_triglyceride_regulating_preparations,* and *anti_depressants_and_mood_stabilisers* is greater compared to the other categories.



# Recommendations

- We can drop features which contain large number of *'Unknown'* category as value.
- As the dataset heavily dimensional, we can apply different methods such as PCA or Attribute Analysis for feature selection as well as dimensionality reduction.
- As the dataset is highly imbalance, we can apply *SMOTE* or *Weighted sampling* techniques for balancing the dataset.
- We can try to train the data on simpler models and apply grid search and cross validation methods for hyper-parameter tuning. The test results will help in understanding the best model.

# Thank You


Your Deep Learning Partner