



**Data Glacier**

Your Deep Learning Partner

# Healthcare - Persistency of a Drug

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# Problem Statement

Measuring patient persistency with drug therapy provides valuable information for healthcare decision makers concerning the effectiveness of a drug in a routine practice setting, which epidemiologists call the population based setting, as opposed to the trial- or clinic-based setting.

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

# Importance of the problem

Increasing adherence rates by only 10 percentage points would translate into a \$41 billion pharmaceutical revenue opportunity in the US (\$124 billion globally), accompanied by improved health outcomes and decreased healthcare spending.<sup>1</sup>

<sup>1</sup> \_ <https://medipense.com/medication-adherence-compliance/>

# Glossary

## **Persistency Definitions <sup>1</sup>**

The measurement of medication persistency attempts to capture the amount of time that an individual remains on chronic drug therapy. Under this framework, patients are classified as either persistent or non persistent with medication therapy for some duration of time. Individuals who are persistent with therapy are continuous with their medication-taking behavior during a certain period. Persistent individuals refill their medications frequently and regularly. In contrast, non persistent individuals either have sporadic refilling practices or have discontinued refilling their medications completely.

<sup>1</sup> -<https://www.ajmc.com/view/jul05-2085p449-457>

# Glossary

## **Medication adherence vs medication persistence <sup>1</sup>**

Medication adherence (compliance): “the extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen.”

Medication persistence: “the duration of time from initiation to discontinuation of therapy.”

1. [https://www.pharmacytoday.org/article/S1042-0991\(15\)30340-6/fulltext#relatedArticles](https://www.pharmacytoday.org/article/S1042-0991(15)30340-6/fulltext#relatedArticles)

# Feature Description

**Bucket** (variable)

Variable Description

**Unique Row Id** (patient ID)

Unique ID of each patient

**Target Variable** (persistency Flag)

Flag indicating if a patient was persistent or not

**Age**

Age of the patient during their therapy

**Race**

Race of the patient from the patient table

**Region**

Region of the patient from the patient table

# Feature Description

## Demographics

### **Ethnicity:**

Ethnicity of the patient from the patient table

### **Gender :**

Gender of the patient from the patient table

### **IDN Indicator:**

Flag indicating patients mapped to IDN



# Feature Description

## Provider Attributes

### **NTM - Physician Specialty**

Specialty of the HCP that prescribed the NTM Rx

### **NTM - T-Score**

T Score of the patient at the time of the NTM Rx (within 2 years prior from rxdate)

### **Change in T Score**

Change in Tscore before starting with any therapy and after receiving therapy  
(Worsened, Remained Same, Improved, Unknown)

### **NTM - Risk Segment**

Risk Segment of the patient at the time of the NTM Rx (within 2 years days prior from rxdate)

### **Change in Risk Segment**

Change in Risk Segment before starting with any therapy and after receiving therapy  
(Worsened, Remained Same, Improved, Unknown)

### **NTM - Multiple Risk Factors**

Flag indicating if patient falls under multiple risk category (having more than 1 risk) at the time of the NTM Rx (within 365 days prior from rxdate)

# Feature Description

## Provider Attributes

### **NTM - Dexa Scan Frequency**

Number of DEXA scans taken prior to the first NTM Rx date (within 365 days prior from rxdate)

### **NTM - Dexa Scan Recency**

Flag indicating the presence of Dexa Scan before the NTM Rx (within 2 years prior from rxdate or between their first Rx and Switched Rx; whichever is smaller and applicable)

### **Dexa During Therapy**

Flag indicating if the patient had a Dexa Scan during their first continuous therapy

### **NTM - Fragility Fracture Recency**

Flag indicating if the patient had a recent fragility fracture (within 365 days prior from rxdate)

### **Fragility Fracture During Therapy**

Flag indicating if the patient had fragility fracture during their first continuous therapy

# Feature Description

## Provider Attributes

### **NTM - Glucocorticoid Recency**

Flag indicating usage of Glucocorticoids ( $\geq 7.5$ mg strength) in the one year look-back from the first NTM Rx

### **Glucocorticoid Usage During Therapy**

Flag indicating if the patient had a Glucocorticoid usage during the first continuous therapy

### **NTM - Injectable Experience**

Flag indicating any injectable drug usage in the recent 12 months before the NTM OP Rx

### **NTM - Risk Factors**

Risk Factors that the patient is falling into. For chronic Risk Factors complete lookback to be applied and for non-chronic Risk Factors, one year lookback from the date of first OP Rx

# Feature Description

## **Disease/Treatment Factor:**

### **NTM - Comorbidity**

Comorbidities are divided into two main categories - Acute and chronic, based on the ICD codes. For chronic disease we are taking complete look back from the first Rx date of NTM therapy and for acute diseases, time period before the NTM OP Rx with one year lookback has been applied

### **NTM - Concomitancy**

Concomitant drugs recorded prior to starting with a therapy(within 365 days prior from first rxdate)

### **Adherence**

Adherence for the therapies

# Features

Ptid, Persistency Flag, Gender, Race, Ethnicity, Region, Age Bucket, Ntm Speciality, Ntm Specialist Flag, Ntm Speciality Bucket, Gluco Record Prior Ntm, Gluco Record During Rx, Dexa Freq During Rx, Dexa During Rx, Frag Frac Prior Ntm, Frag Frac During Rx, Risk Segment Prior Ntm, Tscore Bucket Prior Ntm, Risk Segment During Rx, Tscore Bucket During Rx, Change T Score, Change Risk Segment, Adherent Flag, Idn Indicator, Injectable Experience During Rx.

# Features

Comorb Encounter For Screening For Malignant Neoplasms, Comorb Encounter For Immunization, Comorb Encntr For General Exam W O Complaint, Susp Or Reprtd Dx, Comorb Vitamin D Deficiency, Comorb Other Joint Disorder Not Elsewhere Classified, Comorb Encntr For Oth Sp Exam W O Complaint Suspected Or Reprtd Dx, Comorb Long Term Current Drug Therapy, Comorb Dorsalgia, Comorb Personal History Of Other Diseases And Conditions.

# Features

Comorb Personal history of malignant neoplasm, Comorb Gastroesophageal reflux disease, Concom Cholesterol And Triglyceride Regulating Preparations, Concom Narcotics, Concom Systemic Corticosteroids Plain, Concom Anti Depressants And Mood Stabilisers, Concom Fluoroquinolones, Concom Cephalosporins, Concom Macrolides And Similar Types, Concom Broad Spectrum Penicillins, Concom Anaesthetics General, Concom Viral Vaccines.

# Features

Risk Type 1 Insulin Dependent Diabetes, Risk Osteogenesis Imperfecta, Risk Rheumatoid Arthritis, Risk Untreated Chronic Hyperthyroidism, Risk Untreated Chronic Hypogonadism, Risk Untreated Early Menopause, Risk Patient Parent Fractured Their Hip, Risk Smoking Tobacco, Risk Chronic Malnutrition Or Malabsorption, Risk Chronic Liver Disease, Risk Family History Of Osteoporosis, Risk Low Calcium Intake, Risk Vitamin D Insufficiency, Risk Poor Health Frailty, Risk Excessive Thinness, Risk Hysterectomy Oophorectomy, Risk Estrogen Deficiency, Risk Immobilization, Risk Recurring Falls, Count Of Risks.



# Data intake

<b>Total number of observations</b>	3424
<b>Total number of features</b>	69
<b>Base format of the file</b>	csv
<b>Size of the data</b>	892 KB

# Proposed Approach

- Modifying and Cleaning data
- Adding new variables using existing data to have some better insights to data
- Proposing machine learning models and testing hypothesizes
- Evaluating hypothesizes in order to predict persistency of drugs
- Report the accuracy of model

# Hypothesis

In this research we want to develop a model predicting persistency of drug using machine learning algorithms based on the effects of:

- Gender
- Age
- Risk\_Low\_Calcium\_Intake
- Risk\_Vitamin\_D\_Insufficiency
- .
- .
- .
- Risk\_Immobilization
- Risk\_Recurring\_Falls
- Count\_Of\_Risks

# Data and code link

Data and code are uploaded at:

[https://github.com/Alireza-Ehiaei/Data\\_Sciences/tree/main/Drug\\_Persistence1](https://github.com/Alireza-Ehiaei/Data_Sciences/tree/main/Drug_Persistence1)

Thank You