

## OBJECTIVE

Provide a proof of concept for **predicting patient medication demand** for the Pharmacy Administration at the University of Michigan Medicine to **reduce pharmaceutical waste and lower costs**.



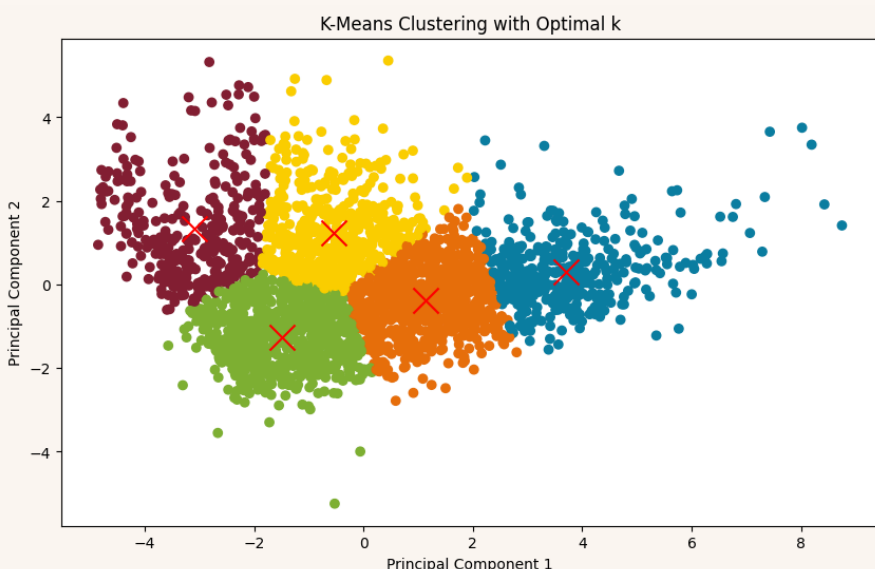
## INVENTORY DATASET

February 2022 to June 2024 transactions for **4,593** medications from:

- **3 Hospitals**
- **40 Outpatient Locations**
- **>120 Clinics**

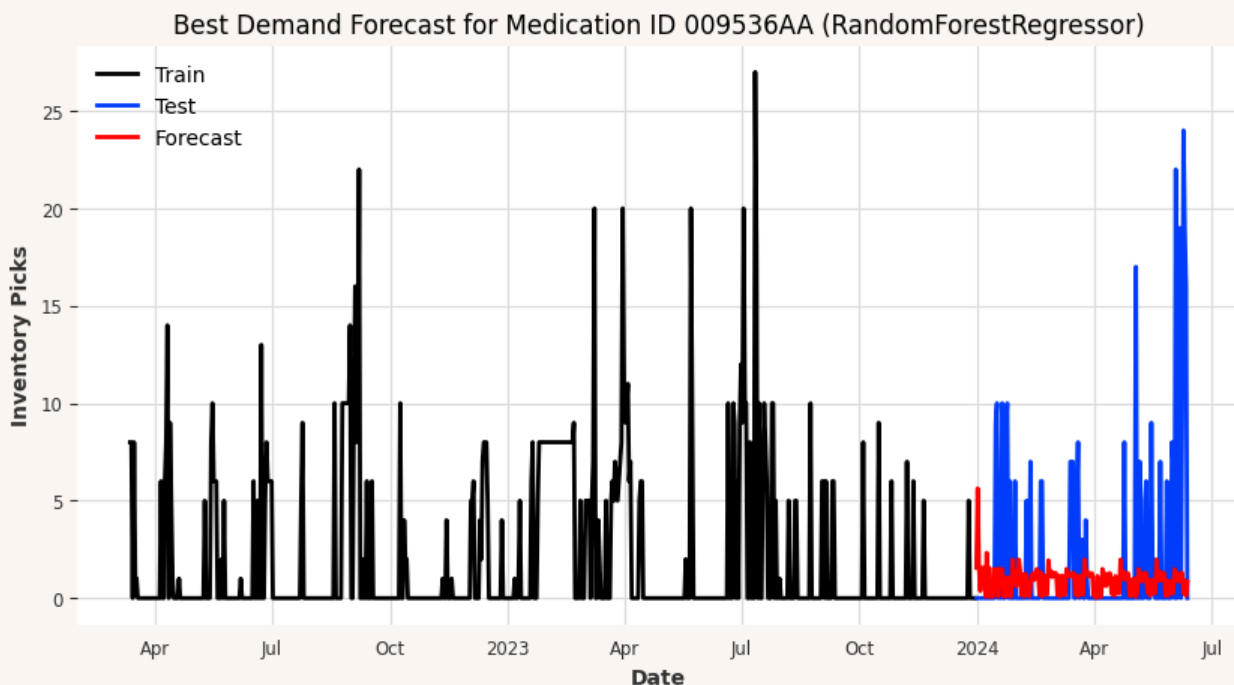
## OVERALL MEDICATION DEMAND

By clustering medications based on their similarity in demand signals, we can identify the general management strategy that they require. These signals include average number of “picks” (withdraws), average inventory levels, scarce inventory rate, excess inventory rate, etc.

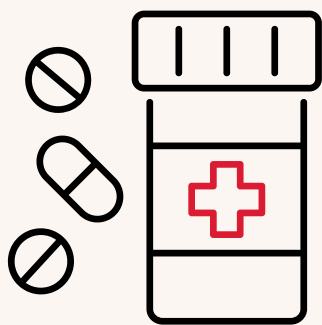


## INDIVIDUAL MEDICATION DEMAND

For more specific inventory management, we suggest forecasting the demand of individual medications, like in the below example. Individual models are important because medications vary in demand, cost, shelf life, dosage, etc. Out of a variety of time series and machine learning models, the Croston SBA and Random Forest Regressor models were the top performers for this demo when evaluated using RMSE.



## FROM PROOF OF CONCEPT TO SOLUTION



Requirements for better analysis and forecasts:

- Revised data extract with better quality, and more complete, data as well as additional medication features
- Further input from domain experts
- Time and research to better understand the nuances of the data

