Improving Patient Wait Times at Outpatient Phlebotomy

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Overview

Goal
Reduce wait times and improve patient experience throughout outpatient blood draw at the three flagship hospitals for UW Medicine: Montlake, Northwest, & Harborview.

UWMed Outpatient Phlebotomy
- Patient walks in & out that day
- Timed VS normal draws
- Peak hours: morning
- No current wait estimation

Assumptions
- Fixed number of draw stations
- Draw time is constant
- Phlebotomists have equal skill
- Historical data is representative

Methodology

Solution Flow
- ANALYZE SYSTEM
- REQUEST & COLLECT DATA
- CLEAN & PREPARE DATA
- CREATE MODELS

Data Collection & Cleaning
- Time studies at all clinics
- Filter to four main clinics
- Remove outliers and negative values
- Calculate wait time
- Derive staffing levels

Variable Modeling
- Methods tried:
  - Linear Regression
  - Decision Tree
  - Multivariate Adaptive Regression Splines
  - Poisson Regression
  - Low predictive power
  - High variable output

Facebook Prophet Modeling
- Time-series forecasting tool with customizable seasonalities and regressors by hospital
- Incorporates historical staffing and patient demand data
- Predicts patient wait times with high accuracy

Recommendations

Model Implementation
- Targeted interventions within 48-72 hours
  - Additional staff called in
- Optimize and test staff schedules to minimize wait times
- Improved data collection practices will lead to greater accuracy

Process Improvements
- Reduction of single-resource consumption
  - Ex: Redistributing phone call duties
- Redirection of overflow patients from main Harborview to NJB