Analyzing Patient Scheduling, No-Shows, and Cancellations in a Specialty Care Clinic

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Background

Key Goal: To develop new methods to investigate and improve patient access to a unique weight management program at the University of Michigan.

Weight Management Program

- Program implemented by Dr. Amy Rothberg
  - Geared at effective weight loss management
- Program incorporates weight loss management and long-term behavioral change
- Objective is to improve overall patient health outcomes

Current State

Basic eligibility of program

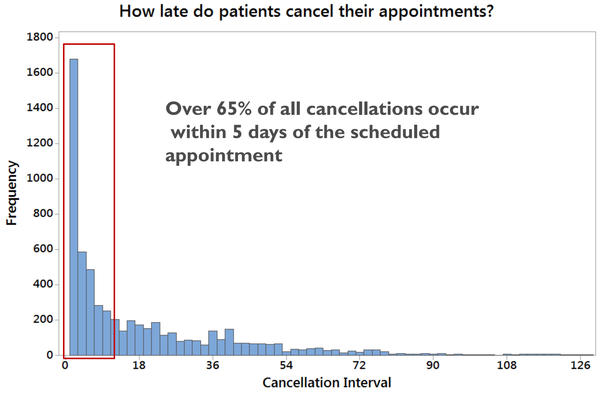
- BMI $\geq$ 32 kg/m^2 with 1 or more comorbidities (diabetes, obesity, etc.)
- BMI $\geq$ 35 kg/m^2
- Patients required to attend more than 80% of appointments

Program timeline & design:

- Regimented visit schedule to ensure program efficacy
- 26 total program visits
  - Greater frequency of visits in the short term
- Visits occur with both physicians and dietitians

Challenges

- Insufficient capacity to see patients according to timeline
- Last minute cancellations negatively impact ability to refill appointment slots, fully utilize capacity



Solution Approach

Goal: To take a new approach to visualizing the evolution of the clinic schedule:

- Build a temporal MySQL database to evaluate the dynamic clinic schedule
- Data: receive 2 spreadsheets every working day
  - Prospective appointment schedules, provider availability data
- Store information on a rolling horizon basis
  - Appointment schedule snapshots
  - One snapshot views six months of the clinic schedule
- Compare consecutive appointment snapshots
  - Evaluate and capture the changes in clinic dynamics.

Appointment		Snapshot Date		
Date	Time	7/26	7/27	7/28
7/28	10:00	**A** *Cancelled*		**C** *Created*
	10:15			
	10:30			
	10:45	**B**	**B** *Cancelled*	
	11:00	Buffer		
	11:15			**B** *Created*

An example of the clinic schedule leading up to July 28th viewed up to two days.

Advantages of Solution Approach

Traditional View of Appointment Schedules

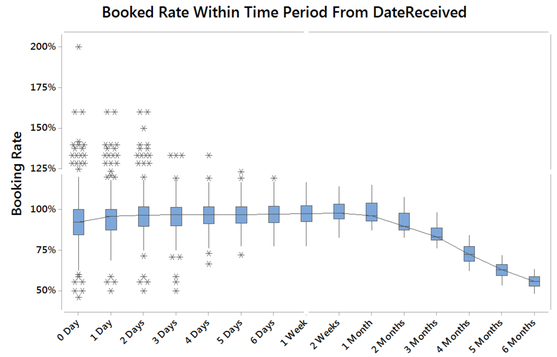
- Often looks at a static view of the calendar.
- No visibility about information between two time points
  - Suppose we look at two static views of an appointment calendar (e.g. July 1st and July 8th)
    - What happens in between these two time points?

Our View of Appointment Schedules

- Temporal database offers many advantages:
  - Capture and quantify information at multiple levels (e.g. appointment type, provider, day of week, etc.)
  - See how multiple opportunities used for one appointment
  - Aggregating snapshots allows us to solve problem seen in traditional approach

Insights and Results

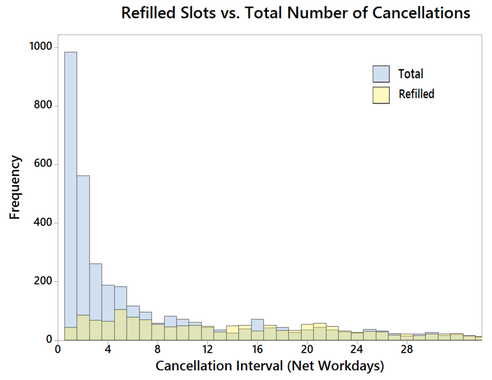
Clinic Booked Rate at Various Points:



$$\text{Booked Rate} = \frac{\text{Number of Appointments Scheduled}}{\text{Number of Appointment Opportunites Available}}$$

- High variability in in booking rates within 5 days of the snapshot date
- Median capacity frees up over a longer period of time
  - Median capacity refers to 50th percentile value of each box & whisker plot

Refilling Cancelled Appointments:



- Late cancellations result in low utilization

Future Work

Scheduling Dashboard

- Create a tool that will allow for easier short term booking for patient and guarantees a small amount of short term capacity available for patients

Simulation Model

Develop a waitlist simulation tool that provides easier appointment access

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