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

Pranjal Singh¹, Amy Cohn PhD¹, Amy Rothberg MD PhD²
University of Michigan¹, University of Michigan Department of Internal Medicine²

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 ≥ 32 kg/m² with 1 or more comorbidities (diabetes, obesity, etc.)
• BMI ≥ 35 kg/m²
• 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.

<table>
<thead>
<tr>
<th>Appointment Date</th>
<th>Snapshot Date</th>
<th>Creating, Canceled</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/26 10:00</td>
<td>C</td>
<td>A Created</td>
</tr>
<tr>
<td>7/27 10:15</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>7/28 10:30</td>
<td></td>
<td>C Created</td>
</tr>
<tr>
<td>7/28 10:45</td>
<td>B</td>
<td>C Created</td>
</tr>
<tr>
<td>11:00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

Booked Rate = Number of Appointments Scheduled / Number of Appointment Opportunities Available

- High variability 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 Canceled Appointments:

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

Acknowledgements
This research is generously supported by the Center for Healthcare Engineering and Patient Safety (CHEPS) and the Boedeker Foundation Special thanks to our collaborators in the Metabolism, Endocrinology & Diabetes Clinic, the University of Michigan Medical School, P.V. Mandel, M. Giancola, and all the students who have worked on this project.

Contact Pranjal Singh: pranjal@umich.edu, Amy Cohn: amycohn@umich.edu