Scheduling Dynamics of a Weight Management Program

Moses Chan

Center for Healthcare Engineering and Patient Safety
Scheduling Dynamics of a Weight Management Program

Moses YH Chan, MSE
Amy Rothberg, MD
William Herman, MD, MPH
Amy Cohn, PhD

May 23, 2016
Research Team

Amy Cohn, PhD\textsuperscript{1,2}  
Amy Rothberg, MD\textsuperscript{3}  
William Herman, MD, MPH\textsuperscript{3}

\textbf{Students}\textsuperscript{1}  
Henry Ballout  
Cara Cheshire, BSE\textsuperscript{2}  
John Li\textsuperscript{2}  
Pranjal Singh, BA\textsuperscript{2}  
Joseph Sorenson\textsuperscript{4}

\textsuperscript{1} Center for Healthcare Engineering and Patient Safety, University of Michigan, Ann Arbor  
\textsuperscript{2} Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor  
\textsuperscript{3} Department of Internal Medicine, University of Michigan Health System  
\textsuperscript{4} Department of Computer Science and Engineering, University of Michigan, Ann Arbor
Weight Management Program

• 2-year program designed by Amy Rothberg, MD
  – Promote weight reduction
  – Support behavioral change

• Basic eligibility
  – BMI $\geq$ 32 kg/m$^2$ with 1 or more comorbidities
  – BMI $\geq$ 35 kg/m$^2$

• Program timeline

0  6  12  18  24
months
What’s the problem?

• Patients waiting too long to get into program
Database approach

• Data: 2 spreadsheets **daily**
  – Prospective appointment, provider availability data
• Design MySQL-based database
• Store information about appointments in rolling horizon basis
  → Appointment schedule snapshots
• Compare snapshots from one day to another
## Database example

<table>
<thead>
<tr>
<th>Appointment</th>
<th>Snapshot Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>5/25</td>
</tr>
<tr>
<td>Time</td>
<td></td>
</tr>
<tr>
<td>09:00</td>
<td></td>
</tr>
<tr>
<td>09:15</td>
<td>A</td>
</tr>
<tr>
<td>09:45</td>
<td>B</td>
</tr>
<tr>
<td>10:00</td>
<td>Buffer</td>
</tr>
<tr>
<td>10:15</td>
<td></td>
</tr>
</tbody>
</table>

- **A** Cancelled
- **B** Cancelled
- **C** Created
Case study

Main takeaways:
1. Multiple opportunities were used for one appointment
2. Impact of late cancellations
Study objectives

• Understand and quantify scheduling dynamics
  – Booking rates
  – Cancellations
  – Refill of emptied slots due to cancellations
Results:
High variability in short term booking rate

Average booking rates within x time period from date of snapshot

N = 366 snapshots
Data from 2014/07/15 to 2016/04/29
Results:

High number of late cancellations

How early do patients cancel their appointments?

~60% of patient cancellations occur within 1 week of appointment

N = 3428 patient cancellations
Data from 2014/07/15 to 2016/04/29
Results:
High number of late cancellations

How early do patients cancel their appointments?

N = 3428 patient cancellations
Data from 2014/07/15 to 2016/04/29
Results:
Difficult to refill slots under late cancellations

Do emptied slots due to cancellations get refilled?

N = 3428 patient cancellations
Data from 2014/07/15 to 2016/04/29
Results:
Difficult to refill slots under late cancellations

N = 3428 patient cancellations
Data from 2014/07/15 to 2016/04/29
Insight from analysis

- No short-term capacity for seeing new patients
- Late cancellations impact utilization of slots
Future work

• Understand refilling mechanism
  – Waitlist management

• Evaluate effectiveness of current reminder system
Acknowledgements

• The Metabolism, Endocrinology & Diabetes (MEND) Clinic
• Div. of Endocrinology, Dept. of Internal Medicine, University of Michigan Medical School
Thank you!

Moses YH Chan
mosesyhc@umich.edu
Amy Cohn
amycohn@umich.edu
Amy Rothberg
arothber@med.umich.edu
N = 5252 cancellations
Data from 2014/07/15 to 2016/04/29
Reschedule of cancellations & Refill of emptied slots

<table>
<thead>
<tr>
<th>Rescheduled?</th>
<th>Count</th>
<th>Percent</th>
<th>Refilled?</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>2060</td>
<td>39.22</td>
<td>No</td>
<td>3468</td>
<td>66.03</td>
</tr>
<tr>
<td>Yes</td>
<td>3192</td>
<td>60.78</td>
<td>Yes</td>
<td>1784</td>
<td>33.97</td>
</tr>
<tr>
<td>N= 5252</td>
<td>100.00</td>
<td></td>
<td>N= 5252</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>
How early do provider cancel an appointment?

N = 1358 patient cancellations
Data from 2014/07/15 to 2016/04/29