Introduction

SCOPES: System Concepts for Optimization and Personalization of Endoscopy Scheduling

Objective: Develop a tool to evaluate several outpatient scheduling templates and policies based on but not limited to:
- Minimize overtime
- Minimize waiting
- Minimize doctor idleness
- Maximize patient access to healthcare
- Maximize appointment (appt.) slot utilization

Terminology

Template
A set of appt. slots of different patient types to be scheduled for a time.

Example:
- Type A appt. slot length: 30min
- Type B appt. slot length: 45min
- No between-slot buffer

Start Time | Appt. Type
---|---
8:00 AM | Type A
8:30 AM | Type A
11:30 AM | Type A
12:00 PM | Type B
12:45 PM | Type B
4:00 PM | Type B
5:00 PM | Closed

Policy
Rules to determine how to schedule patients in a template

Schedule
A template with patients assigned to appt. slots

Example Simulation

Dynamic Outpatient Scheduling Simulation (DOSS) Tool
The team developed a DOSS Tool in Excel to evaluate and compare several scheduling templates and policies.

Template:
The template evaluated in this example is the one described in the Terminology section.

Assumptions:
- The # of appt. requests per day is the # of available appt. slots (13)
- The probability of a Type X request is:

<table>
<thead>
<tr>
<th>Type</th>
<th>Appt. Type</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Type A</td>
<td>0.33</td>
</tr>
<tr>
<td>B</td>
<td>Type B</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Policy:
Assign patient to first available appt. slot designated to their type independent of their preference

- In lieu of historical data, our example assumes:
  - Appt. Type A request rate: 8/13
  - Appt. Type B request rate: 5/13


Results of 10 Simulation Runs

Type A Slot Utilization
- # of Requests
- # of Type A Appt. Slots per Day
- Total # of Appt. Slots per Day

<table>
<thead>
<tr>
<th>Simulation Run</th>
<th># of Requests</th>
<th>Type A Slots</th>
<th>Total Slots</th>
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<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>5</td>
<td>13</td>
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<td>2</td>
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Type B Slot Utilization
- # of Requests
- # of Type B Appt. Slots per Day
- Total # of Appt. Slots per Day

<table>
<thead>
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<th>Simulation Run</th>
<th># of Requests</th>
<th>Type B Slots</th>
<th>Total Slots</th>
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Conclusion

The DOSS Tool:
- Is useful for evaluating scheduling templates and policies
- Determines utilization of appt. slots for every patient type
- Is helpful for visualizing steps of project and for conceptualizing pseudocode
- Can be expanded to accommodate multiple and/or consecutive days, more patient types, and a variety of request rates

Future Work

- Collect data on the number of patient types
- Collect data on the appt. request rate for each patient type
- Evaluate several scheduling policies
- Create a simulation scheduling tool in Python
- Convert simulation model into a scheduling tool to determine optimal template-policy pairing for any clinic
- Set the foundation for outpatient scheduling research of multiple patient types

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