A Dynamic Approach to Improve Chemotherapy Pre-mix Policies
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Problem Statement

Key Goal: Reduce patient waiting time by mixing chemotherapy drugs before patients arrive in the system or at earlier stages in the process

Motivation:
- Long patient waiting times for drugs to be mixed
- High cost of wasted drugs for patients who fail to show up or are deferred
- High variability in pharmacy workload during the day
  - Extremely busy during the afternoon
  - Slower pace during the morning

Solution

Solution: Develop and implement a dynamic pre-mix template generator to update the fixed list that the UMCCC currently uses. This template accounts for different patient populations, drug costs, and mixing times on different days of the week.

Dynamic Template Parameters: The parameters of the dynamic template can be adjusted.

Dynamic Template Testing:
- Retrospectively compare actual pharmacy productivity with static pre-mix template vs. theoretical pharmacy productivity with dynamic pre-mix template
  - Did applying the dynamic template save the UMCCC pharmacy time (by pre-mixing specific drugs) or money (by decreasing wasted pre-mixed drugs)?

Impact/Results

Table 1: The parameters used in the dynamic pre-mix template

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Cost (willingness to expend to reduce wait time)</th>
<th>Demand (from historical data)</th>
<th>Mixing Time (from historical data)</th>
</tr>
</thead>
</table>

Table 2: An example output of our dynamic template to which a pharmacist can refer when prioritizing

Table 3: Comparison between the current UMCCC pre-mix policy and the dynamic template. Parameters used: Cost Upper Limit: $10,000; Daily Average Demand Lower Limit: 1; Mixing Time Lower Limit: 5 min

<table>
<thead>
<tr>
<th>UMCCC Template</th>
<th>Dynamic Template</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Drugs Pre-mixed</td>
<td>73</td>
<td>96</td>
</tr>
<tr>
<td>Weekly Time Saved (hrs)</td>
<td>24.4</td>
<td>29.2</td>
</tr>
<tr>
<td>Waste Cost</td>
<td>$130.27</td>
<td>$89.38</td>
</tr>
</tbody>
</table>

Conclusion

- We show our proposed template reduces both patient waiting time and pharmacy waste costs from Table 3
- Our pre-mix template varies by day of week since providers change by day of week (the provider type or specialty is correlated with the drug demand)
- We propose updating the template on a 6-month to yearly basis to address shifting patient populations
- There is potential to reduce costs further once we include patient probability of deferral

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