Improving the Chemotherapy Scheduling Process at BC Cancer Agency Vancouver Centre

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Abstract

Background:
- The Chemotherapy Unit at the BCCA Vancouver Centre delivers nearly 15,000 outpatient treatments per year with a team of 10 nurses.
- Clinical complexity, high resource utilization and scheduling restrictions led to multiple operational problems, including a significant waitlist, late appointment confirmation and clerical rework. These problems add difficulty for patients to arrange necessary transportation and support for the appointment, increasing distress and anxiety.

Objectives: To improve the patient experience and chemotherapy unit operations by:
- Reducing the size of the patient waitlist
- Increasing the time between notification and appointment

Methods:
- The booking and scheduling processes were studied through direct observation, interviews with staff and patients, and extensive data analysis of more than 19,000 appointment records for 2008-09 from the Cancer Agency Information System (CAIS).
- A discrete-event simulation model was developed to test alternative scheduling practices and evaluate their impact. An optimization-based tool was created to allocate appointments to nurses, balancing workload and complexity in the unit.
- Booking and scheduling practices were redesigned to incorporate more flexibility, eliminating capacity restrictions and using treatment windows earlier in the process.
- An evaluation framework comprising both quantitative and qualitative components was designed and used to evaluate results after implementation.

Results:
- The new processes were implemented in June 2010 and the optimization-based tool is being used on a daily basis to schedule patients.
- Post-implementation evaluation shows significant improvement, with a reduction of more than 60% on wait list size and 50% on the proportion of patients with late confirmation (less than a week). Also, the probability of finding at least one appointment one week in advance has doubled, increasing from 32% to 65%.
- In addition, nurses experience a more balanced workload, adherence to pharmacy capacity has improved, and patient satisfaction has not been affected.

Conclusions:
- The chemotherapy scheduling process can be improved through process redesign and advanced analytical methodologies.
- The significant complexity of scheduling appointments can be managed effectively with a more flexible process and an intelligent scheduling tool that considers patient preferences, treatment requirements, operational restrictions and workload balance.
- Better scheduling practices reduce wait list size, increase confirmation times and generate important benefits to staff and other departments.
- The approach used in this project has the potential to be used in other cancer centres and ambulatory clinics with similar operations.
- Staff and patient engagement since the start of the project greatly contributed to design a successful process.

Implementation and Results

Performance Metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Before</th>
<th>After</th>
<th>Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirmation time</td>
<td>Appointments confirmed &lt; 7 days (%)</td>
<td>43%</td>
<td>18%</td>
</tr>
<tr>
<td>Appts confirmed &lt; 3 days (%)</td>
<td>22%</td>
<td>11%</td>
<td>50%</td>
</tr>
<tr>
<td>Waitlist size</td>
<td>Maximum (75th percentile)</td>
<td>34</td>
<td>9</td>
</tr>
<tr>
<td>At scheduling date (75th percentile)</td>
<td>29</td>
<td>6</td>
<td>79%</td>
</tr>
<tr>
<td>One day before appointment (75th percentile)</td>
<td>11</td>
<td>4</td>
<td>63%</td>
</tr>
<tr>
<td>BCCA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appointment availability</td>
<td>Working days to first available appointment (75th percentile)</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Days with appointment requests exceeding capacity (%)</td>
<td>76%</td>
<td>48%</td>
<td>37%</td>
</tr>
<tr>
<td>Pharmacy capacity</td>
<td>Daily treatment starts exceeding 15' capacity (75th percentile)</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Daily preparations exceeding hourly capacity (75th percentile)</td>
<td>88</td>
<td>71</td>
<td>19%</td>
</tr>
</tbody>
</table>

1. Before implementation: June 29 to October 23, 2009
2. After implementation: June 24 to October 22, 2010

"The new booking system is more straightforward for the clerks and helps the unit to have a more balanced workload across nurses."
― Clinical Nurse Coordinator