An Adaptable 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 at the infusion stage

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

What is Pre-mix?
- A drug is considered pre-mixed if it is made before any patient is deemed ready to receive it
- Pharmacies tend not to pre-mix drugs due to risk in wastage cost

Current Pre-mix Policy

University of Michigan Rogel Cancer Center (UMRCC)
Current Pre-mix Policy:
- Will only mix drugs during a fixed window of time (6AM-8AM) before patients arrive
- Use a fixed list of drugs they are willing to pre-mix, based on cost and common use according to pharmacists experience

Oversights of Current Pre-mix Policy:
- Does not take into account that different clinics operate on different days of the week
- Patients with similar or the same types of cancers receive similar or the same types of treatments
  - Extremely busy during the afternoon
  - Slower pace during the morning

Proposed Solution

Solution: Develop and implement a dynamic pre-mix template generator to update the fixed list that the UMRCC 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.

Parameters:
- Cost (willingness to expend to reduce wait time)
- Demand (from historical data)
- Mixing Time (from historical data)

Dynamic Template Testing:
- 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 UMRCC pharmacy time (by pre-mixing specific drugs) or money (by decreasing wasted pre-mixed drugs)?

Results

Template Comparison: The Percentage of Drugs Pre-mixed (July 11th – 16th, 2016)

Solution: Implementing a dynamic pre-mix template may decrease wait times, waste costs, and pharmacy workload variability via recommendations of currently unconsidered drugs (e.g., during preliminary analysis, Bortezomib and Oxaliplatin were both shown to be in high demand).

Conclusion

- We show our proposed dynamic template reduces both patient waiting time and pharmacy waste costs (Table 3)
- Our dynamic template varies daily, matching daily provider changes (provider type/specialty correlates with drug demand)
- We propose updating the dynamic template every 6 to 12 months to align with shifting patient populations
- There exists potential to reduce costs further by incorporating patient deferral probabilities

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