

MIT 15.777 H-Lab Fall 2023
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Introduction

Boston Children's Hospital

- Location: Boston, MA, USA
- As a Harvard Medical School affiliate, BCH is a top-ranked pediatric center. With 485 beds, it oversees 28,000 inpatient and 622,000 outpatient visits yearly, and its emergency department caters to 60,000 children annually
- The Urology Department at Boston Children's Hospital is distinguished for its exceptional pediatric urologic care.
- The BCH Urology Department has increased its physician count by 50% from 12 to 18 in the last 18 months, which brings new challenges in patient scheduling and wait times

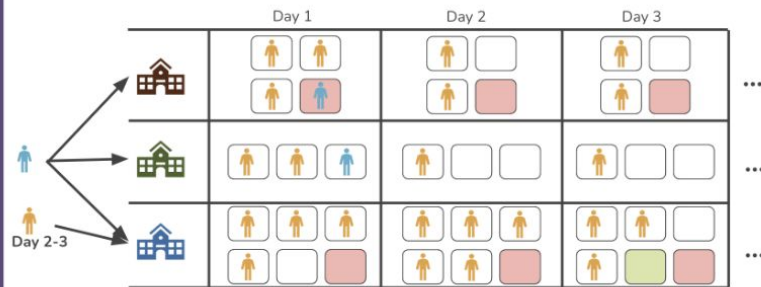
Methodology

Queueing Simulation Model

We develop a queueing simulation model, tailored specifically for the Urology Department's scheduling challenges. The model captures the department's operational constraints and patient demand patterns.

Key Assumptions

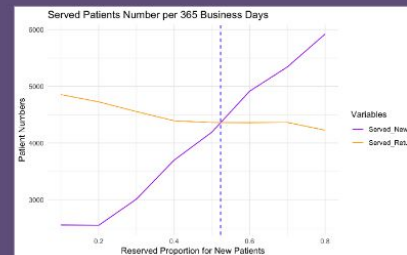
1. We assume that new patients will wait at most 90 days for an appointment.
2. Return patients must be scheduled at the same station within the timeframe dictated by their physician.
3. Out of all available appointments available on that day across all stations, a certain proportion is reserved for new patients.



Results

Simulation Output

- We investigate the impact of the reserved proportion on several outcomes of interest, which include
 - Expected revenue
 - Number of new and return patients served
 - Number of follow-up appointments missed, which indicates poor quality of care
 - Average new patient waiting time
- The graph below displays average results from 10 simulation trials for the general surgical line across 365 business days.
- Similar analysis was conducted for the CHEER line.



Key Observations

- As the reserved proportion for new patients increases from 0.2 to 0.8, the number of served new patients increases sharply. Meanwhile, the average waiting time for new patients increases from 78 days to 85 days.
- Number of served return patients decreases gradually but remains relatively stable.
- There's one intersection point between the number of new and returning patients served. When reserved proportion for new patients is larger than 52.3%, the number of served new patients exceeds the number of served return patients.
- Total revenue increases significantly after reserved proportion for new patients reaches 40%.

