As cancer treatment demand outpaces the capacity of ambulatory infusion centers, clinicians are challenged to provide timely, cost-effective, safe, and patient-centered care. Reduction in patient wait times can help address these challenges through more efficient care delivery. To reduce patient waiting times and operating hours, we developed a mathematical optimization model and easy to implement heuristics to generate patient appointment times at an infusion center. Our models explicitly considered the uncertainty of patient infusion times. We also created a detailed discrete event simulation model to evaluate the performance of the new patient appointment schedules. We observe that scheduling patients with longer infusion times earlier in the day results in shorter patient waiting times and total length of day of operations.

**COMPUTER SIMULATION**

Computer simulation is used to recreate a simple version of the operation of an infusion pod on a regular weekday at the University of Michigan Health System outpatient infusion center

- **Features**
  - 12 patients
  - 1 RN
  - 1 pharmacy technician

- **Operations duration:** 14 hours

- **Input**
  - Patient types
  - Nurse preparation time
  - Nurse discharge time
  - Pharmacy preparation time

- **Appointment schedules**
  - Baseline
  - Longest Processing Time (LPT)
  - Shortest Processing Time (SPT)

- **Output**
  - Average patient waiting times
  - Hours of operation
  - Chair utilization
  - Average time in infusion center

**RESULTS**

- **Appointment schedules generated by the optimization model result in reduced patient wait times and total hours of operation compared to the ones generated by the Baseline schedule, and the LPT and SPT heuristics**
- **Initial results demonstrate a 70% reduction in patient wait times using the appointment schedules generated by the optimization model**

**CONCLUSIONS**

- The effect of implementing different patient appointment schedules at an infusion center can be approximated by a mathematical optimization model
- Results of computer simulation suggest that scheduling patients with longer infusion times earlier in the day results in reduced patient wait times and total length of day

**FUTURE RESEARCH**

- Faster to solve optimization model generating better appointment schedules
- Development of a heuristic that can be easily implemented by schedulers
- Enhancing simulation model
- Addition of oncology clinic, increased complexity with additional nurses, chairs and patients

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**ABSTRACT**

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