

Thesis Project Portfolio

Optimizing Outpatient Cancer Infusion Center Access Operations Using a Systems-Based Approach

(Technical Report)

Integration of Nature into Hospital Design for Cancer Patient Recovery

(STS Research Paper)

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Introduction

As cancer care facilities seek to meet increased demand, they look to treat patients efficiently and effectively. This means that they often look both to improving organization and scheduling to increase throughput as well as seek ways to ensure excellent patient experience and care quality. While some solutions benefit both patient experience and hospital utilization at once, the two are often approached with contrasting strategies. This project aims to explore ways to improve cancer care deeply by diving into both organizational improvements to increase patient throughput as well alternative ways to promote patient experience through incorporating nature into hospital design.

Capstone Summary

As demand for cancer care has increased in the US, outpatient infusion centers have been constructed to meet this rising demand. Operational inefficiencies at these centers translate into long wait times for patients, low throughput, and inability to meet patient demand. This study examined an infusion center in the mid-Atlantic region known for its patient-centered approach. The objective of this study was to analyze the current patient flow, identify inefficiencies, and propose methods to eliminate these inefficiencies. The research team surveyed prior literature regarding patient processing in healthcare systems. After gaining preliminary knowledge, they collaborated for data collection with a comprehensive cancer center located in the mid-Atlantic. Two observational periods were completed, each lasting approximately three hours and involving discussions with an infusion nurse, an infusion nurse scheduler, and an infusion manager. The focus of data collection via these interviews was to improve understanding of patient flow, clinic processes, and pain points. Additionally, electronic health record (EHR) data from July 1, 2022, to June 30, 2023, was analyzed to obtain summary statistics for operations at the cancer center.

Observation and interview data were analyzed using qualitative content analysis procedures, while EHR data was analyzed quantitatively using computational software. Future focus for solution exploration can hone in on the factors that influence and impact patient no-shows, as well as strategies to reduce no-show occurrences.

STS Summary

As cancer rates continue to increase, so does the use of conventional treatments such as chemotherapy. Alongside this, the public and the medical community have varied and evolving views toward considering spending time in nature as a part of cancer treatment. This paper endeavors to answer the question: How can hospitals incorporate nature into their treatment plans and hospital design to support their current methods and further their goal to treat cancer patients as efficiently and effectively as possible. This is achieved through an exploration of three case studies showing various approaches to using nature to promote recovery. Nature is mentally associated with the notion of healing for many people, and various aspects of nature are shown to be beneficial to physical health as well as psychological well-being. Using nature-focused imagery, indoor plants, nearby trees, phytoncide aromatherapy, and nature sounds, hospitals can improve cancer patient biomarkers, manage patient pain levels, improve patient sleep duration and sleep quality, and improve stress and mood. Supporting patient physical and psychological well-being through these interventions is a cost-effective, low risk way to complement the conventional therapies used to treat cancer patients that may help patients associate hospitals with healing more directly.

Conclusion

Cancer centers are organizations with many employees working in a variety of positions, often embedded in a larger hospital ecosystem. Thus, most employees within cancer centers do

not have the opportunity to look at the organization holistically from a variety of different angles. Working on these two projects in parallel has illuminated the complexity of such centers. Moving between the macro lens of hospital throughput to the micro lens of how individual patients envision healing environments has made for a more holistic project where each portion has helped ground the other. The inherently big picture thinking of systems engineering can mean large scale decision-makers can sometimes lose sight of the individuals within the system that the decisions will affect. Likewise, delving into the depths of patient experiences with recovery can mean losing sight of the efficiency of the broader hospital system that promoted that recovery. The insight each project lent to the other helped to counteract the tendency to stay siloed in one lens, resulting in a more integrated and nuanced understanding of the cancer care system.