

Thesis Project Portfolio

**Optimizing Outpatient Cancer Infusion Center
Access Operations Using a Systems-Based Approach**
(Technical Report)

**Examining the Social Dynamics of Mammograms and
Their Impact on Patient Access to Cancer Treatment**
(STS Research Paper)

An Undergraduate Thesis

Presented to The Faculty of the School of Engineering and Applied Science
University of Virginia, Charlottesville, VA

In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Spring 2024

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Executive Summary

The US Healthcare system is a complex system that aims to provide affordable and accessible healthcare across both local and national levels. Providing healthcare however, is a difficult task that comes with many hardships. These difficulties sometimes make it difficult to optimize patient treatment efficiency and satisfaction, sometimes coming at the cost of other patients. The Emily Couric Cancer Center is a state-of-the-art facility at the UVA hospital that provides specialized cancer treatments to Central Virginia, and the greater Mid-Atlantic area. The center is effective at providing treatment to their patients, however, there are improvements to be made in patient access.

I conducted a technical project with a team of UVA systems engineering students to identify problems in their current access operations workflow, and develop solutions to optimize their outpatient flow using a systems-based approach. This culminated into my technical project *Optimizing Outpatient Cancer Infusion Center Access Operations Using A Systems-Based Approach*, included in this portfolio. We conducted a comprehensive assessment of a cancer infusion center in the mid-Atlantic region to analyze patient flow, identify inefficiencies, and propose solutions. Our approach included data analysis, direct observations, and staff interviews to identify key issues impacting the center's operations and improve patient access.

A key finding from our data analysis was significant reliability issues with the center's electronic health record (EHR) data. Inaccurate and missing data was a prevalent problem identified in our study. Interviews with staff revealed that inconsistent data reporting practices, such as physicians not consistently entering data, contributed to these data quality problems. The lack of reliable access data made it challenging to fully understand patient flow and identify opportunities for improvement.

Our analysis of appointment data showed an overall low and uneven utilization rate, potentially leading to longer patient wait times, reduced throughput, and decreased patient satisfaction. We identified that an improved workflow for appointment scheduling and patient access may improve the utilization rate over the course of several years. Direct observations and staff interviews uncovered several challenges related to scheduling and patient access. Inconsistent scheduling practices by providers, such as double-booking patients, created operational challenges and uneven patient flow.

Based on the findings, we proposed several recommendations to address the identified issues. Together with our data analysis, the technical project provides valuable insights into the operational challenges of patient access facing the cancer infusion center. Addressing the identified issues around data quality, utilization, and access can provide the center with a better understanding of their workflow, set the stage for future studies, and help improve the center's efficiency and patient experience.

STS Project Overview

To accompany the technical project, the STS project *Examining the Social Dynamics of Mammograms and Their Impact on Patient Access to Cancer Treatment* reveals the wider implications for the technical project on optimizing cancer infusion center operations. By uncovering systemic barriers and biases, the STS project offers a broader understanding of healthcare disparities that directly impact patient access and outcomes.

Using the Social Construction of Technology (SCOT) Framework, the project examined mammography, the limitations it places on cancer treatment, and the negative financial and health impacts it has on certain social groups. The history and development of mammography was analyzed to provide a background on the technology and its purposes. Using the SCOT

Framework, social groups involved in the use and perception of mammography were identified and analyzed. The social groups involved in the development and present-day use of mammograms primarily include physicians, patients, and their social sub-groups including individuals of racial minority status, low socioeconomic status, and low health literacy. Research found that there were numerous overlapping perceptions and experiences of patient social groups in regards to mammography. Some of the most notable include similar financial barriers to mammography among individuals of racial minority status, low socioeconomic status, and low health literacy. These financial disparities make it more difficult for certain minority and low-income populations to receive the necessary breast cancer screenings, leading to delays in diagnoses and higher rates of poor health outcomes.

In addition to the social groups mentioned, emotional distress is a very common experience among patients, regardless of background. Due to the prevalence of breast cancer and its negative social perception, many women have fear of receiving mammogram screenings due to the possibilities of receiving a positive cancer diagnosis. Additionally, there are risks involved in the mammogram screening process, including misinterpretation of results, and false positive/negative diagnoses. These risks are largely held responsible by physicians who order mammograms for their patients and interpret the results.

An analysis of the different experiences of social groups involved led to an improved understanding of the overlapping challenges facing different social groups. This facilitated the development of potential recommendations for policy changes and practices to be implemented to improve the systemic issues surrounding mammography. These primarily recommendations aim to relieve emotional distress, improve the accuracy of mammography, and increase the rates of breast cancer screenings for underserved patient populations.