Thesis Project Portfolio

OPTIMIZING OUTPATIENT INFUSION CENTER THROUGHPUT USING A SYSTEMS-BASED APPROACH

(Technical Report)

INVESTIGATING THE IMPACT OF THE AFFORDABLE CARE ACT ON CANCER OUTCOMES FOR LOW-INCOME PATIENTS

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

Although cancer survival rates have been improving in the United States over the past 30 years, cancer treatment facilities still struggle to achieve patient treatment volumes that match demand for their services. My capstone team and I studied the treatment workflow at UVA's Cancer Center through a combination of interviews, observations, and statistical analysis. We discovered that there was significant room for process improvement at the center and determined that two strategies, a new drug pre-preparation approach and a novel scheduling approach, could increase chair utilization without subjecting nurses to additional strain. From a human factors standpoint, our research showed that increasing cancer treatment efficiency would improve patient experiences and decrease nurse workload. Indeed, future work at this cancer center and at cancer centers around the country must be evaluated holistically, from both a throughput and human impact perspective.

Cancer care can also be viewed through an infrastructure lens. Susan Star's infrastructure framework helps us understand that cancer care is embedded within pre-existing healthcare systems, learned as a part of membership by patients, and built on an installed base of other pieces of infrastructure. For my thesis project, I investigated the impact of the Affordable Care Act (ACA) on cancer outcomes for low-income patients using Star's framework and statistical analysis. My study found that cancer mortality rates fell significantly in the decade following the ACA's passage, but that cancer mortality rates in persistent poverty counties lagged rates in nonpersistent poverty counties by a decade. Moreover, the mortality rate gap between persistent and nonpersistent poverty counties only barely decreased during this time period. Unfortunately, the ACA was not significantly correlated with improvements in cancer treatment for low-income patients between 2010 and 2020.

My capstone and thesis projects examine cancer care from different angles, but they are connected by their twin desires to understand and improve cancer treatment across the country. Together, these two projects help us understand how hospital-level and policy-level approaches can provide future cancer patients the cancer care they deserve.