

**Thesis Project Portfolio**

**Improving Patient Flow in a Healthcare Clinic Post COVID-19: A Data Validation and Exploratory Analysis Approach**

(Technical Report)

**Care Ethics Analysis of the Hahnemann University Hospital Termination in Philadelphia, Pennsylvania**

(STS Research Paper)

An Undergraduate Thesis

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

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

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## **Sociotechnical Synthesis**

My technical and STS research projects are connected by how they both relate to understanding issues in our healthcare system. My technical project focuses on improving the University Physicians Charlottesville (UPC), a primary care clinic within the UVA Health System. In contrast, my STS research scrutinizes the morality of the actions taken by executives to close the Hahnemann University Hospital (HUH) in Philadelphia, Pennsylvania. Although my technical project focuses on a primary care clinic while my STS research project focuses on an entire hospital, the theme of improving patient care is evident in both.

My technical project focuses on improving the UPC clinic by reducing strain on medical staff, promoting data transparency, and increasing efficiency. UPC was short-staffed, so returning to normal operations in a post-pandemic society placed greater strain on medical personnel and resulted in patients experiencing longer wait times. UPC utilizes an electrical medical record (EMR) system to record patient data and timestamps, such as when a patient arrives, is roomed, etc. However, this data is inaccurate to a certain extent as it is unclear what exactly triggers these timestamps to be collected. My technical project was broken down into three steps: data collection and validation, data analysis, and simulation. The data collection process involved observing the clinic rooming process and collecting data for when each part of the process was completed. We then cross-matched the observational data with the EMR data. The data analysis process involved interpreting the distribution of appointment delays and building a mathematical representation of the queuing system. The simulation phase involved creating a discrete event simulation to replicate patient throughput in order to identify an ideal nurse-to-provider ratio. Overall, these steps allowed us to improve the UPC Clinic, enhancing the patient experience.

My STS research project focuses on investigating the morality of the actions taken by HUH executives to close the hospital. I analyzed this case from a care ethics perspective, examining how the closure demonstrated a failure of social responsibility to its patients, employees, and a neighboring hospital. HUH's closing negatively impacted many as it served some of the city's sickest, poorest patients. Patients were forced to receive care elsewhere. Resident physicians had to find new programs in the middle of their current tenure at HUH. Thomas Jefferson University Hospital, located near HUH, experienced a greater influx of patients, causing delays. The goal of this project was to emphasize that HUH's closing is an ethical issue rather than a solution to a financial crisis.

Working on these projects simultaneously was of great value. My technical project provided a greater understanding of how a higher nurse-to-provider ratio improves patient flow, inspiring my argument for the STS research project as patients, employees, and a neighboring hospital were negatively impacted as a result of HUH's closing. My STS research allowed me to understand how hospital owners owe a duty of care to all of the actors within their network. This allowed me to apply care ethics to argue how the actions taken by executives to close HUH were indeed immoral. Hence, working on both my technical and STS projects concurrently allowed me to explore healthcare from different perspectives, highlighting various issues in our healthcare system today.