Analysis of Patient Flow at the University Physicians Charlottesville Clinic in Charlottesville, VA

Analysis of the Hahnemann University Hospital Termination in Philadelphia, PA

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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction:

The COVID-19 Pandemic significantly strained the University of Virginia (UVA) Health System. UVA Health is comprised of "an integrated network of primary and specialty care clinics" throughout Virginia (*About | UVA Health*, 2022). As result, the effects of the Pandemic were seen across the region. UVA Health navigated this challenge by reducing expenses, employee salaries, and funding for the School of Medicine, School of Nursing, and Health Sciences Library (*UVA Health Enacting Changes in Response to COVID-19 Financial Impact*, 2020). Healthcare providers adjusted accordingly to "ensure the safety and well-being of patients and other stakeholders in the system" (Riggs, 2022). Now, as we transition to a "new normal," healthcare providers are working towards adapting from "pre-Pandemic" times (Riggs, 2022).

The University Physicians Charlottesville (UPC) Clinic, a primary care clinic within UVA Health, is currently experiencing inefficient patient flow. My team and I will work with the UPC Clinic to understand their current situation and improve the patient flow process, especially as the clinic approaches this vaccination season with patient volume expected to increase. To propose solutions, my team and I will apply Evidence-Informed Systems Engineering, which "applies the scientific method to the design of complex systems, uses evidence to inform engineering decisions, and provides the best assurance that the [improvements] will meet the [patient's] needs" (Barnes & Quinn, 2022).

Through initial research and analysis, I learned about various social factors that influence a health system's capability to succeed. This includes having a sufficient number of medical employees able to treat patients, efficient resource management, financial revenue, and effective communication throughout the entire patient process (Pichler, 2018). I will investigate the contribution of these social factors to the termination of the Hahnemann University Hospital in

Philadelphia. To accomplish this, I will apply Actor-Network Theory, analyzing human and non-human actors that integrate to form the health system.

Therefore, multiple aspects of health systems provide a more comprehensive and holistic approach to addressing the challenges associated with it. This will allow my team and I to construct a more effective argument when we present our recommendations in the spring. In what follows, I elaborate on a technical project that attempts to improve the functionality of the UPC Clinic and an STS project that examines the closing of the Hahnemann University Hospital.

Technical Project Proposal:

As UVA Health continuously attracts a significant number of patients, its "high-quality" care must continue (*About | UVA Health*, 2022). The UPC Clinic consists of a team of providers, nurses, medical assistants, and receptionists. As the UPC Clinic attempts to strategically resolve different challenges, it must continue to meet the high patient demand. The UPC Clinic uses an electronic system called Epic that records patient medical information and time stamp data for the patient flow process, such as when a patient checks in, enters a room, etc. (Riggs, 2022). A prior group concluded that these time stamps on Epic are not as accurate due to how it is not exactly clear what prompts the time stamp to be recorded (Riggs, 2022). As a result, my team and I will focus on developing methods to optimize patient flow, verifying what those time stamps officially illustrate.

Currently, the UPC Clinic consists of a team of seven providers, two medical assistants, and one licensed practical nurse. The medical assistants and licensed practical nurses, also known as the rooming staff, work together to room patients from the waiting area to their room and perform necessary vital checks before the patient meets with the provider. The current patient flow is inefficient as patients currently wait long periods of time before being roomed. If

these challenges are not addressed soon, there will be negative impacts on many, ranging from patients to providers. It only takes one patient to alter the rooming process, creating a domino effect as not only are provider schedules impacted but consecutive patients will also have to wait longer for their appointment.

The goal of this technical project is to propose a technical solution comprised of recommendations to help improve the patient flow process at the UPC Clinic. Implementing these recommendations will result in greater efficiency, improving the patient's experience overall. These recommendations will be based on our quantitative and qualitative analyses. First, this will involve shadowing both the rooming staff as well as the providers at the UPC Clinic to gather observational data, which consists of determining what metrics we want to measure, such as retrieval, entry, and exit times. Following this step, my team and I will compare the observational data with the cadence data, which is the data collected automatically by Epic. My team and I will verify what prompts the time stamps to be recorded in Epic by attempting to match the cadence data with our observational data. This will be completed by utilizing the data analysis tools we learned in our Systems Engineering curricula, such as Microsoft Office Excel, Minitab, Python, as well as learning new software, such as Tableau. We hope to gain an understanding of the cadence data by interpreting what the time stamps mean, which will allow us to pinpoint where patients are currently located in the process and what factors contribute to delayed rooming times. Our next step is to conduct a simulation of the UPC Clinic to determine the optimal utilization rate for the rooming staff. Overall, this project will allow us to improve the UPC Clinic experience, which will not only benefit patients but also the medical staff.

STS Project Proposal:

Challenges in healthcare continue to affect our society to a significant extent. Urban areas are prone to experience these effects sooner as their patient volume is significantly higher than rural areas due to 55% of the world's population living in urban areas with this proportion possibly increasing to 68% by 2050 (Unsplash, n.d.). Inquiring on a similar scale, Philadelphia is a city in the United States that experiences difficult challenges as it is the "poorest of the largest U.S. cities with 23.3% of residents living in poverty," straining the Philadelphia health system (Shields, 2020). The Hahnemann University Hospital (HUH), a major hospital in the city, was bought out of bankruptcy in 1998 by Tenet Healthcare (Pomorski, 2021). Tenet Healthcare is a for-profit healthcare services corporation and “owned a hundred and twenty hospitals in eighteen states…and [bought] six other area hospitals” when they bought HUH (Pomorski, 2021). Tenet Healthcare’s C.O.O. at the time, Michael Focht, promised the community that Tenet Healthcare would be there for the “long haul,” implying a long-term goal of serving the community while providing outstanding patient care (Pomorski, 2021). HUH “served mostly low-income patients, but it had a range of medical subspecialties and was the primary teaching hospital used by Drexel University’s College of Medicine” (Pomorski, 2021). Most of the fifty thousand patients that HUH treated per year had “publicly funded medical insurance or none at all; two thirds were Black or Hispanic (Pomorski, 2021). Despite HUH’s positive patient outcomes, HUH executives under Tener Healthcare faced many obstacles (Pomorski, 2021).

HUH permanently closed in September 2019 as Tenet Healthcare could no longer keep up with the expenses (Cramer, 2020). The hospital closing negatively impacted the population as it served "some of the city's sickest, poorest patients" (Burns, 2019). However, the hospital was in extreme debt, experiencing losses of "$3 million to $5 million a month" (Burns, 2019). As a

result of these "severe financial difficulties," the hospital could no longer remain in business (Burns, 2019). Previous researchers examined external factors in the case, but they have not yet adequately addressed diverse, social factors, such as how lack of patient flow, resources, and communication between departments also contributed to the closing of the HUH. If these metrics are not addressed soon in other health systems, patients will face obstacles within inefficient healthcare systems, resulting in patients facing a higher risk of injury or death due to delayed care (Pichler, 2018). Inefficient health systems also negatively impact medical professionals- physicians, nurses, and assistants, by causing burnout (Kaushik, 2021). According to a Washington Post survey, medical burnout during the COVID-19 Pandemic "reached epidemic proportions" (Kaushik, 2021). Approximately 62% of all healthcare workers struggled with "mental repercussions," demonstrating a correlation with workers who cared for COVID-19 patients mainly suffering from these issues (Kaushik, 2021). This portrays how the Pandemic affected our essential workers overall, similar to the UPC Clinic in Charlottesville. Thus, the application will elucidate on the importance of multiple components needed to preserve an integrated health system. This will provide readers with an understanding of how the closing of HUH not only impacted the patients and employees of that hospital but as well as the Philadelphia community as a whole.

Utilizing Actor-Network Theory, I will argue that these conceptual, economic, natural, social, and technical factors, specifically the lack of patient flow, resources, and communication caused Tenet Healthcare to cease operations of the HUH. Analyzing the impacts of inefficient patient flow will illustrate that this metric is equally as important as other elements within the Philadelphia health system. Actor-Network Theory "traces the complex relationship that exists between governments, technologies, knowledge, texts, money, and people" (Cressman, 2009).

Actor-Network Theory is unique in how it considers "human and non-human elements equally as actors within a network" (Cressman, 2009). Given that no actor is more powerful, important, or influential than others, interconnections demonstrate the potential strength a network can have (Cressman, 2009). The HUH executives, who worked under Tenet Healthcare, assembled a heterogeneous network of human and non-human actors. This ranges from medical personnel to computer software for patient tracking. I will apply translation, a concept which examines the formation and maintenance of an actor-network, to determine the different areas that caused HUH's operations to fail (Callon, 1986). To achieve this goal, I will analyze multiple sources of evidence, including a *Philadelphia Case Study- The Impact of the Closure of a Large, Urban Safety-Net Hospital on a Neighboring Academic Center (*Desai et al.*, 2020)*, and a case study on *Improving Emergency Department Flow* at HUH (*Improving ED Flow through the UMLN II--Hahnemann University Hospital*, n.d.).

Conclusion:

The final deliverable for the technical project is an academic paper to be submitted to the Systems and Information Engineering Design Symposium, "a student-focused international forum for applied research, development, and design" in this field (*IEEE SIEDS*, 2019). Additionally, the technical project will allow my team and I to provide the UPC Clinic with effective solutions to make the patient experience more efficient. The STS research project will provide greater explanations of how conceptual, economic, natural, social, and technical factors collectively contributed to the closing of Hahnemann University Hospital (HUH) by utilizing Actor-Network Theory. Through this application, the impact of both technical and social factors will be evident, allowing me to approach the technical project deliberately. This application will also provide greater insight on what elements are needed to maintain an actor-network,

emphasizing the concept of translation. Overall, both projects serve to positively alter our outlook on the healthcare system as we emerge from the Pandemic and transition into a "new normal."

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