Prospectus

Back to the Norm: Helping the UVA Health System return to Pre-COVID Levels of Patient Flow
(Technical Topic)

Theory of Technological Politics and the Lasting Effects of Discriminatory Housing Practices on Healthcare
(STS Topic)

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

COVID-19 has exposed the inefficiencies in the U.S. healthcare system and the disparities in access to healthcare (Centers for Disease Control and Prevention, 2020). Hospitals have had to develop new protocols to protect their patients and staff during the pandemic, many of which have reduced capacity and efficiency. In order to address inadequate access to healthcare services, the UVA Health System needs to increase its efficiency. The inefficiencies in the UVA Health System have reduced patient volume during the pandemic and have decreased patient and provider satisfaction, in regards to experience and quality of care. The UVA Health System clinics have been operating inefficiently long before COVID-19, and the COVID-19 pandemic has exacerbated the negative impacts of this issue. In order to address these inefficiencies and help increase access to healthcare, UVA Health Systems clinic patient flow will be analyzed, refined, and optimized. This solution will help the UVA Health System maintain pre-COVID patient flow, minimize worker furloughs, reduce lost revenue, and improve the patient and provider experience.

While developing the clinic patient flow optimization, it is necessary to explore how certain social factors have marginalized targeted groups, leading to disparities in healthcare access. Discriminatory housing lending practices in the 1930s intentionally prevented access to homeowner's loans in low-income, minority communities, and over the course of time have created even more inequity within these communities. These inequities include lack of access to healthcare, schools, and jobs: life expectancy in these communities can be up to 20 years shorter than nearby white neighborhoods (Richardson et al., 2020). If the UVA Health System clinics' patient flow is optimized without the consideration of these discriminatory housing practices,

low-income, minority communities will continue to be marginalized and will not be able to access the healthcare services they need.

To adequately address the issue of access to healthcare, a solution must address both the technical and social aspects that have prevented this access over time. The U.S. healthcare system as a whole has been affected by social biases that were implemented in housing lending practices that have led to a health equity crisis. Understanding the social factors that have led to healthcare access disparities will help increase the accessibility of healthcare for all Americans and will improve the implementation of the UVA Health System patient flow analysis.

Technical Problem

Health systems worldwide have been disrupted significantly as a result of the COVID-19 pandemic. An article from the University of Virginia Health System Newsroom details its impact from March to April of 2020: ". . . hundreds of inpatient beds have been regularly unoccupied, surgeries have declined by 70%, and clinic visits have been reduced by 90%. The result has been a fall in revenue from clinical care and related services that is producing a deficit of $85 million a month" (Swensen*,* 2020*).* As the pandemic has continued over the past months, there has been an increasing need to determine how to maximize patient flow under new guidelines and requirements meant to mitigate community spread of the disease. Specifically, the Internal Medicine, Primary Care Clinic has faced this challenge in its patient admittance process. Before the pandemic, the admittance process for this clinic began when the patient entered the building and checked in at central registration (refer to Figure 1) (K. Dowdell, personal communication, September 10, 2020). As seen in Figure 2, the patient then travelled to the clinic floor, checked in at the front desk in the clinic's suite, and sat in the waiting room until a nurse retrieved them (K. Dowdell, personal communication, September 10, 2020). Although sufficient for handling

patient arrival under normal circumstances, the process was inadequate for supporting patient admittance in a pandemic.

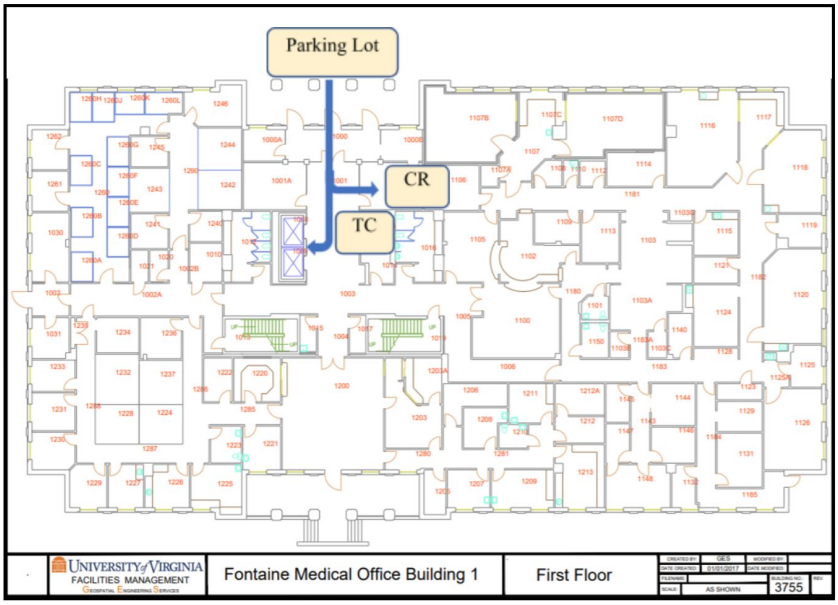

Figure 1. Diagram denoting patient flow process for patients going into Primary Care Clinic & locations of the parking lot, entrance of the building, central registration (CR), and temperature check (TC) (Geospatial Engineering Services, 2017).

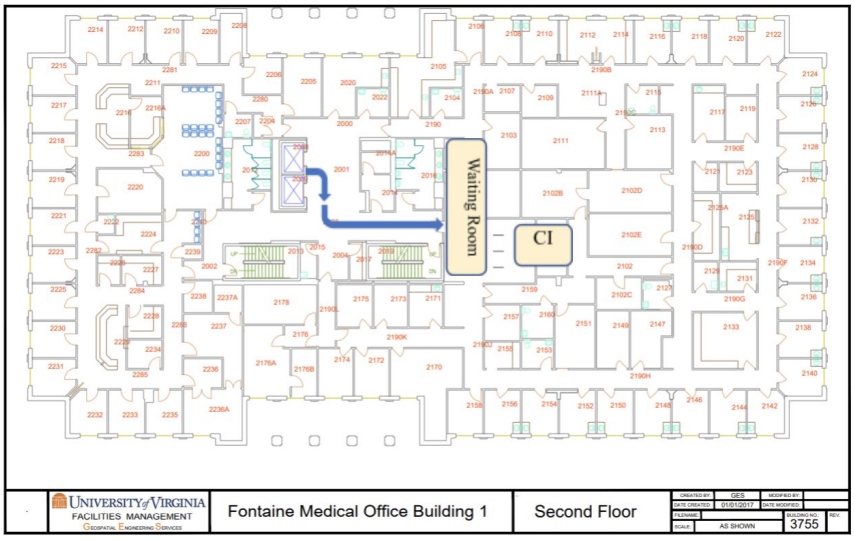

Figure 2. Diagram denoting patient flow process for patients going into the Primary Care Clinic & locations of the waiting room for the Primary Care Clinic and check-in to the clinic (CI) (Geospatial Engineering Services, 2017).

In response to COVID-19, the UVA Health System enacted new guidelines for ambulatory visits to reduce the number of patients in buildings and ensure a safe environment for

patients and providers. These guidelines included prioritizing the use of telemedicine appointments for non-urgent visits and implementing COVID mitigation procedures for in-person appointments, such as requiring social distancing, mask wearing, and patient screening (O'Donnell et al., 2020). Under the new process, patients are able to use remote registration from the parking lot, where the patient waits in the parking lot until clinic staff call them up to their suite (K. Dowdell, personal communication, September 10, 2020). Once called up, the patient enters the building, has their temperature checked, and proceeds to their clinic's reduced-capacity waiting room (refer to Figures 1 and 2) (K. Dowdell, personal communication, September 10, 2020). This new patient admittance process is meant to maximize the safety of patients and providers, but it makes it very difficult for the UVA Health System to operate efficiently and maintain pre-COVID patient flow. The consequences of not optimizing such a process include worker furloughs and lost revenue, as well as general patient and provider frustration and safety.

The goal of this technical project is to refine and optimize patient flow in the Internal Medicine, Primary Care clinic – including its current patient admittance and scheduling processes – to help the clinic return to pre-COVID patient levels while accommodating public health restrictions. To achieve this goal, the team will use a top-down approach to understand the current process weaknesses and develop recommendations. More specifically, the team plans to conduct event simulations and statistical analysis techniques in R, Excel, and SAS on multiple different data sources to analyze factors relating to patient flow during the pandemic. These data sources include timestamp data from Epic, a healthcare software company that UVA Health uses to store electronic health records; observational data gathered by the team; and survey data gathered from clinic staff that was designed by the team. The project will be broken up into two

phases: the first phase will primarily consist of observation, data collection and analysis, and development of a plan of how to use these materials; the second phase will include data modeling, prototyping, test implementation, and final recommendations.

STS Problem

The COVID-19 epidemic has revealed many underlying racial issues within our society. COVID has disproportionately affected the African American community, making access to healthcare for this population more critical than ever before (Nania, 2020). Thus, attempts to improve health system efficiency cannot be achieved without evaluating social factors that have created inequities in healthcare access. Redlining was "the discriminatory practices of denying minority populations access to equal loan and housing opportunities. Emerging in the 1930s, redlining was embraced in the real estate industry for decades and shaped the social landscape of numerous American cities, large and small" (Jones & Foltman, 2019). Redlining was a technological method to determine where and whom it would be appropriate to provide federally-backed mortgage loans. The Federal Housing Administration worked with Home Owners' Loan Corporation (HOLC) to determine which neighborhoods were high risk and low risk investments in 239 cities (Jan, 2018). HOLC used the technology of redlining to grade neighborhoods on "aesthetics and age of houses, their proximity to recreational facilities and environmental hazards and the characteristics of the people who lived in each neighborhood" (Jones & Foltman, 2019).

The redlining method ingrained individual biases into each neighborhood and prevented many qualified homeowners from being classified as a low risk investment based on their race, wealth, and neighbors. The HOLC categorized neighborhoods by color; green neighborhoods were the most in-demand neighborhoods, and were lacking "a single foreigner or Negro"

(Lockwood, 2020). Blue neighborhoods were determined to be still desirable due to a low risk of non-white groups. Yellow areas were the neighborhoods determined to be declining and had the "threat of infiltration of foreign-born, negro, or lower grade populations." Lastly, the red neighborhoods were "hazardous" minority-majority neighborhoods, and were made ineligible for federal housing loans (Lockwood, 2020). Therefore, the nature of redlining lends itself to having a political dimension through the categorizations of neighborhoods.

Considering the technology of redlining in a purely historical context, as a discriminatory loaning practice, prevents an assessment on how this practice continues to negatively affect these areas today. A 2018 study found that redlined neighborhoods residents were 2-4 times more likely to have an emergency room visit due to an asthma attack (Nardone et al., 2020); an analysis of birth certificate data from 2013-2017 found that living in a redlined neighborhood is a predictor for preterm births (Krieger et al., 2020). These studies, among others, have shown how redlining has negative impacts on health outcomes today. If we continue to think of redlining in purely historical terms, we will miss how the marginalization of those who live in redlined neighborhoods has created disparities in access to healthcare, and how these effects have worsened with time.

Drawing on the technological politics framework, I argue that redlining has created inequalities in access to healthcare in U.S. cities, by marginalizing low-income minority neighborhoods. Technological politics will allow me to explore how redlining acted as an arrangement of power and authority which marginalized minority populations. Studying redlining and its history is necessary to understand how historical technologies that marginalized minorities continue to negatively impact them today. To support my argument, I will apply Winner's concept of inherently political technologies to analyze how the use of redlining

developed power relations between communities in American cities (Winner, 1980). Specifically, I will analyze health disparities between communities that were redlined and those that were not, including: life expectancy, child mortality, chronic disease diagnoses, access to primary care, and reliance on emergency medical services. This analysis will highlight how redlining continues to marginalize communities today and the negative implications for considering this technology in a purely historical context.

Conclusion

This proposal calls for technical and social solutions to address inadequate access to healthcare. Access to healthcare is a complex socio-technical problem which requires analysis of the social factors that have prevented access for minorities and the technical inefficiencies within healthcare systems. The technical report will discuss the development of a clinic patient flow optimization to address the inefficiencies within the UVA Health System that have been exposed and exacerbated by COVID-19. This development will lead to higher patient volumes and will improve the patient and provider experience. In addition to the patient flow optimization, the social factors that have marginalized low-income minorities and prevented their access to healthcare will be analyzed using Langdon Winner's Theory of Technological Politics (Winner, 1980). This analysis will expand the understanding of how redlining has impaired access to healthcare for certain populations. While the political component of this technology was inherent, merely viewing this technology for its intended purpose will prevent a greater understanding of its effects over time. In conclusion, the STS paper will uncover how the effects of technologies over time should be considered beyond their initial purpose, in the context of discriminatory housing practices leading to unequal access to healthcare.

Word Count: 1791

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