# IMPROVING PATIENT FLOW FOR THE SUITE 2100 CLINICS IN THE UVA HEALTH SYSTEM

## TELEMEDICINE FUTURE SCENARIOS

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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

Suite 2100 within the UVA Hospital network contains three clinics: Primary Care, Rheumatology, and Endocrinology. All three clinics share the same check-in desk, resources, and patient waiting area. As a result, all are facing similar patient throughput inefficiencies. Optimized patient throughput "allows for the efficient flow of patients through the hospital, ensuring timely and appropriate level of care" (Walker, 2016, p. 1). Throughput measures include the sum of the services provided per unit of time, where services provided include the number of patients treated, patients admitted, patients discharged, and procedures performed (Throughput, 2012). The throughput problem stems from a lack of understandings of systems to maximize efficiency, long-term impacts of the COVID-19 pandemic, and insufficient communication between clinics, within clinics, and between clinics and patients.

Through clinic observation and communication with clinic administrators, the capstone research team has concluded that problems begin before patents arrive at the clinic. Suite 2100 is located within building 415 of the UVA Fontaine Research Park. Building 415 houses 8 independent clinics, a diabetes education and management center, hand and spine centers, a cosmetic and reconstructive surgery canter and an imaging lab (UVA Health, n.d.). Due to insufficient signage on the outside of the building, as well as other buildings in the park, patients often arrive only to find out they are in the wrong place, or arrive behind schedule after going to the wrong location first (Dowdell, 2021). Once they enter, they are unsure where to go and during peak times there are bottlenecks near the front entrance.

During the last academic year, a capstone team supported the Primary Care clinic within Suite 2100 by mitigating patient safety challenges that arose due to the COVID-19 pandemic

(Korte et al, 2021). This year, the capstone team will perform data analytics to inform recommendations on how to increase patient throughput in all of the UVA hospital suite 2100 clinics.

**Technical Topic**

The current operations of the clinic from are as follows. Doctors plan their schedules months in advance, listing the type of appointments they will hold during specific times for each day of the week. Currently, the doctors do not coordinate with each other how they block their appointments. Therefore, there are times when there is a lack or an excess of appointment types. A patient schedules an appointment in a doctor's spot that corresponds with the type of appointment they are looking for. When they arrive at the clinic, they are instructed to register at the central registration located on the first floor. Every clinic in the building requires patients to register there before entering the clinics. At registration, the patient is confirmed to be in the right place, they are screened for COVID-19 symptoms, and they pay a copay if applicable. If they are in the system, the registrar confirms insurance and demographic information, or if the patient is not in system, the registrar collects demographic and insurance information. Lastly, the patient is marked as checked-in to the building. Once a patient enters suite 2100, they check-in there as well. This check-in process only marks the patient as arrived in the clinic and provides an opportunity for the patient to receive any necessary forms to fill out while they wait to be called back. The process after they are called back to see their doctor is out of the scope of the project.

Given that there are multiple small problems contributing to a broader patient throughput problem, the capstone team plans to deliver several recommendations and solutions to the clinic administrators. One deliverable will be a visualization of doctor schedules. This visualization will allow the team to identify specific instances where the current scheduling does not accommodate several appointment types. This will inform specific recommendations about changes each provider should make moving forward. The visualization will transform a multi-tab Excel workbook of individual provider schedules into an easy-to-use tool that will allow doctors to see the current aggregated scheduling as well as updated versions if they make changes to their schedules. This will stimulate communication between doctors on effectively scheduling and help the doctors understand how to maximize efficiency within the system in which they work.

The second deliverable is a recommendation about patient arrival. Currently there is no system in place to effectively communicate how long before a patient's appointment they should arrive to the clinic, nor is there a determination within the clinics of what that time should be. Clinic administrators have expressed that they want the pre-appointment arrival time to be long enough that if a patient is running late, they have time to fill out their paperwork before being called back, but not so long that the average patient or a patient that is early is not waiting for so long that they are crowding the waiting room. The clinics record data of when a patient checks in and when they are roomed. Using this data and qualitative takeaways from observation, the research team will preform analysis that will inform the pre-appointment arrival time. Another factor in this deliverable is the UVA Health eUpdate. The eUpdate within the MyChart communication system is meant to act as patient preregistration. If used correctly and by enough patients, the eUpdate would eliminate all of central registration except marking the patient as arrived in the building as well as some of the paperwork in the clinic. The eUpdate is meant to be completed at home prior to a patient's appointment. The online inetrface requests that patients review/input their contact information, sign documents, upload insurance information, pay any copay, input demographic information and answer COVID-19 prescreening questions (UVA Health, 2021). The eUpdate is currently available to all clinic patients, however, only 5% of patients complete it before their appointments and therefore it is not being used to minimize registration (Dowdell, 2021). If the eUpdate becomes widely used, the pre-appointment arrival time could be shortened. Therefore, the capstone team will provide qualitative recommendations on how to better communicate to patients that they should complete the eUpdate, as well as recommendations for pre-appointment arrival times both with and without increased eUpdate adoption. These recommendations will help reduce communication problems between patients and the clinic, and help mitigate confusion caused by a crowded central registration area.

The third deliverable is on building signage. The team will prototype signs for outside of the building that will list the clinics in the building and signs for right inside the door of the clinic explaining how to register and what to do following registration. The team will make recommendations on the size and contents of the signage with several human factors and readability considerations in mind. Although this deliverable is not solely for the suite 2100 clinics, it will help patients find the building and register more easily which will in turn lower the number of late patients and increase patient throughput.

**STS Topic**

While my technical research focuses specifically on patient throughput, I am interested in exploring how the COVID-19 pandemic motivated the proliferation of telemedicine in healthcare systems and the future of telemedicine technologies. Telemedicine (or telehealth) is defined as "the practice of medicine over a distance, in which interventions, diagnoses, therapeutic decisions, and subsequent treatment recommendations are based on patient data, documents and other information transmitted through telecommunication systems" (WMA General Assembly, 2020, p. 1). Before the COVID-19 pandemic, telemedicine was often seen as a last resort option because of patient and provider reservations as well as limited telemedicine appointment coverage and reimbursement by insurance companies (Bestsennyy et al., 2021). Pre-pandemic, only 4% of the US population had ever used telehealth services (Murez, 2021). However, once COVID-19 became a public health emergency, patients and doctors were looking to limit non-emergent contact and insurance providers relaxed restrictions on telemedicine to allow patients to continue receiving the care they needed (Murez, 2021). At the peak of the pandemic, telehealth vendors reported getting a year's worth of traffic each month (Kaplan, 2020) and "in April 2020, overall telehealth utilization for office visits and outpatient care was 78 times higher than in February 2020" (Bestsennyy et al., 2021, p. 1). At the end of the public health emergency and in the months to follow, telemedicine utilization has stabilized to 38 times higher than the pre-COVID-19 baseline and, on average, its use ranges from 13 to 17 percent across different medical specialties (Bestsennyy et al., 2021).

Looking to the future of the technology, if telemedicine remains an option for patients, the Mayo Clinic anticipates it will result in increased access to medical providers, cost reductions, and increased medical reach to people in underserved communities (Temesgen et al., 2020). It is also important to consider some of the risks of the rapid growth of telemedicine. The are many risks associated with medicine in general such as malpractice, assurance of pay, and misdiagnosis (Nittari et al., 2020). All of these risks would still be present in telehealth interactions but are not projected to increase from in-person visit levels. However, there are added risks associated with telehealth, including, privacy risks, legal risks that come with telehealth across borders, and data protection risks (Nittari et al., 2020).

The main STS frameworks I will use to analyze the changes happening surrounding telemedicine are Actor Network Theory and Voros's Generic Foresight Process Framework. Summarized from Bruno Latour's paper 'Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts', the actor network approach claims that sociotechnical systems are developed through negotiations between people, institutions, and organizations, as well as, nonhuman artifacts within the system (Latour, 1992). This framework will be used to analyze the rise and current state of telemedicine. Foresight frameworks "provide a structure that allows expansion of perspectives to seek new possibilities as external changes evolve over time, to imagine futures that generate new strategic or policy options, and to decide on action to take today to prepare for and work towards a preferred" (Conway, n.d., p. 1). Foresight will be used to generate and analyze the possible futures for telemedicine.

In the first paragraph of John Law's paper, 'Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity', he states: "Just occasionally we find ourselves watching on the sidelines as an order comes crashing down. Organizations or systems which we had always taken for granted … are swallowed up" (Law, 1992, p.1). This statement is very true of the current healthcare environment. Healthcare systems are changing rapidly, with telemedicine being one change. This period of change was sparked by an external force (COVID-19) not the human actors within the system. Law also states that all interactions are "mediated through objects of one kind or another", and specifically that communication is mediated by a network of objects and people (Law, 1992, p.3). Before the pandemic, there was a large resistance to host patient-doctor communications though technology. Therefore, these communications were not mediated heavily by objects. However, when telemedicine became necessary in order to keep individuals safe during the pandemic, more objects, such as telehealth platforms, were added to the communication system.

The future of telemedicine can be assessed through Voros's Generic Foresight Process Framework. The framework has four key stages: inputs, foresight work, outputs, and strategy (Voros, 2003). The input stage is the information gathering phase. The foresight work stage is broken into three parts: analysis, to see what seems to be happening; interpretation, to see what's really happening; and prospection, to think about what might happen. The outputs stage is for assessing the tangible and intangible products of the foresight stage. These outputs are used in the strategy stage to inform decisions (Voros, 2003). The first step of using this framework to assess futures of telemedicine, will be to use the current state we define using Actor Network Theory as the starting point for the inputs stage. During the foresight stage, alternative futures can be generated and these can be used in the outputs and strategy stages to consider which futures are optimal and what intermediate steps would need to be taken with telemedicine in order to reach those goals.

**Research Question and Methods**

It is important to think about the future of the telemedicine because of its proliferation motivated by the COVID-19 pandemic and the uncertainty surrounding the possibilities associated with the associated telehealth technologies. I will address these uncertain futures through Scenario Construction. Scenarios are "structurally different stories about how the future might develop" (Rialland et al., 2009, p. 3). Scenarios are meant to challenge assumptions while still being plausible and relevant for decision makers. "By developing and exploring scenarios we are searching for trends, events or driving forces that may lead to a future radically different from the situation today" (Rialland et al., 2009, p. 9). This allows an organization to think proactively about what they would do if specific things were to happen and what would need to be true for other situations to occur (Rialland et al., 2009). According to Voros's Generic Foresight Process Framework, the types of future scenarios could fall into one of five categories: potential, possible, plausible, probable and preferable (Voros, 2003). Potential futures are all futures that can and cannot be imagined. Possible futures are futures that can imagine and could happen no matter how unlikely and farfetched the technology involved is. Plausible futures could happen according to current knowledge of how things work. Probable futures are likely to happen based on knowledge of current and past trends. Lastly, preferable futures are those that are most desirable (Voros, 2003). In the case of my research, scenario construction would allow healthcare professionals to consider the possible futures associated with telemedicine and the steps they would need to take for specific desirable scenarios to occur.

I will create my scenarios after completing literature review of both the process of constructing scenarios and Shell Scenarios. Since the early 1970s, Shell has been developing possible future scenarios, called Shell Scenarios, that are aimed at helping Shell leaders, academics, governments and businesses make better decisions (Shell, n.d.). Shell describes one of the largest obstacles within scenario construction is that people are inclined to think about the future based on things we already know from the past, however, if we can understand present issues from multiple perspectives, we can better understand future events and trends (Shell, 2017). Some Shell scenarios look at very specific and immediate situations within a short time horizon, others look over decades of system development (Shell, 2017). Through reading the decades of Shell Scenarios published and fully understanding the scenario construction process, I will be able to evaluate the future of telemedicine.

**Conclusion**

Scenario construction of the future of telemedicine after its rapid proliferation during the COVID-19 pandemic will allow healthcare professionals to understand the potential, both in the near and distant futures, of telehealth technologies. The intermediate steps, in order, of the research include literature review of scenario construction process documentation, literature review of Shell Scenarios, construction of scenarios, and assessment of scenario shortcomings such as availability biases, probability neglect, overconfidence and social biases (Erdmann et al., 2018). The final expected deliverable of my research is five detailed scenarios that range in probability and distance from current time, as recommended by experts at Forbes (Ogilvy, 2015).

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