

**UVA INFUSION CLINIC OPTIMIZATION OF ACCESS OPERATIONS**  
**EXAMINING THE DIVERSITY OF APPROACHES FOR**  
**UNDERSTANDING PATIENT FLOW**

A Thesis Prospectus

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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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## **General Research Problem**

*How are patient flow issues perceived and mitigated by healthcare administrators and the core infusion staff at the Infusion Clinic?*

In an ideal world, a patient should move efficiently through a healthcare system – this concept of the patient’s journey from scheduling an appointment to successful completion is known as patient flow. If patients flow rapidly and effectively, their overall satisfaction with their care will be higher. They will also be more likely to continue to seek care within the given medical institution and to recommend it to others. However, no healthcare system is perfect. Issues exist with patient access, which at its core consists of a patient’s ability to obtain medical services. When a patient is unable to be seen until several months after they start the appointment scheduling process, this is an issue of access. Optimized patient access simply means getting people to the right place, at the right time, with minimized obstacles preventing them from efficient care.

Issues with patient flow and access are prevalent across a wide variety of healthcare systems. While the fundamental problem which is experienced is similar, the approaches taken to resolve it differ greatly by organization. Methods ranging from computational solutions to implementation of new training have been attempted with varying success rates (Sobolev, 2005). In some cases, new technologies and products have even been brought into workplaces to improve patient satisfaction with their access. The Infusion Center at the University of Virginia (a part of UVA Health’s larger Emily Couric Clinical Cancer center) is just one of many providers of care lacking a coherent patient flow system (Wyman 2009). While there is a system currently in place, it has not yet optimized patient flow.

The technical project attempts to identify strategies which infusion nurse schedulers, infusion managers, and providers can utilize to improve patient flow and increase patient access. The STS project seeks to understand how actors from different backgrounds conceptualize patient flow and understand underlying causes of poor flow.

## **UVA Infusion Clinic Optimization of Access Operations**

*How can digital simulation software be used to identify bottlenecks and optimize patient flow?*

The Infusion Center is housed within UVA Health’s Emily Couric Clinical Cancer Center. It gives patients access to intravenous administration of medications and blood products, with a specialization in chemotherapy. The client has a process in place for ensuring effective patient flow, but they are unsure whether their process is “the right” process. Historically, similar healthcare institutions have experienced issues with optimizing patient movement throughout the facility and prioritizing ease of accessibility of rapid, timely care (Hyojung 2020). Even outside of cancer treatment, facilities like emergency departments and smaller clinics have attempted to

resolve issues stemming from optimization (Walker 2020). Many solutions have been explored, but UVA Health hopes to find one which caters to the unique needs of cancer patients in critical situations where timeliness means everything.

The client consists of various providers and employees working with the Infusion Center. The client has stated that their access team needs operational flow work and wants a better system for getting patients to the right place at the right time. Within cancer treatment, the client remarked that they try to get patients in for an appointment within two weeks. They emphasized that this timeline is critical to maintain their relationships. Having the process streamlined for them would be valuable. Key players in the health system would like to know what workflows will be required to better this process and who will be affected by implementation.

The objective of the technical project is to perform a multifactor assessment of the current Infusion Center resource demands, capacity utilization, and employee staffing with an overarching goal of improving patient flow practices. A broader objective is to initiate high impact changes to current system design and operational processes. This project aims to add to prior work performed in the previous year which focused more specifically on infusion optimization. Patient flow specifically has not been previously investigated in depth and is crucial to understanding how to efficiently move patients through the clinic, increasing their satisfaction in the process (Suss 2017). To address issues with current patient flow, the research team will utilize computer software to build simulation models based on Infusion Center data. The data was provided to the team directly by the Infusion Center and records every patient visit to the Infusion Center. There are many valuable variables within the dataset – they range from appointment cancellation data to time spent in the clinic to type of appointment and provider seen. These variables will be analyzed by creating various visualizations in Excel such as boxplots that display indicators of poor patient flow (such as large differences in median time between making an appointment and actually being seen). This matters greatly to the Infusion Center because one of their key goals is to ensure patients are processed as soon as possible, given the critical nature of cancer. The team will produce overarching summaries of the activity levels on each floor to identify any trends which may be valuable (for instance, whether certain floors of the building are most populated on certain days at certain times). This scenario analysis of operations will help the team narrow in on areas of bottlenecking or scheduling inefficiency which can be improved, in terms of patient flow. The final step will be piloting several potential ideas which could be solutions to the problems identified. Their effectiveness will be evaluated, as well as their feasibility of implementation.

At the conclusion of the project, a formal paper will be prepared and submitted to the Systems and Information Engineering Design Symposium (SIEDS). This paper will be a continuation of the research conducted by the prior year's capstone group, with a newfound emphasis on patient flow at the Infusion Center. The deliverables presented to the client will most likely take the form of a set of recommendations to create a system to improve patient flow. In order to craft these recommendations and build the system, the team will create simulations of

the current patient flow using computer software. It is hoped that the end results of this project will be used to actually implement a solution within the Infusion Center that improves efficiency. Future work in this area could involve diving deeper into areas touched on within the project but not furthered researched. For instance, floors of the Emily Couric Clinical Cancer Center not as well-examined could be reassessed for any situations like bottlenecks.

## **Examining the Diversity of Approaches for Understanding Patient Flow**

*How do different actors within the UVA Infusion Center network conceptualize patient flow and understand the causes of poor flow?*

The project will examine the role different actors play in contributing to understanding of patient flow as a concept. It will consider all stakeholders and how they conceptualize patient flow based on their own comprehension of the overarching process. It is essential to understand key differences in how patient flow is considered by different staff members, as discrepancies may be indicative of areas of inefficiency (which may further be addressed in the technical portion of the project).

### **Background and Theoretical Framework**

The sociotechnical system surrounding patient flow at the Infusion Center is vast; groups involved include the patients themselves, healthcare providers, healthcare administrators, and core infusion staff. Each of these actors defines optimized patient flow differently. For some, the most effective patient flow maximizes efficiency as a primary concern. Other groups prioritize patient satisfaction as the most valuable metric regarding patient flow, even at a cost of lost efficiency. Competing beliefs when it comes to patient access and patient flow have played a major role in shaping views on both topics (Ansari 2022). To gain understanding of the STS research problem, it will be necessary to conduct an extensive literature review and collect evidence of the various ways patient flow evaluations have been carried out in the past. After gaining a list of key metrics used universally across all studies, it may be possible to conduct a qualitative content analysis to determine key themes which emerge.

One idea which relates directly to the issues at hand is situated knowledge, or the idea that knowledge tends to be contextual in nature. This is meant in the sense that those who produce it are inherently biased by their social status, experiences, and other factors. Situated knowledge applies to the differences between healthcare providers, administrators, and patients, as well as the power dynamics which exist between these concerned parties. Doctors and other trained medical professionals possess a wide variety of experiences and circumstances unique to themselves. This allows them to have a very different knowledge base than, say, an administrative worker who deals with the business side of patient flow and lacks medical

proWess. Looking at the other end of the spectrum, a patient will view their own condition with a different knowledge set than someone who has never actually lived with the specific disease or affliction. When examining a concept such as patient flow, every group of actors will perceive issues in a unique way. This situated knowledge may cause fundamental disagreements in the most effective way to solve problems, and it should certainly be addressed.

Another important concept which can be considered is openness to change. Openness to change is the combined idea of understanding that change may be necessary, receptiveness to it, and motivation to enact it. As stated previously, different actors possess different understandings of what patient flow is. Based on their role in the healthcare institution, these distinct groups may have significantly varied perceptions of the underlying causes of issues with patient flow (Nilsen 2020). Acceptance of changes to the current patient flow process may be received with much more enthusiasm by some actors in the network than others. Going into the STS project, it is imperative to fully recognize these areas of discrepancy. When going about conducting interviews, it should become clearer which actors are most willing to accept changes to the current patient flow.

## **Methods**

The objective of this project is to understand how various individuals within and across healthcare facilities define patient flow differently. Interviews will be conducted solely with staff at the Infusion Center, as the only concern of this project is patient flow within the scope of UVA Health. These staff members will include a provider, an infusion nurse, an infusion nurse scheduler, and an infusion nurse manager. Each of these people has a specific and unique role in the patient flow process. A set of questions will be constructed for each actor in the network, and a preliminary codebook will be created identifying key ideas to be drawn from the interviews. At the conclusion of data collection, qualitative content analysis will be utilized to code the transcripts of the interviews. This method is ideal for drawing out themes which relate to patient flow perception. Based on these themes, the team will gain a knowledge of the different understandings and conceptualizations of patient flow.

## **Conclusion**

Based on the findings from the STS project's qualitative analysis, it should become clear what both patients and providers value in terms of a positive patient flow experience. Each party may have different and unique perspectives which will be brought together in the identification of common themes. With respect to the technical project, it is hoped that an optimized patient flow system will be created which is feasible to implement within the Infusion Center. This system will utilize key metrics of success to ensure that patients are satisfied and medical professionals provide the best quality care. Overall, both projects are intended to make

meaningful contributions toward optimizing healthcare environments so that all relevant stakeholders, may they be patients, doctors, infusion nurses, or infusion schedulers, are happy with the system. This work will be the foundation for further patient flow work in the future that moves toward a completely optimized healthcare experience.

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