Improvement of Efficiency and Patient Flow at the University Physicians Primary Care Clinic

Analysis of the Failure of the Epic EHR Implementation in a Hospital System in Denmark

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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

Technology is a vital tool in the healthcare system, evidenced by the widespread adoption of the Electronic Health Record (EHR). EHRs store patient data throughout the patient's life, serving as a crucial tool for providers to readily see medical history. The specific EHR system that I will be studying, Epic, also collects timestamp data. These timestamps are critical in analyzing clinic efficiency. The efficiency of the clinic is key to ensuring patient satisfaction, which can impact the quality of care by affecting compliance with medical advice or the overall relationship between the provider and the patient (Pockros et al, 2021).

The timestamps from the Epic system provide metrics for efficiency and help compare any potential interventions. My team will work with UVA Health's University Physicians Clinic (UPC) as our client. This clinic has struggled with efficiency and its current Epic data output is confusing and not realistic. My team will work to understand the data collected from Epic and then explore various interventions that will decrease patient wait times and improve efficiency.

Technology can provide capabilities that fundamentally alter healthcare, but only if properly introduced. It is critical to understand the social factors that affect the acceptance or rejection of the EHR tool to ensure full utilization of the capabilities. I will investigate the interaction of multiple human and non-human actors in the EHR network and work to understand how these interactions lead to positive or negative outcomes.

Further exploration will examine the technical applications and strengths of the EHR as a data collection tool. The interplay of data collection problems and social factors creates a challenge that is sociotechnical in nature, thus I will explore both the technical and social aspects to ensure a complete resolution. In what follows, I elaborate on a technical project that functions to increase efficiency in a specific primary care clinic and an STS project that examines the

relationship between various social actors in EHR implementation while applying these relationships to an unsuccessful rollout in Denmark.

Technical Project Proposal

My team will be looking specifically at the patient flow and nursing procedures at UVA Health's University Physicians Clinic (UPC). Patient flow is considered to be the process in which patients move through the various procedures in the clinic. The key component in this flow is the rooming process executed by the nurse. The rooming process is the procedure of getting the patient from the waiting room, bringing them to their assigned exam room, and preparing them to meet with the provider. Rooming tasks can include checking medications, allergies, and vital signs. The nurse's goal is to complete all rooming tasks with the patient and be ready for the physician at the start of the patient's appointment time (Taché & Hill‐Sakurai, 2010). Delays in rooming can cause a ripple effect across the timing of other appointments. UVA Health uses the Epic EHR system, with a goal to create software that can integrate across healthcare sites and visits to create a complete picture of the patient's medical record (Virdee et al., 2022). At UPC, Epic timestamps are vital for understanding patient flow. These timestamps mark key timings throughout the patient's journey in the clinic and can be referred to as cadence data. The UPC is my team's client for this project, and it is our goal to utilize this cadence data to provide them with quantitative evidence about staffing needs and subsequent clinic efficiency.

The analysis of timestamps relies on the standard use of the Epic system. Due to the complicated system of patient care, they are not always using the system uniformly. Through talking to nurses at the UPC, they said that the way they use the system can even vary based on external factors. Should this remain unresolved, the data collected by the Epic EHR will not be

credible and will not yield useful results. This is problematic because these timestamps are used to analyze clinic efficiency and subsequent staffing needs. Proper analysis of cycle times throughout the clinic can lead to interventions that decrease wait times, providing less frustration and higher access to care (Robinson et al., 2020). Decreasing wait times are critical to patient satisfaction, as the time a patient waits to begin their appointment is one of the largest sources of patient frustration (Pockros et al., 2021).

This project will have two main steps to help the University Physicians Clinic improve patient flow and decrease wait times. The first step will be to design a consistent rooming process for nurses to follow that will standardize the Epic timestamps, and analyze the current cycle time data. Secondly, this project will also seek to provide actionable recommendations to clinic staff that will improve cycle times. This objective will be achieved by comparing observational clinic timestamps with Epic timestamps, utilization of Excel and other data analysis tools. Observational clinic data will be compared to the cycle time data collected by the Epic system. Data matching and analysis will be used to determine what Epic data variables correspond to different steps throughout the rooming process. If the cycle time data needs to be transformed to better match the observational data, the goal will be to determine a standard transformation that can be applied to future timestamps. The generic modeling approach will be used to understand the base case model, while also providing a comparable quantitative data point when evaluating various potential interventions (Shoaib & Ramamohan, 2022). To create the model, we may explore queueing theory techniques. A similar study utilized a queueing network model with success (Jiang & Giachetti, 2008). This project will provide an increased understanding of patient flow at the University Physicians clinic, increased clarity on the meaning of cycle time data taken by Epic, and will recommend actionable interventions to

decrease wait times and improve patient satisfaction which is key for ensuring the quality of care.

STS Project Proposal

A longitudinal case study was performed on the Epic EHR rollout in two hospital systems in Denmark that had mixed success (Basler, 2021). Due to the complicated nature of the healthcare industry, EHR implementation across a health system requires significant time and investment. The United States alone has invested over 35 billion dollars to support the implementation of these technologies (Trout et al., 2022). Implementation of an EHR system encompasses system configuration and staff education. Current analyses of these implementations have focused on specific social factors, such as physician experience, physician-patient relationships, and support staff. In similar studies just focusing on physician experience, it was found that there was low satisfaction immediately after implementation but gradually increased over time (Price et al., 2022). Physicians also noted the importance of finding a balance between utilizing the technology to increase record-keeping and efficiency but to also stay attentive and form relationships with the patient (Shayganmehr et al., 2022).

Implementation efforts often emphasize input from physicians to increase their satisfaction with the system but do not strive for other input from nurses and support staff (Nguyen et al., 2014). This oversight does not mean that these groups are not affected by EHRs as well, as studies focusing on just nurses and support staff have found higher rates of burnout due to the additional workload of notetaking and charting, which can become longer when the staff is learning a new system (Howard et al., 2013). This is demonstrated in the Denmark implementation in that clinicians were involved in the EHR implementation but low satisfaction still persisted. Previous writers have individually explored disjoint social factors in EHR

implementation, but have not analyzed the full breadth of the network. This paper aims to connect different social factors that have been previously researched to create a comprehensive understanding of the social network created by EHR implementation and apply it to a specific case of Epic adoption in a hospital system in Denmark (Bansler, 2021).

Through the Danish EHR implementation case study, it can be better understood why the implementations of these systems succeed or fail. Health systems that poorly implement an EHR system stand the risk of the shortcomings, such as poor training or configuration, overshadowing the positive functionalities that systems like Epic can bring to the table. This happens during the Epic implementation in the hospital system in Denmark, where problems with configuration upon installation diminish the satisfaction of this powerful tool (Bansler, 2021).

I will argue the impacts of human and non-human actors within the Epic EHR network on the success or failure of the implementation and apply it to the analysis of the failure of the rollout in the hospital system in Denmark. I will use Actor-Network theory (ANT), which is a framework designed to highlight particular actors or players that are a part of a larger system in such a way that improves understanding of the complexities of the system (Cresswell et al., 2010). Following the ANT framework, I will identify a network builder and better understand how the various human and non-human actors in the Epic EHR network interact to accomplish the goal of successful system implementation. I will utilize this framework by applying it to the specific case of the hospital system in Denmark, to understand what social aspects led to the failure of the implementation of the Epic EHR system. In this analysis, I will examine previous implementation projects in healthcare systems, including those previously mentioned in this proposal. Through identifying actors in these individual cases, such as physicians, support staff, patients, and the user interface, I will seek to understand the broader network of EHR

implementation and what interactions impact the success or failure of the implementation programs.

Conclusion

The technical project outlined in this paper will deliver recommendations for the University Physicians Clinic to improve efficiency and decrease patient wait times through utilizing analysis and modeling of Epic cycle time data. The findings and recommendations from this technical analysis will address the objective of increasing efficiency in clinics and understanding the Epic output data, which can be applied to future studies using this data. The subsequent STS project will create a better understanding of certain social factors that draw from Actor-Network theory, as illustrated in the case of unsuccessful Epic EHR implementation in a hospital system in Denmark. This will address the objective of understanding how different actors within the Epic EHR network can influence the acceptance or rejection of the system rollout. Together these will address the larger sociotechnical challenge of improving satisfaction and subsequent patient quality of care in the healthcare system.

Word Count: 1,740

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