

Diabetic Management Through Integration of Continuous Glucose Monitoring and EHR

Project Overview:

Our project will focus on Diabetes Management through the Integration of Continuous Glucose Monitoring/Blood Pressure levels and Electronic Health Records (EHRs). Traditionally, blood pressure and blood glucose levels have been crucial for diabetes management since maintaining healthy blood pressure and blood glucose levels significantly reduce the risk of complications from diabetes. For Health Data Management, we wanted to focus on a smart wearable that's personalized for the user to manage their diabetes. We believe that the interoperability that comes from integrating and compiling mHealth data into an EHR will enable a better plan of care and improve overall health outcomes for patients.

Objectives:

Our project has two primary objectives. First, we want to enable healthcare providers to accurately predict any ramifications of diabetes based on the data received within a certain timeframe. By integrating continuous blood pressure and blood glucose levels with an EHR, healthcare providers can monitor and analyze their patients' health status more efficiently. Second, we want to develop an alert to optimize insulin injections for individual patients through a smart glucose monitoring wearable. Providing patients with timely alerts for when they need to take insulin will help them conserve the amount of insulin they need to take to properly manage diabetes so they can prevent potentially dangerous situations. It's also worth noting that for providers, if any issue arises with the wearable device, then their patient's EHR will inform them simultaneously and they can quickly rectify that issue before any complications from diabetes occur.

Scope:

The goal of this project is to integrate continuous glucose monitoring with EHR for chronic disease management. This integration will enable healthcare providers to monitor

diabetic patients in a real-world and real-time manner, as well as respond to any drastic changes in their patients' health data. This project will include sample health data from Type I and Type II diabetic patients collected through glucose monitors, as well as factors that impact chronic diabetes management, such as age, BMI, pregnancy, family history, etc, as a way to focus on the integration of this data into EHR systems to streamline and facilitate chronic disease management. This project will not involve the actual development of continuous glucose monitors or an EHR system and will focus on the utilization of already existing devices or EHR systems. The project is primarily focused on chronic disease management, and therefore will not be facilitating in creation of diagnosis or treatment plans. This is ultimately the responsibility of the healthcare provider, but we hope that this project can help improve the quality of care for diabetic patients.

Methodology:

Our approach intends to use continuous glucose monitoring and blood pressure measurements to enhance diabetes management through the integration of this information into electronic health records systems. We will utilize mHealth data from continuous glucose monitoring devices to monitor and display glucose levels to allow care providers to set accurate glucose level ranges, and alerts for patients when exceeding these limits. By integrating this mHealth data into EHR systems, providers can set up more personalized plans for insulin administration based on this data as well as other information available in the EHR such as blood pressure, age, weight, and meal timing (if made available by the patient). After an appropriate glucose range and alert system are configured for a patient, they can get personalized alerts at home to optimize treatment and avoid complications from diabetes. Additionally, we intend to reach out to shareholders, patients, and care providers to better understand the optimal user experience that will enhance usability and patient adherence. The team intends to accomplish this through questionnaires and surveys with individuals to provide

a contextual understanding of our interface's place in healthcare, specifically the EHR mHealth space.

Timeline:

Our group plans to meet weekly and remain in contact throughout the semester utilizing Microsoft Teams. From weeks 4 and 5, we will plan to discuss and complete the feasibility analysis to address technical, operational, economic, and scheduling feasibility for our project. Weeks 6 and 7 will be focused on conducting interviews with healthcare professionals and creating a detailed document about specifications and requirements. Between weeks 8-10 we will work together developing our risk management plan to address certain security and privacy concerns. We will focus on creating our prototype next, submitting this during week 12. Usability testing will occur throughout weeks 13 and 14. From here we will spend the final weeks of the semester finishing up the final version of our project, which we will plan to submit in week 16.

Resources:

Team Members: Gabrielle Holmes, Julius Miller, Mario Galvao-Wilson

Our team has identified some key technologies we intend to use for this project, but additional technology not outlined here may need to be incorporated during implementation. For diagrams and process mapping, we will rely heavily on Lucid for our whiteboard. We will host and design our systems page using Google Sites, optimizing the layout and visualization for the interface. Once satisfied, the team intends to test our data and interface integration with an EHR software, potentially as found through interactions with shareholders. We also hope to leverage external expertise through our usability feedback methods from healthcare professionals, patients, and other shareholders to optimize our system. Lastly, we found both demographic and health data for diabetic and non-diabetic patients on Kaggle at:

<https://www.kaggle.com/datasets/mathchi/diabetes-data-set>.