**CS 6440 Student Project Proposal**

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| **Project Title:** Improving Medication Adherence at the Community Level | |
| **Mentor 1 Name:** Skip Clelland | **Mentor 1 Email:** [CClelland@cdc.gov](mailto:CClelland@cdc.gov) |
| **Mentor 2 Name:** Paula Braun | **Mentor 2 Email:** pax1@cdc.gov |
| **Project Background:** Our goal is to better understand what drives medication adherence by looking beyond individual compliance and taking into account social determinants of health community issues that may impact medication adherence within populations. The ideal solution will be a set of tools that allow community leaders to develop targeted interventions and compare the status of their communities to that of their peers and the overall population. | |
| **Project Objective(s):** Develop three medication adherence type applications (patient-facing, provider-facing, and reporting) using HL7 FHIR and SMART-on-FHIR capabilities. These applications will help bridge the divide between families, clinicians, and public health so that all stakeholders are better able to understand and help promote medication adherence strategies. This document provides the desired functional requirements for each of the applications. | |
| **Description of the Solution:**   1. Patient-facing app: Medications adherence is a behavior that includes decision points throughout the day that either promotes or prevents medication being taken appropriately. This should be an app for a smart phone or tablet or possibly apple watch or fitbit type product. The patient should be able to use the app in a way that captures some sort of biometric response that medication has been taken or if medication is missed after certain time then provides some sort of prompt that provides a reason why medication wasn’t taken. The app should have tracking on how medication was taken and then ability to share with healthcare providers. The data from this app should flow into the electronic medical record and prescription databases so that the patient’s behavioral data appears alongside the medication regiment. 2. Provider-facing app: Unlike the patient facing app looking at the behavior of taking medication, the provider facing app needs to have multiple demographics and social information along with the usual medication regiment and prescription history. This may be accomplished by using readily accessible data bases such as Census data along with current EHR database and prescription drug histories to compile a medication/social/built environment measure for physicians and pharmacists to assess problems and barriers to medication adherence. The idea is that barriers within the communities’ social and built environments play a role in medication adherence and if identified then strategies could be used to promote medication adherence. An example is if you are in an area where you have many grandparents as primary care takers especially with children. This may impact adherence that may not be captured. However with Census data, this could be identified and then strategies to assist grandparents that have this role. The app for the provider would be ideal if there was some mechanism to measure complexity of the medication regimen that would assist providers in determining the feasibility of a patient adhering to the regimen. Complexities to medications include: # of medication prescribed (estimated that most people have problems take more than 6 meds per day)  * Drug-drug interactions * Drug-disease interactions * Contraindications * Side effects (a major reason people stop taking meds) * Adverse effects (a major reason people stop taking meds) * Dosing and timing * Dosing regimen (e.g. once daily versus three times daily)   First Data Bank is the main source for identifying these type of complexities. These areas would need to be developed to provide an estimate for compliance. The thought is that the more complex a medication regimen, the more difficult for the patient to adhere.  Since physicians only have a limited amount of time to spend with patients this app needs easy indicators to view.   1. Reporting: The reporting app will allow healthcare providers, community resources, public health agencies, and other interested parties (e.g., Medicaid) to better understand population health. The app will provide an analytical engine so that the data can be “sliced-and-diced” and visualized or mapped in various ways. The healthcare provider-facing app should be able to call the reporting app to allow clinicians to track their own performance on medication prescribing and adherence, such as percent of patients adherence by disease state, patient adherence by percent adherence, etc.? The main purposes of the app, however, will be to extract info to send to public health (data must be de-identified) or other entities (e.g., Medicaid—data can be identifiable). Key data of public health importance include:   - Age  - Sex  - Race/Ethnicity  - BMI  - Blood Pressure  - Patient behavior info  - Laboratories (e.g., cholesterol, hemoglobin a1c)  - Counseling done (yes/no) – some drill-down ability  - Location (may need to suppressed, algorithm to send or not send on whether child can be re-identified) | |
| **Desired Student Skills/Background:**  Patient-Facing App   * Front-end/UI development * Reporting data to EMR   Provider-Facing App   * Front-end/UI development * Open Data/Data wrangling skills * Interest in social determinants of health, data visualization, analytics   Reporting App   * Experience with RESTful interfaces, backend development, and webservers * Interest in data visualization and analytics | |
| **Data Requirements and Potential Sources:** Students are encouraged to create synthetic data and explore open data sets to meet the objectives of the individual apps. | |
| **Other Comments:**  This project will likely require three or more teams to complete. The teams will need to coordinate from the beginning. The project is well-suited for creative types who are highly self-motivated. | |