

Academic Paper

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1 BACKGROUND AND SIGNIFICANCE

Since the 1920s, heart disease has been the leading cause of death in the United States, resulting in approximately 655,000 deaths per year (Virani et al., 2020). From these deaths, the most common form of heart disease is known as coronary heart disease, which is mainly caused by cholesterol and other plaques-forming substances. Thus, a therapy or a treatment with lipid-lowering drugs is necessary for patients with a risk of heart disease.

High blood cholesterol is one of the key risk factors for heart disease. The 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor, known as statin, has become a cornerstone of cardiovascular risk prevention for a wide range of patients, including hyperlipidemia patients. With an increased use of statins, national guidelines recommend the prescription of statins for a number of conditions, ranging from coronary artery disease to high cholesterol to diabetes (Rosenson et al., 2015). However, hypercholesterolemia itself is asymptomatic. Hence, only 55% or 43 million U.S. adults who could benefit from cholesterol medicine are taking the drugs (Mercado et al., 2015). As one study suggests, diabetic and hypercholesterolemia patients with statins had lower death and stroke rates than the patients without statins (AbuRahma et al., 2015). Therefore, it is important to study and develop a communication mechanism that notifies providers when a statin is warranted.

2 PROBLEM

With asymptotic hyperlipidemia, patients with neglect of high body cholesterol level increase. The known standard total cholesterol level for adults is 200 milligrams per deciliter (mg/dL), yet 93 million U.S. adults over the age of 20 have total cholesterol levels higher than 200 mg/dL and 29 million adults having higher than 240 mg/dL (Virani et al., 2020). Furthermore, many adults who qualify for a statin treatment do not receive statins due to clinical information being overlooked by their providers.

3 SOLUTION

We propose an EHR tool that extrapolates relevant data from a patient's electronic medical record and notifies the patient's provider when a statin is warranted. We wish for this EHR tool to help increase timely treatment with statins.

This tool will be a stand-alone SMART-on-FHIR application that can work with a HL7 fast healthcare interoperability (FHIR) v4-compliant electronic health record (EHR) system. We created a web-based single-page application (SPA) written in a JavaScript framework such as React or Angular. The back-end will perform an analysis of a patient's EHR once it is selected by the physician using the front-end.

The checking process will be done on the backend using Django, a Python backend web framework, by extracting variables from the patient's profile, including, sex, age, total cholesterol, HDL cholesterol, systolic blood pressure, smoking status, and blood pressure medication treatment. Each of these values will be used to calculate a 10 year atherosclerotic cardiovascular disease (ASCVD) risk score. Using the risk score, the application will recommend the physician prescribe a statin of a particular dosage in accordance with American College of Cardiology (ACC)

4 COMPLEXITY AND EFFORT

4.1 BACK-END

In order to create our back-end, we had to make use of Django, a Python backend web framework. This allows for us to write our scripts using Python, a language that makes working with data convenient. We had to make use of several Python libraries in order to calculate the cardiac risk scores and make statin recommendations. These included fhirclient and framingham10yr, among others. Research was needed in order to determine the 10 year ASCVD risk cutoffs and what the corresponding statin recommendations would be.

4.2 FRONT-END

Our front-end employs a minimalist design. This proof-of-concept front-end interface uses the JavaScript React library, and allows for physicians to select a patient of interest, and this information is then communicated to the back-end using REST APIs.

7 REFERENCES

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