Monitoring Patient Systolic and Diastolic Blood Pressure

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1 Background and significance

Remote patient tracking is a relatively newer method in the medical industry for improving patient health outcomes and lowering healthcare costs. Providers remotely monitoring hypertension patients would be extremely beneficial as the chronic condition can lead to complications such as heart disease and stroke if not managed properly ("Chronic Illnesses", n.d.). It costs hypertension patients $2000 more in healthcare expenditures annually which is about $131 billion nationally (Hoffman, 2018) including hospital admissions (Kirkland et al., 2018).

1.1 Problem

There is a burden on the healthcare system due to the risk of patients with hypertension. Nearly half of Americans suffer from hypertension, putting them at risk of heart disease and stroke - the two leading causes of death in the U.S. ("Facts About Hypertension", 2020). Due to the complexity and nature of hypertension, it is difficult for a provider to monitor their patient's during their doctor visits.

1.2 Proposed Idea

Remote patient monitoring could assist providers and patient's with hypertension. It could also serve as a preventative tool for patients with normal blood pressure. Doctors can provide their patients with an IoT blood pressure monitor and access to download the Bluetooth-enabled app that connects with the device. The patient could be instructed (and reminded via the application notifications) to measure their blood pressure at the same time, once a day. This data will be parsed and sent to the doctor's portal for monitoring and analytics. The doctor's portal will allow them to monitor if the patient is in trouble, needs a doctor's visit, different medications, early signs of complications, etc.

1.3 Complexity or Effort

My proposed idea works with many patients, even those that do not have hypertension. This could be used as a preventative measure for patients with hypertension history in their family. Currently, my app has limited blood pressure data. The next steps for my app include adding

additional data and analytics so the provider can see the trends in the patient's blood pressure readings. This would help the doctor conclude a better analysis of the patient's health outcomes. This can also be expanded to other conditions such as obesity, hypercholesterolemia, etc. My app is using the SMART on FHIR JavaScript library to connect my SMART app to FHIR servers. The SMART App Launch framework supports app security by allowing app creators to give permissions for someone to launch the app using their secure authorization protocol.

2 Demonstration

I created a demonstration of a provider portal utilizing the data provided using HL7 FHIR and I deployed a SMART on FHIR app that works in conjunction with an existing EHR system. My app promotes interoperability by providing the doctor with useful information regarding their patient's blood pressure measurements.

2.1 SMART App Launcher

As seen in Figure 1, my project can be launched by visiting this here.

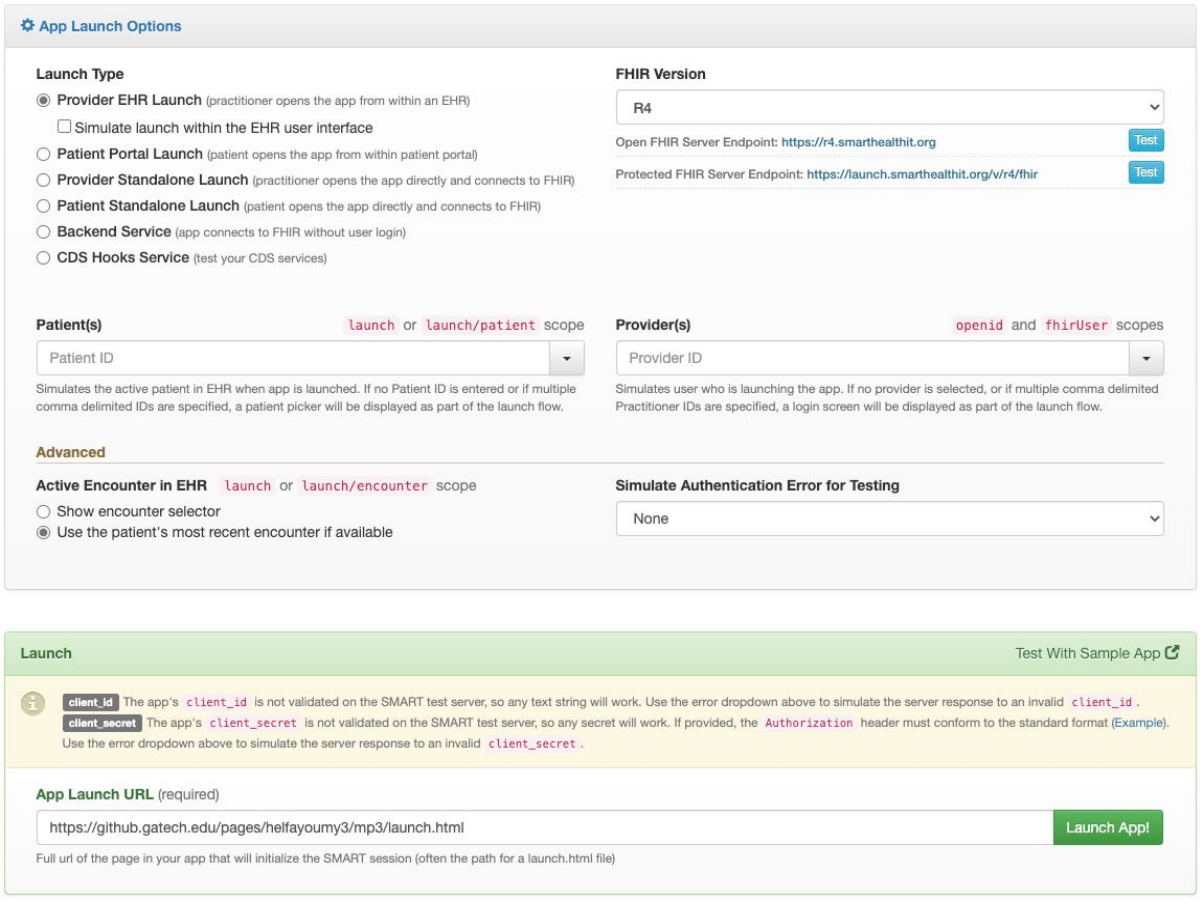

Figure 1—SMART App Launcher. Source: Honya Elfayoumy

2.2 Doctor Portal

Utilizing figure 2, my portal analyzes the patient's systolic and diastolic rate and lets the doctor know which range the patient is in.

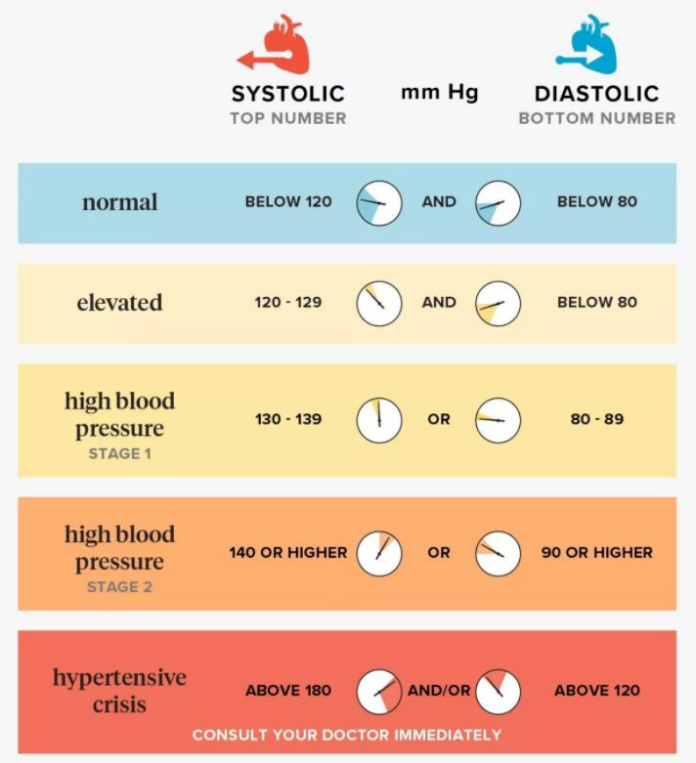

Figure 2 —Systolic and Diastolic ranges. Source: Blood Pressure Readings Explained.

My portal is shown in Figure 3. The doctor can clearly see which range the patient falls in. The doctor can act accordingly based on which range the patient is in. My full app code can be reached here.

Figure 3 —Doctor Portal. Source: Honya Elfayoumy

3 REFERENCES

1. Chronic Illnesses. (n.d.). Retrieved October 11, 2020, from https://www.northshore.org/family-medicine/patient-education/chronic-illnesses/
2. Facts About Hypertension. (2020, September 08). Retrieved October 11, 2020, from https://www.cdc.gov/bloodpressure/facts.htm
3. Hoffman, M. (2018, June 1). Hypertension Costs Patients Additional $2000 Annually, Estimated $131B Nationally. Retrieved October 11, 2020, from https://www.hcplive.com/view/hypertension-costs-patients-additional-2000-annually-estimated-131b-nationally
4. Kirkland, E. B., Heincelman, M., Bishu, K. G., Schumann, S. O., Schreiner, A., Axon, N. R., Mauldin, P. D., Moran, W. P. (2018, May 30). Trends in Healthcare Expenditures Among US Adults With Hypertension: National Estimates, 2003–2014. Retrieved October 11, 2020, from https://www.ahajournals.org/doi/full/10.1161/JAHA.118.008731
5. Madell, R. (2020, February 06). Blood Pressure Readings Explained. Retrieved October 11, 2020, from https://www.healthline.com/health/high-blood-pressure-hypertension/blood-pressure-reading-explained