Monitoring Patient Systolic and Diastolic Blood Pressure

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Link to Video Recording Demonstration: https://www.youtube.com/watch?v=pSH5IUBQ4sM
Github Information:
Link to Project Repository: https://github.gatech.edu/helfayoumy3/individualProject
Link to Github Pages: https://github.gatech.edu/pages/helfayoumy3/individualProject/patient.html
Final Commit ID: 392a413

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 My Solution

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. Due to the time constraints of this course, I decided to showcase part of my idea by creating the provider dashboard. The dashboard will allow the provider to view patient blood pressure data and see the trends over time. I have created the data for my project and along with the Tableau dashboards to be displayed in the web app.

1.3 Complexity/Effort

Remote health monitoring is a feasible solution for everyone - the doctor can help the patient in a more personalized way, and the patient's condition will be controlled. Also, this solution is significantly cheaper than hospital admission. My solution 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 or expanded to other conditions such as obesity, hypercholesterolemia, etc. Currently, my app has limited blood pressure data due to HIPAA regulations and the recent development of health monitoring devices. In future developments of my project, I would like to obtain health monitoring devices and people to willingly help with my research. Ideally, I will create an application for the user which will retrieve the blood pressure measurements and store the data into a database. The database will be connected to Tableau and display analytics for the nurse(s) to examine daily. The Tableau dashboards will allow the nurse(s) to determine if a patient needs a doctor's visit, is reaching an alarming point, dictate early warning signs for complications, or decide what works/does not work for the patient.

2 Written manual

The first step is to navigate to patient.html, this can be accessed on my Github Pages here. Once you arrive you will see a screen like the one below.

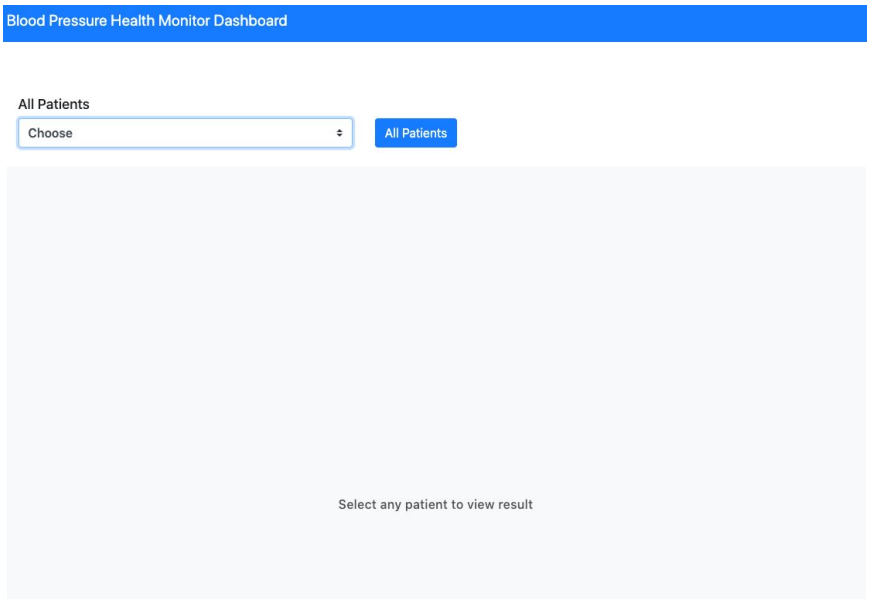


Figure 1 — *Home Page for Blood Pressure Health Monitor Dashboard*. Source: Honya Elfayoumy

You will see a dropdown menu with all the patient names as shown below. You will also see an "All Patients button."

Figure 2 — *Dropdown menu selections.* Source: Honya Elfayoumy

The all patients button will show a table with all of the patient's evening and morning systolic and diastolic blood pressure. The provider can select specific dates to view. This table can be ordered from high to low so the provider can see which patients are more at risk.

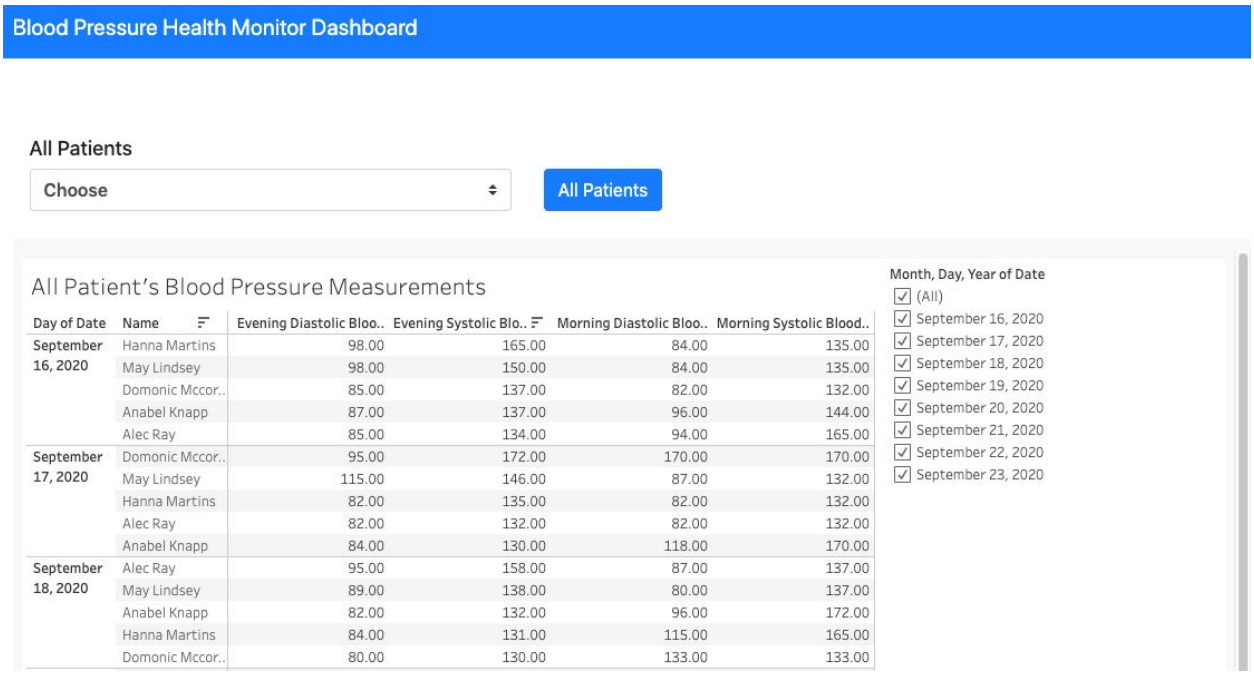


Figure 3 — *All Patients button clicked screen view.* Source: Honya Elfayoumy

Using the dropdown menu, select a patient name. It will display the patient's blood pressure measurements in a table view for the selected dates. It will also show the patient's blood pressure trend graph given the dates of that specific week. The gray area is showing what normal systolic and diastolic blood pressure should be. Ideally, all of the patient's blood pressure should be in this zone.

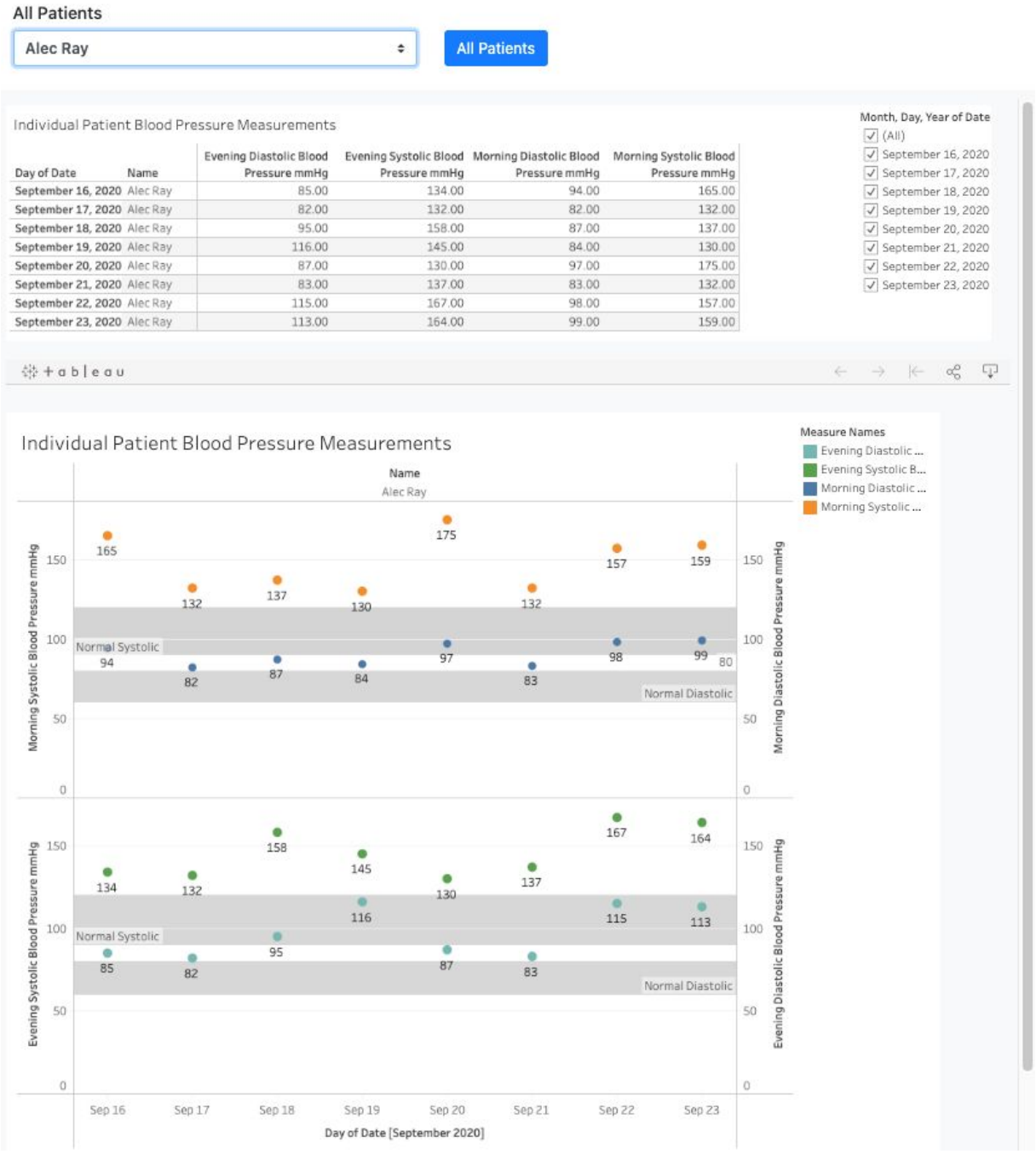
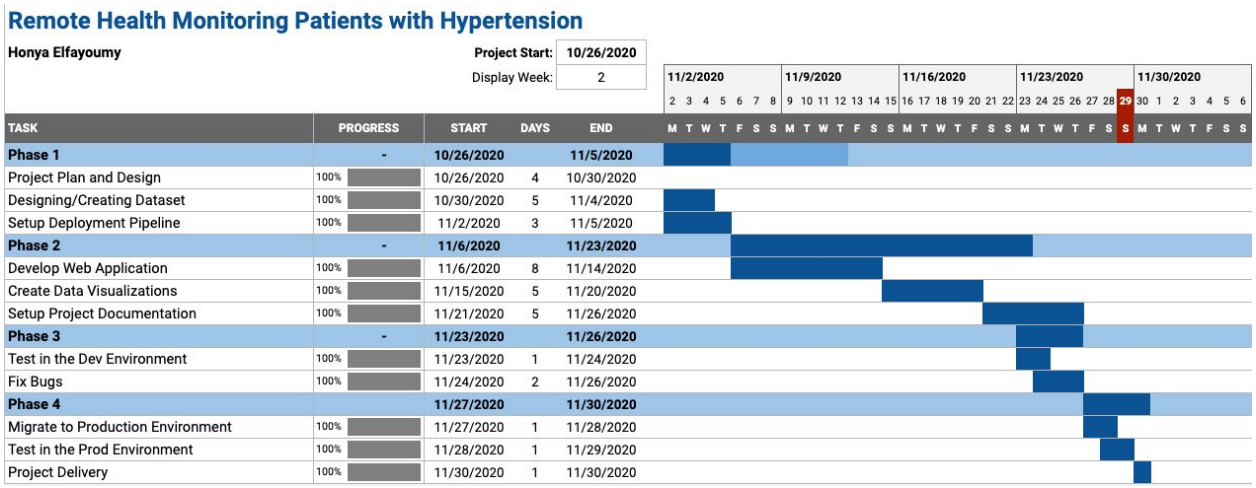


Figure 4 — *Alec Ray Patient selected from dropdown screen view.* Source: Honya Elfayoumy

3 GANTT CHART



Remote Health Monitoring Patients with Hypertension

Honya Elfayoumy — **Project Start:** 10/26/2020 — Display Week: 2

TASK	PROGRESS	START	DAYS	END
Phase 1	-	**10/26/2020**		**11/5/2020**
Project Plan and Design	100%	10/26/2020	4	10/30/2020
Designing/Creating Dataset	100%	10/30/2020	5	11/4/2020
Setup Deployment Pipeline	100%	11/2/2020	3	11/5/2020
Phase 2	-	**11/6/2020**		**11/23/2020**
Develop Web Application	100%	11/6/2020	8	11/14/2020
Create Data Visualizations	100%	11/15/2020	5	11/20/2020
Setup Project Documentation	100%	11/21/2020	5	11/26/2020
Phase 3	-	**11/23/2020**		**11/26/2020**
Test in the Dev Environment	100%	11/23/2020	1	11/24/2020
Fix Bugs	100%	11/24/2020	2	11/26/2020
Phase 4		**11/27/2020**		**11/30/2020**
Migrate to Production Environment	100%	11/27/2020	1	11/28/2020
Test in the Prod Environment	100%	11/28/2020	1	11/29/2020
Project Delivery	100%	11/30/2020	1	11/30/2020

Figure 4 — *Final Gantt Chart.* Source: Honya Elfayoumy

4 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