

Personalized Health Intervention Tracker Test (PHIT-Test) for

Benign Prostatic Hyperplasia (BPH)

Final report

Evelyn Xu, Kaixin Pan, Crystal Shin

Verification of the Design Specifications

The most up-to-date design specifications can be found in Appendix A and the verification plan developed in the Verification and Validation report can be found in Appendix B. Each design specification has been tested according to the verification plan, and the following subsections further detail about the result from the test.

Accessibility

The ‘accessibility’ test is designed to test the first ‘Technology’ clause of the design specification. The clause reads:

“Accessible from different devices (desktop computer; mobile phone) and common browsers including Chrome, Safari, Microsoft Edge, Firefox, etc.”

To prevent confusion caused by the wording of the ‘accessibility’ test, this test refers to whether the website would be accessible using different devices and browsers, rather than the typical ‘accessibility features’ such as enlarged font or text-to-speech.

In order to pass this verification test, the website must maintain its normal functions in the aforementioned devices and browser conditions. The full function of the website, including log in, viewing the calendar in the main page, responding to the survey questions, exploring the data visualization page, doctor’s portal, and log out, have been tested. The test has been successful in all of the devices and browsers used in the test. More detailed evidence such as

photos of successful testing could be found in Appendix C. Therefore, the design specification item has been tested successfully.

Messaging Capability

The ‘messaging capability’ test aims to test the first clause in the ‘Functions to Implement’ section of the design specifications. The design specification reads:

“The patient will be notified via text message when the American Urological Association symptom score of the patient has been above the average by 25% for 7 consecutive days.”

The original test was intended to test three scenarios: 1) when a patient forgets to take the survey for one day; 2) when a patient enters abnormal side effects for 7 consecutive days; 3) when a patient replies “Yes” to the previous scenario. The test would be considered a success if text messages were sent and received successfully. However, due to technical difficulties in the development process, the team has revised the alert feature of the website. Instead of sending text messages to the patients, the new alert system will display an alert message on the visualization page if a patient is, on average, scoring more than 8 points in the American Urological Association (AUA) symptom score for the past 7 days. This alert will be enabled if the patient has at least 7 days of entries.

The test has been updated accordingly to test if the aforementioned function is behaving correctly. Seven days of entries with an average greater than 8 points have been entered into the survey, and the visualization page was visited to verify that the alert message is displaying correctly. The test was successful as could be seen in Figure 1.

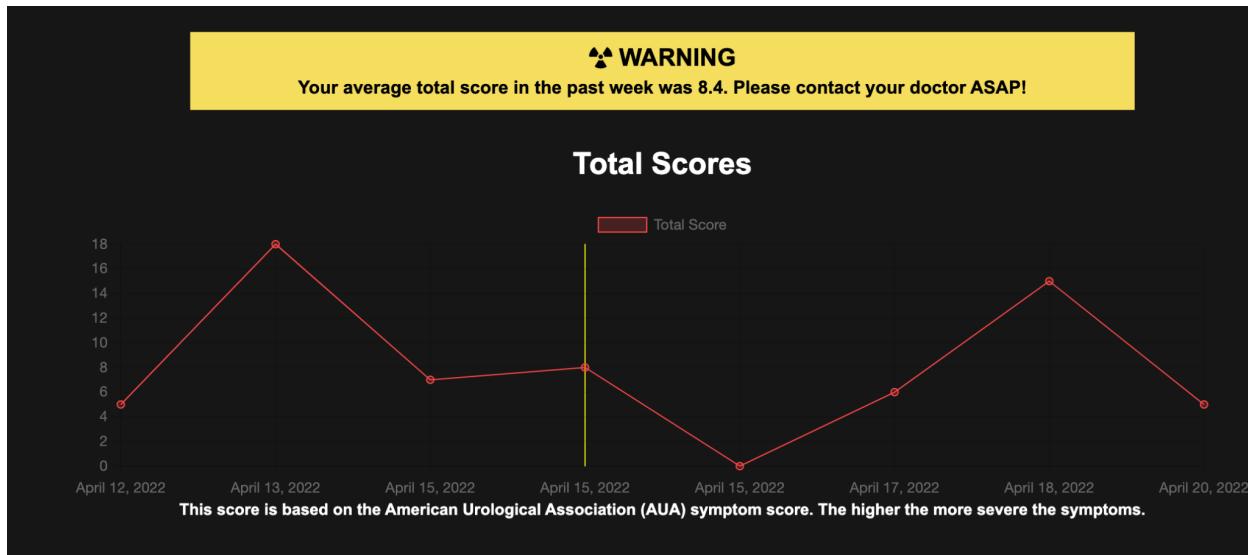


Figure 1. The alert message is displayed when the average score of the past seven days are greater than 7

Data visualization

The ‘data visualization test’ aims to test the design specification items related to ‘user experience’. The exact part of the design specifications reads:

“Users can visualize their progress and medicine efficacy:

- A line chart showing the user’s score over time
- When clicking into the visualization page, user can see comparison figures in more detailed categories”

The original verification plan involved testing of the graphs of medication efficacy and side effects. However, patients’ medication information would not be collected by the website to prevent the breach of patients’ medical records. The tracking of patients’ AUA symptom scores would be sufficient to track their progress after taking their medications or receiving treatments. Therefore, the test was slightly modified to test if the results page is visualizing the patient’s data fetched from the database accurately, and has separate graphs for exploring individual categories in the AUA symptom survey.

Three graphs help to visualize the data from patients, the total score graph (Figure 2), the category score graph (Figure 3) and the quality of life score graph (Figure 4).



Figure 2. total score graph

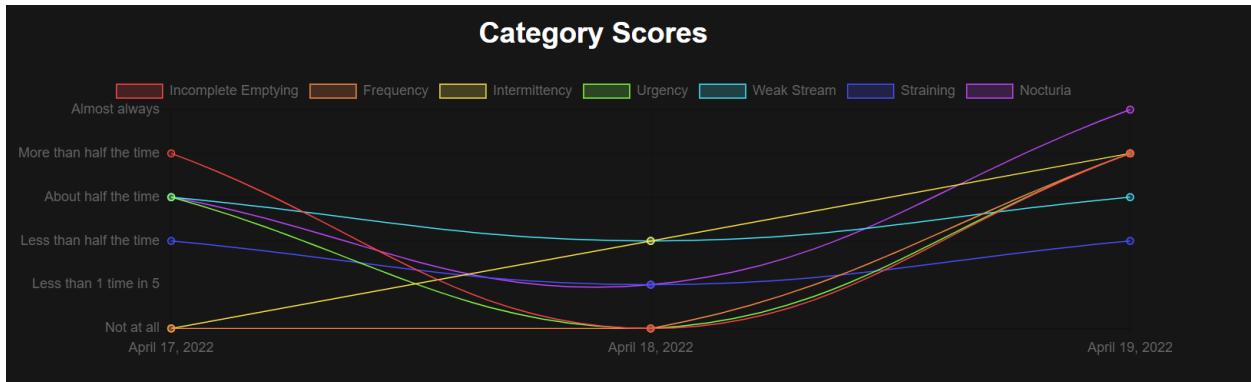


Figure 3. category scores graph



Figure 4. Quality of life score graph

As these graphs are displaying correctly and accurately reflecting the patient's scores fetched from the database, the verification test was a success under the modified conditions.

Patient compliance

The ‘patient compliance’ test evaluates the functions related to ensuring patient compliance, which includes the SNS message function and the ‘streak counter’ feature that counts how many consecutive days a patient has logged one’s responses. The former feature has been tested in the ‘messaging capability’ section and this test will mainly verify that the streaks are counted correctly. The verification plan for this feature is to record a week’s mock data into the database with a missing day in the middle. This would look like three consecutive days of data, one missing day, and three more consecutive days. For the test to be successful, the ‘streak’ should just show up as only a three-day streak as there has been a break in the week’s data.



Figure 5. a) 7 day streak; b) missing streak when less than 7 consecutive days of data is recorded

Figure 5a) and Figure 5b) show the calendar checkmarks and streak messages after the mock data has been added to the database. As expected, the streak message shows that the website is able to detect. This confirms that the mechanism that the team has incorporated to ensure patient compliance is successful and meets this particular design specification under the ‘Functions to Implement’ section, which reads:

“A reward system to motivate patients to record every day.”

Ease of use by doctors

The ‘ease of use by doctors test’ aims to ensure that all functions meant to be used by doctors function as planned in the design specifications. The type of features implemented for the doctor’s page were not clearly specified in the design specifications as functions were added as requested by the client, and the request has changed throughout development. However, to validate this, all of the features developed just for the doctors in mind have been tested for their success. Some features included just for the doctors include a doctors only page where a list of patients are shown and the doctors can navigate to the results page of each patient (Figure 6). Also, for doctors, the landing page after they log into the website would be the patient list instead of the dashboard that a typical patient would see.

The screenshot shows a web application interface titled "PHIT-Test". The top navigation bar includes links for DASHBOARD, SURVEY, RESULTS, PATIENTS (which is highlighted in yellow), USER: CHRISTOPHER ARETT, and LOGOUT. Below the navigation is a search bar with placeholder text "Search: []". The main content area is titled "Patient List". It features a table with columns for First Name, Last Name, and View Data. The table contains six entries:

First Name	Last Name	View Data
andrew	z	View Data
Crystal	Shin	View Data
kaixin	pan	View Data
Umbreom	Eevee	View Data
zhiyao	x	View Data
Zhiyao	Xu	View Data

Below the table, a message says "Showing 1 to 6 of 6 entries". At the bottom right, there are buttons for "Previous", a page number "1", and "Next".

Figure 6. Sample page for doctor account. Doctor can see patients information and data easily

Ease of use by patients

It is important that the website is easy to navigate and use by patients. To test design specifications related to the ease of use by patients, tests have been performed to verify that all of

the functions are working in a proper manner. The parts of the design specification that address this reads:

“Having a modulated main page that has sections of

- summary of user’s data points
- entrance to different recording pages
- chart visualization of the user’s data.”

The verification plan for the ease of use by patients includes: 1) checking whether the user is automatically directed to the dashboard with the calendar upon login; 2) the existence of a survey with radio buttons as inputs; 3) the calendar is positioned properly; 4) users can easily view and interpret data in the results page. As could be seen in Figure 7, the main page which a patient would land upon login shows a navigation bar across the top that takes the user to different parts of the website including the entrance to the survey and data visualization page. The survey has radio buttons instead of direct input to ensure that the data input can be consistent (Figure 9). The calendar is shown in the dashboard with the days for which a patient has answered the survey indicated with check marks (Figure 5). The message at the bottom of the calendar is adaptive to display how many consecutive days the patient has been answering the survey, and encourages the patient to regularly log data. The results page has interactive graphs that are split into three panels - total score, category score, and quality of life - to make data visualization easier (Figure 8). The graphs are interactive so the legend for individual line can be clicked to show and hide the line. This way, only the categories desired can be displayed at the same time, enhancing the user experience with data visualization. As the website meets all of the design specifications, the ease of use by patients has been successfully verified.

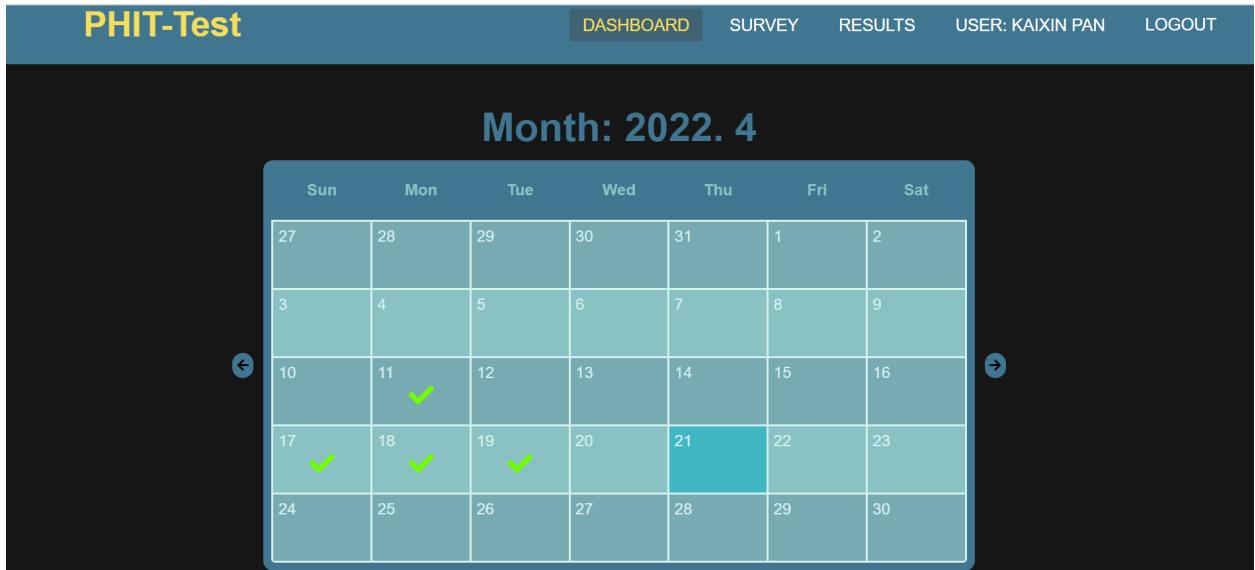


Figure 7. The dashboard page for patients

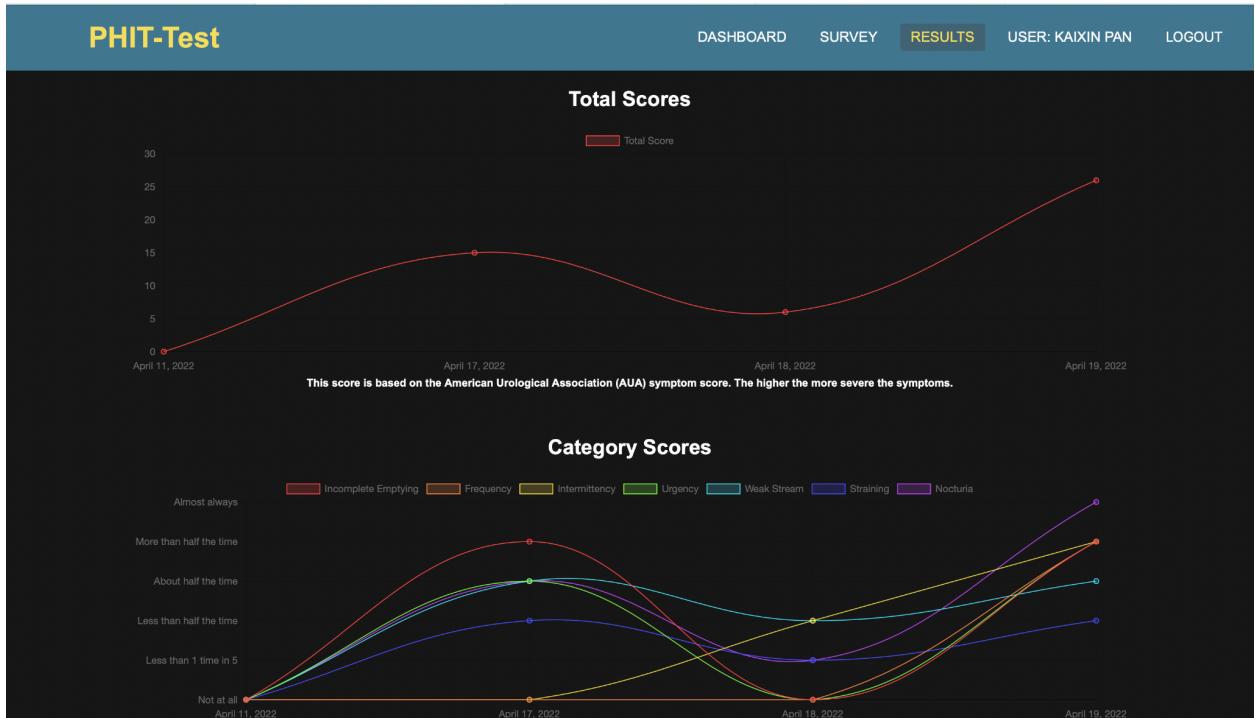


Figure 8. The result page for patients

Engagement time

Since the website is being developed to streamline the process of data recording for patients with benign prostatic hyperplasia (BPH), the engagement time for the users must be kept at minimum while capturing enough data to accurately reflect the progress of the user's

symptoms. The strategy to verify this aspect would be to make the developer keep in mind how to optimize the steps taken to log data throughout the development procedure and ensure the final outcome indeed has the most optimized engagement time. Since web development is an iterative procedure with numerous iterations of designing, implementing, and testing, this approach would ensure that the engagement time is optimized. The account creation takes less than one minute for the developers. It may take longer for those who are new to the website, but it has been verified that the process would not take longer than three minutes given that all of the instructions on the page are read and the user spends a little bit of time thinking what to use as their username and password. After the account has been created, the login process only takes less than 15 seconds. The landing page after logging in is a dashboard page where it shows the calendar shown in Figure 7. The navigation takes the user to the survey and data visualization page. The survey page has radio buttons to choose a multiple-choice option and all buttons are at intuitive positions to ensure the data recording is as smooth as possible. For new users, it would typically take 3-5 minutes to complete the survey, and for continued users, it would take less than one minute. All other procedures and navigation through the website work fluently and logically, verifying that this specification has been tested successfully.

Accuracy input

In order to collect accurate data for data visualization, numerical data is preferred over text data. Also, the survey questions must follow common methods used by contemporary doctor to gauge a urological patient's symptoms, such as the American Urological Association Symptom Scoring Sheet or questions from the Bladder Symptom Diary. This is also highlighted in the design specification as:

“Numerical or categorical input preferred to textual input when recording patient symptoms. Data to be collected everyday includes but not limits to:

- *Features from the American Urological Association Symptom scoring sheet*
- *Features from the Bladder Symptom Diary”*

To achieve this design specification, the website should use a method of data collection that is more accurate. For example, radio buttons or drop-down menus are preferred over sliders due to accuracy reasons. The method to test this design specification is to check if the survey uses radio buttons instead of slide bars. As could be found in Figure 9, the survey consists of only radio-buttons, except for one text field that has been added per the request of the client.

Therefore, this design specification has been met.

Incomplete emptying:

- Not at all
- Less than 1 time in 5
- Less than half the time
- About half the time
- More than half the time
- Almost always

*It does not feel like I empty my bladder all the way

Event change:

Start medication X

Submit

Figure 9 . a) survey radio buttons sample; b) survey text field sample

Easy to learn

The website should be easy to learn for first-time users. The design specification states that “*users should learn how to use this product within 5 minutes of training.*” To verify this design specification, five test users were invited and the learning time of the website was recorded. The users were asked to first create an account and log in using their account. Then the users were asked to fill out today's and yesterday's surveys and then check the graph data. The overall learning time was recorded. The results are shown in Table 1. According to the test, the average time taken to learn to use the website for the first time was 1.4 minutes, which is less than 2 minutes, and achieves our goals and expectations.

Table 1. The learning time of each users and average learning time

Patients	Learning time(mins)
Kai Ma	2
Austin Bao	1
Eugene Heger	1.5
Rahul Edassery	1.5
Harper Qi	1
Average time	1.4

Validation Results

Validation from doctors

The client, Dr. Arett, was invited to test the website. The main functions of the website were introduced and he was asked to log in as both the doctor's account and the patient's account. As planned in the original validation plan, a simple survey was designed and questions were asked to the client throughout the demo. The results are organized in Table 2.

Table 2. The feedback results from Dr. Arett, the client

Easiness to learn	It could be learned how to use the website without much explanation as it follows the general pattern of a typical website. After listening briefly to what each page does, it was easy to navigate.
Any unreasonable design	The existing designs are superb.

Missing or unnecessary data	There is no unnecessary data collected. It would be actually nice to record urination frequency and tie the number into the results somehow.
Data clear and easy to read	The data visualization is extremely clear. The chart is extremely useful as users can interact with the chart and show only parts of the data for easier visualization. Also, like how the visualization is divided into three panels.
Sends alert in a correct way	The alert system is working correctly. It is nice that a doctor would be notified on the doctor's dashboard if a patient is not scoring well.
Suggestions	Add a feature so that any changes in a patient's treatment/medication can be recorded. This way the patient will be able to track when their symptoms are changing and due to what cause it is changing.

The survey overall reveals that the client is satisfied with the product as it meets most of his expectations. Small suggestions were made regarding the feature to record treatment or medication changes. When patients start to receive a new treatment or medication, the date of this change will be recorded in the chart and a distinction will be made so that it is easier to compare the trend before and after the change. Other than this small suggestion, the usability of the website, design, functions, and data visualization all meet the expectations of the client, thus validated successfully.

Validation from patients

The original plan was to first invite 5 Washington University students to try using the website. Then, with the help of the client, some of his actual patients were to be invited to try the

website. However, due to the difficulty of recruiting patients, the validation testing has been performed only on Washington University students.

The participants were asked to use the website and fill out the survey. For each question, the participant could choose from 1 (least agree) to 5 (most agree). The survey result is shown below in Table 3.

Table 3. Survey results from patients

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Average Score
Easy to access the website	5	4	5	5	5	4.8
Willingness to continue use the website	2	2	5	3	3	3
Easiness to navigate the website	5	5	4	4	5	4.6
Usefulness of the data visualization	5	2	4	3	3	3.4

Overall scores from the survey reveal that the product is successful in its validation with potential patients. All of the survey question items have received an average score that is greater than 3. Ease of accessing the website and navigating the website received a very high score, and it is promising as making the website easy to use was the primary goal of this project. The participants were asked to provide any suggestions for the website, and the following is the summary of their responses:

- Change the domain to something that's easier to remember. Currently, remembering <http://13.59.35.92:8000/> is a little bit difficult.
- Allow users to be able to go back and fill in data even if the day has been passed.

Computer Requirements

The website does not have any specific requirements for the computer or mobile hardware. Operating systems and processors of computers will not influence patients' use of websites. All devices that can connect to the internet can run the website. However, to achieve the best performance, google chrome or firefox is recommended.

The website is hosted on the Amazon Web Service. The EC2 instance type should be t2.micro free tier, and the Platform type should be Linux/UNIX.

To deploy the Django app on the AWS EC2 instance, a virtual environment of Python 3.8.5 or above should be created. Django 4.0.2 and SQLite 3.9 should be explicitly installed in the virtual environment. The rest of the packages used are specified in the code and can be installed by simply running `python -m pip install -r requirements.txt`.

Software Flow Diagram

The software flow diagram could be found in Appendix D. The flow diagram captures the overall flow of the website and how the alert feature works.

Software Code

The code used to build the entire website was so large that it was unreasonable to copy and paste in the report. Therefore, the entire codebase could be accessed through this public GitHub repository link: <https://github.com/SeniorDesign2022/phit-test/tree/dev>. The repository has multiple branches, but the final work was pushed to the 'dev' branch.

DesignSafe Analysis Discussion

The users of the website would be doctors, patients, and the website technicians. All mitigation plans are in the future direction. For doctors and patients, the same task is to read the graph. The hazard is the misunderstanding of the graph may be caused by reading the graph too fast and lead to the misuse and misunderstanding of data. A detailed introduction of graphs will be provided to users to mitigate the hazard. The risk level is 6 with severity 3 and possibilities 2 after mitigation. Another task for doctors is to use data to diagnose patients. The hazard is wrong medication because of using data in an improper way. The remainder will be sent to doctors to cautiously use the data to mitigate the hazard. The risk level is 4 with a severity of 4 and possibilities 1 after mitigation. Another task for patients is to fill out the survey. The hazard in this task for patients is providing the wrong information which might be caused by filling the survey too fast or misunderstanding the survey questions. The website will notify the patients to check their answers to mitigate the hazard. The risk level is 6 with severity 3 and possibilities 2 after mitigation. The tasks for website builders are to repair the website based on the problems from users and update the function of the website. The hazard is that the new function is useless or influences the user experience in a negative way. Sample surveys from users before changing any functions in the website might mitigate the hazard. The risk level is 6 with severity 3 and possibilities 2 after mitigation. The full spreadsheet containing the analysis can be found in Appendix E.

User Manual

Since the website was designed to be used without the help of heavy training, the user manual would not be necessary to most users of the website. However, to introduce how to use

the website to first-time users, a user manual has been created for both the patients and doctors. The full user manual could be found in Appendix F.

FDA requirements, analysis, and plan (or other agency)

Since the project only involves minimal data from the patient's medical records (it only requires current medication information) and most of the data collected are related to the patient's subjective assessment of their symptoms, the product will not require a specific approval process. Also, the product is not classified as a medical device, as the product will not deal with data obtained by physical examinations or lab results. The data collected will be survey answers about patients' symptoms, and this falls under the category of a health tracker, which does not fall under FDA's regulated medical devices.

In order to maintain the security of the website as it collects user account information such as username, password, and first and last names of the patient, Django's built in user authentication framework was used. This is a robust framework that prevents Cross Site Request Forgery and other malicious attempts to leak important user information. Even though the website does not require FDA approval or any other agency's approval, measures like such have been taken to ensure the safety of patient privacy and data safety.

Conclusions

Solution to the Problem - Meeting the Design Specifications

The medical problem this project initially aimed to address is reducing the overuse of medications by being able to track symptoms more easily and accurately using an online platform. The project is a feasible solution to this problem because it allows easy recording of

the AUA symptom score from patient's mobile phones or computers. Without the product, patients would have to carry multiple hard copies of the symptom survey and record it using pen and paper. However, this is often inaccurate and information may get lost on the way. The product streamlines the information transmission between the patients and the doctor. The doctor can monitor an individual patient's progress anytime using the doctor's website. The patients can monitor their symptoms more objectively through the interactive graphs and have more awareness of how severe symptoms they have, so that when they meet with the doctor, they can get more out of the doctor's appointment.

Although the design specifications and the direction of the final product has changed a little bit, most of the major design specifications have been met as shown from the verification and validation portion of the report. The original plan for the product was to incorporate machine learning to be able to compare data across patients and make extrapolation data for their medication efficacy. However, due to breach of medical information and the risk of such, the team has decided to record much safer data, which is the symptoms only. Despite such changes, the client was satisfied with the outcome, and the product is overall a success.

Future directions

The website still might have more features that could be implemented. If the website were to be used by doctors other than the client, Dr. Arett, a professional institution will need to verify the doctor's information and assign the doctor account upon account creation. Also, if this were to be used by multiple doctors at the same time, the patient list should only show the patients who are assigned to a certain doctor. This could be done easily using Django's group selection feature, but a way to automate this process upon account creation would be useful in

the future. Also, there is only one survey in the website system currently. In the future, it would be nice to allow the doctor to customize the survey questions depending on the need for each individual patient or his groups of patients. This way, the doctors might be able to meet the needs of patients suffering from different symptoms. Lastly, it would be exciting to see this application could also be applied to other diseases as well. Many patients suffering from different diseases oftentimes have difficulties assessing their own symptoms objectively and reporting it to their doctors. Therefore, having this tool available universally would help these patients tremendously.

Ethical consideration

Since the project is dealing with some degree of a patient's personal symptom data, there are some ethical issues that must be considered thoughtfully. As the website needs to obtain the information directly from patients, the main ethical problem is to protect the information of patients. The four major issues of information ethics are privacy, accuracy, property, and accessibility. The website will ask the consent from patients to use the data. It is an invasion of privacy if the information is obtained without consent from users. For accuracy, the website ensures to save and conclude the data accurately. The information will be presented to doctors accurately. The inaccurate information may lead to the wrong medication and improper diagnosis results, which further detriment the patient's health and may cause irrevocable harm. The property of information will always belong to patients. For accessibility, the website will not let people except for account owners and doctors to access the information and use the information to gain benefit.

Intellectual Property

The appearance of the website and the concept of the website is the team's own intellectual property. However, due to the nature of web development, different third-party open source frameworks and JavaScript packages have been incorporated. Therefore, this puts the website in a unique position that maybe some design aspects of the website would qualify as an intellectual property but the entire product cannot be entirely original.

According to the team's research, there were no openly available online symptom tracking tools for BPH. Therefore, the product may be an IP in that regard. To protect the IP of the project, the public GitHub repository will be switched back to private.

Appendices

Appendix A

Most up-to-date design specifications

Data Collection:

- Obtain clear patient consent before data collection
- Numerical or categorical input is preferred to textual input when recording patient symptoms.
Data to be collected every day includes but is not limited to:
 - Features from the American Urological Association Symptom scoring sheet
 - Features from the Bladder Symptom Diary

Functions to implement:

- The patient will be notified via text message when the American Urological Association symptom score of the patient has been below the average by 25% for 7 consecutive days.
- Having a modulated main page that has sections of
 - A summary of user's data points
 - entrance to different recording pages
 - chart visualization of the user's data
- A reward system to motivate patients to record every day

User Experience:

- User should learn how to use this product within 5 minutes of training
- User engagement time should take less than 2 minutes a day (excluding time to communication with the doctor)
 - Login process should be smooth and kept under 15 seconds
 - All recording can be finished within one minute's time
 - Less than 45 seconds for users to read the interpretation of their data
- Users can visualize their progress and medicine efficacy
 - A line chart showing the user's score over time
 - When clicking into the visualization page, user can see comparison figures in more detailed categories

Technical:

- Accessible from different devices and browsers including Chrome, Safari, Microsoft Edge, Firefox, etc.
- Visualization algorithm calculates and displays all relevant data points

Web Security:

- Collection and storage of data must be HIPAA compliant
- Use secure web browser and use hashed passwords
- Protect against SQL injections and cross-site request forgery

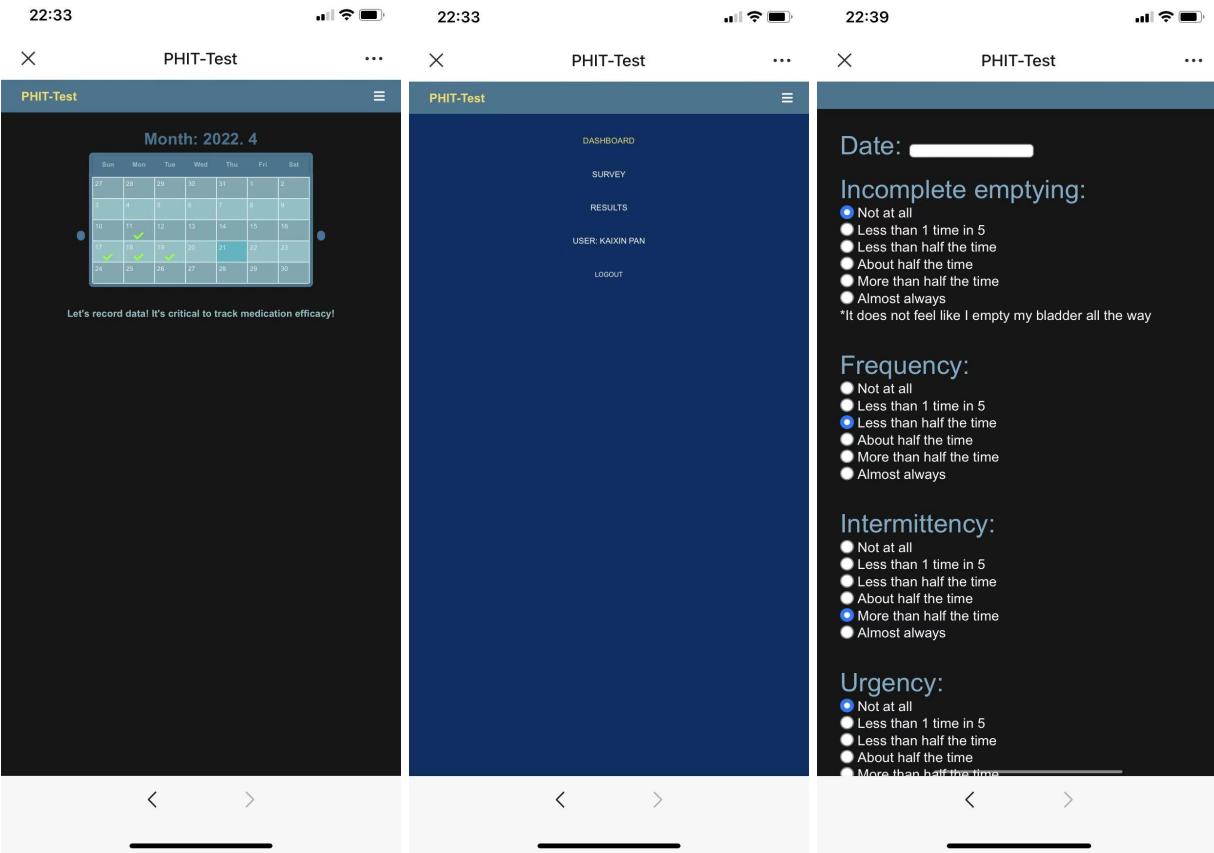
Appendix B

Verification Testing Plan

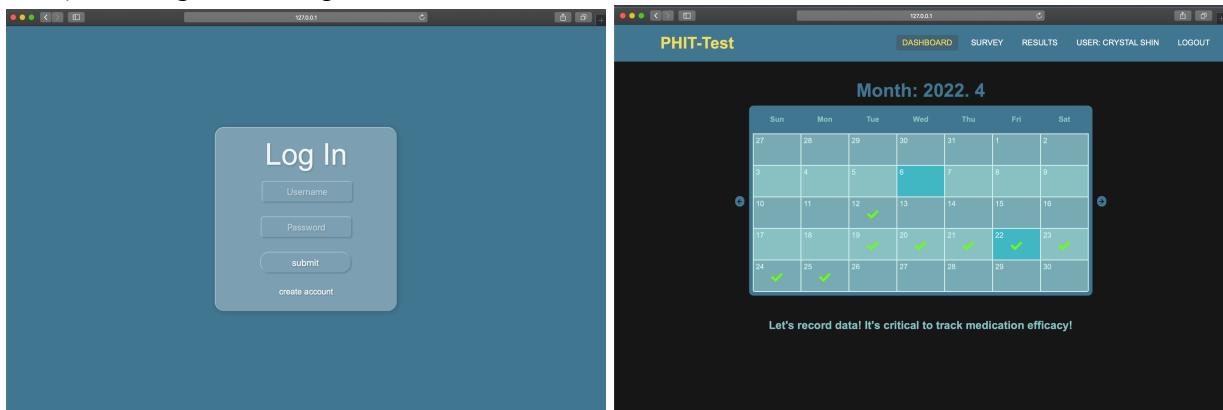
Design Specification	Verification Plan
Accessibility	Responsive Web Design will be tested by testing the functions of the website from multiple devices (iOS, Android) and browsers (Safari, Chrome, Firefox).
Message capability	Three scenarios will be simulated: a) when a patient forgets to take the survey for one day, the website should alert the patient by a notification in the dashboard and a text message through Amazon SNS (Simple Notification Service); b) when a patient enters abnormal side effects for 7 consecutive days, SNS should send a text message to ask if the patient wants to notify the doctor; c) when a patient replies “Yes” to the previous scenario, SNS should alert the doctor. If message notifications are successfully sent and received in all scenarios, then it can be verified that the SNS functions properly.
Data visualization	A medication effect graph and a side effect graph should be generated from patients' recorded data fetched from the database. Both graphs should clearly reflect the patient's progress. This specification will be verified if the two graphs can be successfully generated.
Patient compliance	Features related with patient compliance are the SNS function and the calendar, and the former could be verified in the previous specification. The latter feature will be tested by assigning one week of mock data (three days with records, one day without, and three days with record again) to the database. If the calendar shows two three-day streaks with a missing day in between, then its function must be verified.
Ease of use by doctors	The doctor's portal should have all its functions working as intended: a) when a doctor account is logged in, the person will be automatically redirected to the doctor's dashboard; b) the dashboard contains a list of patients, whose medication effect data and side effect data can be viewed as graphs.
Ease of use by patients	The patient's portal should have all its functions working as intended: a) when a patient account is logged in, the person will be automatically redirected to the patient's dashboard; b) in the dashboard, user can do the survey, which should have chained input radio buttons (i.e. new questions pop up based on the answer to the previous questions); c) the checkin calendar is in a conspicuous position; d) user can easily view and interpret their recordings in the result page .
Engagement time	This specification should be ensured by keeping the website simple and straightforward in the development stage. When the website is ready to launch, the developers should go over the daily routine of a patient and optimize the procedure if the engagement time is not the shortest possible.
Accuracy of input	As discussed in the progress report, the accuracy of input could be achieved by using radio buttons instead of slide bars. Thus as long as radio buttons are used, this specification can be verified.
Easy to learn	The website should follow a straightforward design such that all features are instinctual to use. If a person using the website for the first time can learn the procedures in less than two minute and without confusion, then this specification is verified.

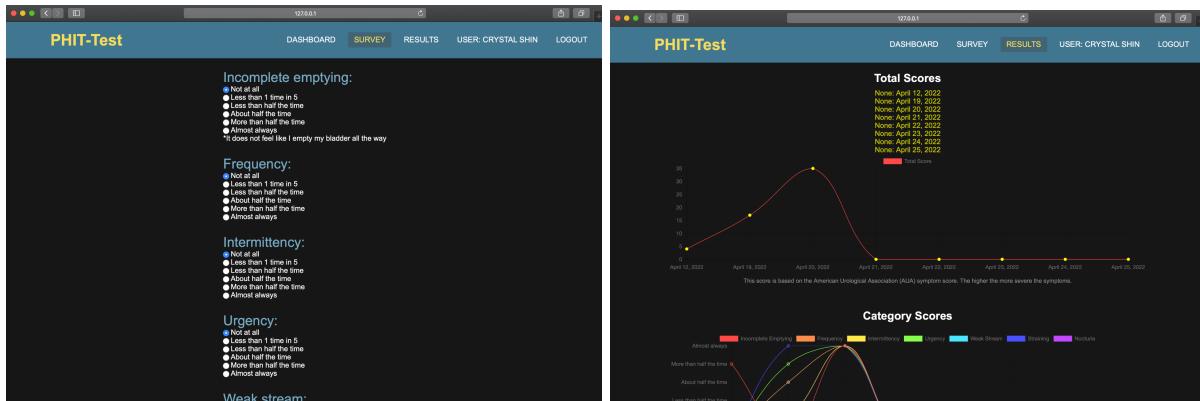
Appendix C

a) Testing in mobile phone - Safari

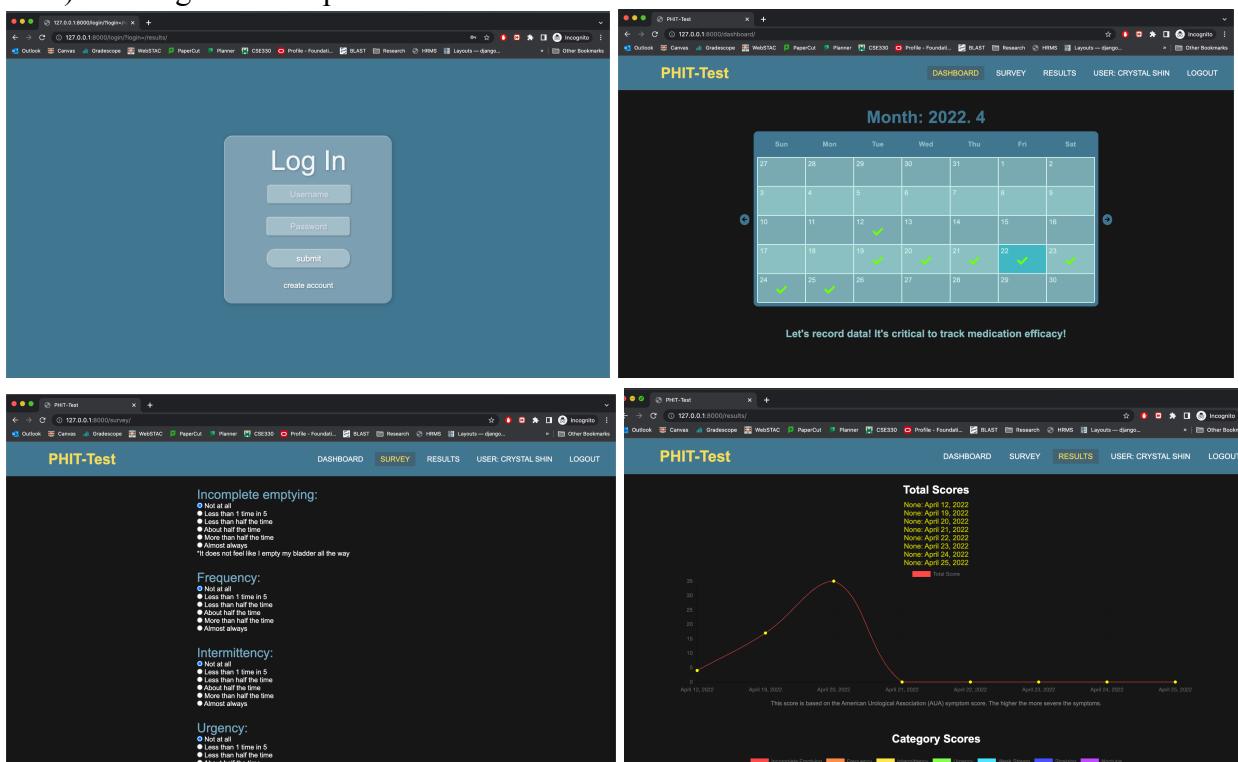


b) Testing on desktop - Safari

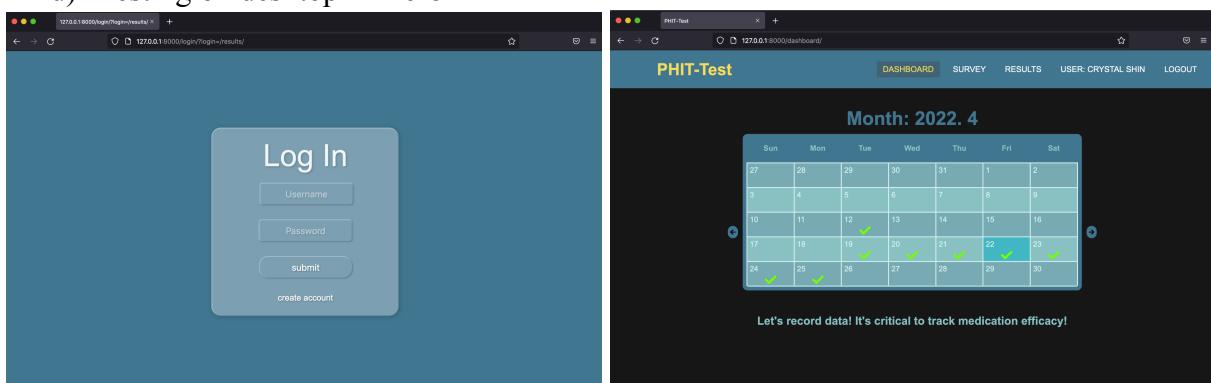


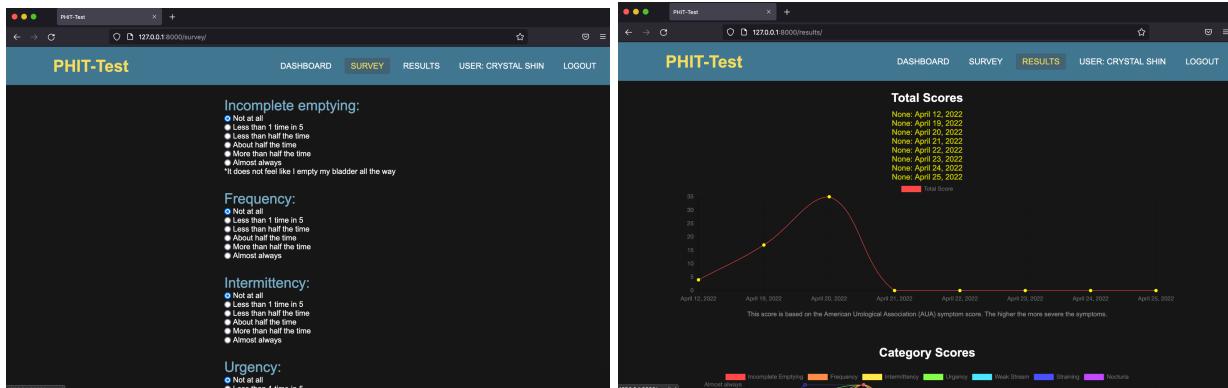


c) Testing on desktop - Chrome



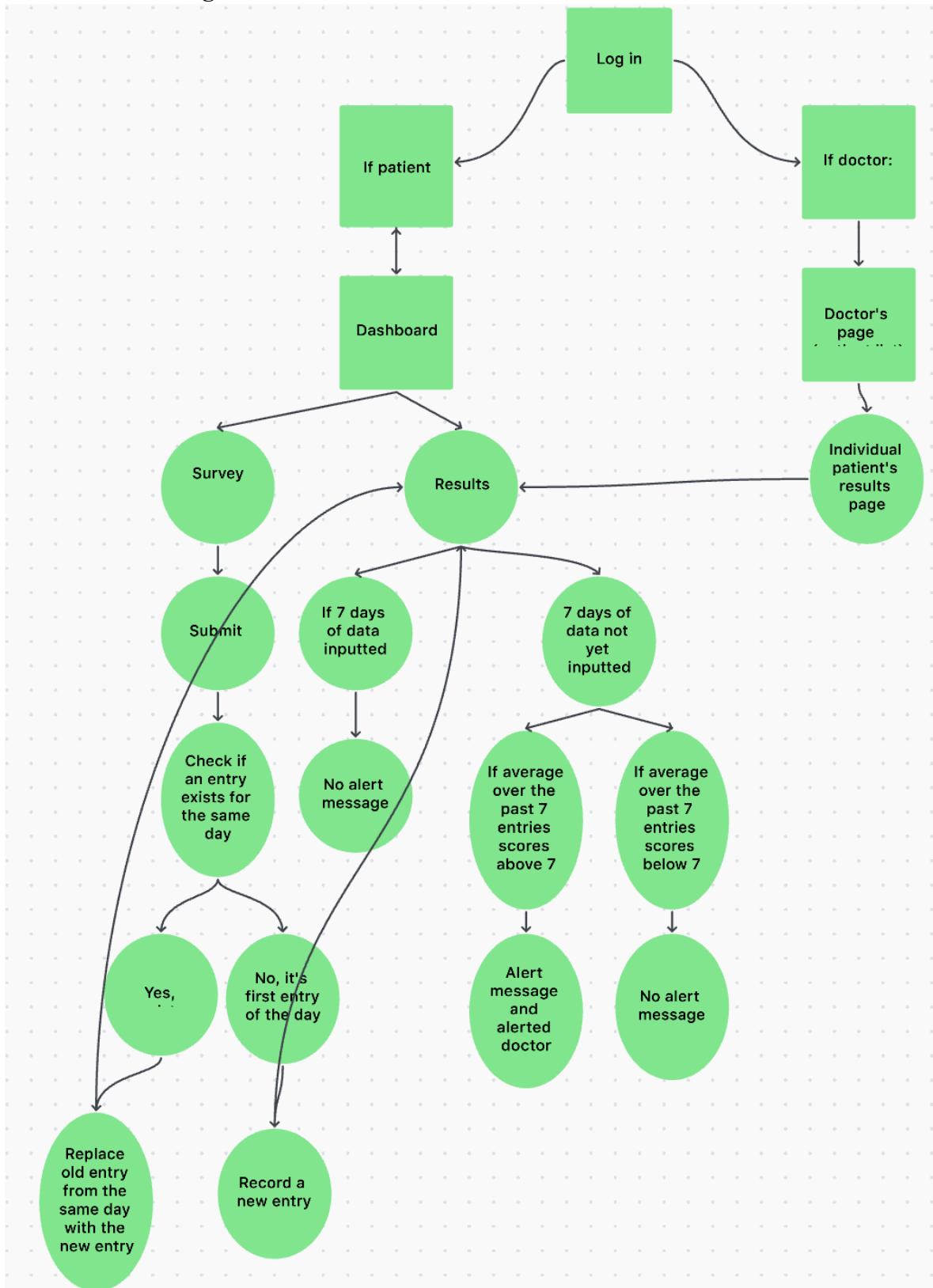
d) Testing on desktop - Firefox





Appendix D

Software Flow Diagram



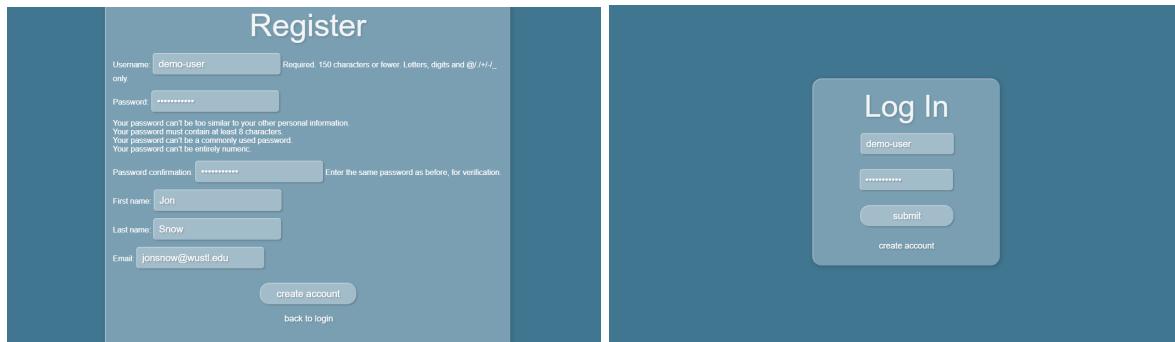
Appendix E

Link to DesignSafe Analysis Spreadsheet

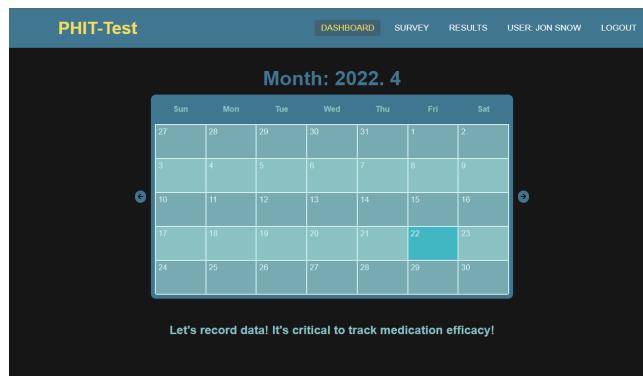
<https://docs.google.com/spreadsheets/d/1hMFxFdRcEkfqtVflxMtdkrc3vhrlmi2Z/edit?usp=sharing&ouid=113067044201564967266&rtpof=true&sd=true>

Appendix F Software User Manual (for patients)

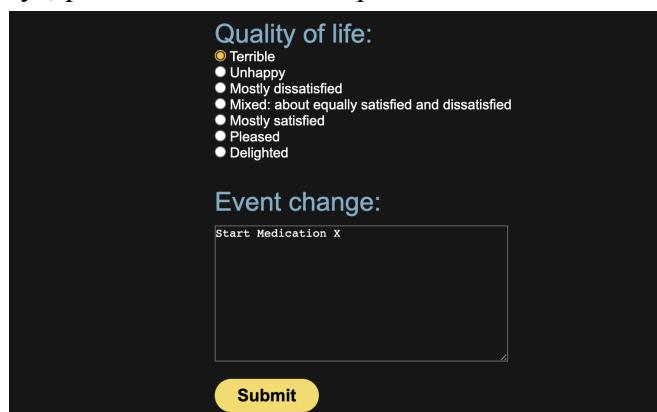
Step 1. Create an account on <http://13.59.35.92:8000/register/>. Enter your username, password, first name, last name, and email address as prompted. After seeing the success message, return to the login page. Enter your username and password and click the submit button.



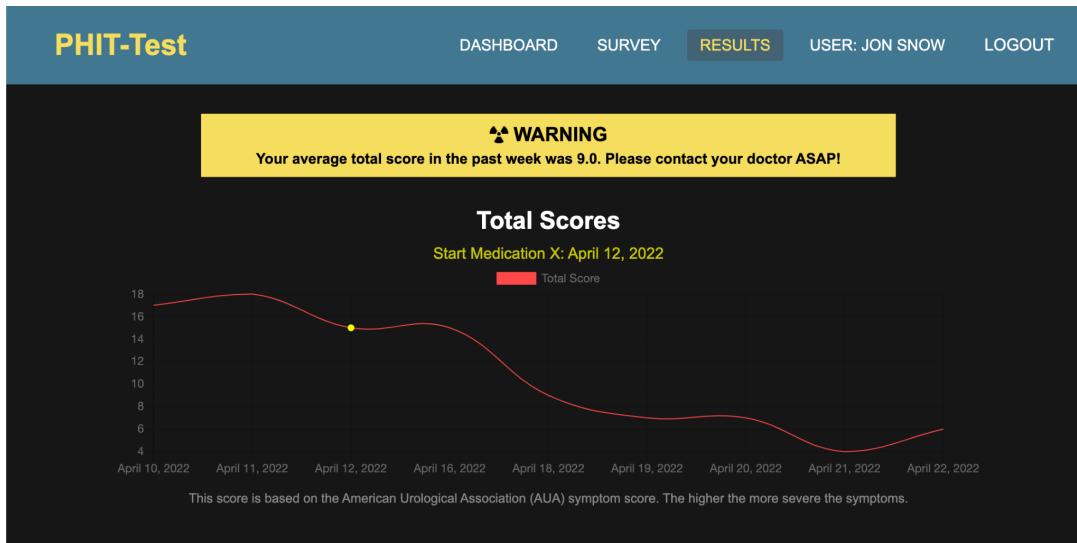
Step 2. You will be redirected to the dashboard page. Today's date is highlighted in blue on the calendar. There is nothing you can do on this page for now, but as you log in more data, the dashboard page will reflect your progress.



Step 3. Go to the survey page and fill out the questionnaire. There are seven questions relating to your symptoms, and the eighth asks about your subjective feeling about the quality of your life. The ninth item in the survey is a text entry to record major events like medication changes or surgeries. On normal days, please leave the text input blank.



Step 4. Click on the results button in the navigation bar. This is the page where you can visualize your recordings. The total scores graph reflects the combined score of your survey data. A higher total score typically reflects more severe symptoms. The day where you entered an event is highlighted as a yellow dot. If you have more than seven days of recording and the average scores for the past week went over a safety threshold of 7.0, the warning message will appear, and you need to contact your doctor for help.



You can find two more graphs on the results page. Try clicking on the legends to filter out some categories so to better investigate the rest.



Step 5. The last step, but the most important and difficult step, is to keep recording!

Thanks for using PHIT-Test!

Appendix F Software User Manual (for doctors)

As a doctor, you need to control two accounts to use this website. One is the administration account to manage the database and to give permissions to other accounts. The other is the staff account to view your patients' results.

Step 0. The developer team will create an AWS EC2 instance and give you access. They will also help you configure the instance on your local machine.

Step 1. Follow the detailed steps in requirements.txt to activate the virtual environment in your terminal and install the required packages.

Step 2. The first thing to do after launching the server is to create an admin account using `python manage.py createsuperuser` command. Then login with the account credential on <http://13.59.35.92:8000/admin/>.

Step 3. Get familiarized with the administration site: The Django administration site has three main pages: Groups, Users and Surveys. The users are listed in the dashboard. To see or modify information of one user account, click on the name colored in blue.

The screenshot shows the Django Admin interface for the 'Users' model. The top navigation bar includes links for 'WELCOME, ADMIN', 'VIEW SITE / CHANGE PASSWORD / LOG OUT'. On the left, there's a sidebar with 'Start typing to filter...', 'AUTHENTICATION AND AUTHORIZATION' (Groups, Users), and 'PAGES' (Surveys). The main content area is titled 'Select user to change' and contains a search bar and a table of users. The table columns are: USERNAME, EMAIL ADDRESS, FIRST NAME, LAST NAME, and STAFF STATUS. The data in the table is:

USERNAME	EMAIL ADDRESS	FIRST NAME	LAST NAME	STAFF STATUS
Eevee	jbuhrle@wustl.edu	Umbreom	Eevee	✗
admin	admin@wustl.edu			✓
demo-user	jonsnow@wustl.edu	Jon	Snow	✗
evelyn	xuzhiyao@wustl.edu			✓
evelyn2	evelynxzy@163.com	evelyn	xu	✗
mdzz		zhiyao	x	✗
o98k		andrew	z	✗
pika	smatteucc@wustl.edu	pika	chu	✓

Below the table, it says '8 users'. On the right, there's a 'FILTER' sidebar with sections for 'By staff status' (All, Yes, No), 'By superuser status' (All, Yes, No), 'By active' (All, Yes, No), and 'By groups' (All, doctor, -).

Step 4. Next, create a doctor's account by clicking the “+Add” button on the left panel. Enter basic info, scroll down, check “Staff status” and double click on “doctor” in Available groups. Save the changes.

Permissions

Active
Designates whether this user should be treated as active. Unselect this instead of deleting accounts.

Staff status
Designates whether the user can log into this admin site.

Superuser status
Designates that this user has all permissions without explicitly assigning them.

Groups:

Available groups	Chosen groups
doctor	

[Choose all](#) [Remove all](#)

Step 5. Navigate to <http://13.59.35.92:8000/login/> and enter the doctor credentials you just created. You will be directed to the Patient page, where you can see an interactive table containing an entry for each of your patients. You can access each patient's visualization data by clicking the “View Data” link after the patient's name. A yellow highlighted View Data cell indicates a total score above the healthy threshold for the past seven days.

PHIT-Test

DASHBOARD SURVEY RESULTS PATIENTS USER: PIKA CHU LOGOUT

Patient List

Show 10 entries Search:

First Name	Last Name	View Data
andrew	z	View Data
evelyn	xu	View Data
Jon	Snow	View Data
Umbreom	Eevee	View Data
zhiyao	x	View Data

Showing 1 to 5 of 5 entries Previous [1](#) Next

Step 6. You can order the patients in reverse alphabetical order by clicking on the “First Name” or “Last Name” table headings. You can also search for a particular patients using the search box on the top right.

Patient List		
First Name	Last Name	View Data
zhiyao	x	View Data
Umbreom	Eevee	View Data
Jon	Snow	View Data
evelyn	xu	View Data
andrew	z	View Data

Showing 1 to 5 of 5 entries

Search:

Previous Next

Patient List		
First Name	Last Name	View Data
Jon	Snow	View Data

Showing 1 to 1 of 1 entries (filtered from 5 total entries)

Search:

Previous Next

Step 7. The Dashboard, Survey and Results pages are just the same as what patients see in their own accounts. You can use these pages as a reference to better understand patients’ data.

If you encounter any issues, please contact the developer team for technical support.

Thanks for using PHIT-test!