OnPoint: A Social and Mobile Platform to Optimize Health Services for Complex, Chronic Care Management

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ONPOINT

A SOCIAL AND MOBILE PLATFORM TO OPTIMIZE HEALTH SERVICES
FOR COMPLEX, CHRONIC CARE MANAGEMENT

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TABLE OF CONTENTS

CHAPTER 1 : TECHNICAL CONTRIBUTIONS

1.1 INTRODUCTION

Effective treatment for chronic illnesses revolves around an active, engaged, and informed patient who is able to make health decisions and self-manage his or her care. Our project is a social and mobile platform called OnPoint that is geared towards helping chronic care patients understand their care plan and make effective decisions that are critical to managing their own health. In order to adhere to their care plans, patients must understand why and how they should change their lifestyles to manage their disease. Chronic care management is highly complex, and our partners the UC Davis School of Nursing have identified several core needs and required functionality. These functions include: a shared care plan, medication management, symptom management, appointment tracking, nutrition tracking, physical activity tracking, and personal device integration (Haynes and Kim 2015:3-4). We faced the challenge of narrowing down the scope of the project to a feasible amount of work. Through our discussions with our advisors, background research on available healthcare management tools, and interviews with target users and stakeholders, we whittled down the list of features to a set of the most critically important functions, shown in Table 1-1. The scope of our project will encompass several core elements: a shared care plan, a medication management module, and a symptom management module. A central focus of our project is facilitating communication and collaboration between patients and their care team to help manage aspects of their health.

TABLE 1-1: Supported functionality

List of functionality for OnPoint
- Shared care plan   - Medication management   - Symptom management   - Appointment tracking   - Nutrition tracking*   - Physical activity tracking*   - Personal device integration*   (* functionality is supported by existing applications and will not be implemented in our project.)

1.2 PHASE 1: DESIGNING THE USER INTERFACE

We are designing a user interface to help patients navigate the complexities of their health management. Our project consists of two phases: the design phase and the implementation phase. Since design work is best done collaboratively, we have worked together on most of the design phase of the project as we iterate through the three stages of design process: design, prototype, and evaluate. The work breakdown for the first phase is shown in Figure 1-1.
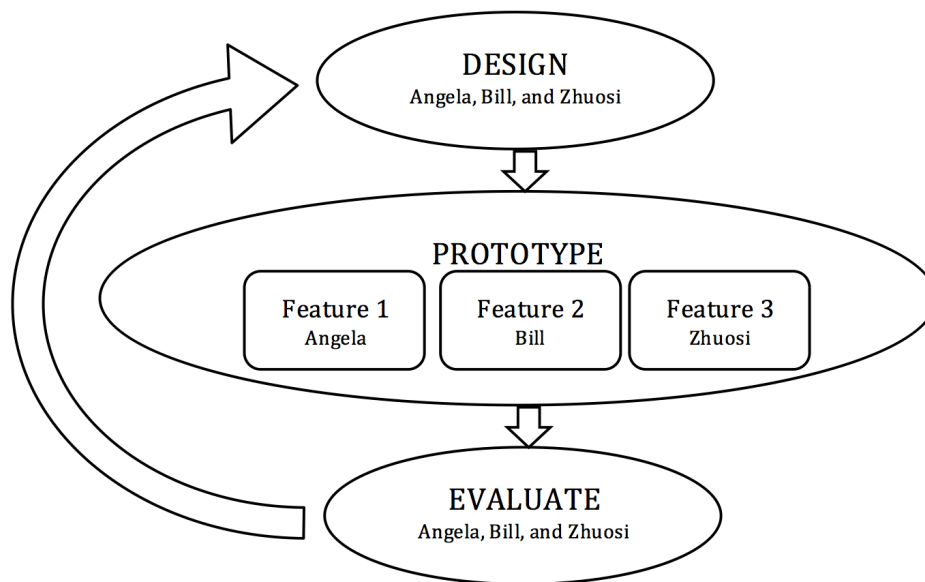
FIGURE 1-1: Work breakdown for the design phase

First, in the design stage, we brainstormed together to create a design and merge our ideas as we created low-fidelity sketches using paper and post-it notes. Next, in the prototype stage, we split up the work to create medium-fidelity prototypes in Balsamiq[1]

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[1] Balsamiq Mockups subscription for rapid wireframing was purchased from November 2015 – March 2016. https://balsamiq.com/

and Keynote, using Keynotopia[2]. Finally, in the evaluate stage, we collaborated to

present our prototypes for feedback, and decided what to amend during our next cycle

of design iteration. In his paper, Bill Kim discusses the design process for the shared

care plan, which encompasses features ranging from goal-setting to symptom

management. Zhuosi Wang and I will both write about the medication management

functionality. In her paper, Zhuosi Wang discusses the tracking aspect of medication

management, which reminds users to take their medications and track their daily

medication adherence. I will briefly describe the main view of our application, and

describe in detail the challenges and progress of the scheduling aspect of medication

management, which aids patients in understanding and scheduling their prescriptions.

1.2.1 MAIN HOMEPAGE VIEW

The primary goal of our main homepage view of our application is to give the

user an overview of their current health status, and prompt the user with reminders

and actions that will help the user adhere to a care plan. In order to effectively follow a

care plan and make the necessary lifestyle changes to improve their health, patients

need to become more engaged in their own care. To do this, patients should be trained

with the self-management skills that are necessary to effect behavioral change. Patient

self-management support can be broken down into several aspects: decision-making,

problem-solving, goal-setting, and assessment (Funnell 2009:2). As patients encounter

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[2] Keynotopia iPhone prototyping templates licenses were purchased in February 2016. http://keynotopia.com/

issues in their daily lives, they need to know how to assess the issues and decide on a course of action to resolve the issues. To achieve the goals outlined in care plans, patients should figure out how to break down long-term goals into near-term achievable steps, which helps increase their confidence in their ability to follow the plan and consequently increases self-efficacy (Funnell 2009:2). In addition, an informed and engaged patient can participate in more effective interactions with his or her physician, resulting in better quality of care.

The design for our main view supports the patient by prompting the user to take necessary actions using cards. Cards will appear on the main view when the user needs to take action or requires a reminder; in effect the main homepage view acts as a sort of health timeline detailing relevant events and actions. For example, when the user needs to take certain medications, a card will appear, reminding the user about which medications should be taken at what time. By tapping on the card, the user can navigate to the specific view that manages the health aspect detailed by the card. If the card requires an action, then the card will be updated with the status of the action. When the card has been completed, then the user can choose to archive the card and move the card to "History". Cards cannot be destroyed, so a log of the user's actions is preserved in the card history. An example of how the card is updated after the user takes action is shown in Figure 1-2.
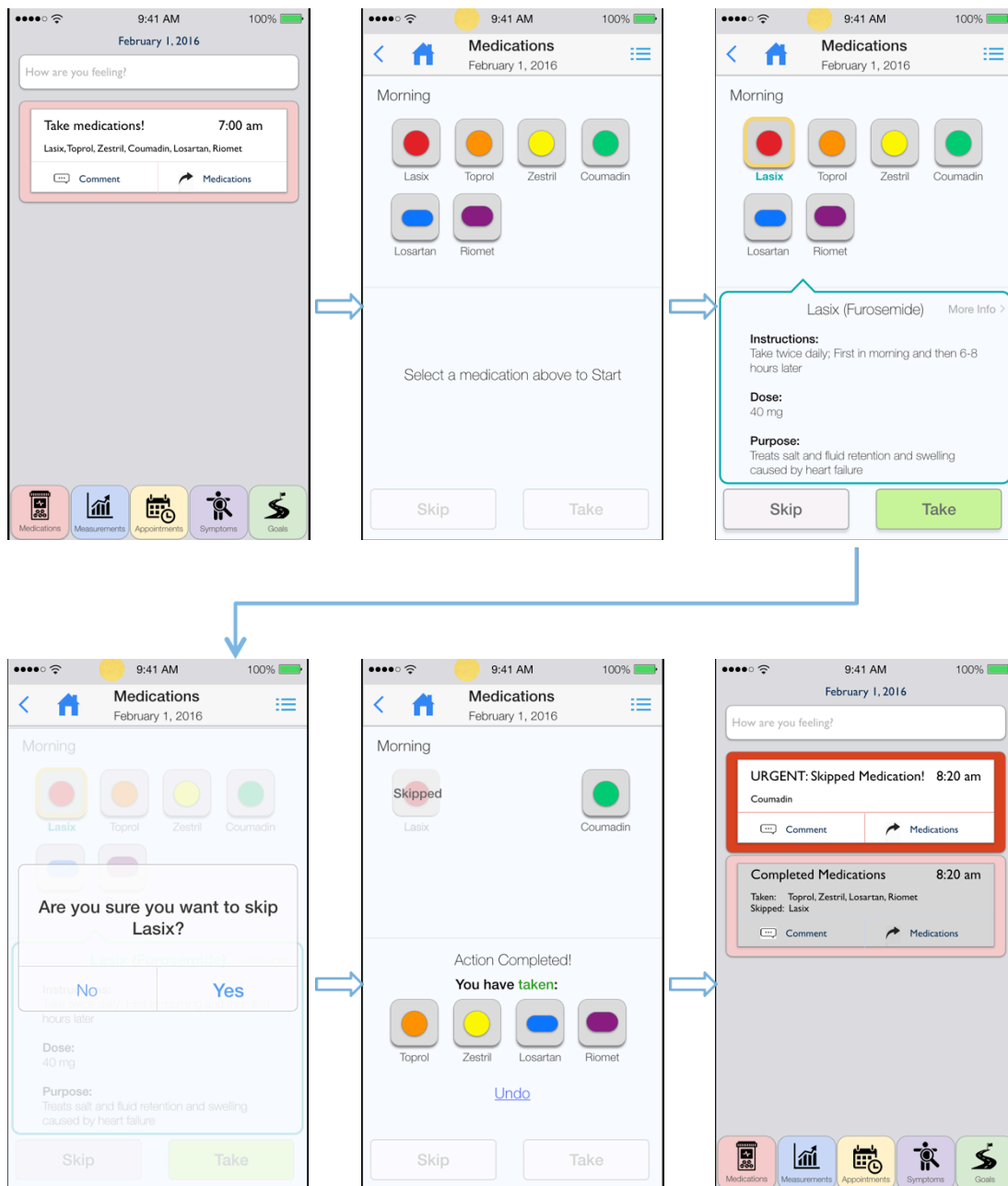
FIGURE 1-2: A series of wireframes designed in Keynote detailing how the main homepage view cards link to health modules and update according to user action. After the user has taken Lasix and proceeds to take and skip the other medications, the main homepage cards are updated with the latest status. If necessary, cards for urgent actions may also be generated.

Our application features five main health aspect modules: medications, measurements, appointments, symptoms, and goals. These health aspect modules can be reached through navigation tabs on the bottom of the main homepage view, or through cards that appear on the main timeline view. By providing modules such as medication tracking and goal setting to help the user manage different aspects of his or her health, our application aims to help the user become a more informed and engaged patient.

Social community support is also an integral part of keeping patients engaged in their self-care. Having support from not only healthcare professionals, but family, friends, and peers who experience similar problems is shown to help patients manage the challenges of chronic disease (Funnell 2009:2). To address this, our application will support a commenting feature on the cards in the main timeline view. A patient who is using OnPoint will be able to designate friends and family as authorized users who can view the main homepage and comment on the cards.

1.2.2 MEDICATION SCHEDULING

The medication scheduling portion of our app is designed to help patients plan when they must take their medications and create a routine in their daily lives to adhere to their prescribed medication treatment. Unfortunately, medication nonadherence is a serious public health issue; the World Health Organization estimates that only half of all patients with chronic illnesses in developed countries adhere to their medication

plan (Adherence to Long-Term Therapies: Evidence for Action 2003). Nonadherence

has been shown to result in poorer quality of life, increased healthcare costs, and even

preventable deaths (Yeaw, Benner and Walt 2009:1).   Indeed, medication adherence is

critical to helping patients improve their health and outcome (Ellwood 2007:3).

However, taking medications can be complex and confusing for patients, especially

those with chronic illnesses who must juggle a large number of prescriptions which

each have differing instructions and warnings. Thus, the process of translating a list of

medications into a daily schedule is crucial in helping patients understand how and

when to take their medications.

We designed an interactive scheduler for patients to view their prescribed

medications along with associated instructions, and drag-and-drop each medication

into a time slot. Our team created a medium-fidelity prototype for a tablet format in

Balsamiq and later created a higher fidelity prototype in Keynote for the mobile phone

format. The medication scheduling process encompasses several technical challenges.

First, patients must have an easy, intuitive method of inputting their prescription

medications. Second, patients need to be able to plan when to take their medications.

Finally, the digital representation in our app should complement the tools that patients

use in real life, such as pillboxes, in order to make the app easier to understand.

1.2.2.1 Challenge 1: Medication input

The first challenge for medication scheduling is creating an easy method for patients to input their prescriptions, which often include complex drug names, various warnings and limitations, and instructions. Older patients may not have the dexterity and eyesight to manually enter information. In addition, form factors such as tablets or mobile phones are not conducive for intensive data entry tasks. Thus, our solution seeks to leverage the camera functionality of a tablet or mobile phone, so the user can take several photographs of the prescription bottle, and with optical character recognition (OCR), translate the characters in the image into text. Using OCR, the important information printed on the label such as instructions can be parsed, so that our app can understand what is printed. This information will be used by our app to guide the user in scheduling the medication. We will also provide a backup, alternative method to allow patients to manually input their data, in case the OCR technology is unable to perform sufficiently well. Figure 1-3 shows a sequence of wireframes designed using Keynotopia in Keynote. This mock-up of screen sequences illustrates how a user can choose to take images of a prescription label to capture drug and barcode information. The envisioned design uses OCR to extract the text in order to populate the fields pertinent to the medication such as the drug name, dosage, timing, instructions, and purpose.
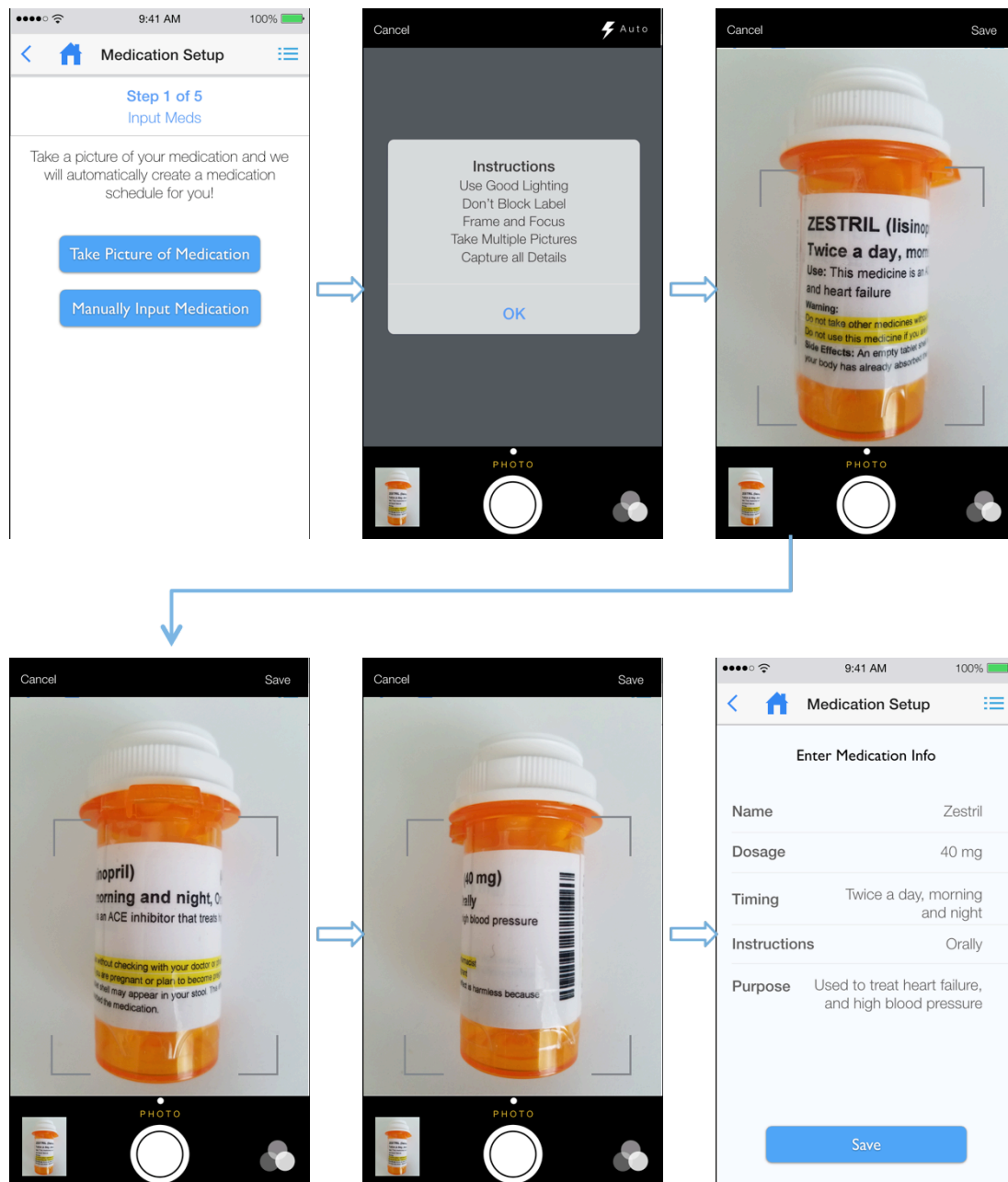
FIGURE 1-3: An example of Keynote wireframes designed using Keynotopia. This sequence shows how a user can input medication by using the camera on the device to capture images. Using OCR technology, text can be extracted from the images.

1.2.2.2 Challenge 2: Planning medication times

The second challenge of planning when to take the medications is one of the most algorithmically complex problems to solve. Medications have different requirements, such as having time constraints that dictate a specific time window to take the prescription, or having requirements to take the medications with a meal in order to prevent upset stomachs. To reduce the effort that the patient must make to generate a schedule, our partners at UC Davis worked with a team at Purdue University to create an algorithm that takes as input a list of medications and restrictions, and outputs a suggested schedule. However, as it is still under development, this algorithm cannot handle the most complex medication schedules such as those with meal requirements. Our plan is to leverage this algorithm to generate a basic schedule, and offer a drag-and-drop interface for the patient to make adjustments as needed in order to take other constraints into account and to better fit their schedules. The drag-and-drop functionality allows the user to easily make adjustments to their medication schedules when the care plan evolves.

1.2.2.3 Challenge 3: Designing the visual interface

The third challenge for medication scheduling involves designing a visual interface to graphically represent time slots in an intuitive way. Since patients often use pillboxes (Figure 1-4) to organize their medications, we decided to create an interface that uses the pillbox metaphor to evoke a familiar concept and connect the digital

representation on the tablet to the physical pillbox in reality. We first solved this by

researching pillbox designs, and chose to discretize the duration of an entire day into

four time slots: morning, noon, evening, and night. However, when we presented our

four-slot pillbox design for review by our UC Davis advisor, we received negative

responses. We learned from this design review that we should focus on helping

patients take their medications at the correct time, instead of fitting the prescriptions

into the limits of the four-slot pillbox. For the next design iteration, we removed the

four-slot constraint. Instead, we discretized the 24-hour day into several time slots,

which could be adjusted by the user. Thus, depending on a patient's daily routine,

mealtimes, and medication requirements, we can suggest the optimal pillbox to buy and

use for their schedule. By enabling patients to schedule their medications at the correct

time and providing them the proper matching pillbox in real life, we aim to improve

adherence. An example screen from of our medication scheduling wireframes designed

using Balsamiq is shown in Figure 1-5, followed by an example of our medication

pillbox filling wireframe to aid the user in matching the pills and pillboxes in real life to

the generated schedule shown in Figure 1-6.

FIGURE 1-4: An example of a 4-slot pillbox used by patients to organize medications
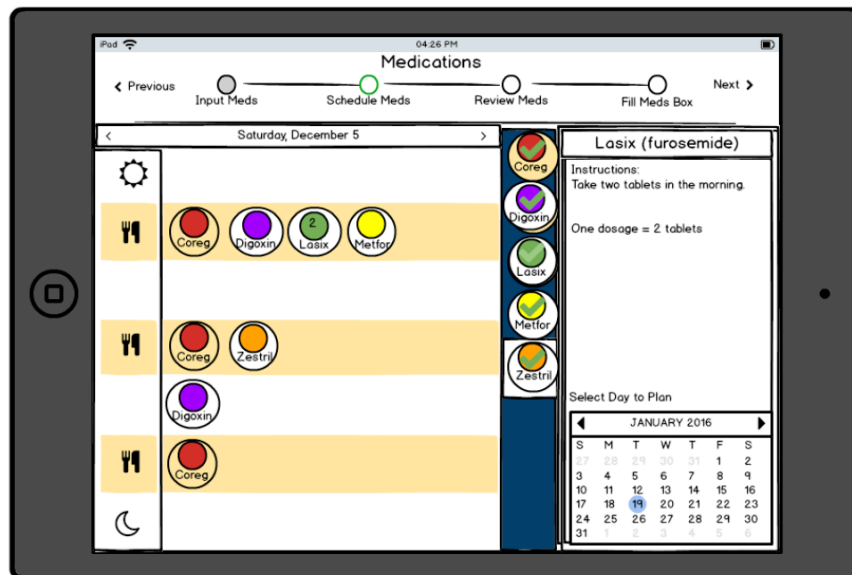

FIGURE 1-5: Medication scheduling wireframe designed using Balsamiq. The left side of the screen shows the user's daily schedule, with adjustable time slots for the meals. In this example, there are three time slots corresponding to mealtimes. On the right side of the screen, the user views the medications that need to be scheduled. The user selects each medication and uses the touchscreen interface to drag the medication into the desired time slot. In this example, the application recommends a 4-slot pillbox.
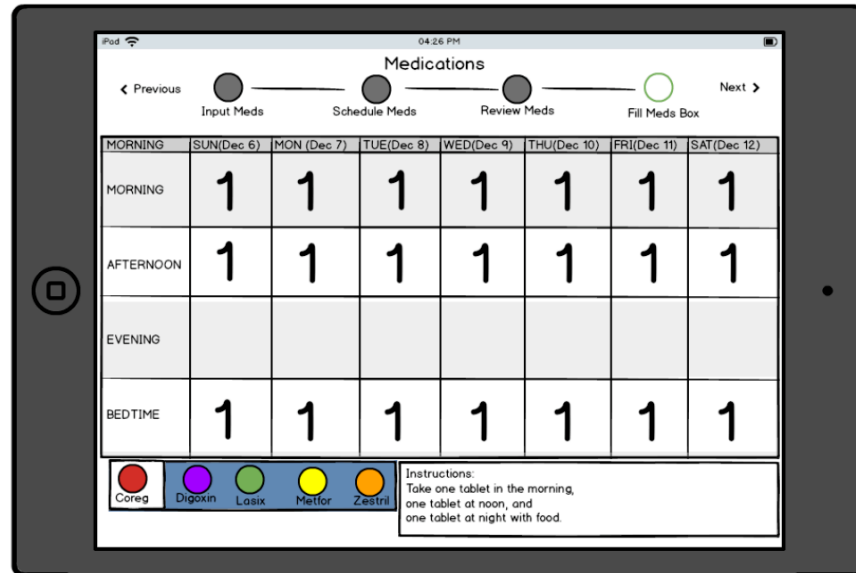
FIGURE 1-6: Medication setup wireframe to aid the pillbox filling process designed using Balsamiq. After the user has finished creating and reviewing the medication schedule, the application helps the user fill their pillbox according to the schedule. In this example, the user uses a 4-slot pillbox.

1.2.3 USER TESTING SCENARIOS

After redesigning our prototypes with the feedback from the design review, we prepared our medium-fidelity designs to perform user testing with research participants. To do so, we contextualized the design within a storyboard so that users can understand the situations and motivations surrounding the use case. Having a storyboard kept the design grounded in real-world contexts, so that we, as designers, always kept the end-user in mind as we designed the user interface and interactions. However, creating a storyboard presented new challenges. First, we had to decide on a persona to design our application and scenarios around. Second, we needed to have realistic scenarios that accurately reflected what patients would face in their daily lives.

Selecting a persona for design was challenging because we had several variables

that we wanted to make sure we supported. These variables included how long the

patient had been dealing with his chronic disease, whether or not a patient had a

clinician who served as a care coordinator in his care network, and whether or not a

patient had a family member who was around to help facilitate his care. Each of these

different variables would affect what we would include in our scenario and the

information we would present in our prototype walkthrough. We requested a full

persona from our UC Davis advisory team, since they have a deep understanding of

patients and doctors that they work with directly and have the clearest idea of the target

user. The UC Davis advisors gave us a full, complex persona of a diabetes patient

suffering from heart disease who grappled with eight medications, saw several

physicians, and needed to take several daily health measurements (See Appendix A).

This information was crucial in setting up the information in our storyboard.

Creating realistic scenarios for our storyboard was also a challenge because of

our limited experience in the medical industry. We constructed several scenarios of use

based on the information provided by UC Davis and also our background research.

However, we still needed more guidance to create realistic interactions. For example, in

our health timeline design, we had created a "comment" feature, which allowed any

member of the care team to comment on items that appeared on the timeline. One

scenario that we had envisioned was a patient commenting on his health status and

receiving a reply from a nurse care coordinator. When we showed this scenario to our

UC Davis advisors, we were informed that this scenario was not realistic, since nurse

care coordinators often have hundreds of patients, even upwards of a thousand

patients. These nurses would have their hands full and would not be able to monitor

the potential thousands of health status updates from their many patients. Thus, we

realized that we needed to adjust our scenarios to account for the fact that the typical

interaction between a nurse care coordinator and the patient was conducted by phone.

Instead of allowing patients to directly send messages to their clinicians, our application

would prompt the user to contact the clinician's office by phone via the mobile device's

phone functionality.

1.2.4 USER TESTING SETUP

We created a set of tasks and scenarios for the users to step through in our

Keynote prototypes for our main health timeline view, medications module,

measurements module, symptoms module, goals module, and appointments module,

which are detailed in Table 1-2. For example, we constructed a measurements task

where the user would use the application to log some daily measurements such as

blood pressure and weight, and we provided props such as a blood pressure cuff and a

scale so that the user could go through all the motions of the interaction. We also tested

the medication scheduling and tracking parts of the application using props such as

medication bottles filled with candy and pillboxes to simulate a daily pill-taking

scenario.   Figure 1-7 shows a scenario where the user uses the application to fill the

pillbox with the medications. With this setup, we could observe how a user would

interact with the application on a mobile phone in a real-world scenario and discover

which parts of the design were intuitive or confusing.

TABLE 1-2: List of user-testing scenarios

Scenario	Details
Medication Scheduling	The user is given a new medications list with 8 different prescription drugs, as well as a pillbox and medication bottles filled with candy "medication". The user's task is to step through the set-up procedure to input medications, generate a schedule, view the schedule, and explore the schedule page. Next, the user is told to add a time slot to the schedule and use the drag-and-drop functionality to move a medication from the morning time slot to the new time slot, as well as modify the name and reminder time for the time slot. Finally, the last task is to use the interactive diagram feature in the application to fill the pillbox prop with the candy "medication".
Medication Tracking	The user is presented with the main homepage view, where a medications card is reminding the user to take the medications stored in the morning time slot of the pillbox. Next, the user needs to figure out what the card is telling the user to do, and complete the step of taking and skipping certain scheduled medications. Finally, the user should navigate to the medication module to take an as-needed medication from the Medication Cabinet.
Measurements	The user is presented with the main homepage view, where a measurements card is reminding the user to take the daily weight, blood pressure, and heart rate measurements. The user is given a scale prop, and a blood pressure cuff and told to go through the motions of taking readings and entering them into the application.
Symptom Management	The user is presented with a reminder card on the main homepage view to take a screening questionnaire. The task is to click on the card to navigate to the questionnaire and step through the questions.
Appointments and Commenting	The user is presented with the main homepage view, where an appointments reminder card has appeared. The user is tasked with viewing the appointment details. Also, the user can view a comment that someone has made on the card, and reply to the comment on the card.

FIGURE 1-7: The image on the left shows a pillbox and a variety of prescription bottle props filled with candy to simulate the process of organizing and taking pills. The Keynote wireframe on the right shows the corresponding view in the application, which aids the user in matching the physical pillbox with the desired schedule.

We met with our users at UC Davis and ran through the scenarios to collect feedback on all aspects of our design. Our user-testing group consisted of clinicians, nurse care coordinators, health coaches, patients, and family members, who are participants in the research study that encompasses our project, detailed in Table 1-3.

TABLE 1-3: User testing participant pairings

	Participant set-up
1	1 patient and 1 family member caregiver
2	1 patient and 1 health coach
3	1 patient and 1 nurse care coordinator
4	2 clinicians

1.2.5 USER TESTING FEEDBACK

User testing allowed us to observe actual people using our application and helped us to identify usability problems in our design. As users stepped through the scenarios and interacted with the application, we noted their thought processes and asked for their assessment on ease of use. We gathered the feedback that the "comments" functionality in our application was very useful and great for addressing the need for better communication and collaboration. However, the font size should be increased to improve readability. In addition, some of our user interface design elements required re-design to afford action, and users also requested additional functionality for the medication feature.

1.2.5.1 Main Homepage Cards Improvements

A core issue was that our cards in the health timeline view should be more explicit about what action the user needs to take. For example, when presented with a card to take medications, the limited graphical element of the card and the wording on the card did not make it clear to the user that the user should tap directly on the card in order to proceed to the next screen. In order to solve this, we redesigned our card element to color code according to card urgency, rather than color code by health module category, and changed the wording to be clearer. The updated design is shown in Figure 1-8.
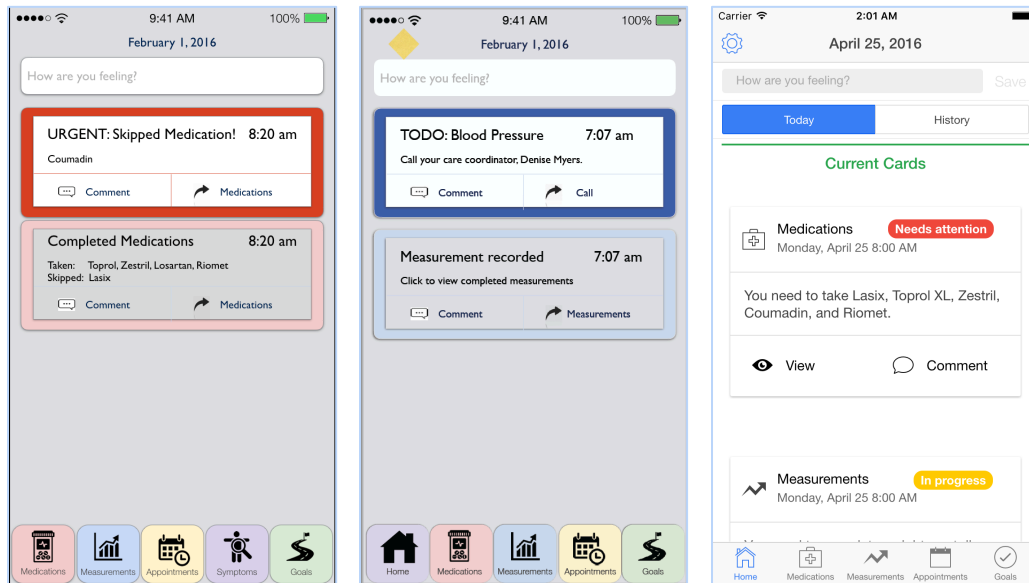
FIGURE 1-8: Evolution of Card design. The left two screens show the original red Medications and blue Measurements cards, with bolded colors signifying urgent cards that require immediate action. The screen on the right shows the final design which color-codes the cards by urgency and status rather than by category. Thus, urgent cards are labeled with a red "Needs attention" label.

1.2.5.2 Medications Improvements

Users also requested more flexibility in the medications module. For example, patients may need to adjust the dosage and timing of their medication as they experience side effects. Thus, it is important for our application to handle use cases where patients can take a varying amount of a medication depending on their health status. Updates to the medication design are shown in Figure 1-9.
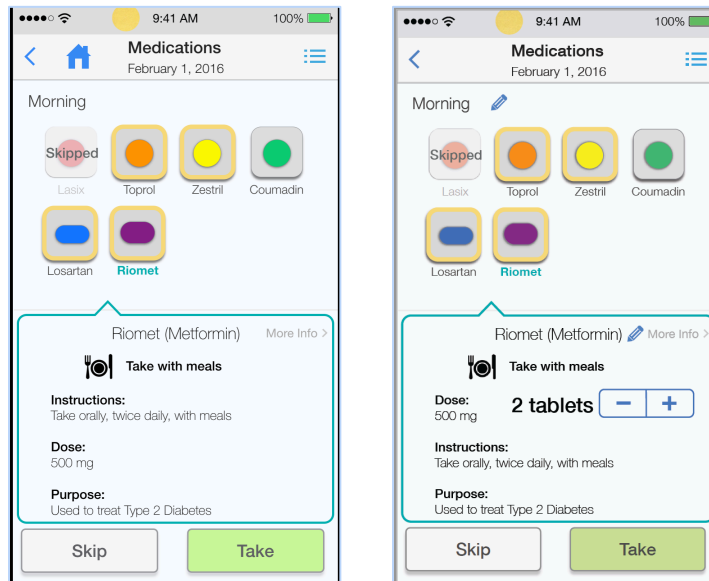
FIGURE 1-9: Improvements to Medications. The left screen shows the initial design. The right screen shows the updated design with the flexibility to edit time slots, medications, and dosage.

With the valuable feedback from the user testing sessions, we refined our

prototypes in preparation for the final phase of our project: implementation.

1.3 PHASE 2: IMPLEMENTATION

After we finalized our design, we began to implement our application to bring

our project to life. Since we are a team with limited experience developing mobile

applications, our UC Berkeley advisors brought in an application development

consultant, Dmitri Skjorshammer, to help manage the project and provide

implementation help for difficult application elements. In addition, we are

collaborating with a medical student who will be helping us integrate the application

with Apple's HealthKit.

During the implementation phase, we split the work to individual tasks. For

simpler modules, we each developed a module individually; Bill implemented the

measurements module, Zhuosi created the appointments module, and I developed the

goals module. For more complicated portions of the application such as the timeline

view and medications modules, we divided the work into different sub-features that we

are developing individually and integrating together when completed. Bill worked on

the backend integration to store and fetch data from Firebase[3], which is a NoSQL cloud

database. Zhuosi and I worked on the user interface for the onboarding setup steps. I

worked on the main timeline view featuring daily cards, and also worked on the

medication-scheduling portion of the application with the drag-and-drop interface. The

work breakdown is outlined in Figure 1-10.

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[3] Firebase is a cloud services provider that provides backend services such as data storage and user authentication. https://www.firebase.com/

Design, Prototype, Evaluate
Angela, Bill, and Zhuosi

Implement Modules

Goals, Medication Scheduling, Main View

Angela

Measurements, Medication Tracking, Firebase Integration

Bill

Appointments, Medication Input, Commenting

Zhuosi

Test and Debug
Angela, Bill, and Zhuosi
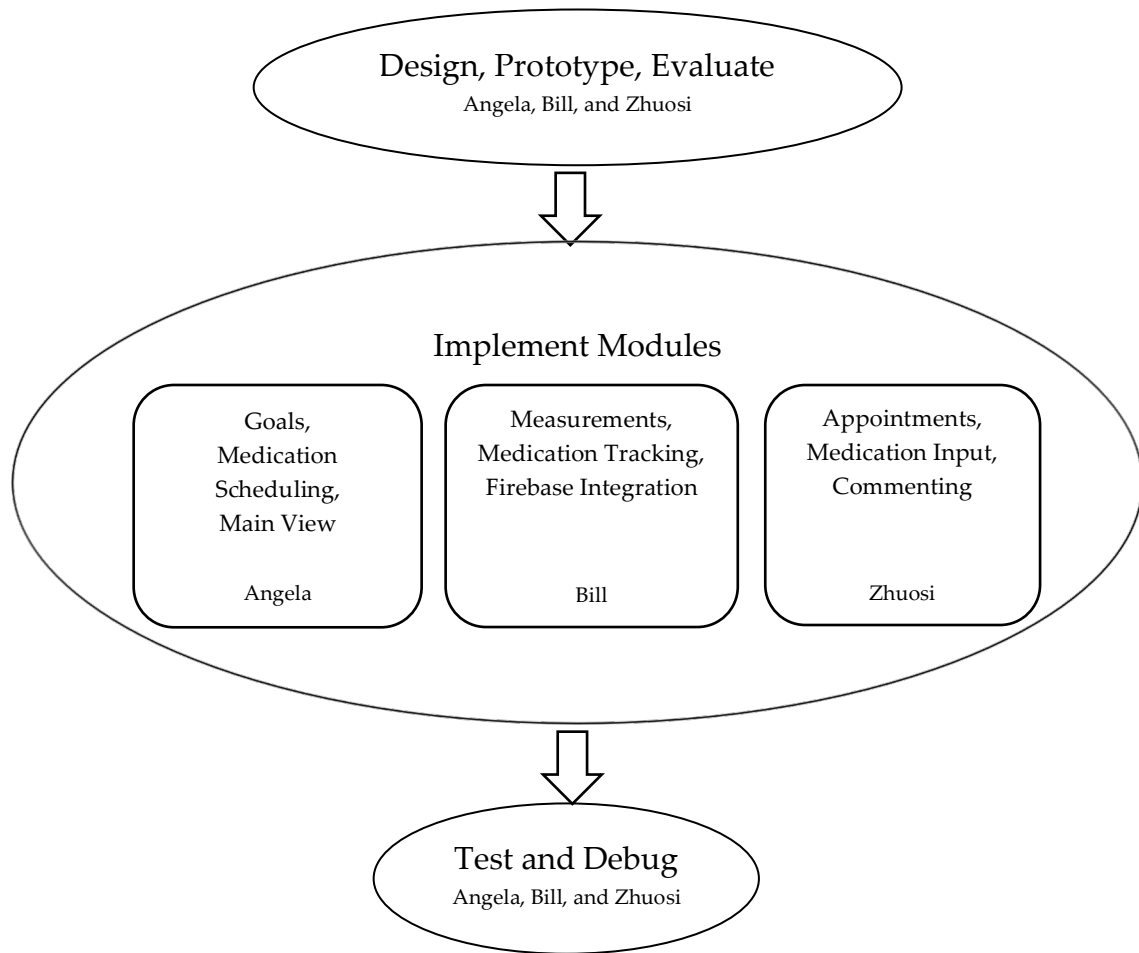
FIGURE 1-10: WORK BREAKDOWN FOR IMPLEMENTATION PHASE

1.3.1 IMPLEMENTATION: CHOOSING A DEVELOPMENT PLATFORM

One of the first tasks we faced was deciding upon a development platform. At

first, we originally planned on developing on the native iOS platform, since the Apple

xcode platform simplifies the process of styling the application with iOS elements.

However, we decided to develop on a hybrid HTML/CSS/AngularJS platform using the

Ionic Framework[4] to run on PhoneGap. Using this approach, we can leverage the

strong HTML/CSS/AngularJS developer community. Also, we will not be restricted to

using a specific native platform such as iOS or Android; using PhoneGap, we can create

cross-platform applications more easily in the future.

1.3.2 IMPLEMENTATION: SOFTWARE ARCHITECTURE

At a high level, our software architecture can be described as having three main

components: model, view, and controller, as shown in Figure 1-11. The model handles

data and queries from the database. The view includes the HTML and CSS code, which

renders the user interface and determines how the screens look. AngularJS features

two-way data binding, so that if data changes in the model, the change is immediately

reflected in the view, and vice versa. For example, if the medication data is bound to

the view for medication scheduling editing, then when the user drags a medication

from one time slot to another time slot, this change is immediately reflected in the data

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[4] Ionic Framework http://ionicframework.com/

array. The final portion is the controller, which handles user interactions and processes events from the view and updates the model.
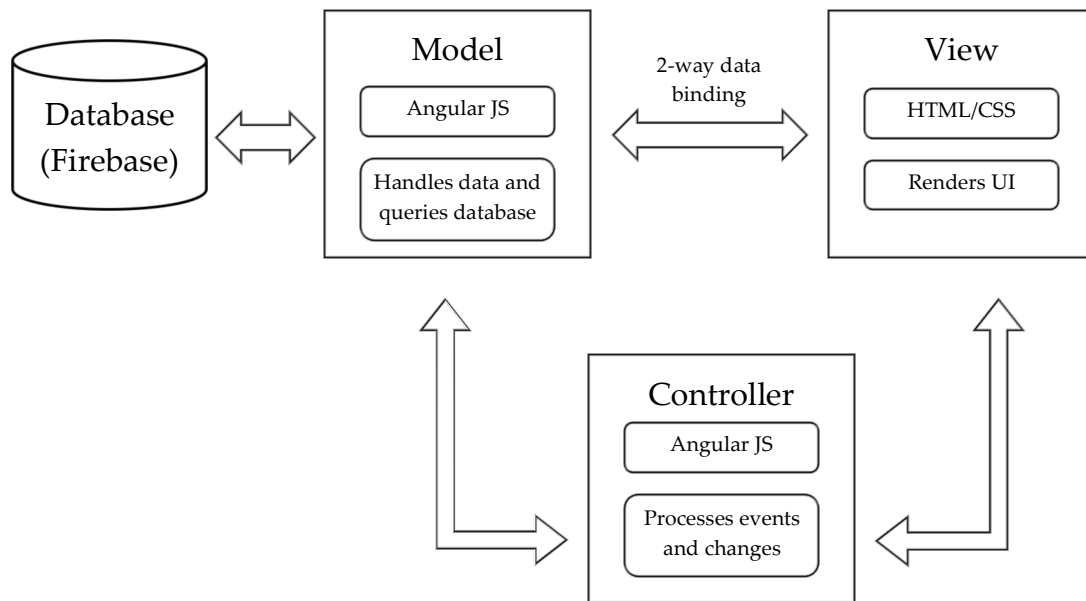
FIGURE 1-11: High-level diagram of software architecture

1.3.3 IMPLEMENTATION: FINAL FEATURES

We have created an alpha version of our application (See Appendix B) with basic functionality for a user to create an account and set up their health data. The user can step through an onboarding process to input, schedule, and track their medications and measurements. In addition, the user can create appointments and input goals. Finally, most importantly, the user can view all of their current and upcoming actions and reminders as cards on the main home view. The main homepage view serves as a snapshot of what the user needs to accomplish daily in order to be healthy and follow

their care plan. Users can comment on the card and directly navigate to the health

module to perform an action or check the latest status. I will elaborate in more detail

about the onboarding process, main homepage view, and medications functionality.

1.3.3.1 Onboarding Process

The user begins by registering an account with an email and password. Next, the

onboarding process guides the user through setting up the different aspects of their care

plan. Currently, we support Medications setup and Measurements setup. Other

planned onboarding setup processes for modules such as Appointment, Symptoms, and

Goals have not been implemented.

For Medications setup, we implemented a simple interface for users to manually

input the medication details. For the purposes of user testing, we have prepopulated

eight auto-filled medication choices based on the given persona for medications that are

taken on a scheduled basis. For additional as-needed medications, users can add

medications by inputting the drug name, dosage, instructions, and purpose. Currently,

the application does not support OCR technology to automatically extract medication

information from images of prescription labels. Thus, users have to manually input

each medication by data entry. For the schedule generation step, we have not

integrated any scheduling algorithms, and currently have hard-coded a pre-determined

schedule based off of the given persona. To work around the lack of a scheduling

algorithm, we provide an interface for users to modify the generated schedule, shown

in Figure 1-12. Within the schedule, users can create new time slots, edit the time slots, and drag-and-drop medications from one time slot to another. Finally, the user can view an interactive diagram to help fill their medication pillbox.
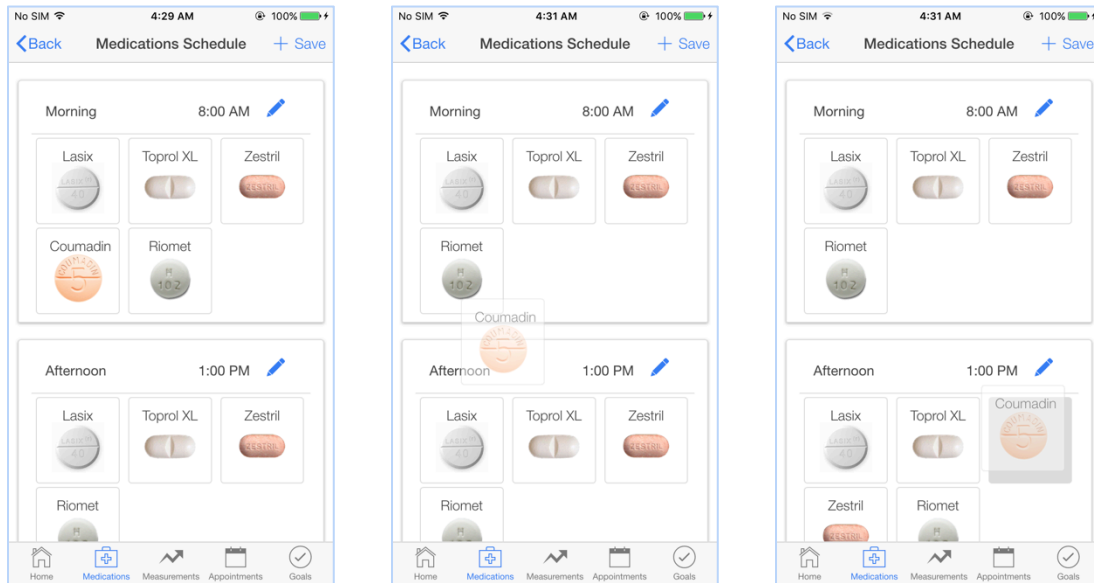
FIGURE 1-12: Screenshots depicting the drag-and-drop functionality for editing the medication schedule. This example shows moving Coumadin from the Morning to the Afternoon time slot.

For Measurements setup, a user is able to create a schedule and select three pre-defined types of measurements to add to the schedule: weight, blood pressure, and heart rate. The user can also set the reminder days and times.

1.3.3.2 Main Homepage View

The main homepage view features cards for the current day and upcoming cards for the next day. By tapping on "view", the user will navigate to the module requiring attention, as shown in Figure 1-13. The user can view and comment on the current cards, but cannot perform any actions on the upcoming future cards. When a user has

completed a card, the card can be archived. Archival removes the card from the main

view and displays it under the History tab in the main view. Currently, cards are only

generated for scheduled medications and scheduled measurements. Future

improvements would include card generation for all scenarios such as medication refill

reminders and upcoming appointments.
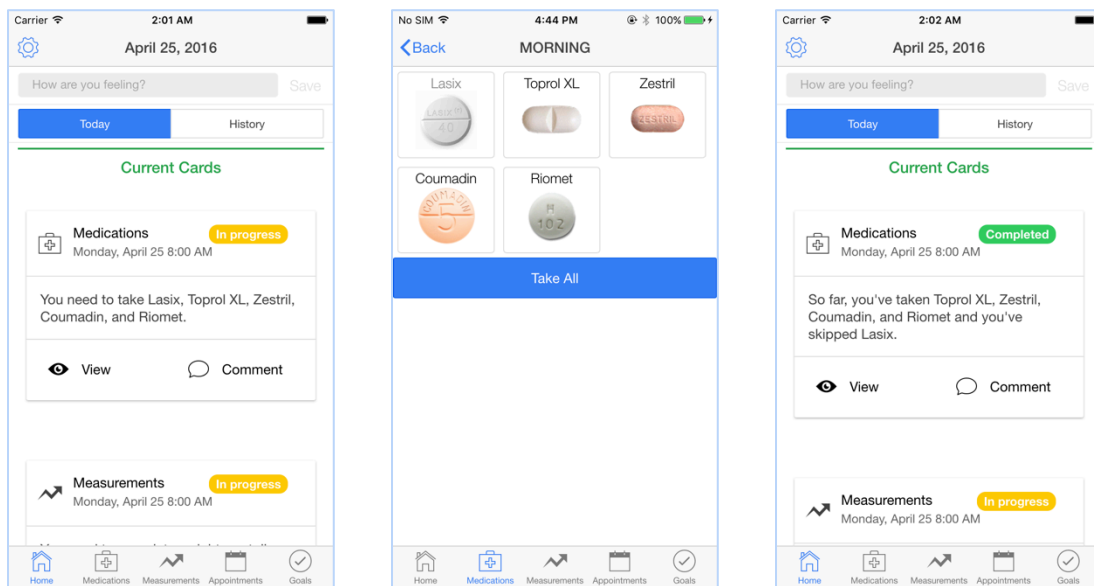
FIGURE 1-13: Screenshots depicting a user viewing a Medications card, which leads the user to the Medications tab showing the medications that should be taken at that reminder time. After the user takes or skips the medications, the Medications card is updated to "Completed" status in the main homepage view.

1.3.3.3 Medications

The medication functionality is a core part of the application. Through the

medications tab, the user can view the daily schedule and take or skip medications in

each time slot, manage the list of medications, and consult an interactive diagram to

help fill their physical pillbox. However, we have not implemented algorithms to verify

if a medication can be skipped or if the user should take a medication at a certain time.

1.3.4 FUTURE WORK

Future work for OnPoint would be to add graphical elements and implement

animations to create a more aesthetically pleasant user experience that were designed in

the Keynote wireframes (See Appendix C). In addition, the permissions settings and

commenting feature would need to be enhanced to allow other authorized users access

to another user's timeline view. Also, the measurements feature and symptom

management feature would need to be integrated with Apple's HealthKit and

ResearchKit frameworks in order to leverage the data visualization and aggregation

platforms. We would integrate more advanced functionality such as OCR technology

for medication input, and also implement a robust medication-scheduling algorithm to

enhance the user experience of setting up medications. Finally, we would add

functionality to allow a user to generate a report of past health activity over a specified

period of time, which the user can bring to an appointment with a clinician to improve

patient-doctor interactions.

1.4 CONCLUSION

OnPoint is the next step in improving patient outcomes by helping chronic care

patients understand and adhere to their care plans. Throughout the past school year,

we have been focused on designing and creating the new platform for chronic care

patients to effectively manage their self-care. We strove to thoroughly understand user

needs in order to create a mobile application that best serves chronic care patients. As

we iterated through the design process, we refined the user interface with each

prototype and used valuable user feedback and insights to inform our design. During

the limited span of our school year, we have focused on designing modules that address

the most important aspects of a patient's health status, specifically on the shared care

plan, medications and symptoms. However, OnPoint has the potential to grow into a

more comprehensive health platform with additional modules such as activity tracking,

device integration, and nutrition management. With OnPoint, we hope to make a

meaningful impact in the lives of chronic care patients.

CHAPTER 2 : ENGINEERING LEADERSHIP

Co-authored by Angela Hsueh, Bill Kim, and Zhuosi Wang

2.1 INTRODUCTION

Chronic disease is the greatest challenge facing the healthcare system in the United States. It is the leading cause of death, accounting for 7 out of 10 deaths each year, and over half of all Americans have at least one chronic condition (Chronic Disease Prevention and Health Promotion 2015, Gerteis, Izrael and Deitz 2014:4). In order to address the challenges and long-term nature of chronic illness, the healthcare system is evolving from a reactive system to a more proactive system aimed at preventative care and patient self-empowerment. Chronic diseases require a diverse range of medications, appointments, caregivers, and specialists to effectively manage the disease and the patient. This poses significant challenges for patients as they are left to self-manage their care between office visits. Furthermore, a patient who suffers from one chronic disease also often suffers from multiple comorbidities such as depression, hypertension, and obesity. The varying number and magnitude of diseases a patient suffers from further complicates the delivery of efficient and effective care (Kim 2015:1). Managing chronic conditions requires complex interactions between multiple health care specialists, multiple transitions between physical locations and different degrees of maintenance and surveillance (Kim 2015:1). Our project is a collaborative mobile platform for patients to engage in their care and more effectively manage their complex health conditions. We will analyze how our project fits into the industry landscape, our approach to marketing, and the challenges we face regarding health data regulations.

The healthcare landscape is constantly evolving as it adapts and transforms to best serve the needs of an ever-increasing population. Our capstone project is at the center of an emerging industry within healthcare: the disease management industry. The number of people with chronic diseases is projected to grow over the next few decades as the baby boomer generation ages and becomes more susceptible to chronic illness. (Anderson 2010:7) Moreover, the Patient Protection and Affordable Care Act has brought wellness and long-term patient care to the forefront (Curran 2015:5-6). The potential market for a comprehensive chronic care management system is huge with such a high demand from the increasing population of potential buyers.

The current state of solutions for chronic care management pales in comparison to the alarming rate at which the need for such a system is rising. Current care management revolves around infrequent checkups from a care manager and relies heavily on family members as well as self-care. The disease management industry, however, has rapidly grown due to the digital revolution and technological advancements. E-patients, healthcare consumers that have taken a more active role in their own care by researching various topics online, have been a direct result of the internet and information age (Ball and Lillis 2001:2-3). The rise of the electronic health records and the e-patient has contributed to improving information flow between doctors, patients, and caregivers. Furthermore, the propagation of medical devices and

smartphone applications that pair with these devices in the realm of preventative

medical care have empowered patients to monitor their own health, and have also

improved communications between patients and their care network as well as

strengthened patient self-care.

With the rapid pace of technological developments, there is no shortage of

developers or engineers who can invent a solution for chronic care management. The

disease management industry has experienced a flurry of new entrants such as

CareZone[5], Flow Health[6], Caremerge[7], and CareSync[8], which increases the rivalry

within the industry. All of these companies provide smartphone solutions to lighten the

load of managing the patient's chronic disease. The disease management industry,

however, is still looking for a comprehensive solution that can increase coordination

and collaboration without significantly impeding the natural flow of a patient's life.

2.3 MARKET ANALYSIS

Our project is designed to help chronic care patients understand their care plan

and make the behavioral lifestyle changes necessary to improve their health outcomes;

this is a central tenet to the evolving healthcare paradigm that healthcare professionals

are struggling to effectively address through patient and provider training. Thus, our

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[5] CareZone https://carezone.com

[6] Flow Health https://www.flowhealth.com

[7] Caremerge http://www.caremerge.com/web

[8] CareSync http://www.caresync.com

strategy to introduce our product to the market will be to first target healthcare

professionals, who in turn, can recommend our app to their patients who have chronic

diseases. Since we are partnering with the UC Davis School of Nursing, we can

leverage the credibility of our partnership and proven deployment in the UC Davis

Health System to market our app to healthcare professionals, and also take advantage

of any network effects and connections of our partners at UC Davis. With the goal of

increasing adoption rate, our product is developed on the iOS platform and will be

offered in the Apple AppStore for free.

2.4 REGULATION AND ETHICS

The proliferation of health-related smartphone applications, of the standalone

variety and also those which pair with medical devices, has brought to the spotlight

regulatory concerns over such technologies. The US Food and Drug Administration

(FDA) has regulatory authority over the safety of mobile health applications and

stipulates that

> "apps acting as medical devices or as accessories to
>
> medical devices will require FDA approval, whereas apps
>
> that provide users with the ability to log life events,
>
> retrieve medical content, or communicate with clinicians
>
> or health centers will not be regulated under its
>
> jurisdiction [...] the FDA has focused on safety, it has

largely left the review and certification of apps to the

marketplace" (Powell et al. 2014:1851).

The explosion of smartphone applications that are aimed at the healthcare

industry provides convenience and ease of use for patients but also comes with various

risks and security concerns. Since we are not creating a medical device, which comes

with risk of liability and also requires a lengthy and complicated process of FDA

approval, we must be careful to distinguish ourselves as a non-medical health

management application which aggregates health data and facilitates communication

and collaboration. Our challenge lies in providing enough guidance to help patients

organize their health care, without crossing the line to becoming a medical device by

providing diagnoses or medical recommendations. Instead, all medical advice and

suggested adjustments of a patient's care plan will come from the health care

professionals within the patient's healthcare team. In a nutshell, our application is an

information channel, not an information generator.

Since our project centers on patient medical data, we must be mindful of

regulations and laws concerning privacy. In the United States, the Health Insurance

Portability and Accountability Act (HIPAA) Privacy and Security Rules establish

standards governing patient health data. According to the HIPAA Privacy Rule, any

"individually identifiable health information" must be protected. This includes the

individual's past, present, or future physical or mental health or condition; the

provision of health care to the individual; the past, present or future payment for the

provision of health care to the individual and other common identifiers that could be

used to identify the individual (Office for Civil Rights 2003:3-4). Because our application

will aggregate various factors that describe the patient's health status and present it in a

timeline view with searchable past history, we must be vigilant in the transmission and

security of the information collected by the application. We will provide data privacy

by creating user accounts and only giving read and write permissions to specific users

designated by the care plan and the patient. Furthermore, all information transfer, such

as screening questionnaire and symptom protocol results, will be encrypted. Through

these precautionary steps we will safeguard the patient's health-related data and ensure

their privacy is secure.

2.5 CONCLUSION

The healthcare industry is on the cusp of a digital revolution as technology

empowers patients to take charge of their own health. With the ever-increasing human

population combined with the aging of the baby boomer generation, a more efficient

and effective healthcare system is a challenge that is evident now more than ever

before. Our capstone group will leverage expert advice from the UC Davis School of

Nursing and CITRIS to maneuver around patient data privacy concerns and create an

application to meet the rising demand for a comprehensive chronic care management

system. Our focus on fostering and facilitating collaboration and communication will

distinguish us from current solutions and will serve as the key to improving chronic

care management.

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APPENDIX A: PERSONA

This appendix contains the care plan provided by Sarah Haynes from the University of California Davis, Betty Irene Moore School of Nursing.

Mrs. A's Care Plan:

Summary of problem:

Mrs. A is a 72 year-old woman who has been living with type II diabetes for 12 years. She developed cardiovascular disease and was recently informed that she has heart failure. She has noticed greater difficulty in walking with hip and leg pain. Mrs. A takes eight prescription medications: Metoprolol (beta-blocker), Lisinopril (ace inhibitor), Coumadin (anti-coagulant), Lasix (diuretic), Lipitor (statin), and Losartan (angiotensin receptor blocker), as well as Metformin for diabetes and Ativan for anxiety. All are taken daily but on different schedules, e.g. before going to bed, 1 hour before taking food, or with food. Mrs. A sometimes doesn't take Lasix if she plans to go out for the afternoon because it causes frequent urination. Several medications cause Mrs. A to be dizzy and fatigued. She describes them as making her feel "loopy" and prevents her from driving. She's not sure they are working so she sometimes decides to take a break from them. Mrs. A needs to limit intake of vitamin K-rich foods, e.g. kale/collards/grapefruit, pomegranate, as vitamin K can make Coumadin less effective as a blood thinner. She is also on a low-sodium and diabetic diet and restricted fluid intake. Mrs. A's healthcare team includes a primary care doctor, cardiologist, diabetes educator, dietician, and pharmacist who are located in four different facilities. She has visits with her doctors around every six months. She's met with the diabetes educator and dietician once. She sees the pharmacist to get her refills. She lives alone in a two-story home. Her son lives in the same town and although he works full-time and has a family, he frequently helps with her healthcare and daily living needs. Her daughter lives in another state and checks in regularly with both of them. Mrs. A's greatest concerns are remaining independent and having the energy to visit with friends and family.

Mrs. A's Care Plan:

    I.   The care team
    II.   Goals
    III.   Medications
    IV.   Measurements
    V.   Symptoms
    VI.   Nutrition
    VII.   Access and changes to the care plan

I.   The care team

Name	Role/relationship	Responsibilities	Nature/frequency of

			communication
Geeta Patel	Cardiologist	1. Prescribe list of medications for heart failure and adjust as needed 2. Answer questions about symptoms, problems, and issues with medication related to heart failure during visits 3. Set clinical goals based on existing guidelines 4. Monitor Mrs. A's heart failure, including assessing symptoms and physiologic parameters 5. Set clinical goals based on existing heart failure guidelines	After diagnosis, will see Mrs. A every 1-2 weeks until it is certain that all paramters are stable (BP, kidney function, heart rate, potassium levels). Then she will move to once a month and if after 3-4 months she is doing well, she will move to every 4-6 months.
Bob Smith	Primary care physician	1.Monitor Mrs. A's diabetes, including assessing symptoms and physiologic parameters 2. Monitor Mrs. A's general health and well-being 3. Communicate with Geeta about any information relevant to Mrs. A's heart condition 4. Adjust diabetes medications as needed 5. Set clinical goals based on existing guidelines	Sees Mrs. A during primary care visits every 6 months and when she has an issue or problem
Denise Myers	Nurse care coordinator	1. Help Mrs. A understand the causes and management of heart failure 2. Check in on Mrs. A's progress regularly, including viewing summaries of measurements and symptoms 3. Make sure Mrs. A understands her clinical goals 4. Help Mrs. A set personal goals related to her treatment 4. Answer questions about symptoms, problems, and issues with medication related to heart failure as needed by phone, MyChart, or in person through a clinic or home visit 5. Send Mrs. A symptom management decision aids according to results of screening tool 6. Checks Mrs. A's medications against her medical chart 7. Reconcile medication list at every visit	Sees Mrs. A during cardiology visits every six months; communicates with Mrs. A weekly regarding measurements and labs (more often when a problem arises). Available by phone when a question or concern arises. Views Mrs. A's data weekly; if something looks wrong, Denise verifies with Mrs. A that the data of concern is accurate. Then, she contacts Geeta for guidance, especially if it will require medication adjustment

Ken Rodriguez	Pharmacist	1. Fill and dispense Mrs. A's medications 2. Ensure that Mrs. A understands her medications, their instructions, and their restrictions 3. Medication reconciliation 4. Coumadin monitoring: The Coumadin clinic is run by pharmacy at UC Davis. They do their own follow ups for blood testing and dosing. A critical component and definitely a goal of therapy and monitoring is to have the Coumadin clinic alerted every time a medication is changed. There are a lot of medications that affect the levels of Coumadin and sometimes the dosing needs to be adjusted. The physicians do not do this.	Does not make contact with Mrs. A directly; explains medications and instructions to her son when he comes to pick up the medications
Nicole Graham	Dietician	1. Help Mrs. A understand her dietary restrictions and needs 2. Create a diet plan for Mrs. A 3. Teach Mrs. A about tracking certain nutrients, such as sugar, potassium, vit K and salt 4. Check in with Mrs. A around nutrition	Met with Mrs. A when she was diagnosed with diabetes diagnosis and again after her heart failure diagnosis. Since the heart failure diagnosis, follows up with Mrs. A monthly by phone
Alan Moore	Diabetes educator	1. Help Mrs. A understand causes and management of diabetes 2. Educates on lifestyle modifications 3. Educates on sign and symptoms of complications i.e. hypoglycemia, wound healing, eye exams, etc.	One-time visit with Mrs. A; no subsequent communication
Roger Anderson	Son	1. Pick up meds from pharmacy 2. Drive Mrs. A to appointments 3. Help Mrs. A understand her condition and care plan 4. Help Mrs. A understand her symptoms and determine if she needs to see a clinician 5. Learns about the data needed for	Regularly looks at Mrs. A's measurements and symptoms. Speaks daily with Mrs. A by phone and in person about how she is doing. Knows and communicates with all

		monitoring (BP, sugar, weight, etc.)	of the members of the care team.
Allison Thomas	Daughter	1. Check in on Mrs. A and ensure she is getting the care she needs 2. Provide emotional support	Regularly looks at Mrs. A's measurements and symptoms. Speaks daily with Mrs. A by phone about how she is doing but is not actively involved in delivering her care or speaking with her care team.

II. Goals

Personal goals:

1. Remain independent
2. Keep visiting with friends and doing my daily activities
3. Be able to visit out-of-town family by plane
4. Feel healthy

Clinical goals:

1. Control systolic blood pressure to lower than 130/80 mm Hg but not less than 90 mmHg
2. Home glucose monitor to avoid hypoglycemia- this is what kills diabetics in the short term!
3. Keep HbA1C levels at 7% or less
4. Keep heart rate between 60-80 bpm
5. Tolerate all heart failure medications
6. Lower LDL cholesterol levels to below 100 mg/dL
7. Weight- we usually define a dry weight and then monitor 3-5 Lb. changes from it to modify medications (i.e. diuretics) and diet (i.e. salt).
8. INR measurement for Coumadin goal is 2-3
9. Oxygen levels with ambulation or while sleeping – keep O2 saturation at >91-92%
10. Decrease anxiety levels
11. Due to a risk of hyperkalemia with the Losartan, move Mrs. A off of losartan; if blood pressure increases, switch to carvedilol instead of metoprolol

III. Medications

Medication	Description	Dose	Timing	Instructions	Purpose
Furosemide (brand name Lasix)	Diuretic	40 mg	Twice daily: first in morning and then 6-8 hours later	Orally	Treats salt and fluid retention and swelling caused by heart failure
Metoprolol succinate (brand	Beta-blocker	25 mg; double dose	Twice a day,	Orally	Used to treat heart failure, and high blood

names: Toprol, Lopressor) extended release tablets		every 2 weeks to highest tolerated dose up to 200 mg per day	morning and night		pressure
Lisinopril (brand name: Prinivil, Zestril)	ACE inhibitor	40 mg	Twice a day, morning and night	Orally	Used to treat congestive heart failure
Warfarin sodium (Coumadin)	Anticoagulant	2 mg	Once a day, morning	Orally	Used to treat and prevent blood clots by acting as a blood thinner
Atorvastatin (Brand name: Lipitor)	Statin	20 mg	Once a day, best given at bedtime because liver deals with cholesterol during sleep	Orally; do not take with grapefruit	Used to treat cholesterol and triglyceride levels
Losartan	Angiotensin II receptor antagonist	25 mg	Twice a day, morning and night	Orally	Used to treat high blood pressure
Metformin (Brand names: Glumetza, Riomet, Glucophage) immediate release	Oral hypoglycemic agent Antidiabetic	500 mg	Twice daily	Orally; with meals	Used to treat type 2 diabetes
Lorazepam (Ativan)	Benzodiazepine	0.5 mg	One tablet, as needed	Orally	Used for the short-term relief of the symptoms of anxiety

IV.   Measurements taken at home

Measure	Unit	Frequency	Purpose	Instructions

Weight	Kg (if possible); can use lbs if more comfortable	Daily; in the morning before eating or drinking (after urination)	Sudden weight gain can be a sign that heart failure is worsening	Weigh on the same scale at the same time each day. If you gain more than 1.4 kg or three pounds in one day, call Denise.
Blood pressure	mm Hg	Twice daily, in the morning before taking medications, and 4-6 hours after morning meds	Controlling blood pressure is important because heart failure can get worse if the heart is pumping too hard or not hard enough.	For both measurements, use the digital blood pressure/heart rate monitor. Take measurements at the same time every day, while sitting down and resting. If you see a reading that seems too high or low, try again twice more. If you get the same reading two more times, call Denise. Target blood pressure: 90-130/60-80 mm Hg Call if blood pressure is above 160 (systolic) or below 90 systolic Target heart rate: 60-80 bpm Call if heart rate is above 100 bpm or below 45 bpm
Heart rate (pulse)	Beats per minute (bpm)	Daily, in the morning, before getting out of bed	Monitoring heart rate is important because a fast or slow rate can indicate that something is wrong with the heart.	

V. Symptoms

Currently, we are only going to focus on anxiety and constipation. We will add more symptoms later.

Symptoms	*Evaluation*
Anxiety, Constipation	Mrs. A will use the screening tool every two weeks. If she selects that yes, she is experiencing the symptom, she will automatically receive the symptom decision aid tool for that symptom. Depending on the resulting score, Denise will either send self-care materials or reach out to Mrs. A to make another plan for care

VI. Nutrition

Foods to avoid or limit	Reason to avoid
Grapefruit	Interacts with Lipitor
Alcohol, cranberry juice	Can increase the effect of Coumadin
Large amounts of kale, spinach, brussel sprouts, parsley, collard greens, mustard greens, chard, green tea	These are rich in Vitamin K and can lessen the effect of Coumadin; you can still eat small amounts of these foods ; the most important thing is that the amount of Vitamin K *stays consistent from week to week*
Alcohol	Have no more than 1 drink per day; drinking large amounts of alcohol can cause cardiomyopathy or bleeding (interaction with Coumadin)
Caffeine (coffee, tea, chocolate)	It can increase heart rate or give you palpitations.
Salty foods (canned and processed foods, condiments, olives, pickles, soups, gravy, instant cereal, cured meats, cheese, sports drinks, fast foods, and frozen foods)	Aim to eat 1500 grams or less of salt each day; watch out for hidden salt
Fluids (don't forget about foods that contain a lot of fluid, like ice cream, juicy fruits, and soups)	Limiting fluids can help you feel better and lower risk of going back to the hospital; limit fluids to 8 cups (2,000 mL or 2 L) per day
Added sugar (ingredients listed as granulated sugar, cane sugar, corn syrup, glucose, dextrose, maltose, galactose, fructose)	Carbohydrate intake should be limited to 250 grams of complex carbs per day (for 2,000 calorie diet). Try to have around 50 grams of carbs per meal and 20 grams for snacks.

VII. Access and changes to the care plan

Mrs. A can grant different types of access to her care plan to members of the care team. For those with the ability to make changes, the change has to be approved by Mrs. A. When a change is made, members of the care team with viewing privileges should receive a notification. The following shows privileges:

Person	Can make changes	Goals	Meds	Measures	Symptoms	Nutrition
Geeta Patel	X	X	X	X	X	X
Bob Smith	X	X	X	X	X	X
Denise Myers	X	X	X	X	X	X
Ken Rodriguez			X			X
Nicole Graham		X	X	X	X	X
Alan Moore						X
Roger Anderson	X	X	X	X	X	X
Allison Thomas		X	X	X	X	X

Reference:

Haynes, Sarah. *Updated Care Plan*. 7 Feb. 2016.

APPENDIX B: SCREENSHOTS

Appendix of Screenshots

This appendix contains screenshots of OnPoint, developed using Ionic Framework. The OnPoint application can be viewed using Ionic View on an Apple iPhone 6, or and Apple iPad Mini. The following screenshots are for the Apple iPhone 6.
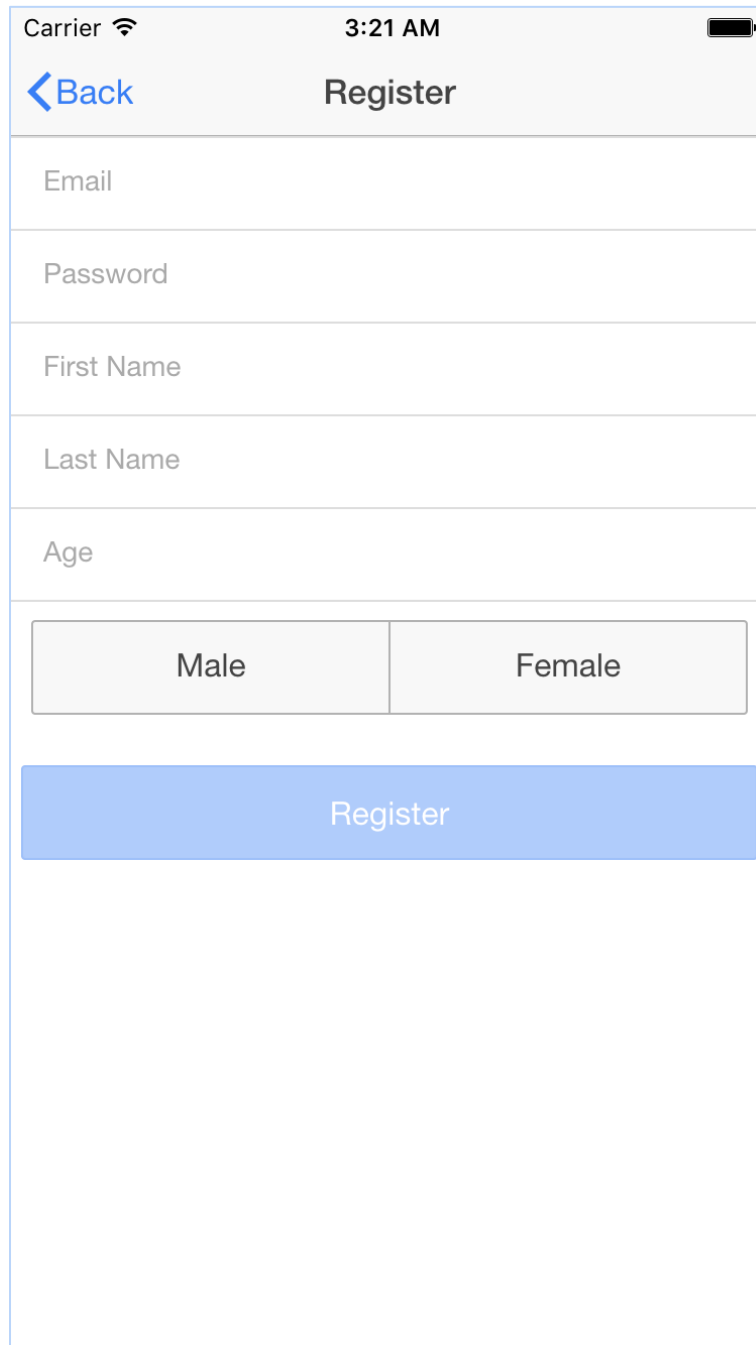
Each screen is displayed on a page, with instructions on how to proceed to the next screen.
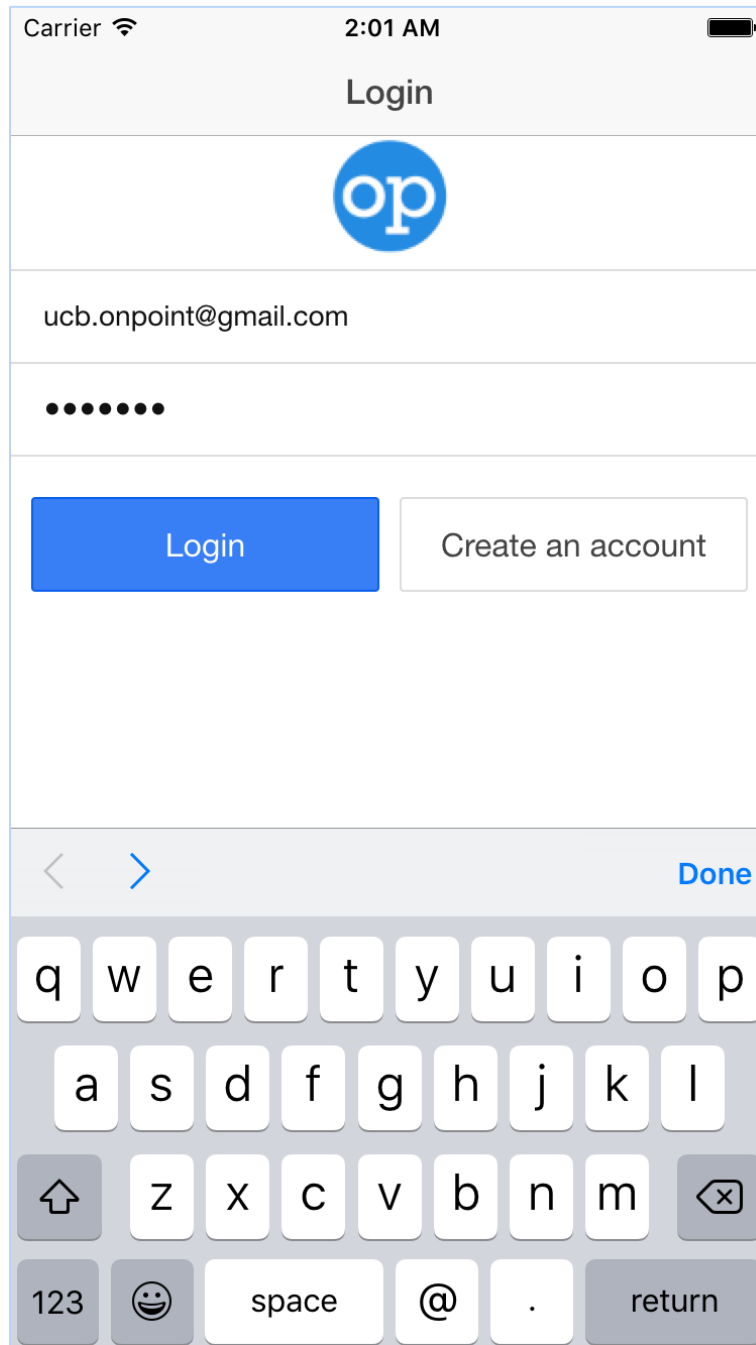
APPENDIX FIGURE B-1: LOGIN SCREEN.

To "Create an account" and register, refer to Appendix Figure B-2: Registration screen.

To "Login", refer to Appendix Figure B-3: Onboarding start screen.

APPENDIX FIGURE B-2: REGISTRATION SCREEN

After filling in all fields, click on "Register" and proceed to Appendix Figure B-3: Onboarding start screen.
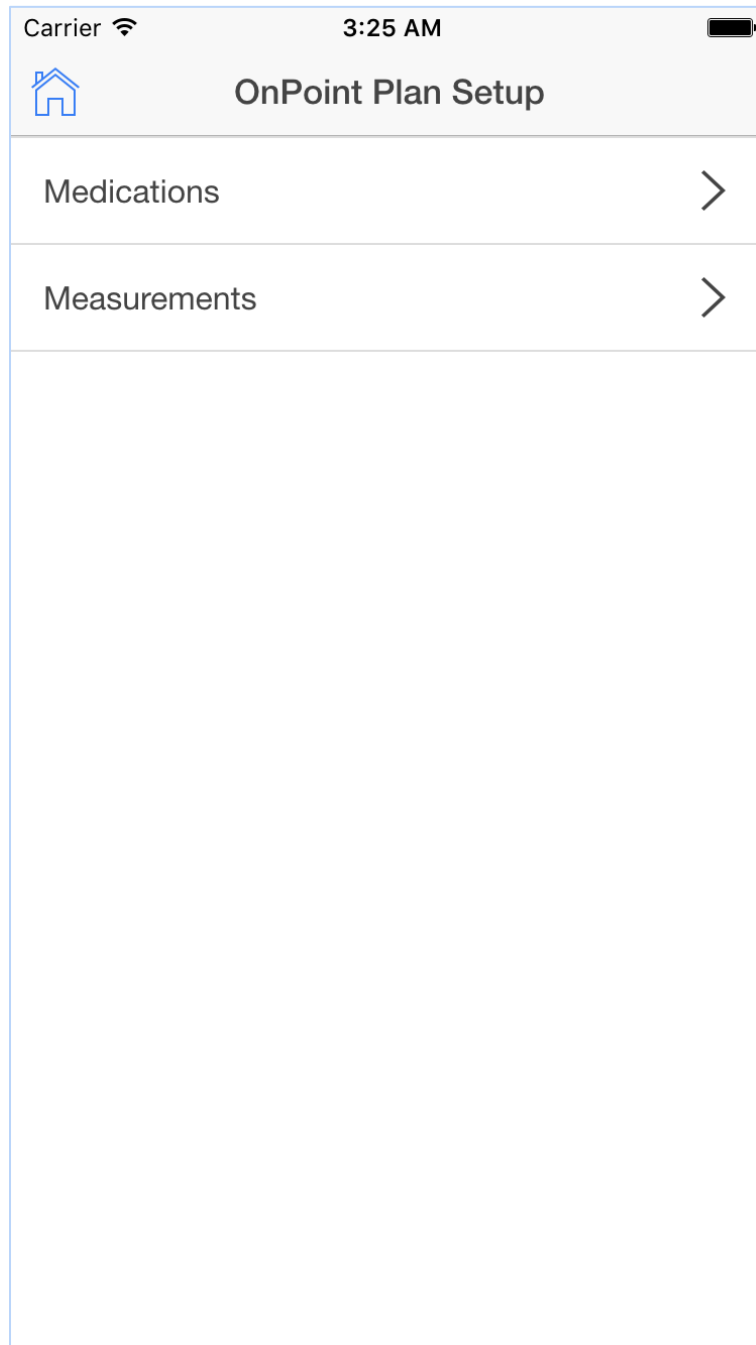
APPENDIX FIGURE B-3: ONBOARDING START SCREEN

To set up "Medications", proceed to Appendix Figure B-4: Add medication screen.

To set up "Measurements", proceed to Appendix Figure B-7: Measurements Schedule List.

To go to the home page, proceed to Appendix Figure B-9: Main Home View displaying cards.
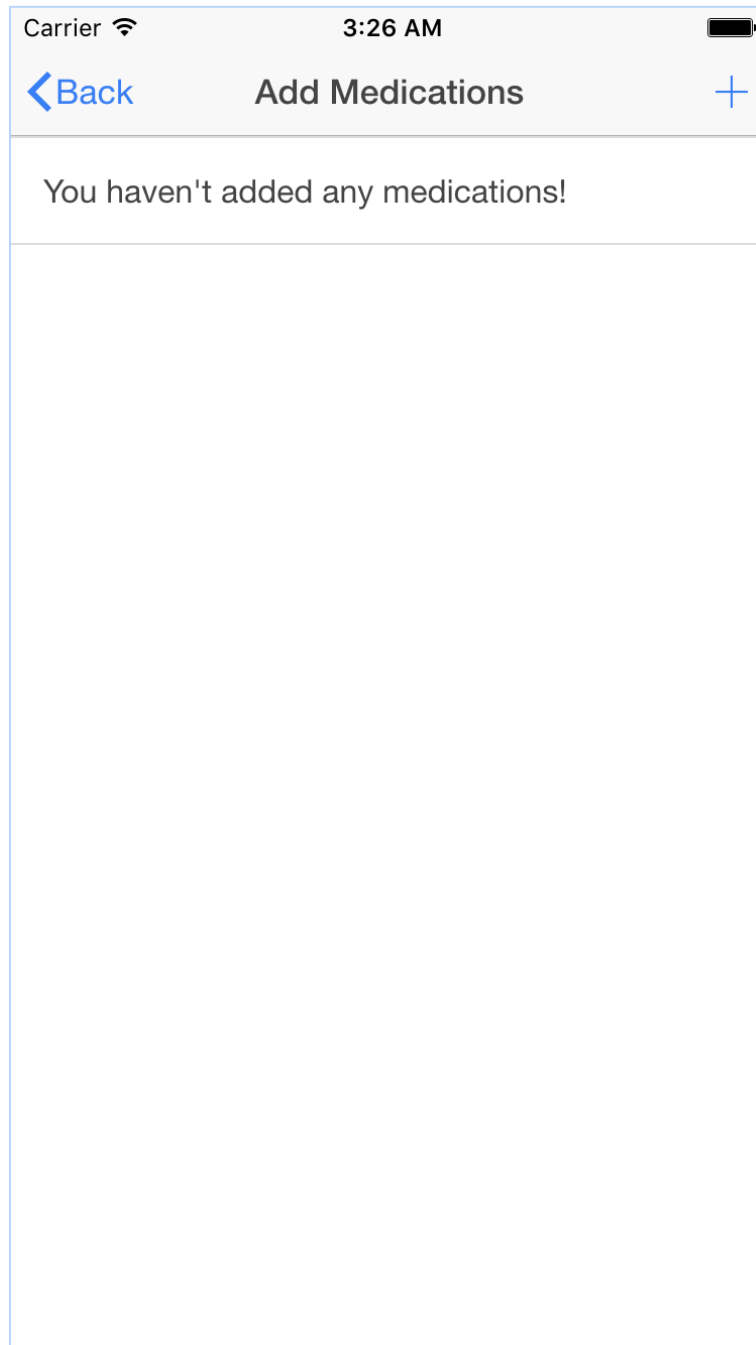
APPENDIX FIGURE B-4: ADD MEDICATION SCREEN

To add a medication, tap the "+" and proceed to Appendix Figure B-5: New Medication screen.

Otherwise, return to the onboarding screen Appendix Figure B-3: Onboarding Start Screen.

APPENDIX FIGURE B-5: NEW MEDICATION SCREEN

When all of the medication fields are input, tap the save button and continue to Appendix Figure B-6: Medication Input List.

APPENDIX FIGURE B-6: MEDICATION INPUT LIST

To continue, tap "Generate Schedule" and proceed to Appendix Figure B-18: Medications Tab - Editing the medication schedule.
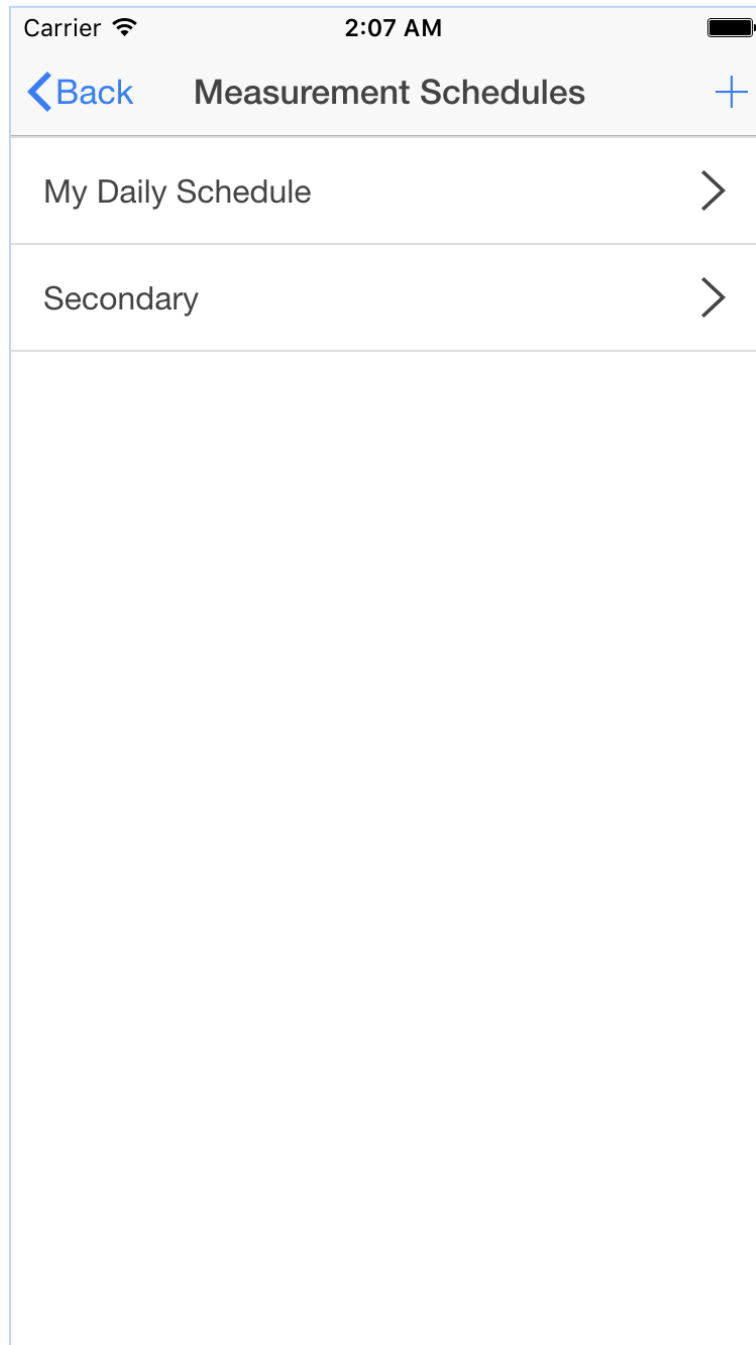
APPENDIX FIGURE B-7: MEASUREMENTS SCHEDULE LIST

Tap "+" to add a new schedule, proceed to Appendix Figure B-8: New Measurement Schedule.

If done with both Medications and Measurements onboarding, proceed to the main home page, Appendix Figure B-9. Otherwise, return to the onboarding screen Appendix Figure B-3: Onboarding Start Screen.

APPENDIX FIGURE B-8: NEW MEASUREMENT SCHEDULE

When done filling in all fields, tap the "Save" button at the bottom of the screen to return to Appendix Figure B-8: New Measurement Schedule.

Home Page View
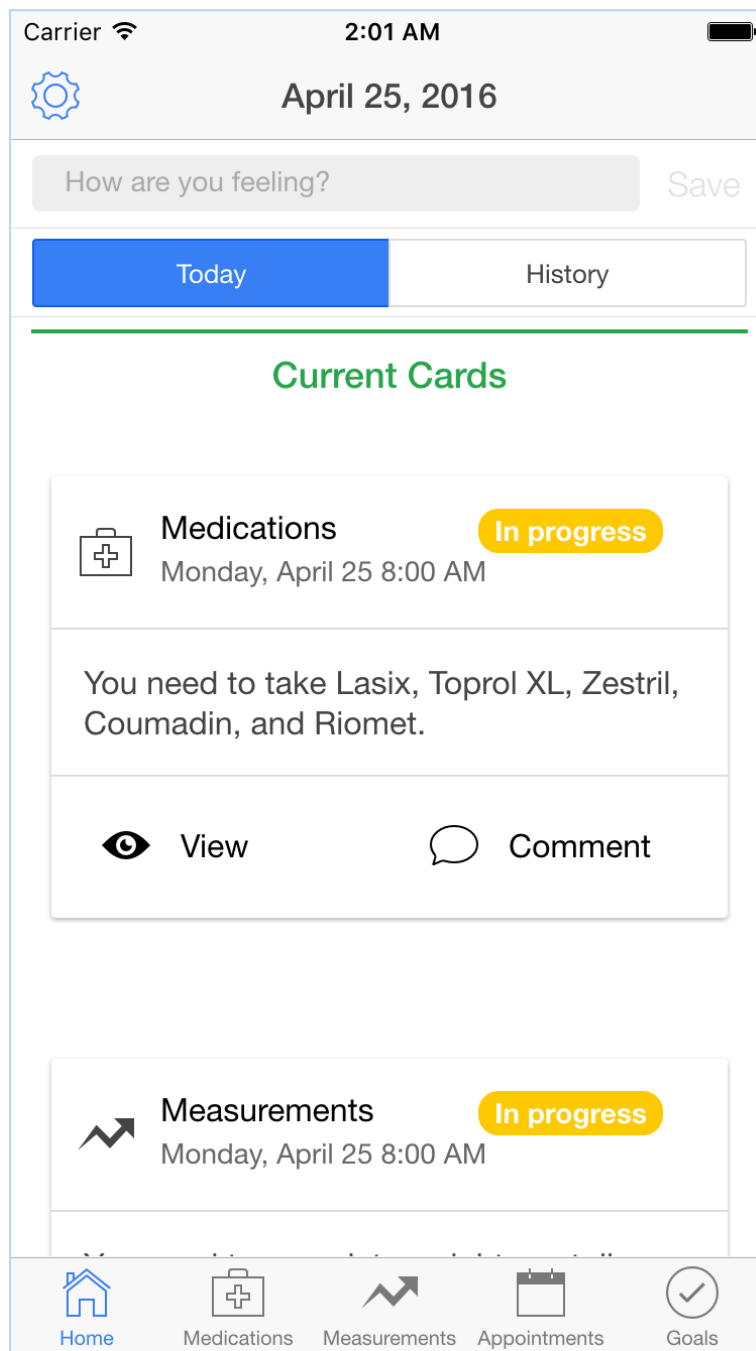
To view the Medications card, proceed to Appendix Figure B-12: View Medication Time Slot. To view the Measurements card, proceed to Appendix Figure B-21: Measurements tab - View today's measurement schedule. To comment on a card, go to Appendix Figure B-26.
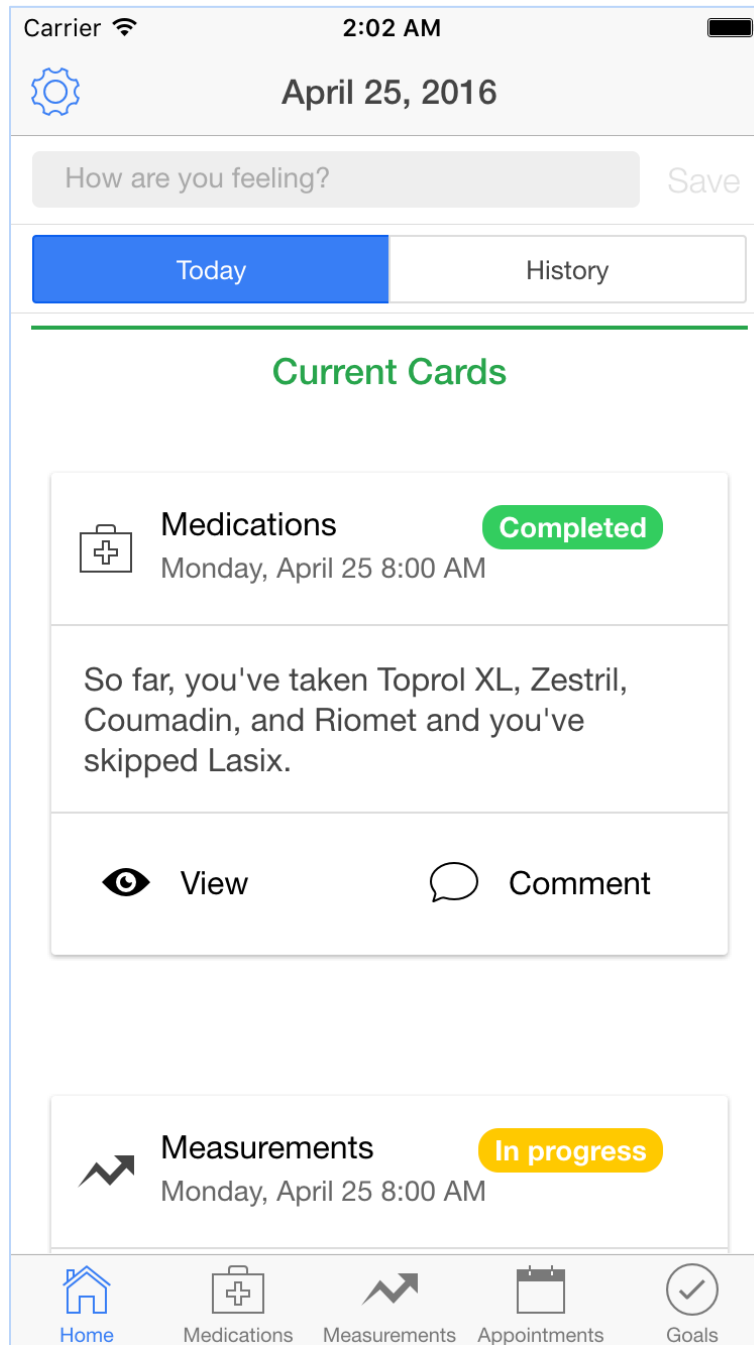
APPENDIX FIGURE B-10: MAIN HOME VIEW DISPLAYING CARD THAT HAS BEEN COMPLETED

To comment on a card, go to Appendix Figure B-26.

To view tabs, Medications: Appendix Figure B-13, Measurements: Appendix Figure B-21, Appointments: Appendix Figure B-24, Goals: Appendix Figure B-25.
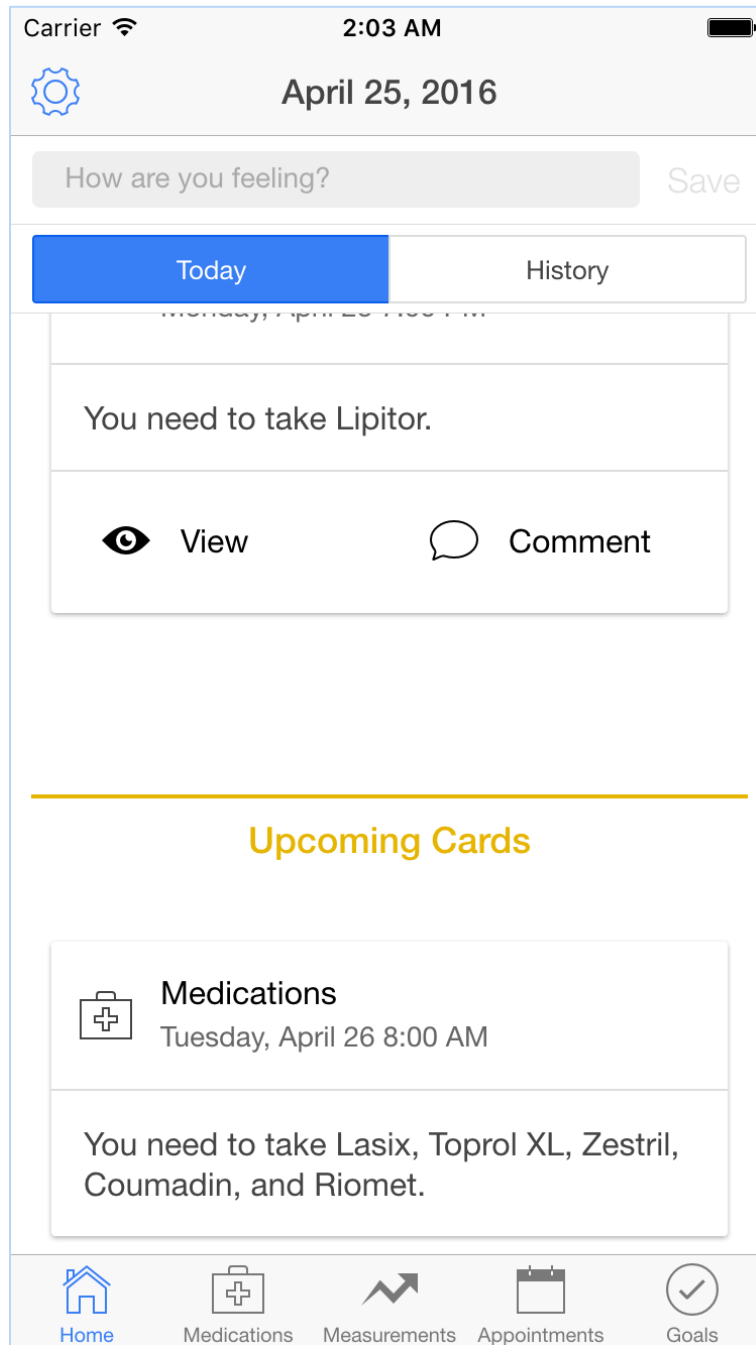
APPENDIX FIGURE B-11: MAIN HOME VIEW SCROLLED DOWN TO VIEW UPCOMING CARDS FOR TOMORROW

To return to the top of the page, go to Appendix Figure B-9: Main Home View displaying cards or Appendix Figure B-10: Main Home view displaying card that has been completed.
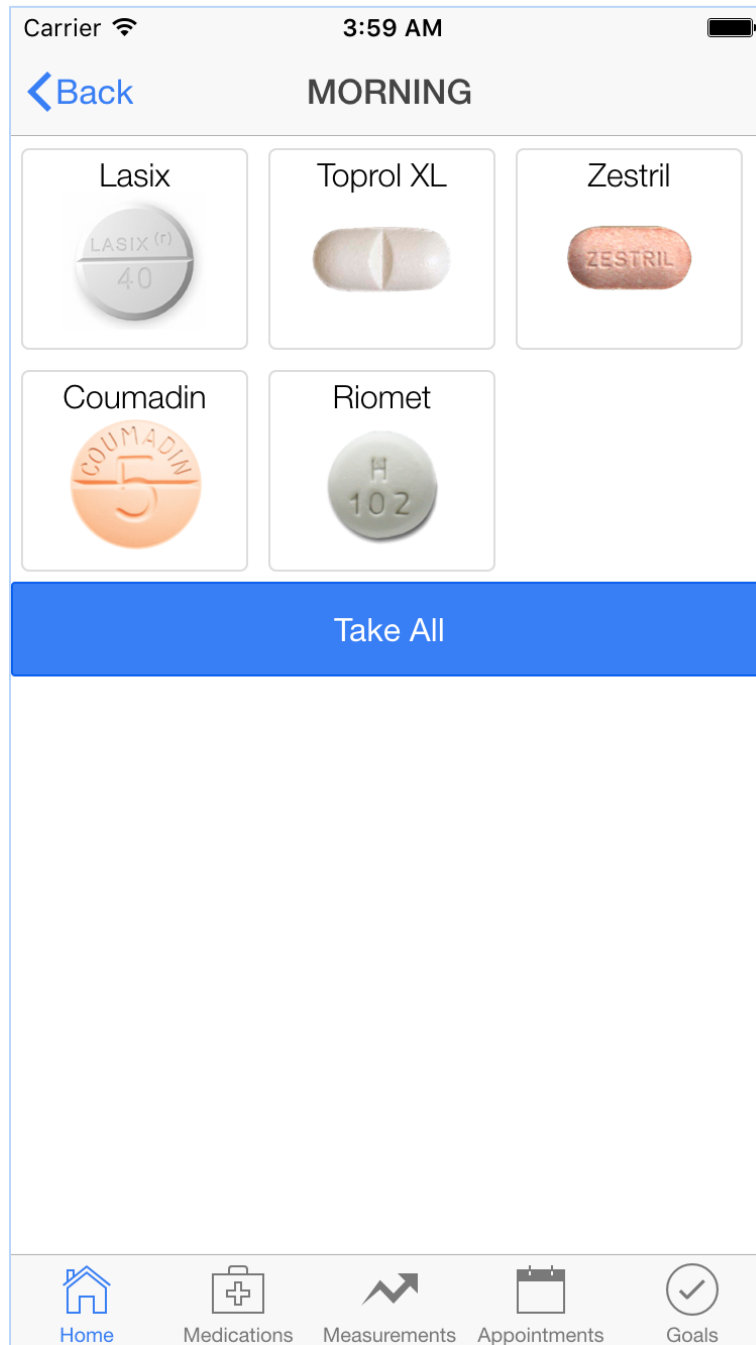
APPENDIX FIGURE B-12: VIEW MEDICATION TIME SLOT

To take all of the medications, tap the "Take All" and return to Appendix Figure B-10: Main Home view displaying card that has been completed.

To view a medication, tap on the medication and proceed to Appendix Figure B-17.
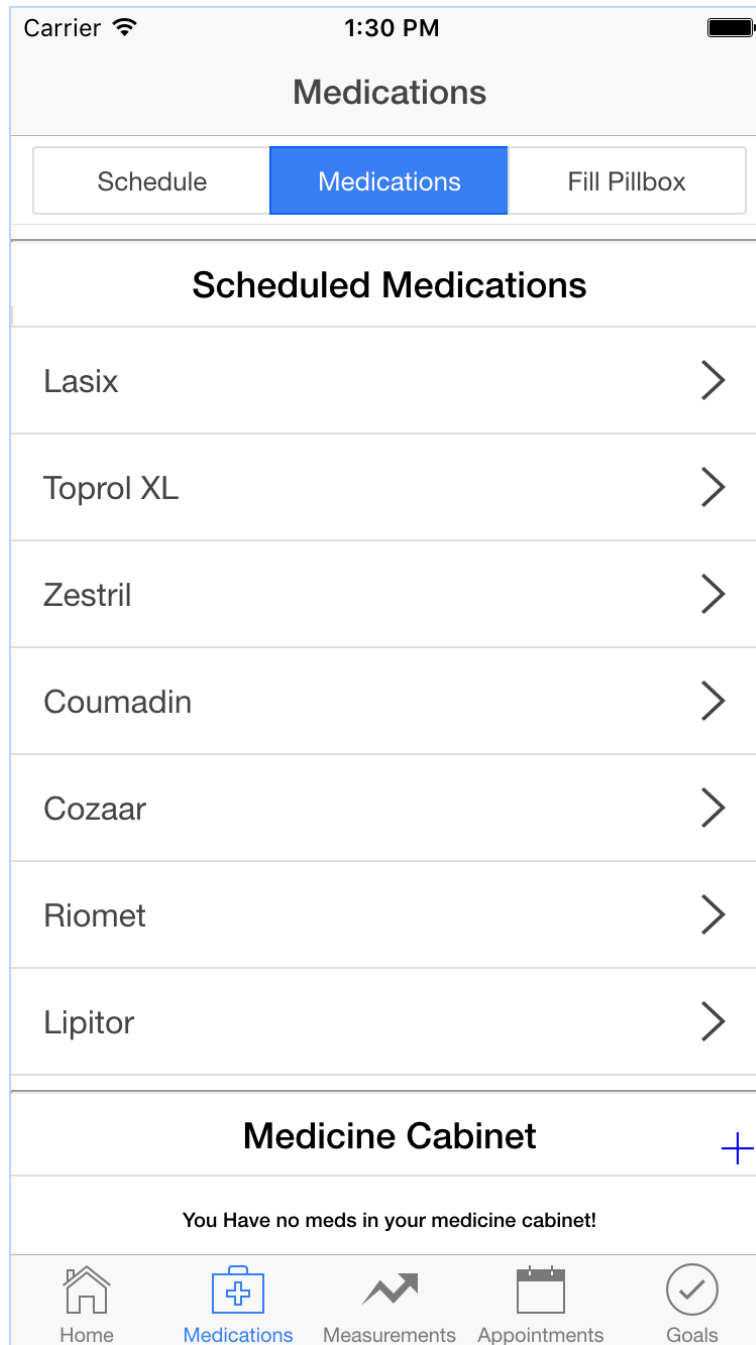
APPENDIX FIGURE B-13: MEDICATIONS TAB - VIEW MEDICATION LIST. USER HAS THE OPTION
OF ADDING AS-NEEDED MEDICATION TO THE MEDICINE CABINET

To view a medication, proceed to Appendix Figure B-17.

To add a medication, select the "+". Note: for user testing purposes we have disabled
the "+" for "Scheduled Mediations" since the medication schedules are pre-determined.

To add an as-needed pill, proceed to Appendix Figure B-14.

APPENDIX FIGURE B-14: NEW CABINET MEDICATION

Fill in all fields, and return to Appendix Figure B-13.
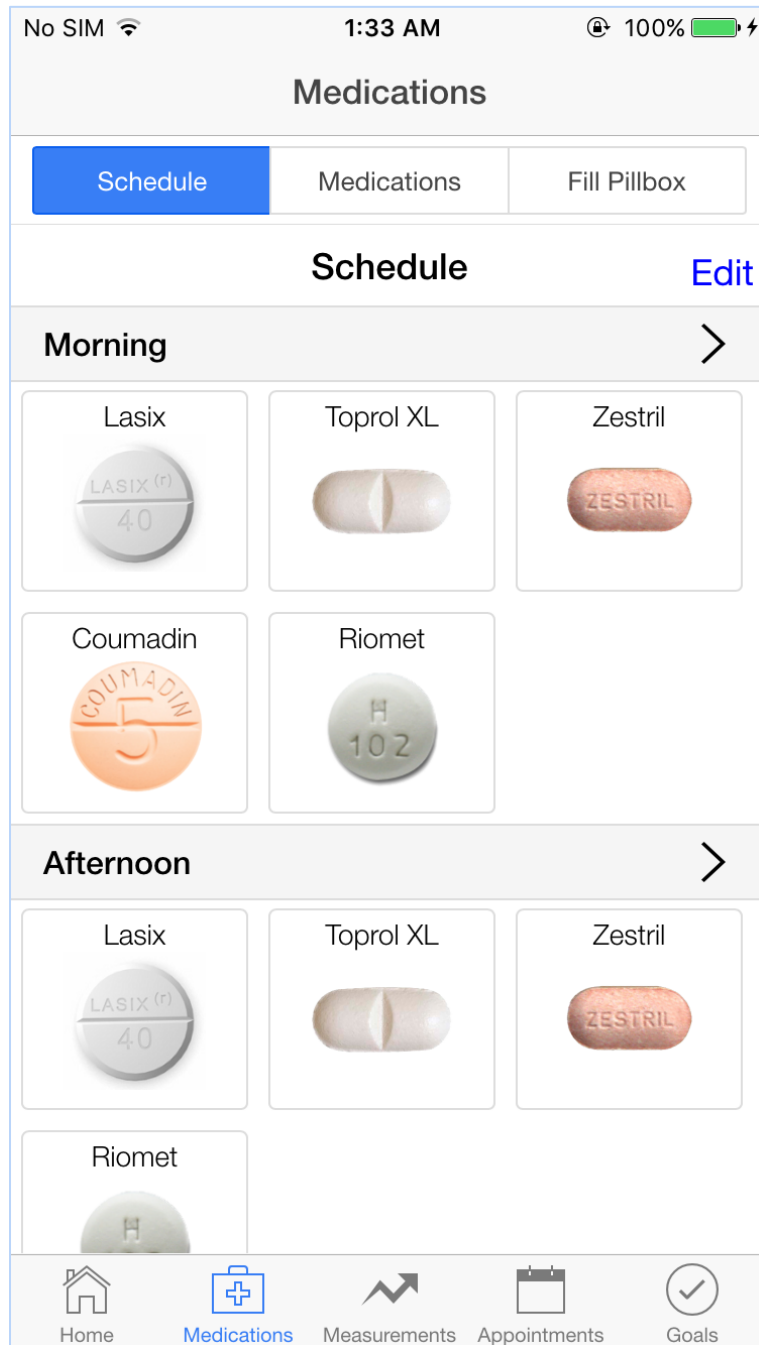
APPENDIX FIGURE B-15: MEDICATIONS TAB - MEDICATION SCHEDULE DISPLAYING ALL TIME SLOTS IN THE DAY

To view a list of all medications, proceed to Appendix Figure B-13. To view a diagram for filling the pillbox, tap the "Fill Pillbox" tab. Proceed to Appendix Figure B-20.

Scroll down to view the Medicine Cabinet and access as-needed pills. Proceed to Appendix Figure B-16.
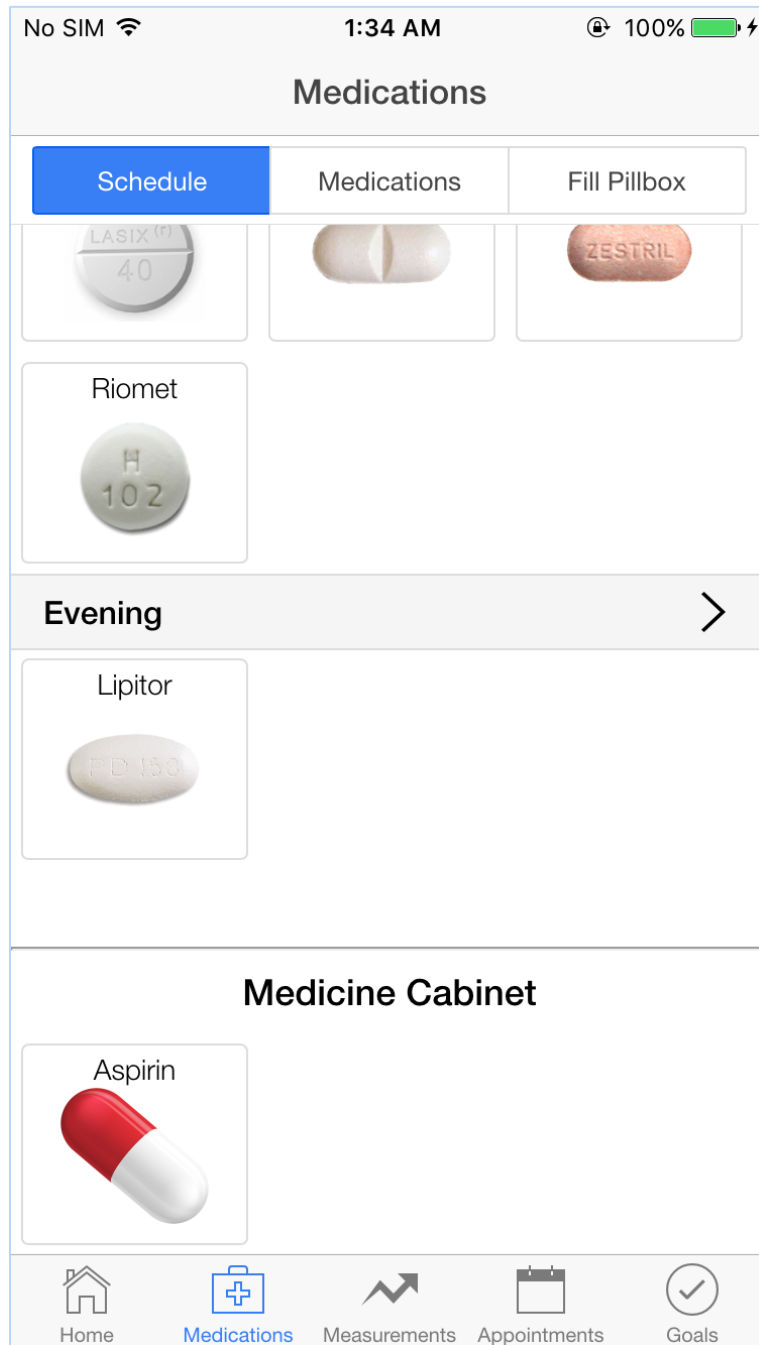
APPENDIX FIGURE B-16: MEDICATIONS TAB - MEDICATION SCHEDULE VIEW SCROLLED DOWN TO VIEW REST OF THE TIME SLOTS AND ALSO MEDICINE CABINET.

To scroll up, view Appendix Figure B-15.

To view medication details, proceed to Appendix Figure B-17: View Medication Information.

No SIM 📶　　　　　4:29 AM　　　　🔒 100% 🔋 ⚡

<Back　　　**Coumadin (warfarin)**

Coumadin　　　　　　　500 mg
warfarin　　　　　　　　4 tablet

Instructions

Take orally once a day in the morning

Purpose

Treats and prevents blood clots by acting as a blood thinner.

Skip	Take

🏠 Home　　⊞ Medications　　📈 Measurements　　📅 Appointments　　✓ Goals
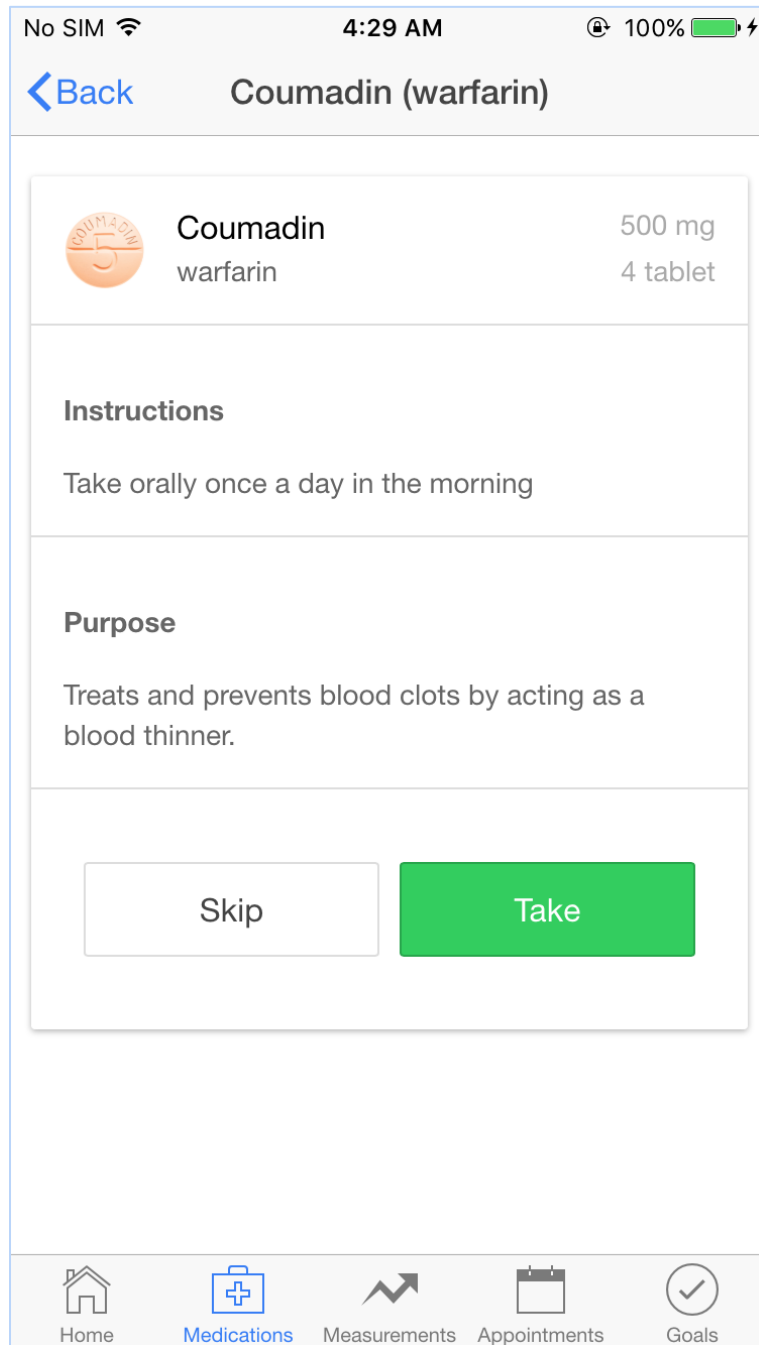
APPENDIX FIGURE B-17: VIEWING MEDICATION INFORMATION. THIS IS ACCESSED WHEN THE USER TAPS ON A MEDICATION. THE USER CAN CHOOSE TO TAKE OR SKIP A MEDICATION.

Choose to either "skip" or "take" the medication. Return to Appendix Figure B-12: View Medication time slot.
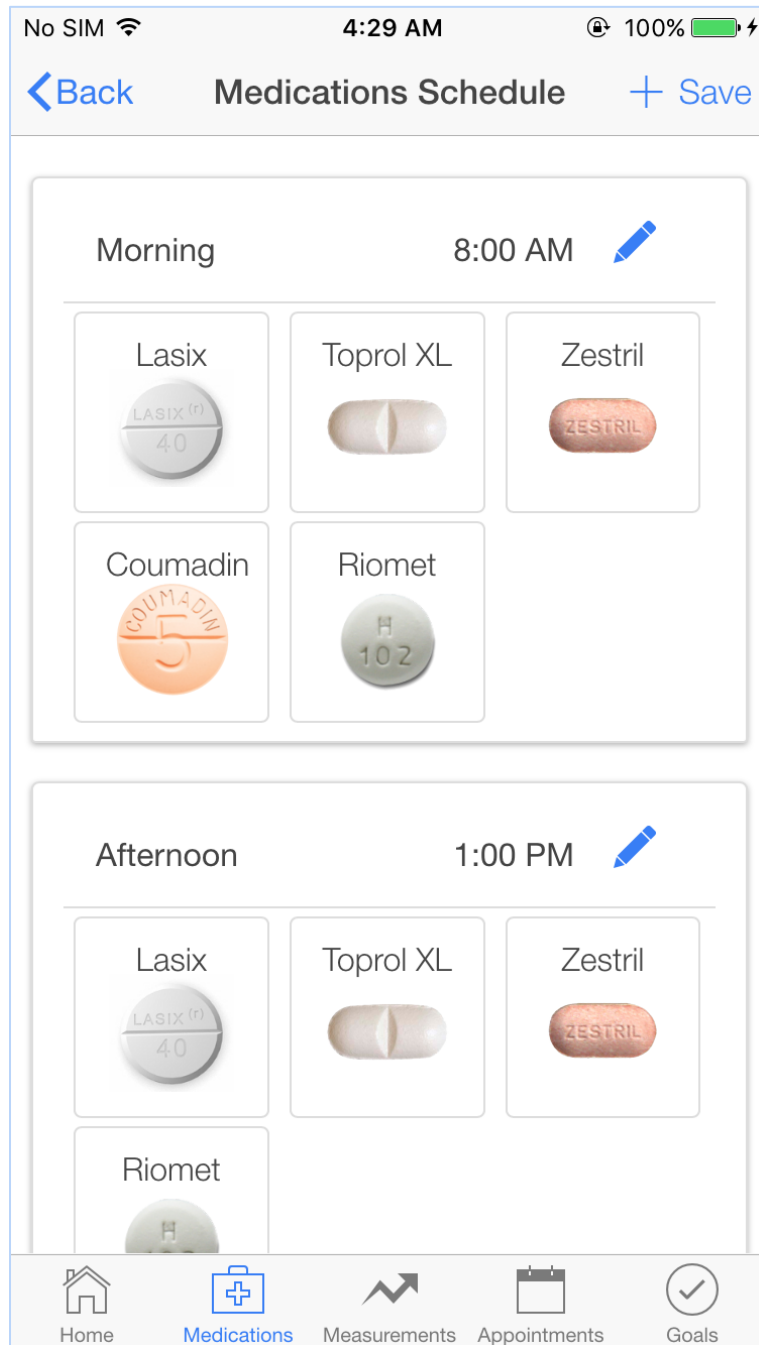
APPENDIX FIGURE B-18: MEDICATIONS TAB - EDITING THE MEDICATION SCHEDULE

To edit a time slot, proceed to Appendix Figure B-19: Medications Tab - Editing a time slot in the medication schedule. To complete the medications onboarding process, proceed to Appendix Figure B-20: Medications Tab - Viewing the Fill Pillbox diagram. Otherwise, return back to the Medications Tab: Appendix Figure B-15: Medications Tab - Medication Schedule displaying all time slots in the day.
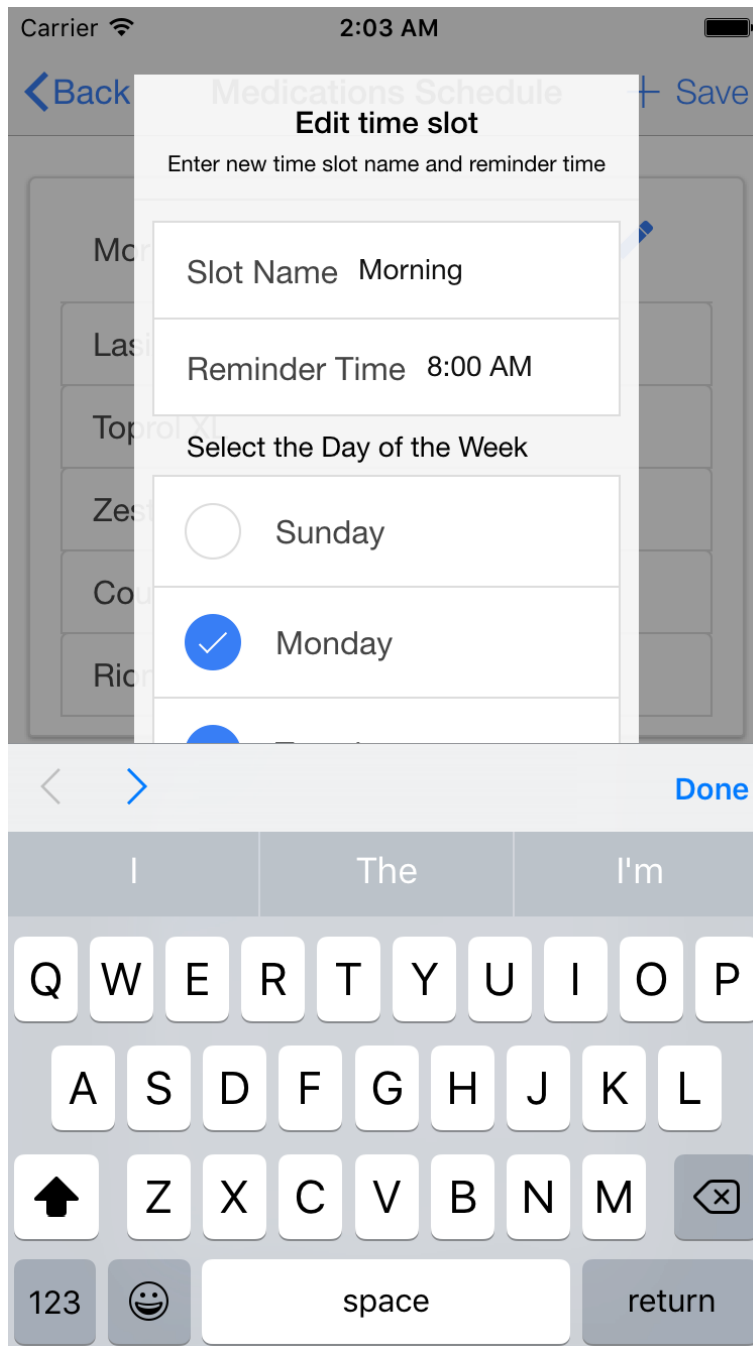
APPENDIX FIGURE B-19: MEDICATIONS TAB - EDITING A TIME SLOT IN THE MEDICATION SCHEDULE.

Save and return to Appendix Figure B-18: Medications Tab - Editing the medication schedule.

Medications

Schedule	Medications	**Fill Pillbox**

Slots	S	M	T	W	T	F	S
Morning	4	4	4	4	4	4	4
Afternoon							
Evening							

Select Medication to Begin:

Lasix	Toprol XL	Zestril

Coumadin	Cozaar	Riomet

Lipitor

🏠 Home	✚ Medications	📈 Measurements	📅 Appointments	✓ Goals
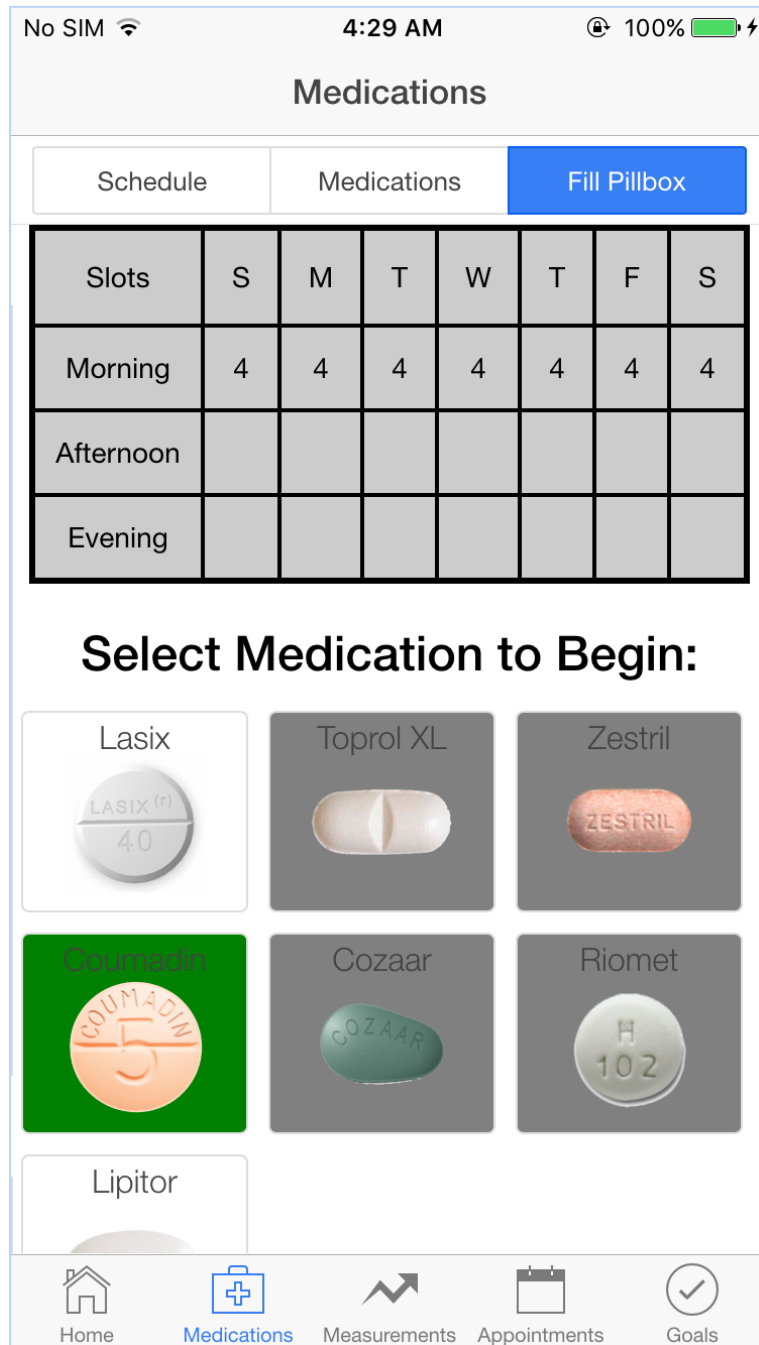
APPENDIX FIGURE B-20: MEDICATIONS TAB - VIEWING THE FILL PILLBOX DIAGRAM

To view the medication schedule, tap on "Schedule" and proceed to Appendix Figure B-15.

To view the list of all medications, tap on "Medications" and proceed to Appendix Figure B-13: View Medication list.

APPENDIX FIGURE B-21: MEASUREMENTS TAB - VIEW TODAY'S MEASUREMENT SCHEDULE

The user can input the scheduled measurements and save the measurements. These will appear under the "History" tab.

To add an unscheduled measurement in order to log an extra reading, tap "Add" and proceed to Appendix Figure B-22: Measurements Tab – Logging an additional measurement.

APPENDIX FIGURE B-22: MEASUREMENTS TAB - LOGGING AN ADDITIONAL MEASUREMENT THAT IS NOT SCHEDULED.

To view the daily scheduled measurements, proceed to Appendix Figure B-21.
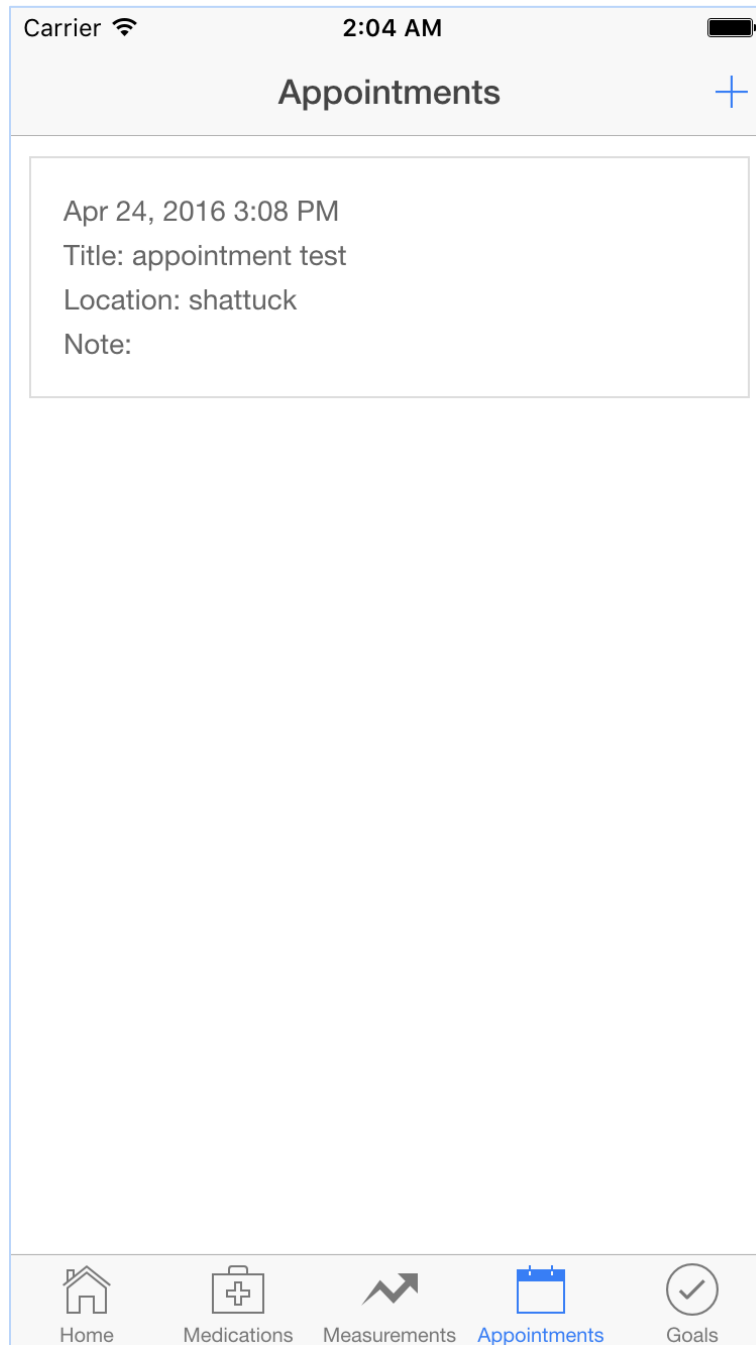
APPENDIX FIGURE B-23: VIEW APPOINTMENTS

Return to home by tapping the "Home" tab and proceeding to Appendix Figure B-9: Main Home View.
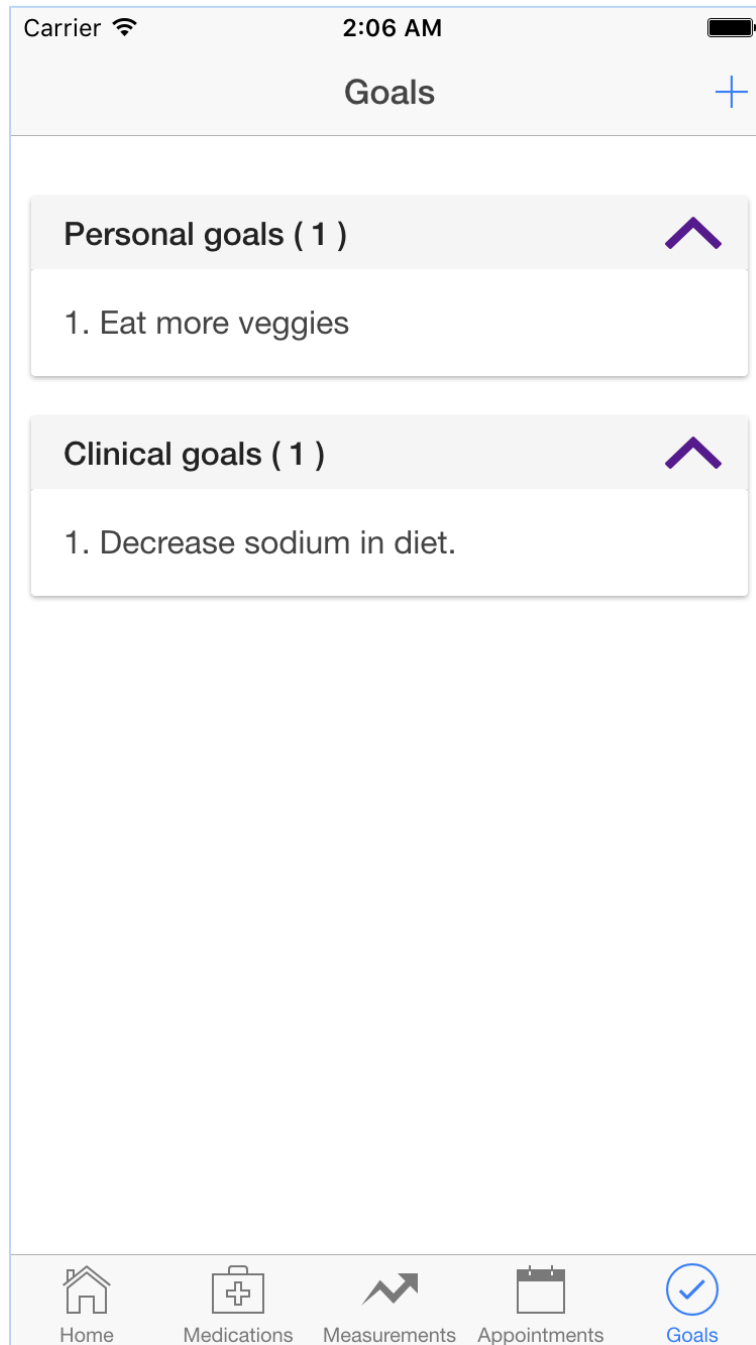
APPENDIX FIGURE B-24: VIEW GOALS. USER CAN COLLAPSE OR EXPAND GOALS AND ALSO ADD NEW GOALS.

To add a new goal, tap the "+" and proceed to Appendix Figure B-25: Add Goal.

Return to home by tapping the "Home" tab and proceeding to Appendix Figure B-9: Main Home View.

APPENDIX FIGURE B-25: GOALS TAB - ADD NEW GOAL

Fill in all fields and return to Appendix Figure B-24: Goals Tab.
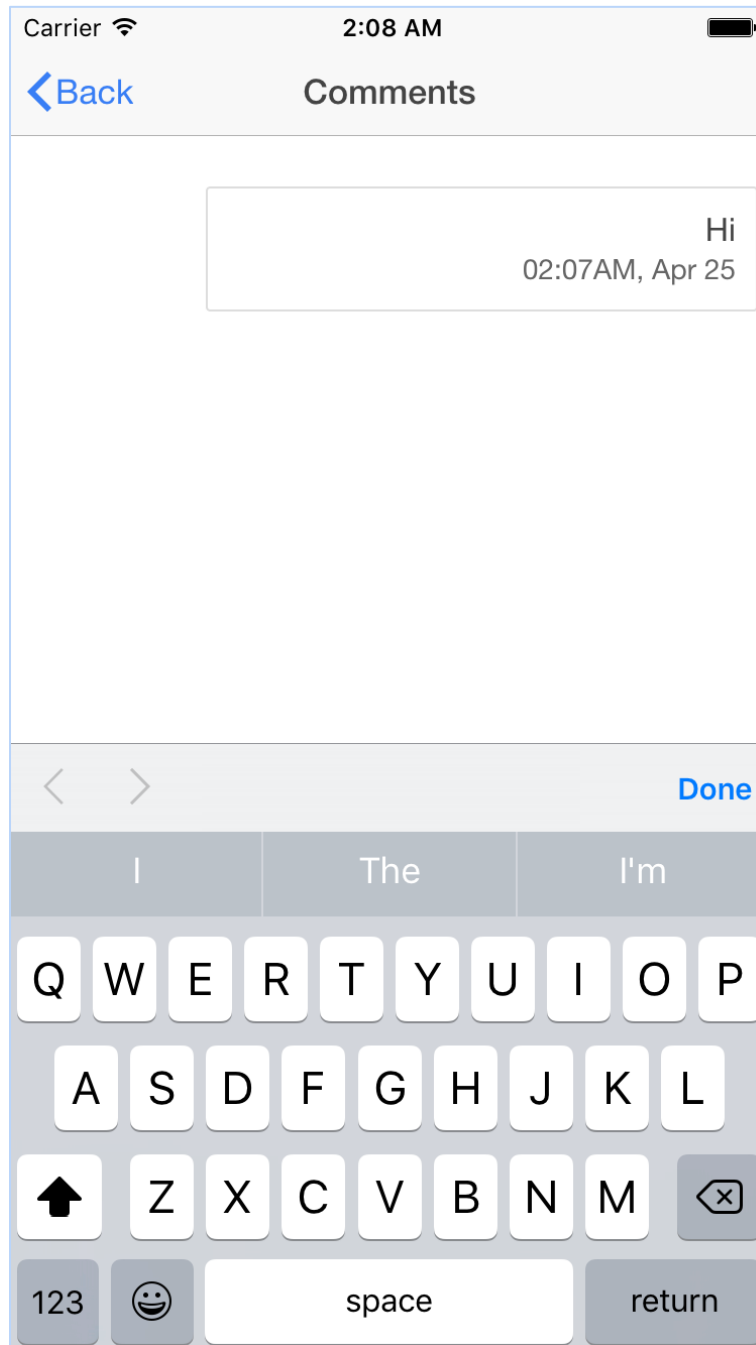
Return to the main page view when done commenting. Proceed to Appendix Figure B-9: Main Home View.

APPENDIX C: KEYNOTE WIREFRAMES

Medium-fidelity Prototypes

This appendix contains the medium-fidelity prototypes developed in Keynote using Keynotopia. Each screen contains clickable elements, which link to other screens. Thus, these prototypes can simulate basic application functionality and allow users to interact with the prototype. These prototypes were used during user testing sessions with UC Davis.

February 1, 2016

Set up your onPoint plan

logo

Medications	>

Measurements	>

Appointments	>

Symptoms	>

Goals	>

Medications Measurements Appointments Symptoms Goals

🏠 **Medication Setup** ☰

Step 1 of 5

Input Meds

Take a picture of your medication and we will automatically create a medication schedule for you!

Take Picture of Medication

Manually Input Medication

Instructions

Use Good Lighting
Don't Block Label
Frame and Focus
Take Multiple Pictures
Capture all Details

OK

PHOTO

Cancel

Save

ZESTRIL (lisinopr

Twice a day, morni

Use: This medicine is an A

and heart failure

Warning:

Do not take other medicines without

Do not use this medicine if you are

Side Effects: An empty tablet shel

your body has already absorbed the

PHOTO

inopril)

morning and night, O

is an ACE inhibitor that treats h

without checking with your doctor or ph
you are pregnant or plan to become preg
shell may appear in your stool. This
bed the medication.

PHOTO

ZESTRIL (lisinop
Twice a day, mor
Use: This medicine is a
and heart failure

(40 mg)

rally

high blood pressure

armacist

yrant

ffect is harmless because

PHOTO

ZESTRIL (lisinop

Twice a day, mom

Use: This medicine is an

and heart failure

Warning:

Do not take other medicine

Do not use this medicine if you

Side Effects: An empty tablet

your body has already absorbed

Step 1 of 5

Input Meds

Medications to schedule

Zestril ❯

Add Another Medication ❯

Generate Schedule

Medication Setup
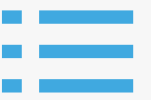
Enter Medication Info

Name	Toprol
Dosage	25 mg
Timing	Twice a day, morning and night
Instructions	Orally
Purpose	Used to treat heart failure, and high blood pressure
Notes	Lorem ipsum

Save

Step 1 of 5
Input Meds

Medications to schedule

Lasix ›

Toprol ›

Add Another Medication ›

Generate Schedule

Step 1 of 5

Input Meds

Medications to schedule

Lasix	>
Toprol	>
Zestril	>
Coumadin	>
Losarten	>
Lipitor	>
Add Another Medication	>

Generate Schedule

Step 1 of 5

Input Meds

Medications taken as needed

Ativan   ›

Medications to schedule

Lasix   ›

Toprol   ›
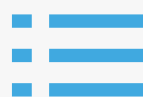
Zestril   ›

Coumadin   ›
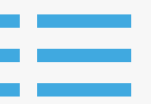
Losarten   ›

Add Another Medication   ›

Generate Schedule

Step 2 of 5

Generate Schedule

Generating Schedule...
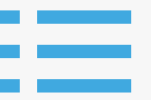
Step 2 of 5
Generate Schedule

Done!

We've created a schedule for you based on your list of medications:

Lasix	›
Toprol	›
Zestril	›
Coumadin	›
Losarten	›
Lipitor	›

Your "As Needed" Medications are in the Medicine Cabinet.

View Schedule
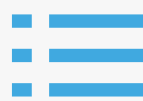
Step 3 of 5
Review Schedule

(S) (M) (T) (W) (T) (F) (S)

Daily Schedule +

Morning See All >

🔴 🟠 🟡 🟢 🔵
Lasix Toprol Zestril Coumadin Los

Afternoon See All >

🔴 🟠 🟡 🔵 🟣
Lasix Toprol Zestril Losartan Ri

Evening See All >

🟤
Lipitor

Step 3 of 5
Review Schedule

S M T W T F S
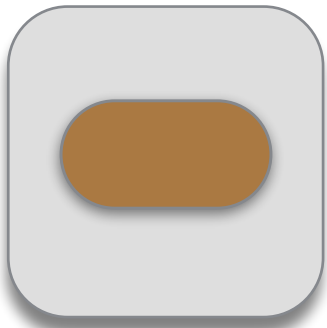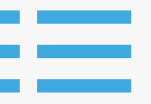
Daily Schedule +
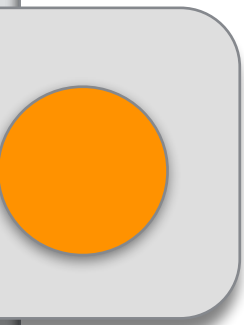
Morning   See All >

Toprol   Zestril   Coumadin   Losartan   Riomet

Afternoon   See All >
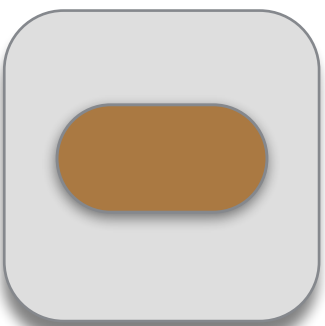
Lasix   Toprol   Zestril   Losartan   Ri

Evening   See All >

Lipitor

Medications Setup
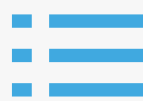
Step 3 of 5
Review Schedule

S	M	T	W	T	F	S

Daily Schedule

Morning

Lasix	Toprol	Zestril	Coumadin	Losartan

Afternoon
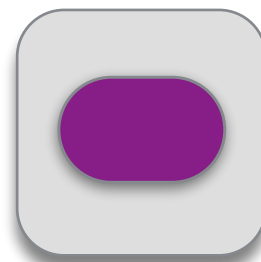
Lasix	Toprol	Zestril	Losartan	Riomet

Evening
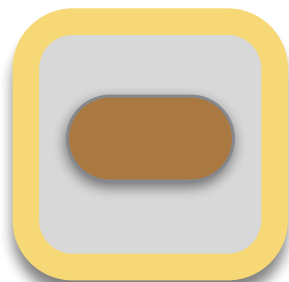
Lipitor

This is an example of how to move a pill from one slot to another
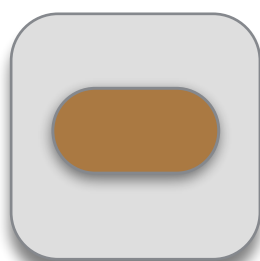
Lipitor (Atorvastatin)

Lipitor

Take once a day
Best taken at bedtime because liver deals with cholesterol during sleep.

Medications Setup
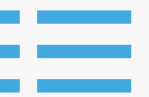
Step 3 of 5
Review Schedule

S M T W T F S

Daily Schedule

+

Morning

Lasix   Toprol   Zestril   Coumadin   Losartan

+

Afternoon

Lasix   Toprol   Zestril   Losartan   Riomet

+

Evening

Lipitor

+

< 🏠 **Medications Setup** ☰
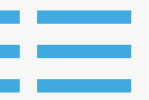
S M T W T F S

Daily Schedule

Morning

Enter a name for the new time slot

Noo|
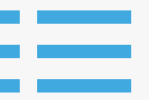
Lasix Toprol Zestril Coumadin Losartan

Done

Q W E R T Y U I O P

A S D F G H J K L

⇧ Z X C V B N M ⌫

.?123   space   return

Step 3 of 5
Review Schedule

S M T W T F S

Daily Schedule +

Morning   See All >

Lasix   Toprol   Zestril   Coumadin   Los

Noon   Remove

Afternoon   See All >

Lasix   Toprol   Zestril   Losartan   Ri

Evening   See All >

Step 3 of 5

S M T W T F S

Daily Schedule +

Lasix   Toprol   Zestril   Coumadin   Los

Remove

Noon

Afternoon   See All ›

Lasix   Toprol   Zestril   Losartan   Rio
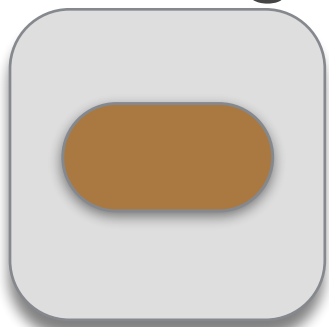
Evening   See All ›

Lipitor

Finalize Schedule

Medications Setup
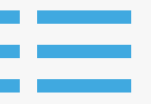
Review Schedule

S **M** T **W** T **F** S

Monday Wednesday Friday

‹ Rotate schedule to be on another day of week ›

Morning   See All ›

Lasix   Toprol   Zestril   Coumad...

Afternoon   See All ›

Lasix   Toprol   Zestril   Losartan

Evening   See All ›

Lipitor
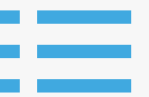
Step 4 of 5
Finalize Schedule

Set your reminder times for each medication time slow below

Morning	7:00 AM ›
Noon	12:00 PM ›
Afternoon	3:00 PM ›
Evening	6:00 PM ›

Done

Medication Setup

Save

6	45	
7	50	
8	55	
9	**00**	**AM**
10	05	PM
11	10	
12	15	

‹   🏠   **Medication Setup**   ☰
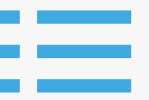
Step 4 of 5
Finalize Schedule

Set your reminder times for each medication time slow below

Morning	9:00 AM ›
Noon	12:00 PM ›
Afternoon	3:00 PM ›
Evening	6:00 PM ›

Done
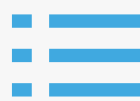
Step 5 of 5
Fill Pillbox
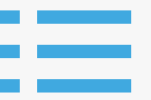
Let's fill in your pillbox.

Please have your medications and your pillbox handy for the next step.

Fill My Pillbox

Step 5 of 5
Fill Pillbox

	S	M	T	W	T	F	S
Morning							
Noon							
Afternoon							
Evening							

Select medication to begin:

Lasix	Toprol	Zestril	Coumadin
🔴	🟠	🟡	🟢

Losartan	Riomet	Lipitor
🔵	🟣	🟤
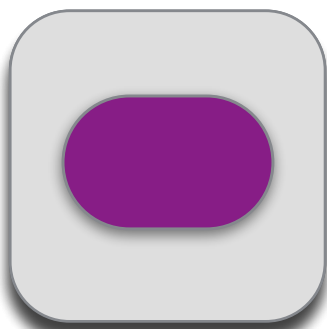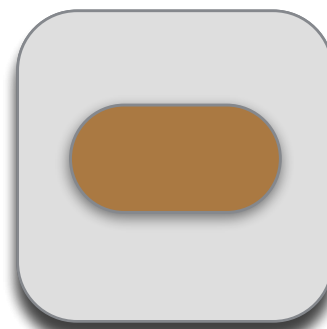
🏠 **Medications Setup** ☰

Step 5 of 5
Fill Pillbox

	S	M	T	W	T	F	S
Morning	1	1	1	1	1	1	1
Noon							
Afternoon	1	1	1	1	1	1	1
Evening							

Fill your pillbox with Lasix

Lasix	Toprol	Zestril	Coumadin
🔴	🟠	🟡	🟢

🔵 🟣 🟤

Done

🏠 Medications Setup ☰

Step 5 of 5
Fill Pillbox

	S	M	T	W	T	F	S
Morning							
Noon							
Afternoon							
Evening							

Select medication to begin:

Lasix	Toprol	Zestril	Coumadin
🔴✅	🟠	🟡	🟢
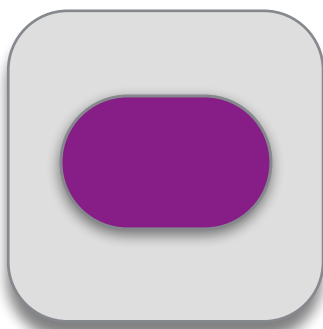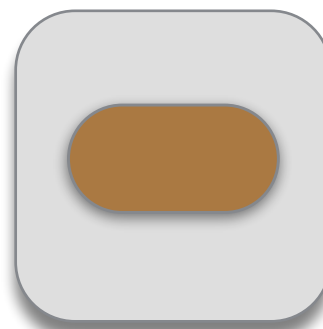
Losartan	Riomet	Lipitor
🔵	🟣	🟤
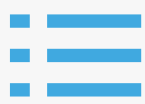
Step 5 of 5
Fill Pillbox

	S	M	T	W	T	F	S
Morning	1	1	1	1	1	1	1
Noon							
Afternoon	1	1	1	1	1	1	1
Evening							

Fill your pillbox with Toprol

Lasix	Toprol	Zestril	Coumadin
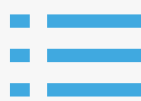
Losartan	Riomet	Lipitor

Done

Step 5 of 5
Fill Pillbox

	S	M	T	W	T	F	S
Morning							
Noon							
Afternoon							
Evening							

Select medication to begin:

Lasix   Toprol   Zestril   Coumadin
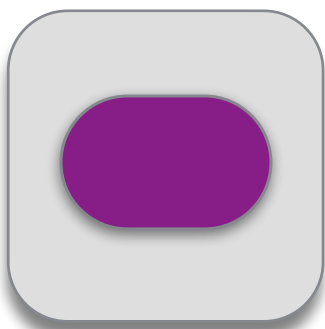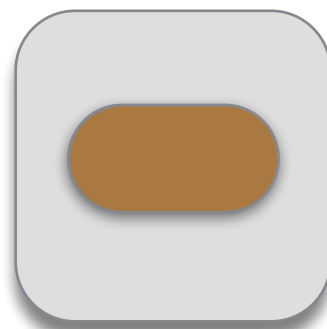
Losartan   Riomet   Lipitor

🏠 **Medications Setup** Done

Step 5 of 5
Fill Pillbox

	S	M	T	W	T	F	S
Morning							
Noon							
Afternoon							
Evening							

Select medication to begin:

Lasix   Toprol   Zestril   Coumadin

Losartan   Riomet   Lipitor

Done

February 1, 2016

Set up your onPoint plan

logo

Measurements   ❯

Appointments   ❯

Symptoms   ❯

Goals   ❯

| Medications | Measurements | Appointments | Symptoms | Goals |

‹   🏠   **Medications**
February 1, 2016   ☰

Morning   See All ›

🔴   🟠   🟡   🟢   🔵
Lasix   Toprol   Zestril   Coumadin   Losar

Afternoon   See All ›

🔴   🟠   🟡   🔵   🟣
Lasix   Toprol   Zestril   Losartan   Riom

Evening   See All ›

🟤
Lipitor
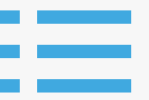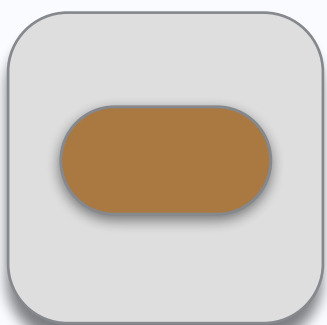
Medicine Cabinet

Medications Measurements Appointments Symptoms Goals

Settings

View Medication List >

View Medication Schedule >

Reminder Times >

Fill Pillbox >

February 1, 2016

How are you feeling?

Take medications!   7:00 am

Lasix, Toprol, Zestril, Coumadin, Losartan, Riomet

💬 Comment   ↪ Take Medications

🏠 Home   💊 Medications   📈 Measurements   📅 Appointments   🛤 Goals

Medications
February 1, 2016

<

≡

Morning ✏️   See All ›

🔴	🟠	🟡	🟢	🔵
Lasix	Toprol	Zestril	Coumadin	Losar

Afternoon ✏️   See All ›

🔴	🟠	🟡	🔵	🟣
Lasix	Toprol	Zestril	Losartan	Riom

Evening ✏️   See All ›

🟤
Lipitor

⌒

Medicine Cabinet

🏠	💊	📊	📅	🚩
Home	Medications	Measurements	Appointments	Goals

Morning ✏️

🔴	🟠	🟡	🟢
Lasix	Toprol	Zestril	Coumadin
🔵	🟣		
Losartan	Riomet		
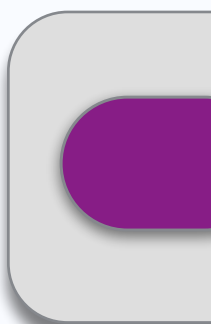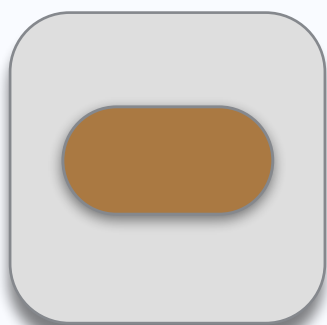
Select a medication above to Start

Skip   Take
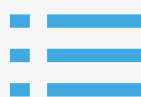
Medications
February 1, 2016

‹ ☰

Morning ✏️

Lasix

Toprol
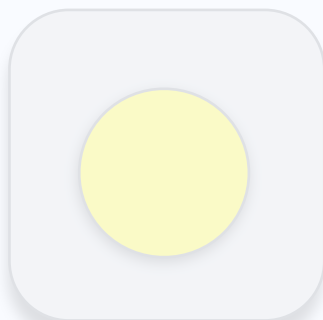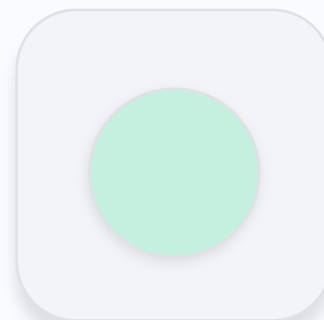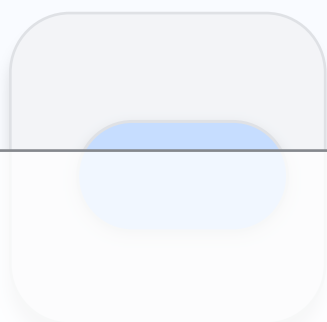
Zestril

Coumadin

Losartan

Riomet

Lasix (Furosemide) ✏️ More Info ›

Dose:
40 mg

1 tablets [− | +]

Instructions:
Take twice daily; First in morning and then 6-8 hours later

Purpose:
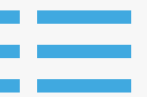Treats salt and fluid retention and swelling caused by heart failure

| Skip | Take |

Morning ✎

Lasix   Toprol   Zestril   Coumadin

Are you sure you want to skip Lasix?

| No | Yes |

Lasix (Furosemide)   More Info >

Instructions:
Take twice daily; First in morning and then 6-8 hours later

Dose:
40 mg

Purpose:
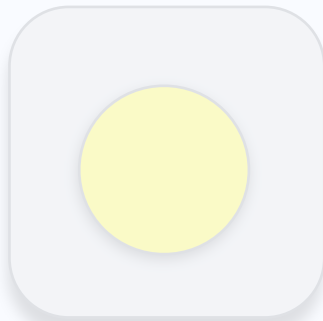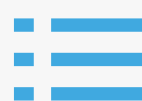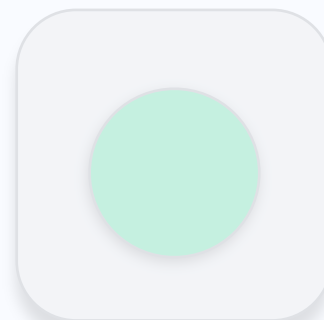Treats salt and fluid retention and swelling caused by heart failure

Skip   Take

Morning ✏️

| Lasix | Toprol | Zestril | Coumadin |

Are you sure you want to skip Lasix?

Lasix (Furosemide) More Info >

| Take | Skip |

Instructions:
Take twice daily; First in morning and then 6-8 hours later

Alternate

Dose:
40 mg

Purpose:
Treats salt and fluid retention and swelling caused by heart failure

| Skip | Take |

Morning 🖊

Lasix   Toprol   Zestril   Coumadin

Are you sure you want to skip Lasix?

Lasix (Furosemide)   More Info >

No:	Yes

Instructions:
Take twice daily; First in morning and then 6-8 hours later

Alternate

Dose:
40 mg

Purpose:
Treats salt and fluid retention and swelling caused by heart failure

Skip   Take

Medications
February 1, 2016
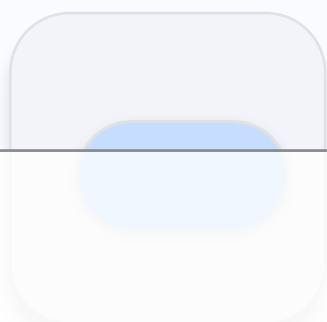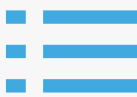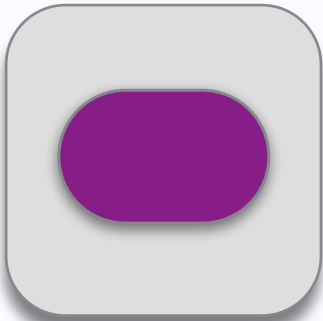
< ☰

Morning ✏️

Skipped   🟠   🟡   🟢
Lasix   Toprol Zestril Coumadin

🔵   🟣
Losartan Riomet

Action Completed!

You have skipped:

🔴
Lasix

Undo

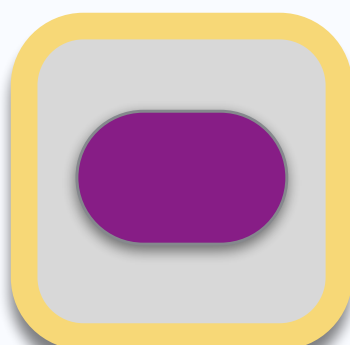Skip   Take

Medications
February 1, 2016

< ☰

Morning ✏️

Skipped	🟠	🟡	🟢
Lasix	Toprol	Zestril	Coumadin

🔵	🟣
Losartan	**Riomet**

Riomet (Metformin) ✏️ More Info ›

🍽️ **Take with meals**

Dose:
500 mg

2 tablets   [− | +]

Instructions:
Take orally, twice daily, with meals

Purpose:
Used to treat Type 2 Diabetes

Skip	Take

Medications
February 1, 2016

< ☰
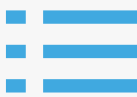
Morning ✏️

Skipped Lasix	🟢 Coumadin

Action Completed!

You have taken:
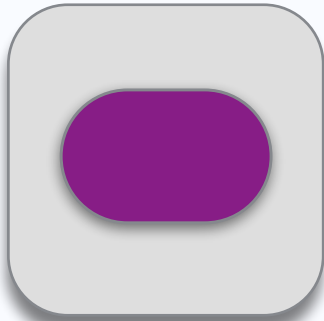
Toprol	Zestril	Losartan	Riomet
🟠	🟡	🔵	🟣

Undo

Skip   Take

Medications
February 1, 2016

Morning ✏️

Skipped
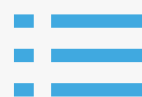
Lasix

🟢

Coumadin

Coumadin (Warfarin sodium) ✏️ More Info ›

Instructions:
Take orally once a day in the morning

Dose:
2 mg

Purpose:
Treats and prevents blood clots by acting as a blood thinner.
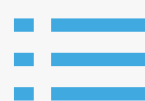
Skip	Take

Morning ✏️

Skipped

Lasix

Coumadin

Warning:
You should not skip Coumadin. Please take the dose as soon as possible, unless it is time for your next dose.

Coumadin (Warfarin sodium)   More Info

Instructions:
Take orally

Are you sure you want to skip Coumadin?

Dose:
2 mg

No   Yes

Purpose:
Treats and prevents blood clots by acting as a blood thinner.
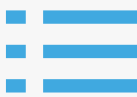
Skip   Take

Morning ✏️

Skipped   !
                Skipped

Lasix   Coumadin

Action Completed!

You have skipped:

🟢

Coumadin

Undo

Skip   Take

Medications
February 1, 2016
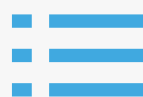
< ☰

Morning ✏️

Skipped	**!** **Skipped**
Lasix	Coumadin

Action Completed!
You have **skipped**:

🟢

Coumadin

[Undo](#)

[Back to Medications Home](#)
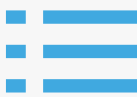
Skip	Take

Medications
February 1, 2016

<☰

Morning ✏️   See All ›

Skipped	! Skipped
Lasix	Coumadin

Afternoon ✏️   See All ›

| Lasix | Toprol | Zestril | Losartan | Riom |

Evening ✏️   See All ›

Lipitor

⌒
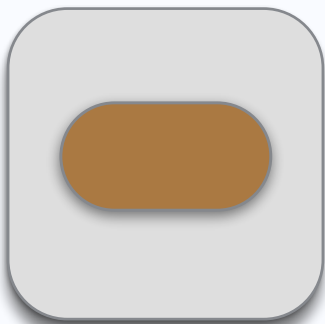
Medicine Cabinet

February 1, 2016

How are you feeling?

URGENT: Skipped Medication!   8:20 am

Coumadin

💬 Comment   ➦ Medications

Completed Medications   8:20 am

Taken: Toprol, Zestril, Losartan, Riomet
Skipped: Lasix

💬 Comment   ➦ Medications

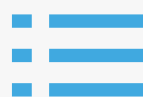🏠 Home   💊 Medications   📊 Measurements   📅 Appointments   🛣 Goals

Morning ✏️   See All >

Skipped	❗ Skipped
Lasix	Coumadin

Afternoon ✏️   See All >

🔴	🟠	🟡	🔵	🟣
Lasix	Toprol	Zestril	Losartan	Riom

Evening ✏️   See All >

🟤
Lipitor

Medicine Cabinet

Medications
February 1, 2016

☰
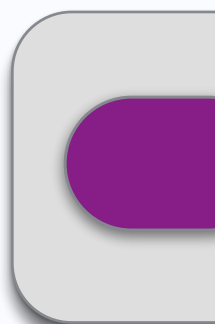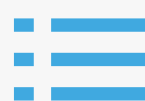
Morning ✏️

Skipped	**!** Skipped
Lasix	Coumadin

Select a medication above to Start

Skip   Take

Morning ✏️

Skipped

Lasix

!
Skipped

Coumadin

Coumadin (Warfarin sodium) More Info ›

You skipped your 8:00 am dose at 8:20 am. Please take this dose as soon as possible.

Instructions:
Take orally once a day in the morning

Purpose:
Treats and prevents blood clots by acting as a blood thinner.

Skip

Take

Medications
February 1, 2016

<   ☰

Morning ✏️

[Skipped]

Lasix

Action Completed!

You have taken:

🟢

Coumadin

[Undo]

Back to Medications Home
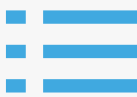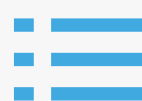
| Skip | Take |

Medications

February 1, 2016

Morning ✏️

Skipped

Lasix

Skipped

Coumadin

Coumadin (Warfarin sodium) More Info >

You skipped your 8:00 am dose at 8:20 am. More than 4 hours have passed. Please DO NOT TAKE this dose.

Instructions:
Take orally once a day in the m

Alternate View

Purpose:
Treats and prevents blood clots by acting as a blood thinner.

Skip

Take

February 1, 2016

How are you feeling?

Completed Medications   9:14 am

Taken: Coumadin

💬 Comment   ↪ Medications

Completed Medications   8:20 am

Taken: Toprol, Zestril, Losartan, Riomet
Skipped: Lasix

💬 Comment   ↪ Medications

Medications
February 1, 2016

<   ☰

Morning ✏️   See All ›

Skipped	**!** Skipped
Lasix	Coumadin

Afternoon ✏️   See All ›

🔴	🟠	🟡	🔵	🟣
Lasix	Toprol	Zestril	Losartan	Riom

Evening ✏️   See All ›

🟤
Lipitor

⌄

Medicine Cabinet

🏠 Home	💊 Medications	📈 Measurements	📅 Appointments	🛣️ Goals

Medications
February 1, 2016

‹   ☰

Morning ✏️   See All ›

Skipped	Skipped
Lasix	Coumadin

Afternoon ✏️   See All ›

Lasix   Toprol   Zestril   Losartan   Riom

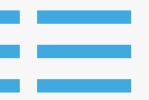## Evening ✏️   See All ›

⌄

Medicine Cabinet

Ativan   Lasix   Toprol   Zestril   Losar

Skip	Take

Medications
February 1, 2016

‹   ☰
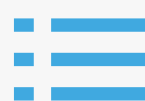
Morning ✏️   See All ›

Skipped	Skipped
Lasix	Coumadin

⌄

Medicine Cabinet

Ativan

Ativan (Lorazepam)

Provides short-term relief of the symptoms of anxiety

Select reason for taking Ativan:

✅ Felt Anxious

◯ Heart Racing

◯ | Other…

[Skip]   [Take]

February 1, 2016

How are you feeling?

Completed Medications   9:42 am

Taken: Ativan
Reason: Felt anxious

💬 Comment   ➡ Medications

Completed Medications   9:14 am

Taken: Coumadin

💬 Comment   ➡ Medications

Completed Medications   8:20 am

Taken: Toprol, Zestril, Losartan, Riomet
Skipped: Lasix

💬 Comment   ➡ Medications

Medications
February 1, 2016

< ☰

Morning ✏️ See All >

Skipped
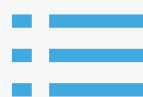
Lasix

Afternoon ✏️ See All >

Lasix   Toprol   Zestril   Losartan   Riom
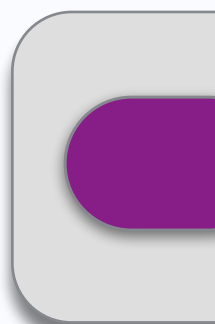
Evening ✏️ See All >
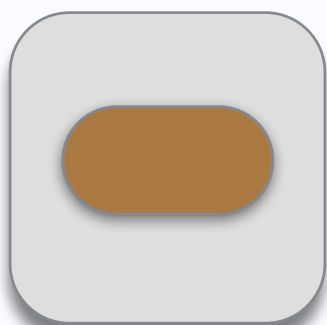
Lipitor

Medicine Cabinet

Home | Medications | Measurements | Appointments | Goals

February 1, 2016

How are you feeling?

Take Measurement   7:00 am

Weight, Blood Pressure, and Heart Rate

💬 Comment   ➦ Measurements

View Past History
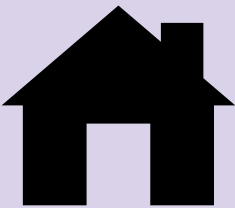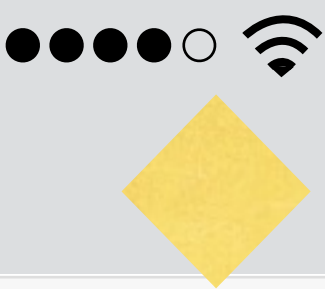
‹   **Measurements**   Done

Weight | incomplete   **lbs**

Blood Pressure | incomplete   **mmHg**

Heart Rate | incomplete   **bpm**

<   **Measurements**   Done

Weight | lbs

Blood Pressure   incomplete   mmHg

Heart Rate   incomplete   bpm

1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
	0	⌫

◁   **Measurements**   Done

Weight	120	lbs
Blood Pressure	| /	mmHg
Heart Rate	incomplete	bpm

1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
	0	⌫

February 1, 2016

<   **Measurements**   Done

Weight   120 lbs   **lbs**

Blood Pressure High

Try taking another measurement in one minute. To ensure a good reading, please follow the tips.

View tips | OK

Home   Medications   Measurements   Appointments   Goals

<   **Measurements**   Done

Weight   120   lbs

Blood Pressure   Try again in 54 seconds

Heart Rate   incomplete   bpm

1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
	0	⌫

< **Measurement Tips**

Blood Pressure Tips

- Be still

- Make sure you haven't had any caffeine, tobacco, or exercise in the last 30 minutes.

- Wait one minute before taking another measurement.

- Make sure you are sitting down, with your back supported by a chair and your feet on the floor.

◁   **Measurements**   Done

Weight	120	lbs
Blood Pressure		/		mmHg
Heart Rate	incomplete	bpm

1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
	0	⌫

February 1, 2016

<   **Measurements**   Done

Weight   120   lbs

Blood Pressure High

Try taking another measurement in one minute. To ensure a good reading, please follow the tips.
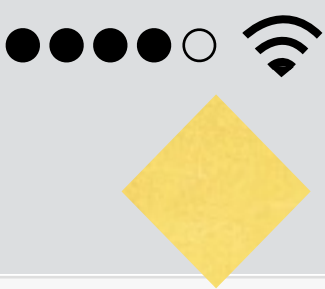
View tips   OK

Home   Medications   Measurements   Appointments   Goals

‹   **Measurements**   Done

Weight   120   lbs

Blood Pressure   Try again in 60 seconds

Heart Rate   incomplete   bpm

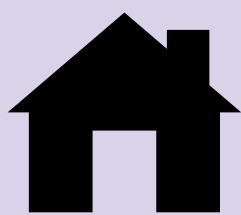| 1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
	0	⌫

‹   **Measurement Tips**

Blood Pressure Tips

- Be still

- Make sure you haven't had any caffeine, tobacco, or exercise in the last 30 minutes.

- Wait one minute before taking another measurement.

- Make sure you are sitting down, with your back supported by a chair and your feet on the floor.
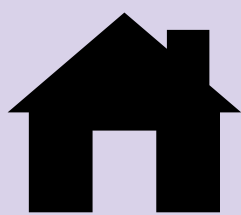
⟨ **Measurements** Done

Weight **120** lbs

Blood Pressure | / mmHg

Heart Rate *incomplete* bpm

1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
	0	⌫

‹ **Measurements** Done

Weight | 120 | lbs

Blood Pressure | 175/95 | mmHg

Heart Rate | | | bpm

1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
	0	⌫

<   **Measurements**   Done

Weight	120	lbs
Blood Pressure	175/98	mmHg
Heart Rate	75	bpm

🏠 Home   💊 Medications   📊 Measurements   📅 Appointments   🏁 Goals

February 1, 2016

How are you feeling?

TODO: Blood Pressure　　　7:07 am

Call your care coordinator, Denise Myers.

💬 Comment　　　　　↱ Call

Measurement recorded　　　7:07 am

Click to view completed measurements

💬 Comment　　　　　↱ Measurements
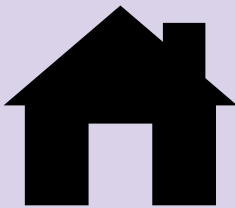
Home　　Medications　　Measurements　　Appointments　　Goals

February 1, 2016

How are you feeling?

TODO: Blood Pressure   7:07 am

Call your care coordinator, Denise Myers.

(111) 222-333

| Call | Cancel |

Click to view completed measurements

💬 Comment   ➡ Measurements

🏠 Home   💊 Medications   📊 Measurements   📅 Appointments   🚩 Goals

| Day | **Week** | Month | Year |

Weight
Daily Average: 120

120 lbs
Today, 8:54 PM

140

100

Feb 3　4　5　6　7　8　9

Blood Pressure
⌄170 / ⌃90 mmHg

170/90
Today, 8:53 PM

200
⌄

⌃
60

Feb 3　4　5　6　7　8　9

Heart Rate
Min: 75　Max: 75

75 bpm
Today, 8:55 PM

86

February 1, 2016

Hi Mrs A   🔍   +

Clinical Goals
11 Goals

Personal Goals
4 Goals

February 1, 2016

Hi Mrs A   🔍 +

Clinical Goals
11 Goals

Personal Goals
4 Goals

1. Remain independent

2. Keep visiting with friends and doing my daily activities

3. Be able to visit out-of-town family by plane

4. Feel healthy

Hi Mrs A

🔍   +

Clinical Goals
11 Goals

1. Control systolic blood pressure to lower than 130/80 mm Hg but not less than 90 mmHg

2. Oxygen levels with ambulation or while sleeping – keep O2 saturation at >91-92%

3. Keep HbA1C levels at 7% or less
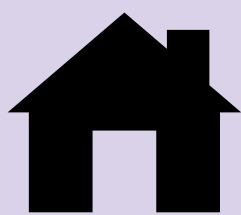
4. Keep heart rate between 60-80 bpm

February 1, 2016

How are you feeling?

Appointment Reminder!   9:00 AM

Appointment with cardiologist Dr.Hart
tomorrow at 9:00 AM

💬   Comment   ↱   View Appointment

Home   Medications   Measurements   Appointments   Goals

February 1, 2016

🏠

How are you feeling?

Appointment Reminder!　　9:01 AM

Appointment with cardiologist Dr.Hart
tomorrow at 9:00 AM

💬 Comment　　↱ View Appointment

🏠 Home　 💊 Medications　 📊 Measurements　 📅 Appointments　 🛣 Goals

February 1, 2016

How are you feeling?

Your son Commented on your 9:00 Am Appointment Reminder. Click to view.

Appointment Reminder!   9:01 AM

Appointment with cardiologist Dr.Hart
tomorrow at 9:00 AM

💬 Comment   ↱ View Appointment

Home   Medications   Measurements   Appointments   Goals

🏠   February 1, 2016

How are you feeling?

Appointment Reminder!   9:01 AM

Appointment with cardiologist Dr.Hart tomorrow at 9:00 AM

💬 Comment   ➡ View Appointment

Son   10:22 AM

Hey Mom, I'll come pick you up at around 8:30Am tomorrow. Don't forget to bring your ID.

📷   Send

How are you feeling?

Appointment Reminder!   9:01 AM

Appointment with cardiologist Dr.Hart tomorrow at 9:00 AM

💬 Comment   ➤ View Appointment

Son   10:22 AM

Hey Mom, I'll come pick you up at around 8:30Am tomorrow. Don't forget to bring your ID.

Thanks. See you tomorrow.   Send

Q W E R T Y U I O P

A S D F G H J K L
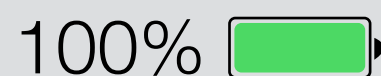
⇧ Z X C V B N M ⌫

.?123   space   return

February 1, 2016

How are you feeling?

Appointment Reminder!   9:01 AM

Appointment with cardiologist Dr.Hart tomorrow at 9:00 AM
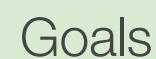
💬 | Comment   ➤ View Appointment

Son

10:22 AM

Hey Mom, I'll come pick you up at around 8:30Am tomorrow. Don't forget to bring your ID.

10:30 AM

Thanks. See you tomorrow.

📷 | Send

Home   Medications   Measurements   Appointments   Goals

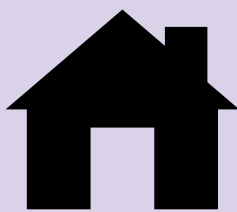| S	M	T	W	T	F	S
	1	2	**3**	4	5	6
7	8	9	10	11	12	13
14	15	16	17	**18**	19	20
21	22	23	24	25	26	27
28	**29**					

Appointment with cardiologist Dr.Hart

Feb 2, 2016 9:00 AM to 10:30 Am
Location : 2020 Kittredge Str, Berkeley, 94704

Note : Please bring your ID

Home   Medications   Measurements   Appointments   Goals

February 1, 2016

How are you feeling?

Screening Questionnaire   10:02 am

Complete every 2 weeks

💬 Comment   ➡ Symptoms

URGENT: Call Denise   7:07 am

Blood Pressure too high!

💬 Comment   ➡ Measurements

Measurement recorded   7:07 am

Click to view completed measurements

💬 Comment   ➡ Measurements

Home   Medications   Measurements   Appointments   Goals

In terms of <u>anxiety</u>, select the number that best describes how you feel now.

1

No anxiety   Worst possible anxiety

1   10
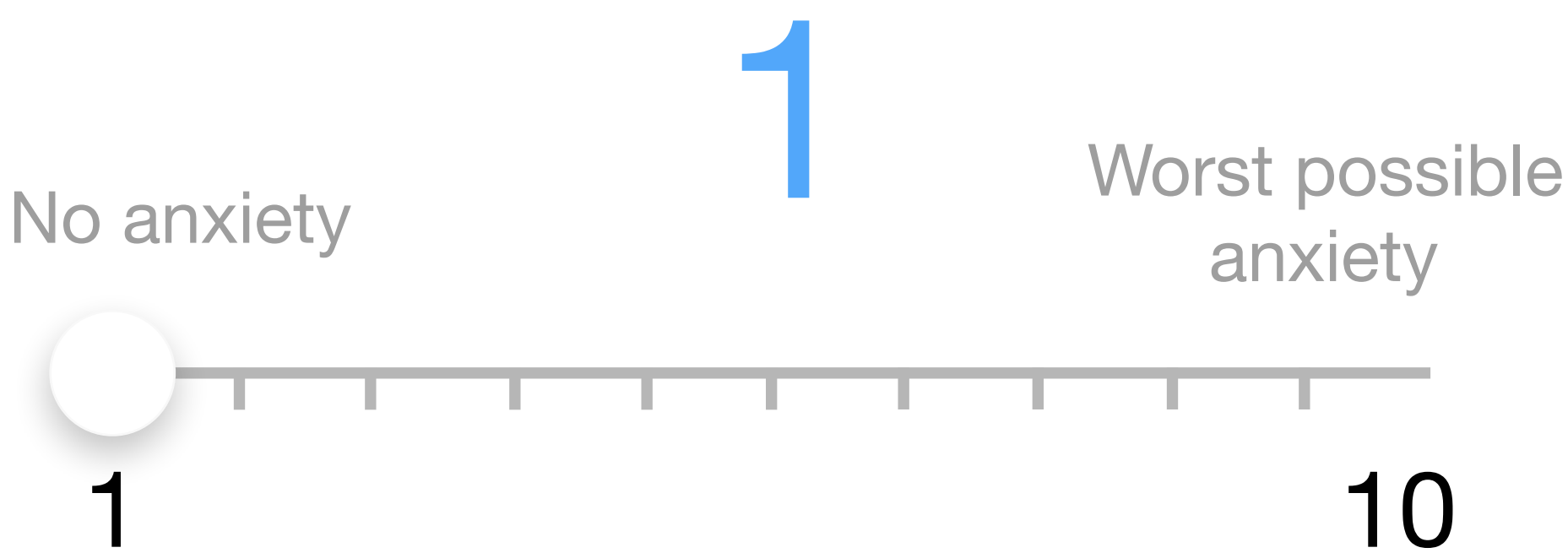
Next

Skip this question

In terms of <u>anxiety</u>, select the number that best describes how you feel now.

3

No anxiety

Worst possible anxiety

1   10

Next

Skip this question

You ranked your anxiety as 3 on a scale of 1-10.

Have you felt this anxious for <u>two weeks or longer</u>?

Yes, continuously.

Yes, off and on.

No

Next

Skip this question

You ranked your anxiety as 3 on a scale of 1-10.

Have you felt this anxious for <u>two weeks or longer</u>?

Yes, continuously.

Yes, off and on.　　✓

No

Next

Skip this question

Are you re-living or facing events in ways that make you feel more anxious, like dreams or flashbacks?

Yes, continuously.

Yes, off and on.

No

Next

Skip this question

Are you re-living or facing events in ways that make you feel more anxious, like dreams or flashbacks?

Yes, continuously.

Yes, off and on. ✓

No

Next

Skip this question

Are you having panic attacks, periods or spells of sudden fear, discomfort, intense worry or uneasiness?

Yes, continuously.

Yes, off and on.

No

Next

Skip this question

Are you having panic attacks, periods or spells of sudden fear, discomfort, intense worry or uneasiness?

Yes, continuously.

Yes, off and on.   ✓

No

Next

Skip this question

How much does your anxiety affect your daily activities at home or at work?

Yes, significantly.

Yes, some.

Not at all.

Next

Skip this question

How much does your anxiety affect your daily activities at home or at work?

Yes, significantly.

Yes, some.   ✓

Not at all.

Next

Skip this question

How much does your anxiety affect your sleep?

Significantly.

Some.

Not at all.

Next

Skip this question

How much does your anxiety affect your sleep?

Significantly

Some ✓

Not at all

Next

Skip this question

Do any of these apply to you?

Select all that apply.

Waiting for test results

Financial problems

History of anxiety or depression

Withdrawal from alcohol or substance use

Living alone

Recurrent or advanced disease

Not exercising

Next

Skip this question

Do any of these apply to you?

Select all that apply.

Waiting for test results

Financial problems ✓

History of anxiety or depression

Withdrawal from alcohol or substance use ✓

Living alone

Recurrent or advanced disease

Not exercising

Next

Skip this question

Are you feeling any of the following?

Fatigue

Shortness of breath

Pain

No

Next

Skip this question

Are you feeling any of the following?

Fatigue

Shortness of breath   ✓

Pain

No

Done

Skip this question

Thank you for completing the Screening Questionnaire.

🏠 Home

How are you feeling?

Screening Questionnaire   10:02 am

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