"Memedicine": Paper Prototype, Testing, Refinement

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Sean Mack - Observer/ Note-taker

<Problem & Solution Overview - 1 paragraph>

Taking prescription medication is a routine part of everyday life for nearly half of all Americans. Modern pharmaceuticals are tailored to treat an expansive variety of ailments including potentially life-threatening conditions such as high cholesterol, depression, heart disease, and diabetes. However, even when faced with the dangerous consequences of failing to take these essential medications, patients of all ages can still fall prey to simple forgetfulness and accidentally neglect to follow their regimen correctly. Memedicine seeks to liberate patients from the memorization and guesswork of tracking their prescriptions themselves and instead organize it for them on their mobile device. Memedicine composites multiple distinct dosing schedules, quantities, and methods into a single, easy-to-follow timeline, and presents patients with just the information they need when it's time for the next dose. With Memedicine, patients can finally get back to doing what their prescriptions were supposed to afford them all along: living happy, healthy lives.

<Paper Prototype Description w/Overview & Close-ups - 1 page>

The paper prototype consists of several 2"x3" cards, representing a smartphone screen. They were designed in Adobe Illustrator and printed, then pasted onto index card backing for durability. This method, instead of drawing on pieces of paper directly, was chosen because many elements are repeated over and over in the app, making it tedious to draw one by one. Drawing neatly on tiny pieces of paper is also quite difficult. General design choices for the prototype were rounded rectangles for clickables, a single font for the whole app, and back/ cancel buttons on all screens.
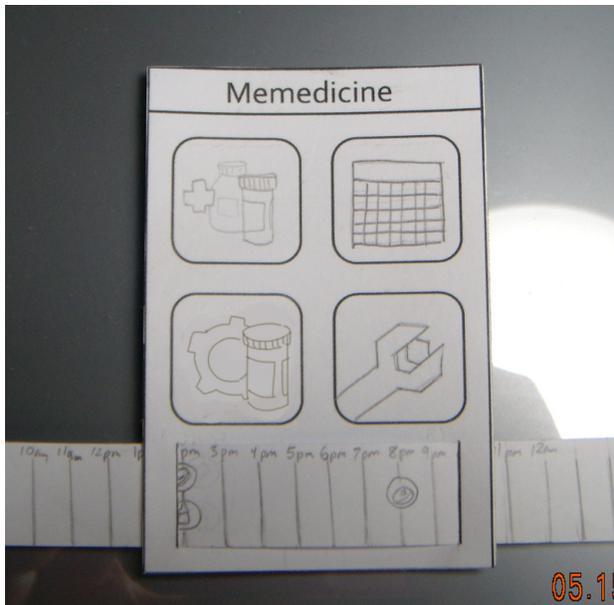
The main screen has 4 options represented pictorially - Adding a new medicine, accessing the calendar, setting the medication settings, and setting app options. It also has a small interactive quick schedule on the bottom, which can be scrolled for a convenient look at upcoming medications. The schedule screen is non-interactive because it is not required for any task but needs to be present in case a tester accesses it. The app settings screen is blank.

Adding Medicine
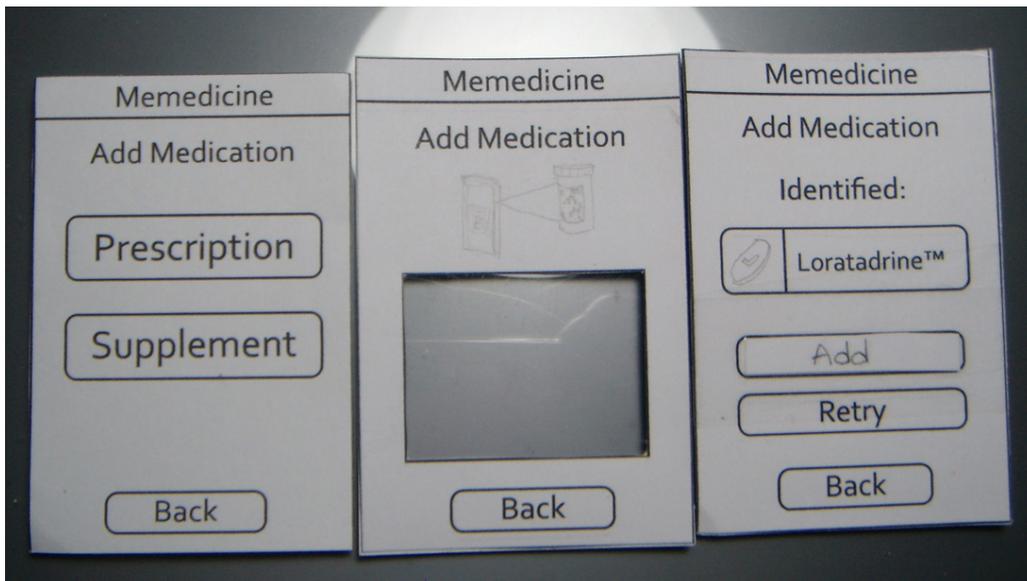
Adding medicine is supported by three screens. The first screen (left) asks the user if they are adding a prescription medication or a supplement, since they have different requirements. The screens for adding supplements are not included since they aren't within the task scope, and it

is highly unlikely a tester would mistakenly try to add a supplement.

The second screen (middle) has a picture telling people to point the phone camera at the QR code on the prescription medication they are trying to add, the cut-out portion of the card representing the camera view. The lack of text/detailed explanation is an effort to keep with the simplified format of the app, but as seen later it causes trouble.

The third screen (right)shows the detected medicine and asks what action the user would like to take - add the detected medication, retry in case the wrong one was detected, or go back. If the user chooses to add the medicine, the activity is finished and the main screen is brought up.

Medication Settings
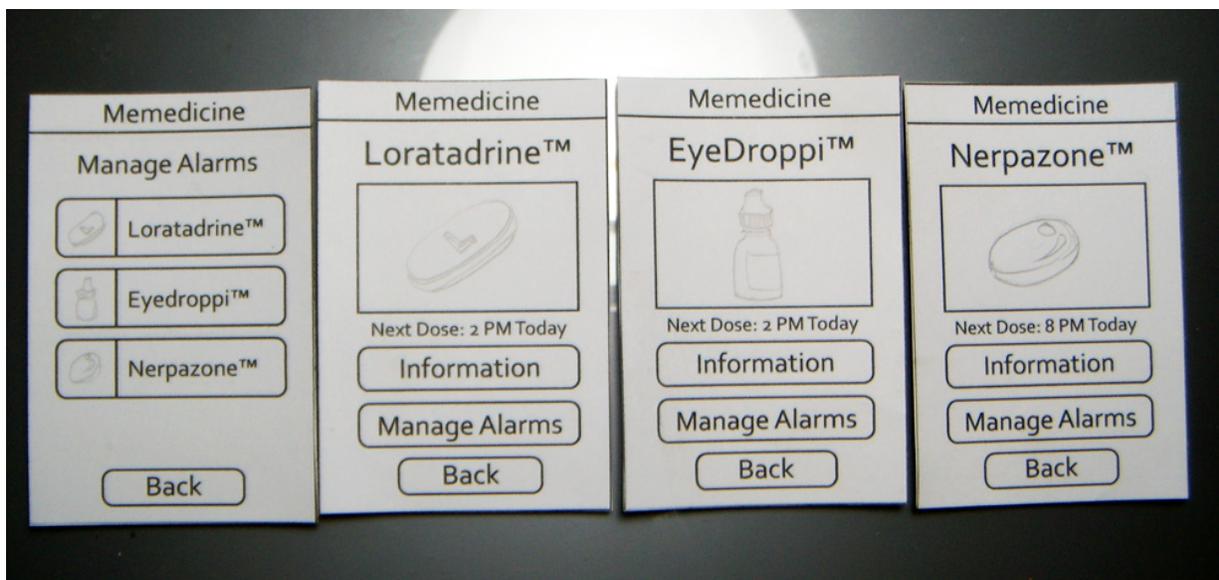
The initial medication settings screen (far left) shows all the medications. When one is pressed the summary screen for that medication (right, all) comes up and the user can choose to read more information about it or set the alarms.
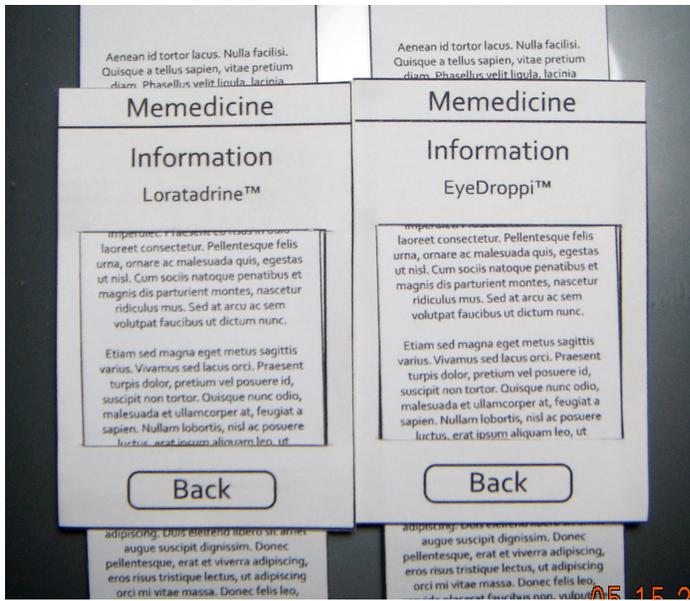
"Information" leads to a screen with a scrollable text box containing information about the medication.
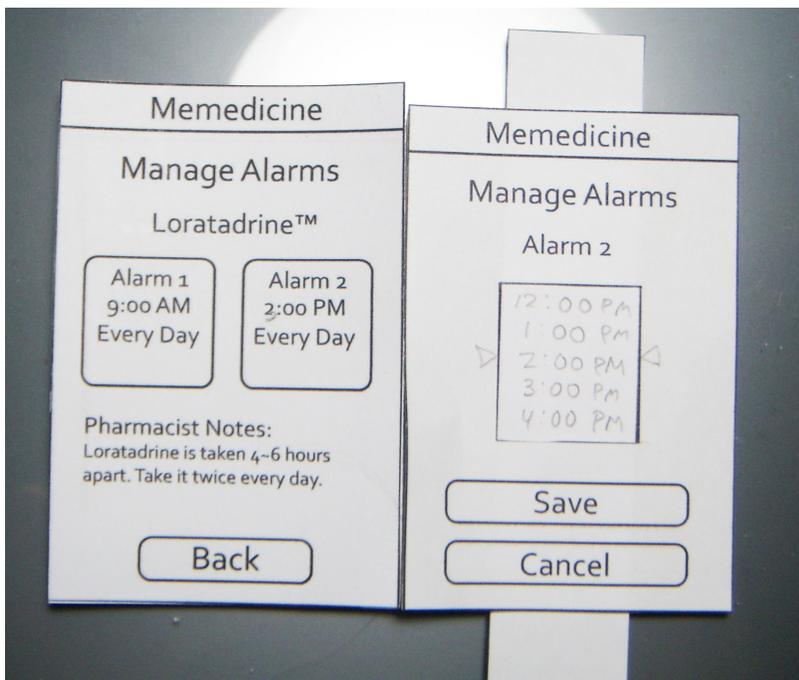
"Set Alarms" leads to a screen (left) with buttons for setting the alarms, and pertinent information to remember when setting alarms. Clicking an alarm button leads to a screen (right) with a scrollable area for choosing the alarm time.

Taking Medication
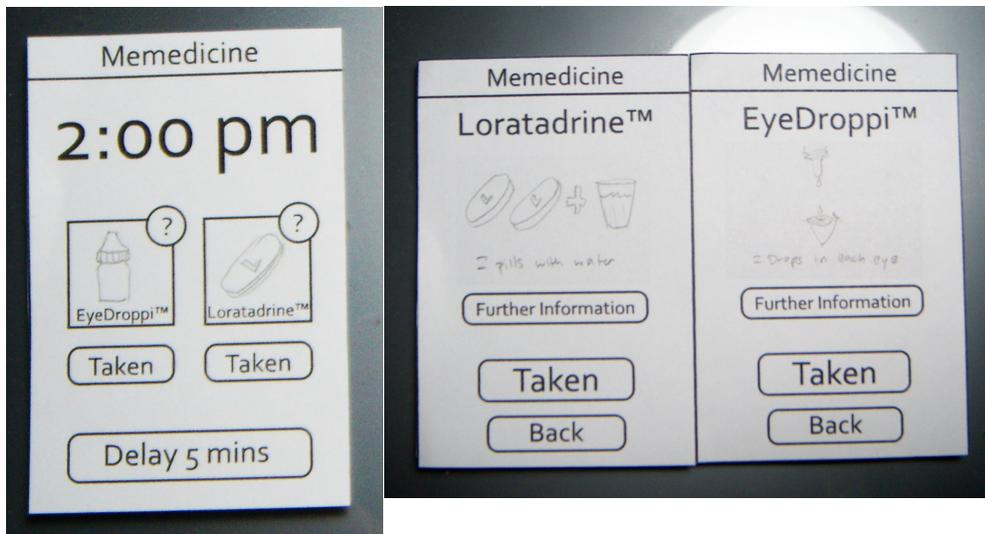
When an alarm goes off a screen appears with the medication linked to that alarm time on it. The "Taken" button considers the medication above it taken, and removes it from the screen. If the user does not remember the way to take that medication, they can click the "?" button on the upper right hand corner of the medication picture and go to a screen with a picture of how to take it, "Further Information" if the user wants to read more about it (Same as Medicine Settings Information screen), "Taken" which goes back to the taking medication screen and considers that medication taken, and "Back".

There is a "Delay 5 Mins" button that behaves like a snooze button, temporarily stopping the alarm.

Once all medications are taken, a screen [fig 2.?] confirming all medications have been taken is shown. Going "back" takes the user to the main screen.

<Testing Method>

<Participants - 1 paragraph>

The three participants for our paper prototype testing were chosen because they took medicine and supplements for conditions that would not take a turn for the worse or be dangerous to their short or long-term health if they frequently missed taking their medication. For our contextual inquiries, we had sought out individuals who had rather serious health issues. This previous group claimed that taking their medicine was high priority, and therefore they only forgot to take their medicine once every month and a half, to two months. Though this group's needs were higher, we believed that more forgetful individuals would benefit more greatly from our application than those who forgot less often. Jeremy, Yoko and Cheri represent those who take medication but their conditions are not as dire, or those who wish to take supplements for their diet but do not make a habit of doing so.

<Environment - 1 paragraph>

The environment for our user testing was designed to help the user feel comfortable. Jeremy's testing occurred in an on-campus cafe, in which he faced Mariko, the facilitator, head-on, with Katherine the "computer" on one side and Sean the note-taker on the other. The paper prototype was laid on the table facing him, and Mariko urged him to express his thought process vocally while giving him enough space to think without having one of us looking over his shoulder. Yoko's testing occurred in her kitchen, and Cheri's testing occurred an off-campus lounge, but the positions in which our group placed ourselves relative to the user was unchanged.

<Tasks - 0.5 pages>

The tasks that we had our users perform were carried over from our task analysis. Though the order of the difficulties were not performed from low to high, the order that we designated-- add medication, set alarm, take medicine-- reflected the most natural order of tasks that a user would perform when using our application, especially for the first time. Since our users had not been exposed to our interface prior to testing, we hypothesized that this task order would therefore result in less confusion.

Through our task analysis and video prototyping, we worked with these three tasks and concluded that they were distinct and would be commonly performed by the great majority of the projected user base of our application. Details of each task did, however, evolve throughout the course of the past couple weeks. As we solidified the design for our paper prototype, we naturally had to have example medications that we would use for the user testing stage of our design development. We created three fictional medications for paper prototype testing: Loratadrine, Eyedroppi, and Derpazone. Our most recent refined tasks involved the first of these three. Task 1 was to add Loratadrine to Memedicine as a new prescription medication. Task 2 was to set two alarms a day for Loratadrine: 9am and 2pm (the default being 9am and 3pm). Task 3 was to take all necessary medication when Memedicine's alarm goes off at 2pm.

The experimental roles of each member of the team stayed static throughout the user testing process, from user to user. Mariko was the observer and facilitator, who pressed the user to explain his or her thought process when he or she grew quiet. If a user expressed that he or she was unsure about the next step to take, Mariko asked the user to try whatever came to mind first, or explain what he or she would most likely do, and why. She asked questions such as "what did you think that button would do?" Or, "what was most confusing about that step?" After completion of all of the tasks, Mariko asked the user what he or she found most confusing about the interface, and what could be done to improve it.

Katherine acted as the computer by moving the appropriate pieces of the paper prototype in front of the user when he or she performed an action on a previous piece. She ordered the pieces by task, and then by screen, so that they could be quickly swapped out as necessary.

Sean was the note-taker who jotted down phrases spoken by the user, and questions that he or she asked, that would give us a clue as to what part of our prototype design was causing the most confusion. He primarily typed while listening to the user's spoken words, though he looked up whenever possible to gain clues about the user's confusion from his or her gestures and expressions as well.

Our user tests measured participants by their ease of use and places of pause. Most of our notes consist of process data, namely what features or buttons confused the user. We did not time our users' task navigation, but we did take note of how often the user had to pause and think about the next course of action to take. This included times at which the user asked for confirmation of the validity of their proposed "next step" (before taking the action itself), but did not include the number of times that a user took an action and explained their reasoning concurrently.

All-in-all, feedback from the users was good. We received positive comments about our main screen, which comprised of big icons for adding medication, schedule, alarms, and options/configurations. Most of the other screens also seemed easy to navigate, as the act of completing a task requires only linear navigation of a sequence of screens. The issues that arose were primarily caused by unclear button names and medicine recognition screen.

User 1: Jeremy

Jeremy completed the three tasks given to him without error or hesitation. He identified himself as being very tech-savvy, which could explain his lack of difficulty while navigating our interface. Though he understood the bar code scanning screen, he said that the retry and back buttons seemed redundant and were potentially confusing. Also, when the medication that was scanned was finalized, Jeremy claimed that the phrase "confirm" would have been better than "add" as it the task itself was to add the medication, and the single step would just be a final confirmation. For the second task, that of setting an alarm for Loratadrine, he considered the "back" button after setting the time for the second alarm unnecessary. If he felt that he were done with that task, he said, he would use the device's "back" or "home" button to return to the device's main screen.

User 2: Yoko

Yoko navigated most screens with a little hesitation, as she identified herself as not being very tech-savvy. She liked the big icons on the main screen, commenting that they were straight-forward and easy to understand.

For the first task, adding new medication to the application, she got stuck on the bar code scanning screen. There were two reasons for this: one, she could not make out the drawing at the top of the screen that was meant to direct her to point the mobile device's camera towards a bar code on the new medication container, and two, there was no button on the screen indicating a photograph was to be taken. When she figured out that she had to take a picture of the medicine, her first action was to attempt to take a picture of the instructions on the medicine bottle, instead of a bar code or QR code.

Everything went smoothly on the second task (setting the alarms) until she came across the "save" button on the time setting screen. She pressed it correctly, but said that it made more sense for her if it had said "set" instead of "save". After returning to the screen with the two alarms for Loratadrine, Yoko did not know what to do. The only button on the screen was "back", and she did not know whether or not pressing it would reset the change that she just made. She stated that it would be less confusing if there was a "confirm and return to main screen" button. She did, however, like that directly after setting the time, the app returned to the screen with the two alarms for Loratadrine; she said that it was nice to be able to confirm the new, changed times.

For the third task, taking medication, Yoko did not know what the question marks were for. She said that it was not clear that it would take the user to a directions screen and give information on how to take the medicine.

User 3: Cheri

Overall, Cheri whizzed through our interface with little trouble. She encountered the same problem as with Yoko when presented with the bar code screen for the first task. She said that

her first instinct would be to line up the medicine bottle with the camera, but she did not know whether that would involve a certain part of the bottle, or whether it would suffice to just have the entire bottle within the screen. Like Yoko, she could not make out the image at the top of the screen as the device taking a picture of a bar code/QR code. The second task did not cause her any confusion, and she stepped through the screens accurately, without hesitation. For the third task, Cheri was not sure whether or not she had to take all of the medication on screen that was presented to her at 2pm. Once she got past that part, however, she did not have any problems with locating and understanding the "taken" buttons on the following screen. When asked whether or not she would use the "?" buttons, she replied that she most likely would not, and would instead refer directly to the prescribed medicine bottle if confused about how to take the medicine. According to her, she would consider the bottle more reliable than the application.

<Interface Revision Sketches - 0.5 pages>

The changes to the interface are mostly superficial, as the testers did not find the underlying mechanics confusing but rather the wording and illustrations.
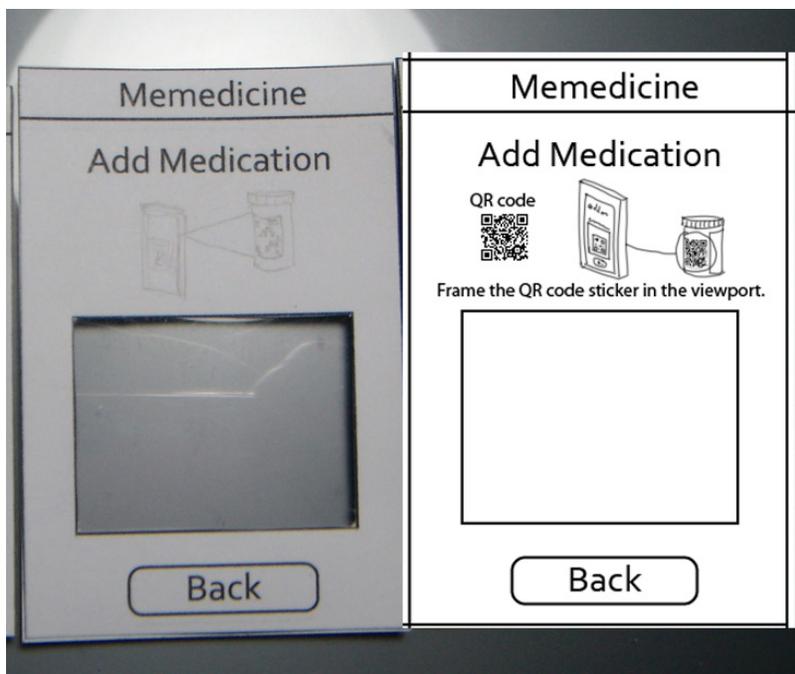
The QR code reading screen for adding medication has been supplemented with written explanation, since testers had a hard time figuring out what the small instructional illustration was telling them to do.
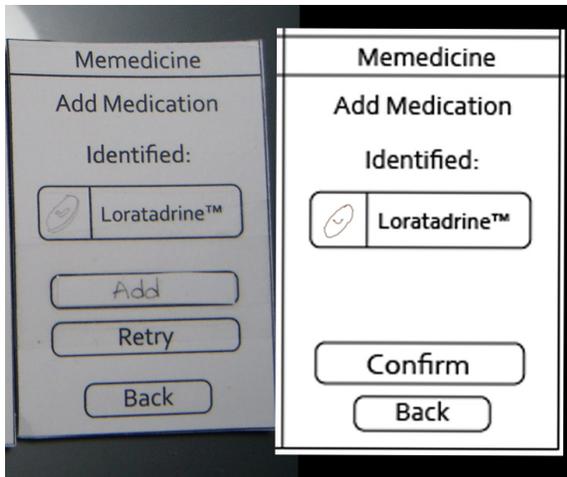
The screen for adding a detected medication has had its "Add" and "Retry" buttons replaced with "Confirm", "Retry"'s function being covered by the back button. This streamlines the options and makes them more understandable.
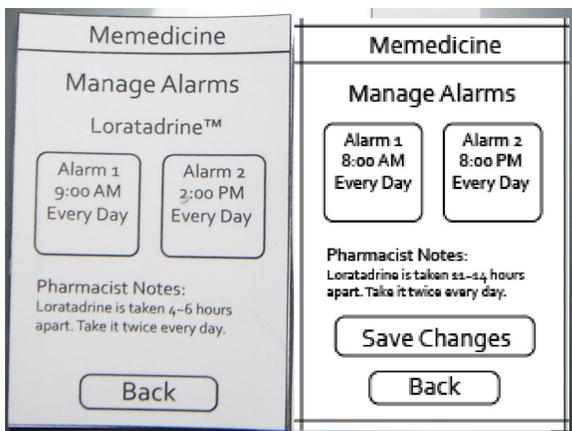
The alarm setting main screen now has a "Save Changes" button so that users can affirm that their changes have been made, something they were unsure of.
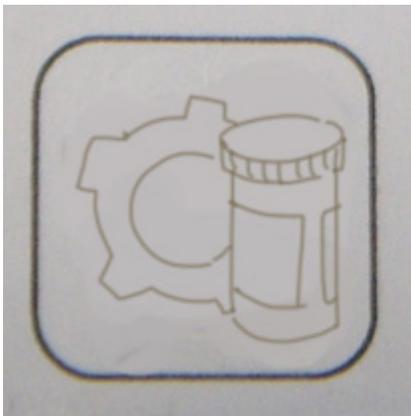
Lastly the Medicine Settings button on the main screen has had its icon changed to emphasize the fact that the alarm settings are edited there, as some testers were initially confused where to go.

<Summary Discussion & Lessons Learned - 0.75 pages>

Although user testing did indeed reveal weaknesses in the design captured by our paper prototype, they can be remedied by simple changes to phrasing or illustration; there was nothing about the design that revealed itself as fundamentally flawed after exposure to testers.

Buttons should use more specific language in their labels to more clearly inform users about the design state and which element to interact with next to accomplish their task; for example, "Back" implies to users that any changes recently made will be undone, even when the intent is that it simply indicate moving to a screen higher in the hierarchy.

Redundant paths should be avoided; the final screen of the "Add Medicine" progression had two buttons, "Retry" and "Back", that took users to exactly the same destination and bred some confusion in the users.

Successfully introducing new technologies to users requires more careful instruction. The code-scanning step of the "Add Medicine" progression is perhaps the design element most foreign to users, who may not have had prior exposure to QR codes or understand their function. The revised illustration and accompanying text tell users what it is that they should be looking for, where they can find it, and what to do with it once it's found.

On the whole, Memedicine benefits from a fairly straightforward progression of actions from home screen to task completion. Users are typically presented with only two directions in which to travel through the interface, and branching is fairly shallow when it does occur; it's difficult to get lost when home is only a few screens away.

Despite intense focus on removing ambiguities and streamlining progression through the design, we simply had too much knowledge about the intent of the design to view it with the fresh, ignorant perspective of someone without prior exposure. Testers were able to identify problems in mere minutes that had escaped our own lengthier scrutiny. The value of low-fidelity prototyping and user testing is clear in the concrete revisions to implement moving into the interactive prototype.