Medical Literacy Group | MedAware

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Team

Joe Lanzone
Senior, Computer Science
Joe was a pivotal part of the Heuristic Evaluation and Usability Tests, in improving the design for the high-fidelity prototype, creating the high fidelity prototype with others, and in documenting the design refinement process.

Joe Connolly
Sophomore, Computer Science
Joe played a key role in creating the initial prototype, performing the Heuristic Evaluation and Usability Tests, and in improving the design for the high-fidelity prototype.

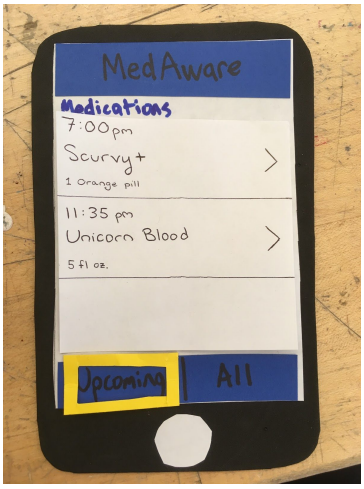
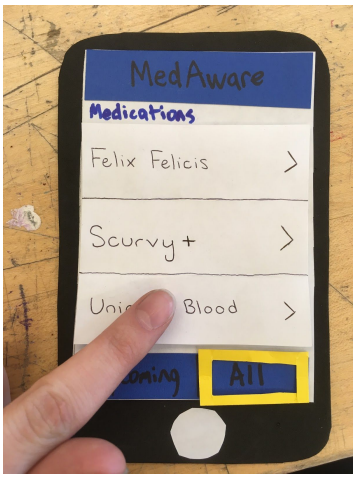
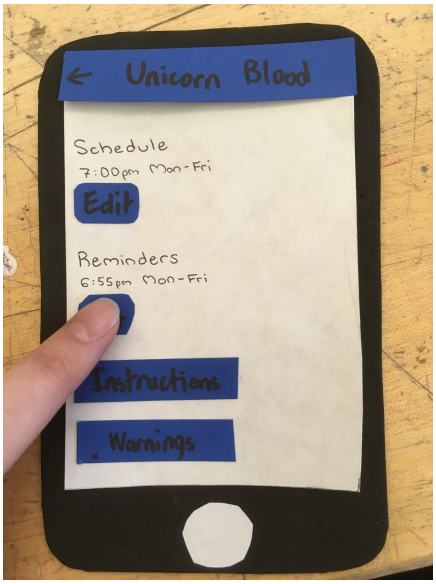
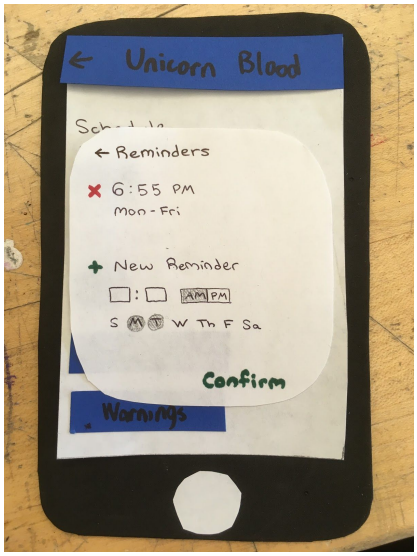
Simon Mendelsohn
Junior, Computer Science
Simon played a pivotal role in designing the initial prototype, performing the Heuristic Evaluation and Usability Tests, in improving the design for the high-fidelity prototype, and in documenting the design refinement process.

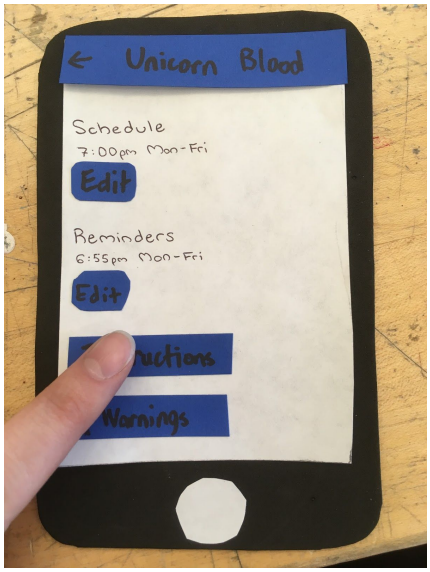
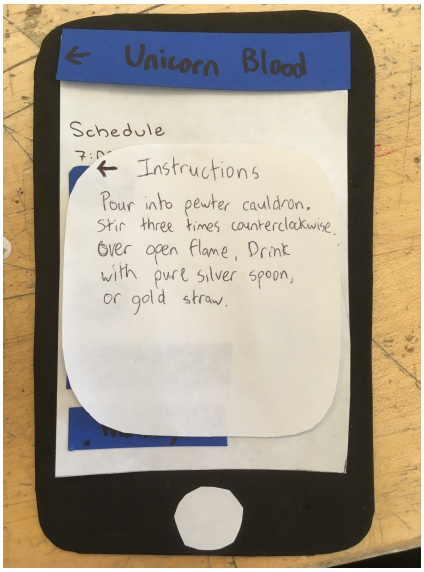
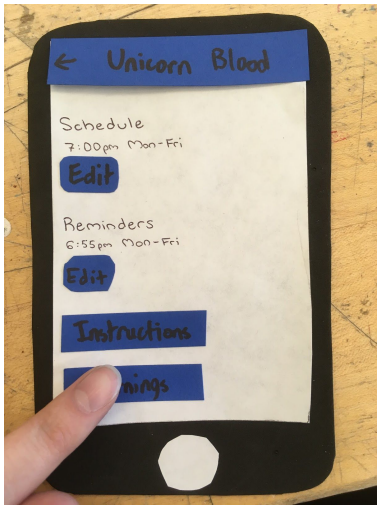
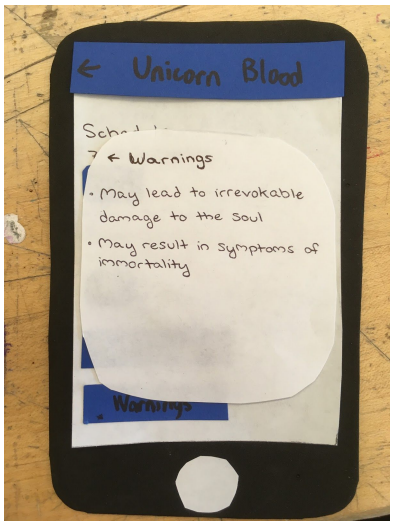
Dalya Dickstein
Junior, Computer Science
Dalya played a crucial role in creating the initial prototype, performing the Heuristic Evaluation, improving the design for the high-fidelity prototype, and in documenting the design refinement process.

Problem and Solution Overview

Frequently, patients incorrectly take or fail to take their prescribed medications. Generally, this is not because they make a conscious effort to ignore their doctors' instructions. Rather, the instructions for these medications can sometimes be involved or confusing, and it can be difficult to follow them every day, often multiple times a day. As a result, we propose a way to alleviate this situation. Broadly, we hope our application will improve drug adherence for patients with chronic illnesses. We hope to do this by providing a mobile application that can effectively organize the instructions and warnings of patients' medications, and can send patients reminders when their medications must be taken.

Initial Paper Prototype

	
Listing of upcoming dosage times. This helps the user plan for upcoming medication dosages.	**A listing page of all medications entered by the user. Here, the user can modify dosage information for medications that might not be listed in the "upcoming" tab.**
	
This is the medication overview page for Unicorn Blood. To edit a reminder (Task 1), the User selects "Edit" under the "Reminders" heading.	**Having clicked "Edit" under "Reminders", a pop-up window appears allowing the user to add and change reminders affiliated with the medication. This allows them to use the app as a platform to schedule and ensure medication usage.**

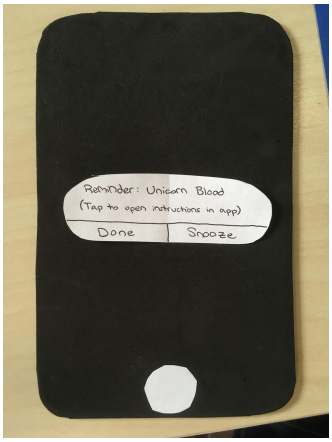
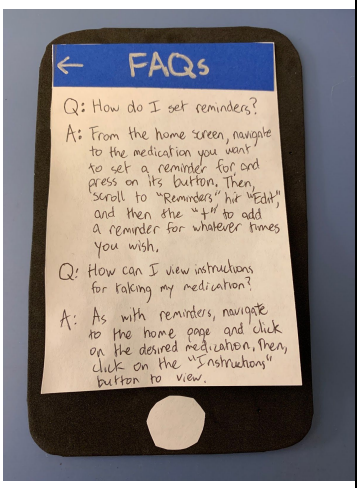
	
User Selects "Instructions" for the medication Unicorn Blood (Task 2).	**A small pop-up window appears directing the user in how to use their medication, helping ensure proper usage.**
	
The user selects "Warnings" for the medication Unicorn Blood.	**A small pop-up window appears listing high-priority warnings and side-effects of the medication. This helps users stay aware of the effects that their medications are having on their body, as well as potential dangers and unhealthy combinations (i.e. other medications or foods not to be consumed while on this medication).**

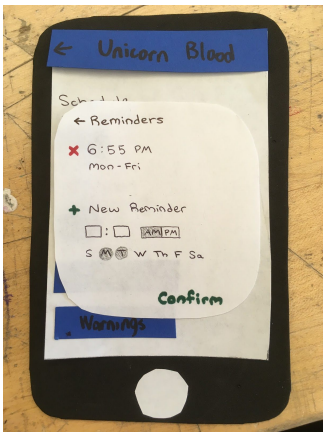
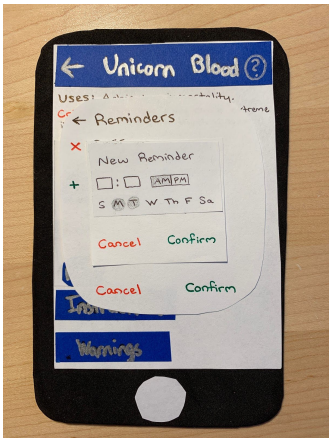
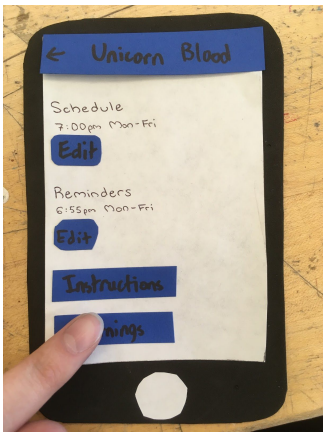
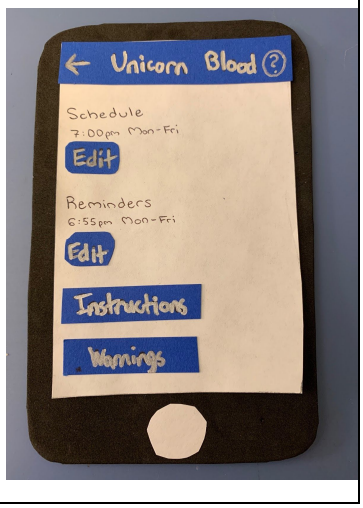
Testing Process

Heuristic Evaluation:

In class, we performed two separate heuristic evaluations with three students of another project group. Joe Connolly and Joe Lanzone conducted one evaluation with one subgroup, while Dalya and Simon conducted the other evaluation with the other subgroup. In both evaluations, we sought to understand whether our paper prototype violated any of the ten of Nielsen's Heuristics.

Results/Issues:

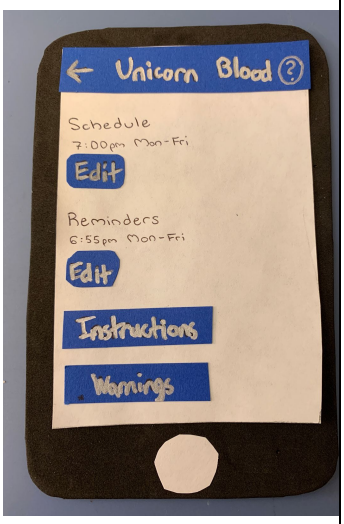
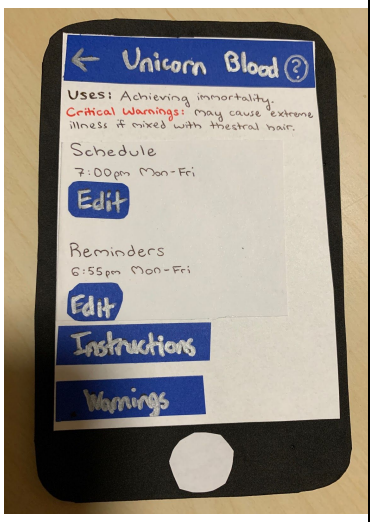
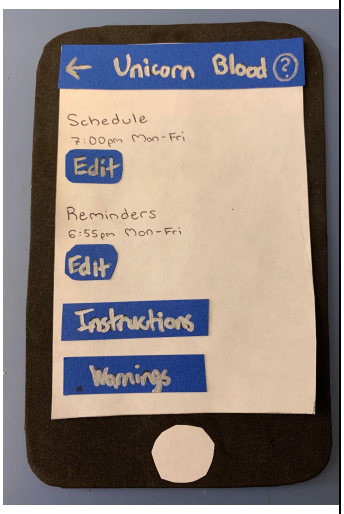
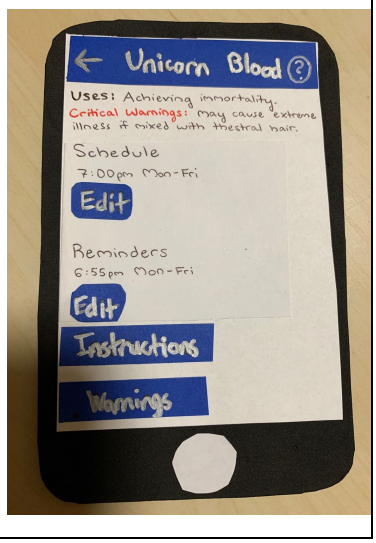
Image from Initial Prototype	Violation	Severity/Explanation	Fixed Image
N/A (didn't exist before)	P1. Visibility ● Keeping track of when medications are taken is not supported	2- We added an explicit push notification to better notify users at the time of taking the medication	
N/A (didn't exist before)	P10. Help and Documentation ● Wiki not there	2 - We added an FAQ page for clarity and help	

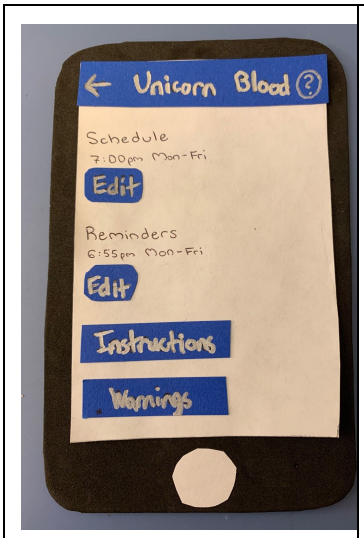
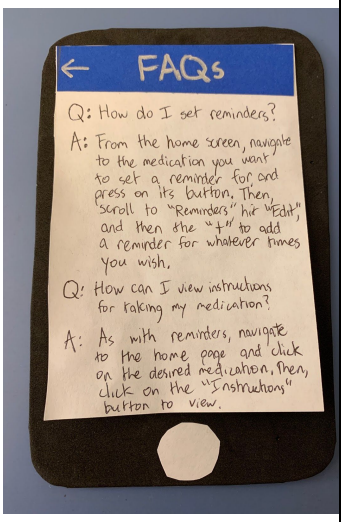
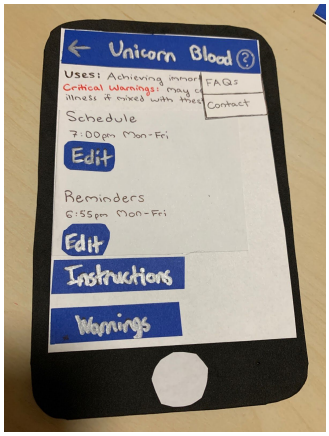
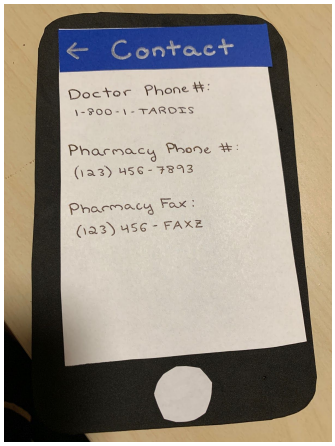
	P9. Help users recognize, diagnose, and recover from errors ● Can't cancel or go back when setting reminders	2 - We added additional buttons for users to cancel their reminders	
	P8. Aesthetic and minimalist design ● Black text on dark blue background not the best combination	1- Changed black text to lighter color for easier reading/usage	

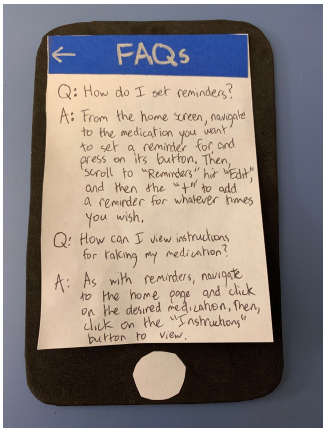
First Usability Test:

Roles: Joe Lanzone and Simon Mendelsohn performed the first usability test.
Rationale: We wanted to learn from someone with a chronic illness and see how they interacted with our prototype. Specifically, we wanted to elicit feedback as to how we could improve the app's functionality for our target user base.
Background: We performed the usability test with a Yale student with lyme disease. He currently takes 5 or 6 pills a day, twice a day, which is the lowest amount of medication he has taken in many years.
Test Protocol: Joe Lanzone led the usability test, while Simon Mendelsohn took notes. Joe encouraged the patient to interact with the prototype, asked questions, and guided the patient when interaction with the app stalled.

Results/Issues:

Image	Incident	Severity/Explanation	Fixed Image
	Wants major warnings to be more prominent	3 - We added critical warnings to the individual medication home page in order to make them more visible to users at an earlier stage when using the app	
	Wants the reason for taking the medication at top-level page; click-through buttons should provide further detail.	3 - We added a brief description of the purpose for taking the medication so that the user can access it more easily from the individual medication home page	

	Wants the time of the reminders to be relative to the time of the schedule (like 5 minutes before, as opposed to a specific time)	0 - We decided not to make this change because there are cases where it makes sense to have the reminder significantly earlier than the medication (like if one needs to remember in the morning to take the medication to work).	N/A However, we would consider allowing the option of syncing the reminder to the schedule, if users would prefer that instead.
	Wants the question mark to lead to contact page, not just FAQs.	2 - We added a contact option in order to provide the user with the chance to talk one-on-one with a health professional. This is useful for when the user thinks an in-person conversation would best benefit their understanding of their medical situation at a particular time.	 

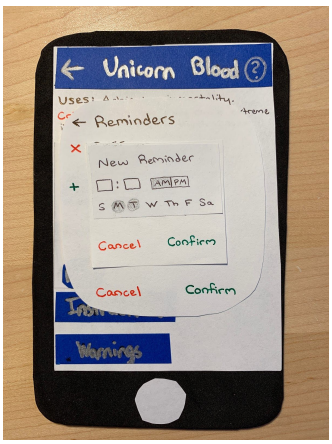
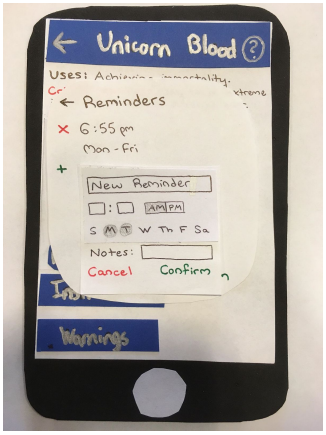
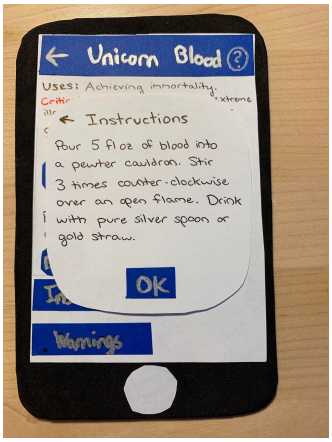
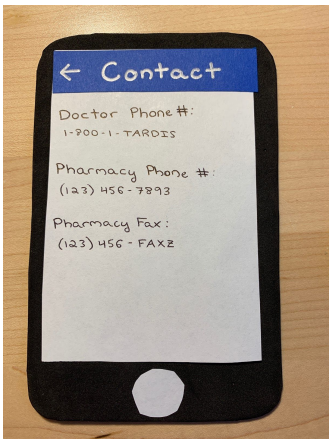
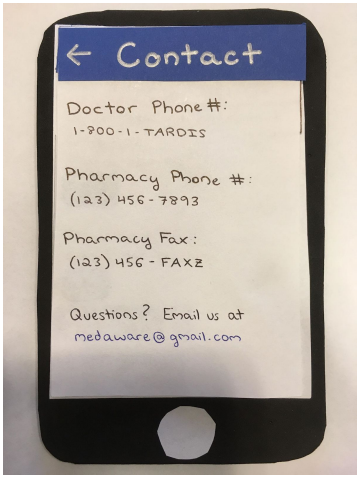
			

Second Usability Test:

Roles: Simon Mendelsohn performed the second usability test.
Rationale: We wanted to learn from someone who routinely takes medications and see how they interacted with our prototype. Specifically, we wanted to elicit feedback as to how we could improve the app's functionality for our target user base.
Background: We performed the usability test with a Yale student who routinely takes some medication.
Test Protocol: Simon Mendelsohn performed the usability test and took notes, guiding the patient where necessary.

Overall, the patient had a positive experience.
Results/Critical Incidents:

Image	Incident	Severity/Explanation	Fixed Image

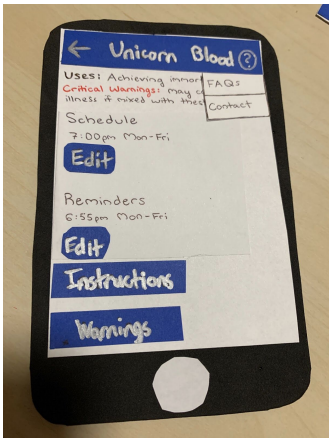
	Negative - Would like to be able to add comments to a reminder	2 - Can now edit the name of the reminder, and add notes as well	
	Positive - Liked the consistency that the “<-” and “OK” do the same thing.	N/A	N/A
	Negative - Would like more information on this page; perhaps email addresses, and having it editable? Maybe the ability to directly text the doctor through the app?	1 - Good to add, but it doesn’t directly relate to either of our main tasks. Added an email address for users to contact the app creators (us). Note: this email address is made up.	

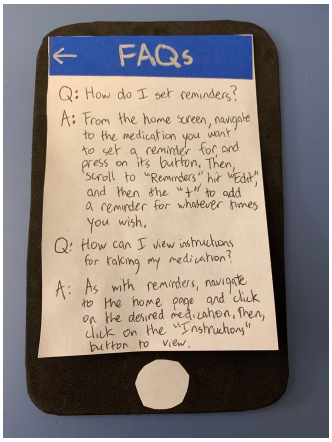
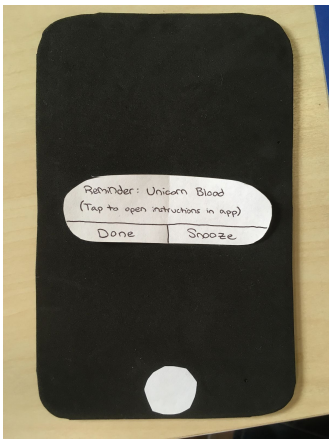
Third Usability Test:

Roles: Joe Connolly performed the third usability test.
Rationale: We wanted to learn from someone who routinely takes medications and see how they interacted with our prototype. Specifically, we wanted to elicit feedback as to how we could improve the app's functionality for our target user base.
Background: We performed the usability test with a Yale student who routinely takes some medication.
Test Protocol: Joe performed the usability test and took notes, guiding the patient where necessary.

Generally, the patient indicated that they had a positive experience.

Results/Critical Incidents:

Image	Incident	Severity/Explanation	Fixed Image
	Negative - Found menu for FAQ and Contact to be confusing/ strange. Suggested separate buttons or a more clear distinction between the two.	0 - We didn't agree that an extra button just for contacts would be anything but more confusing. We thought it made sense to have a question mark lead to two help mechanisms - contacts and FAQs. Dropdowns are also common in apps, and was perhaps only unclear because it was	N/A

		paper.	
	Positive- Thought the FAQ page itself was clear and helpful	N/A	N/A
	Positive - Liked the pop up reminder format	N/A	N/A

Testing Results

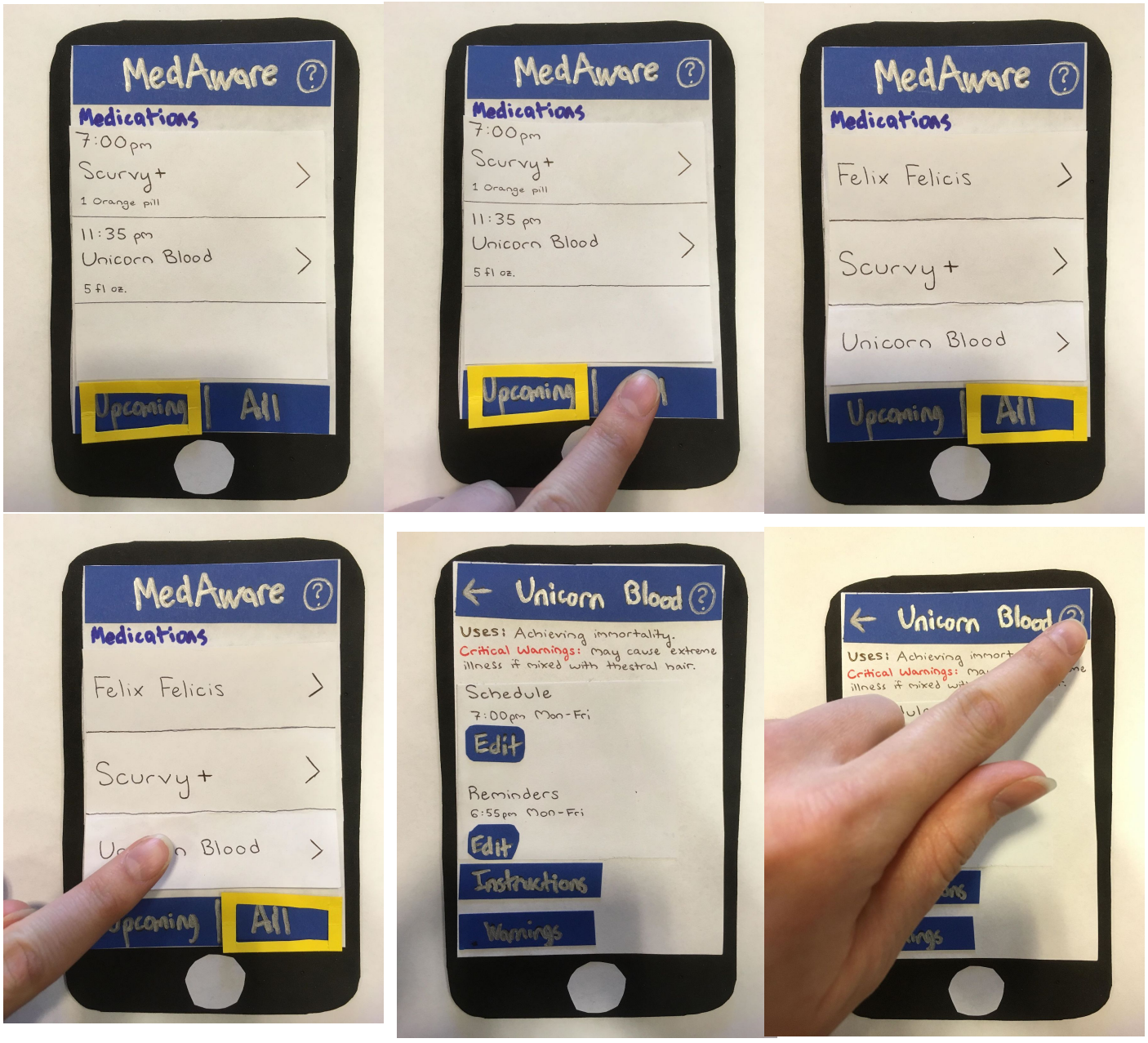
The main changes to the app's functionality that we made after the heuristic evaluations were the addition of a FAQ page and push notifications. Then, after the usability tests (mostly due to the first usability test), we added each prescription's critical warnings and purpose to the medication home page, the ability to edit reminder names and add reminder notes, and a detailed contact page for getting in touch with medical professionals.

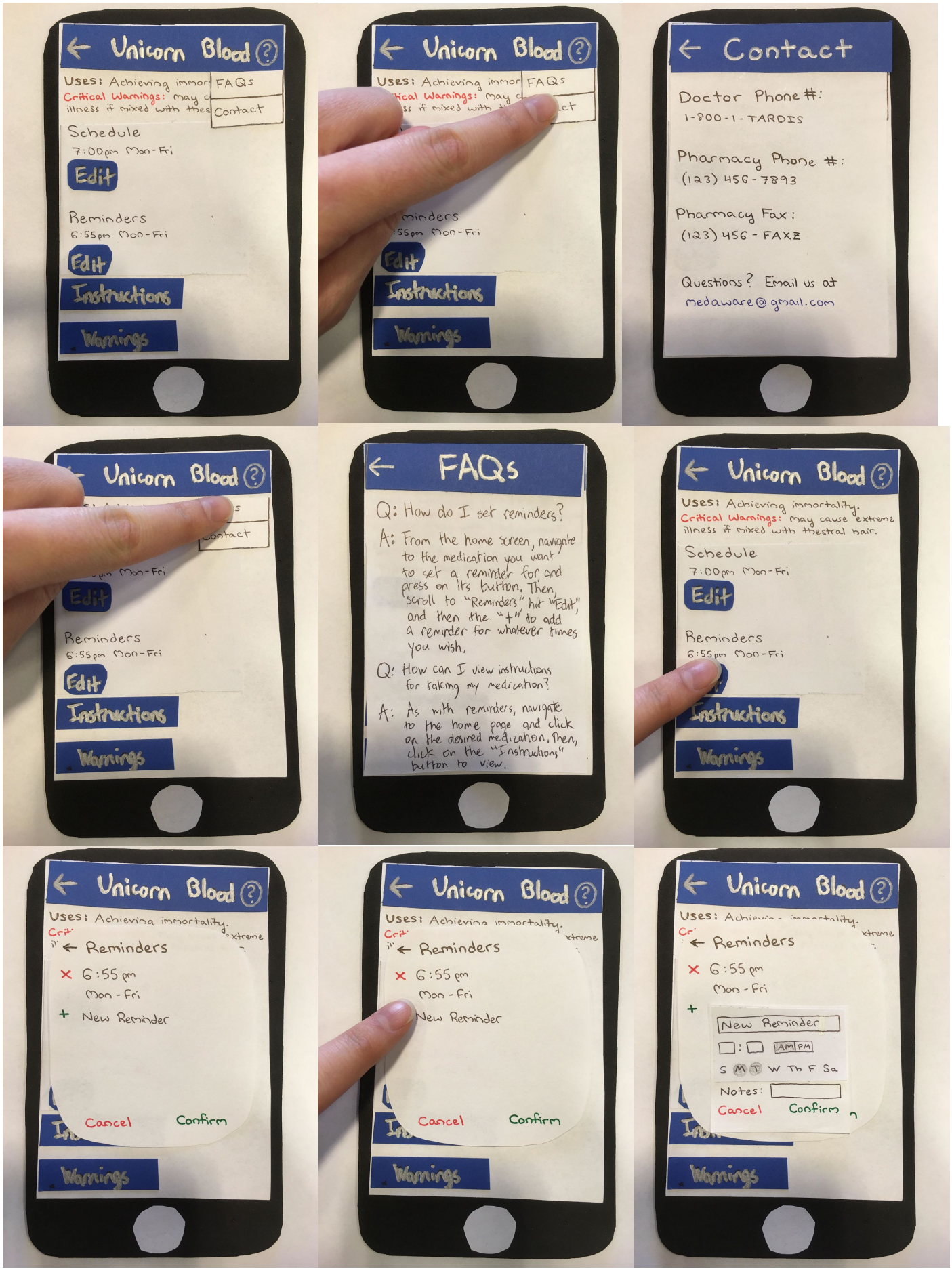
Including the FAQ is an important addition for helping users when they get stuck. Likewise, the inclusion of push notifications solidified how the user would be reminded in a consistent way to take medication on their mobile devices. The addition of warnings and the purpose for taking each prescription on the individual medication home page is also important because patients who use the app need to know first and foremost why they are taking their prescriptions,

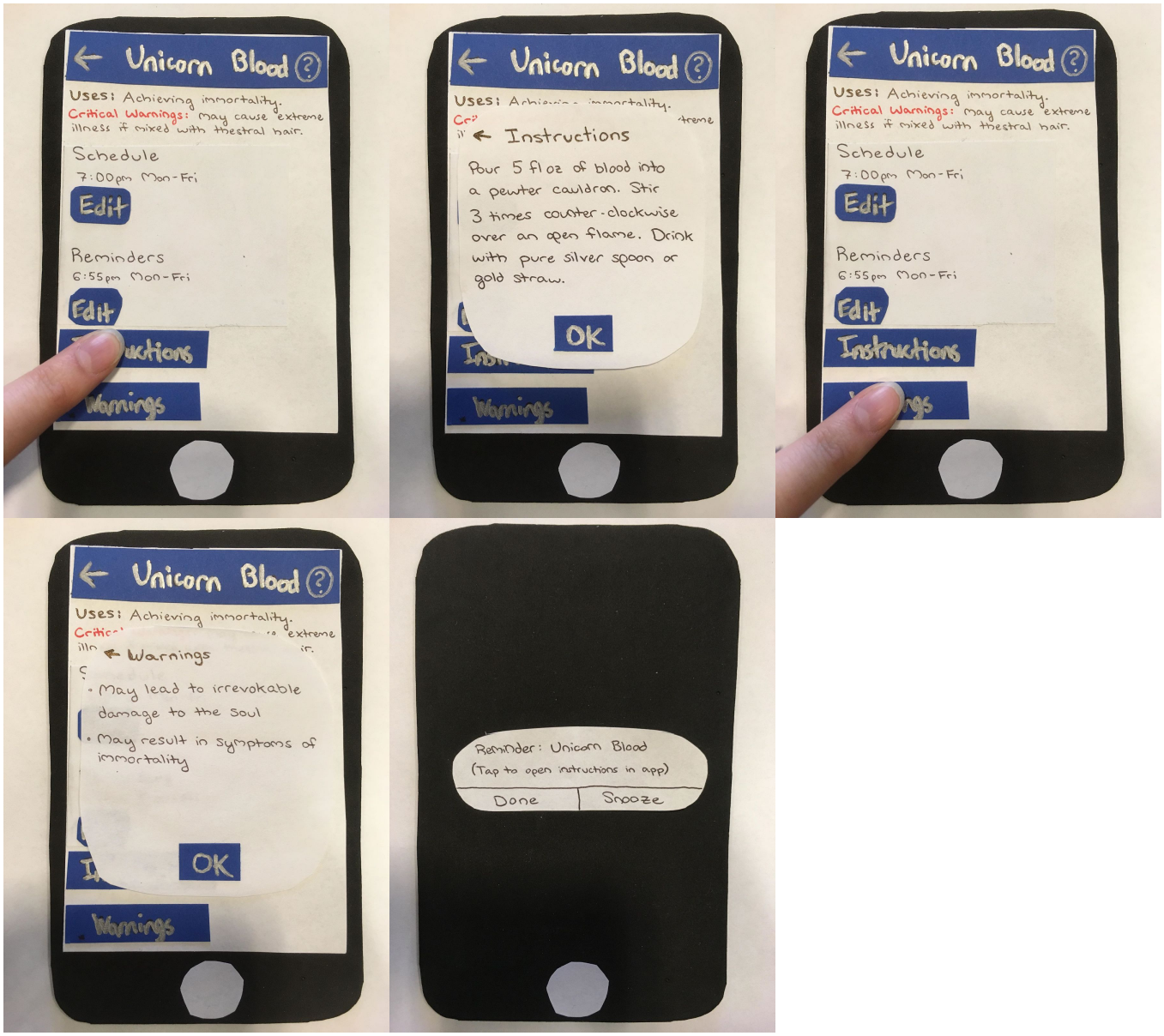
as well as what the most severe consequences possible that may result from taking a particular drug are.

Similarly, the new feature to edit reminder names and add reminder notes is significant because it enables patients to personalize their warnings such that they can include information specific to their situation/routine that doesn't really fit elsewhere in the app. Finally, the addition of the Contact page is also noteworthy because it helps patients ask questions and find out more about their medication in a way that is accessible and reliable.

Final Paper Prototype




Unicorn Blood
Uses: Achieving immor
Critical Warnings: may c
illness if mixed with the
FAQs
Contact
Schedule
7:00pm Mon-Fri
Edit
Reminders
6:55pm Mon-Fri
Edit
Instructions
Warnings
Contact
Doctor Phone #:
1-800-1-TARDIS
Pharmacy Phone #:
(123) 456-7893
Pharmacy Fax:
(123) 456-FAXZ
Questions? Email us at
medaware@gmail.com
FAQs
Q: How do I set reminders?
A: From the home screen, navigate to the medication you want to set a reminder for and press on its button. Then, scroll to "Reminders" hit "Edit", and then the "+" to add a reminder for whatever times you wish.
Q: How can I view instructions for taking my medication?
A: As with reminders, navigate to the home page and click on the desired medication, then, click on the "Instructions" button to view.
Uses: Achieving immortality.
Critical Warnings: may cause extreme illness if mixed with thestral hair.
Reminders
6:55 pm
Mon - Fri
New Reminder
Cancel
Confirm
AM PM
S M T W Th F Sa
Notes:



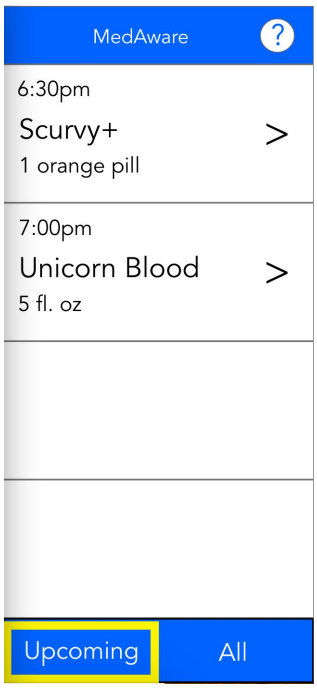
Design/Task Support

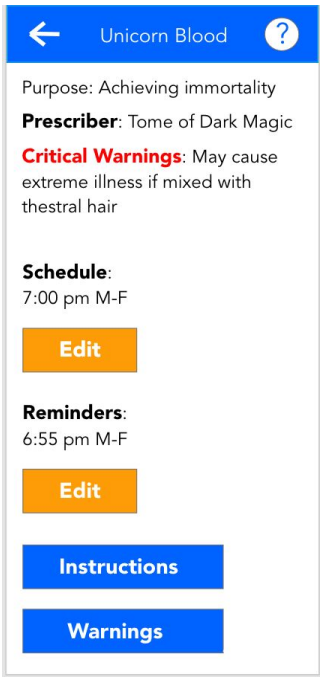
The design is comprised of an overall home page containing all medications, each of which has its own home page containing relevant information on scheduling, reminders, instructions and warnings. As can be seen above, the prototype supports the task of managing reminders through the individual medication homepage, as you can tap “Edit” under Reminders and add, edit, or delete individual reminders. Also, the reminder is executed by the push notification shown in the last image. Likewise, the app also supports the feature of labeling critical warnings and instructions clearly, as the most

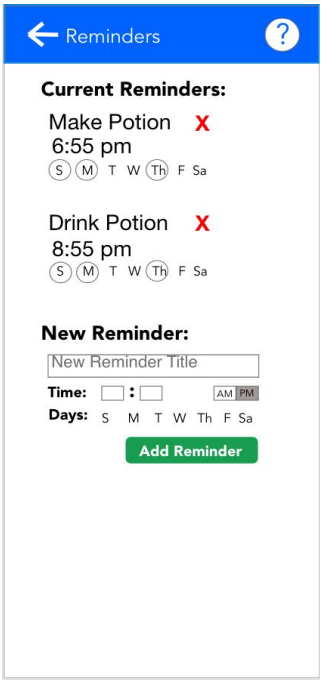
important information is displayed at the top of the individual medication home page, and the full warnings and instructions can be accessed through buttons on the same page.

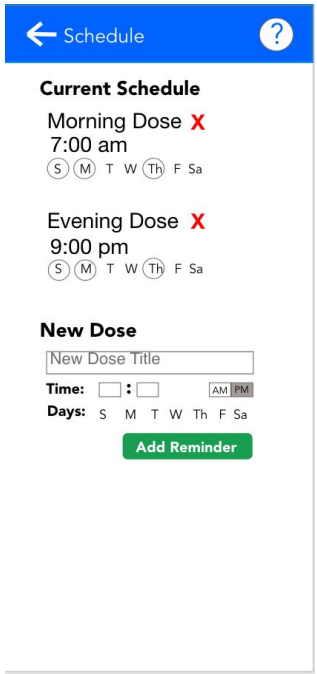
Design Mockup

Overview: Here we have the home pages, in addition to an example page for a medication (unicorn blood in this case).



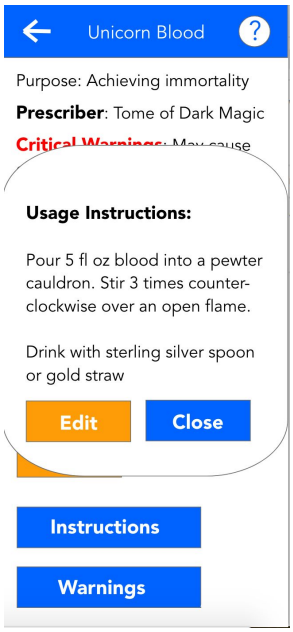


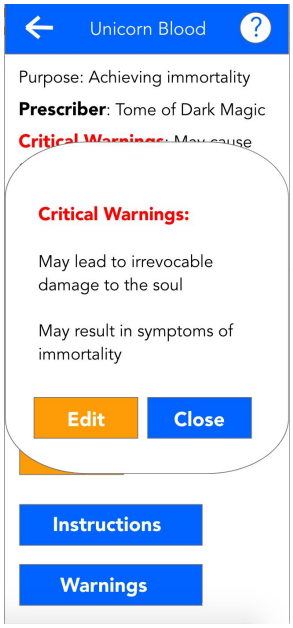




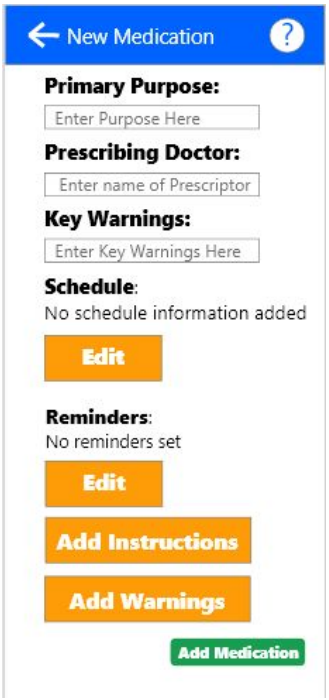
Task 1 - Reminders/Schedule: Here are the screens for creating and editing reminders/schedule:

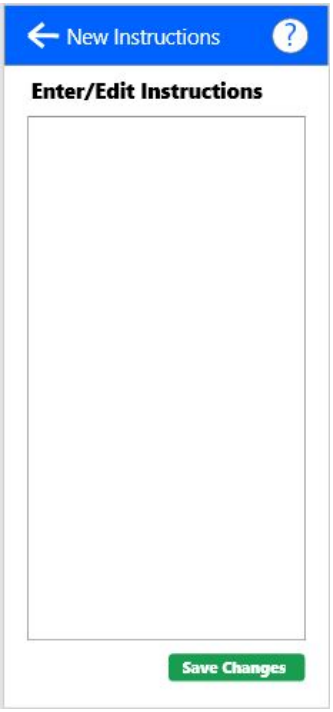
Task 2 - Instruction / Information: Here are the screens for the instructions and warnings:



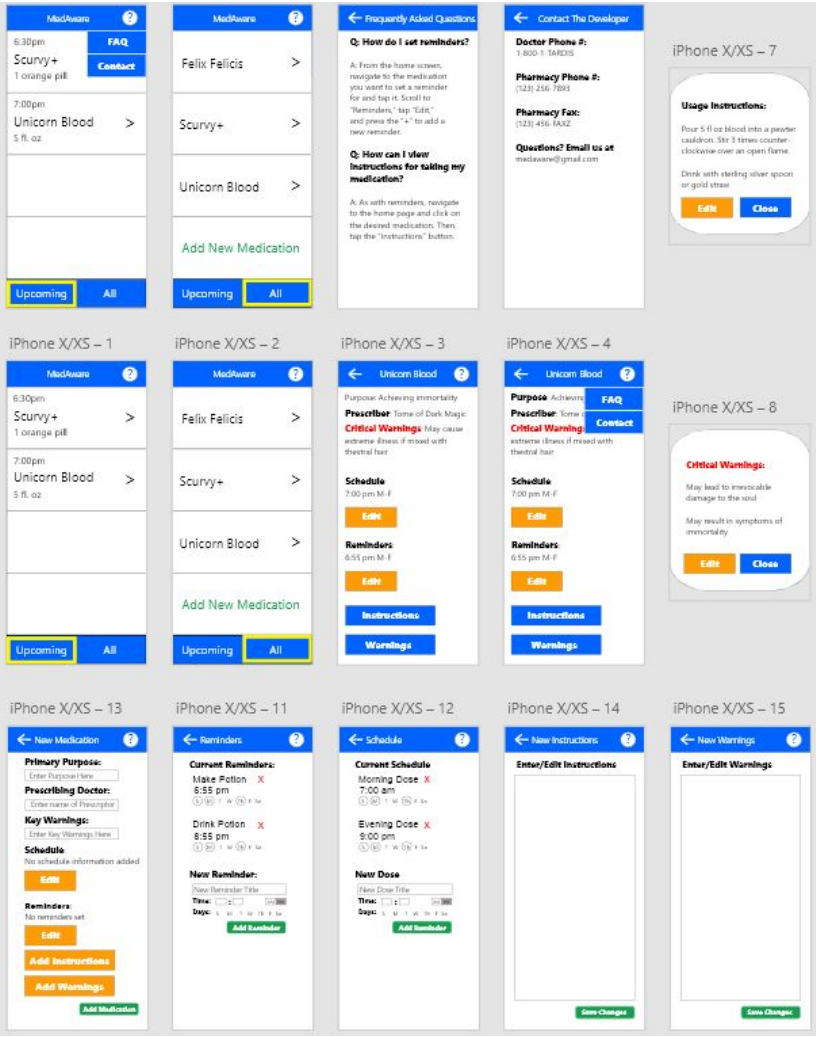


In these two illustrations, you can see general pop-ups showing general usage instructions and critical warnings. This information is scrollable, but should be reasonably short and digestible.





Here, we see the interface for adding a new medication (assuming the data isn't automatically added by an EMR system). This is where you can edit/enter instructions and warnings.



For further context, here's an overview of each of the screens currently shown by our application.

Discussion

From the process of iterative design, we learned that even though users have different preferences, their input is essential to improving the design of our app, as their suggestions were potential improvements we never even considered incorporating before conducting user testing. The process significantly shaped the design, as we added necessary features such as push notifications, a FAQ page, and a Contact page, in addition to making information more accessible at an earlier stage in the app, precisely because of the feedback we received throughout the design cycle. All of these changes will assuredly benefit the user experience of those who may decide to use our app in the future. Likewise, in terms of the tasks, our core two tasks did not change at all (reminders, clear instructions/warnings), but we did add supplemental functionality/task support through a Contact page in order to address some concerns that arose through testing, as well as an Add Medication page for users to input their own new medications. Lastly, if we had the time, more iterations would definitely help our app design, as we would likely be able to discover more problems in our interface through better data collection, and then use that data and feedback to make improvements for an even better design.

Appendix

Task Instructions:
1. Set a new reminder for one of your medications
2. Find the instructions for how to use and take one of your medications

Heuristic Evaluation Minor Incidents:

P3. Control Freedom (0)
- Too much work on user end of user input
- Having big buttons

P4. Error (0)
- Not much to prevent a user from entering a bad schedule

P6. Recognition rather than recall (1)
- How to use the “+”

Other Notes on the Design Process:
We initially had a low-fidelity prototype which used a series of modals/pop-ups for users to edit and set new reminders or change their schedules for medications. After some feedback, we realized that mobile apps should traditionally avoid using pop-ups where user interaction is required, because it shrinks an already-small screen. As such, we made a switch in our high-fidelity prototype to using entirely new screens for things like editing and setting reminders and schedules.