Nurse Watch

Team Members

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Feedback Based Revisions

The feedback we received about our project concerned the first task that our design addressed. It was brought to our attention that nurses may be resistant to speaking out loud about medical information that would go into charts with a patient nearby. It was suggested that some sort of two way charting system, where chart reminders would appear on the watch while nurses could conversely use the watch to chart, might work, but we felt that this was too general and would try to address two of our tasks instead of one. We decided to change the first task that our design addressed from charting from anywhere to time sensitive reminders for nurses' tasks. We felt that this would be an appropriate task that could be accomplished with a smartwatch, but that could still only be accomplished by some sort of technology aide, which is the reason we selected our original two tasks.

Problem and Solution Overview

Many modern nursing homes and retirement communities face the challenge of having too few nurses for the patients they accommodate. Oftentimes nurses are in charge of several patients throughout the day, and must complete tasks that are unique for every patient, such as administering medication and escorting a patient to a doctor's appointment. It can prove difficult and challenging for nurses to stay on top of their tasks throughout the day, as not only are many time sensitive, but when an emergency occurs, a nurse must figure out how to manage both the emergency as well as the remainder of her tasks. In addition, each patient's medical condition can change during any given day, so a nurse must make sure to be aware of any changes for the patients she is in charge of. Our challenge was to create a design that helped nurses manage their daily tasks with multiple patients more easily, as well as any emergencies that might occur. Our solution is a smartwatch that nurses can take with them easily by wearing it on their wrists. This watch will vibrate with a reminder when a nurse has an upcoming, time-sensitive task to complete, as well as 10 minutes prior to this task to give him/her time to prepare for it. However, in order to protect patient information, the task will only appear on screen when the nurse taps her watch. In addition, if an emergency occurs, the nurse can speak into his/her watch, detailing the emergency, and the watch will then transmit a notification to other nurses/doctors. This solution will allow nurses to keep track of time sensitive tasks more easily, without burdening them with additional items to carry around throughout their day.

Design Research Goals, Stakeholders, and Participants

Gabrielle:

We interviewed Gabrielle in her office at The Hearthstone for a total of thirty minutes. Gabrielle first worked at The Hearthstone for six years as a registered nurse, then for three years as a director of nursing. During our interview, she explained that the main focus of her career and background has been on long term care of patients.

Jason/Casey/Jenna:

Our interview with Jason lasted about forty minutes in total. We started by interviewing him individually, but about partway through, he pulled in two caregivers (Casey and Jenna) who work at Merrill Gardens. Jason described his main tasks to be organizing the community calendar in addition to being the social director for events for the patients. He has been at Merrill Gardens for two years and noted that he interacts with both patients and caregivers on a regular basis. Our interview with Jenna and Casey was also conducted in Jason's office and lasted about fifteen minutes, since they were in the middle of their respective shifts. Jenna was still undergoing training when we spoke to her and had been at Merrill Garden for four weeks, while Casey had been working there for four months. For both Casey and Jenna, their daily jobs involved interacting with and taking care of several different patients.

Elizabeth:

Our interview with Elizabeth was completed via email because of time and location constraints. Elizabeth is currently in her senior year as a nursing student at UCLA. Elizabeth has a lot of experience in clinical settings starting in her winter quarter of 2015. In particular, her experience working at Cedars-Sinai and UCLA Medical Center on the general surgical floor makes her a helpful interviewee as her job there involved taking care of multiple geriatric patients.

While we were planning our research methods, we knew we wanted to select a method that would let us interact directly with nurses because we had little knowledge on the problem we were designing for. With this in mind, we narrowed our options down to either interviews or some sort of participant observation. However, we thought that because nurses deal with private medical information, it would be complicated to get permission to directly observe nurses. We felt that interviews would be feasible to set up and would allow us to ask follow up questions to make sure we understood all the tasks and problems of a nurse's daily schedule. We selected our participants keeping in mind the knowledge we needed to gain. We wanted to discuss what a nurse's schedule looks like, what technology already exists, and what tools could be used. We chose to interview Gabrielle and Jason because of their knowledge of organizing nurses and of how their respective nursing homes work with technology. On the other hand, we chose to interview Casey, Jenna, and Elizabeth because of their direct and recent experience as nurses, and what they would be able to tell us about the day to day tasks. We felt that we would get a broad spectrum of answers and a wider perspective on our target group and their issues, which would help us design our project going forward.

Design Research Results and Themes

Although specific suggestions varied interview by interview, there were several high-level themes that became clear through our design research.

The first common theme in all our interviews is a desire to stick with the current system(s) in place for charting and keeping track of medical information. In particular, our interviewees explained that it would be difficult to revamp and transfer from systems currently in place to entirely new applications as it would not only require transferring a lot of information, but also time to adjust to the new system, which might be tough for already overburdened nurses. This theme/problem suggests that it's important to design for nurses and caretakers who are already accustomed to a system in place and don't want to spend a lot of time learning an entirely new software. It also suggests that our design should be something that is flexible and can be built on top of or parallel to existing software instead of requiring a completely new system.

A second theme that came up was the need for automatic features. All three interviewees noted that the main improvement that existing tools could use were features that didn't require explicit activation or manual interaction. For instance, Gabrielle noted that some sort of reminder feature that recognized keywords like 'care alert' of charts and that could then automatically save reminder updates would be extremely useful. Similarly, Jason, Casey, and Jenna all mentioned that some sort of automatic notification system would be the best way to improve their systems, as that would save them time in the case of a medical emergency. This theme suggests that our design should focus and incorporate automatic features if we aim to improve existing tools. It also suggests that the design tasks we should focus on are features that use automatic updating for already existing systems.

The last theme that was common through all interviews was what tools would be helpful for nurses to organize their information if a crisis or a medical emergency arose. All three interviewees noted that when an emergency with a patient occurs, their tasks and routine get halted so features that could benefit them in situations like that would be ones that allow them to catch up either on charting or reprioritizing their task list in case of an emergency. This theme suggests that an important task to design for and consider is interruptions to busy schedules, and how tasks are redistributed in this situation. We should consider what happens in an emergency while our tool is being used, what tasks need to be completed in an emergency, and how to realign schedules when an emergency does occur.

Answers to Task Analysis Questions

1. **Who is going to use the design?**

   This design is meant for nurses and caretakers who take care of multiple patients in nursing homes.

2. **What tasks do they now perform?**

   When nurses are with patients, their tasks include checking vital signs, dispensing medications, doing assessments, helping patients get ready, and general assistance. Nurses also chart information and updates about their patients when they have time, but often times have to wait until the end of the day. In addition, when a crisis or medical emergency arises, nurses must attend to it immediately and then reprioritize their remaining tasks.

3. **What tasks are desired?**

   Tasks that help nurses keep track of their day to day to do list, and remind nurses of upcoming schedules or changes to patients' medical information. Additional tasks that are desired are automatic features that take care of reminders for tasks, alerts for changes in patients' charts, and emergency notifications. Ideally these additional features would be added or overlaid with the current software system they're using.

4. **How are the tasks learned?**

   Because we would be introducing new features to a software that nurses have grown accustomed to, nurses can learn the new tasks through special sessions or workshops that guide them through tutorials on how to use the modifications. In addition, we could provide 'How To' guides as tutorials that the nurses can reference later on outside of the workshops.

5. **Where are the tasks performed?**

   We expect some of the desired tasks to be completed when the nurse fills out charts or check patient information at a computer. However, because the nurses are moving around a lot and spend most of their day helping various patients, the tasks will most likely be performed at a variety of locations, wherever the nurses happen to be. This is especially applicable to any tasks dealing with quick data entry or emergency notifications, since these aim to be independent of location.

6. **What is the relationship between the person and data?**

   Nurses are responsible for recording data about updates on patient health that translate to reminders about tasks that need to be completed for these patients. Because our design would ideally be integrated into their existing software, nurses would also be

in charge of updating data that would trigger either emergency notifications or reminders about patient care.

7. **What other tools does the person have?**

   Tools differ between locations, but nurses have electronic means of charting notes that may include changes in patient health, doctors' updates, emergencies, etc. In addition, nurses have daily task lists or to do lists, often on paper. Lastly there is software to keep track of legal records for treatment authorization and medication administration.

8. **How do people communicate with each other?**

   Part of the desired tasks for nurses (i.e. charting patient information and task reminders) will be on an individual basis and won't need communication with others. Communication between nurses may be done by reading past chart notes or alerts set up by other nurses. In addition, emergency notifications would automatically send alerts to other nurses, allowing quick communication of vital information.

9. **How often are the tasks performed?**

   Most of the specified tasks, such as charting, creating to do lists, etc., are done on a daily basis by each nurse. However, sending emergency notifications or updating patient charts with changes in behavior or medical condition would depend on when these situations arise with various patients.

10. **What are the time constraints on the tasks?**

    Oftentimes nurses have pressing time constraints on their tasks, especially with medications as many patients' medications are time sensitive. In addition, daily tasks for nurses need to be completed by the end of the day as each patient has a daily schedule that must be completed for their health and wellbeing. In addition, in the face of an emergency, addressing and notifying concerned parties about the problem must be done very quickly. Because so many of nurses' tasks are time sensitive, our design should address this as well, and ensure any tasks it completes are done quickly.

11. **What happens when things go wrong?**

    In the case of an emergency, nurses usually suspend normally planned tasks to focus on the emergency and have to re-prioritize their task list as a result. If our design fails either to notify the appropriate parties in the face of an emergency there should be some sort of warning to the user that this has occurred because it is important that the nurses be made aware of this. Similarly, if a notification or reminder has not been saved properly, a warning would also be appropriate as it's important for nurses to know what patient information has been communicated and saved.

Proposed Design Sketches

Design 1: Our first design combines the system already in place at nursing homes with an app that works on a tablet. The modifications to the nursing home's charting system would be to allow care alerts to pop up when any nurse opens a patient's chart (figure 1), highlight tasks in a patient's chart that need to be done for the day (figure 2), and allow the nurses to export their task list to the tablet they would carry (figure 2). This tablet would then read the tasks and create reminders for tasks that are time sensitive (figure 3). Lastly, the task list will have an emergency button that, when pressed, reorders the nurse's task list appropriately so that no information is lost in the chaos of the emergency (figure 4).

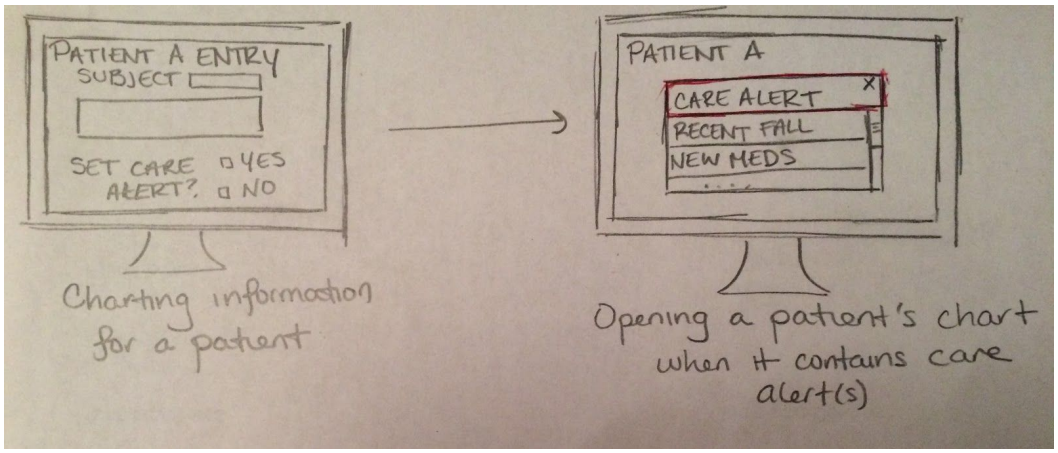


Figure 1

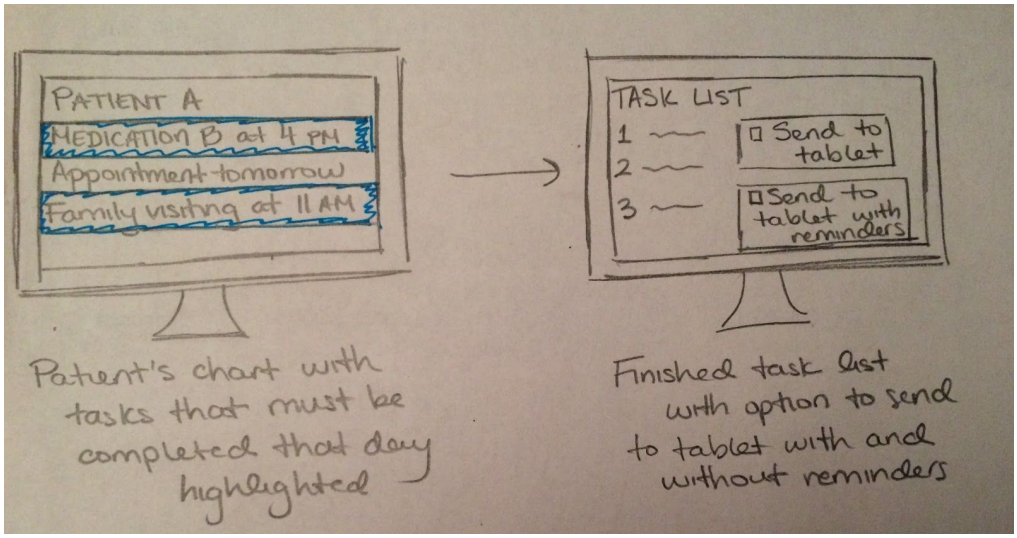


Figure 2

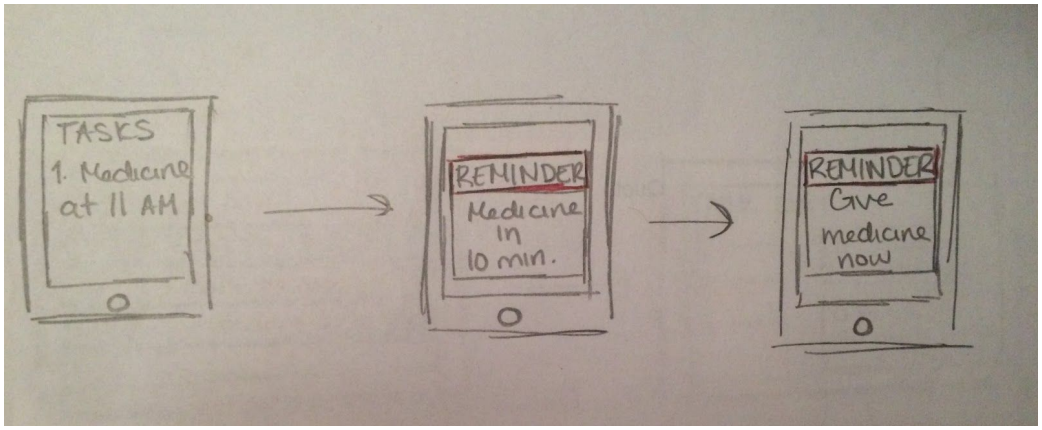


Figure 3

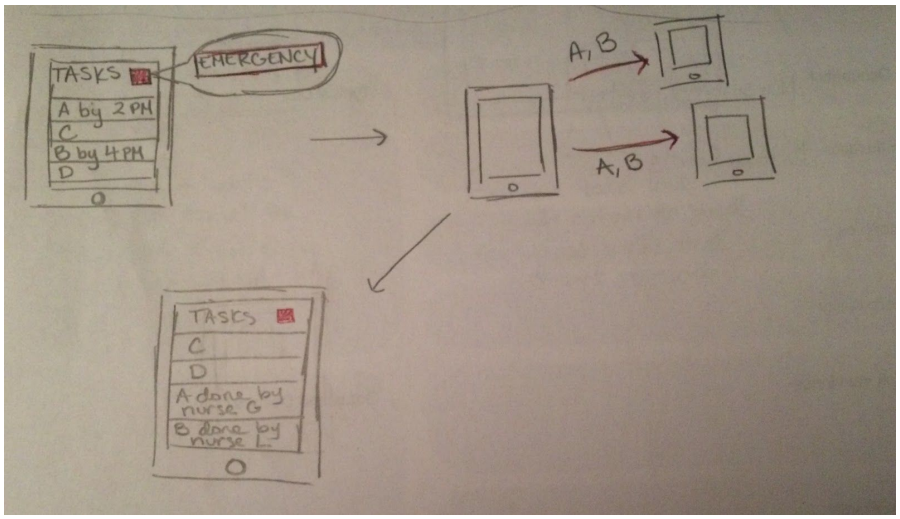
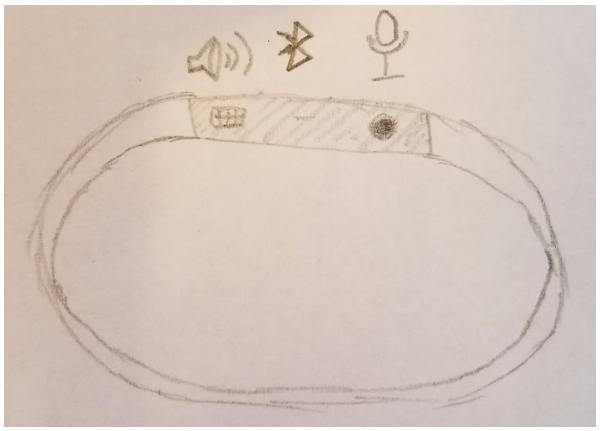


Figure 4

Design 2: Our second design is a voice-activated smartwatch that has a small screen, bluetooth connection to a centralized system, audio output, and a microphone (figure 1). When an emergency occurs, the watch allows the user to speak into the microphone with the keyword "emergency," and immediately notifies all other staff of the situation via audio and location information (figure 2). In addition, the watch can recall special notes that have been flagged in charts to notify the nurse of special conditions she needs to watch for, for a given patient (figure 3). The watch can also remind nurses of upcoming time-sensitive tasks. It will vibrate both 10 minutes before the task and when the task is due to start, in addition to showing a brief message about describing the task when the nurse taps the screen (figure 4). Lastly, the chart can listen to any notes the nurse makes, and send them over the bluetooth connection to the main charting system.



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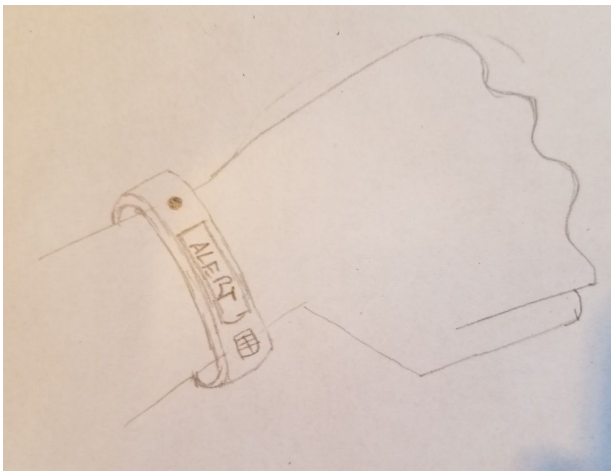

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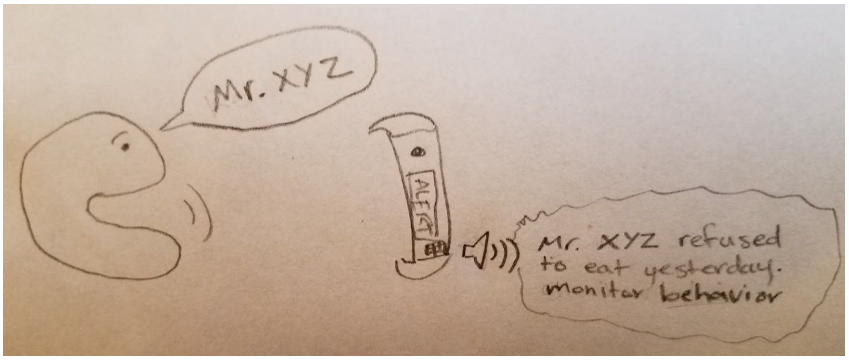


Figure 3

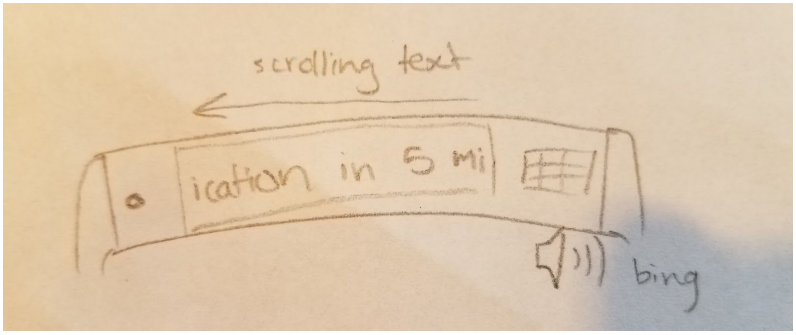
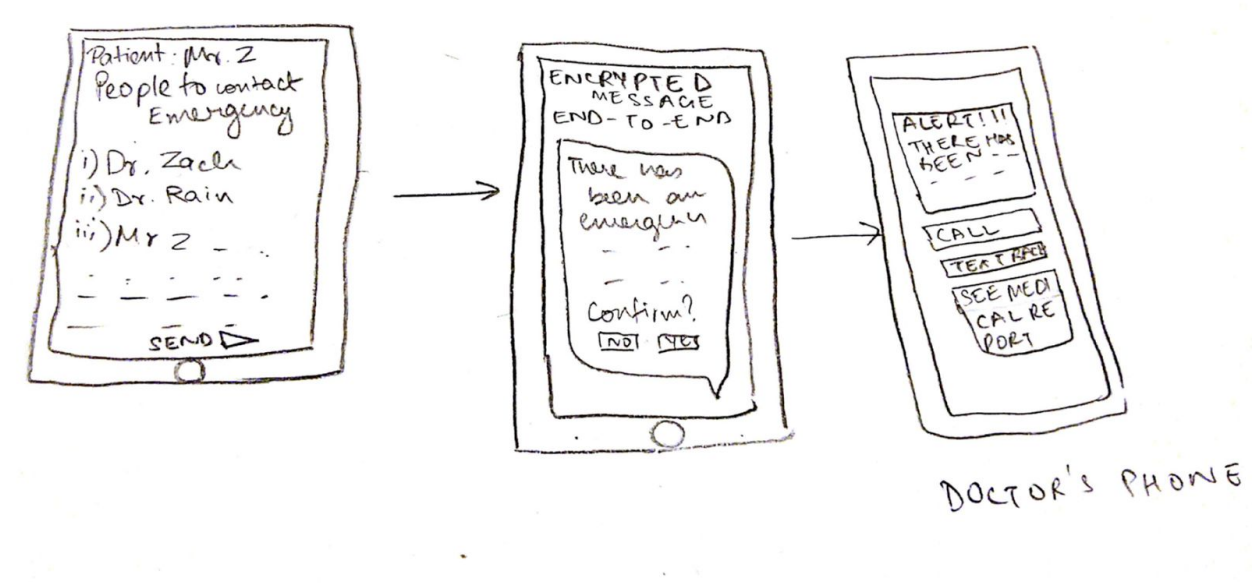


Figure 4

Design 3: Our third design is an app that focuses on tablet to tablet communication between nurses. When an emergency happens with a patient, a nurse can view the list of all concerned parties for that patient and press a button that sends all parties an automatic encrypted message (figure 1). The tablets would also highlight chart-based alerts so that when a nurse is looking at his/her details/medical report for a patient, he/she can see all the care alerts that other nurses had observed for the patient at the top of the screen (figure 2). If an emergency occurs, this app will re-prioritize and rank a nurse's task list after the emergency so that the nurse can still keep track of what duties she has finished for the patient when the emergency is over (figure 3). Lastly, the nurse can set up time-sensitive reminders, for which she will receive a pop-up reminder. When inputting a reminder, the nurse can also select a 'global' option so that all nurses that are on duty and attending to the patient get the reminder as well (figure 4).



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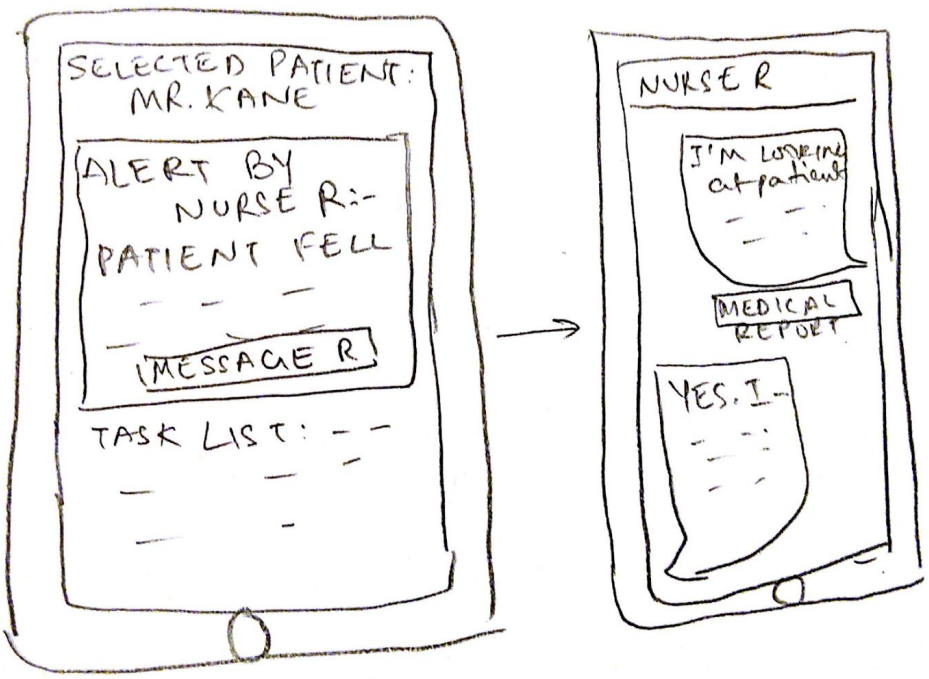
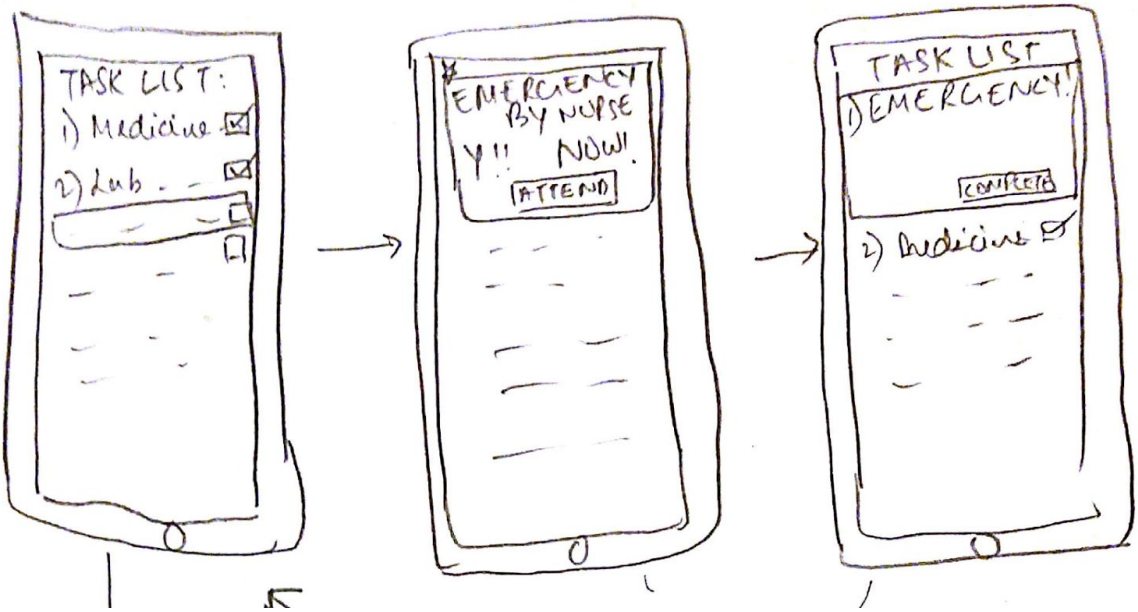


Figure 2



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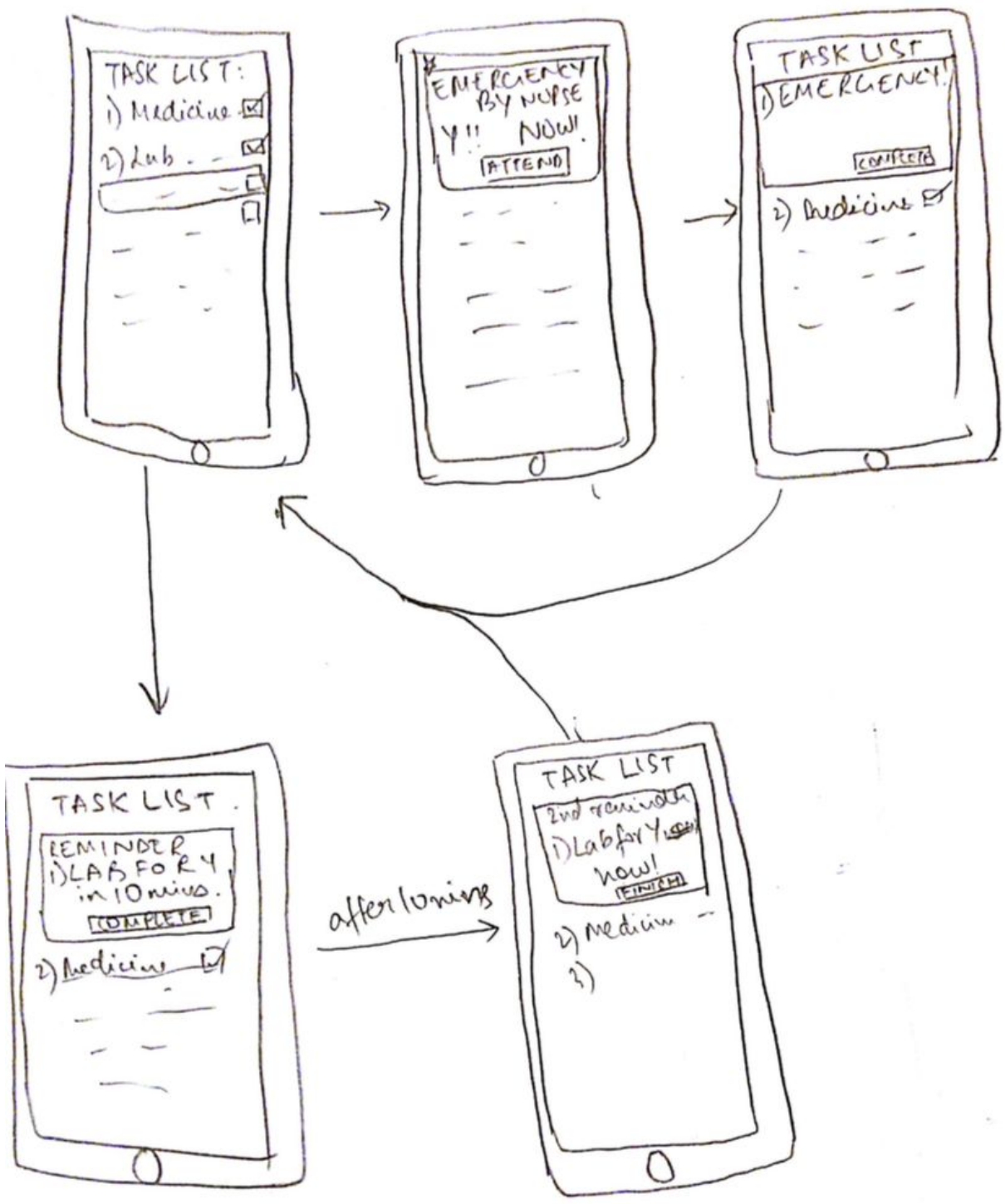

TASK LIST:
1) Medicine
2) Lab
EMERGENCY BY NURSE
Y!! NOW!
ATTEND
TASK LIST
1) EMERGENCY!
COMPLETE
2) Medicine
TASK LIST
REMINDER
1) LAB FOR Y
in 10 mins.
COMPLETE
2) Medicine
after 10 mins
TASK LIST
2nd reminder
1) Lab for Y
now!
FINISH
2) Medicine
3)

Figure 4

Selected Design The design that we are moving forward with will be the voice activated watch that would contain audio output, a small screen, and a microphone. We feel that this design is best suited for the population we are designing for because of the central theme of busyness that came up throughout all our interviews. All of the nurses we interviewed mentioned that their schedules were very packed, moving from patient to patient, and they often don't have time to stop by a computer. We feel that this watch will eliminate this challenge because it provides technology that a nurse can easily carry with him/her, but that won't be obtrusive. The two tasks that our design will focus on will be reminders for time-sensitive tasks as well as automatic emergency notifications that allow nurses to securely notify other nurses in addition to a patient's doctors and family members. We felt that these tasks are the most compelling because they are the two that were the most difficult for nurses to address without some sort of technology aide. In addition to the two tasks, we also plan to add more functionality that can further help accomplish time critical tasks for nurses.

Written Scenarios

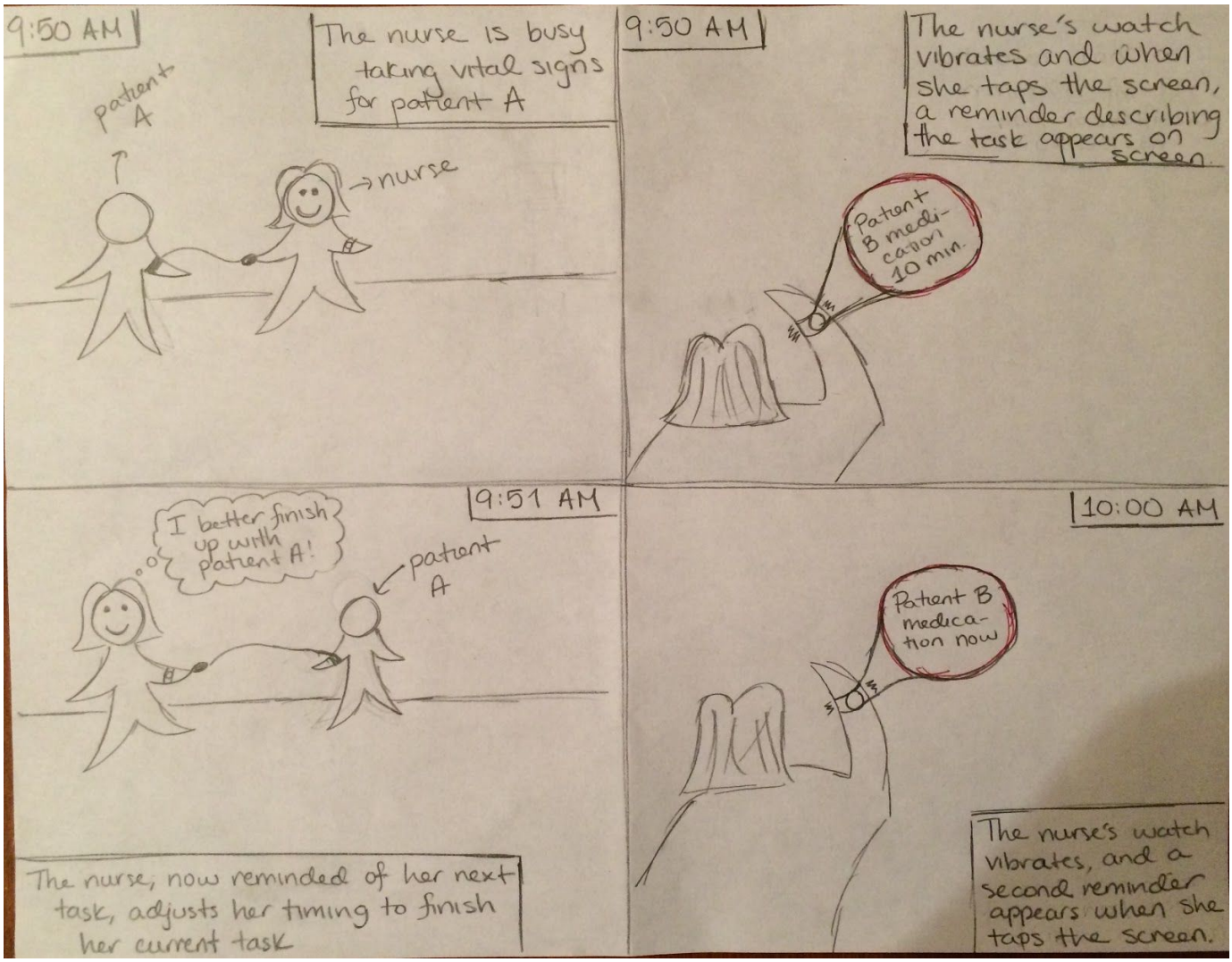
Task 4 (Storyboard 1):

Betsy is a nurse who has worked at the Gardens Nursing Home for the past three years. Her days are very busy as she tends to five to six patients a day, and keeps track of updates for each. In order to keep her schedule in line and avoid forgetting important tasks, a centralized system will send reminders to her watch of upcoming tasks that need to be performed. For example Resident A was recently prescribed a new medication that needs to be taken every 6 hours (a new update that might slip Betsy's mind). Her watch will vibrate 10 minutes before it is time to deliver medication to Resident A and when she taps the screen, the task she is being notified about will appear on the screen. This will prevent the notification from being displayed while she is not looking and avoid breaching the privacy of the patient. In addition, a second reminder will be issued using the same tactic of watch vibration at the actual time of the reminder to ensure that the nurse is aware of the task.

Task 6 (Storyboard 2): Jane is a nurse who also works at the Gardens Nursing Home, but has only worked there for a year. She usually works during the night shift, and if an emergency happens with a patient, she must ensure that all other nurses and the patient's doctor know quickly, but must also attend to the emergency as well. Thanks to her voice activated watch, this task is now much easier. The other night when a patient fell, Jane quickly pressed and held the 'Emergency' button. When the watch prompted her to "Record an emergency" with an audio output, Jane described the patient, room, and emergency. As she was helping the patient, her watch automatically transmitted this message to the other nurses on shift, as well as the patient's doctor. Within a minute, another nurse had arrived to help her, and she didn't need to spend any more time notifying various parties about the emergency, and instead could focus on helping the patient. Shortly after, the doctor also called in to check and provide his input on the next steps following the emergency.

Storyboards of the Selected Design

Storyboard 1:



Storyboard 2: