

Diana Vazquez
Capstone - Dr. Edwards
15 January 2020

RxCorrects App

Abstract:

Discussion of how to reduce medical errors in the pharmacy are pertinent to the health of patients. The problem of medical error being the third leading cause of death in the United States is considerable during the process of translation and transcription. Communication between doctors and pharmacists is a huge obstacle in providing the right treatment for the patient without mistakes.

Computerized data entry is the key concept in this project. The program demonstrates the ability to read and translate a prescription, as well as alert the person processing of any changes, calculations, or concerns involving the prescription. A scanner should be able to identify a doctor's handwriting to key in information without error.

Results should indicate a reduction in medical errors. This program should also bring awareness to both doctors and pharmacists in the number of errors occurring on a daily basis and open discussion on how to improve down the line.

These results should draw awareness to the problem, but also be a driving force to make changes in or improve upon the current system so the number of alerts decrease over time. This can be a way to not only save the patient from harmful errors, but also increase efficiency in the pharmacy workplace. The more clear information on the prescription, the less likely a pharmacist will find an area to make assumptions. By avoiding this problem, less time is needed to contact the doctor's office for clarification.

Problem Statement:

One of the main responsibilities of any healthcare provider is to help patients have the best experience. One important aspect is minimizing medical errors to optimize treatment and to reduce the chances of further harming the patient. Patients rely on a variety of people including doctors, nurses, and pharmacists, to give the best chance possible at a full recovery. Unfortunately, according to a recent John Hopkins study, medical error is the third-leading cause of death in the United States.

This research aspires to explore possibilities for a system that could be incorporated in the current healthcare world. A possible cause of this problem is unclarity between professionals. Perhaps a study which investigates medical error by a consistent and organized database could help resolve the situation. Specifically, we shall attempt to incorporate commonly used techniques and conversion methods to help reduce the possibility of error. Incorporating a system that checks for anything missing on a prescription or unclarity, such as missing units or precise dosage.

Hypothesis:

Part of the oath both pharmacists and doctors swear to is to put the patient first and deliver the best care and treatment possible. While knowledge is important, thoroughness and caution is just as important. I would like to prioritize the reduction of medical errors. Patients rely on the specialized knowledge and must trust these healthcare professionals to a certain extent, with their lives. Depending on the situation, a small error may lead to disastrous results. According to studies made by universities like John Hopkins, medical error is the third-leading cause of death in the United States.

I aspire to provide a tool that may help in the industry to clear up communication issues between pharmacies and doctors. A doctor may understand what treatment they wish for their patient, but it is not always translated well on paper. Sometimes these small things are important parts that are missing on a prescription. As a pharmacy technician or pharmacist, we are legally not allowed to make assumptions about anything, as tempting as it may be. There are times where things forgotten may result in bigger inconveniences for the patient, and incorrect documentation may result in an audit for the pharmacy. Incorporating a system that checks for anything missing on a prescription or unclarity, such as missing units or precise dosage, missing route of administration, unspecified units altogether. Say if a doctor calls in a “box” of albuterol, but that information is not specific enough to satisfy processing it. Possible consequences may be that the pharmacy is audited for lack of specification on the prescription or the patient may receive the incorrect amount of medication needed since albuterol may come in different quantities

What I would like to do to reduce the occurrence of these situations is program a check-list of sorts that will scan a prescription to make sure all needed parts are present, as well as check the consistency of data. The goal is to find a way to extract all the information needed to properly fill a prescription. If anything needed is missing or obviously incorrect, a warning should come up to notify whoever is processing the prescription. I would also like to incorporate a system that helps convert any mismatching dosage forms or units, as well as notifying the technician that this conversion was executed. If there is anything important missing (i.e. the name of the medication), or if further clarification is needed, I would like to notify the technician that either the pharmacist or doctor’s office should be contacted, and the reasoning behind this pop-up.

If possible, I would like to keep track of the history of a patient’s medications that they’ve filled with that specific pharmacy. I would like to do this in order to be able to counsel patients if they may be taking something that interacts with another medication or if the patient has allergies on file that may be triggered from a medication currently trying to be processed. Ultimately, I hope these steps will lead to an easier process when filling medications in a pharmacy as well as ease the stress on patients who often need these medications in a timely manner.

Objectives:

SMART Objectives:

Specific:

- Research, design and create a program that translates a doctor's prescription into a universal format, converts units when necessary, and alerts technician of any incorrect, unclear, or missing information

Measurable with Measurement:

- Information regarding prescription requirements should be updated weekly
Calculates conversions and transcribes prescriptions in a timely manner (give est. time here)
- Program properly alerts technician of any changes made or any missing data, and accurately converts dosages and units with little to no error

Achievable:

- Ability to research and find up-to-date information
- Proficiency in Android Studio
- Knowledge of medications and processing a prescription
- Pharmacy professional advice useful as an outside resource

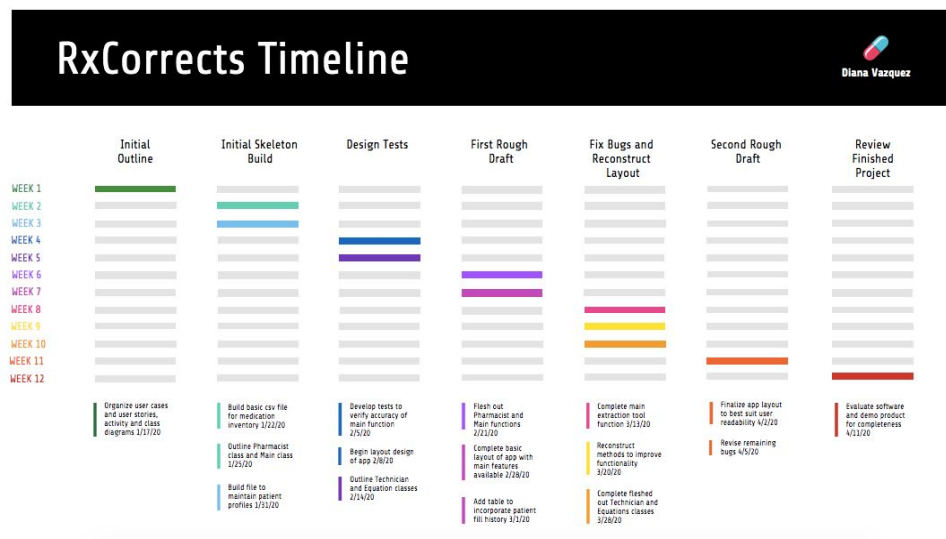
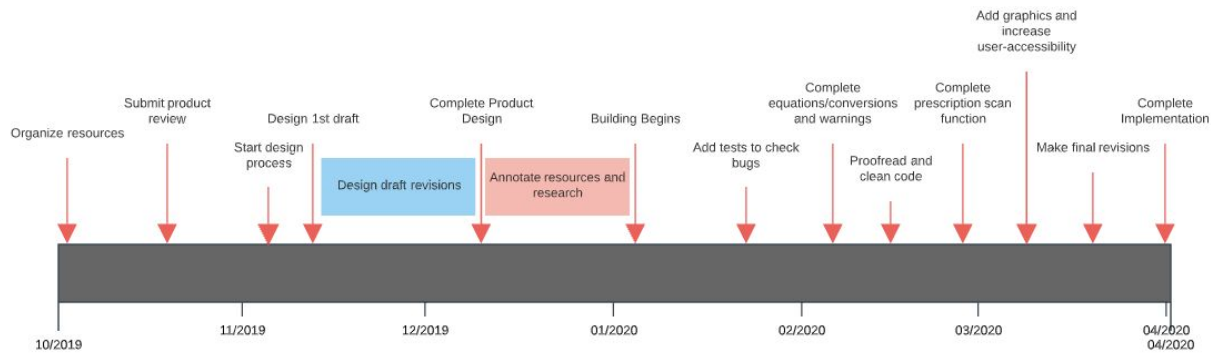
Relevant:

- This objective was chosen to help reduce medical errors in the pharmacy by identifying inconsistent or missing data with technology, reducing the chances of human error or oversight
- Healthcare professionals are constantly looking to improve the system to help the patient's experience and speed up recovery

Time-oriented:

- The final program outline will be done by December 2019, and the program will be implemented by April 2020.

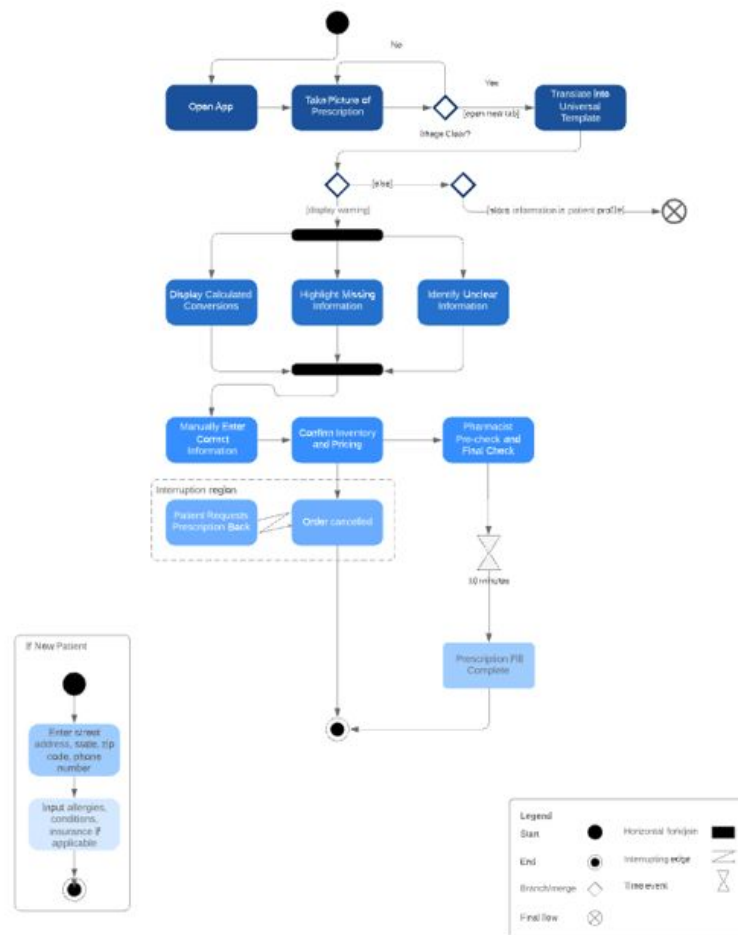
Timelines:



Design:

RxCorrects UML Activity Diagram

Diana Vainque | November 33, 2018



Literature Review:

Healthcare professionals focus on the safety and overall well being of their patients. The public have a very simple understanding of the steps behind the process of treatment and recovery in a hospital or pharmacy. While most of these steps are simple, each step must be thoroughly processed to ensure the best outcome for a patient. Without this clarity and caution in every step, small mistakes along the way add up to larger problems down the road. These documents serve to show what problems are occurring in these healthcare settings and hopefully shine lights on areas that can be improved upon.

In this first primary resource, titled *Medication Errors and Adverse Drug Events in Pediatric Inpatients*, investigated the rates of medication errors as well as the types of errors through a cohort study of 1120 patients in two academic institutions over a period of six weeks. In this study, both hospitals handwrote orders and sent copies to the pharmacy. A chart in the document provides a quick view of the major errors and how often they occurred. Especially in

this case, the rapid changes in growth for infants greatly contributed to the degree of error. This study found that errors occurred most commonly during drug ordering.

Through this study, the importance of computerized order entry may be a huge impact to the reduction of error in medications, especially in the case of the NICU pediatric ward. However, this study does not cover a wide variety of circumstances. It does not report outside of non-academic hospitals where a lot of children receive care. Another important note is that report of incidence or the amount of errors may have been reduced as the people conducting the study were obligated to take action if serious problems were detected. While these issues may have slightly altered the outcome of the study, this report ultimately guides the audience to understand that miscommunication in the transfer of information and how information is taken down can be detrimental to the patient's treatment.

My second primary source takes on a hospital and interviews a variety of employees, with a larger portion from the pharmacy department. In the article *Defining and Classifying Medical Error: Lessons for Patient Safety Reporting Systems*, the objective of this experiment is to get more information on the system currently in place as well as the user's perspective on its efficiency. One major aspect of this source serves to help identify how medical error may be reported differently depending on how the definition of a medical error is interpreted. These definitions are laid out in the article to give an idea of the differences to show how incidents may be under reported. Even without asking questions directly related to adverse drug effects and problems in the pharmacy, many reported incidents and gave examples as to how the system in place does not always work as intended.

This source should prove useful to identify what the process currently is within the healthcare world and how workers currently feel about the way things are at the moment. Some of the pharmacy staff explain how catching mistakes is the difference between an incident and an error. Some of the limitations of this study may be that these results could be unique to the urban tertiary care teaching hospital chosen for the voluntary interviews. Not only that, but the interview was conducted by classifying events as incidents, rather than using classifications such as professional accountability or the event outcome. Rather than pushing for some general conclusion in this source, it provides a good place for discussion over the topic of medical error in the healthcare world.

In my first secondary source, *The Alarming Reality of Medication Error: A Patient Case and Review of Pennsylvania and National Database*, an example case is used to describe where the system failed a 71-year-old woman. It helps break down the processes and where the system slowly went wrong at each step, which ultimately lead to a cycle of illness for this patient. This breakdown of the system shows off what is known as the Swiss Cheese Model. This source emphasizes the importance of medication review with the patient as well as clarity in instructions from the prescriber. Electronic systems that help import and export information between the doctor and pharmacy help in avoiding accidental errors like in the example in the beginning.

This source provides light for my research in support of why my application may aid in the reduction of medical error. This gathering of data also points out the actual numbers of the outcome of these medical errors such as hospitalization and discharge. By implementing a system that will help reduce the occurrence of these problems, this source shows that there could also be an economic impact due to the high medical costs of treatment. Limitations of this source includes a lack of processes that are currently being implemented that are beneficial. While it is important to take note of what can be improved upon, the training and processes that are currently done that should not be manipulated but serve as a starting point.

The last source, titled *Medication Errors: Prevention Using Information Technology Systems*, not only identifies where the process of dispensing medications can go wrong, but focuses on how advanced technological systems may aid in reducing error at the time of dispensing. This source acknowledges how experienced these healthcare professionals are, but shows the reality that not everything is considered at the time of prescribing or dispensing. Decision support and electronic order entry are some of the examples provided for an information system to help reduce medical errors. One of the important aspects this source mentions is about how costly this system can be and how that obstacle can be handled so this resource can be more easily accessible.

IT systems here are highlighted to show how they optimize workflow in the clinical and pharmaceutical setting. The source maintains a positive position when addressing possible skepticism that may arise from those who doubt the usefulness of one of these systems. However, this source is limited in its lack of examples and studies brought in that could back up the report. It provides a lot to support the idea of the IT system, but implementation is just as important. The primary use of this source would be to identify the key goals of what my system should aspire to and what I want it to become.

The final primary source, titled *The Impact of Computerized Provider Order Entry on Medication Errors in a Multispecialty Group Practice*, takes into account a variety of common errors in the pharmacy. They focus on a good number of patients and perform an experiment that give results that the simple system minimizes errors in most areas. The advantage to this type of experiment demonstrates not only by how much these errors were reduced but if the severity also decreased. This experiment gives a statistical perspective on the outcome of implementing more technology in the medical field.

This source will provide a more quantitative analysis of the benefits of adding technology to reduce medical error. While some of the limitations include the biased picking of the three pharmacies used, this is partially taken care of with the direct method of testing their hypothesis. This new perspective will fill in the gap from personal accounts and clinical cases of the other sources.

Overall, these sources provide feedback on the benefits as well as the possible obstacles that I may come across when developing my system to reduce medical error. These provide a range of information from direct interviews of workers who describe the current system, cases of

the effects of medical error and their cost, and a quantitative analysis of the results of implementing such a system. I hope to use these resources as a way to further improve the design of my product as well as add on to the benefits of a pre-existent system.