

CS486C –Senior Capstone Design in Computer Science Project Description

Project Title: iMATter mHealth app to support opioid recovery

Sponsor Information:



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Project Overview:

Opioid addiction is a growing crisis in the United States with an estimated 11.4 million persons affected and resulting in over 130 deaths each day from overdoses. For women with opioid use disorders, becoming pregnant while struggling with addiction adds complications to already difficult life circumstances.



Many women who need help with addiction during pregnancy are given medications such as methadone; adding counseling in addition to the medication can improve the outcomes, i.e., women successfully completing treatment. For women in rural areas, however, getting to medical appointments to receive their medications, let alone getting to counseling or peer support groups that can help them successfully stop using heroin or other opioids, is a difficult task. In addition, babies who are exposed to opioids before they are born go through withdrawals after birth and require additional care. Many mothers end up losing their babies because they just don't have the support to be successful in treatment and to learn to care for their babies' additional needs. Women who do receive support, though, can make a full recovery and their infants can grow up healthy. Thus, inventing novel ways to help rural expectant mothers succeed in opioid recovery can have enormous impacts for an entire generation.

What can technology do to help? To help women be successful in sticking with substance use treatment, staying clean, and keeping their babies, we propose to develop a mobile health (mHealth) app that will offer a range of supportive features for mothers in opioid recovery during and after pregnancy. We hypothesize that app-based support can improve success in medication assisted treatment (MAT) programs, and ultimately help women become stable parents.

The Envisioned Product

We envision a mobile health system that we call iMATter that centers around a simple but effective mobile app, linked to a central cloud-based server. *The overall aim of the iMATter product* is to provide a supportive safety net that mothers can rely on to tackle the challenges of addiction recovery during pregnancy by creating an online community that essentially supports

a safe and shame-free “sisterhood” of mothers facing the same challenges, and providing a suite of tools to facilitate motivational social bonds within the cohorts. Using iMATter will be simple: participants will download the free mobile app to their smartphone and connect using a unique “invite code” provided by their clinic supervisor. Once connected, they are automatically placed in the appropriate “due date team”, can choose a pseudonym and avatar, and are engaged via an automated welcome message sent to their team on their behalf. iMATter administrators will use a based web-app interface to manage content and other administrative tasks, while end-users (pregnant women in treatment) will use the mobile app to receive information, counseling, and other treatment support. An ideal solution would generate both Android and iOS apps, but for the purpose of this prototype, our main focus will be on an Android version. Specific functions that the iMATter system should provide include:

The Basics

- A secure web-app to administer the system: allows program administrators to monitor and manage activity in the iMATter recovery forum, adding new educational materials, tracking and motivating participation, and preventing negative social dynamics from developing.
- Safe and private. Women sign up using pseudonyms and choose an avatar icon, allowing them to participate freely without fear of revealing their real-world identities.
- Supports sending alerts to take specific action such as attend appointments or take medication
- Support participant-initiated learning via a “Learning Center” that allows women to explore short articles related to pregnancy and opioid recovery.
- Support directed learning as well: a configurable mechanism for sending links to readings or exercises to specific participants or groups.

Unique and Key features to make it truly usable

- Supports “pregnancy stage cohorts”. The app is specifically tailored to the pregnancy process, tracking each participant’s progress towards her due date, and groups women with similar due dates into “cohorts”.
- Ability for information content to be organized based on stage of pregnancy to each pregnancy cohort: daily/weekly information updates, and custom stage-specific motivational and educational interventions to keep patients engaged
- Creates a mutually supportive social network for women in the same cohort (e.g. “Team January”). Teams have a discussion forum where they can (under their pseudonyms) discuss questions and concerns.

Stretch goals: Cool ideas for an exceptional app

- Mothers can “follow” other mothers (e.g., whose opinions they value to begin creating personality-based subgroups). Participants can privately message others to engage in off-forum conversations.
- Educational exercises or games to reinforce learning from the articles provided via the app. Protocol-initiated learning is supported as well, with
- Provide intra-community supportive and motivational tools. Participants can share their current mood (e.g. change from happy to sad faces), and send out an “SOS” to their team when they feel low or shaky. In response, teammates can send supportive messages, emoticons and other responses. App can also detect a series of SOS or

negative mood notifications and will refer to Arizona Opioid Assistance and Referral Line.

- Provide a framework for casual “gamification”, e.g., participants can win “stars” as milestones in their recovery process, or “cherries” for completing education reading/exercises. These tokens could be redeemed for real-world items (e.g. small baby gifts) provided by our program.
- Provide researchers the ability to deploy surveys and gather other metrics (e.g. usage patterns, see Table 2 for outcome measures), downloading these datasets for further analysis.
- Other features, as discovered during requirements acquisition. We are inventing new technology here; the creative input of the team is strongly encouraged!

A successful app will ensure that mothers have access to useful, timely information, while also allowing them to (anonymously) share their concerns and receive supportive feedback from other expectant mothers in the same situation. Our hope is that a successful app could have a truly significant impact on treatment success rates and positive health outcomes for babies.

Knowledge, skills, and expertise required for this project:

- Knowledge of mobile application programming frameworks, with particular emphasis on cross-platform frameworks like Ionic and React Native.
- Knowledge of modern Web2.0 programming techniques required to develop the administrative web app
- Knowledge of back-end server and database technologies, with emphasis on configuration and deployment of cloud-based server resources.

Equipment Requirements:

- There should be no equipment or software required other than a development platform and software/tools freely available online.
- A cloud-based server will eventually be required as a deployment platform. Development can be done on a free-tier server available from AWS. At product delivery, the client will take over this server and any future costs.

Deliverables:

- The software applications as described above, deployed and tested successfully with real data. Must include a complete and clear User Manual for configuring and operating the software.
- A strong as-built report detailing the design and implementation of the product in a complete, clear and professional manner. This document should provide a strong basis for future development of the product.
- Complete professionally-documented codebase, delivered both as a repository in GitHub, BitBucket, or some other version control repository; and as a physical archive on a USB drive.