Development Team  Surabhi Mundada, Anji Ren, Diva Sharma, Mandy Lu, Natasha Goenawan

Mentor  Dr. Sesh Mudumbai, MD, MS, Anesthesia
Background and Factors

- Opioid-use after surgeries
- Contributes to opioid crisis
- Lack of tools of surveillance
- Millions of surgeries happen annually in the U.S.
- Difficult to conduct surveillance for persistent post-operative opioid use
Objective

Create an early intervention tool to track opioid use and evaluate patient daily functioning post-operation.

Inform both clinicians and patients about post-operative opioid use, and help minimize re-admittance.
Requirements

iOS app + web app with ResearchKit and HealthKit integration

Older target population → needs to be user-friendly, simple

Patient and clinician-facing
Presentation Overview

- **User Onboarding**
  - UI/UX
  - Steps (Consent, Authentication, Permissions)

- **Main UI**
  - CareKit
  - ResearchKit Surveys
  - HealthKit Data Collection
  - Profile

- **Backend**
  - Survey Data
  - HealthKit Data
  - Web App

- **App Demo**

- **Future**
User Onboarding Overview

Clinician directs patient to download iOS app → Patient goes through informed consent → Patient logs in with email → Patient grants permission (through app) for HealthKit to collect data → Clinician assigns patient an anonymized VA ID and helps select medications
UI and UX Considerations

- Make it easy for users to read (i.e. big text)
- Simple login
- Intuitive app flow
- Color scheme, logos, etc.
Step 1: Setting up the App

Clinician gives context to the patient on the tasks they will be asked to do (monthly and daily surveys)

Clinician guides patients through installing the app + Steps 2-4
Step 2: Consent Process

What is this study about?
What is expected?
Will my info be protected?
Can I change my mind later?

Clinician + App

Signature for Consent
Step 3: Email + Authentication

Sign in to project-653011234435

noreply@ssmart-480d2.firebaseapp.com
to me

Hello,

We received a request to sign in to project-653011234435 using this email address. If you want to sign in with your renate@gmail.com account, click this link:

Sign in to project-653011234435

If you did not request this link, you can safely ignore this email.

Thanks,

Your project-653011234435 team
Step 4: HealthKit Permissions

Asks for two permissions:

Apple Health Records Integration

Release all Health Kit Activity data (e.g. Step Count, Distance Walking) to App
Step 4: HealthKit Permissions

You should make sure that you trust this app before you grant access.

- The records you share may identify you and your care team.
- The app may be able to infer other aspects of your health history from the records you share.
- The app developer may retain and use your records after you stop sharing or delete the app.

View Your Health Records

Continue

Not Now

Which categories can "Project-SSMART" access?

APP EXPLANATION
Used for study data purposes.

View "Project-SSMART" Privacy Policy
Review the app's Privacy Policy to understand how it may use and disclose your records.

ALLOW "PROJECT-SSMART" TO READ

Allergies

"Project-SSMART" will have access to your current records as of December 4, 2019 at 11:33 PM.

Share Current Records

Don't Share

Health

"Project-SSMART" would like to access and update your Health data in the categories below.

Turn All Categories Off
Allow or disallow "Project-SSMART" to access all health data types listed here.

ALLOW "PROJECT-SSMART" TO WRITE DATA:

- Cycling Distance
- Downhill Snow Sports Distance
- Fights Climbed
- Pushes
- Steps
- Swimming Distance
- Swimming Strokes
- Walking + Running Distance
- Wheelchair Distance

App Explanation:
Used for study data purposes.
Main UI

**CareKit**
- Dec 4, 2019
- Active Survey

**ResearchKit**
- SF 12 Survey
- SOWS Survey
- Active Survey
- Medication Survey

**HealthKit**
- Dashboard
  - Today’s Step Count: 0.0
  - heartrate
  - systolicBloodPressure
  - diastolicBloodPressure

**Profile**
- Profile
  - Patient ID
  - Study Participant
  - Change Pasacode
  - Help
  - Report a Problem
  - Support #
  - (855) 617 2755
  - Withdraw from Study
  - Made at Stanford with ❤
  - (1.0) (Build 0)
CareKit

Calendar View
For easy tracking

ResearchKit Surveys
SF12 Survey
SOWS Survey
Active Survey

Daily and Monthly Tasks (can also be weekly)
SF12 Survey

Taken before surgery
Monthly baseline survey
Measures general patient health

Has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

3

1  2  3  4  5  6
None of the time  All of the time
SOWS Survey

Taken before surgery

Monthly baseline survey

Measures patient mood and physical symptoms
Active Survey

Daily check in survey

Documents patient pain, emotions, and moods
Wong-Baker Pain Rating Scale

As bad as it could be, nothing else matters
Pain Localization
Dynamic Medication Survey

Medication Survey
List medications for Active Survey

What prescription opioid pain medications have you taken today?

- Medication: Codeine
  Dosage: 50mg

- Medication: Fentanyl
  Dosage: 10mg
Continuous Sliders

Last night, how many hours of actual sleep did you get? (This may be different than the number of hours you spend in bed.)

8.3

0 24

0 hours 24 hours
HealthKit

Users can see

- **Step Count (number of steps)** - sum of the daily step count
- **Heart Rate (beats/min)** - last heart rate recorded is displayed
- **Systolic Blood Pressure & Diastolic Blood Pressure (mmHg)** [patient needs a connected blood pressure monitor to record] - last systolic blood pressure and diastolic blood pressure reading is displayed

<table>
<thead>
<tr>
<th>Dashboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today's Step Count : 0.0</td>
</tr>
<tr>
<td>Heart Rate (bpm) : 71</td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg) : N/A</td>
</tr>
<tr>
<td>Diastolic Blood Pressure (mmHg) : N/A</td>
</tr>
</tbody>
</table>
Profile View

- User info
- Study team contact
- Option to Withdraw
App Backend

CareKit + ResearchKit Survey Data

HealthKit Data

User ID Info
Backend: Storing Survey Data

Firebase stores data in real-time:

- ResearchKit Survey data
- Survey questions and user answers
- User ID
Backend: Storing HealthKit Data

Firebase stores data in real-time:

- Daily sum of steps per user
- Last Heart Rate recorded per user
- Last Systolic Blood Pressure/Diastolic Blood Pressure reading per user (currently not recorded as we do not have a blood pressure monitor)
Backend: Visualizing User’s Inputs

- Built with npm & React
- Physician dashboardsyncs with data from Firebase
- Aggregation and visualization of survey results
App Demo
Future Steps

- Inputs on profile page and Firebase storage for clinicians to add anonymized IDs and list of medications
- User research on veteran population to get feedback on UI and UX
- Interest from some team members in working with the S-SMART team to apply for a research grant or future papers
- File for security and privacy reviews
- Launch the study!
Acknowledgements

S-SMART Research Team: Dr. Mudumbai, Sam, Adeeti

CS 342 Staff: Dr. Aalami, Santi, Michael, Neil

You :) for attending! THANK YOU!
Thank you!

Questions