ERAS APP for Patients

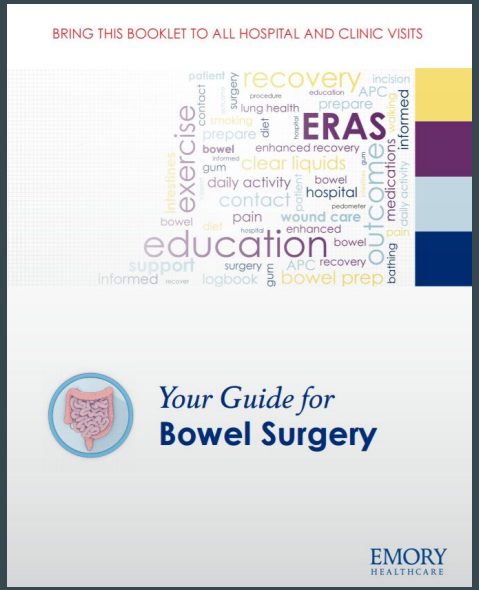
Final Presentation

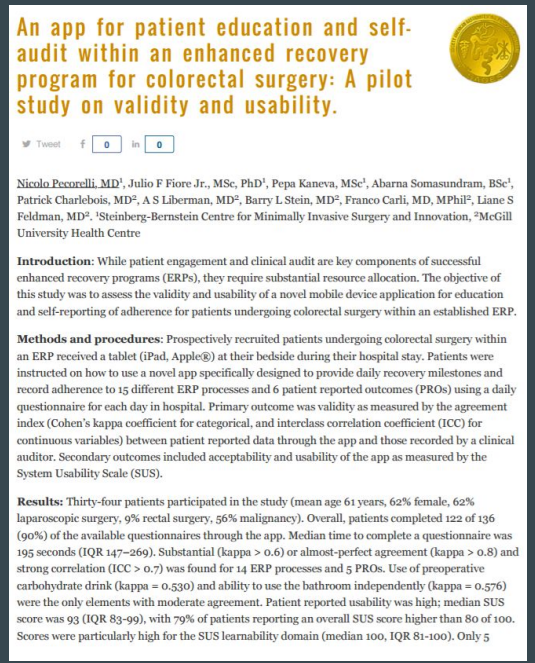
Team Ramblin' on FHIR
Keith Adams, Lauren Aloia, Tyler Bobik, Chiawei Chien, Aaron Reed

Video Presentation Link: https://www.youtube.com/watch?v=j0mnaBZKMhE&feature=youtu.be

Background Research

- Bowel Surgery Handbook
- Sessions with mentors/physicians
- ERAS App study





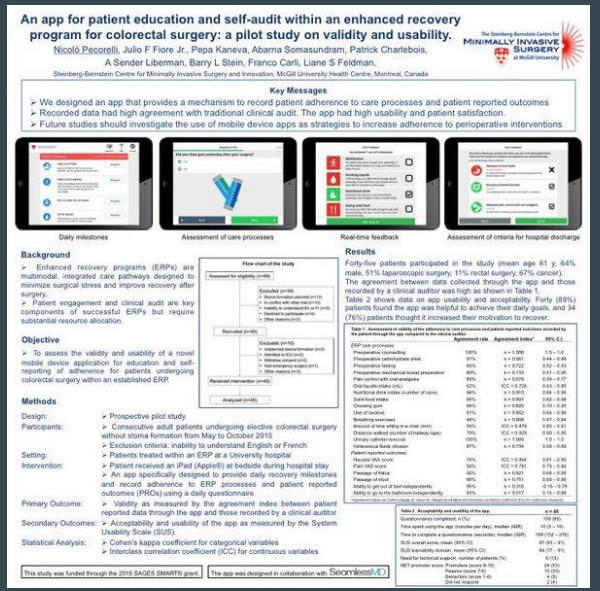
An app for patient education and self-audit within an enhanced recovery program for colorectal surgery: A pilot study on validity and usability.

Nicolo Pecorelli, MD[1], Julio F Fiore Jr., MSc, PhD[1], Pepa Kaneva, MSc[1], Abarna Somasundram, BSc[1], Patrick Charlebois, MD[2], A S Liberman, MD[2], Barry L Stein, MD[2], Franco Carli, MD, MPhil[2], Liane S Feldman, MD[2]. [1]Steinberg-Bernstein Centre for Minimally Invasive Surgery and Innovation, [2]McGill University Health Centre

Introduction: While patient engagement and clinical audit are key components of successful enhanced recovery programs (ERPs), they require substantial resource allocation. The objective of this study was to assess the validity and usability of a novel mobile device application for education and self-reporting of adherence for patients undergoing colorectal surgery within an established ERP.

Methods and procedures: Prospectively recruited patients undergoing colorectal surgery within an ERP received a tablet (iPad, Apple®) at their bedside during their hospital stay. Patients were instructed on how to use a novel app specifically designed to provide daily recovery milestones and record adherence to 15 different ERP processes and 6 patient reported outcomes (PROs) using a daily questionnaire for each day in hospital. Primary outcome was validity as measured by the agreement index (Cohen's kappa coefficient for categorical, and interclass correlation coefficient (ICC) for continuous variables) between patient reported data through the app and those recorded by a clinical auditor. Secondary outcomes included acceptability and usability of the app as measured by the System Usability Scale (SUS).

Results: Thirty-four patients participated in the study (mean age 61 years, 62% female, 62% laparoscopic surgery, 9% rectal surgery, 56% malignancy). Overall, patients completed 122 of 136 (90%) of the available questionnaires through the app. Median time to complete a questionnaire was 195 seconds (IQR 147–269). Substantial (kappa > 0.6) or almost-perfect agreement (kappa > 0.8) and strong correlation (ICC > 0.7) was found for 14 ERP processes and 5 PROs. Use of preoperative carbohydrate drink (kappa = 0.530) and ability to use the bathroom independently (kappa = 0.576) were the only elements with moderate agreement. Patient reported usability was high; median SUS score was 93 (IQR 83-99), with 79% of patients reporting an overall SUS score higher than 80 of 100. Scores were particularly high for the SUS learnability domain (median 100, IQR 81-100). Only 5



An app for patient education and self-audit within an enhanced recovery program for colorectal surgery: a pilot study on validity and usability.

Nicolò Pecorelli, Julio F Fiore Jr., Pepa Kaneva, Abarna Somasundram, Patrick Charlebois, A Sender Liberman, Barry L Stein, Franco Carli, Liane S Feldman,

Steinberg-Bernstein Centre for Minimally Invasive Surgery and Innovation, McGill University Health Centre, Montreal, Canada

Key Messages

- We designed an app that provides a mechanism to record patient adherence to care processes and patient reported outcomes
- Recorded data had high agreement with traditional clinical audit. The app had high usability and patient satisfaction.
- Future studies should investigate the use of mobile device apps as strategies to increase adherence to perioperative interventions

Daily milestones | Assessment of care processes | Real-time feedback | Assessment of criteria for hospital discharge

Background

- Enhanced recovery programs (ERPs) are multimodal, integrated care pathways designed to minimize surgical stress and improve recovery after surgery.
- Patient engagement and clinical audit are key components of successful ERPs but require substantial resource allocation.

Objective

- To assess the validity and usability of a novel mobile device application for education and self-reporting of adherence for patients undergoing colorectal surgery within an established ERP.

Methods

Design: Prospective pilot study

Participants: Consecutive adult patients undergoing elective colorectal surgery without stoma formation from May to October 2015

Setting: Exclusion criteria: inability to understand English or French; Patients treated within an ERP at a University hospital

Intervention: Patient received an iPad (Apple®) at bedside during hospital stay; An app specifically designed to provide daily recovery milestones and record adherence to ERP processes and patient reported outcomes (PROs) using a daily questionnaire

Primary Outcome: Validity as measured by the agreement index between patient reported data through the app and those recorded by a clinical auditor

Secondary Outcomes: Acceptability and usability of the app as measured by the System Usability Scale (SUS).

Statistical Analysis: Cohen's kappa coefficient for categorical variables; Interclass correlation coefficient (ICC) for continuous variables

Results

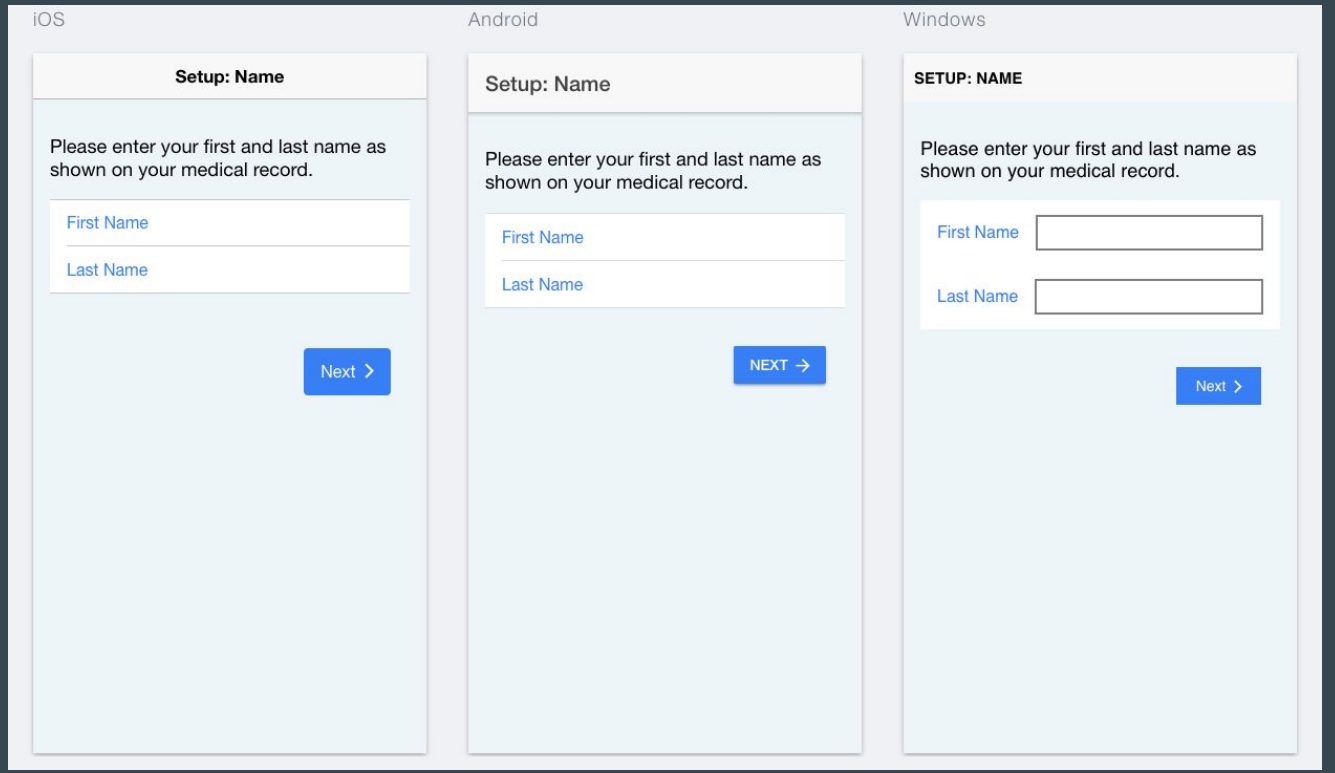
Forty-five patients participated in the study (mean age 61 y, 64% male, 51% laparoscopic surgery, 11% rectal surgery, 67% cancer). The agreement between data collected through the app and those recorded by a clinical auditor was high as shown in Table 1.

Table 2 shows data on app usability and acceptability. Forty (89%) patients found the app was helpful to achieve their daily goals, and 34 (76%) patients thought it increased their motivation to recover.

This study was funded through the 2015 SAGES SMART® grant. The app was designed in collaboration with SeamlessMD

Innovation

- Use of Ionic Framework allows cross platform capability



Project Status

- Working app that runs on iOS, Android and Windows phones.

- We were able to hit almost all the goals we planned on, this includes: Making a user friendly app that educates colorectal surgery patients, stores their information in a database and interacts with FHIR which I will explain more in depth in the demo.

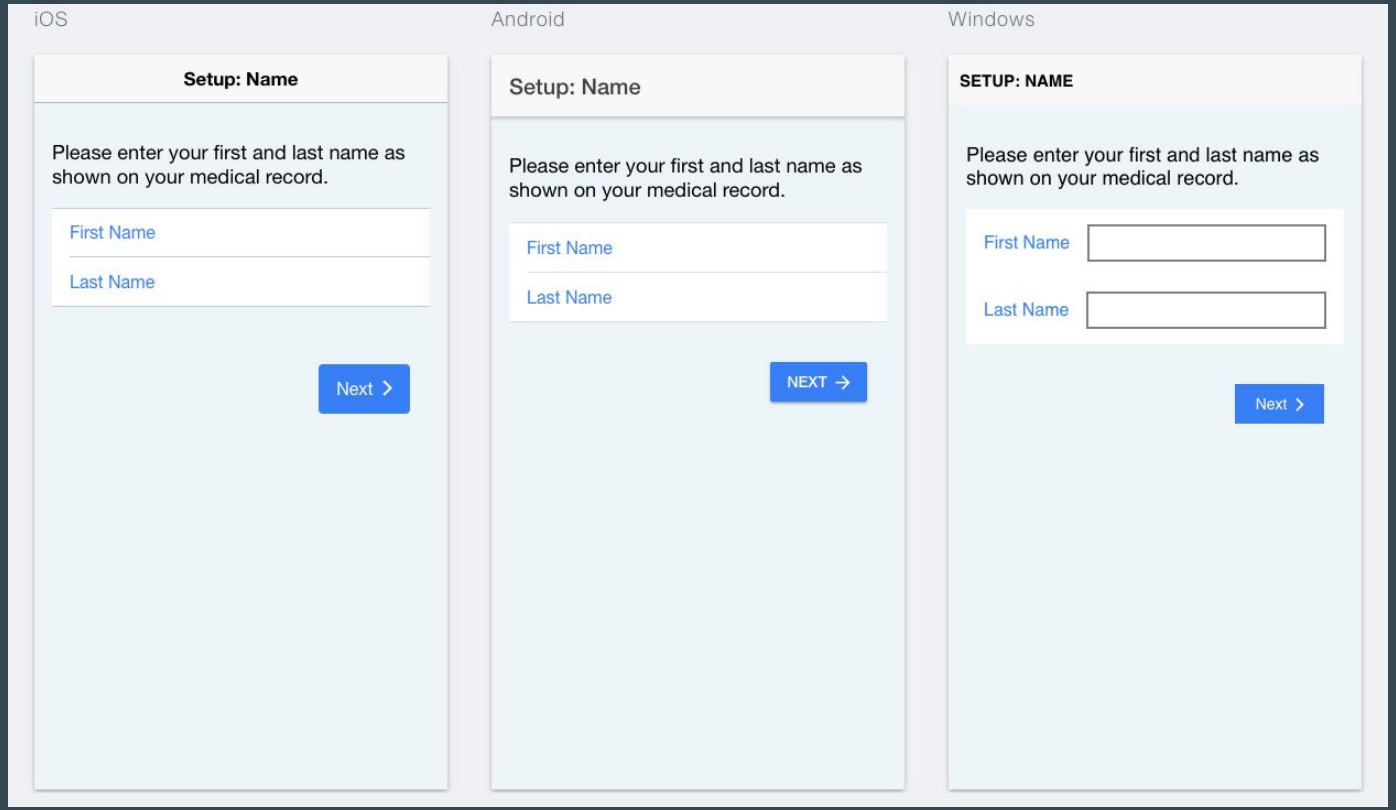
Outstanding Elements

- Notifications that let the patient know if they miss a target.
- Save the profile as a questionnaire.

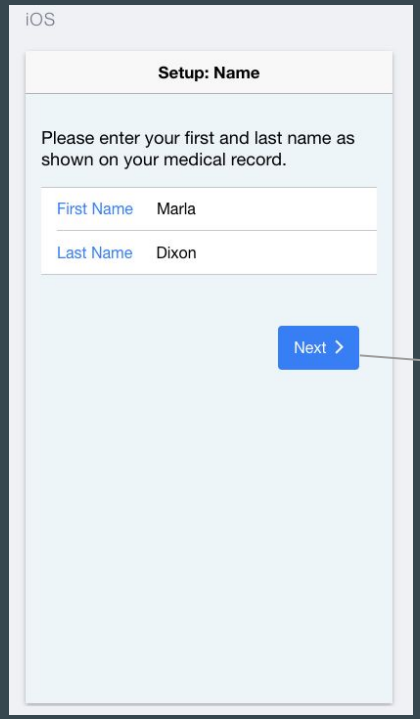
Deploy Final Product

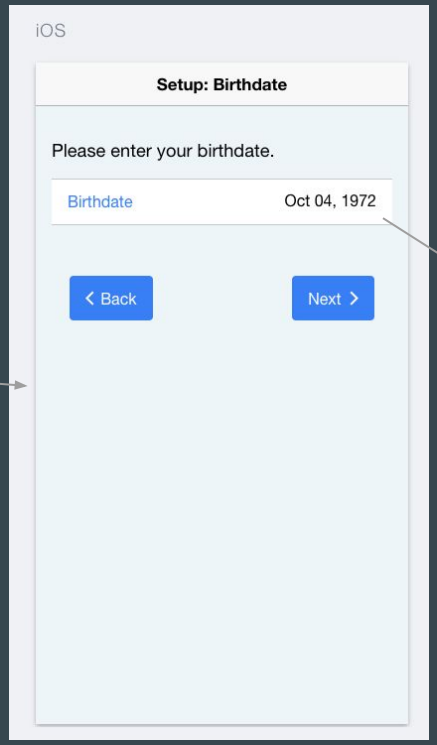
- No actual deployment, we will just be handing the code off to our mentors, explaining to them how to set it up and run it. It is up to them if they want to put it up on an app store or not.

When you First Start the App
Setup: Name

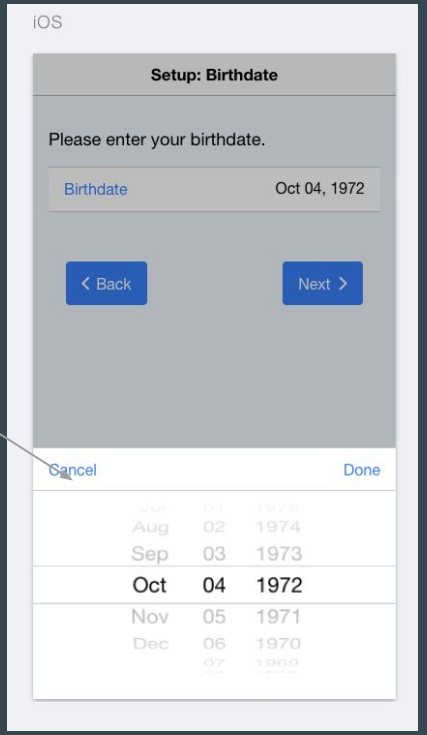


Setup: Birthdate

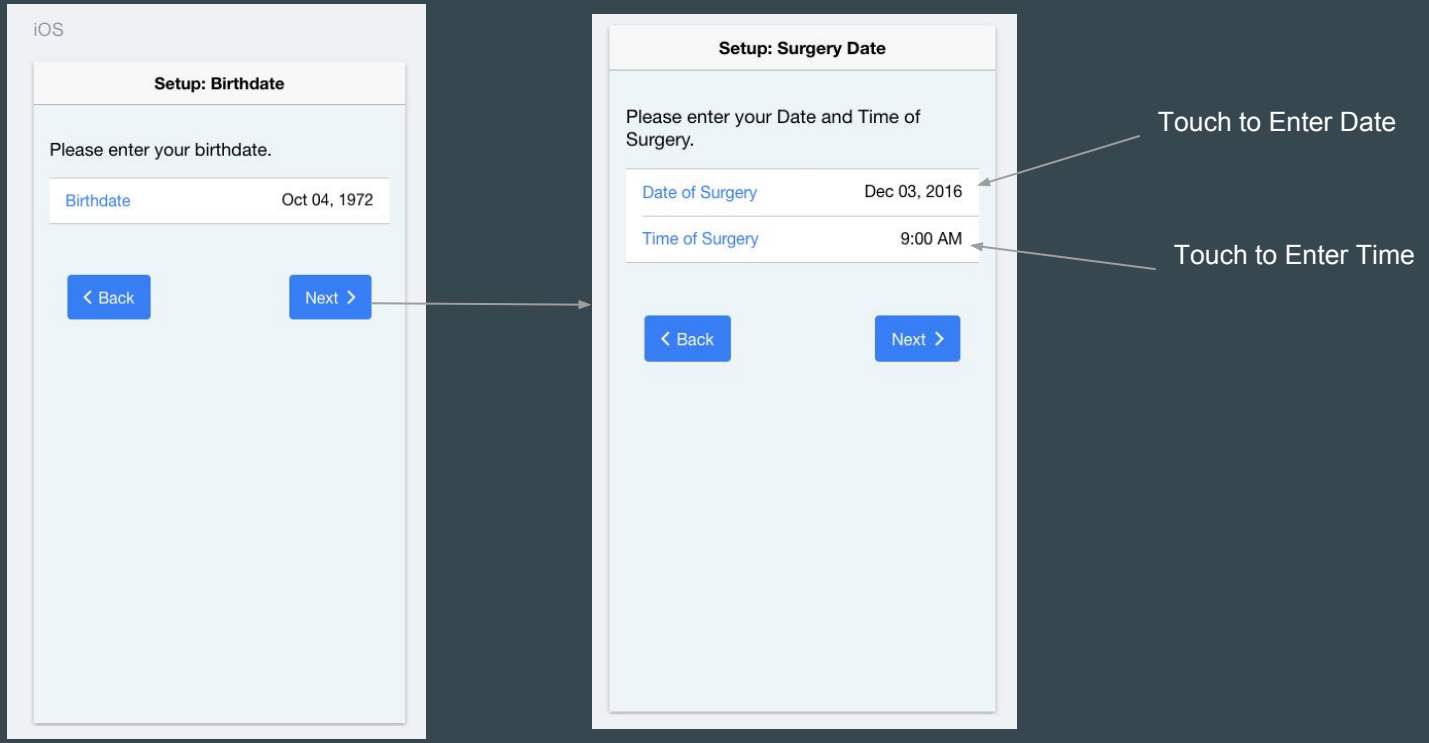




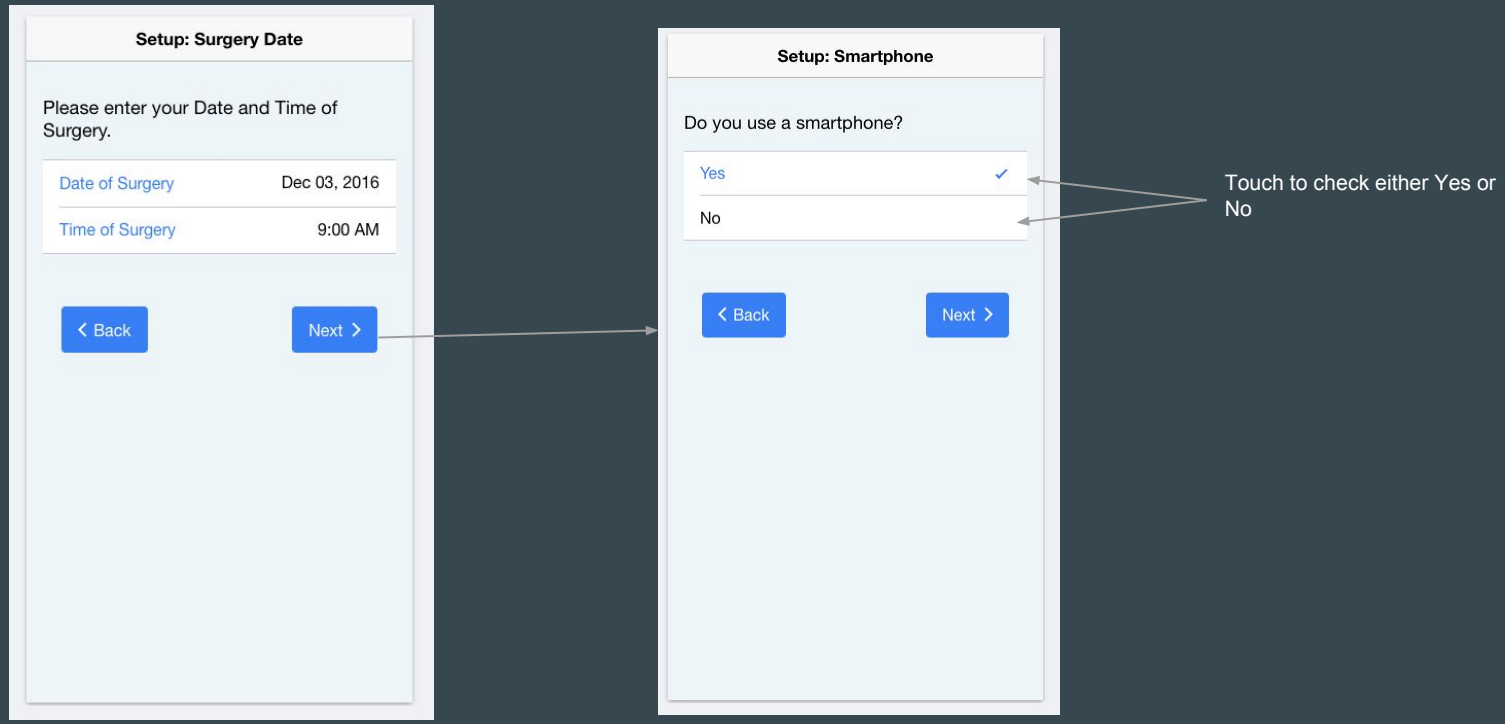
Touch to Enter Birthdate



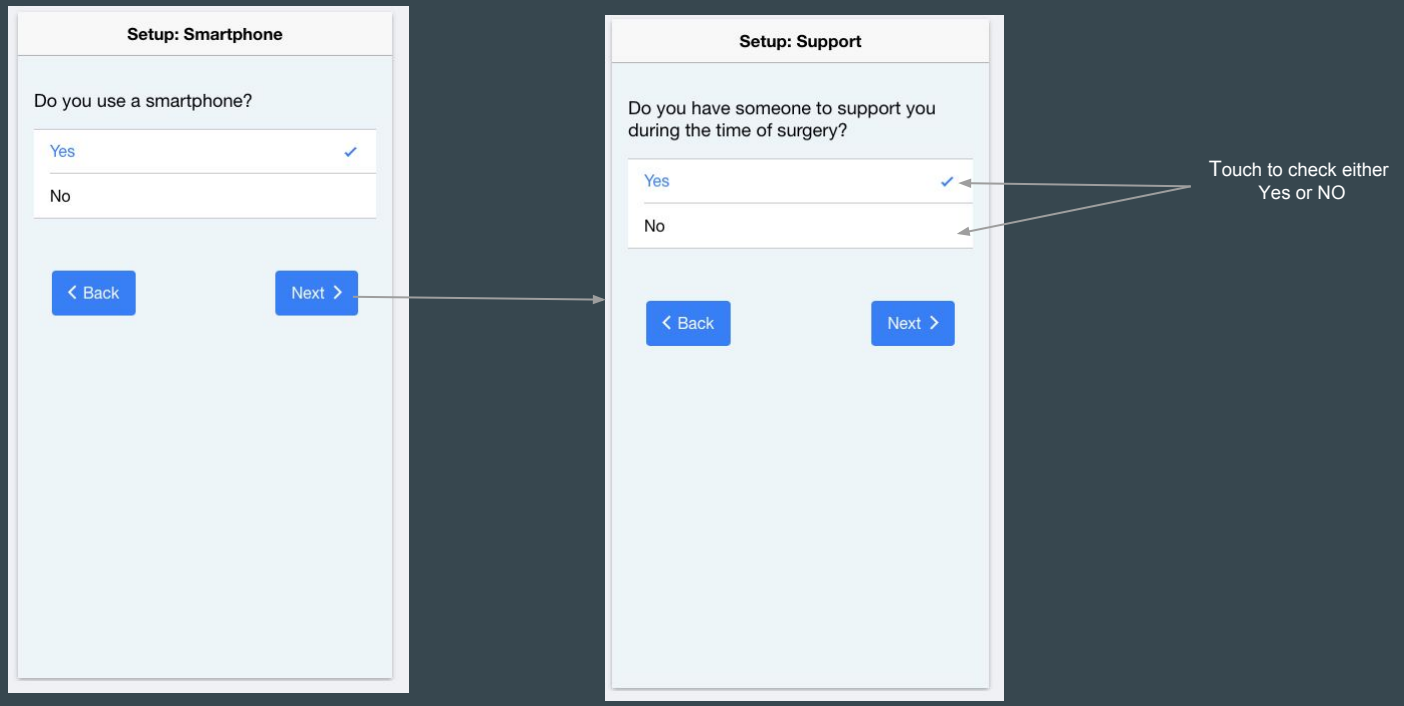
Setup: Surgery Date



Setup: Smartphone

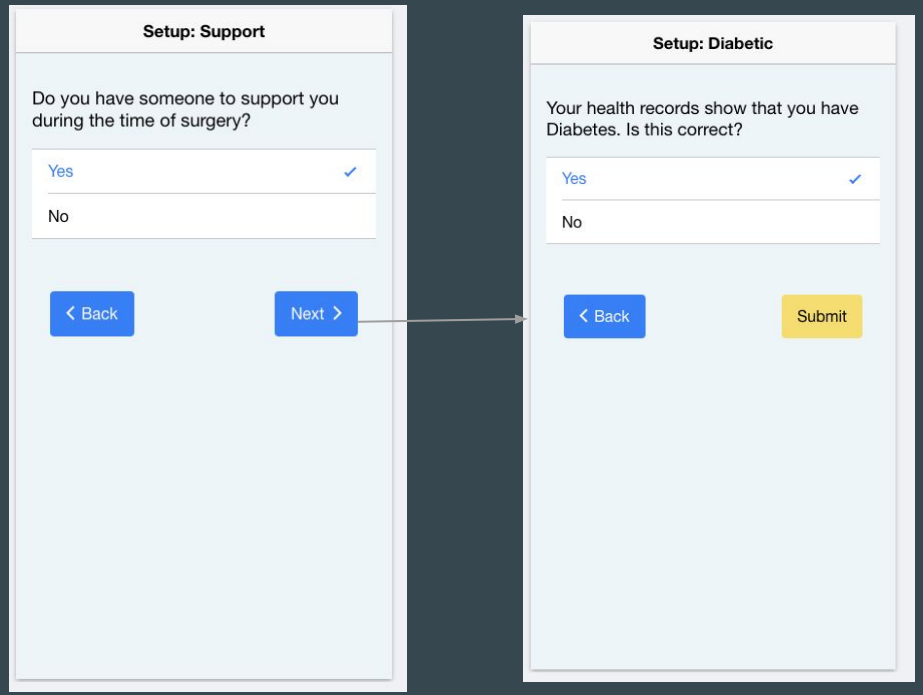


Setup: Support

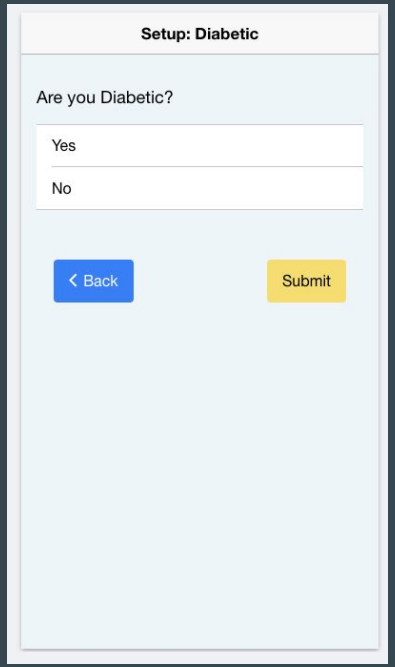


Setup: Diabetic

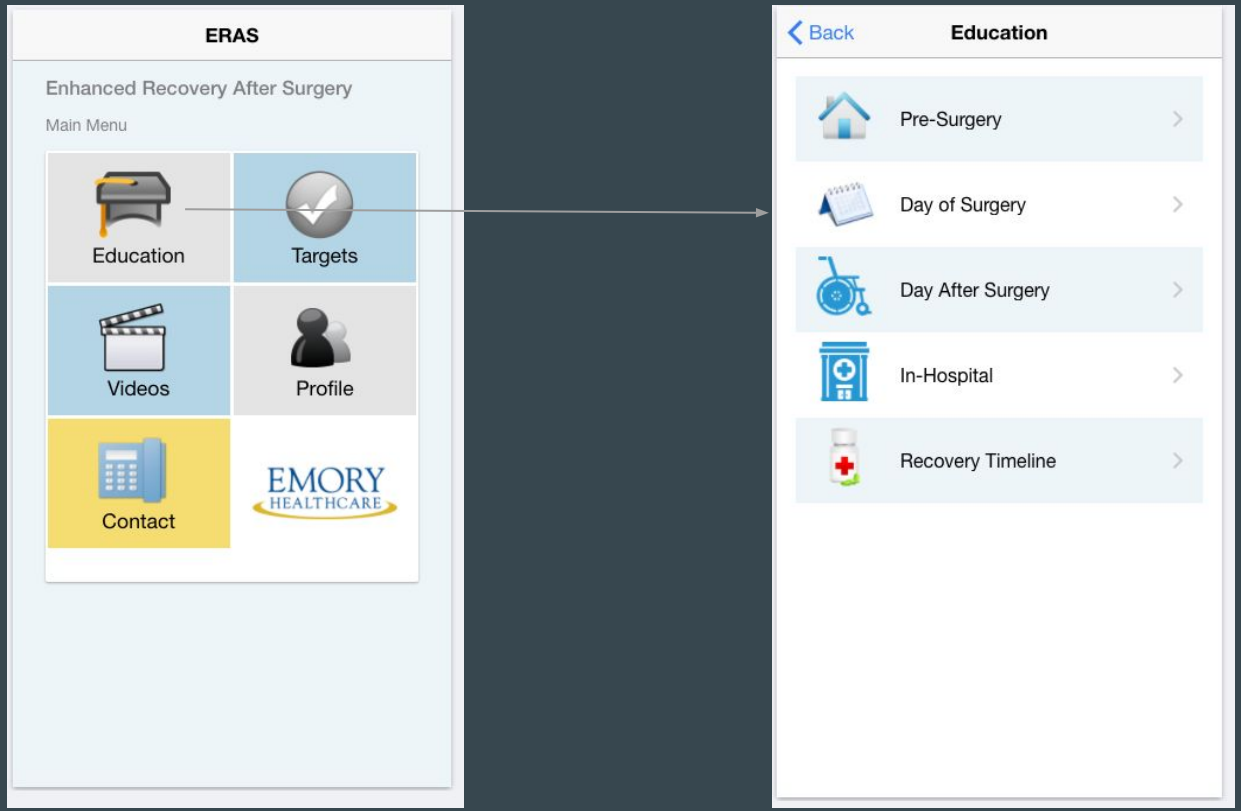
GT FHIR Server Check for Diabetes on Marla Dixon
Because it returns True, Yes is automatically checked.



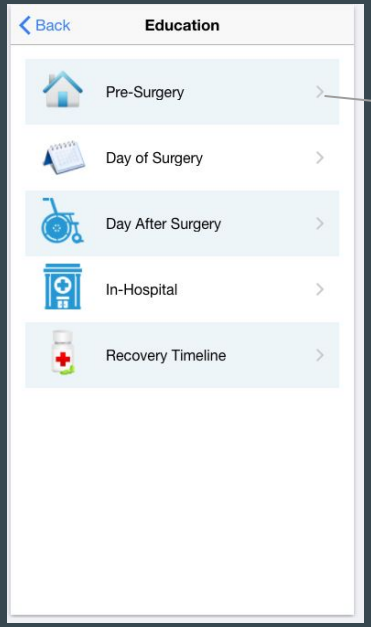
If the user has no diabetes or the user's name is not located in the GT FHIR server the user must specify on their own whether they have diabetes or not.

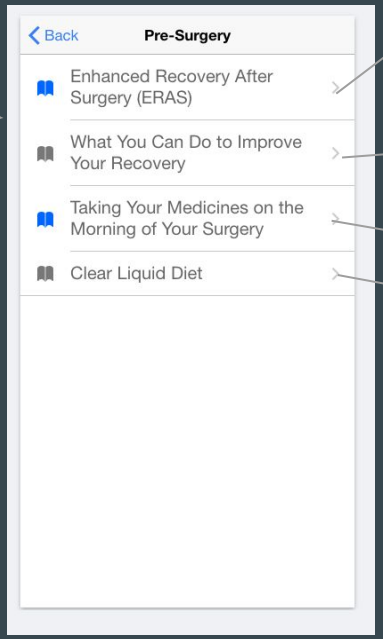


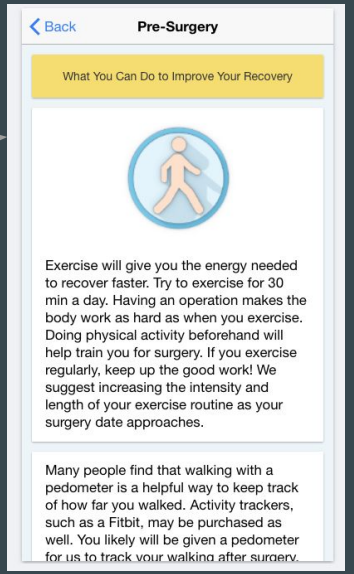
Main Menu and Education



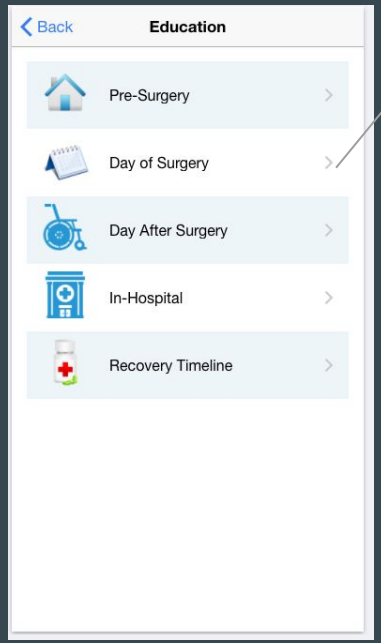
Education: Pre-Surgery Screens

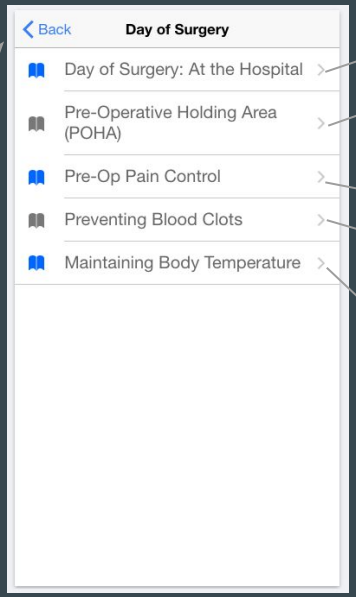


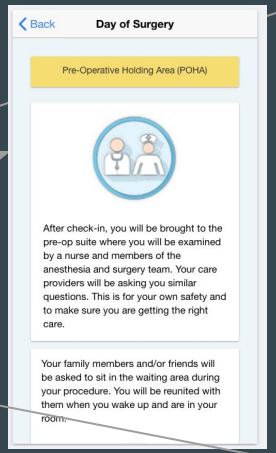


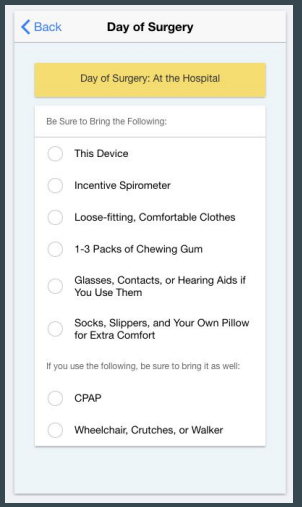


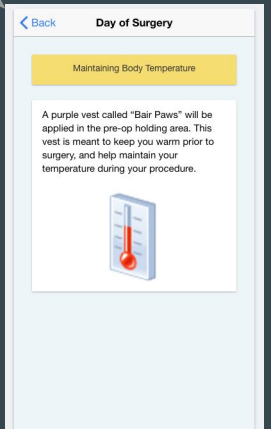
Education: Day of Surgery Screens

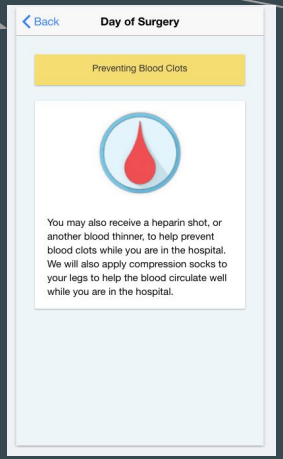


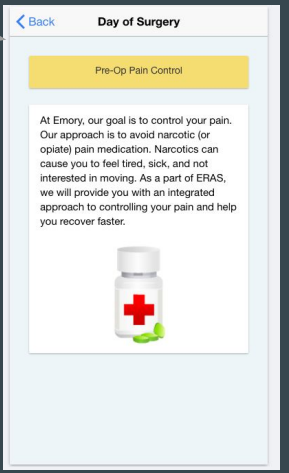




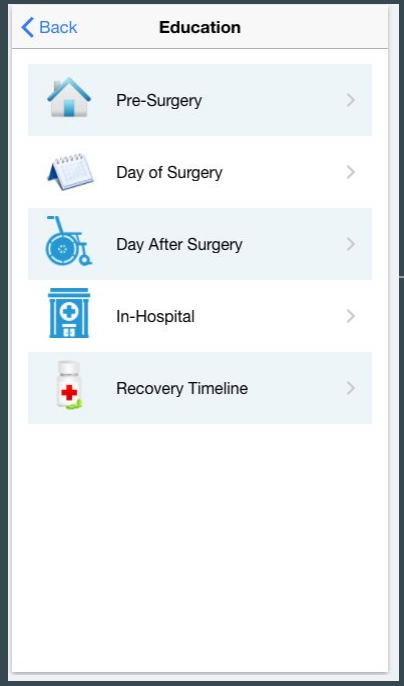


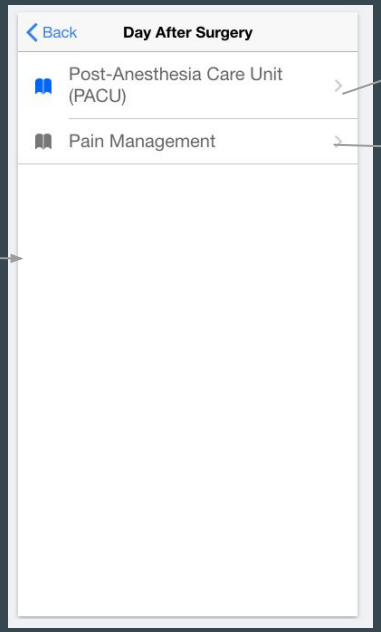


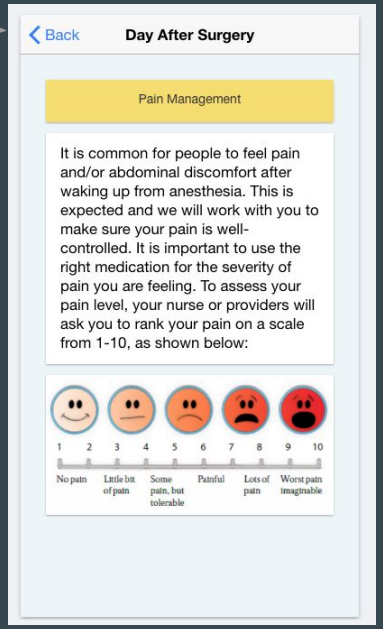


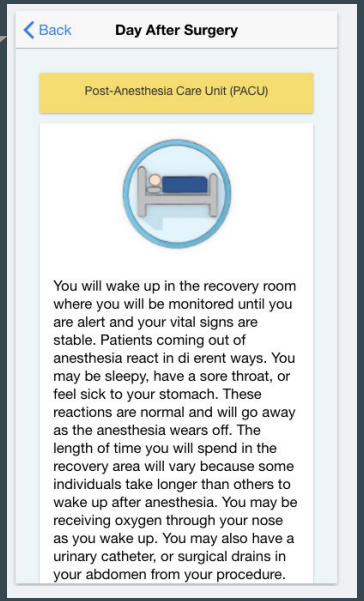


Education: Day After Surgery Screens

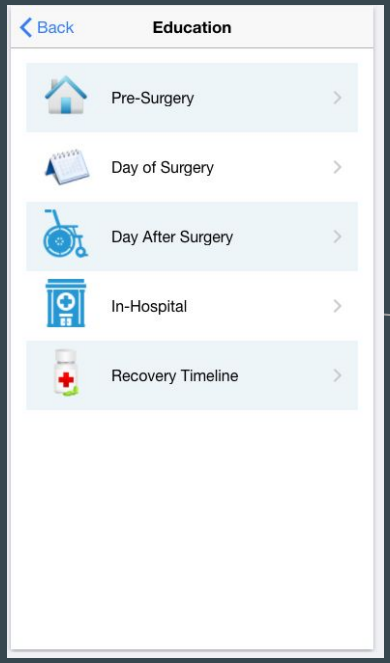


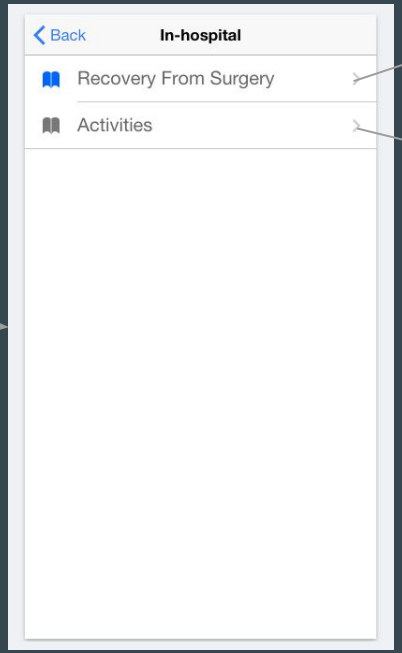


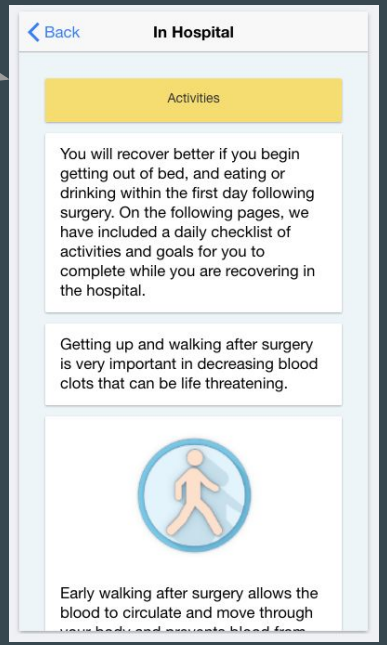


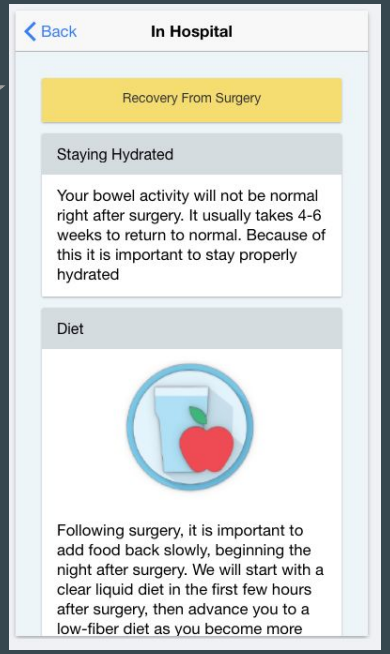


Education: In-hospital Screens

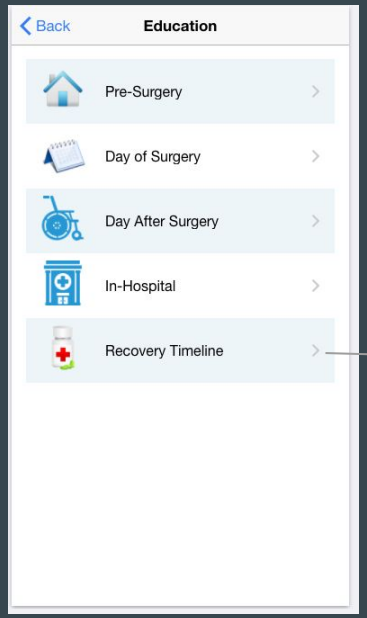


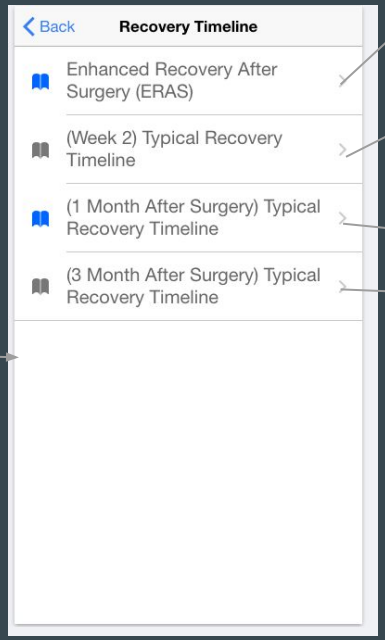


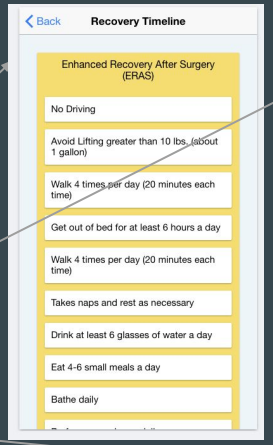


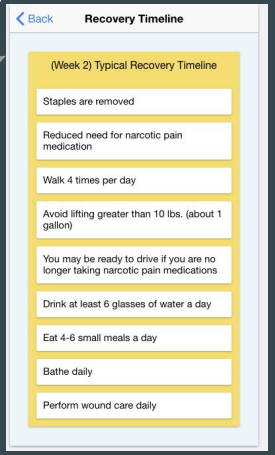


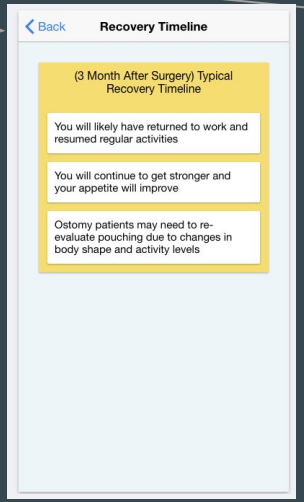
Education: Recovery Timeline Screens

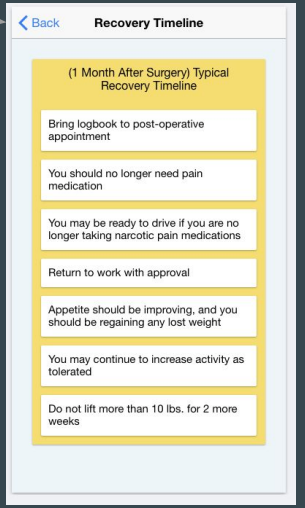








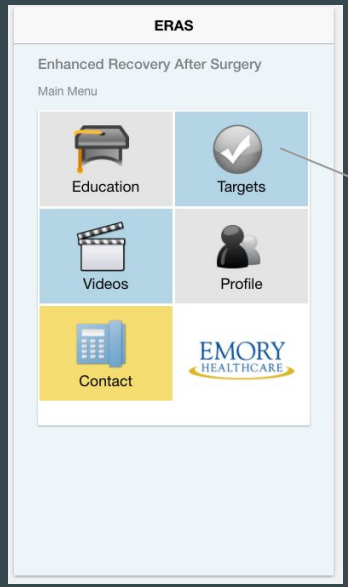


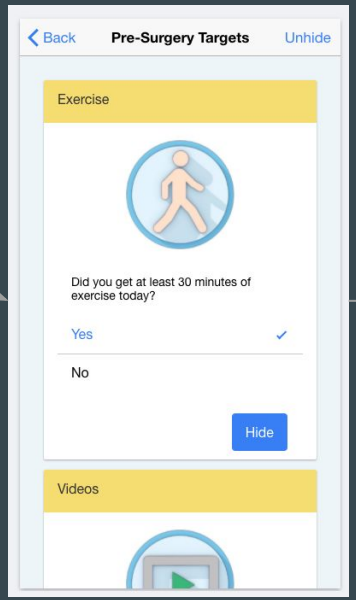


Targets: Pre-Surgery Targets

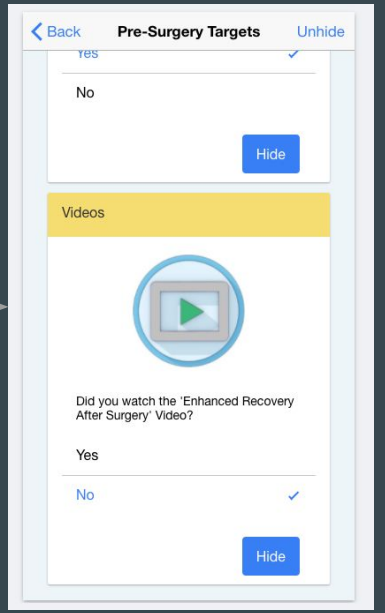
- Pre-Surgery targets are conditional on the surgery date and the current date

If surgery date is more than 2 days before the current date: Only these targets displayed
Pre-Surgery Targets





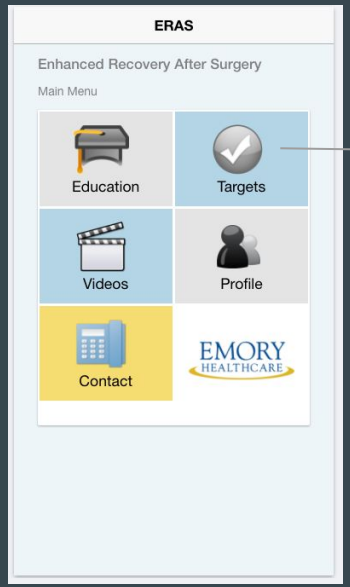
Scroll Down

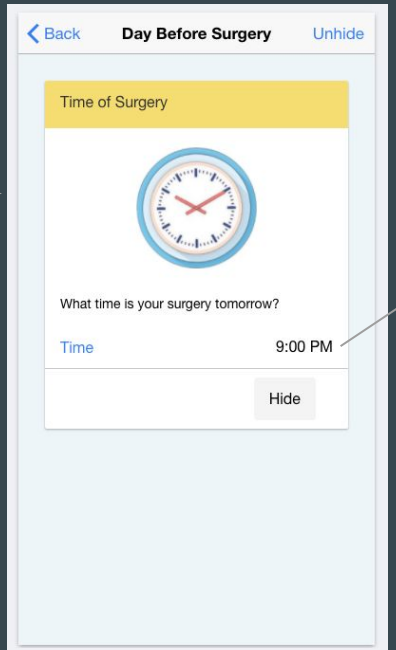


Targets: Day Before Surgery

- Targets are conditional on the surgery date and the current date

If surgery date is 1 day before the current date: Only these targets displayed
Day Before Surgery Targets





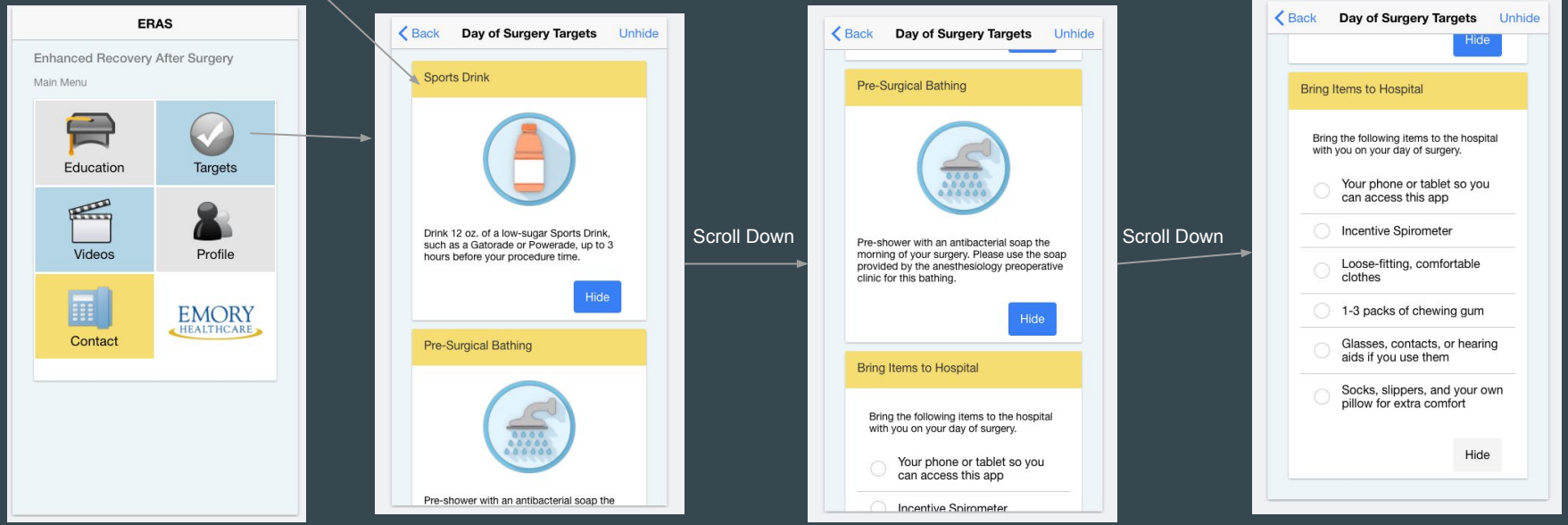
Time automatically added from when the user inputted it at the start via the database it was saved to.

Targets: Day of Surgery (Yes Diabetes)

Targets are conditional on two things:
1. The surgery date and the current date
2. If the patient has Diabetes or not: If Yes, then when the day of surgery matches the patient's **Day of Surgery** they entered on setup, drink a low-sugar sports drink card appears. If No diabetes is entered, the card will not appear.

If surgery date = current date AND Diabetes = True:
Only these targets displayed
Day of Surgery Targets

Shows becuase user has Diabetes

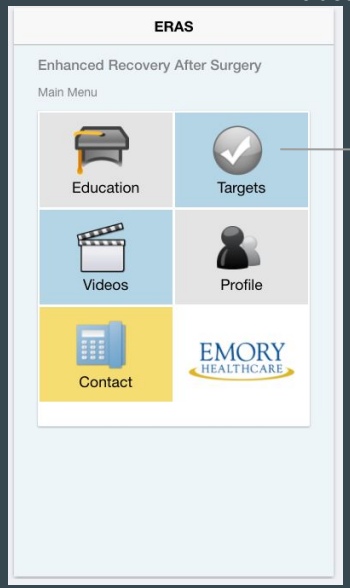


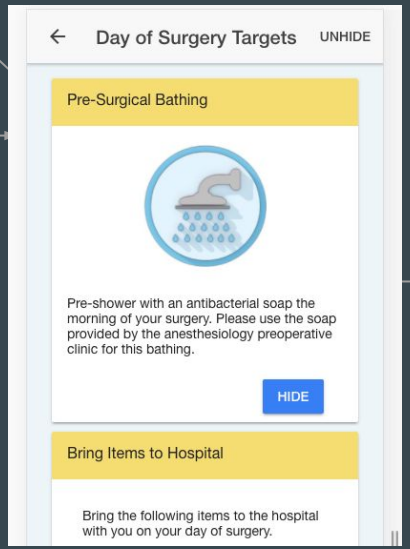
Targets: Day of Surgery (No Diabetes)

Targets are conditional on two things:
1. The surgery date and the current date
2. If the patient has Diabetes or not: If Yes, then when the day of surgery matches the patient's **Day of Surgery** they entered on setup, drink a low-sugar sports drink card appears. If No diabetes is entered, the card will not appear.

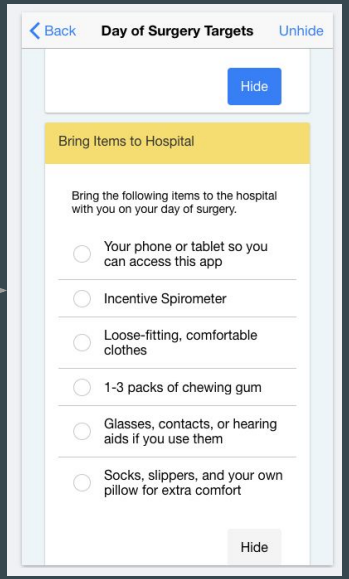
If surgery date = current date AND Diabetes = False:
Only these targets displayed
Day of Surgery Targets

Sports drink card Disappears because Diabetes is false





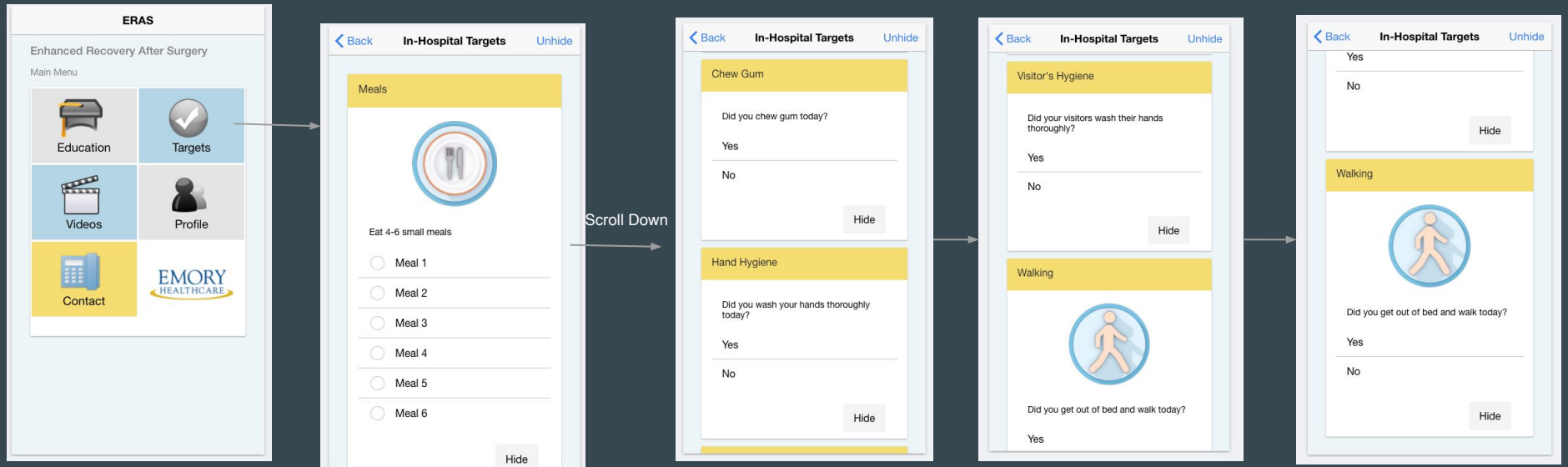
Scroll Down



Targets: In-Hospital

- In-Hospital targets are conditional on the surgery date and the current date

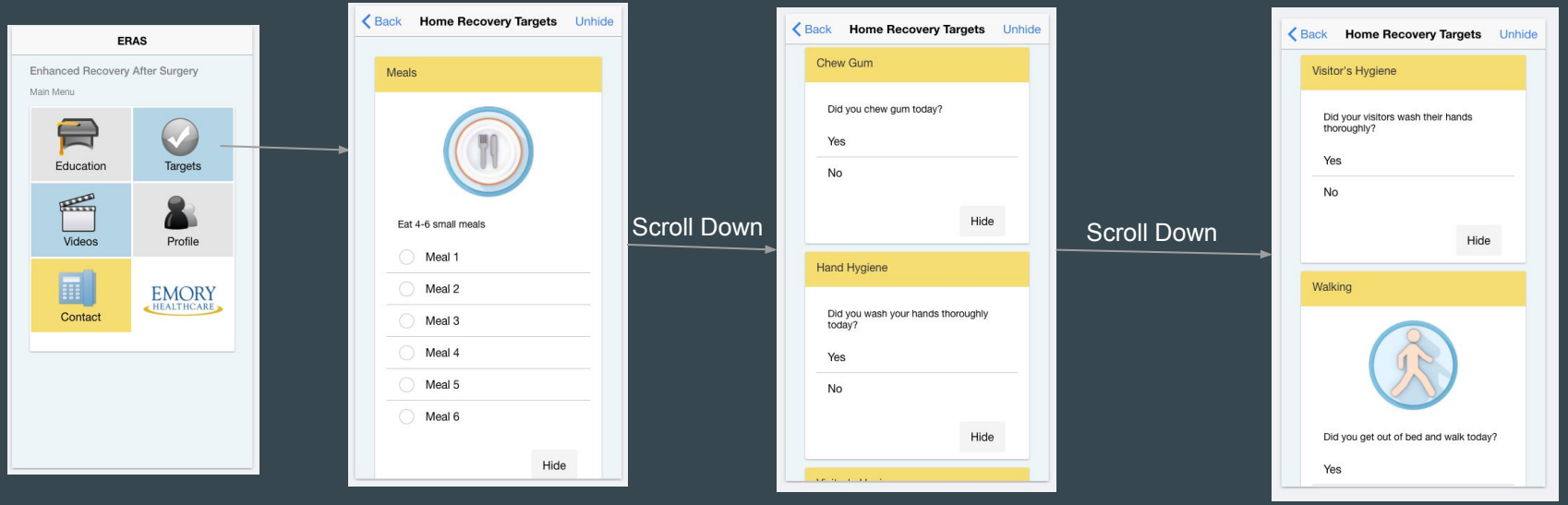
If surgery date was 1 day before the current date and less than a week after surgery:
Only these targets displayed
In-Hospital Targets



Targets: Home Recovery

- Home Recovery targets are conditional on the surgery date and the current date

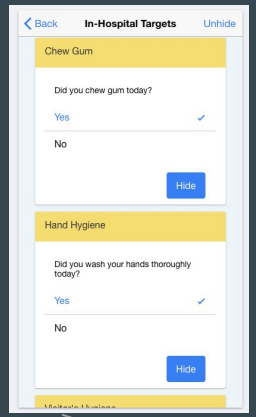
If surgery date was 7 days before the current date: Only these targets displayed
Home Recovery Targets

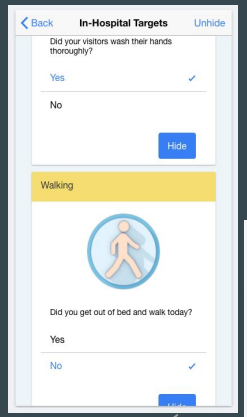


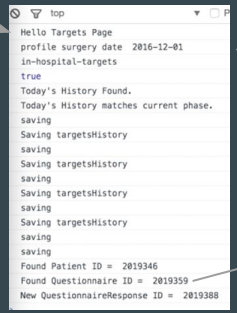
Targets Integration With FHIR: Questionnair

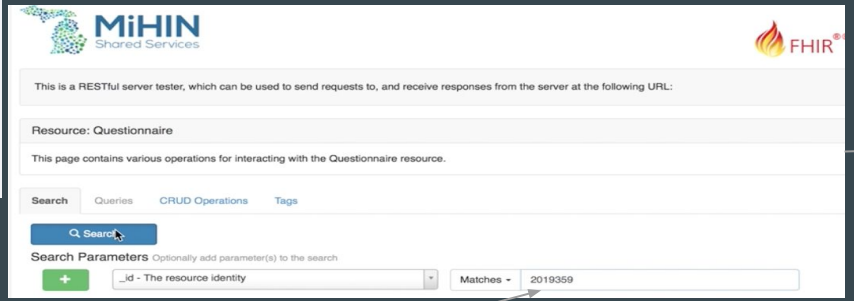
For Questionnaire and QuestionnaireResponse on FHIR:

1. It saves when you leave targets.
2. Finds all the questions on the targets page that are ‘radio’
3. Sends to server and checks if questionnaire already exists. If yes, it uses that questionnaire id.
4. Gets user’s responses and creates QuestionnaireResponse resource. Sends to server and gets back id.







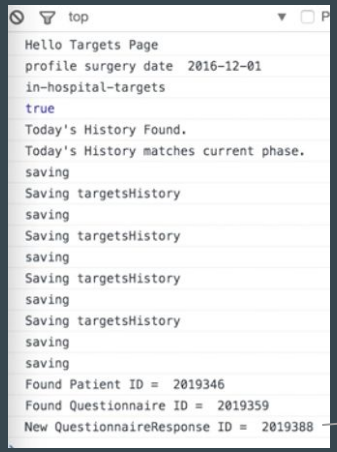


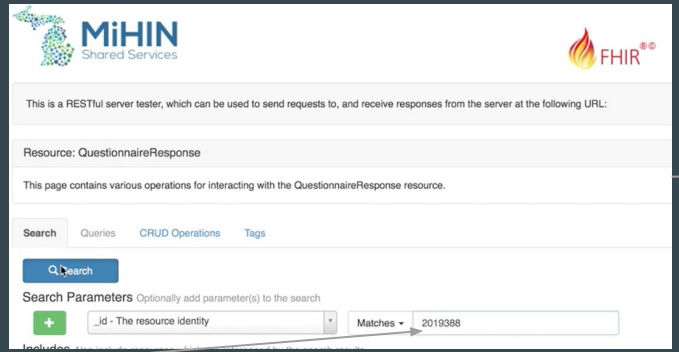
Questionnaire

Targets Integration With FHIR: QuestionnaireResponse Resource

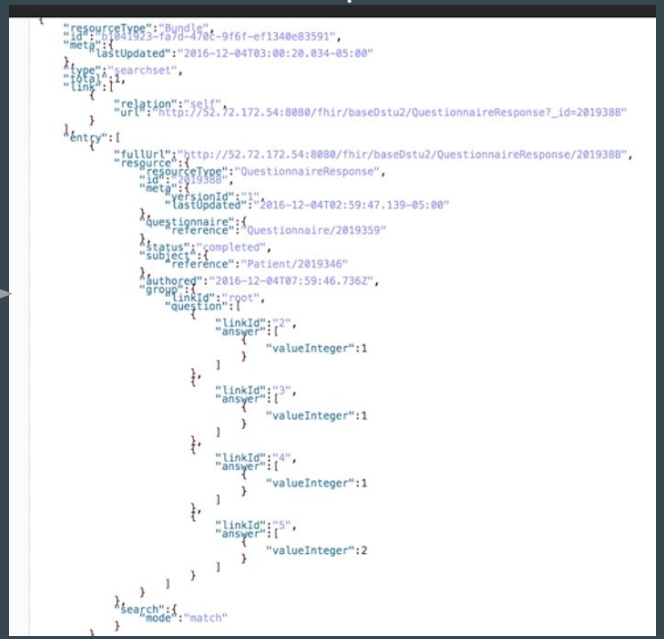
For Questionnaire and QuestionnaireResponse on FHIR:

1. it saves when you leave targets.
2. Finds all the questions on the targets page that are ‘radio’
3. Sends to server and checks if questionnaire already exists. If yes, it uses that questionnaire id.
4. Gets user’s responses and creates QuestionnaireResponse resource. Sends to server and gets back id.

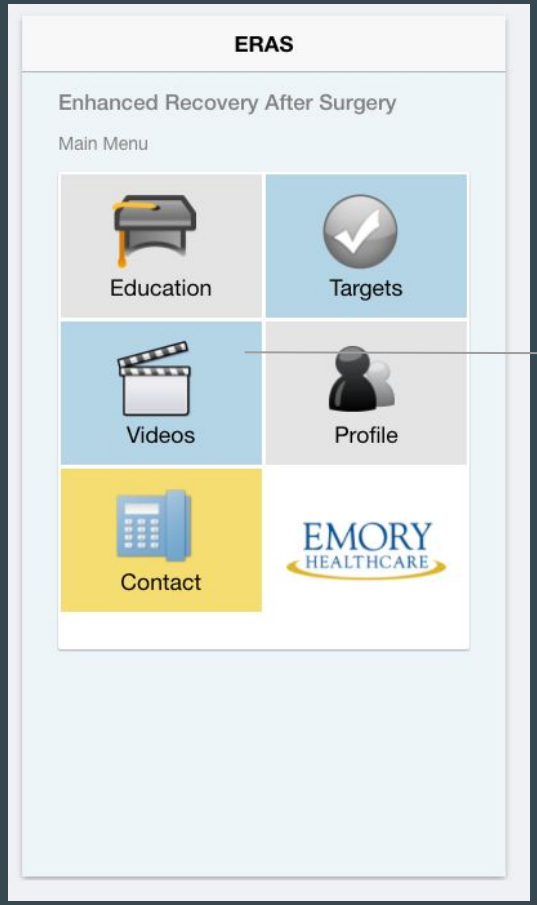


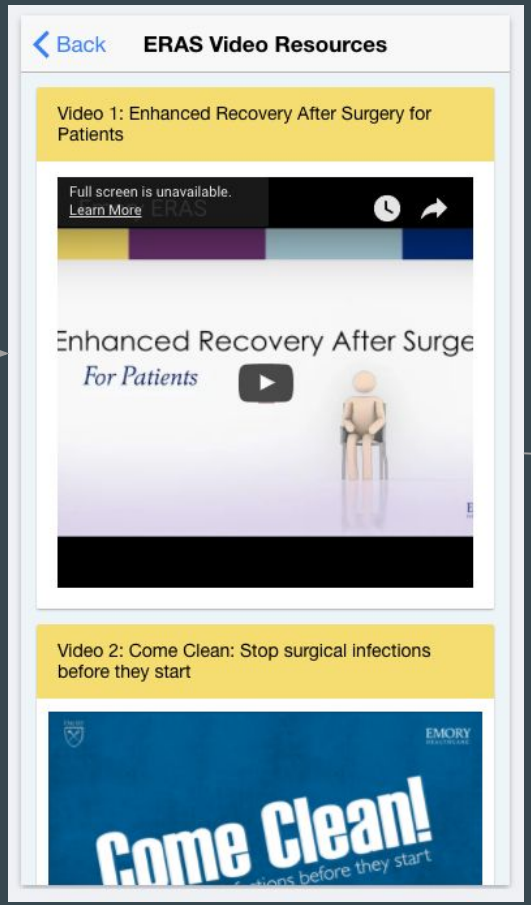


QuestionnaireResponse Resource

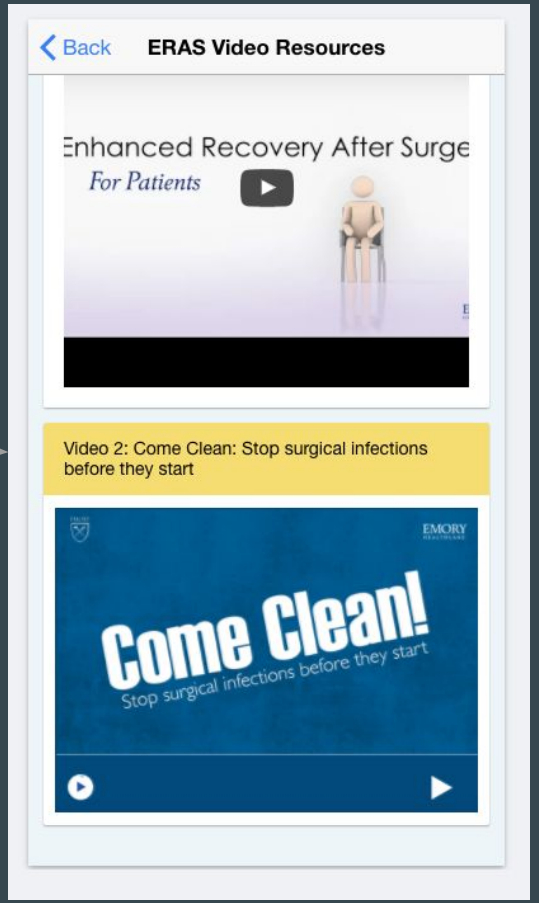


Videos

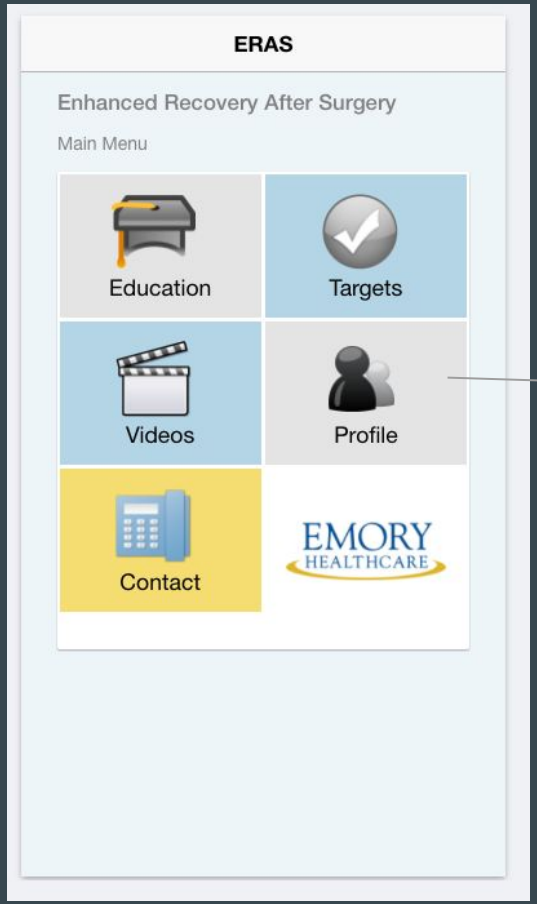


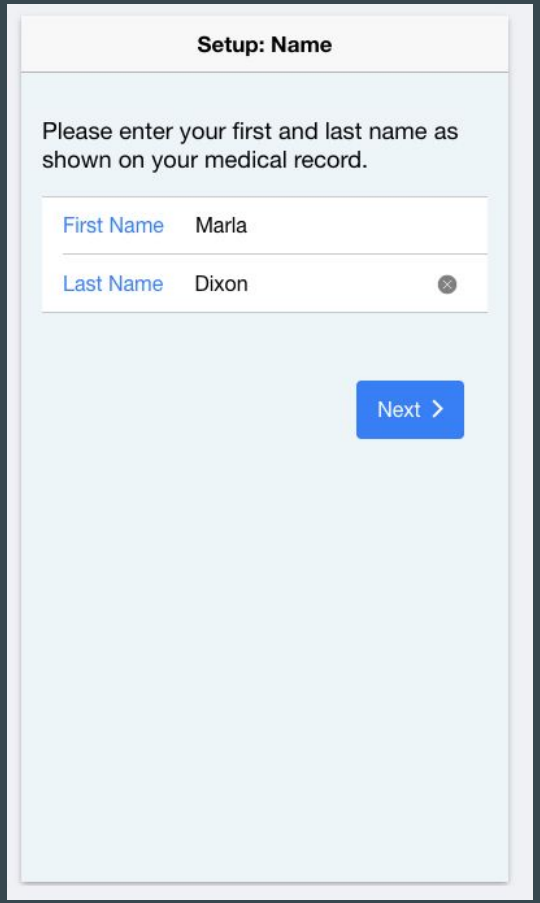


Scroll

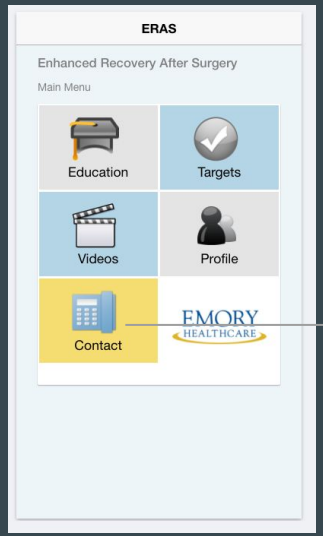


Profile


ERAS
Enhanced Recovery After Surgery
Main Menu
Education
Targets
Videos
Profile
Contact
EMORY
HEALTHCARE


Setup: Name
Please enter your first and last name as shown on your medical record.
First Name
Marla
Last Name
Dixon
Next

Contact


ERAS
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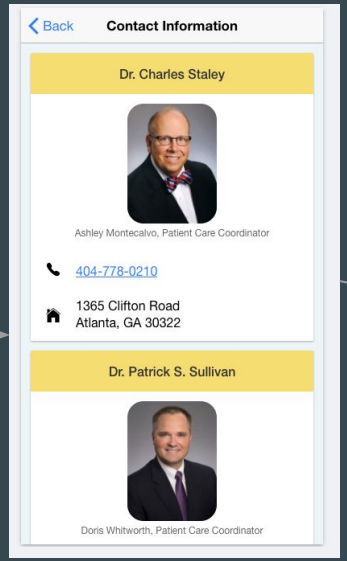
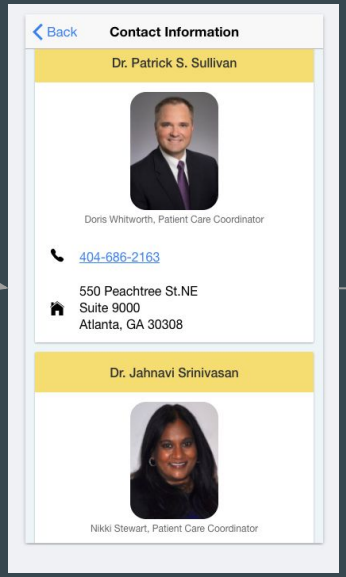
EMORY HEALTHCARE


Back
Contact Information
Dr. Charles Staley
Ashley Montecalvo, Patient Care Coordinator
404-778-0210
1365 Clifton Road
Atlanta, GA 30322
Dr. Patrick S. Sullivan
Doris Whitworth, Patient Care Coordinator


Back
Contact Information
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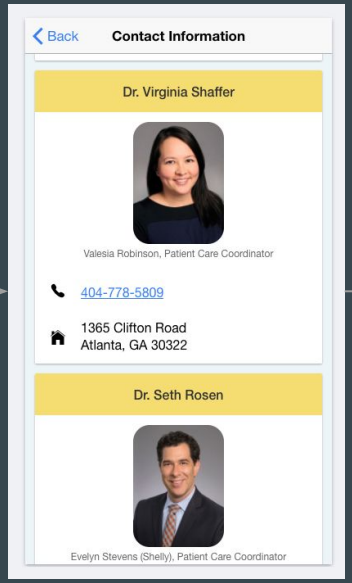
404-686-2163
550 Peachtree St.NE
Suite 9000
Atlanta, GA 30308
Dr. Jahnavi Srinivasan
Nikki Stewart, Patient Care Coordinator


Back
Contact Information
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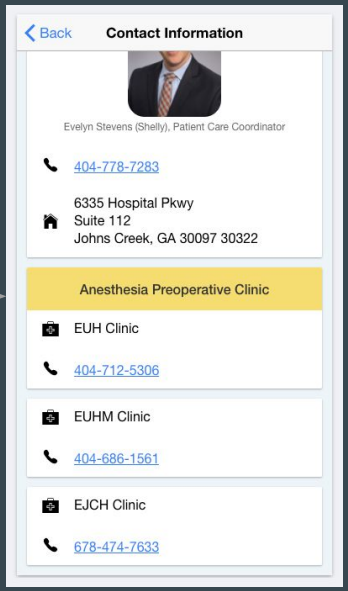
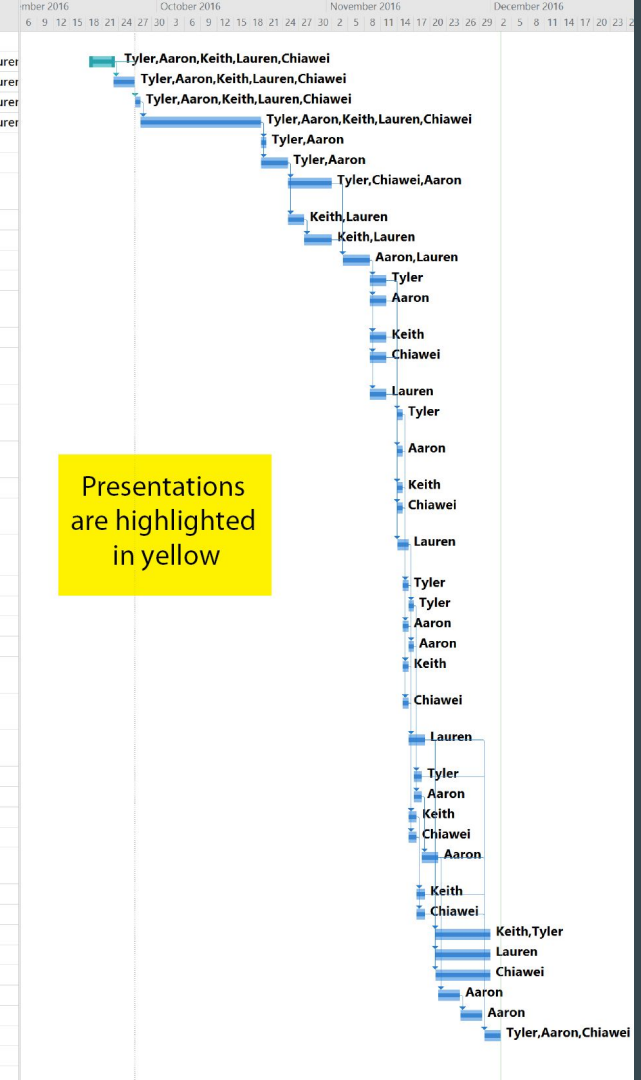
Valesia Robinson, Patient Care Coordinator
404-778-5809
1365 Clifton Road
Atlanta, GA 30322
Dr. Seth Rosen
Evelyn Stevens (Shelly), Patient Care Coordinator


Back
Contact Information
Evelyn Stevens (Shelly), Patient Care Coordinator
404-778-7283
6335 Hospital Pkwy
Suite 112
Johns Creek, GA 30097 30322
Anesthesia Preoperative Clinic
EUH Clinic
404-712-5306
EUHM Clinic
404-686-1561
EJCH Clinic
678-474-7633

Gnatt Chart

GANTT CHART

	Task Mode	Task Name	Duration	Start	Finish	Prec	Resource Names
1							
2		Team formation	4 days	Mon 9/19/16	Thu 9/22/16		Tyler,Aaron,Keith,Lauren
3		Team Formation Presentation	2 days	Fri 9/23/16	Mon 9/26/16	2	Tyler,Aaron,Keith,Lauren
4		Meet with mentor	1 day	Tue 9/27/16	Tue 9/27/16	2	Tyler,Aaron,Keith,Lauren
5		Gather requirements	16 days	Wed 9/28/16	Wed 10/19/16	4	Tyler,Aaron,Keith,Lauren
6		Refine project plan	1 day	Thu 10/20/16	Thu 10/20/16	5	Tyler,Aaron
7		Technical presentation	3 days	Thu 10/20/16	Mon 10/24/16	5	Tyler,Aaron
8		Setup DB server and design/create schema	6 days	Tue 10/25/16	Tue 11/1/16	7	Tyler,Chiawei,Aaron
9		Setup PHP server	3 days	Tue 10/25/16	Thu 10/27/16	7	Keith,Lauren
10		Create UI design/layout	3 days	Fri 10/28/16	Tue 11/1/16	9	Keith,Lauren
11		Team Progress Report	3 days	Fri 11/4/16	Tue 11/8/16	10,8	Aaron,Lauren
12		Login Screen	3 days	Wed 11/9/16	Fri 11/11/16	11	Tyler
13		Intro Screen (Purpose of app)	3 days	Wed 11/9/16	Fri 11/11/16	11	Aaron
14		Bowel Prep Screen	3 days	Wed 11/9/16	Fri 11/11/16	11	Keith
15		Purpose of Procedure Screen	3 days	Wed 11/9/16	Fri 11/11/16	11	Chiawei
16		Before surgery screen	3 days	Wed 11/9/16	Fri 11/11/16	11	Lauren
17		What you can do to improve recovery screen	1 day	Mon 11/14/16	Mon 11/14/16	12	Tyler
18		Taking meds morning of screen	1 day	Mon 11/14/16	Mon 11/14/16	13	Aaron
19		Daily recovery diary screen	1 day	Mon 11/14/16	Mon 11/14/16	14	Keith
20		Home intake/output logbook (p. 24)	1 day	Mon 11/14/16	Mon 11/14/16	15	Chiawei
21		Daily tasks (p.23) and reminders	2 days	Mon 11/14/16	Tue 11/15/16	16	Lauren
22		Clear liquid diet screen	1 day	Tue 11/15/16	Tue 11/15/16	17	Tyler
23		Day of surgery screen	1 day	Wed 11/16/16	Wed 11/16/16	22	Tyler
24		Before your surgery screen	1 day	Tue 11/15/16	Tue 11/15/16	18	Aaron
25		After your surgery screen	1 day	Wed 11/16/16	Wed 11/16/16	24	Aaron
26		Your hospital stay info screens (2)	1 day	Tue 11/15/16	Tue 11/15/16	19	Keith
27		When can I leave the hospital screen	1 day	Tue 11/15/16	Tue 11/15/16	20	Chiawei
28		Recovery timeline at home screen	3 days	Wed 11/16/16	Fri 11/18/16	21	Lauren
29		Bowel recovery screen	1.5 days	Thu 11/17/16	Fri 11/18/16	23	Tyler
30		Hospital maps screen	1.5 days	Thu 11/17/16	Fri 11/18/16	25	Aaron
31		Contact info screen	1.5 days	Wed 11/16/16	Thu 11/17/16	26	Keith
32		Ostomy education screen	1.5 days	Wed 11/16/16	Thu 11/17/16	27	Chiawei
33		Best health with an Ostomy screen	1 day	Fri 11/18/16	Mon 11/21/16	30	Aaron
34		Low residue diet screen	1.5 days	Thu 11/17/16	Fri 11/18/16	31	Keith
35		resources screen	1.5 days	Thu 11/17/16	Fri 11/18/16	32	Chiawei
36		Finalize Application Functions	8 days	Mon 11/21/16	Wed 11/30/16	34	Keith,Tyler
37		Finalize Application Skinning	8 days	Mon 11/21/16	Wed 11/30/16	28	Lauren
38		Applciation Icon and Graphics	8 days	Mon 11/21/16	Wed 11/30/16	35	Chiawei
39		Organization Final Turn In	4 days	Mon 11/21/16	Fri 11/25/16	33	Aaron
40		Finalize Gantt Chart	2 days	Fri 11/25/16	Tue 11/29/16	39	Aaron
41		Final Project Presentation	3 days	Wed 11/30/16	Fri 12/2/16	35,34,	Tyler,Aaron,Chiawei



Presentations are highlighted in yellow

Next Step (Future Improvement)

- Deployment with client - 12/7/2016
- Communication with Existing Client EHR Server
- Full SQLite Implementation
- Push notification from physician (ex: change of surgery date)
- Consult physician through in app messaging
- Admin login on physician end to track patient targets within app