

Mobile Health (mHealth) Technologies used in the U.S. Veterans Health Administration

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Discussion Topics

- ▶ **Review Results of 2013 Research Study**

- ▶ “The Impact of Mobile Health (mHealth) Technology on Family Caregiver’s Burden Levels and an Assessment of Variation in mHealth Tool Use”

- ▶ **Review New VA Mobile Apps**

- ▶ Apps are available for distribution to open source community
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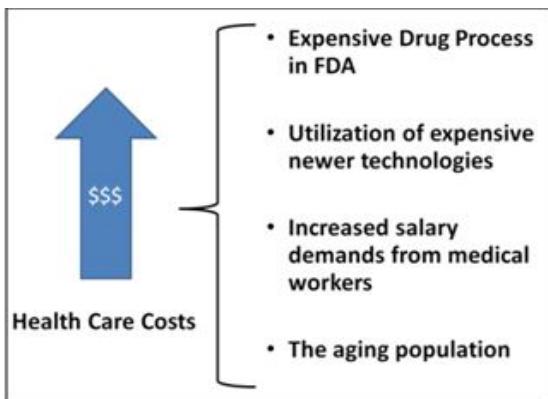
Impetus for the Research

Joint Investigation of the U.S. Department of Veterans Affairs (VA) & George Washington University (GWU)

Over 2 million U.S. Vets Returning from War – Many Seriously Injured



Costs Escalating



VA's Family Caregiver Program



High Rates of Stress & Burden



Mobile Health's Potential



VA Family Caregiver
Mobile Health Pilot



VA Family Caregiver Program

- ▶ July of 2012 there were 4,501 Caregivers enrolled, today there are over 21,000 enrolled
 - ▶ Caregivers receive a stipend from the VA of ~USD 1,500 per month to provide in home healthcare support to Veterans
 - ▶ Program provides training, counseling and respite care to support the Caregivers
 - ▶ Program is staffed by VA Caregiver Support Coordinators who make quarterly home visits
 - ▶ Veterans in the program are from post 9/11 wars and have sustained severe physical and emotional injuries from require caregiving services
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Study Purpose

- ▶ Contribute to the evidence base regarding the effectiveness of technology-based solutions, specifically mHealth tools, in reducing Family Caregiver burden

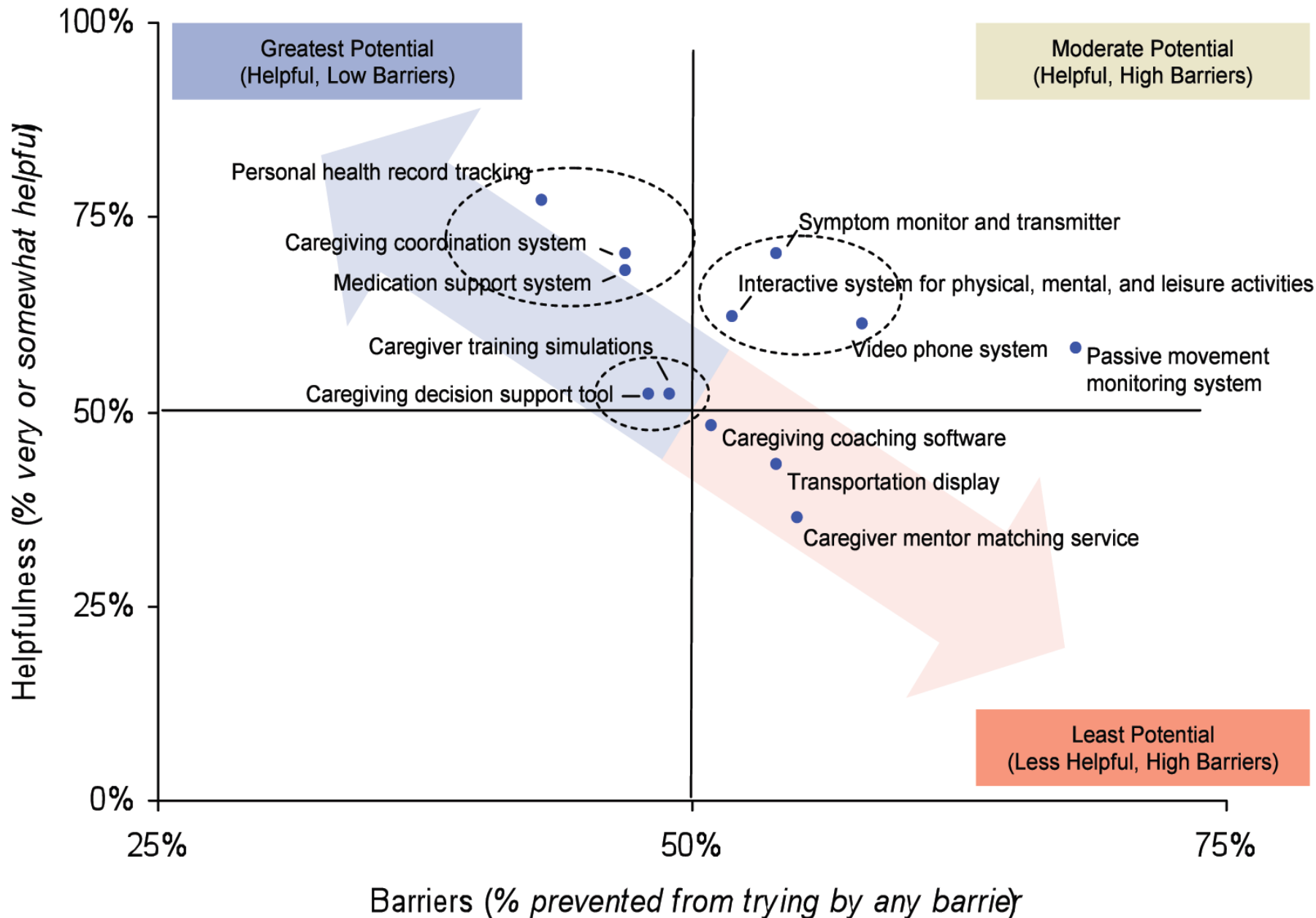
 - ▶ Describe the relative use of the mHealth apps and the factors that predict this use in a medically complex Caregiver-Care Recipient population
-

Related Research

- ▶ Technology-based Caregiver interventions studies have shown mixed results in reducing Caregiver burden/stress
 - Caregivers report the need for access to more health information and ways to communicate with providers
 - mHealth interventions had not been studied in the Caregiver population and this study is the first to do so

 - ▶ Many mHealth studies are limited, many poorly designed with small sample sizes
 - Unclear what factors influence use of mHealth and if it is the same as factors driving other Consumer Health Technologies
 - This study is the first to identify factors driving mHealth use in this Caregiver/Veteran population
-

What Caregivers want from Technology



Significance of the Research

- ▶ Finding ways to reduce Caregiver burden is important:
 - Caregivers provide USD450 billion in uncompensated care in U.S. annually
 - Caregivers prevent /delay institutionalization of care recipients
 - High rates of burnout reduce Caregivers' ability to provide care

 - ▶ Understanding which mHealth apps are most commonly used by Caregivers and their Veterans, along with factors that influence their use, is important to future mHealth implementation decisions
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Study Design

Zarit Burden Study

- ▶ Quasi-experimental pretest/posttest design with a nonrandomized control group

Treatment Group	○ X ○	(N=620)

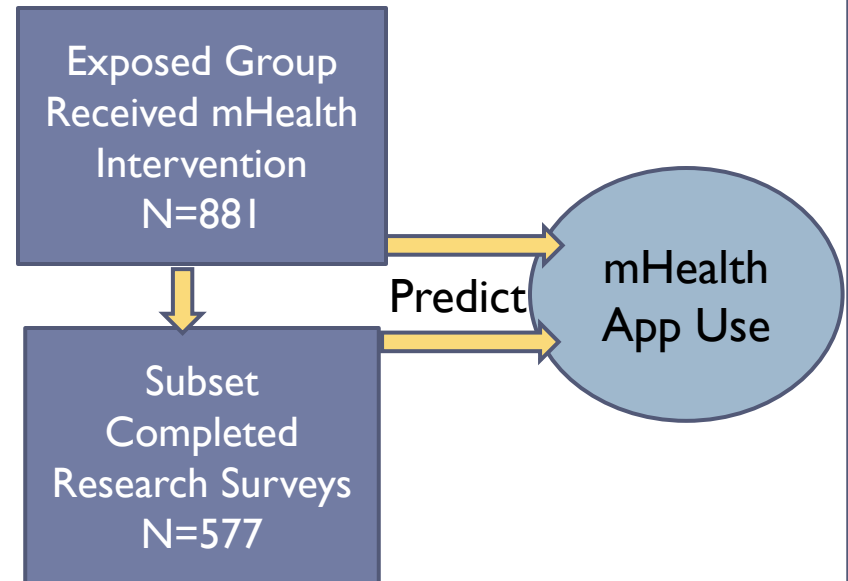
Control Group	○ ○	(N=2,274)

○ = Measurement

X = mHealth Intervention

mHealth Use Study

- ▶ Prospective Cohort Study Design (3 months)



Designed as an “intention to treat” study by including in the analysis patients who received the intervention but may not have used it

Two Study Research Questions

- ▶ Will VA Family Caregivers/Vets receiving a suite of mHealth apps on an iPad® have a significantly different change in measured caregiver burden levels at the end of the 3 month study period, as compared with a measured control group, after adjusting for pre-study burden levels and other covariates?
- ▶ What is the relative use of the mHealth apps provided to the treatment group, and what are the characteristics of the Caregivers and Veterans that predict their use?

Intervention



- ▶ iPad loaded with a suite of mobile health apps designed to support Caregivers
 - ▶ Intervention was only available to study participants
 - ▶ Initial App concepts were created based on needs identified by Caregiver focus groups
 - ▶ Specific App design sessions & usability sessions were then held with follow-up Caregiver/Veteran focus groups
 - ▶ Support included: Quick Start guide, Help desk, website with FAQs, monthly newsletter
 - ▶ Logging on to apps required Dept of Defense (DoD) supplied credentials
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mHealth Apps

Launchpad: Container for all study apps

Summary of Care: Provides access to health care record

Notifications: Sets medication reminders

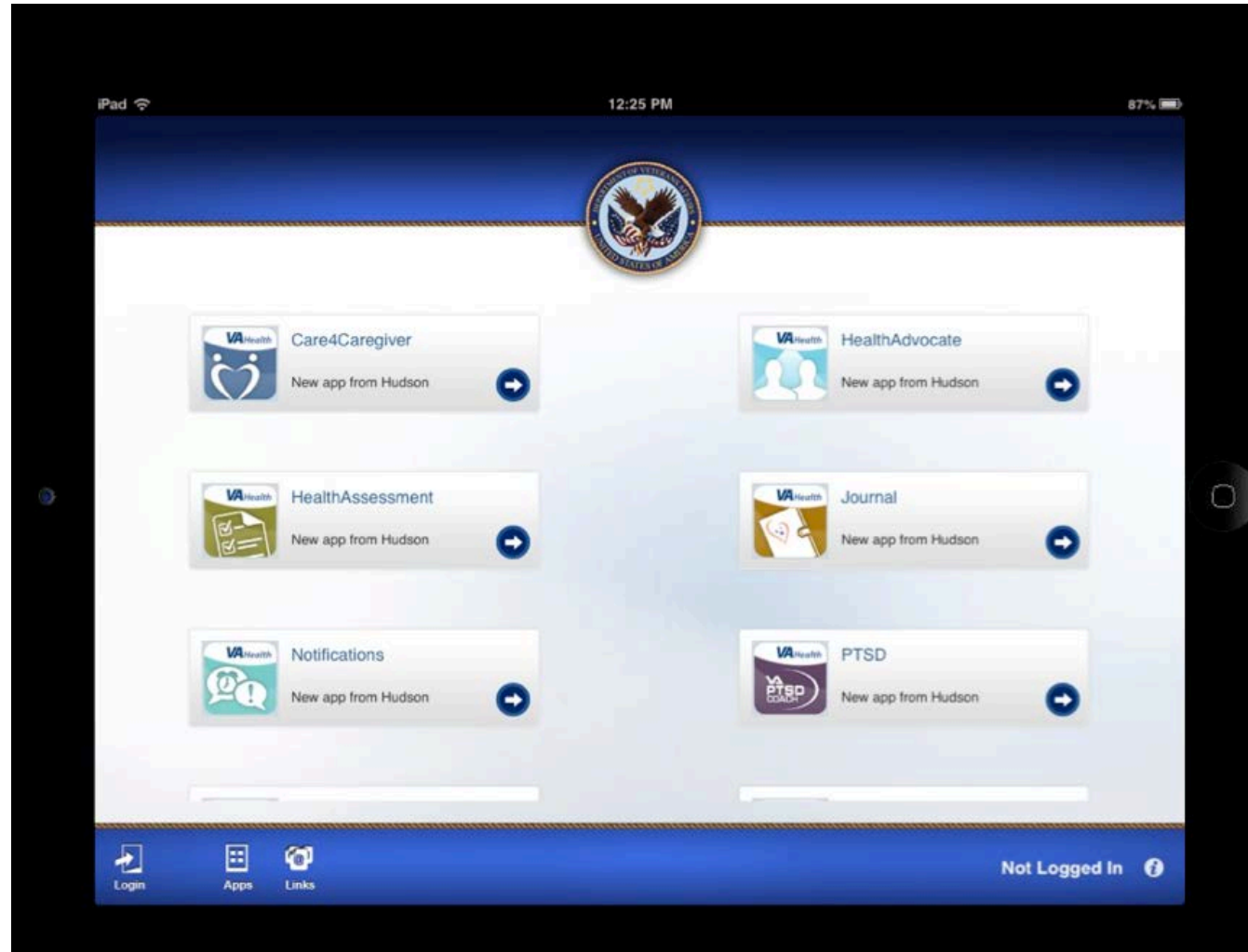
Rx Refill: Refill prescriptions

Journal: Diary

Care4Caregivers: Caregiver Support

PTSD Coach: PTSD Support

Pain Coach: Pain Support



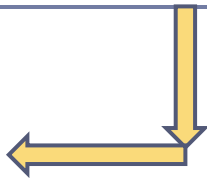
Data Collection



Zarit Burden Study Data Collection

- ▶ Zarit Burden Inventory administered quarterly during home visits by VA staff & recorded in Electronic Health Record (EHR)
- ▶ Zarit Burden Scores extracted from EHR using text mining
- ▶ VA Administrative Databases used as covariate data source

Study Start Date = June 1, 2013
or Day iPad Received



Look back 6 months from
study start date and
extract most proximal Zarit
Burden Score

Study End Date
September 18, 2013



Look forward 6 months
after study end date and
extract most proximal
Zarit Burden Score

If post study Zarit
is not found, select
last Zarit after
study start date

mHeath Use Study Data Collection

- ▶ App use was tracked and sent to backend database
 - Metrics collected: user, app used, time, duration of use
 - ▶ VA administrative databases were used as source for predictor variables
 - ▶ Survey data was collected by asking participants to complete the surveys on the iPads
 - ▶ If surveys were not completed within 2 weeks of receiving the iPad, participants were contacted and asked to complete on iPad or via a telephone interview
-

Outcome Variables

- ▶ **Zarit Burden Study: Change in Zarit Burden Score**
 - 4 question Zarit screening score extracted from EMR

 - ▶ **mHealth Use Study: App Use**
 - At least one use of the mHealth apps
 - Frequency of use of the mHealth apps for those who have used
 - App use was measured for each app individually and for the group of seven study mHealth apps
-

Statistical Analysis

Statistical Analysis

- ▶ Zarit Burden Study:

- ▶ General Linearized Model (GLM) used to assess differences between control and treatment groups in the outcome variable Zarit burden change scores

- ▶ mHealth Study:

- ▶ Logistic Regression Model used to understand the factors that predict at least one use of the apps
-

Results

Study Group Characteristics

- ▶ 95% were woman and 91% were spouses
 - ▶ Average age was 40 years
 - ▶ 66% reported providing care more than 40 hours/week
 - ▶ 27% reported having a high burden level
 - ▶ 40% lived in a rural area
 - ▶ 30% had Traumatic Brain Injuries
 - ▶ 90% had PTSD or other mental illness
 - ▶ 9% had Spinal Cord Injuries
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Zarit Burden Study Results

Key Finding from Zarit Burden Study

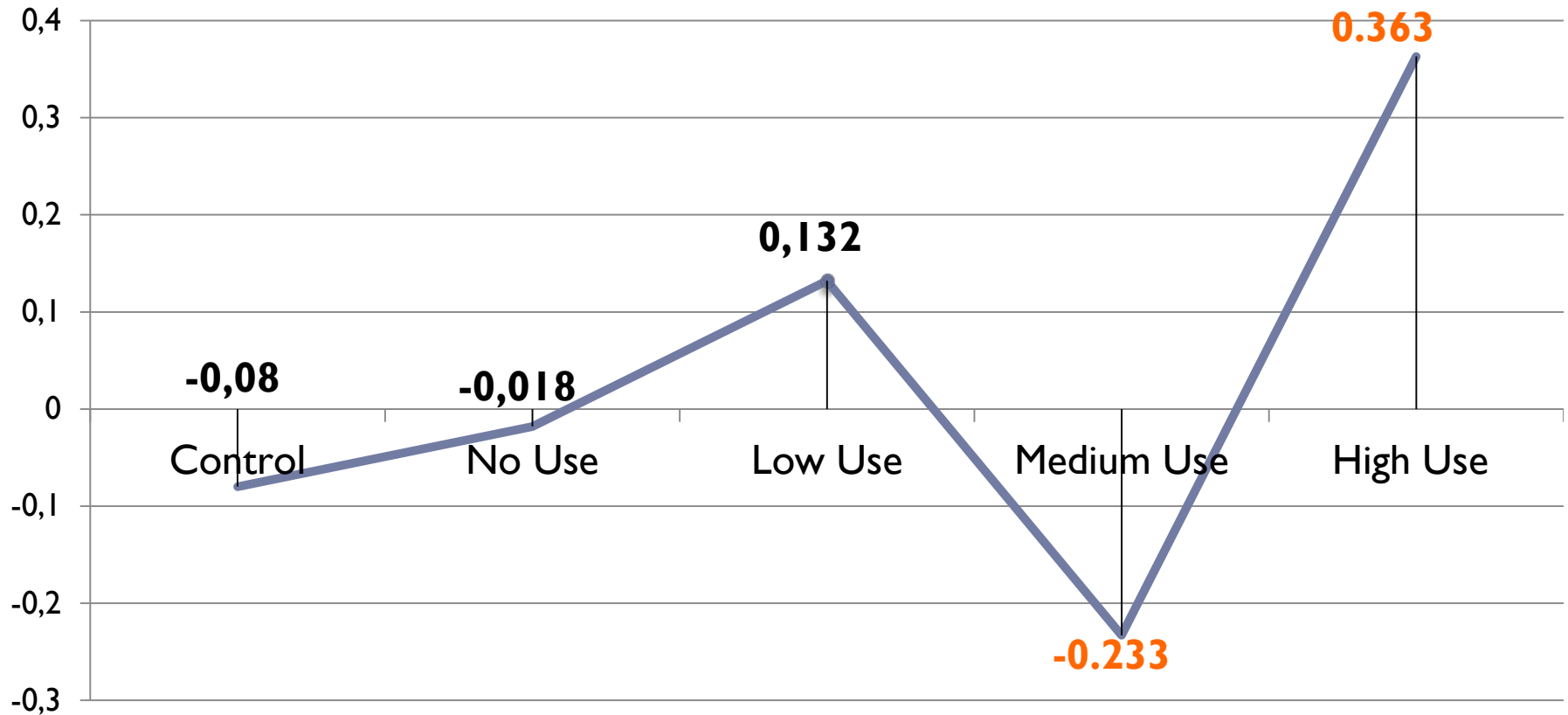
The study did not observe that the mHealth intervention had a significant impact on Zarit burden change

This result is consistent with other Caregiver burden technology intervention studies

The three month study period may have been too short to see a fuller effect of the mHealth intervention

Post Hoc Analysis Results

Adjusted Mean Zarit Burden Change Scores



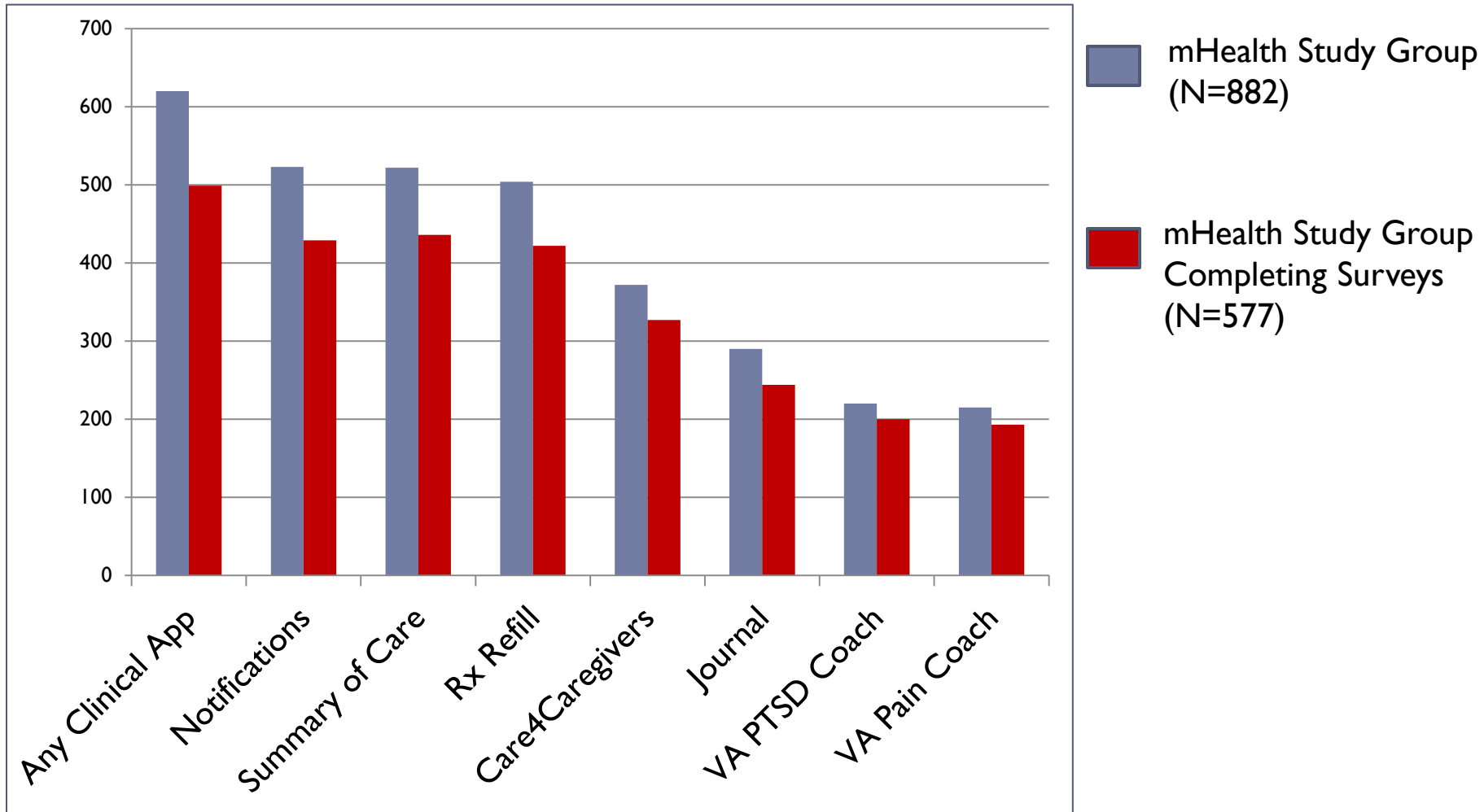
The high use group experienced an increase in Zarit burden that was statistically different from the control group ($p=0.047$)

The medium use group experienced a decrease in Zarit burden that was borderline statistically different from the high use group ($p=0.055$)

mHealth Use Study Results

mHealth Use Study Outcome Measures

Binary Outcome – At Least One App Use



Key Findings from Logistic Regression Modeling

Modeled the factors that predict interest in using the mHealth Apps
– using the app at least once

- ▶ Living in a **rural** location increased initial use by **1.5** times
 - Other studies have shown that use of eHealth tools in rural area is less than urban, due to reduced internet access
 - Providing data plans may have contributed to increased rural use
 - ▶ Every one year increase in **age** decreased initial app use by **2%**
 - ▶ **Spouse** Caregivers were **2.4** times more likely to use the apps than non-spouse Caregivers
 - ▶ Caregivers caring for Veterans with **mental health conditions** (other than PTSD) were **1.6 times more likely to use the apps**
 - ▶ **Caregivers who felt less prepared** for Caregiving were **40% more likely** to try using the apps
-

VA Mobile Apps



VA App Store

- ▶ **Currently the majority of VA Health Mobile Apps are cataloged on the VA's App Store at:**
<http://mobile.va.gov/appstore>
- ▶ **Apps discussed today are “tethered” to VA data systems so that information can be exchanged between providers and Veterans/Caregivers**

VA Mobile Apps Discussed Today

Care4Caregiver

Summary of Care

Pain Coach

My VA Health

My VA Health Video

Dementia Care






Annie

Care4Caregiver App



If you are a Caregiver for a Veteran, the Care4Caregiver App is designed to support you by educating you about self-care and normal reactions to caregiving responsibilities, helping you track and manage your personal strain level, and providing you with access to tools for coping skills, psychological education and other community and personal resources.

Learn about Caregiving

Learn	
 Emotional Consequences of Caregiving	
 Take Care of Yourself	
 Build Resilience	
 Manage Stress	
 Manage Relationships	

Learn about the emotional consequences of caregiving, as well as ways to take care of yourself, build resilience, manage your stress level and strengthen your relationships.

Assess your strain level

Date	Score
07/29/2015 10:05	17

Take regular self-assessments to help you track your strain level over time.

Manage your strain

Meditate

Note: This tool contains a 10 minute countdown timer.



Meditate.

9:53

☆

List 5 things you like about yourself



Change negative moods by doing something pleasant:

List 5 things you like about yourself.

☆

Use resources in the app to help you with coping mechanisms and self-care. Resources can help you:

- ▶ Take a Time Out
- ▶ Plan a Social Activity
- ▶ Distract Yourself
- ▶ Soothe Yourself
- ▶ Change Perspective
- ▶ Relax Yourself

Get Support

Summary of Care App

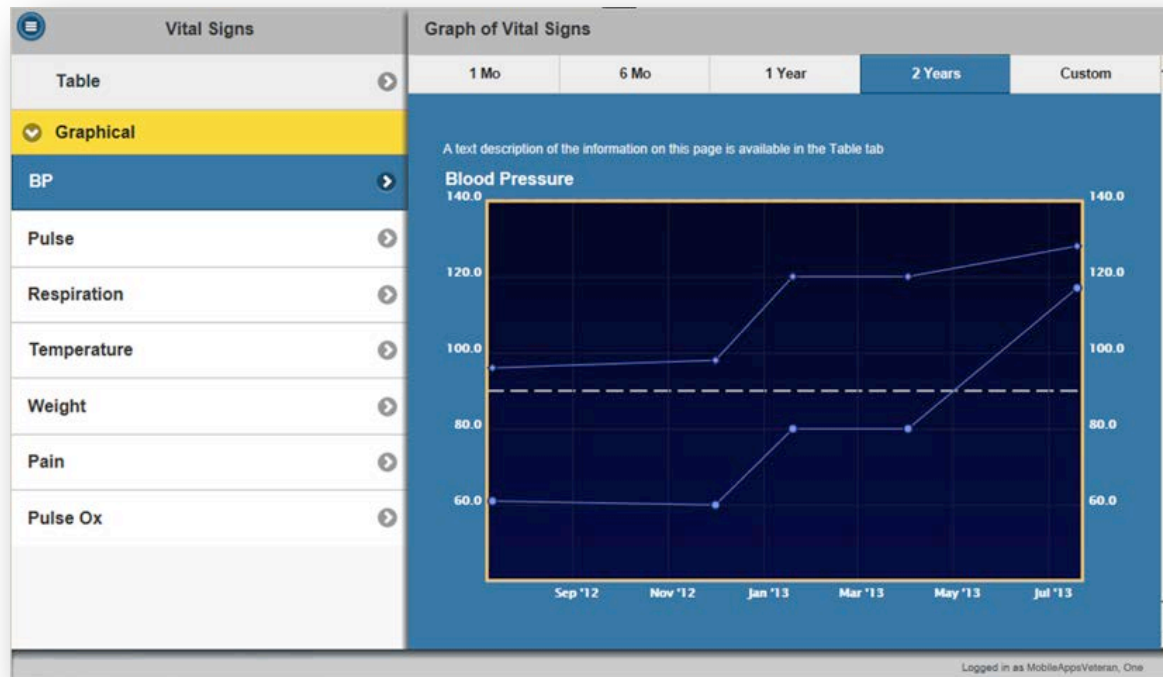


If you are a Veteran enrolled in VA health care, the Summary of Care App lets you receive and view your VA medical information in one place and from the convenience of your mobile device.

Access your health data

Access data from certain parts of your VA Electronic Health Record (EHR):

- ▶ Contact Information
- ▶ Medical Diagnoses
- ▶ Allergies
- ▶ Medications
- ▶ Surgeries
- ▶ Lab Results
- ▶ Vital Signs
- ▶ Radiology Exams




Share your health data

MobileAppsVeteran, One **CONFIDENTIAL** Page 1 of 6

My Mobile Blue Button Report

CONFIDENTIAL

Produced by the VA My Mobile Blue Button App 

This summary is a copy of information from your Mobile Blue Button App. This summary contains information from VA health systems that was available on the date requested. The primary data source for the summary is updated nightly for all areas in this report except for radiology reports which are updated weekly. Additionally, to ensure your healthcare team has had time to review reports there may be a time delay for the display of some information.

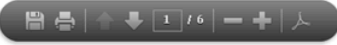
General Information

- The Table of Contents lists areas that you requested to included in this summary.
- Information in the "Current/Active" section shows current information regardless of date range
- Time limited information shows more detailed information for the selected date range.

Please let your health care team know if you have questions about your health information.

Generated exclusively for:
MobileAppsVeteran, One Date of Birth: 16 May 1966

On: 14 Apr 2014 @ 1601



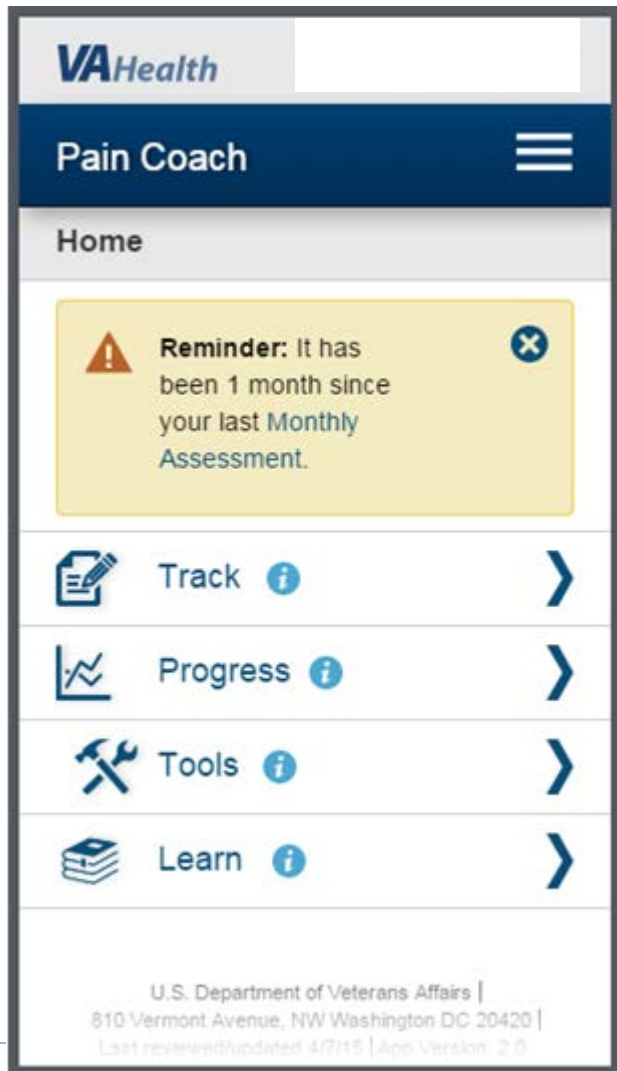
Download, save or print a PDF of your record to have on hand or share with your Caregivers and providers

Pain Coach App



If you are a Veteran enrolled in VA health care, the Pain Coach App helps you manage your pain. Through the app, you will be able to enter information about pain you experience, such as the type, severity, location and effect. You can track your pain over time, set goals for improving your conditions and share information with your VA care team.

Manage your pain



- ▶ **Track** - take monthly and daily pain self-assessments and set reminders.
- ▶ **Progress** - view your pain levels over time as a graph and view tools to help you manage pain.
- ▶ **Learn** - access a list of articles, resources and links to related topics.

Assess your pain

The screenshot shows the VA Health app interface. At the top left is the VA Health logo. Below it is a dark blue header with the text "Pain Coach" and a hamburger menu icon. Underneath is a light gray bar with the text "Monthly Check-In". A dark gray bar below that indicates "Question 1 of 7". The main content area contains the question: "What number best describes your pain on average in the past week?". Below the question is a dropdown menu currently showing "0 - No Pain" with a downward arrow. At the bottom, there are two buttons: a light gray "Back to Track" button on the left and a dark blue "Next" button on the right.

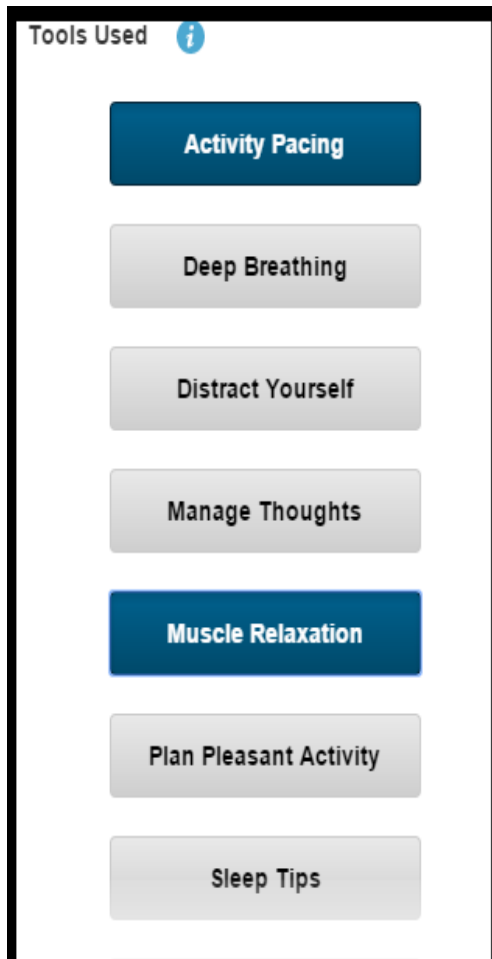
Take regular self-assessments of your pain levels to see recommendations on next steps.

Keep a pain diary

The screenshot shows the VA Health app interface for the Pain Coach section. At the top, the VA Health logo is visible. Below it, the 'Pain Coach' header is displayed with a menu icon. The main section is titled 'Pain Diary'. A note states '* indicates a required field'. The 'Pain Rating' field is a dropdown menu currently set to '1', with an information icon to its left. Below this, a prompt says 'Select one of the optional forms to fill out.' Three options are listed: 'Pain Description', 'Treatments & Tools Used', and 'Health Impact & Comments', each with a right-pointing chevron. At the bottom, there are two buttons: a grey 'Cancel' button and a dark blue 'Submit' button.

Rate your pain level daily to better track it over time.

Access treatment tools



Easily find coping tools and activities to help you manage your pain.

My VA Health App



If you are a Veteran enrolled in VA health care, the My VA Health App helps you track your health data, record your life and health goals over time, and share information about your health with your VA care team. You will also have the ability to create graphs and download your health information to a PDF.

Track your data

The screenshot displays a mobile application interface for tracking health data. The top navigation bar is dark blue with a hamburger menu icon on the left and a list icon on the right. Below the navigation bar, the main content area is divided into two sections. On the left is a vertical list of tracking categories: Blood Pressure and Pulse, Cholesterol/Lipid, Daily Events, Diet, Exercise, Glucose (Self Tested), Height, Mood, Pain, Respiration, Sleep, Stress, Temperature, and Weight. The right section is titled 'Blood Pressure and Pulse' and features a 'Filter' button, 'PDF', 'Graph', and 'Notification (Off)' options. Below these are date range selection fields for 'Start Date' (11/16/2014) and 'End Date' (12/16/2014), with a '* required field' note. 'Filter' and 'Reset' buttons are also present. A data table is overlaid on the interface, showing the following information:

Systolic (mmHg)	Diastolic (mmHg)	Pulse (bpm)	Position	Date Entered
120	80	90		12/15/2014 02:26 PM
150	90	80		12/06/2014 02:26 PM
120	80	40		12/05/2014 02:26 PM
100	80	40		12/01/2014 02:26 PM
120	80	100	Standing	12/01/2014 09:21 AM

Manage your health by keeping track of your health readings including blood pressure, cholesterol, weight and more.

Record your story & goals

The screenshot displays the 'My Story' application interface. On the left is a sidebar with navigation options: Summary, Personal values, Assessment, Reflections, Goals (highlighted), and Learn. The main panel is titled 'Goals' and features a 'Filter' section with 'Goal End Date' (From: 07/17/2014, To: 07/17/2015), 'Status' (Active, Inactive, Complete), and 'Type' (Select). Below the filter is a table of goals:

Goal	Progress	Goal End Date	Steps	Type
Learn fluent French	30%	08/31/2015 (44 Days Remaining)	1/2 Complete Next Due: 08/15/2015	Leisure
Lose 5 lbs		09/01/2015 (45 Days Remaining)	0/1 Complete Next Due: 06/22/2015	Health
Pay off credit card debt	25%	12/31/2015 (196 Days Remaining)	None	Finance

Through the My Story feature, you can record your personal values, assessments and reflections, and track your life and health goals over time.

My VA Health Video App For Veterans



If you are a Veteran enrolled in VA health care, the Video App will help you connect with your VA care team by allowing you to submit short videos related to your health care that your care team has requested. This app will help your care team better visualize health issues you might be facing, even when you are not in the same physical location.

Monitor your video requests

The screenshot shows the VA Health Journal Video interface. At the top is the VA Health logo and a navigation bar with tabs for Home, New Requests, Uploaded Videos, About, and Help. Below the navigation bar, the 'Home' section features two summary cards: 'New Requests' with a plus sign icon and a notification badge showing '12', and 'Uploaded Videos' with a checkmark icon and a notification badge showing '1'. Below these cards is a list of request details. Each request entry includes fields for Request Date, Provider Instructions, Type, Category, and Status, along with a 'Select' button and a right-pointing chevron.

Request Details		Action
Request Date		
Provider Instructions	fsfsdzxcvxc	Select >
Type		
Category	Medical	
Status	PENDING	
Request Date	06/26/2015	
Provider Instructions	Take 2 aspirin and call me ... See More	Select >
Type		
Category	Rehabilitation	
Status		

See new video requests from your care team.

Upload a video

The screenshot shows the VAHealth 'Upload Video' form. At the top left is the VAHealth logo. A yellow navigation bar contains a 'Journal Video' button and menu items for 'Home', 'New Requests', 'Uploaded Videos', 'About', and 'Help'. The form title is 'Upload Video'. It includes several input fields: 'Request Date', 'Provider Instructions', 'Type', and 'Category'. A 'Status' field shows 'PENDING'. Below these is a legend: '* Indicates a required field.' The 'Date of Video' field has a placeholder 'mm/dd/yyyy'. The 'Video File to Upload' field has an information icon and a '+ Add Video File' button with the text 'select a file...'. A 'Notes' field is at the bottom.

Easily upload a health video and fill in related information from your mobile device.

Dementia Care App (Caregivers)



If you are a Caregiver for a Veteran with dementia, the GRECC App will provide you with support and educational resources, including informational videos from medical experts. The app will also help you communicate and share information with your Veteran's care team, and log and track your Veteran's health information over time.

Access resources

The screenshot shows the VA Health website for GRECC Dementia Care. At the top left is the VA Health logo. The main navigation bar includes 'GRECC Dementia Care' with a snowflake icon, and links for 'Home', 'Assessments' (with a dropdown arrow), 'Resource Center', 'About', and 'Help'. Below the navigation is a 'Welcome' section with a message: 'Welcome to GRECC Dementia Care. Please sign in if you are a caregiver or request for an account if you would like to care for a Veteran patient.' Two prominent buttons are shown: 'Caregiver Sign In' with a hand icon and 'Resource Center' with a book icon. A yellow 'Tip of the Week' box contains a lightbulb icon and text about Lorem Ipsum. Below this is a section titled 'Get the GRECC Dementia Care App' with 'Download on the App Store' and 'GET IT ON Google play' buttons. The footer text reads: 'U.S. Department of Veterans Affairs | 810 Vermont Avenue, NW Washington DC 20420 | Last reviewed/updated 6/25/15 | App Version: 25.0'.

Access support tools and resources to help you learn about caring for your loved one with dementia.

Track your Veteran's health

VAHealth

GRECC Dementia Care Home Assessments Resource Center About Help

Status Update for

Please use the buttons below to tell us about any changes since March 21, 2015.
If this is an emergency, call 911 or the Veteran's Crisis Hotline 1-800-273-8255.

Category	History	Markedly Improved	Much Improved	Minimally Improved	No Change	Minimally Worse	Much Worse	Markedly Worse
Overall		1	2	3	4	5	6	7
Cognition		1	2	3	4	5	6	7
Daily Function		1	2	3	4	5	6	7
Behavior		1	2	3	4	5	6	7
Falls		1	2	3	4	5	6	7
Medications		1	2	3	4	5	6	7
Sleep		1	2	3	4	5	6	7
Pain		1	2	3	4	5	6	7
Incontinence		1	2	3	4	5	6	7
Confusion		1	2	3	4	5	6	7
Safety		1	2	3	4	5	6	7
Caregiver		1	2	3	4	5	6	7

Cancel Reset Submit

Regularly log physical and mental health measures for your Veteran including sleep, agitation, pain, confusion and more. You can also log your own stress levels. This information can be accessed by your Veteran's care team.

VA's Text Messaging System

annie



Annie G. Fox

August 4, 1893 – January 20, 1987

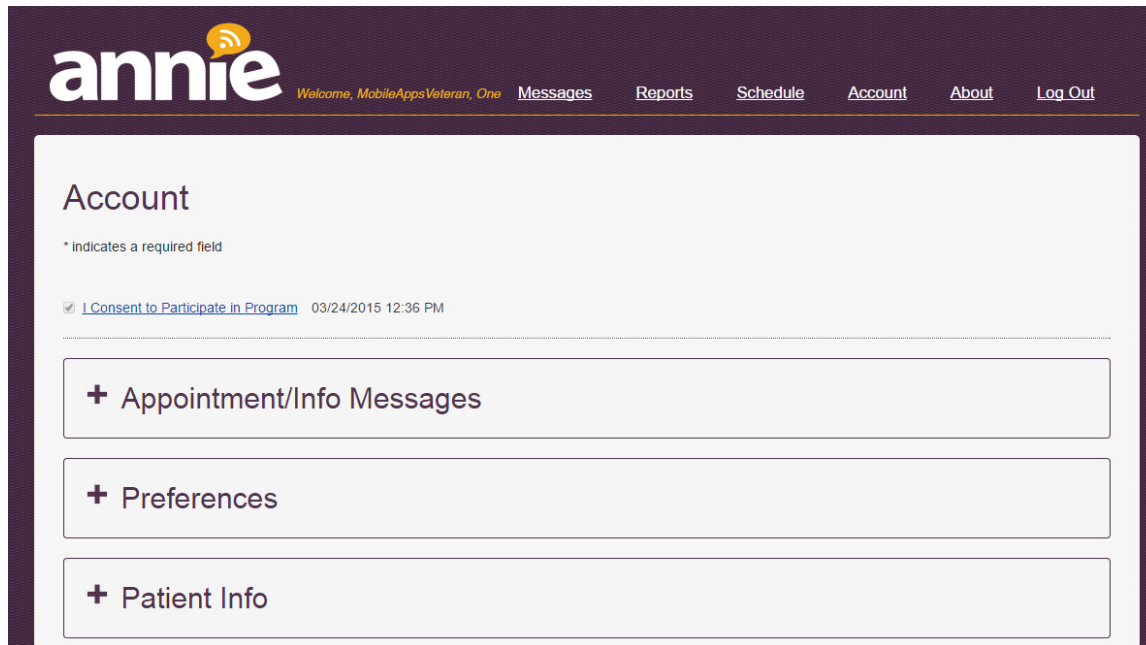
- First woman to receive Purple Heart
- Chief Nurse in Army Nurse Corps at Pearl Harbor

Annie for Veterans App



The Annie App is a Short Message Service (SMS) text messaging capability that promotes self-care for Veterans enrolled in VA health care. When your provider or a member of your VA health care team signs you up for Annie for a health issue, you will receive automated messages that prompt you to track your own health. You are asked to reply to messages so that Annie can let you know how you are doing. Annie also can send you appointment reminders and messages from your local VA medical facility.

Annie – access and self-care



The screenshot shows the Annie mobile app interface. At the top, the 'annie' logo is displayed with a Wi-Fi icon. Below the logo, a navigation bar contains the following links: 'Welcome, MobileAppsVeteran, One', 'Messages', 'Reports', 'Schedule', 'Account', 'About', and 'Log Out'. The main content area is titled 'Account' and includes a note: '* Indicates a required field'. Below this, there is a checkbox labeled 'I Consent to Participate in Program' with a timestamp of '03/24/2015 12:36 PM'. Three expandable menu items are listed: '+ Appointment/Info Messages', '+ Preferences', and '+ Patient Info'.

You can send and receive message through Annie on a basic cell phone that includes a texting feature, or you can access the Annie App on any mobile device connected to the Internet, including a computer or a smartphone.

Whichever way you choose, Annie can help you track your health on your own.

***Note: Annie is for self-care. Your text and message replies to Annie are kept in a computer system. Your VA health care team will be able to view the messages, but will not routinely review them.**

Thank you

- ▶ **My Contact Information:**

- ▶ Kathleen.Frisbee@va.gov
