CENTRIC:
Center For Patient, Family, And Community Engagement In Chronic Care Management

PILOT STUDY FINDINGS

Can Patients with Rheumatoid Arthritis Better Manage their Chronic Disease with a Customized Smartphone App?

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Drs. Mollard and Michaud will present the findings from their CENTRIC pilot grant study meant to test a smartphone application for RA symptom self-management feasibility, and provide preliminary data as to whether or not the application improved self-management, self-efficacy, and health outcomes.

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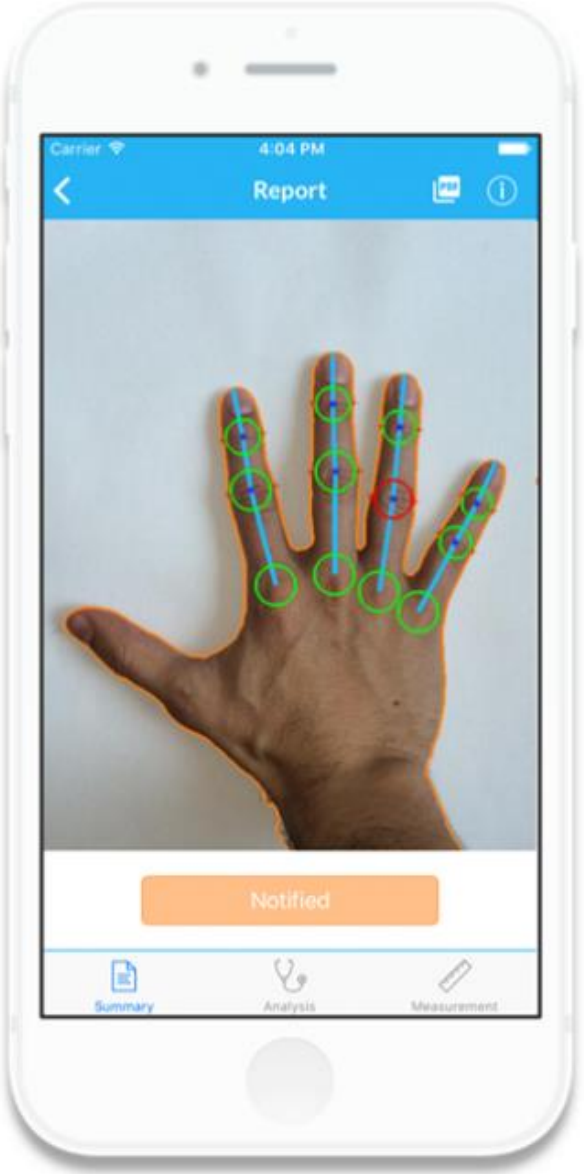
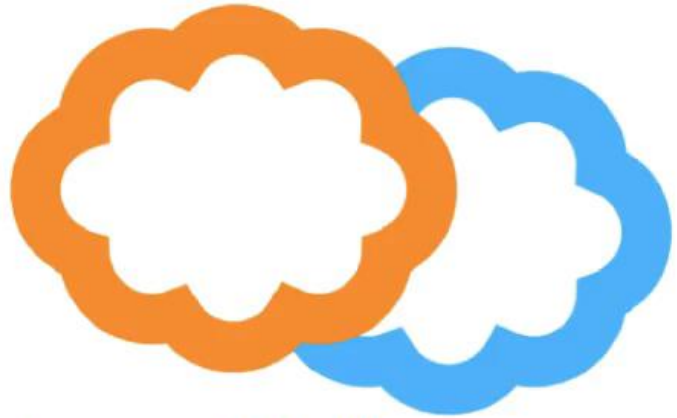
BREAKTHROUGHS FOR LIFE

The LiveWith Application



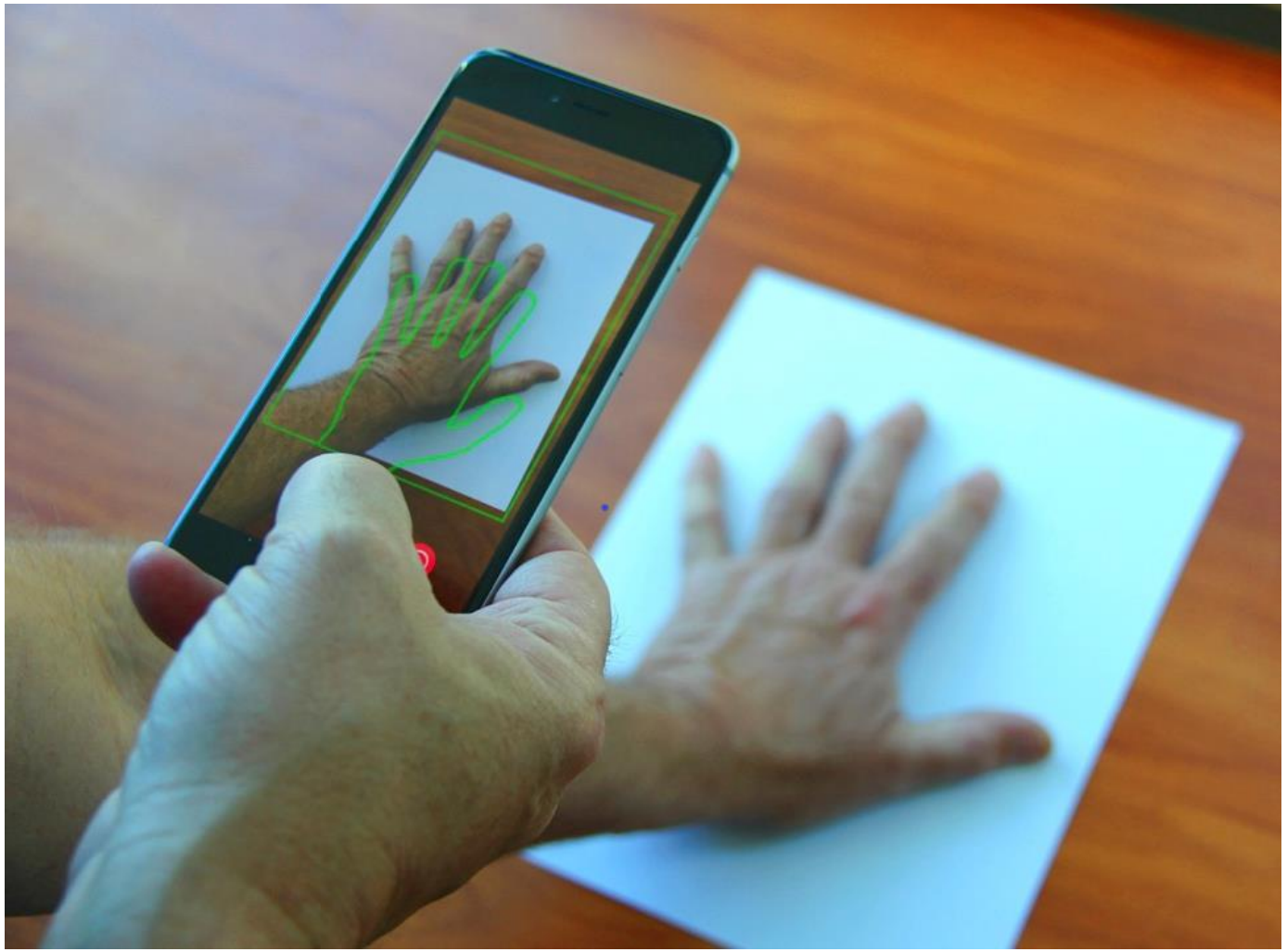


LiveWith™

Arthritis Plus

University of Nebraska
Medical Center

The Pilot Study



Objectives

1. Gather preliminary data as to whether a mobile app with hand optical imaging capabilities improves self-management behaviors
2. Determine if app use shows promise in improving health outcomes
3. Validate whether the measures on the app (e.g. Pain) correlate with in-office measures

Sample Characteristics

- Adult patients with RA participating in RAIN-Database and an active patient at Nebraska Medicine Rheumatology Clinic
- Participants had to own a smartphone, and be able to read and speak English.
- 21 intervention participants
  - 62% original sample, 21/34
- 15 controls
  - 52% of original sample, 15/29

Methods

Mixed-methods design

- Quantitative portion was a traditional 2-group experimental design
- Qualitative portion was a follow-up telephone interview for intervention participants who did not complete the study.

Measures:

- Patient-Reported Outcomes Measurement Information System (PROMIS) self-efficacy in managing symptoms (P-SEMS)
- Patient Activation Measure (PAM).
- Health outcomes associated with RAIN-DB

Two group experimental design

DATA WERE COLLECTED AT 2 VISITS, BASELINE AND FOLLOW-UP, WHICH WERE 6 MONTHS APART.

THE BASELINE VISIT FOR INTERVENTION PARTICIPANTS INCLUDED MEETING WITH A RESEARCH ASSISTANT TO DOWNLOAD THE APP ON THE PARTICIPANT'S SMARTPHONE AND TO TAKE AN IMAGE OF THE HAND TO TEACH THE PATIENT HOW TO USE THIS FEATURE OF THE APP.

INTERVENTION PARTICIPANTS WERE INSTRUCTED TO USE THE IMAGING TECHNOLOGY AT LEAST ONCE PER MONTH AND THE APP FOR SELF-MANAGEMENT REGULARLY.

Results (change in value pre-test to post-test)

Variable	Intervention	Control	P value
P-SEMS[a]	2.80	−1.66	.04
PAM[b]	6.37	2.30	.46
HAQ-II[c]	0.02	0.05	.83
Pain	−0.61	0.18	.38

[a]P-SEMS: Patient-Reported Outcomes Measurement Information System Self-Efficacy Managing Symptoms.
[b]PAM: Patient Activation Measure.
[c]HAQ-II: Health Assessment Questionnaire-II.

PROMIS – Self-Efficacy in Managing Symptoms

- Measures an individual's perceived self-efficacy in managing the symptoms of their disease.
- Self-efficacy is the foundation for an individual's decision to act and implement healthy behaviors to manage their illness or symptoms.
- Questions on the 28-item questionnaire assess the level of confidence a patient has in managing their symptoms in a variety of settings and situations such as, "I can keep my symptoms from interfering with the work I need to do"

PROMIS – Self Efficacy in Managing Symptoms

- A 2-sample *t* test with equal variances for showed that the intervention group had statistically significant improvement to their score compared with the control group (2.8 vs −1.66, *P*=.04).

PAM -Patient Activation Measure

- The PAM is a 13-item self-report instrument designed to assess an individual's level of patient activation.
- It measures the patient's self-reported knowledge, skills, and confidence in self-management of their chronic condition
- Patients either agree or disagree with statements such as, "When all is said and done, I am the person who is responsible for managing my health."
- A highly activated individual is an involved and confident self-manager of their health.

PAM- Patient Activation Measure

- A 2-sample *t* test with equal variances showed that the intervention group had an increase in PAM score that was 2.8 times greater than the control group (6.37 vs 2.30, *P*=.48).

Health Outcomes

- Health outcomes measured from RAIN-DB participant office visit data
- **Pain** was measured using the Visual Analog Scale (VAS). The VAS measures pain from 0 to 10, with 0 meaning no pain and 10 being *worst pain.*
- **Physical function** was measured with the reliable and valid 10-item questionnaire HAQ-II. Scores on the HAQ-II range from 0 (minimum loss of function) to 3 (completely disabled).

Health Outcomes

- Pain decreased for intervention and increased for control
- HAQ-II value was increased in control group- but not clinically significant
- Participants with higher PAM and PROMIS Self Efficacy Managing Symptoms scores had lower HAQ-II scores and lower pain scores at both baseline and follow-up.
- Changes in PAM and PROMIS Self Efficacy Managing Symptoms scores were negatively correlated with changes in HAQ-II (Pearson correlations: −0.33, *P*=.10 for PAM and −0.50, *P*=.007 for P-SEMS).

Non-Participator App Experience

Qualitative Interview

Participants who did not complete the study

- Our qualitative sample consisted of subjects who dropped out of the intervention group.
- We were able to reach and invite all 13 intervention participants who dropped out of the study. However, 1 intervention participant dropped out due to a diagnosis of lymphoma and ongoing health concerns, preventing her participation.
- The remaining 12 intervention participants who did not complete the study participated in the qualitative component of our study.
- Intervention participants who did not complete quantitative portion of study tended to:
  - Have a slightly higher HAQ-II (0.63 vs 0.54) and pain score (3.2 vs 2.5) and lower PAM (67.4 vs 71.9) and P-SEMS (45.4 vs 47.3) at baseline.

Frustration with technology

•Participants described frustration with technology especially with initial use of the app.

•Participants who did not have a good initial experience did not feel confident to return to the app or use it as directed on their own.

Once they did get all the kinks out, it still wasn't working for me to mess with it; so then, by that time, I had just never gone back in to do anything else with it. [P2]

I dropped out a long time ago because of the problems they were having with the app at the very beginning, and I just got frustrated and I went, "Forget it." [P7]

Rheumatoid Arthritis Makes the App Difficult to Use

•Participants who had more severe hand RA and who were disabled by their disease had difficulty using both the optical imaging and other features of the app.

•Some participants recruited someone to assist them with photographing their hand, but this also made it difficult for the participants to use the app on a regular basis.

Because I live alone, and I have had my neighbors help me, and I just could not hold the telephone the right way, so the app really did not work for me. [P5]

I could never get it to come out right, and I gave up. I just completely gave up. I could not get my hand photographed right, and there wasn't always somebody there to help me with it.[P11]

Satisfaction with Current Self- Management System

•Some participants explained that the mobile app could not be integrated easily into their lifestyle as they had already had a system to manage their RA.

•These participants felt that the use of the mobile app would not add to their self-management needs and that their system was working for them.

It's so hit and miss, but, you know, I do my own logs as far as what I eat, what activities I do; and then, the days that I flare, I always go back and look and see if I did anything different, or ate anything different, to see if it coincides. [P2]

My rheumatoid arthritis is under good control, so I don't have a lot of flare-ups and that kind of thing; and if I go through a period where I do, to me, it's most helpful just to write it in a journal. [P1]

Summary of Results

- Statistically significant improvement in PROMIS Self Efficacy Managing Symptoms for participants who used the app.
- Promising trends for improvement in PAM, HAQ-II, and Pain scores for participants who used the LiveWith app.
- These results demonstrated the potential of the LiveWith app for improving self-management and increasing confidence in these behaviors.
- Future studies with a larger sample size are necessary to confirm these findings

Limitations

- Our attrition rate was higher than the acceptable level of 20%, with a large percentage of both intervention and control group participants dropping out
- Based on our qualitative interviews with participants who dropped out, we attribute attrition of the intervention group almost primarily to technology issues.
- We had technology difficulties at the beginning of the study requiring several updates, and the time frame required to work out the *bugs* tarnished the initial app experience for many.
- Critical that participants first experience using the app is positive to promote confidence in continual use.

Limitations (cont.)

- Choosing a sample from a large database and an actual physical appointment at the rheumatology clinic limited ongoing participation.

- Future studies should consider a completely digital experience with Web-based surveys and digital prompts to use the app and complete the tasks

Questions for Discussion

We saw promising trends from this app- was it this app?

Hawthorne effect?

Going forward- Federal funding priorities

How important is optical imaging vs app alone vs pen and paper self-management