HeartMapp: Theory-Based mHealth Intervention for Self-care and Behavior Change in Heart Failure

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Disclaimer

HeartMapp: A mobile App for Heart Failure

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Patent Application Pending:
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Objective

• Raise awareness on self-management difficulties in heart failure.

• Discuss intervention protocol in the development of a mobile technology.

• Discuss early results of using mobile technology to improve heart failure outcomes.
Complex Heart Failure Self Care

- Complex Medication
- Complex Diet
- Activity & Exercise
- Daily Check for Symptoms
- Daily Weight
- Heart Failure Signs and Symptoms
Hypothesis for the mHealth (HeartMapp) Development

• HeartMapp: Mobile technology to offer ecological momentary intervention (EMI), defined as “treatments/interventions that are provided to people during their everyday lives (i.e. in real time) and in the natural settings/ real world (Heron, & Smyth, 2010).

• To collect ecological momentary assessment (EMA) defined as data on “reports on symptoms, affect, behavior, and cognitions close in time to experience and in the participants' natural environment (Soong et al., 2015).
1) Initial needs assessment
2) Program objective
3) Selection of theory-based methods
4) Translation of objectives into an actual program plan for a mHealth intervention
5) Adaptation and implementation plan
6) Evaluation plan

(Bartholomew, 1998 & 2006)

1. Needs Assessment
   • Data on mobile phone use
     – In the US, 95% own a mobile phone
     – 79% accessed Internet through mobile phone
   • Literature review.
   • Interviewed 10 patients with HF and four cardiologists.

2. Program Objective
   • Patient engagement in HF self-management (Proximal outcome)
   • Distal outcomes: Improvement in self-management = reduce costly readmission rate
3. Conceptual Framework

- Information, Motivation, and Behavioral change model
- Engagement as a mediator for behavioral change
4. Mapping the Intervention to Align with Theory

<table>
<thead>
<tr>
<th>Information</th>
<th>Motivation</th>
<th>Engagement</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Outcome</td>
<td>Intervention Objective</td>
<td>Intervention Component: Scientist Initiated and Patient initiated</td>
<td>Decision Rule for EMI</td>
</tr>
<tr>
<td>Proximal outcome: patient engagement</td>
<td>Ecological Momentary Intervention (EMI)</td>
<td>Yes response to EMI: Patient is engaged</td>
<td>Performing desired behavior</td>
</tr>
<tr>
<td>Distal Outcome: improved self-management</td>
<td>Ecological Momentary Intervention (EMI)</td>
<td>Yes response to EMI or random alerts: Patient is engaged</td>
<td>Automated Feedback of encouragement</td>
</tr>
</tbody>
</table>

- Yes response to EMI: Patient is engaged
- No Response: Not engaged

Scientist initiated EMI for checking weight and HF symptoms.
Scientist initiated Random alert or could be patient initiated to engage in Physical activity (6-minute walking) and Deep breathing
Scientist initiated physiological data from wearable sensor
Random alerts demanding entry on Medication taken
Random alerts on CHF info (Education)
Proof of Concept Testing- Funded by NSF I-Corps

• Interviewed 125 potential customers
• Explored The Business Model Canvas
  – Increased admissions from SNF
  – Two types of patients
  – Challenges on transitional care
  – Struggle with patient engagement on self-care
  – Avoid Readmission penalty
  – Use of home health care

5. Adaptation/Implementation

- Patient centered approach was utilized
- Alpha and beta settings of the prototype
- Continuous refinements to the prototype HeartMapp
- Feedback from patients and health care providers are adopted
- Preliminary testing on the systems completed

5. Adaptation/Implementation

• **Feasibility Study** = 25 patients and 12 HCPs

Provider Confidence

- Recommend HeartMapp
- Use Data for Decision-making
- Use Data to Guide Patient Care
- Patients Use of HeartMapp
- Patients Learning Skill
- Manage HF Symptoms
- Improve Self-care
- Reduce Readmission

Self-confidence of Health Care Team in Utilizing HeartMapp

Preliminary Evaluation.

**Pilot Study** evaluated the 6-key features
Aim: Compared HeartMapp (n=9) with CHF Info (n=9) for 30-days

6. Evaluation Plan

Lessons Learned from Pilot Study

• HeartMapp is beneficial
• Need to offer support for engagement
• Data access by health care providers

HeartMapp updated

• Added communication feature
• Access to coaches – family and HCP
Current Work on Evaluation

NINR 1R43NR018415-01
Collaboration with Posit Science Corporation, CA
$ 225,000

“HeartMapp: A Closed-Loop Assessment and Treatment Mobile Application for Heart Failure”. Phase 1, SBIR
Comparing HeartMapp + Computerized BHQ Training with CHF Info App + Computerized BHQ Training

ClinicalTrials.gov Identifier: NCT03827954
Conclusion

• Established feasibility of using mobile health in heart failure

• Adequately powered clinical trial is warranted

• Need to evaluate triage and clinical decision making using performance statistics and communication feature

• Translate in iOS and Spanish
Thank You