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Confirmation and testing of an idea of using mobile technology in heart failure

Heart failure means that the heart is not pumping blood as well as it should. The weak pumping function of the heart causes blood to back up into the blood vessels around the lungs causing cough and breathing difficulty; fluid starts to buildup in the body causing swollen legs, feet and abdomen and causes fatigue. This is why heart failure is called “Congestive Heart Failure” or CHF. Heart Failure patients are asked to check their weight daily as the best way to watch for fluid build-up because one could gain fluid without noticing swelling. Therefore, the patients are told to monitor symptoms daily as a way to care for themselves at home and seek care when symptom gets worse. In the era of the Affordable Care Act, hospitals are penalized for excess admissions, which is highest for heart failure. Lack of self-care at home is considered the potential offender for this increased admissions for heart failure. Therefore, a team of researchers wanted to confirm and test if a mobile application will offer a solution to patients to care for themselves at home.

The team interviewed 125 people including patients with heart failure and their family members, nurses, doctors, emergency medical professionals, heads of hospital, nursing home and health insurance companies. A three-member team was involved in reading and reviewing all 125 interview data and the field notes written during the interviews. The lessons learned from these rich interviews are below with themes and sub-themes are described below.

Our initial interview data pointed out increased readmissions from skilled nursing or long term care facilities. Approximately 2 million Americans over the age of 65 reside in a skilled nursing or long term care facilities and suffer from some form of cardiovascular disease. The nursing staff composition is very different from the nursing staff composition in the hospitals. Unlicensed certified nursing assistants (CNAs) make up much of the staff and are responsible for direct care at the bedside, such as weighing the residents and monitoring vital signs. Lack of knowledge on assessment of patients for early worsening symptoms results in sending patients to the hospitals.

The major challenge faced by our team was to find a way to engage the patients who are in denial of having heart failure, since “high deniers are known to be more noncompliant with medical recommendations. Even the tech savvy patients may find the obligation of self-care at home overwhelming and tiresome.

Nurses and paramedics reported that patient education alone may not effective in the care seeking behavior of patients. The most common reasons for not seeking early treatment may be symptom uncertainty or symptoms are not intense enough to seek urgent care. This reflects the need to design a mobile health app to offer decision making support for worsening symptoms and include of family members in the decision making.

Major Themes	Subthemes	Confirmation
1. Increased readmissions from skilled nursing facilities (SNF)	a. Fear of malpractice claims b. Lack of trained staff c. SNF care about star rating	Confirmed that the SNF are not potential customers to use mobile apps.
2. Two types of patient architecture	a. Tach savvy who are proactive in managing their care b. Those in denial about the disease and are non-compliant	Confirmed that patients with heart failure are our end users (EU)
3. Transitional care challenge on readmission	a. Put the patient's view in perspective while educating patient b. Lower cost option for continued care at home c. Physicians recommend technology to patients d. Physicians are also concerned about older adults' ability to use technology e. technology connected to the electronic medical record	Confirmed that the health care providers may serve as recommenders and influencers in the use of mobile technology by patients.
4. Patient education and engagement	a. Lack of symptom assessment b. Family support as key c. Importance of patient engagement d. Inconsistent practice by home care agencies.	Patient engagement must be address while developing a minimum viable mobile product.
5. Hospitals using shortcuts by using home care, telehealth and telemedicine to keep patients at home for 30-days after discharge to avoid penalty by CMS	a. Temporary fix b. Hospitals use home health care to keep patients at home. c. Home care uses costly telehealth d. Patients must be qualified to receive telehealth care	Confirmed that the hospitals are not potential customers to use mobile health or recommend mobile health to patients.
6. Home care agencies are exploring Novel technology to use to recommend patients	a. Home care agencies are shopping for new technology b. Current telemonitoring systems are bulky, and costly. c. Willing to test once we have our product	Confirmed that the home care agencies are our potential intermediate partners to try to use mobile technology.

Tab. 1. Summary of Themes, Subthemes and Confirmation on the Value of Mobile Application.

Mobile technology has evolved and become less obtrusive, such as heart-rate monitoring using a wrist worn Bluetooth device and mobile apps by having symptom assessment and knowledge in patients' hand in their mobile phone. Thus, our team developed a mobile app that may offer the desired solution for long-term benefit with decision making support using algorithm based on symptom severity. The mobile app "HeartMapp" may offer significant advantage over costly telemonitoring devices and meet the needs of home care agencies. The potential of HeartMapp's efficacy in symptom monitoring by patients, improve knowledge and quality of life and thereby reduce hospital readmissions warrants testing in sample of patients.

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Publication

Mobile technology to improve heart failure outcomes: A proof of concept paper.
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