mHealth Enabled Patient & Provider Centered Medical Regimen Adherence Solutions for Uncontrolled Hypertension

Frank Treiber, PhD.
Professor of Nursing & Psychiatry
Director, Technology Applications Center for Healthful Lifestyles (TACHL)
Medical University of South Carolina

Presented at: Society of Behavioral Medicine Conference
Washington, D.C. 3/31/16
Objectives

1. Brief overview of medication nonadherence
2. Rationale for using mHealth
3. Rationale for user patient centered, theory guided, iterative design process
4. Provide example of this process with 4 patient populations with uncontrolled EH:
   - Kidney transplant patients
   - FQHC Hispanic migrant farmers
   - FQHC African Americans
   - Post stroke patients
Obj.#1: Patient Nonadherence to Medication Regimens

- Leading obstacle in chronic disease management
  - 25% of initial scripts never filled
  - ~50% of patients with chronic disease(s) adhere to med regimens
- Med nonadherence responsible for:
  - 10% of hospitalizations
  - reduced work force productivity
  - suboptimal clinical outcomes (~125,000 deaths/yr)
  - increased healthcare costs $100-300 B/yr
Obj.#2: Why use mHealth in Tackling Patient Nonadherence to Med Regimens?

- Ubiquity of Mobile Phones:
  - ~93% of Americans have cell phones
  - ~63% own Smart Phones
  - ~64% use phone to access health info

- mHealth solutions:
  - increase quality, reach & personalization of care
  - available 24/7; provide timely access to therapeutic support
  - “snap shot clinic visit” issue addressed –HCPs know how patient is functioning & can address needs quicker
Obj.#3: Why Use Theory Guided, User Centered, Iterative Design Process?

Insurers, Hospital & health plan execs & HCPs need:

- Evidence based, empirically validated, sustainable & cost effective solutions;

- ACCOMPLISHED using:
  - iterative design process guided by patient & provider input
  - behavioral & tech. application theories ( foster self efficacy & intrinsic motivation to sustain adherence to medical regimen )
  - Empirical evaluations & repeated refinements establishing usability, efficacy, effectiveness & sustainability
  - Development of personalized, sustainable, effective solutions
Iterative Design Process

Engages all stakeholders from generation of clinical need through all iterative design phases

1. User Needs
   - Content/Function
     - Focus groups
     - Interviews

2. Qualitative Analysis

3. Prototype Development

4. Usability Testing

5. Further Development

6. User Surveys

7. Refine prototype

Clinical Trials

Proof of Concept

Efficacy/Effectiveness

Dissemination

Users

Design Team

Researchers

Post Trial Focus Groups

Technology Applications Center for Healthful Lifestyles
Obj.#4a: Development of mHealth Medication Adherence & BP Control Program Among Kidney Transplant Recipients (KTRs)
Rationale

➢ ESRD afflicts >500,000/yr in USA
  ✓ EH is the #1 cause of ESRD

➢ Transplantation is treatment of choice

➢ Despite advances, graft survival stagnant:
  ✓ M=9 yrs (S.C. 4.5 yrs)

➢ Medication nonadherence:
  ✓ Key cause of premature graft loss (35-45%)
  ✓ Fosters immune mediated rejection & deleterious effects of uncontrolled EH & DM
Iterative Design Process of Prototype System

- Individual interviews conducted to determine:
  - healthcare providers’ needs for following KDIGO & MUSC stepped care guidelines & perspectives on premature graft loss
  - patients’ functional health literacy, attitudes toward, willingness and ability to use mHealth
Iterative Development of mHealth Prototype System cond.

- Prototype mHealth system developed (SMASH) & usability tested
- 99 KTRs surveyed after demo of SMASH mHealth system
- Further SMASH Refinement
- Feasibility trial conducted
- Post trial interviews & further refinement
- Efficacy RCT underway
Survey Results of mHealth prototype: SMASH

- 90% cell phones; 52% had smart phone access
- 61% texted; 34% downloaded apps
- 7% had heard of mHealth/Telehealth
- 79% very willing to use mHealth
- 87% very confident mHealth would increase communication with physician
- 84% felt doctor would make quicker med changes

McGillcuddy et al. (2014) *Journal Medical Internet Research*
TACHL Prototype
Identification of Tailored Motivational Message Content

1. Do you want to be there for them while they grow up? Yes
2. Do you worry about being a burden on your children if you have poor health? Yes
3. Do you want to see your children marry and have your grandchildren? Yes
Tailored Motivational Message Example

Background: 55 yr.-old single with EH & T2D. Family history: parents with EH, T2D & ESRD.

Life goals & personal values: religious, desires to spend more time with family, worries about dying young from kidney disease or a stroke like his parents

Medication dose(s) taken correctly:

Great, Frank! You’re taking your meds on time! Your family history does not have to be your future!

Missed medication dose(s):

Frank, try and remember to take your meds on time every day! God has blessed you, take care of His gift of life!
Medication Adherence in KTRs

McGillicuddy et al. (2013a, b) Journal of Assn. Computing Machinery & Journal of Medical Internet Research
BP Changes Among KTRs

One Year Follow-up Clinic BP Among KTRs

McGillicuddy et al. (2015) Progress in Transplantation
Obj.#4b: Development of mHealth Medication Adherence & BP Control Program Among Hispanic Hypertensives

- Highest rate of uncontrolled EH in USA
- Fastest growing ethnic group
- >50% Nonadherent to medication regimen
Obj.#4b: mHealth (SMASH) & Hispanic Uncontrolled Hypertensives

- Focus groups & surveys led to SMASH prototype refinement
  - 81% cell phone; 39% smart phone
  - 78% texted; 48% downloaded apps
  - 19% had heard of mHealth
  - 94% very willing to use mHealth
  - 76% had complete trust in privacy of data
  - 85% very confident mHealth would increase communication with physician

Price et al. (2013) Journal Medical Internet Research
BP Changes & Med Adherence Among Hispanic FQHC Uncontrolled Hypertensives

SMASH med adherence 96% across 3 mths

Sieverdes et al. (2013) Mobile Health Telecare
Obj.#4c: SMASH with African American FQHC Patients & Post Stroke patients Uncontrolled Hypertensives

Davidson et al. (2015) *Journal of Personalized Medicine*

Ovbiagele et al. (2015) *J. of the Neurological Sciences*
Discussion

- SMASH has high patient & provider acceptability
- Significant & sustained med adherence achieved
- Sustained BP control achieved (resting BP <140/90; 24 hr BP < 135/80 mmHg), not typically achieved in previous trials
- Indications that SDT constructs enhanced (self-efficacy & intrinsic motivation) based upon 3 & 12 mth follow-ups
- Theory guided, iterative patient–provider centered designs useful in mHealth enabled medical regimen self-management programs