Patient Perspectives of Utilizing Mobile Health Technologies to Self-manage Type II Diabetes

Anna Diané BSN RN[1]; Allison Lewinski PhD[2]; Jacqueline Vaughn BSN RN[1]; Janee Stevenson BSN, RN[3]; Ryan J. Shaw PhD RN[1]
[1]Duke University School of Nursing, Durham, NC; [2] Durham Center of Innovation to Accelerate Discovery and Practice Transformation, Durham VA Health Care System, Durham, NC [3] Winston- Salem State University, Winston-Salem, NC

Introduction

- Type II Diabetes (T2D) is a complex, chronic illness that requires daily self-management of blood glucose levels, weight, medication adherence and attention to lifestyle behaviors.
- Mobile health (mHealth) technologies facilitate the collection of real-time, in situ patient-generated health data (e.g., physical activity, blood glucose, weight, and medication adherence)
- These real time data can be leveraged to deliver real-time targeted self-management interventions to improve the patient's ability to engage in diabetes self-management.

Objectives

- **Aim 1:** Examine the feasibility and utility of self-monitoring multiple types of diabetes-related data using mobile health technologies (wireless glucometer, cellular scale, and wrist-worn accelerometer).
- **Aim 2:** Explore the challenges and successes of patients self-managing diabetes through semi-structured interviews.

Methods

- Design: Exploratory Mixed Methods Study
- Eligibility: >18 years old; diagnosed with T2DM; owning and using a smart phone
- Continuous Data Collection over 6-month period:
  - FitBit– HR, Step Count
  - Wireless BodyTrace Scale – Weight
  - Wireless iHealth Glucometer– Blood sugar
- **Semi-Structured Interviews:** At study completion, participants (n=20) were invited to provide their perspectives on T2DM self-management utilizing the (3) mHealth technologies provided.

Participant Demographics

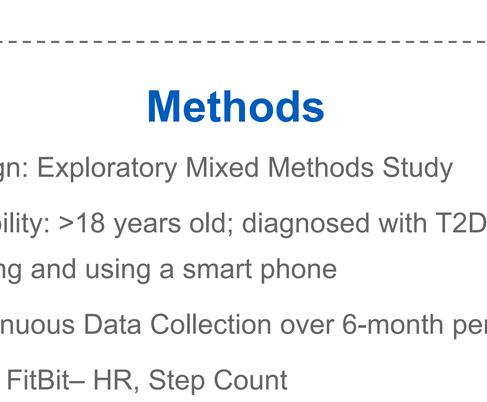

Table 1. Patient Averages

Age	57.2 years
Duration of T2DM diagnoses	9.5 years
HbA1c	7.9 %

Results

Table 2. Main Themes

Subtheme	Definition
Theme 1: Practicality of the multiple mobile technologies	
Feasibility	How easy or difficult the device was to use to support T2DM self-management during the study period
Usability	How or to what extent the devices were used to monitor the participant's weight, daily blood glucose, and activity
Satisfaction	Satisfaction or dissatisfaction with the devices in T2DM self-management
Theme 2: Utility of the multiple mobile technologies	
Accountability	How the mobile devices helped support the participant in T2DM self-management
Facilitation of conversation	Description of how the participant used the device to facilitate a conversation with others about diabetes self-management
Accuracy	Participant's perception of the accuracy of the mobile device
Accessibility	How the participants could access the raw data and then use these data within T2DM self-management

Wrist Worn Accelerometer

"I really liked the Fitbit cause it gives you a habit formed type attitude… to be keen on your walking and stuff. It let's you know that you really need to put forth an effort to do things that can be a help you conquer this diabetes and it had given me a great attitude. I've walked just about two miles today!"

Wireless Scale

"The scale did help me manage cause it was connected to my phone, and I would go create a goal. It would tell me every day how close I was to my goal. I mean everything had an APP, so when you weigh yourself, it records it and then it's options for you to set goals for yourself. And every day you weigh yourself it will say how much you lost and how close you are to losing those pounds."

Thematic Analysis Results

Wireless Glucometer

"Now, the glucometer, I really like the glucometer. It was very easy to use and then you could take it with you. It was easily accessible, my information. It was right there for my provider to see. Even if they didn't ask to see it, because I was so proud of myself, I was like you want to see my blood sugars?"

All Devices

"I think that the devices will be a great asset to diabetics you know… helping you to kind of get you in a scheduling type form, to keep it under control and be in compliance rather than just freelancing. Because if it's something that your conscious about doing, then you would try to stick close to the pattern of getting it done… I took it very seriously when I had the devices. I mean it really bothered me when numbers was slightly elevated and I'm trying to figure out what caused the numbers to be a little elevated and it made me want to really do better."

Conclusion

- Preliminary results indicate it is feasible for participants from **diverse backgrounds** to track diabetes-related data from multiple mobile health devices for self-management
- Understanding the range **of participant-centered perspectives** can inform design of future mobile health interventions aimed at promoting patient self-management of chronic illnesses
- Future research needs to be completed on **incorporating** these tools and data into **the health record** and care delivery

Duke University School of Nursing

Study Protocol: Shaw, R.J., Barnes, A., Steinberg, D., Vaughn, J., Diane, A., Levine, E., Vorderstrasse, A., Crowley, M.J., Wood, E., Hatch, D., Lewinski, A., Jiang, M., Stevenson, J., Yang, Q.(2019). Enhancing diabetes self-management through collection and visualization of data from multiple mobile health technologies: Protocol for a development and feasibility trial. JMIR Res Protoc 2019;8(6):e13517 DOI: 10.2196/13517

Funding: NIH/NINR grants 1R15NR015890 (to RJS) and 1F31NR018100 (to JV); Duke University Data+ (to RJS); US Department of Veterans Affairs Office of Academic Affiliations grant No. TPH 21-000 (to AAL); and Durham Center of Innovation to Accelerate Discovery and Practice Transformation Grant No. CIN 13-410 (to AAL).