Title: A Feasibility Study for Teaching Older Kidney Transplant Recepients How to Wear and Use an Activity Tracker to Promote Daily Physical Activity

Introduction

Older adult kidney transplant recipients (KTRs) are at particularly high risk for graft failure and cardiovascular-related death due to non-adherent self-management of physical activity (Hedayati, Shahgholian, & Ghadami, 2017). Non-adherent self-management behaviors such as lack of physical activity are associated with a $12,840 per year increase in medical costs among KTRs (Pinsky et al., 2009). Physical activity levels are greatly lower among kidney recipients as compared to the general population (A. Takahashi, Hu, & Bostom, 2018). Transplant recipients reported that an important facilitator for performing physical activity is setting personal goals (van Adrichem et al., 2016).

In other chronic disease populations, (mental illness, cancer, and chronic obstructive pulmonary disease) one feasible physical activity intervention that has been implemented to promote goal setting and physical activity is the use of consumer-based wearable mobile activity trackers (Beg, Gupta, Stewart, & Rethorst, 2017; Naslund, Aschbrenner, Barre, & Bartels, 2015; Orme et al., 2018). Consumer-based wearable activity trackers are unobtrusive and provide an opportunity to collect physical activity data in real time. In addition, the overwhelming recent growth in the adoption of the smartphone technology also affords the opportunity to combine tracking of the data with the wristband activity tracker and mobile apps. Recently, an abundance of published data (Davergne, Pallot, Dechartres, Fautrel, & Gossec, 2018; Straiton et al., 2018; Wright, Hall Brown, Collier, & Sandberg, 2017) has become available in the literature related to the use of activity trackers in older populations with chronic diseases to promote physical activity; however, few studies have described how the participants were taught how to use the activity trackers.

Review of the Literature

A literature search of peer-reviewed journal articles published between 2013 and 2018 was conducted in five electronic data bases (PubMed, CINHAL, Academic Search Premier, psychINFO, and ERIC) using the search terms “activity trackers” and “chronic disease.” The following criteria was used for inclusion for the review: (a) mean age 50 and older, (b) peer reviewed, (c) RCT, (d) feasibility, (e) pilot, (f) descriptive, (g) qualitative study, and (h) observational study. Studies that were not written in the English language and case studies were excluded from the review. Initially using the search terms “activity trackers” and “chronic disease, the search revealed PubMed: 25 hits, CINHAL: 9 hits, Academic Search Premier: 9 hits, psycINFO: 4 hits, ERIC: 0 hits. Each of the retrieved journal articles were evaluated using the above criteria and, after duplicates were eliminated, only nine articles (Brickwood, Smith, Watson, & Williams, 2017; Cadmus-Bertram, Marcus, Patterson, Parker, & Morey, 2015; Gualtieri, Rosenbluth, & Phillips, 2016; Mercer et al., 2016; O'Brien, Troutman-Jordan, Hathaway, Armstrong, & Moore, 2015; Orme et al., 2018; Preusse, Mitzner, Fausset, & Rogers, 2017; Sievi et al., 2017; P. Y. Takahashi, Quigg, Croghan, Schroeder, & Ebbert, 2016) included adults over age 50 who were diagnosed with a chronic disease. These nine studies were further reviewed for the details of how the participants were taught how to use the activity tracker. None of the nine identified studies provided in-depth details about how the participants were instructed to use the activity tracker. The purpose of this study is to: (a) to describe the Teach-Back method used to instruct older kidney transplant recipients to use an activity tracker/app called Fitbit and (b) describe the facilitators and challenges of wearing the activity tracker daily for four weeks as reported by the participants.

Conceptual Framework

This study is based on the Teach-Back Model (Kripalani S, 2008) using the three concepts of: (a) explain (healthcare provider role): verbal and written explanation of the activity tracker and app using pamphlets containing illustrations with step-by step instructions, (b) teach-back (patient role): explanation and demonstration of using activity tracker and app, and (c) assessment (healthcare provider role): the understanding of the participant to perform the task (Klingbeil & Gibson, 2018).

Methods

Design

We used a feasibility design for implementing the use of mobile activity trackers and evaluating the facilitators and challenges of wearing a mobile activity tracker among older post-kidney transplant recipients using a 4-week follow-up questionnaire. IRB approval was obtained from a Mid-West university. Written consent to participate was obtained from the participants by the research team.

Sample

Participants were recruited from January-July 2018 from a Midwest Transplant Program. The transplant center performs over 200 transplants annually. At the time of the study, the transplant center was monitoring 1,117 kidney recipients. Our goal was to recruit a convenience sample of KTRs in a manner consistent with recommendations for the conducting of feasibility studies (Hertzog, 2008). Inclusion criteria included: a) aged 60 or older, (b) functioning KTR (not on dialysis), (c) ability to speak, read, and hear English, (d) possession of a smartphone capable of accessing mobile activity tracker data, (e) ability to secure a device similar to a watch to the wrist, (f) no use of assistive devices for walking (cane or walker), (g) greater than three months post-transplant;. Exclusion criteria included disability of arms or legs (activity trackers require movement of the arms and legs).

Instrument

The authors developed a 6- item open-ended questionnaire to evaluate participants' opinions about wearing and using the activity tracker. The questions were designed to elicit responses about: (a) problems retrieving the step-data, (b) frequency of retrieving the step-data, (c) location for retrieving the step-data, (d) number of days per week they wore the activity tracker, (e) factors contributing to wearing the activity tracker, and (f) factors contributing to not wearing the activity tracker.

Procedure

The research team created pamphlets containing illustrations that were used during the educational session to teach the participants how to (a) set-up, (b) sync, and (c) use the features of their activity tracker. Since the population was older and many participants had visual impairments, the pamphlets were prepared using large font text with pictures to help explain concepts. The research team created unique emails and passwords using Gmail. The participants used these emails and passwords to create their Fitbit account. This made it possible for the research team to monitor the participants' daily steps using the Fitabase data system (Small Steps Labs, 2019). The Fitabase provided real-time access to the step-data. The research team assessed weight and height prior to the Fitbit setup and educational session. These heights and weights were obtained so that participants could enter this information into the demographics section of their app.

The pamphlets contained step-by-step set-up instructions for: downloading the app, steps for entering in demographic information into the app, how to enter research developed email and password into the app, how to charge the activity tracker, how to sync the step-data, how to wear the activity tracker, and how to care for the activity tracker. The participants kept their pamphlets to use as an instructional resource. Prior to the educational session with all of the participants, the research team practiced delivering the educational information to 5 volunteers. This included going through the step-by-step pamphlets.

The educational session information was delivered in 1.5 hours using a face-to-face format. During the session the research team assisted the participants using a hands-on approach to enable the Fitbit app and Fitbit wristband activity tracker. The participants were also provided a step/mile converter chart which allowed each participant to choose their own individual step goal in which the team assisted the participant to enter into the Fitbit app. The research team taught the participants how to retrieve the number of daily steps taken and demonstrated how to use each feature of the Fitbit (clock, heart rate, stairs, miles, calories burned, stopwatch, relax). Even though the Fitbit could hold a charge of five days, participants were instructed to charge it every night. Our reasoning for charging the Fitbit each night was that we were only monitoring daily steps taken during the day time hours and it would ensure that the activity tracker would be fully charged each day. Participants were given a wall charger and provided a demonstration for how to charge the Fitbit using the wall charge. In addition, the RAs demonstrated how to sync the Fitbit activity tracker with the participant's smartphone. The syncing of the data allowed the research team to access the participants' daily step-data through the Fitabase database system

After the app and activity tracker were set-up, the Teach-back Method (Klingbeil & Gibson, 2018) was used to ensure the team had delivered effective verbal and written instructions to each participant for setting up and using the feature of the Fitbit app. The Teach-back Method was utilized and assessed by having each participant demonstrate their ability to use the features of the app, secure the band, charge the activity tracker, and sync the data.

Lastly, the participants were asked to walk a few steps to make sure the data were being recorded in the Fitabase database system. A log of the time taken for each group session was kept to ensure equivalent treatment dose across all group sessions. A checklist was used to ensure all steps were completed for each group session.

Data Collection

After 4 weeks of wearing the activity tracker, the participants were administered the 6-item questionnaire. The questionnaire was administered by the research team using an iPad via the Research Electronic Data Capture (REDCap) web-based system. Collection of the questionnaire required less than 15 minutes to complete.

Data Analysis

Questionnaire responses were analyzed using a content analysis approach. The first author conducted the content analysis, and the second author confirmed the first author's findings. The authors used Excel to organize the responses from 6-open ended questions for analysis. A line-by-line analysis was conducted among the responses for the frequency of words related to each of the six questions. Based on the frequency count of words, a codebook was developed for categories of meaningful data which were labeled as codes. The codes were grouped together based on commonalities of emerging patterns or themes.

Results

Sample

All study participants (N=53) were taught how to use the mobile activity tracker and the Fitbit app to monitor daily physical activity. The mean age of the participants was 65 $\pm$ 4.4 years. The sample consisted of n = 36 (66%) male (n = 20 White, n= 14, Black, and n = 1 Multiracial) and n = 18 female (34%) (n = 10 White, n = 6, Black, Asian n = 1, and n= 1 Multiracial). The majority (n = 51, 96%) of the participants earned a high school degree or higher; only n = 2 (4%) did not complete high school or GED.

Data reported from the questionnaire:

Problems retrieving the step-data

The majority (n = 49, 92%) of participants reported no problems with retrieving the step-data from the app and the activity tracker. Although a few participants (n =3, 6%) reported their phone stopped syncing the step-data from the activity tracker to their phone.

Frequency of retrieving the step-data

All of the participants reported checking their steps each day except for one person. The majority of the participants (n = 25, 47%) reported checking their steps more than three times each day. However, many of these participants reported that they checked their steps once a day (n = 16, 30%).

Location for retrieving the step-data

The participants reported checking their steps most often (n = 29, 55%) using only the activity tracker. Four (7.5%) participants reported using the app only to review their step-data. Several (n = 20 38%) reported using both the activity tracker and the app to review their step-data.

Number of days per week for wearing the activity tracker

The majority of participants (n = 52, 98%) reported wearing the activity tracker every day to record steps. Only one person indicated they only wore the activity tracker 6 days a week instead of 7 days a week.

Factors contributing to wearing the activity tracker

The main (n = 24, 45%) reason participants reported wearing the activity tracker was because they believed it would be healthier to track steps, sleep, and water intake. Only 13 participants (25%) reported wearing the activity tracker to only track daily steps. Other factors contributing to participants wearing the activity tracker included that it was a habit to wear the activity tracker (n = 9, 17%), they were wearing the tracker for the study purposes (n = 6, 11%), they were curious about wearing the activity tracker (n = 5, 9%), and that the activity tracker had now replaced their watch (n = 2, 4%). However, three (6%) participants reported no factors contributed to them wearing the activity tracker.

Factors contributing to not wearing the activity tracker

The majority (n = 22, 42%) of participants reported that there were no factors which contributed to them not wearing the activity tracker. 13 participants (25%) reported that they did not wear the activity tracker while taking a shower or participating in water activities. However, the research team informed them that they should not wear their activity tracker while showering or participating in water activities. Other reasons included charging the band (n = 7, 13%), sleeping (n = 7, 8%), and the comfort of the band (n = 7, 8%). Lastly, three participants reported they simply forgot to put the band on for the day (n = 3, 6%).

Discussion

This study is important because it is one of the first studies to report the details of how a consumer-based activity tracker and app called Fitbit was taught and used by a group of older adults with a chronic disease. After four weeks of wearing the Fitbit and using the Fitbit app, participants reported only minimal problems. The participants in this study were engaged with monitoring their daily recorded steps many times throughout the day. Interestingly, even though participants were only asked to track steps, many of the participants reported they wore the activity tracker to become healthier and that they were also monitoring their sleep and water intake. Another interesting finding of this study is that the majority of participants reported retrieving the step data only from the activity tracker, not from the phone app. Therefore, it is important that most features of activity trackers are accessible through the wristband activity tracker. For instance, some people are not permitted on their phones during work, so being able to get all the features of the activity tracker through the tracker itself is critical.

The main reason participants gave for not wearing the activity tracker was because of showering or participating in a water activity. Recently, newer water proof versions of activity trackers like Fitbit are now available, which would allow participants to wear their activity trackers during various water-related activities (Fitbit, 2019).

We attribute the main facilitator for the success of implementing these activity trackers in this population by developing the education pamphlets with graphic pictures and using the Teach-Back Method. The main challenge reported was that phones stopped syncing the step data from the activity trackers to the participant's phone. To address this challenge, participants were referred back to the pamphlets that contained graphic pictures illustrating how to sync the data.

In a similar study (Preusse et al., 2017) with older adults (mean age 70 $\pm$ 3.09), after 28 days of wearing a Fitbit activity tracker, the researchers found that the participants reported that activity tracking promoted health awareness and helped in tracking their health goal. However, another study (Ummels, Beekman, Theunissen, Braun, & Beurskens, 2018) reported that activity trackers are not without error and found evidence that commercial available fitness trackers may underestimate the steps taken by individuals with chronic disease with an altered gait (slow or shuffled). Moreover, some studies have reported data suggesting that activity trackers are not valid for assessing the accuracy of activities of daily living and that these activity trackers should only be used to assess walking activities (Nelson, Kaminsky, Dickin, &

Montoye, 2016; Ummels et al., 2018). Finally, some recent studies (Beg, Gupta, Stewart, & Rethorst, 2017; Cadmus-Bertram, 2017) have found that people with chronic diseases can greatly benefit from wearing an activity tracker to gain an understanding of their daily physical activity patterns and promote daily steps taken which ultimately will enhance health outcomes and quality of life.

Limitations

One limitation was found in regard to the question about the factors contributing to wearing the activity tracker. A few participants indicated more than one factor, and some people did not indicate any factors at all; therefore, it made it difficult for the team to analyze this information. Although some people put more than one contributing factor, it still provided insight into the contributing factors. Another limitation was the demographics. The sample consisted primarily of white males. However, this is a typical demographic for the population in the U.S. among kidney transplant recipients (United States Organ Procurement and Transplantation Network, 2018).

Implications for Practice

Consumer-based wearable activity trackers have become extremely popular in the general public over the last couple of years (International Data Corporation, 2016). Additionally, many activity trackers are now affordable, ranging in price from $50.00-$300.00. Therefore, more transplant patients are likely to already own an activity tracker. If nurses are inquiring about a patient's activity level it may be helpful to first, ask if they are currently using an activity tracker to monitoring their physical activity and if patients are meeting their specific guidelines for daily steps taken.

Data from this study suggests that transplant nurses planning to teach patients how to monitor their daily steps should provide them with a detailed education pamphlet with graphic pictures that explain how to use an activity tracker. The data also suggests that transplant nurses should use the Teach-Back Method to assess patient comprehension. Also, nurses should plan to allow one hour for set-up, teaching, and evaluation of the activity tracker. Future studies should consider evaluating the workflow of nurses who teach post-kidney transplant patients how to use an activity tracker to promote physical activity. Ultimately, teaching the patient to use such self-monitoring activity devices could improve health outcomes and quality of life among this population.

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