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

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Abstract

Activity trackers have demonstrated promise in promoting physical activity in chronic disease populations, but few studies describe how participants were educated to use the activity tracker. The purpose of this study was to describe the teach-back method used to instruct older kidney transplant recipients to use an activity tracker/app and to describe the facilitators/challenges of wearing the activity tracker. A feasibility design was used for implementing the use of the tracker. A four-week follow-up questionnaire was administered to obtain participants' opinions on wearing the tracker. The leading facilitator was the desire to track daily steps. The main challenge was securing the band. Reports of challenges were minimal, suggesting the teach-back method is feasible for teaching this population how to use an activity tracker.

Keywords

Kidney transplant; activity tracker; teach-back method; physical activity

Kidney transplant recipients are at particularly high risk for graft failure and cardiovascular-related death due to nonadherent self-management of physical activity (Hedayati et al., 2017). Nonadherent self-management behaviors, such as lack of physical activity, are associated with \$12,840 per year in excess medical costs among kidney transplant recipients (Pinsky et al., 2009). Physical activity levels are much lower among kidney transplant recipients than among the general population (Takahashi et al., 2018). Transplant recipients reported that an important facilitator for performing physical activity was setting personal goals (van Adrichem et al., 2016). In other chronic disease populations (patients with mental illness, cancer, and chronic obstructive pulmonary disease), one feasible physical activity intervention implemented to promote goal setting and physical activity is the use of consumer-based wearable mobile activity trackers (Beg et al., 2017; Naslund et al., 2015; Orme et al., 2018).

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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 smartphone technology also affords the opportunity to combine tracking of data with the wristband activity tracker and mobile apps. Recently, an abundance of published data (Davergne et al., 2018; Straiton et al., 2018; Wright et al., 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 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 databases (PubMed, CINAHL, Academic Search Premier, psycINFO, and ERIC) using the search terms *activity trackers* and *chronic disease*. The following criteria were used for inclusion for the review: mean age 50 and older, peer reviewed, randomized control trial (RCT), feasibility, pilot, descriptive, qualitative study, and observational study. Studies 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 the following PubMed: 25 hits; CINAHL: 9 hits; Academic Search Premier: 9 hits; psycINFO: 4 hits; and ERIC: 0 hits. Each retrieved journal article was evaluated using the above criteria, and after duplicates were eliminated, only nine articles (Brickwood et al., 2017; Cadmus-Bertram et al., 2015; Gualtieri et al., 2016; Mercer et al., 2016; O'Brien et al., 2015; Orme et al., 2018; Preusse et al., 2017; Sievi et al., 2017; Takahashi et al., 2016) included adults over age 50 years diagnosed with a chronic disease. These nine studies were further reviewed for details of how participants were taught how to use the activity tracker. None of the nine identified studies provided indepth details about how participants were instructed to use the activity tracker. The purpose of this study was to describe the teach-back method used to instruct older kidney transplant recipients to use an activity tracker/app called Fitbit, and describe facilitators and challenges of wearing the activity tracker daily for four weeks as reported by participants.

Conceptual Framework

This study is based on the Teach-Back Model (Klingbeil & Gibson, 2018; Kripalani et al., 2008;) using the three concepts of 1) explain (health care provider role) – verbal and written explanation of the activity tracker and app using pamphlets containing illustrations with step-by step instructions, 2) teach-back (patient role) – explanation and demonstration of using activity tracker and app, and 3) assessment (health care provider role) – assessment of the understanding of the participant to perform the task.

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 four-week follow-up questionnaire. Institutional

Review Board approval was obtained from a Midwestern university. Written consent to participate was obtained from participants by the research team.

Sample

Participants were recruited from January to July 2018 from a Midwestern 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 convenient sample of kidney transplant recipients in a manner consistent with recommendations for the conducting of feasibility studies (Hertzog, 2008). Inclusion criteria included a) aged 60 years or older; b) functioning kidney transplant recipient (not on dialysis); c) ability to speak, read, and understand 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); and 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 six-item open-ended questionnaire to evaluate participants' opinions about wearing and using the activity tracker. Questions were designed to elicit responses about problems retrieving the step data, frequency of retrieving the step data, location for retrieving the step data, number of days per week participants wore the activity tracker, factors contributing to wearing the activity tracker, and factors contributing to not wearing the activity tracker.

Procedure

Fitbit Charge 2™ mobile wristband activity trackers were provided for participants (Fitbit, 2019). Participants were allowed to keep the activity trackers after the study. The Fitbit Charge 2 had the ability to track steps, sleep patterns, water intake, food intake, calories burned, and heart rate. For the purpose of our study, we only instructed participants to track daily steps. The research team created pamphlets containing illustrations that were used during the educational session to teach participants how to set up, sync, and use the features of their activity tracker.

The targeted population was older, and many participants had visual impairments; thus, pamphlets were prepared using large-font text with pictures to help explain concepts. The research team created unique emails and passwords using Gmail. Participants used these emails and passwords to create their Fitbit account. This made it possible for the research team to monitor 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 participants could enter this information into the demographics section of their app.

Pamphlets contained step-by-step set-up instructions on how to download the app; enter demographic information, research-developed email, and password into the app; charge the

activity tracker; sync step data, and wear and care for the activity tracker. Participants kept their pamphlets to use as an instructional resource. Prior to the educational session with all participants, the research team practiced delivering the educational information to five 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 in a group session. During the group session, the research team assisted participants using a hands-on approach to enable the Fitbit app and Fitbit wristband activity tracker. Participants were also provided a step/mile converter chart that allowed each participant to choose their own individual step goal, which the team assisted participants to enter into the Fitbit app. The research team taught 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 the device every night. Our reasoning for charging the Fitbit each night was that we were only monitoring daily steps taken during day-time hours, and it would ensure the activity tracker would be fully charged each day. Participants were given a wall charger and a demonstration for how to charge the Fitbit using the wall charge. In addition, research assistants demonstrated how to sync the Fitbit activity tracker with each participant's smartphone. The syncing of data allowed the research team to access 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, participants were asked to walk a few steps to make sure 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 four weeks of wearing the activity tracker, participants were administered the six-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 questionnaire responses 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 six open-ended questions for analysis. A line-by-line analysis was conducted among 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 ± 4.4 years. The sample consisted of 36 (66%) males (White = 20, Black = 14, and Multiracial = 1) and 18 (34%) females (White = 10, Black = 6, Asian = 1, and Multiracial = 1). The majority ($n = 51$, 96%) of participants earned a high school degree or higher; only 2 (4%) did not complete high school or General Educational Development (GED).

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. A few participants ($n = 3$, 6%), however, reported their phone stopped syncing the step data from the activity tracker to their phone.

Frequency of Retrieving the Step Data

Nearly all participants ($n = 52$, 98%) reported checking their steps each day except for one person. About half of participants ($n = 25$, 47%) reported checking their steps more than three times each day. However, many of these participants reported they checked their steps once a day ($n = 16$, 30%).

Location for Retrieving the Step Data

All updated except participant 24. 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 six days a week instead of seven 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 only to track daily steps. Other contributing factors for participants to wear the activity tracker included that it was a habit to wear the activity tracker ($n = 9$, 17%), they were wearing the tracker for study purposes ($n = 6$, 11%), they were curious about wearing the activity tracker ($n = 5$, 9%), and the activity tracker had now replaced their watch ($n = 2$, 4%). However, three (6%) participants reported that no factors contributed to them wearing the activity tracker.

Factors Contributing to Not Wearing the Activity Tracker

About half ($n = 22$, 42%) of participants reported there were no factors that contributed to them not wearing the activity tracker. Thirteen participants (25%) reported they did not wear the activity tracker while taking a shower or participating in water activities. However, the research team informed them they should not wear their activity tracker while showering or participating in water activities. Other reasons for not wearing the activity tracker included charging the band ($n = 7$, 13%), sleeping ($n = 7$, 8%), and discomfort 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 to report 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 activity tracker and using the app, participants reported only minimal problems. 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 participants reported they wore the activity tracker to become healthier, as well as to monitor their sleep and water intake. Another interesting finding of this study is 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 features of the activity tracker through the tracker itself is critical. The main reason for participants not wearing the activity tracker was because of showering or participating in a water activity. Recently, newer waterproof 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 to developing the educational 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 to 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 ± 3.09), researchers found that after 28 days of wearing a Fitbit activity tracker, participants reported that activity tracking promoted health awareness and helped in tracking their health goal. However, another study (Ummels et al., 2018) reported that activity trackers are not without error, and commercially available fitness trackers may underestimate the steps taken by individuals with chronic disease with an altered gait (slow or shuffled). Moreover, some studies reported data suggesting that activity trackers are not valid for assessing the accuracy of activities of daily living, and these activity trackers should only be used to assess walking activities (Nelson et al., 2016; Ummels et al., 2018). Finally, some recent studies (Beg et al., 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 regarding the question about 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; this made it difficult for the team to analyze this information. Although some people put more than one contributing factor, they still provided insight into the contributing factors. Another limitation was demographics. The sample consisted primarily of white males. However, this is a typical demographic for the population in the United States 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 (Qureshi, 2016). Additionally, many activity trackers are now affordable, ranging in price from \$50.00 to \$300.00. Therefore, more kidney transplant recipients 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 monitor their physical activity and if patients are meeting their specific guidelines for daily steps taken.

Data from this study suggest 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. Data also suggest that transplant nurses should use the teach-back method to assess patient comprehension. Nurses should also 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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