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Utilizing a Personal Health Coach in the Management of T2DM

Emily Killebrew

Southern Illinois University

Matthew Huelsman

Southern Illinois University Edwardsville

Verah Bonareri

Southern Illinois University Edwardsville

Terri Furfaro

Southern Illinois University Edwardsville

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Introduction

Type 2 diabetes mellitus (T2DM) affects over 30 million Americans and is increasing every year (Center for Disease Control and Prevention [CDC], 2019a). Diabetes mellitus (DM) was the seventh leading cause of death in 2016 (World Health Organization [WHO], 2020). From 1980 to 2014, there was a 3.8% increase among adults 18 years and older in DM prevalence (WHO, 2020). Between 2000 and 2016, there was a 5% increase in premature death caused by diabetic complications and 1.6 million deaths worldwide attributed to DM in 2016 (WHO, 2020). The increasing prevalence of this disease is due to the increasing amount of obesity, lack of exercise, and increasing stress in everyday lives (CDC, 2019d).

When diabetic patients have additional education regarding lifestyle modifications and individualized training sessions to further their understanding of how to manage their T2DM, many aspects of diabetes improve (Garcia-Molina et al., 2020). Personal health coaching is an additional service that helps improve knowledge, self-efficacy, adherence to treatment, behavioral changes, health outcomes, and utilization of healthcare resources (Ruffin, 2017).

Literature Review

Type 2 diabetes mellitus can result in multiple comorbidities. It is a major cause of blindness, kidney failure, strokes, myocardial infarctions, and lower-limb amputations (WHO, 2020). It reduces the blood flow to the peripheral vascular system resulting in neuropathy, delayed wound healing, and foot ulcers (WHO, 2020). It is the cause of 2.6% of global blindness (WHO, 2020). Likewise, it is one of the world's leading causes of chronic kidney disease and nontraumatic lower limb amputation (Office of Disease Prevention and Health Promotion [ODPHP], n.d.; WHO, 2020). The vast comorbidities generate a heavy burden on the affected patient, further decreasing quality of life, limiting physical function, decreasing mental health, and causing more financial burden (CDC, 2019c). According to the ODPHP (n.d.),

having the diagnosis of T2DM increases a person's overall mortality rate 1.8 times more than an otherwise healthy person. T2DM had a financial cost of \$327 billion in 2017 that included medical costs, disability, and mortality (ADA, n.d.). With the growing numbers of obesity and sedentary lifestyle, the prevalence of T2DM will continue to increase and potentially overwhelm the current healthcare system (ODPHP, n.d.).

Utilizing supported interventions to control T2DM has shown to provide numerous benefits to affected patients. Results from a systematic review showed that nutritional modification had the highest value regarding glycemic control (Garcia-Molina et al., 2020). In addition, when patients were able to lower their body mass index (BMI) by 5%, engage in furthering diabetic education, and partake in group and individual support sessions, glycemic control was greater achieved (Garcia-Molina et al., 2020).

With the ability to largely control T2DM with lifestyle modifications, it is pertinent to understand the knowledge gap regarding these modifications and their effectiveness. Diabetic self-management will increase the health and knowledge of T2DM, save medical and prescription costs, better problem solving on how to prevent diabetic complications, help prevent or delay secondary health complications related to T2DM, and improve overall health (CDC, 2020c).

T2DM is a highly manageable disease with a variety of barriers that make it more difficult. Pharmacological therapy is effective but constitutes specific adverse effects. Therefore, the use of nonpharmacological interventions alone or alongside pharmacological intervention has shown success in glycemic management (Ruffin, 2017).

The most widely used intervention from the research was the use of a personal health coach (PHC). A PHC is a member of a diabetic care team that aids in improving a patient's

diabetic self-management through empowerment, motivation, action planning, goal setting, and communication (Cinar et al., 2018). They aid in formulating a diabetic management agenda that is geared towards the patient's needs, is flexible and modifiable, facilitates patient engagement, provides intrinsic motivation, ideas, and resources that reinforce the notion of increased health management in the present and sustained in the future (Cinar et al., 2018).

Project Methods

The overall purpose of this project was to evaluate the implementation of a PHC for the management of T2DM in adult patients in a federally-funded clinic. Compliance with the management regimen as well as readiness for self-management was evaluated. The project design included adult patients ranging in age from 21 to 75 years with a current diagnosis of T2DM who have a hemoglobin a1c level > seven (American Diabetes Association [ADA], n.d.).

This project was submitted to the Institutional Review Board of Southern Illinois University at Edwardsville and Chestnut Health Systems and deemed a quality improvement project.

Recruiting was conducted for two months, September and October 2021, during a patient's routine appointment with their health care provider. All patients aged 21-75 with a diagnosis of T2DM and a hemoglobin A1c (hgb a1c) > 7% were eligible for this project. Patients were asked to complete a pre-and post-survey and their pre-and post- hemoglobin a1c levels were obtained from patient charts. A three-month appointment to reevaluate compliance and self-management skills was required after the project. Patients met with the investigators of the project after their scheduled appointment with their health care provider. The project was explained, including risks and benefits, and the patient was given the opportunity to choose to participate. A signed informed consent form was obtained, and the patient completed the pre-survey and a contact

information sheet. The investigators obtained the patient's most recent hemoglobin a1c level from the office charts. The survey utilized for this project was the Diabetes Management Self-Efficacy Scale (DMSES) which evaluates individual current knowledge and comfort level in the management of T2DM (Bilj et al., 1999; Jiyeon et al., 2020). The DMSES is a scale to measure self-efficacy that was developed by five diabetic experts and four self-efficacy experts (Bilj et al., 1999). The survey consists of 15 questions regarding four predominant factors of diabetic care: nutrition and weight, nutrition and medical treatment, exercise, and blood sugar (Bilj et al, 1999). Permission to use the DMSES was obtained from the copyright owner.

A PHC employed by the clinic was originally going to meet with the participants routinely throughout the project. However, after receiving his resignation, the clinic decided to not fill the original PHC position. Therefore, the project investigators acted in place of the PHC. The former PHC was interviewed to ensure interviews and communication were consistent with how he completed them. The recommendations from the PHC were used when developing the project methods.

After the three-month implementation period, the patients were seen by their health care provider during which their hgb a1c levels were obtained. After their appointment, the patients met with the investigators and were asked to complete the same survey. The results of their post-hgb a1c as well their responses to the post-survey were used to evaluate their readiness to manage their disease on their own as well as their compliance to the management regimen.

Evaluation

The evaluation of this project was conducted by collecting the objective data from the pre-and post-intervention hgb a1c and DMSES. The post-intervention hgb a1c and DMSES were

collected at a three-month follow-up appointment. Statistical analysis using a paired t-test was performed on the data to obtain the mean hgb a1c and numerical answer for the DMSES pre and post-intervention. The difference in these means was then calculated to assess if the intervention had an overall improvement or detriment to these values.

A total of seven patients were recruited for this project, with three participating through completion. Reasons for not completing the project were due to patients not answering routine phone calls during implementation and not showing up for their follow-up appointments. For those who did complete the project, a follow-up hemoglobin a1c and a subsequent DMSES were completed to assess for change in glucose control and self-efficacy. The patients' hgb a1c decreased by an average of 0.93% in three months. Patient one began the project with a hgb a1c of 11.3% and showed a reduction of 1.2% in three months. Patient two began the project with a hgb a1c of 8.4% and reduced it by 1.3% in three months. Lastly, the third patient began the project with a hgb a1c of 8.9% and reduced it by 0.3%. There were improvements in DMSES scores for questions one-four, six-eight, and 11-15, and decreasing/no change in DMSES scores for questions five, nine, and 10. Improvements were seen in the ability to properly check blood sugar, correct blood sugar if too high or low, choose appropriate foods, examine feet for cuts, adjust eating habits when ill, follow a healthy diet, eat healthy when away from home or at a party, adjust eating habits when anxious, and take medication properly (Bijl et al., 1999). Areas needing improvement were assessing one's ability to keep weight under control, exercise more, and adjust eating plans if one were to exercise more (Bijl et al., 1999).

Based on the results found in this small project, there is support for the use of a PHC in the management of T2DM. Of the three participants to fully complete the project, all of them had a

reduction in hgb a1c levels and an overall improvement in self-efficacy as evidenced by an overall improvement in DMSES scores.

This project had many limitations. First, the sample size was exceedingly small. It is difficult to draw confident conclusions from a sample size of three. We were only able to recruit for a maximum of two months due to time constraints for the project. Similarly, implementation occurred during the COVID-19 pandemic. This resulted in added difficulties with recruiting and implementation due to public health restrictions. The project was implemented in a primary care clinic; utilizing a diabetic specialist office may have resulted in larger recruitment possibilities as well as a larger sample size. Second, the retention rate was under 50%. Improving strategies to help patients complete the project will be important in future studies. Thirdly, the PHC left his position at the initiation of the project, thereby limiting our ability to truly evaluate the impact a PHC can have on DM management. A PHC has special training in intrinsic motivation, goal setting, and individualized care. Therefore, replacing the PHC with the researchers did not fully encompass the benefits a PHC provides. Additionally, the office was in a minimally diverse area, serving a majority of low-income, underserved populations. This creates many barriers to healthcare, such as high no-show rates due to unreliable transportation, use of public transportation, and limited resources to help promote healthy behaviors. Finding effective solutions to help navigate around these barriers would be crucial in future projects.

Impact on Practice

The impact on practice this project has is a better management technique for T2DM. The use of a PHC has been supported by the literature and from the outcomes of this project to improve patients' hgb a1c values and promote self-efficacy of their T2DM management. This allows patients to become more knowledgeable and independent in their diabetic care. T2DM is

largely a disease produced by poor lifestyle choices (CDC, 2019d). Improving the self-efficacy of patients by providing them with a PHC can provide a personalized healthcare plan and give them a resource to seek advice from to help improve the long-term management of their T2DM. The DMSES scores revealed an overall increase in patients' ability to assess blood sugar properly, adhere to a proper diet, adjust their diet when they are ill or away from home, assess feet for lesions, and take medication properly. Conversely, DMSES scores showed reduced scores or no change in areas regarding maintaining a healthy weight and adhering to a healthy diet. Based on these results, further support from a PHC regarding diet and weight loss could be beneficial for patients with T2DM. Increased self-efficacy will also reduce or prevent the need for pharmacological intervention which can have negative adverse effects, like causing hypoglycemic events if used improperly. The long-term impact of the project is to have the stakeholders and clinic use a PHC in the routine management of their patients who have uncontrolled T2DM. This intervention will improve patient outcomes by lowering hgb a1c values and promoting independence regarding the management of T2DM.

Recommendations resulting from this project would be to address the barriers identified, such as finding creative ways to navigate the barriers provided in a low-income community. This may help retain patients and create a better experience and improve outcomes. One suggestion would be to design a community-focused approach allowing the PHC to provide DM management in patients' homes. The PHC could meet at the patient's house to help educate healthy food options, work out together at a local gym, or take a walk through a local park on a nice day. This approach will help limit the number of times the patient needs to come into the office and avoid transportation issues. Likewise, supplying bus tokens or finding ways to perform telehealth visits with patients could help avoid the difficulties of transportation for some

patients. Another suggestion would be to conduct the project at a diabetic specialist office. This may help increase the sample size, creating a more robust project. Lastly, designing a project that is more long-term may help determine the effectiveness of a PHC. This would be beneficial to assess if a longer relationship between the PHC and patient could improve outcomes further. This is something that was not addressed in the literature.

Conclusion

The implementation of a PHC in the care of T2DM has shown to improve hgb a1c values and promote a more self-efficacious patient (Cinar et al, 2018; Pirbaglou et al., 2018; Ruffin, 2017; Sharma et al., 2016; Sherifali et al., 2016; Sherifali et al., 2020). Results from this small project were similar as participants experienced improved hgb a1c levels and improvements in their DMSES scores, indicating an increase in self-efficacy. Despite this small project, participants were shown to improve with the aid of a PHC and hopefully, practices will see the importance of including a PHC in their care of diabetic patients.

Author Contact Information

Verah Bonareri ybonare@siue.edu

Matthew Huelsmann mhuelsm@siue.edu

Emily Killebrew ekilleb@siue.edu