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Effects of Diabetes Self-Management Education in the Primary Care Setting on Self-Efficacy and Glycosylated Hemoglobin Levels Among Adults With Type 2 Diabetes Mellitus

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Abstract

Persons with uncontrolled type 2 diabetes, generally defined as having a hemoglobin A1c above target goal of 7% to 8%, have an increased risk for developing chronic diseases including renal disease, heart disease, strokes, and blindness. Lifestyle modifications play a significant role in mitigating these risks and improving glycemic control. The purpose of this evidence-based project (EBP) is to provide individualized diabetes self-management education to patients with type 2 diabetes to improve patient's self-efficacy and glycemic control.

This EBP project is a continuation of a previously completed EBP by Nishita Patolia, DNP, FNP (2020), using wider inclusion criteria and optional telehealth modality designed to reach a larger number of participants. Individualized education appointments, consisting of a 30-minute encounter and one week telephone follow up call were provided to participants. Educational content was guided by the American Association of Diabetes seven self-care behaviors (AADE7). Techniques of motivational interviewing and goal setting were implemented in educational appointments to reinforce these concepts. Hemoglobin A1c values were measured at baseline and at 3 months. Self-efficacy was measured pre- and post-intervention using the Stanford Patient Education Resource Center Self-Efficacy for Diabetes Questionnaire.

A total of six participants completed the education, telephone follow up, and self-efficacy surveys. Of those participants, five also completed the follow up hemoglobin A1c lab. Fifty percent of participants had an improvement in self-efficacy and 60% of participants had a reduction in hemoglobin A1c values.

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Background and Significance

Type 2 diabetes mellitus (T2DM) is a chronic disease caused by a decreased response to the available insulin within the body, and over time, a diminished overall production of insulin by the beta cells in the pancreas (Goyal & Jialal, 2022). Several risk factors can contribute to T2DM development, including being overweight, inactivity, age over 45, elevated lipid levels, a family history of T2DM, a personal history of gestational diabetes or polycystic ovarian syndrome, and certain ethnicities (Mayo Clinic, 2021). Presenting symptoms of patients with diabetes can include increases in urination and thirst, blurry vision and/or tingling sensations due to persistently elevated glucose levels (Goyal & Jialal, 2022). T2DM increases a patient's risk of morbidity and mortality through development of acute and chronic complications. Chronic complications from long-term uncontrolled T2DM include both micro- and macrovascular complications, such as neuropathy, nephropathy, retinopathy, cardiovascular, cerebrovascular, and peripheral vascular diseases (Goyal & Jialal, 2022).

T2DM is a widespread problem in the United States in terms of both health care spending and number of persons affected. By 2050, it is estimated that one in three adults will have T2DM (Hildebrand et al., 2020). In California, 9.8% of adults have diabetes, just under the national average of 10.6% (United Health Foundation, 2019). Of all diabetes diagnoses, 90% are T2DM (Goyal & Jialal, 2022). Additionally, 20% of the spending on health care in the United States goes toward T2DM (Hildebrand et al., 2020).

Lifestyle modifications play an important role in achieving and maintaining glycemic control among patients with T2DM. Education regarding specific behavioral modifications, including but not limited to, physical activity, dietary modifications, medication adherence, and blood glucose monitoring can improve the patient's ability to manage their T2DM (Kolb, 2021). The American Diabetes Association (ADA) recommended providers educate patients with T2DM on self-management strategies to increase the patient's knowledge and skills to improve self-care behaviors and health outcomes (American Diabetes Association, 2020). The ADA recommends implementation of self-management education during four specific times including, at diagnosis, annually, with new complicating factors, and with any life or care transitions (American Diabetes Association, 2020).

Purpose

The purpose of this EBP project is to provide diabetes self-management education within a family practice clinic for the purpose of improving patient's self-efficacy and glycemic control. This project is a modified continuation of a former DNP student, Nishita Patolia, DNP, FNP-C (Patolia, 2020). This EBP project has an expanded inclusion criteria to meet the recommendation of annual diabetes self-management education and offers individualized education via telehealth modalities designed to reach a wider group of participants and improved convenience.

Review of Literature

There is significant evidence to support implementation of diabetes self-management education for patients with T2DM in a clinic setting to achieve improved self-efficacy and glycemic control. Implementation of self-management education is recommended based on guidelines provided by the American Diabetes Association, including providing education annually (American Diabetes Association, 2020). Self-management education can be implemented in a variety of ways within a primary care setting through differing educational content, delivery techniques, and frequency and length of contact time with providers. A literature review was conducted using CINAHL, PubMed, and Cochrane databases to evaluate potential evidence-based implementation of diabetes self-management education within a clinic setting. Search terms included type 2 diabetes mellitus, diabetes self-management education, diabetes self-efficacy, AADE7, HgA1c. A total of six articles were chosen to support implementation of this EBP project including three meta-analyses, one systematic review, and two randomized control trials articles.

Implementation of self-management education with a focus on interactive interventions, such as goal setting and motivational interview, were found to improve self-efficacy and glycemic control in a meta-analysis by Cheng et al. (2017). Similarly, Zhao et al. (2016) found theory-based self-management educational interventions, which included individualized goal setting during educational appointments, was effective in improving self-efficacy and glycemic control.

A systematic review by Chrvala et al. (2016) found supportive evidence that individualized self-management interventions compared to a group setting had more significant improvements in patient's glycemic control. Similarly, Hildebrand et al. (2020) conducted a meta-analysis and found greater reduction in A1c values when education was implemented within individualized versus group settings. A randomized control trial with 2 years follow up by Moreno et al., (2018) found self-management education in structured workshops to improve patient self-efficacy and a lead to a reduction in health care resource utilization.

When considering educational content material for diabetes self-management education, a randomized control trial by Azami et al. (2018) added evidence to the effectiveness of using the American Association of Diabetes 7 self-care behaviors (AADE7) to lower A1c levels and improve self-efficacy among patients with T2DM. First developed in response to request by the

Centers for Medicare and Medicaid Services (CMS) in 1997, the AADE7 framework now focuses on patient-centered education to allow personalized, sustainable behavioral change (Kolb, 2021).

Evidence-Based Practice Model

The Iowa model was chosen to guide this EBP project. First developed in 1994, at the University of Iowa Hospitals and Clinics, this model was chosen for this project due to its structured, well-organized flow chart and ability to guide the project from the developmental stages through implementation (Titler et al., 1994). This model ensures the topic is a priority within a clinic, sufficient supporting evidence for implementation is available, and provides feedback loops for problem solving along the implementation timeline (Iowa Model Collaborative, 2017). These factors help to contribute to the success of project implementation and sustainability within the clinic after project completion.

Materials and Methods

The EBP project was implemented within a primary care setting that has a high number of patients with the diagnosis of T2DM. At the time of implementation, specific individualized diabetes self-management education appointments were not being held. Participants were recruited via calling without a scheduled appointment, face-to-face invitation within the clinic, and provider referral. To participate, individuals needed to have a diagnosis of T2DM with an HgbA1c value greater than or equal to 6.5%, a willingness to participate in education either in person or via telehealth, and a desire to make lifestyle modifications.

Educational appointments were scheduled at patient convenience as individual 30-minute appointments with the DNP student during clinic hours Monday through Friday. Appointments were offered as in-person appointments or via telehealth, including telephone call. Education was guided using the AADE7 self-care behaviors, which include the following categories: physical activity, healthy eating, monitoring, medication adherence, problem solving, healthy coping, and risk reduction (Kolb, 2021). Handouts for these topics and website information for the AADE7 were provided during the appointment. Educational appointments incorporated techniques of motivational interviewing. The DNP student assisted patients in setting individualized goals based on the AADE7 and patient's current desired lifestyle modifications. One week telephone follow up was provided post educational encounter lasting approximately 10 minutes. Telephone follow up served to provide ongoing supports, assess barriers in working toward lifestyle medications, and measure post-intervention self-efficacy.

Outcomes measured include HgbA1c levels and self-efficacy. HgbA1c levels were measured at baseline and at routine 3-month follow up visits after the educational appointment. Self-efficacy was measured pre- and post-intervention using the Stanford Self-Efficacy for Diabetes Questionnaire survey. Pre-intervention measurement occurred at the start of the educational encounter. Post-intervention measurement occurred at the 1-week telephone follow up encounter.

Project Timeline and Approval

Project timeline was categorized into three sections including pre-implementation, implementation, and post-implementation. Pre-implementation occurred from May to August of 2021. This included obtaining support from both the clinical mentor and faculty advisor, University of San Diego IRB approval, and organizing educational materials. Implementation occurred from September to December 2021. During this time, educational appointments and telephone follow up were conducted, self-efficacy survey scores were obtained, and baseline HgbA1c values were recorded. Post-implementation occurred during December 2021 to

February 2022. This included post-intervention HgbA1c value collection, data analysis, and project dissemination.

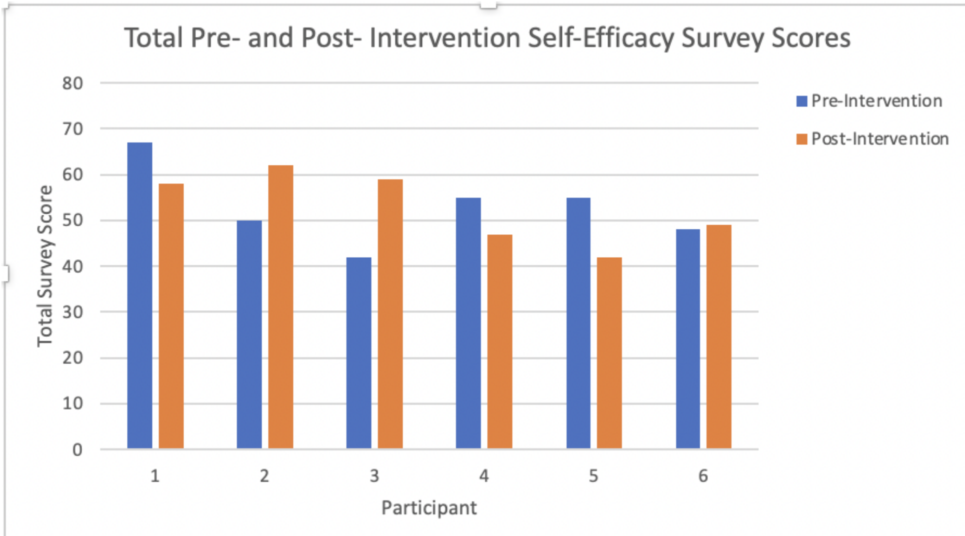
Results

Eleven participants agreed to participate in the diabetes self-management education. Of these 11 participants, five failed to scheduled appointments or had several no-show appointments leading to exclusion from the project. Six participants completed educational appointments, telephone follow up, and pre- and post-intervention self-efficacy surveys. Of these six participants, five went on to complete the follow up routine 3-month HgbA1c lab. Five participants chose education in the in-person format, while one participant chose education via telephone encounters.

Self-efficacy survey scores were calculated by total mean averages on pre- and post-survey results and compared. HgbA1c results were compared to that of baseline to 3-month follow up. As seen in Figure 1, 50% of participants had an increase in self-efficacy score results. Of those participants who saw in increase in their self-efficacy scores, there was an average increase by 16%. However, among all participants there was an average decrease by 1.8% in overall self-efficacy scores.

Figure 1

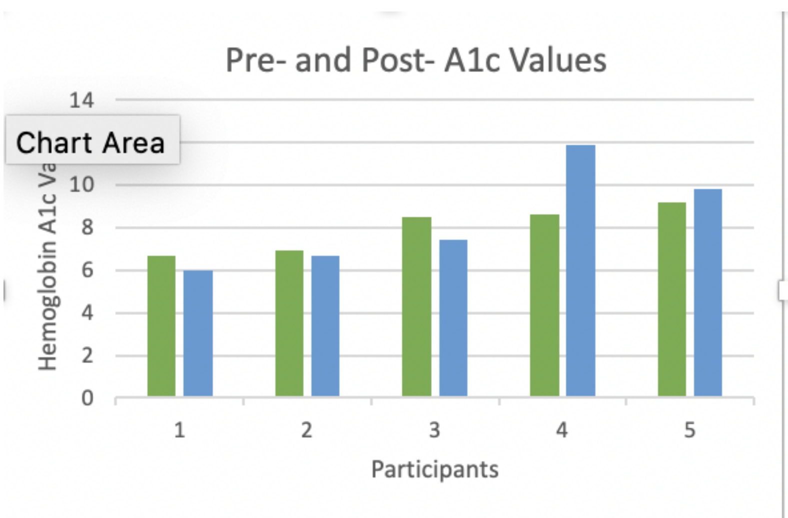
Total Pre- and Post-Intervention Scores



As seen in Figure 2, 60% of participants had a decrease in HgbA1c value when baseline and 3-month testing was compared. Of those participants with a decrease, there was an average decrease by 8.6%. However, among all participants there was an average increase in HgbA1c values by 3.3%.

Figure 2

Pre- and Post- A1c Values



Cost Benefit Analysis

The cost of implementing this project by a DNP student within a primary care setting was a total of $63.00. This included $60.00 for educational handouts regarding the ADDE7, printed in color ink, and self-efficacy survey handouts, printed in black and white ink. Lab costs were completed within the clinical site and covered by patient's medical insurance. No additional staffing costs were needed for project implementation.

Benefits of this project include both tangible benefits in costs savings and intangible benefits. The average cost of an emergency department visits, without hospitalization due to a diabetic complication, including but not limited to diseases such as pyelonephritis and osteomyelitis, were estimated to be $693.00 (Candrilli et al., 2015). Providing diabetes self-management education can aid in this cost savings through improved glycemic control and avoidance of unnecessary diabetic complications requiring higher levels of care. Additionally, intangible benefits include improvements in patient-provider relationships, improvement in patient's understanding of medications, adherence, and practice with goal identification and setting.

In consideration of the discussed factors, it was found that in implementation of this project, for every dollar spent, there was an $11.00 savings with a return on investment of 1,000%. If this were to be sustained within the clinic, costs for educational appointments and telephone follow up by staffed providers would need to be considered in the cost benefit analysis.

Barriers In Project Completion

Encountered in this study throughout implementation were barriers including difficulties in participant recruitment and patient scheduling and/or transportation issues for appointments. Additionally, several participants expressed perceived difficulties in implementing lifestyle modifications due to barriers from the COVID-19 pandemic, food insecurity, and limited access to available places for physical activity.

Participants were invited face-to-face in the clinic, via phone calls, and provider referrals. Many calls without an appointment or invitation went without response or return call. Many individuals expressed concerns regarding the COVID-19 pandemic and wanting to limit exposure to others as the reason for declining participation. Additionally, this project occurred in the fall and winter months with several participants expressing concern for lifestyle modification impacts due to holiday seasons. Transportation to and from the clinic was also a barrier for many individuals, as was having a busy home and work schedule.

Within the educational appointments and telephone follow up encounters, several participants noted perceived barriers for implementing lifestyle modifications due to food insecurities and limited area for physical activity, in part due to the COVID-19 pandemic limiting access to regular activities. These barriers were addressed with active listening, support, and brainstorming alternative accommodations with available resources throughout the education.

Conclusions and Implications for Clinical Practice

Implementation of diabetes self-management education within a primary care site through individualized appointments and one-week telephone follow up can provide a low investment option for improving self-efficacy and glycemic control among some patients with T2DM. Although a limited participant size was used during this EBP project, 50% of participants had an increase in their self-efficacy and 60% of individuals had a decrease in HgbA1c values.

However, several barriers existed, including recruitment and individuals desire to participate in education.

Sustainability of this project within the primary care clinic is feasible with recommended adjustments. It would be prudent to consider further ways to accommodate patient’s scheduling and desire to limit exposure to others during the pandemic through a reduction in visits while still obtaining education. Extension of one 3-month routine follow up visit a year from a 20-minute timed appointment to a 40-minute timed appointment could provide the necessary time to provide diabetes self-management education while limiting required provider visits for patients and improve convivence. This will likely improve participation numbers and reduce the scheduling burden for patients.

References

American Diabetes Association. (2020). 5. Facilitating behavior change and well-being to improve health outcomes: Standards of medical care in diabetes—2021. *Diabetes Care*, *44*(Supplement_1), S53–S72. https://doi.org/10.2337/dc21-s005

Azami, G., Soh, K., Sazlina, G., Salmiah, M., Aazami, S., Mozafari, M., & Taghinejad, H. (2018). Effect of nurse-led diabetes self-management education program on glycosylated hemoglobin among adults with type 2 diabetes. *Journal of Diabetes Research*, *2018*, 1–12. https://doi.org/10.1155/2018/4930157

Candrilli, S., Meyers, J., Boye, K., & Bae, J. (2015). Health care resource utilization and costs during episodes of care for type 2 diabetes mellitus-related comorbidities. *Journal of Diabetes and Its Complications*, *29*(4), 529–533. https://doi.org/10.1016/j.jdiacomp.2014.12.009

Cheng, L., Sit, J., Choi, K., Chair, S., Li, X., & He, X. (2017). Effectiveness of interactive self-management interventions in individuals with poorly controlled type 2 diabetes: A meta-analysis of randomized controlled trials. *Worldviews on evidence-based nursing*, *14(1*), 65–73. http://doi.org/10.1111/wvn.12191

Chrvala, C., Sherr, D., & Lipman, R. (2016). Diabetes self-management education for adults with type 2 diabetes mellitus: A systematic review of the effect on glycemic control. *Patient Education and Counseling, 99(6),* 926–943. https://doi.org/10.1016/j.pec.2015.11.003

Goyal, R., & Jialal, I. (2021, September 28). *Diabetes Mellitus Type 2*. StatPearls. https://www.statpearls.com/ArticleLibrary/viewarticle/36052

Hildebrand, J., Billimek, J., Lee, J., Sorkin, D., Olshansky, E., Clancy, S., &

Evangelista, L. (2020). Effect of diabetes self-management education on glycemic control in Latino adults with type 2 diabetes: A systematic review and meta-analysis. *Patient Education and Counseling, 103(2*), 266275. http://doi.org/10.1016/j.pec.2019.09.009

Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing*, *14*(3), 175–182. doi:10.1111/wvn.12223

Kolb, L. (2021). An effective model of diabetes care and education: The ADCES7 Self-Care Behaviors™. *The Science of Diabetes Self-Management and Care*, *47*(1), 30–53. https://doi.org/10.1177/0145721720978154

Mayo Clinic. (2021, January 20). *Type 2 diabetes - Symptoms and causes*. https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/symptoms-causes/syc-20351193

Moreno, E., Mateo-Abad, M., Ochoa de Retana García, L., Vrotsou, K., del Campo Pena, E., Sánchez Perez, Á., Martínez Carazo, C., Arbonies Ortiz, J. C., Rúa Portu, M. Á., Piñera, Elorriaga, K., Zenarutzabeitia Pikatza, A., Urquiza Bengoa, M. N., Méndez Sanpedro, T., Oses Portu, A., Aguirre Sorondo, M. B., & Rotaeche del Campo, R. (2019). Efficacy of a self-management education programme on patients with type 2 diabetes in primary care: A randomised controlled trial. *Primary Care Diabetes*, *13*(2), 122–133. https://doi.org/10.1016/j.pcd.2018.10.001

Patolia, Nishita BSN, RN, DNP Student, "Effects of Standardized Self-Care Behavior Education on Self Efficacy Outcomes in Type II Diabetes Mellitus" (2020).

Doctor of Nursing Practice Final Manuscripts. 124. Doi:10.2237/01/2020/021. https://digital.sandiego.edu/dnp/124/

Titler, M., Kleiber, C., Steelman, V., Goode, C., Rakel, B., Barry-walker, J., Small, S., & Buckwalter, K. (1994). Infusing research into practice to promote quality care. *Nursing Research*, *43*(5), 307–313. https://doi.org/10.1097/00006199-199409000-00009

United Health Foundation. (2019). *Public health impact: Diabetes*. America's Health Rankings United Health Foundation. https://www.americashealthrankings.org/explore/annual/measure/Diabetes/state/CA

Zhao, F., Subonen, R., Koskinene, S., & Leino-Kilpi, H. (2016). Theory-based self-management educational interventions on patients with type 2 diabetes: A systematic review and meta-analysis of randomized controlled trials. *Journal of Advanced Nursing*, *73(4*), 812–833. http://doi.org/10.1111/jan.13163