

Type 2 Diabetes: Motivational Interviewing Improving Clients' Dieting and Exercise

Azeb Lemma

The University of Texas at El Paso

NURS 6893

Spring 2022

DNP Chair: Dr. Hector Morales

Abstract

Background: Type 2 diabetes continues to be a prevalent chronic disease in the world, leading to increased rates of mortality and morbidity. In context of type 2 diabetes (T2D) management, patient empowerment is broadly investigated in the medical literature to date. This concept emphasizes patient autonomy and an individual approach to patient care. In turn, motivational interviewing (MI) is a patient-centered approach that aims to modify patients' behaviors. The effectiveness of MI in modifying patients' behaviors diagnosed with T2D has been documented in many sources. MI aims to reduce patients' internal resistance to change health and lifestyle habits and provide patients with awareness on how to become healthier and more self-disciplined in controlling own health condition.

Objective: The goal of this DNP project was to improve self-management capacities of type 2 diabetic patients who struggle with following their diet and exercise programs, thus experiencing high blood glucose levels. MI intervention was utilized to enhance patients' self-management behaviors and improve their adherence to the diabetic diet and exercise program.

Method: Motivational interviewing intervention was conducted among eight adults with type 2 diabetes. To gather the baseline data prior to and after the intervention, the following tools were used: Perceived Dietary Adherence Questionnaire (PDAQ) and Exercise Adherence Rating Scale (EARS).

Results: The use of MI demonstrated a significant effect on behavior changes related to the compliance with diabetic diet and physical activity. Findings from the PDAQ indicated an improvement between 3.9% and 22.75%; EARS findings indicated improvements between 6.67% and 37.5%.

Conclusions: This quality improvement project gained evidence that MI intervention, based on PDAQ and EARS scores, considerably improved diabetic diet, and exercise adherences.

Keywords: Type 2 diabetes, motivational interviewing, hyperglycemia

Introduction

The increasing cost of managing T2D is a great burden for current healthcare systems in the U.S. In 2019, 37 million American citizens had diabetes (Centers for Disease Control and Prevention [CDC], 2021). Elderly patients with diabetes are growing in numbers dramatically, which reflects on people's economic capacities and health progression. The factors of age and T2D are often correlated. Hence, elderly people (aged 65 and above) represent almost 25% of all adult population registered with diabetes. Importantly, elderly patients demonstrate a diversity in physical and cognitive capacities compared to young adults. Moreover, the availability of comorbidities, elevated risks of having hyperglycemic crises, and intense personal care needs, along with shortage of resilience, increase the risk of health complications and make T2D management quite complicated in case of older adult patients (Leung et al., 2018).

The therapeutic approach for dealing with diabetes mellitus can be described as a lifetime experience. It demands the development of specific self-management skills and self-care habits to support individual health at the appropriate level. Suboptimal diabetes self-care leads to the increased risk of health issues related to diabetes. For instance, many diabetes-affected patients may deal with macrovascular issues (Kosiborod et al., 2018). Diabetes management is nevertheless connected to essential costs during the lifetime, which tend to increase upon improper self-caring strategies and behaviors. The ongoing prevalence of type 2 diabetes (T2D) and its related risks indicates of the necessity to develop efficient strategies for promoting healthy behaviors and awareness and subsequently improving patients' self-caring skills, given the complexity of managing T2D in modern realities.

Diabetes is considered a complex chronic disease leading to a range of health complications, including the high risk of early mortality (CDC, 2021). Due to complexity, diabetes is challenging for everyday management. A list of different interventions, including patient education and hard behavior development, is applied to maintain healthy status of patients. A guideline issued by the American Diabetic Association (ADA) recommends using a patient-centered approach for modifying patient behaviors for better self-care of diabetes (Harris, et.al., 2020). In recent years, motivational interviewing (MI) has been a subject of close interest in research and clinical practice due to growing evidence indicating of its wide positive influence and outcomes. MI can be described as a patient-centered communication skillset designed to encourage high motivational spirit in the persons interviewed and to ensure the behavior change (Arbuckle, 2020). In case of T2D, it is a behavior change for appropriate self-management. The efficiency and clinical value of MI in developing behavior change has been recorded in various health cases, various population groups, and with multiple behaviors (Hartlieb et al., 2016).

MI, as a technique, has been developed to evoke the patient's intrinsic motivational forces through the individualized communication approach that incorporates guiding, directing, and following. A set of intercommunication skills refers to such elements as open questions for discussions, reflective listening, and maintenance of patient autonomy right and self-coordination (Hartlieb et al., 2016). A person may show resistance, thus complicating the behavior change process. To cope with resistance, MI communication techniques can be implemented—for instance, showing empathy, pointing to discrepancy in argumentation, promoting patient's self-efficacy, and leading talks about necessary change in context of witnessing clinical experience by own eyes (Arbuckle, 2020).

The goal of this quality improvement (QI) project was to improve self-management capacities of type 2 diabetic patients who struggle with following their diet and exercise programs, thus experiencing high blood glucose levels. MI intervention was utilized to enhance patients' self-management behaviors and improve their adherence to the diabetic diet and exercise program. A reflective 10-day practice review was conducted in a Skilled Nursing Facility (SNF) to assess and identify a clinical need of current practice. My findings indicated of hyperglycemia being the most prevalent clinical diagnosis and associated with low adherence to the health supporting recommendations such as diabetic diet and exercise programs. Enhancement in patient's motivation indicates that the compliance with healthy recommendations (diet and exercises) will improve as well, hence reducing adverse health conditions. Accordingly, the positive learning from increased motivation might result in behavioral changes in other aspects and directions of the selected self-care plan (Arbuckle, 2020).

Problem Description

The SNF is located in the El Paso, Texas area. It provides a range of therapeutic solutions and caring strategies. The facility is big enough to offer 124 beds. The clinical issue addressed in this facility was inefficient glycemic control due to poor adherence to the health recommendations, such as diabetic diet and regular physical activities. The reflective 10-day practice review revealed that patients with T2D suffered with hyperglycemia because of low compliance index to the recommended health practices, namely diabetic diet and physical exercises.

As a part of the SNF's primary care team, the provider mostly relied on health education technique as a leading way of patients' behavior change tactics. The value of relying on

conventional patient education tactics to modify behavior and lifestyle has been rather dissatisfactory in a long-term perspective. This can be explained by insufficient motivation for patients to adopt behavior changes, decreasing own self-efficacy and value of self-management. The poor motivation to comply with the primary health recommendations (diet and exercises) in T2D patients was found as a clinical practice gap, which often led to negative glycemic control results (Koenigsberg, 2017). Thus, the need to revise the existing programs and design a new, more comprehensive, patient-centered strategy to enhance diabetes management emerged. Particularly, the presence of motivational gap demands the addition of the efficient motivational strategy aimed at meeting patient's individual health needs and challenges of compliance. The eventual objective is to elaborate a valid self-care plan to motivate patients to comply with the above-mentioned health recommendations.

Upon defining the practical gap, identifying the source of increased hyperglycemia among patients was necessary to learn of patients' perspectives and related mitigation steps (Bukhsh et al., 2020). Eventually, patients with hyperglycemia have been interviewed. Their replies clearly indicated about a vivid problem of poor compliance with health recommendations, such as diet and regular physical activities. Poor adherence level was not associated with shortage of knowledge or education provided. Instead, lack of motivation to adopt new behavior change was identified as a root cause. Afterwards, developing a credible solution to the issue identified was important. Hence, an analysis of scientific literature was completed to evaluate information and gain useful insight on treating patients with T2D and experiencing problems with adherence to diet and fitness. Upon developing PICOT questions for the patient population, relevant factors such as the clinical setting and population type have been taken into account.

The PICOT questions for quality improvement project have been elaborated in the following way:

P: Adults aged 40 years and above with T2D have been recommended to follow a diabetic diet and physical activities plan.

I: Culturally adapted motivational interviewing

C: Education on diabetic diet and physical activity

O: Improved compliance to diabetic diet and exercise program

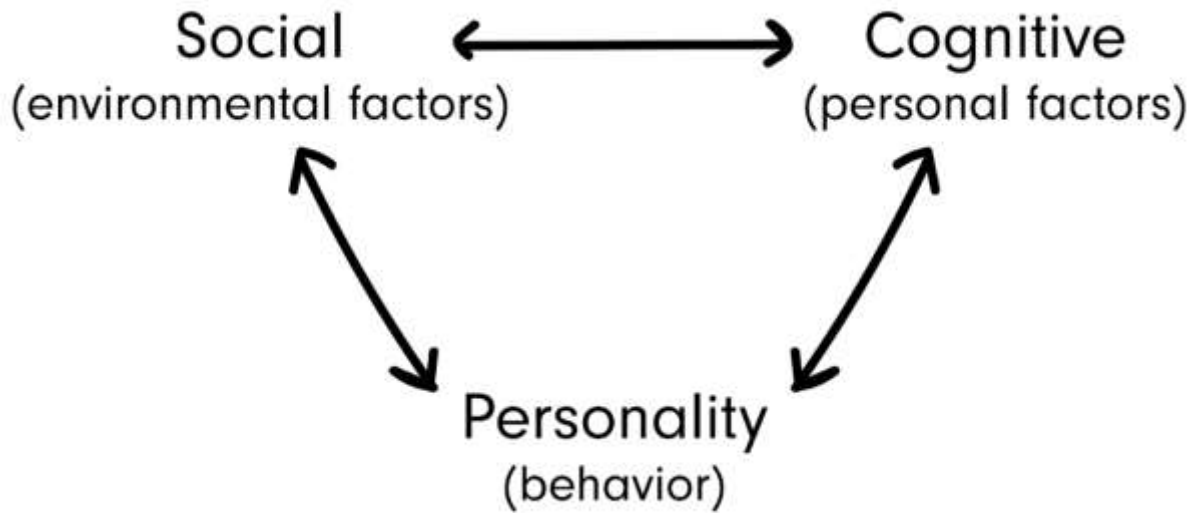
T: Five weeks

Project Framework

The Social Cognitive Theory (SCT) created in 1986 by Albert Bandura has been used as a framework for this QI project. It is based on the mutual interaction between core agents, specifically the person, behavioral patterns, and setting (Thojampa & Sarnkhaowkhom, 2019).

Figure 1

Caption (Pixorize, 2022)



The concept has been found quite efficient to incorporate upon supporting patient's adherence to the health recommendations on diabetic management (diet and exercises). It helped to understand that learning must be adopted as a lifetime, mutual and uninterrupted interaction between the person, his or her behaviors, and setting that surrounds an individual (Thojampa & Sarnkhaowkhom, 2019). The SCT encourages compliance thinking with the health recommendations for T2D patients. The application of SCT allowed this quality improvement project to consider patients' previous experiences, factors of reinforcements, and expectations. Such insight assisted in a more accurate identification of whether a patient is going to modify his or her lifestyle and behavior.

In treating T2D, it is vital to consider the setting a person lives in, as this factor might considerably affect patients' behaviors. The environment causes a direct impact on behaviors of patients with diabetes. It implies that in attempt to modify behaviors of patients with T2D with any intervention possible, it is important to concentrate on the social support, self-efficacy

opportunities and health beliefs, and self-efficacy that are all relevant for behavior change (Dendup et al., 2018). Thus, social support assists patients with diabetes to gain confidence and select individual directions for changing own lifestyle. When proper social support is provided in terms of self-care, patients with T2D demonstrate an improved compliance with health recommendations, specifically diabetic diet, hence better reaching self-management objectives and psychosocially adapting to the new lifestyle (Dendup,2018). The SCT has been applied as a framework to focus on variables of social support and self-efficacy with referring to patients' cultural beliefs. Moreover, when stimulating behavioral change of a patient with T2D, socio-environmental factors have been noted. The social aspect and environmental setting were marked as highly relevant elements affecting compliance with health recommendation (diet and exercises) at the SNF.

Knowledge Available

Strategies of Search

A literature review was performed covering digital databases and reference datasets having valuable materials articles. The topic of focus was strategies used to enhance healthy behaviors and adherence to them (particularly diet and physical activities) in adult patients with T2D. The list of databases included Google Scholar, Cochrane, PubMed, Dynamed, Embase, as well as UpToDate and CINAHL. They were searched and scanned with the help of keywords, including type 2 diabetes, adherence/compliance to diabetic diet, nurse-led intervention, glycemic control and improvement strategies, motivational interviewing, MI efficiency on adherence/compliance, self-management and self-care in diabetes. The results included 40 articles that met the search criteria. The search timeline was set between 2016 and 2022. The search parameters were further optimized by setting “OR” instead of “AND.” The pool of suitable articles was reduced to 25 works. The relevance of topics associated with studies and

articles was also considered during the search. The materials were evaluated in terms of credibility, validity, usability, and conceptual pros and cons. Among materials type, criteria of search included meta-analyses, randomized controlled trials, and systematic reviews.

Literature Review

Diabetes continues to be a prevalent chronic disease in the world, leading to increased rates of mortality and morbidity. Importantly, it causes a heavy impact on the national healthcare system (World Health Organization [WHO], 2021). In context of illness management, patient empowerment is broadly investigated in the medical literature to date. This concept emphasizes patient autonomy and individual approach to patient care. In turn, MI is a patient-centered approach that aims to modify patients' behaviors (Arbuckle, 2020). The efficiency of MI in modifying patients' behaviors diagnosed with T2D has been documented in many sources. MI aims at reducing patients' internal resistance to change health and lifestyle habits and provide patients with awareness on how to become healthier and more self-disciplined in controlling their own health condition. Thus, the most recent analysis on MI revealed positive changes in health behaviors among patients with T2D (Thepwongsa et al., 2017).

Patient compliance with health guidelines is highly relevant for reaching positive and stable health outcomes in case of diabetes (Ekong & Kavookjian, 2016). However, a lot of patients with T2D at the SNF fail to adhere to these vital health recommendations regarding diabetes diet, regular exercises, and general self-care. MI is a cooperative and mutually interactive approach that fosters patients to use their motivational potential for improving their health awareness and behaviors through voluntary changes. The task of clinical practitioners is to support and guide motivational potential of patients to make change through the reflective listening method. To be specific, it is not only a chance to hear what others say but also to

understand and accept the core of their statements. In context of T2D treatment, MI has gained value for modifying patient behaviors and lifestyles for improving health outcomes. MI is found useful in case when treatment plan stands on long-term objectives on modification, such as compliance to rules and motivation support. As motivation is the most challenging part of lifestyle modification, MI provides methodological resources for inspiring patients to accept change and cope with chronic disease for patient's benefit. The nursing education with an inclusion of MI has been found more efficient for enhancing compliance and motivation shift compared to the limited and traditional consultation on self-care of patients with T2D (Steffen et al., 2021).

Modern healthcare providers are highly interested in the working methods of healthy motivation control among their patients. Thus, Ekong and Kavookjian (2016) in their systematic literature review assessed the impact of MI on specific self-caring behavior changes among adult patients diagnosed with T2D. In addition, MI, as an intervention method of improving self-management capacities of diabetes patients, was examined in the 14 synthesized randomized controlled trials. The noticeable positive trends in behavior modification and related improved health outcomes for the MI participants have been recorded in four out of the seven projects for specific dietary modifications and in four out of the 14 studies for glycemic management. Three research projects claimed about significant improvement of self-management behaviors. Such findings overall provide strong evidence to the efficacy of MI in modifying behaviors of patients with T2D.

Other reviews and studies made in the following years reinforced such evidence. Hence, Thomas et al. (2018), in their systematic analysis of randomized controlled trials comparatively assessed the effect of MI and health coaching (HC) in caring interventions on diabetes. Authors

highlighted that both approaches, despite their similarity, are different in nature and impact on health education. This, nevertheless, means that both methods might be implemented to improve patients' self-efficacy and self-management awareness in treating chronic diseases, including T2D. Despite distinctions, researchers outlined positive effect noticed in two cases for using MI and HC. Patient behaviors have been adopted strongly in both contexts. However, it was also highlighted that learning and complying with healthy behaviors, particularly diet and fulfilling exercises might confuse patients with proper choice of food and physical activities. This means that MI and HC should be as specific as possible. Both techniques are able to psychologically help a patient with T2D to change his or her lifestyle and improve their self-management skills in controlling the disease progression.

An important study has been performed to estimate the effect of MI on the patients' quality of life and related conditions (Li et al., 2014). Patients were diagnosed with T2D and had problems with long-term glycemic control. A study revealed that the use of MI led to a considerable decrease of HbA1c as well as serum lipid levels in contrast to the control group. In addition, MI considerably increased self-management index of patients in their attempt to manage diabetes conditions. In contrast to traditional health education instructions, MI was found to be more promising and efficient strategy for enhancing self-management skills of patients with T2D who have problems with long-term glycemic control.

The current QI project analysis incorporated several common findings in light of the research information revealed above. This QI project involves the same original problem, the reliance on self-reported compliance protocol, the same population of focus, as well as the similar primary health objectives. Importantly, the primary objective of accommodating behavioral changes with a help of MI was reached successfully.

Specific Goals

In terms of the self-care plan, diabetic diet and physical exercises management remain to be serious challenges. Patients placed at the SNF experience problems with following healthy eating recommendations and controlling overall care of their disease. Long-term health complications develop due to poorly managed diabetes. To name a few, it is possible to have macrovascular complications (peripheral arterial disease, coronary artery disease, and stroke) as well as microvascular issues (neuropathy, retinopathy, along with nephropathy) (Kosiborod et al., 2018). For this reason, paying attention to this clinical issue was a central focus. In case of poorly controlled diabetes, empowering of patients to perform self-caring practices and activities was found as the best way to affect their behaviors and lifestyles. Hence, MI has been used to authorize and teach patients to have a clear control over their health status (Ekong & Kavookjian, 2016). Patient comfort and cost economy were identified as crucial advantages of personalized MI that was conducted during the planned standard visits by the practitioner. The goal of this DNP project was to improve self-management capacities of type 2 diabetic patients who struggle with following their diet and exercise programs, thus experiencing high blood glucose levels. MI intervention was utilized to enhance patients' self-management behaviors and improve their adherence to the diabetic diet and exercise program. Output has been evaluated with a help of the Perceived Dietary Adherences Questionnaire (PDAQ) (Assad et al., 2015), along with the use of the Exercise Adherence Rating Scale (EARS) (Newman-Beinart, 2017).

Methods

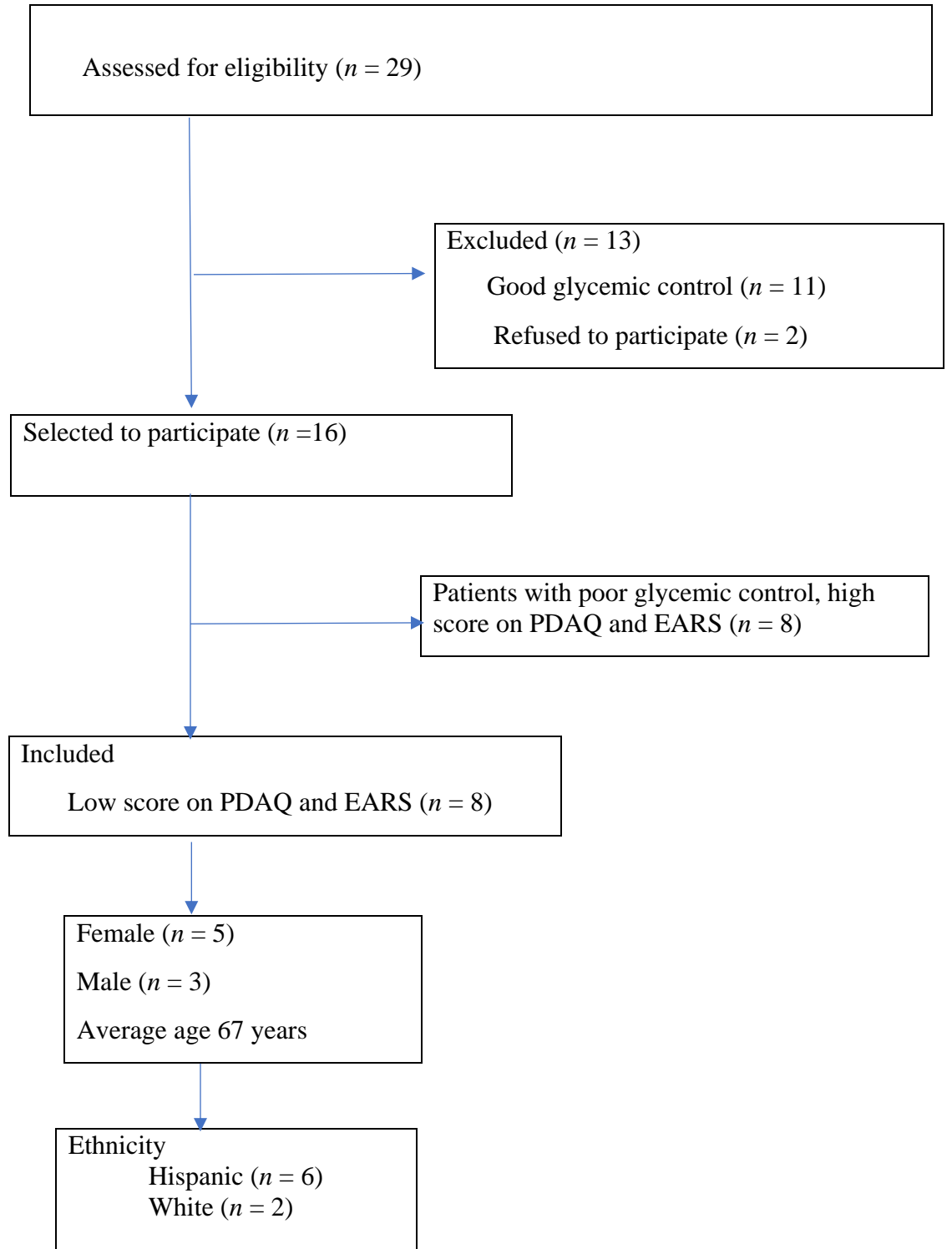
The QI project has been performed at the SNF. The date of operation was January 19, 2022 to February 16, 2022. This QI project lasted 5 weeks. The population of adult patients (aged 40 and above) diagnosed with T2D has been evaluated with a help of screening tools

(PDAQ and EARS) on their adherence level towards healthy behaviors (diet and exercises) in the first week of a QI project. During the first session, both evaluation tools allowed the practitioner to assess and collect necessary baseline information about pre-MI intervention, assessing T2D patients' ability to comply with health recommendations (diet and physical activities).

Individuals with high scores were associated with high-level compliance. Meanwhile, individuals with low scores were selected for this QI project. Patients with a good glycemic control index measured in terms of PADQ and EARS were excluded from the project. The University of Texas at El Paso Institutional Review Board (IRB) provided an ethical approval of the QI project. Moreover, a letter of approval to conduct a QI project at the SNF was provided by Cimarron Park Nursing and Rehabilitation Center in El Paso, Texas. Patients guaranteed their verbal approval on participating in the QI project. The selection based on demographic data of patients participating in the QI project has been proceeded in accordance with the following parameters (Figure 2).

Figure 2

Demographic Data and Patient Selection



Interventions

Intervention Planning

This QI project was prepared based on the 10-day reflection and observation of clinical practices in the SNF. The observation revealed that there were patients with poorly controlled T2D being the most prevalent diagnosis among patients. Even though the practitioner of the SNF provides patients with standard consultation on diabetic management, many patients still have problems with controlling adequate blood glucose level. With intention to define variables, challenges, and circumstances resulting in elevated blood glucose rates, subjective perspectives of patients have been obtained and analyzed. Hence, interviewing patients with elevated glucose was the most optimal method.

In addition, it was critically important to cooperate with the patients selected. The practitioner asked for patients' personal opinions about reasons of hyperglycemia. The vast portion of replies from patients was chiefly associated with poor compliance with the healthy recommendations (diet and physical exercises). Responses from patients were mostly similar: "I eat what I've got," "I eat what my wife/friend brings me," "I use the vending machine to get what I want," "I can't resist against eating sweets," "I don't like physical activities," "I can't do exercises for a long term," etc. Diabetes management represents a mix of different balanced activities, including diet, physical activity, and medication use (National Institute of Diabetes and Digestive and Kidney Diseases, 2016). The American Diabetes Association (2022) noted that sticking to recommendations on diet and exercises is one of the core solutions on successful management of T2D. If patients are able to get an idea that their changed lifestyle positively affects their health outcomes regarding diabetes control, their adherence level and motivation to improve are going to increase.

As low compliance was determined as a central clinical issue at the SNF, the next step was to complete a literature review to assess and integrate evidence-based strategies for the QI project to remedy or minimize the issue. The literature focusing on improvement of patients' adherence to the American Diabetes Association's healthy recommendations on diet and regular fitness revealed optimistic findings in the area of cognitive behavior strategies, particularly MI interventions.

The QI project took 5 weeks including three MI face-to-face sessions. The MI sessions were completed with a 2-week interval, lasting for approximately 20 minutes each. The sessions on week one and week five took 30 minutes due to administration of PDAQ and EARS and pre- and post-operational discussion of MI outcomes. The sessions were operated by the practitioner during standard and planned visits. All patients from the pool completed the first MI session in the first week of the QI project.

Before the motivational interviewing, a baseline score of incidences of increased blood glucose level was calculated by relying on a retrospective review of electronic health records (EHR) charts of patients seeking for care on managing T2D at the SNF. The input was obtained from the electronic medical records (EMR) of registered patients. The input included age, sex, race, medical history, laboratory test results, as well as diet assigned and physical therapy plan.

Compliance with the recommended diet and fitness might be calculated by determining the behavioral patterns necessary for adherence to the self-care plan. Moreover, the efficiency of patients in following these patterns during the QI project can be measured with determining relevant scores. There are two essential parts regarding the data gathering procedure. The first

part focuses on compliance with diet recommendations, whereas the second part emphasizes physical activity adherence. The EARS tool was modified to suit the assessment goals of the clinical QI project. Hence, patients having the lowest scores were transferred to the next MI session on a second week because of meeting the inclusion criteria. The PDAQ tool was used in its original version, containing nine items measured by summarizing all scores from questions. Each response was coordinated by using the seven-point Likert scale. Except for items 4 and 9 outlining unhealthy diet choices, high scores indicated of high and reliable compliance with diabetic diet. Items 4 and 9 indicate that patients have low compliance level upon achieving high scores. Hence, scores for these items had been designed to calculate a total PDAQ score. If patients made healthy diet choices during four days per week (at least), they were marked as the ones having high dietary compliance (Assad et al., 2015).

The data gathered has been evaluated. Out of 29 T2D patients, 13 participants showed normal glycemic control. Along with two others who declined to take part, they were out of observation. In turn, 16 patients have been chosen for intervention because of increased blood glucose levels. The QI practitioner used the PDAQ and EARS tools for measuring scores. As the PDAQ was utilized to measure patient perspectives on adhering to diabetic diet, the EARS helped to accumulate responses from patients regarding their compliance with fitness recommendations (Newman-Beinart et al., 2017). Among 16 patients, eight respondents got high scores in two measuring tools (PDAQ and EARS) and were further excluded from the QI project. The last eight patients were included because of reaching low scores in the same measuring tools.

In terms of this QI project, the PDAQ pre-intervention scores were the following: 29 for the highest and 15 for the lowest score. In context of the EARS, the radical scores were 20

(highest) and eight (lowest). Then, the practitioner talked to patients about outcomes of the PDAQ/EARS tests. The task was to assist them in understanding their position, their qualification to the main QI project, and importance of mutual relationships. In this moment, it was critically important to identify the patient's values and challenges they had. Developing trust and confidence was also relevant to achieve maximum output from such cooperation. Such an approach ensured more productive and open patient-provider communication. The practitioner was aware of the patients' perceptions due to showing empathy and looking at their situation from their perspective. In addition, the practitioner was lacking direct judgments of patients' thinking and was positive, supportive, and cooperative. This approach helped the practitioner to accept the patients' autonomy and self-efficacy in selecting their ways of living with disease. Still, this ensured conditions to appeal to the patients' sense of reason and offer rational solutions for behavior change (Mifsud et al., 2020).

The practitioner relied on a patient-centered strategy to stimulate change in behavior. Each MI session included the following components:

1. **Involvement:** patient-centered communication was used by the practitioner to learn of patients' values and beliefs.
2. **Focusing:** The practitioner communicated with patients on how to focus on specific aspects of adhering to diet and fitness recommendations for diabetes management.
3. **Inducing:** The stimulation of the patient's individual motivational resources to change behavior
4. **Planning:** A patient's commitment to change was successfully established with developing a specific action plan.

During a standard MI session, the practitioner relined on MI's core principles. The list of MI values involved the following points:

- *Showing empathy*: The practitioner put oneself into patient's shoes regarding health states, which ensured that patients are heard, emotionally understood, feel cared, and have improved trust to share their health experiences.
- *Self-efficacy*: The practitioner relied on a strengths-associated methodology, making patients believe they have internal resources to change their behaviors.
- *Coping with resistance*: The practitioner took a role of a facilitator to prevent any conflict, if resistance becomes evident. Moreover, negative reactions were avoided with clear attempts to guide patients in finding most comfortable solutions to minimize resistance.
- *Identifying discrepancies*: The practitioner investigated the inconsistencies between the identified behaviors on low compliance, the patient's beliefs, and future intentions. The practitioner was to mitigate the patient's perceived discrepancy between current patterns and future objectives.

The practitioner exploited open-ended questions directing to the ultimate topic of change behavior during each MI session. Acknowledgements were used to identify strengths and patients' attempts to changes. Reflections were utilized to show awareness of the patient's perceptions and inspire patients to the resolution of inconsistencies by motivating, addressing discrepancies, and supporting the whole conversation about change necessity. Finally, summarizations were made to recap and make the logical conclusion over the whole MI session. Table 1 shows the Perceived Dietary Adherence Questionnaire (PDAQ), and Table 2 shows the Exercise Adherence Rating Scale (EARS).

Table 1*Perceived Dietary Adherence Questionnaire (PDAQ)*

Item	Response *
1. On how many of the last SEVEN DAYS have you followed a healthful eating plan such as Eating Well with ADA diet guidelines?	0 1 2 3 4 5 6 7
2. On how many of the last SEVEN DAYS did you eat the number of fruit and vegetable servings you are supposed to eat based on ADA's Food Guide?	0 1 2 3 4 5 6 7
3. On how many of the last SEVEN DAYS did you eat carbohydrate-containing foods with a low Glycemic Index? (Example: dried beans, lentils, barley, pasta, low fat dairy products)	0 1 2 3 4 5 6 7
4. On how many of the last SEVEN DAYS did you eat foods high in sugar, such as cakes, cookies, desserts, candies, <i>etc.</i> ?	0 1 2 3 4 5 6 7
5. On how many of the last SEVEN DAYS did you eat foods high in fibre such as oatmeal, high fiber cereals, whole-grain breads?	0 1 2 3 4 5 6 7

Item	Response *
6. On how many of the last SEVEN DAYS did you space carbohydrates evenly throughout the day?	0 1 2 3 4 5 6 7
7. On how many of the last SEVEN DAYS did you eat fish or other foods high in omega-3 fats?	0 1 2 3 4 5 6 7
8. On how many of the last SEVEN DAYS did you eat foods that contained or was prepared with canola, walnut, olive, or flax oils?	0 1 2 3 4 5 6 7
9. On how many of the last SEVEN DAYS did you eat foods high in fat (such as high fat dairy products, fatty meat, fried foods or deep-fried foods)?	0 1 2 3 4 5 6 7

* Scoring: to get the total PDAQ score, the replies for items 4 and 9 were re-designed, - for instance a score of 7 turns 0, then add all the replies together. The highest score is 63.

Table 2

Exercise Adherence Rating Scale (EARS)

Name: _____ Room # _____ Date: _____

- | | | | | | |
|--|---|---|---|---|---|
| 1) I don't do my exercises as often as recommended | 1 | 2 | 3 | 4 | 5 |
| 2) I adjust the way I do my exercises to suit myself | 1 | 2 | 3 | 4 | 5 |
| 3) I don't do my exercises when I am tired | 1 | 2 | 3 | 4 | 5 |

4) I do some, but not all, of my exercises	1	2	3	4	5
5) I do less exercises than recommended	1	2	3	4	5

1= Always, 2= often, 3=Sometimes, 4=Rarely, 5= Never

Scoring: The EARS is computed by summarizing all scores from replies (Range= 5 -25). High scores refer to increased level of adherence to fitness recommendations.

Description of Biweekly MI Sessions

Session one: Face-to-face, Week One, Total duration – 30 minutes.

MI session one: The first original session involved all patients observed throughout the first week. Patients (aged 40 and above) diagnosed with T2D were recommended to follow diabetic diet and complete physical activity routine. To evaluate patients' compliance with diabetic diet and exercise program recommendations, PDAQ and EARS tools have been used, whereas outcomes of measuring tests have been communicated to patients. Outcomes derived from measuring tools were summarized with qualifying those patients who achieved the lowest scores. Eventually, eight patients were included into the QI project to be further taking part in the following second session. Each patient transferred to the second session had a unique ID for proper distinguishing.

Format of Session One: Face-to-face, interpersonal communication.

Timing: 30 minutes

Session Content: Engaging

Engaging is the original yet most relevant step in completing MI intervention. The practitioner was involved with every patient to develop strong, trusting relationships. To ensure a

proper patient-centered method, principal investigator relied on the OARS approach of MI (AHRQ, 2018). This approach incorporates open-ended questions for generating more detailed and expressive information from patients regarding their feelings and perceptions. Moreover, the approach stood on comforting approvals of patients' achievements and advantages, which was necessary for patients to cope with destructive thinking. In addition, reflections were used to help patients to share discrepancies available. Finally, the information was summarized, and intervention was generally recapped to show that the patient was successfully heard. This initial communication allowed both principal investigator and patients to identify the clinical problem exactly and then navigate towards further consensus.

MI session two:

Format of session one: Face-to-face, interpersonal communication.

Timing: 20 minutes

Session Content: Focusing and evoking

Focusing was about producing and supporting the general course of discussion regarding the compliance with diet and fitness plan recommendations and explaining their role in health regulation, specifically in relation to glycemic control index.

Evoking was about stimulating patients' inner motivational resources for behavior change. The practitioner first settled a ground for conversation about change, drew the contours of possible changes in behavior, and then used the inspiring words to stimulate direct change.

MI session three:

Timing: 30 minutes

Session Content: Planning, elaboration of PDAQ and EARS outcomes in the post-intervention setting, discussion of outcomes with patients.

Planning was necessary to assist patients who expressed readiness to change to clarify clear ways of transforming self, establish a strong commitment to transform, and develop a detailed action plan. All eight patients participating in the QI project demonstrated their readiness to transform their lifestyle and improve their compliance with health recommendations (diet and exercises). The practitioner, by accepting autonomy right of all patients, took a role of a facilitator for supporting behavior change during MI. The practitioner integrally motivated patients to comply with the action plan, stressed patients' principles, and supplied participants with credible and motivational information. The outcomes of PDAQ and EARS tools were shared to discuss them with patients and evaluate further adherence level on health recommendations after the MI intervention.

Post-intervention outcomes derived from PDAQ and EARS measurements indicated of clear enhancement. Patients also demonstrated positive trends in fasting blood glucose index.

Evaluating Intervention

To analyze the effect of the whole intervention, the review of EHR charts was adopted, in addition to PDAQ and EARS tools. The review was applied before and after the intervention to estimate patient compliance levels in relation to diet and physical activities. The PDAQ was used as a valid and credible instrument for measuring adherence to diet. Being easy and comfortable in administration, the PDAQ is beneficial for measuring such type of adherence (Assad, 2015). Physical activities adherence, being the crucial element of diabetes management, was evaluated with a help of the EARS instrument. Notably, the EARS structure was modified a bit to better fit

the QI project's population. The EARS represent a five-item questionnaire designed to measure the patient's adherence level in completing fitness program. Both the PDAQ and EARS were found to be cost-efficient, user-friendly, and valuable for clinical analysis.

The measurements used in the QI project to solve the clinical issue were grounded in the 10-day reflection conducted in the SNF. It was anticipated that MI used during the standard clinical visits could ensure an enhancement in patients' glycemic control index, as well as improve patients' adherence to health recommendations (diet and fitness). Therefore, blood glucose level was also measured to confirm any improvement signs from the intervention.

The patient population (all are adults aged 40 and above) represented the registered residents of the SNF. Those who met the inclusion criteria were subjected to MI sessions and face-to-face communication. Only eight patients out of the entire population took part in three sessions of MI. Sessions were based on basic MI phases, such as engaging, focusing, evoking, and planning. The sum of actions during the intervention aimed at stimulating patients' behavior change via mutual interaction and patient empowerment.

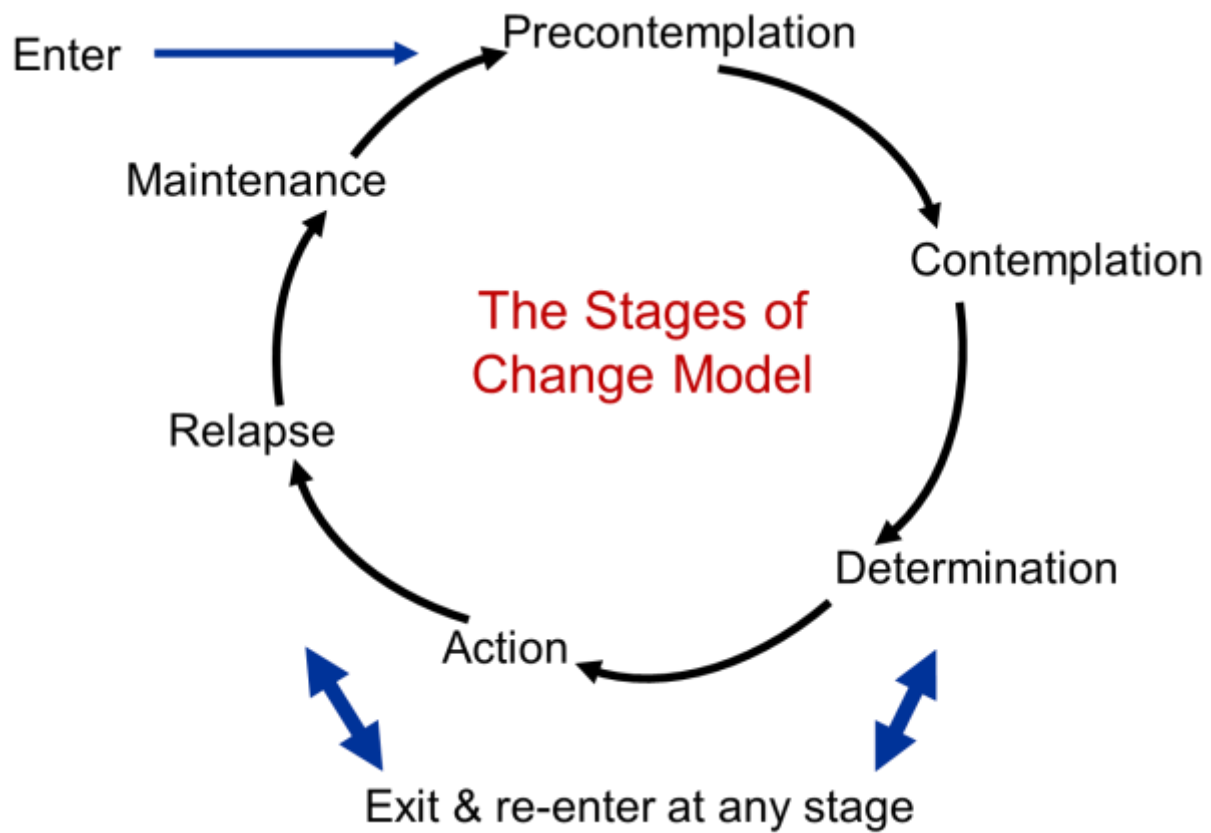
In eight patients interviewed, fasting blood glucose was measured. The outcomes revealed that all eight patients demonstrated a clear enhancement in blood glucose parameters. This indicates that MI contributed to the positive modification of healthy habits.

Quite surely, patient problems in diabetes self-management must be viewed as a complex and multi-factorial cognitive-behavioral phenomenon. Hence, an emphasis on cognitive-behavioral interventions should be made to attain improved clinical and medical outcomes among patients diagnosed with T2D. In this project, the transtheoretical model (TTM) was the key framework to ensure behavior change in patients.

Figure 3

The transtheoretical Model

Caption (Boston University School of Public Health, 2019)



The TTM considers the individual decision-making and emphasizes the intentional change factor. It stands on the idea that individuals cannot transform their behaviors in a fast and determined way. Instead, integral habits and established behaviors change and get modified via the continuous and cyclical process (Glanz et al., 2015).

The TTM outlines six phases of human transformation. They are precontemplation, contemplation, preparation, action, maintenance, and termination (Glanz et al., 2015). In the

original design, termination phase was not included. Hence, this QI project also excluded this phase from the healthy behavior paradigm. At every transformation phase, a variety of MI approaches was utilized to guide patients towards the next phase of change to, ultimately, achieve the perfect behavior type at the maintenance phase. Every phase of transformation applied in this QI project is explained below.

1. **Precontemplation:** Patients were provided with insight and benefits on why a specific healthy behavior is important in their case. At this phase, patients rarely accept the necessity of transformation.
2. **Contemplation:** This phase is characterized by decrease of limitations that hinder personal change and increase of patient's self-efficacy. Patients tend to evaluate barriers they have and advantages they got from transformation. Despite resistance, patients tend to identify discrepancies and controversies about change.
3. **Preparation:** An individual plan for each patient to work on breaking limitations and barriers was developed by principal investigator at this stage. Patients' intention to transform is more palpable here.
4. **Action:** Participants were provided with instructions of change during MI sessions to avoid relapse at this stage. Patients take their chance in modifying behaviors and following health recommendations (diet and exercises).
5. **Maintenance:** Monitoring on whether patients have truly transformed and do their best to avoid relapse. Principal Investigator works as an observer and a guide.

QI Project Outcomes

The outcomes derived during this QI project were analyzed with reference to clinical needs evaluation that was completed during the 10-day clinical practice review in the SNF. The

primary outcome was enhancing the patients' compliance with health recommendations (diet and exercises) along with measurable improvement of blood glucose index. Face-to-face MI sessions were performed during the routine visits. Blood glucose level was used as a supportive evidence of intervention efficiency in relation to positive behavior changes.

Baseline and demographic information were obtained in the beginning. Patients were selected based on the inclusion criteria developed for this QI project. Two measurement tools, PDAQ and EARS, have been utilized to measure patient adherence to diet and fitness recommendations, respectively. Data about patients' blood glucose was taken from the SNF's EHR database. All data gathered was utilized during pre- and post-intervention periods.

The TTM framework was used in the QI project to measure and ensure patients' stimulation towards lifestyle transformation. The model is important for evaluating patients' readiness to transform by applying the efficient motivational strategy. The model incorporated five stages of transformation described in detail in the previous section. The gradual and cyclical transformation is more efficient than swift and forced change (Selcuk-Tosun & Zincir, 2019). MI was performed throughout the entire project for 5 weeks. The comparison of patients' motivation to change and actual transformation results before and after the MI intervention was completed. Notably, positive shifts in behavior were associated with self-efficacy, blood glucose levels, and lifestyle changes, including progress in compliance with diet and fitness recommendations.

The project's theoretical base stood on the SCT concept that was applied at each phase. Meanwhile, the TTM was utilized to ensure transition between theory and clinical practice. Both the SCT and TTM contributed to the optimal formation of the QI project structure and ensured more evidence-based approach towards goal achievement. Being fully patient-centered, MI face-to-face sessions were conducted with every patient who met the QI project's inclusion criteria.

The practitioner personally got an approval from the DNP chair to get full control over the observation and get advice on QI project implementation.

To measure any improvements in the post-intervention interval, the PDAQ and EARS tools were applied again. Along with blood glucose levels taken from the SNF's EHR database, results of pre-and post-interventions have been compared. All eight patients took part in all three MI sessions without exclusions or dropouts. Eventually, improvements have been recorded, which means that MI contributed to necessary lifestyle changes.

Analysis

The QI project relied on a quantitative data analysis design with comparison between pre-and post-intervention outcomes. The central measurement before (baseline) and after 5 weeks of intervention for this QI project was blood glucose level. Adherence to health recommendations (diet and exercises) was evaluated by contrasting scores from PDAQ and EARS tools before and after the MI intervention. To describe the QI project's population, quantitative data evaluation was performed. Overall, 29 (18 females and 11 males) adult patients aged 40 and above had been initially chosen for the QI project. All patients were diagnosed with T2D. Out of the total amount, 11 patients were having normal glycemic control, as opposed to other 18 patients with improper index. Two patients from this sample refused to take part. The remaining 16 gave their consent, but only eight patients (five females and three males) fit the necessary criteria to continue.

Prior to completing the project, all measurement tools have been verified on feasibility, paying attention to factors of reliability, time, and cost. Obtained before and after the intervention, the original inputs were integrated into the separate flowcharts to indicate of intervention impact in different conditions. Scores from PDAQ and EARS tools were used

before and after MI to assess the outcomes. Importantly, patients participating in the QI project were provided with results of testing. The comparative outcomes of pre- and post-interventions based on PDAQ and EARS output and measurements of blood glucose levels are presented in the flowcharts below.

Figure 4

Diet Compliance Rating Scale

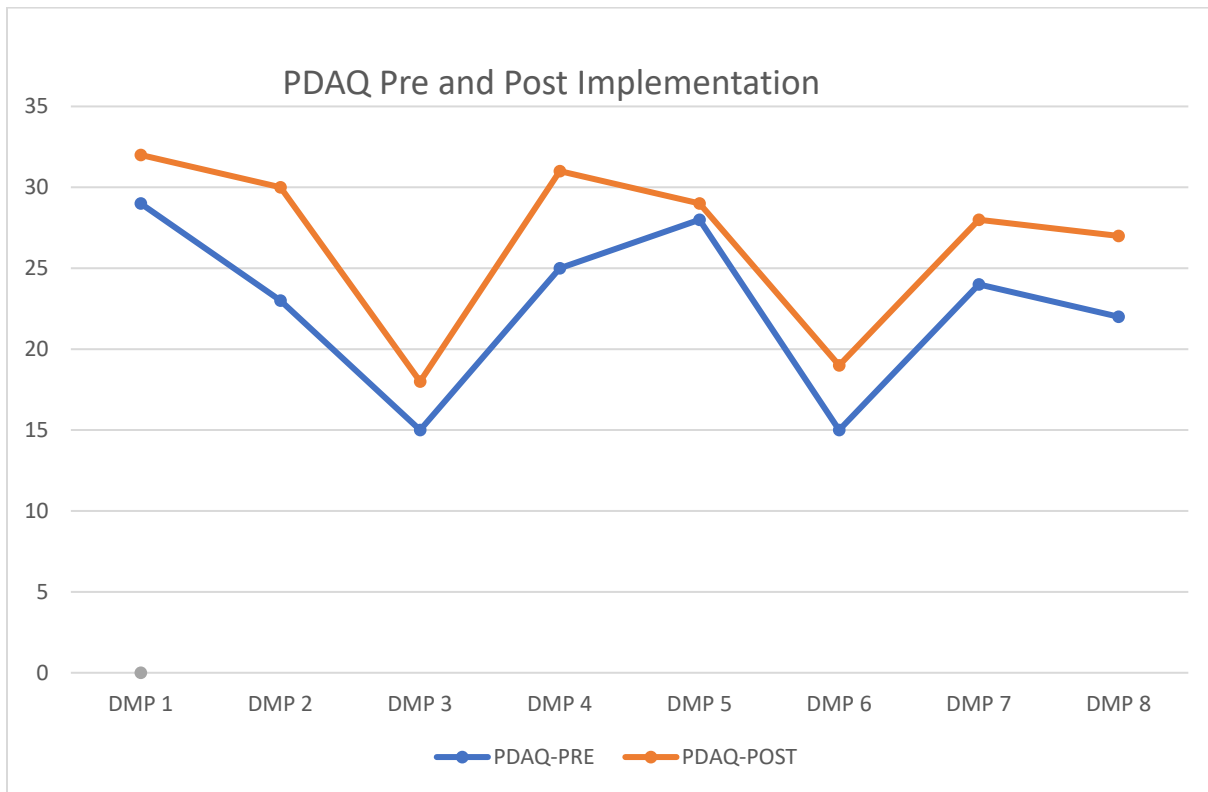


Figure 5

Fitness Compliance Rating Scale

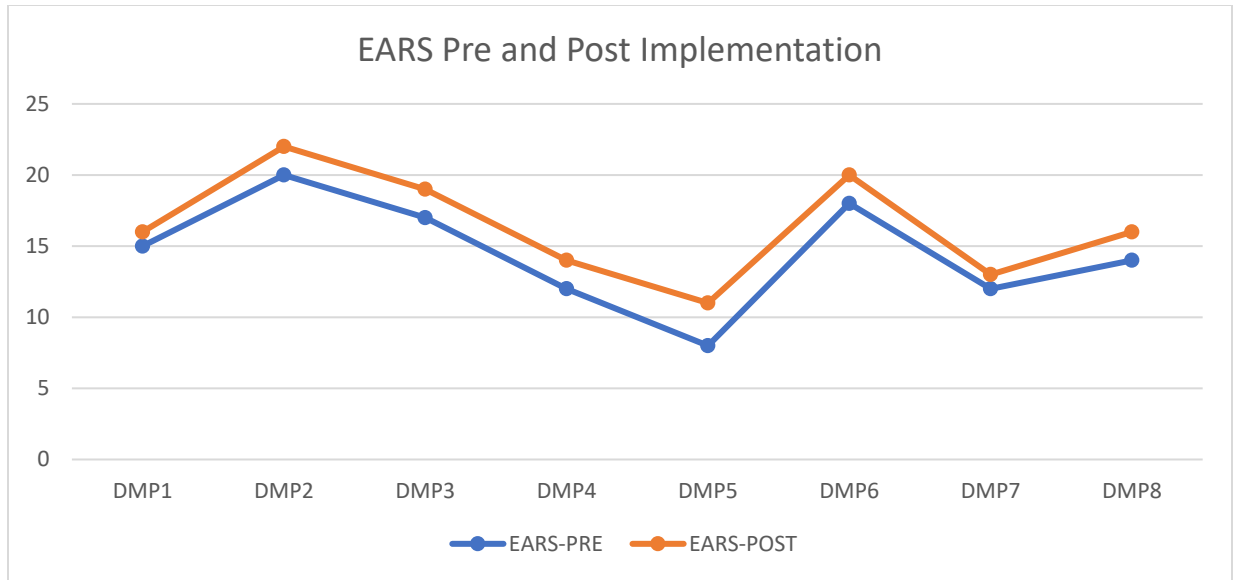
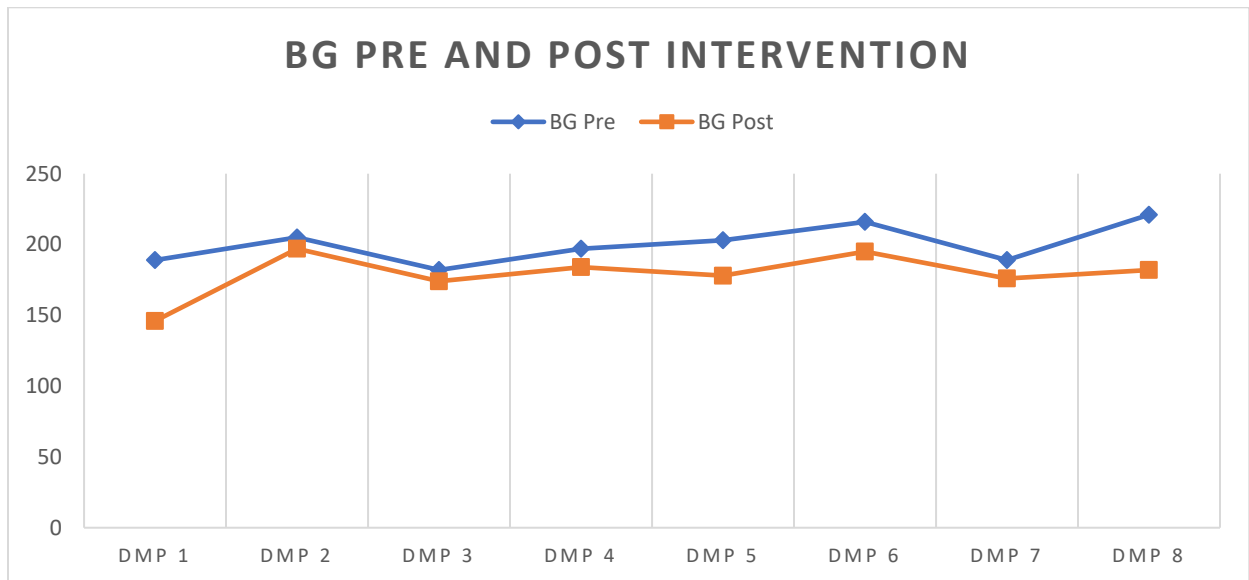


Figure 6

Blood Glucose Levels Before and After MI



Ethical Considerations

Before starting the QI project, the University of Texas at El Paso IRB provided an ethical approval. Every participant gave his or her informed verbal consent upon receiving the information about the QI project's purpose, goals, methodology and protocols. Confidentiality was provided to every participant, which is why their personal information had not been recorded during the data gathering stage. Instead, a unique ID was attributed to each respondent.

Results

The QI project was arranged in the SNF located in El Paso, Texas. The facility is large in structure and offers 124 hospitalization beds. The flow of participants was registered. The final number of patients under the observation and project was eight. Basic demographic parameters were common with distinct behavioral patterns. All patients were diagnosed with T2D and were advised and instructed on following diabetic diet and physical activities. Demographic characteristics regarding patient sample is included in Table 3.

Table 3

Demographic Characteristics

Variables	Number
Age (years)	
40-59	1 (12.5%)
60-69	5 (62.5%)
70-85	2 (25%)
Gender	
Male	3 (37.5%)

	Female	5 (62.5%)
Ethnicity		
	Hispanic	6 (75%)
	White	2 (25%)
Marital status		
	Single	1 (12.5%)
	Widowed/ Living with family	5 (62.5%)
	Married	2 (25%)

Table 3*Comparing Diet Compliance Levels Before and After MI*

Patient	Sex	PDAQ-Pre	PDAQ-Post	% Improved
DMP1	F	29	32	10.34%
DMP2	F	23	30	30.43%
DMP3	M	15	18	20%
DMP4	F	25	31	24%
DMP5	F	28	29	3.57%
DMP6	F	15	19	26.67%
DMP7	M	24	28	16.67%
DMP8	M	22	27	22.73%

Table 4*Comparing Exercise Compliance Levels Before and After MI*

Patient	Sex	EARS -Pre	EARS -Post	% Improved
DMP1	F	15	16	6.67%
DMP2	F	20	22	9.09%
DMP3	M	17	19	11.76%
DMP4	F	12	14	16.67%
DMP5	F	8	11	37.5%
DMP6	F	18	20	11.11%
DMP7	M	12	13	8.33%
DMP8	M	14	16	23.08%

Table 5*Comparing Scores From PDAQ and EARS Tools With Blood Glucose Levels Before and After MI*

Patient	PDAQ-pre	EARS-pre	BG-pre	BG-post	% BG Decreased
DMP1	32	15	189	146	22.75%
DMP2	20	20	205	197	3.9%
DMP3	18	17	182	174	4.4%
DMP4	25	12	197	184	6.6%
DMP5	28	8	203	178	12.32%
DMP6	15	18	216	195	9.72%

DMP7	24	12	189	176	6.88%
DMP8	22	14	221	182	17.65%

Eight patients successfully passed through all three MI sessions, providing data for pre- and post-intervention stages under PDAQ and EARS usage. Two tools were utilized to estimate patients' compliance level before and after MI. The review of EHRs was also applied to contrast blood glucose in pre- and post-intervention intervals. The baseline hypothesis presumes that all eight patients had poor compliance level, as noted in the scores from PDAQ/EARS tools. Blood glucose parameters were also comparatively analyzed with reference to the EHR database. The expected primary outcome of this QI project has been an enhanced compliance level with health recommendations (diet and fitness). The expected secondary outcome has been a normalized blood glucose level. Participants were observed bi-weekly in terms of personalized face-to-face MI sessions. The methodological guidelines provided by Miller and Rollnick (2012) have been followed thoroughly. The final third MI session allowed to summarize all findings from the PDAQ and EARS performed in the post-implementation period. As a result, all eight participants showed enhancement patterns. Thus, findings from PDAQ indicated of improvement between 3.9% and 22.75%; EARS findings indicated about improvements between 6.67% and 37.5%. Reduction of blood glucose level was recorded, showing a decline from 22.75% to 3.9%.

Discussion

Summary

Diabetes is a complex chronic disease, where empowering patients for efficient self-management is critically important. Research literature has confirmed that health education used as a lone method is insufficient to modify patients' healthy behaviors in a long-term perspective.

Empowerment, unlike traditional education and instructions, presumes reinforcing patients' inner motivational resources to change own destructive behaviors. Therefore, health awareness programs and initiatives, as well as their problems, has become highly indicative and resonant in the clinical practice over the past years. The role of long-term self-management has become paramount. In turn, MI being a patient-centered methodology has been widely used as a strategy of improving patients' attitudes to health and their behaviors and health habits (Lin et al., 2021).

The eight participants took part in the pre-intervention procedures and then in the post-intervention procedures to provide the final data. After implementation of MI sessions, the common increase in patients' compliance levels to diet and fitness recommendations were recorded. Particularly, all eight participants had high scores in terms of completing PDAQ and EARS tools. Moreover, the common glycemic control was also normalized. Importantly, an improvement in lifestyle changes has been recorded exactly after MI sessions. A small portion of patient empowerment is of real clinical importance in context of diabetes, whereas MI can comprehensively improve lifestyles and self-management skills of the patient population receiving care services at the SNF, as evident in this project.

Limitations

Findings from this QI project can be treated as too general and poorly extrapolated because of a small number of participants (eight valid patients only). To efficiently generalize findings from this project, an intervention test on a much bigger scope has to be completed additionally. Poor diversity of the population under the QI project is another limitation. Thus, within the group of patients, six patients were of Hispanic origins, while two others were White. Thus, to increase the representation value, it may be important to include more diverse population group in the QI project.

Conclusion

This QI project managed to provide evidence that lifestyle change is a fundamental factor of enhancing diabetes management and health outcomes. However, it was outlined that behavior changes are quite challenging for people diagnosed with diabetes. This is also a complex problem for clinicians responsible for educating and instructing diabetes patients. Standard and conventional approaches of health education can have gaps and make patients dissatisfied from education and perceptual loss of autonomy and previous life benefits. Defined as a patient-centered method of modifying behaviors, MI was used in the QI project to prove its value. MI has marked as a caring and nonjudgmental methodology, which is supportive for patient's autonomy, inspiring for self-efficacy, and instructional for a patient (specifically with diabetes) toward using own motivational resources.

MI was invented as a beneficial instrument aimed at mobilizing patients' inner motivational resources and forces. In case of diabetes management, MI's value is in potential increase of compliance and adherence levels in terms of following health recommendations. Still, MI cannot be viewed as a universal methodology that fits all clinical contexts. In turn, this QI project gained evidence that MI intervention, based on PDAQ and EARS scores, considerably improved health outcomes and lifestyles of monitored patients in contrast to conventional education programs on giving health recommendations.

Funding

This QI project was in part sponsored by the Paso Del Norte Health Foundation Graduate Fellows Program at The University of Texas at El Paso. The grant was part of the award provided by the program. Concerning the sponsor's role in completing the QI project, the program's representatives were not involved in the QI project's activities and processes, including preparation, design, data gathering, information management, data evaluation and interpretation. The QI project's reviewing, approval, as well as submission to the official publication was also within our field of responsibility.

References

American Diabetes Association. (2022). *It's a great time to get moving*.

https://www.diabetes.org/healthy-living/fitness?&ada_source=WWP211001BW001M001CC&ada_sub_source=bing&auto_login=true&s_src=AAP181101LXXXXM001CC%E2%80%9D&gclid=20908daebb7911b98fd0ef9806c783c4&gclsrc=3p.ds&msclkid=20908daebb7911b98fd0ef9806c783c4&utm_source=bing&utm_medium=cpc&utm_campaign=Awareness_Generic_ADA_%20DiabetesFitness_PH&utm_term=diabetes%20workouts&utm_content=Diabetes-Fitness

Assad, G., Sadegian, M., Lau, R., Xu, Y., Soria-Contreras, D. C., Bell, R. C., & Chan, C.

B. (2015). The Reliability and Validity of the Perceived Dietary Adherence Questionnaire for People with Type 2 Diabetes. *Nutrients*. doi: 10.3390/nu7075231

Harris, S.B., Cheng, A.Y., Davies, M. J., Gerstein, H. C., Green, J.B., & Skolink, K. (2020).

Person-Centered, Outcomes-Driven Treatment: A New Paradigm for Type 2 Diabetes in Primary Care. Retrieved from

https://professional.diabetes.org/sites/professional.diabetes.org/files/media/ada_cvd-renalcompendium_fin-web.pdf

Arbuckle, M. R., Foster, F. P., Talley, R., Covell, N. C., & Essock, S. M. (2020). Applying motivational interviewing strategies to enhance organizational readiness and facilitate implementation efforts. *Quality Management in Healthcare* 29(1), 1-6.

doi:[10.1097/QMH.0000000000000234](https://doi.org/10.1097/QMH.0000000000000234)

Boston University School of Public Health (2019). Behavioral Change Models: The

Transtheoretical Model (Stages of Change). Retrieved from:

<https://sphweb.bumc.bu.edu/otlt/mph-modules/sb/behavioralchangetheories/behavioralchangetheories6.html>

Bukhsh, A., Goh, Bey-Hing., Zimbudzi, E., Lo, C., Zoungas, S. Chan, K., & Khan, T. M. (2020). Type 2 diabetes patients' perspectives, experiences, and barriers toward diabetes – related self-care: A qualitative study from Pakistan. *Frontiers in Endocrinology*, <https://doi.org/10.3389/fendo.2020.534873>

Centers for Disease Control and Prevention. (2021). *Put the brakes on diabetes complications*. <https://www.cdc.gov/diabetes/library/features/prevent-complications.html>

Dendup, T., Feng, X., Clingan, S., & Astell-Burt, T. (2018). Environmental risk factors for developing type 2 diabetes mellitus: A systematic review. *International Journal of Environmental Research and Public Health*, 15(1),78. doi:[10.3390/ijerph15010078](https://doi.org/10.3390/ijerph15010078)

Ekong, G., & Kavookjian, J. (2016). Motivational interviewing and outcomes in adults with type 2 diabetes: A systematic review. *Patient Education and Counseling*, 99(6), 944–952. doi:10.1016/j.pec.2015.11.022

Glanz, K., Rimer, B. K., & Viswanath, K. (2015). *Health behavior theory, research, and practice* (5th ed.). John Wiley & Sons, Inc.

Hartlieb, K. B., Engel, B., Obeso, V., Pedoussaut, M, A., Merlo, L. & Brown, D. R. (2016). Advanced Patient-Centered Communication for Health Behavior Change: Motivational Interviewing Workshops for Medical Learners. *MedED Portal*, 12, 10455. https://doi.org/10.15766/mep_2374-8265.10455

Koenigsberg, M. R., & Corliss, J (2017). *Diabetes self-management: Facilitating lifestyle change*. <https://www.aafp.org/afp/2017/0915/p362.html>

- Kosiborod, M., Gomes, M.B., Nicolucci, A., Pocock, S., Rathmann, W., Shestakova, M.V., Watada, H., Shimomura, I., Chen, H., & Khunti, K. (2018). Vascular complications in patients with type 2 diabetes: Prevalence and associated factors in 38 countries (the DISCOVER study program). *Cardiovascular Diabetology*, *17*, 150.
<https://doi.org/10.1186/s12933-018-0787-8>
- Leung, E., Wongrakpanich, S., & Munshi, M. N (2018). Diabetes management in the elderly. *Diabetes Spectrum*, *31*(3), 245-253. doi:10.2337/ds18-0033
- Li, M., Li, T., Shi, B., & Gao, C.(2014). Impact of motivational interviewing on the quality of life and its related factors in type 2 diabetes mellitus patients with poor long-term glycemic control. *International Journal of Nursing Science*, *1*(3), 250-254.
<https://doi.org/10.1016/j.ijnss.2014.05.022>
- Lin, L., Huang, L., Chang, Y., & Chen, R. (2021). Effectiveness of health coaching in diabetes control and lifestyle improvement: A randomized-controlled trial. *Nutrients*, *13*(11), 3878. doi:10.3390/nu13113878 PMC8621665
- Mifsud, L., Galea, J., Garside, J., Stephenson, J., & Astin, F.(2020). Motivational interviewing to support modifiable risk factor change in individuals at increased risk of cardiovascular disease: A systematic review and meta-analysis. *PLOS One*.
doi:[10.1371/journal.pone.0241193](https://doi.org/10.1371/journal.pone.0241193).
- Miller, W. R., & Rollnick, S. (2012). *Motivational Interviewing*. 3rd Ed. New York: Helping people change. Guilford press
- National Institute of Diabetes and Digestive and Kidney Diseases (2016). *Diabetes diet, eating, & physical activity*. <https://www.niddk.nih.gov/health-information/diabetes/overview/diet-eating-physical-activity>

- Newman-Beinart, N. A., Norton, S., Dowling, D., Gavriloff, D., Vari, C., Weinman, J. A & Godfery, E. L (2017). The development and initial psychometric evaluation of a measure assessing adherence to prescribed exercise: The Exercise Adherence Rating Scale (EARS). *Physiotherapy*, 103(2), 180-185. doi:10.1016/j.physio.2016.11.001
- Pixorize. (2022). *Social cognitive theory of personality*. <https://pixorize.com/view/5130>
- Selcuk-Tosun, A., & Zincir, H (2019). The effect on health outcomes of post-intervention transtheoretical model-based motivational interview in adults with type 2 diabetes mellitus: Follow-up a cross-sectional study. *Journal of Caring Sciences*, 8(1), 1-8. doi:10.15171/jcs.2019.001
- Steffen, P. L., Mendonça, C. S., Meyer, E., & Faustino-Silva, D. D. (2021). Motivational interviewing in the management of type 2 diabetes mellitus and arterial hypertension in primary health care: An RCT. *American Journal of Preventive Medicine*, 60(5), e203–e212. doi:10.1016/j.amepre.2020.12.015
- Thepwongsa, I., Muthukumar, R., & Kessomboon. P. (2017). Motivational interviewing by general practitioners for Type 2 diabetes patients: A systematic review. *Family Practice*, 34(4), 376-383. doi:10.1093/fampra/cmz045
- Thojampa, S., & Sarnkhaowkhom, C. (2019). The social cognitive theory with diabetes: discussion. *International Journal of Caring Sciences*, 12(2), 1251-1254. http://www.internationaljournalofcaringsciences.org/docs/76_1-thojampa_special_12_2.pdf
- Thomas, T. W., Kattan, W., & Terry, A. (2018). Health coaching and motivational interventions for diabetes and hypertension care. doi:10.23937/2469-5823/1510113

World Health Organization. (2021). *Diabetes*. <https://www.who.int/news-room/factsheets/detail/diabetes>