

Spring 4-10-2019

Diabetes Shared Medical Appointment: An Evidence-Based Innovation Project

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DIABETES SHARED MEDICAL APPOINTMENT: AN EVIDENCE-BASED INNOVATION
PROJECT

by

MOHAMED BOJANG

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Nursing Practice
School of Nursing

Sandra Petersen, DNP, Committee Chair

College of Nursing and Health Sciences

The University of Texas at Tyler
May 2019


The University of Texas at Tyler
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Dedication

I dedicate this EPIP to my loving family, who sacrificed a lot and provided unconditional support to me throughout this journey. To my wife, Mama, and my children, Hawa, Khadija and Ismael, you have given up a lot to see me pursue my educational goals. To my parents, Omar and Nara, who taught me that with hard work, determination, persistence, nothing is beyond reach.

Acknowledgment

I want to extend my sincere thanks to Dr. Sandra Petersen, DNP, APRN, GNP/FNP-BC, PMHNP, my faculty mentor, DNP committee member, and director for her tremendous support and guidance during the entire program. I also want to thank DNP committee member Dr. Marcie Lusk, DNP, APRN, FNP-C and the entire UT Tyler DNP faculty who all contributed to the actualization of this EPIP. I want to thank Dr. Ellen Fineout-Overholt, PhD, RN, FNAP, FAAN, assistant director of the DNP program for her contribution to this project, and expertise in EBP. I want to thank Dr. Nora Gimpel MD, my industry mentor for her expertise in Shared Medical Appointment, and her guidance during the implementation of this project. Lastly, I want to thank Lashanta Gipson, RN who worked with me side by side during the implementation. My sincere thanks to you all for your support in making this EPIP a successful reality.

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Abstract

DIABETES SHARED MEDICAL APPOINTMENT: AN EVIDENCE-BASED INNOVATION PROJECT

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May 2019

The purpose of the EPIP project is to address uncontrolled diabetes by implementing an evidence-based shared medical appointment (SMA) intervention which based on the body of the evidence will help improve diabetes outcomes. A pilot implementation and retrospective chart review were conducted. Data was collected on outcome indicators such as blood pressure, lipid values, body mass index, A1C, and knowledge. The results of a pilot SMA implementation revealed that patients who participated in the weekly SMA saw an improvement in post-mean values compared to pre-mean values. Mean A1c dropped to 7.0% from 7.11%; systolic blood pressure improved to 125 mmHg from 128 mmHg; diastolic blood pressure dropped to 77 mmHg from 84 mmHg; body mass index dropped to 33.63 kg/m² from 35.44 kg/m²; and, knowledge increased from 52% to 93%. Retrospective chart review findings revealed that the number of patients who were at goal A1C increased from 25% to 38% post intervention. The number of patients at goal for hypertension increased from 65% to 88%, and mean HbA1c dropped from 8.0% to 7.5%. These findings are consistent with those represented in the body of the evidence, suggesting SMA as an effective and feasible intervention to helping diabetes patients to meet glycemic goals and improving diabetes outcomes. Therefore, policy and culture change are

warranted to adopt and sustain SMA as the standard of diabetes care. New clinic policies, SMA clinic mentors, and utilization of conceptual models will promote sustainability of SMA.

Chapter 1

Development of Clinical Question and Problem Identification (EBP Steps 0, 1, & 2)

Background and Significance

Diabetes is currently affecting 422 million people globally; this is a rise of 314 million people since 1980 (World Health Organization (WHO), 2018). The global prevalence of diabetes among adults over the age of 18 years has risen from 4.7% in 1980 to 8.5% in 2014 (WHO, 2018). The prevalence has been rising more rapidly in middle and low-income countries (WHO, 2018). In the United States (US), diabetes is currently affecting 30.3 million Americans or 9.4% of the US population; out of this number, 23.1 million have been diagnosed and 7.2 million have the disease but are yet to be diagnosed (Centers for Disease Control and Prevention (CDC), 2017).

Some of the common and serious complications of diabetes include cardiovascular and chronic kidney diseases. In 2014, a total of 7.2 million hospital discharges with diabetes as the diagnosis were reported in the US; out of these number, 1.5 million discharges were due to major cardiovascular events with 400,000 reported as ischemic heart disease, and 251,000 reported as stroke (CDC, 2017). Moreover, in 2014, 52,159 people developed end-stage renal disease with diabetes as the primary cause (CDC, 2017). Diabetes not only affects patients physically, but also economically affects individuals and taxpayers as whole. In 2017, the total cost of diabetes in the United States (US) was estimated to be \$327 billion, with \$237 billion related to direct medical costs, and \$90 billion related to reduce productivity (American Diabetes Association (ADA), 2018). Average medical expenditures among people with diabetes is 2.3 times higher than people without diabetes (ADA, 2018). Furthermore, according to CDC (2017), 84.1 million people age 18 years and older, or 33.9% of US population have prediabetes.

Prediabetes is a condition whereby blood sugar levels are higher than normal but are less than the values required to diagnose diabetes. According to ADA (2018), normal Glycosylated hemoglobin A1c (HbA1c) is less than 5.7%, and for prediabetes an acceptable A1C is between 5.7% and 6.4%. For a patient to be diagnosed with diabetes, their A1C must be 6.5% or greater. Having prediabetes increasingly puts an individual at risk for developing type II diabetes, especially in the presence of strong family history, lack of physical activity, and poor diet. Adoption of meaningful life style modifications such as losing weight, moderate intensity physical activity and healthy diet, can reduce the risk of prediabetes progressing to full diabetes by as much as 58 % (CDC, 2017).

In my previous practice, approximately 90% of my patients have one or two diagnoses of mental illness. Thus, an additional diagnosis of diabetes becomes very challenging for both the patient and the provider because certain antipsychotic drugs can exacerbate blood sugars. These patients also because of their multiple co-morbidities have difficulties following through with their follow up appointments and recommended life style modification. Approximately 15% of my patients at the time have type II diabetes. The average HbA1c in the clinic was 7.4%, and approximately 20% of the patients who have diabetes are either overweight or obese. The average body mass index (BMI) at the clinic was 36, while normal BMI is below 25kg/m².

There is a clear need for better management of diabetes within this patient population. Patient education and their involvement in care is an important part of the overall management of diabetes to prevent complications. One of the emerging and innovative ways to accomplish this is through shared medical appointment (SMA), also known as group visits. During SMA visit, a medical provider attends to each patient for 3-10 minutes in a group setting, eliciting conversation and discussion of patient's medical problems with the group for a longer period so

that assessment becomes part of the education, and patient to patient interaction becomes a learning opportunity. A discussion among patients elicits positive health behavior change including: medication management, education about diabetes, self-management strategies including diet, exercise, and losing weight (Heyworth et al., 2014). Constructive patient interactions are encouraged during SMA sessions. Interactions such as patients sharing success stories with each other to motivate others who are not doing well in their management are encouraged. Efficient and effective peer support is central to group sessions (Edelman et al., 2014). SMA creates a supportive group environment where ideas and solutions are shared by patients. The use of group as a treatment modality is rooted from social learning theory that states that people learn new information from one another by watching other people and imitating the behavior of others (Caballero, 2015).

In contrast, individual medical appointment (IMA) is when a patient sees a provider alone in an exam room and the assessment and education takes place at that time in a typically short visit. There is usually no patient to patient interaction and discussion of experiences (Watts et al., 2015). The question now is which of these encounter modalities works best for patients with diabetes.

PICOT Question

Therefore, the clinical question that arises is “In diabetic patients(**P**), how does shared medical appointments(**I**) compared with individual medical appointments(**C**) affect hemoglobin A1c results and BMI(**O**) in 3 months(**T**)?”

Systematic Search

To answer the PICOT question, a systematic search was conducted within the following databases: Cumulative Index Nursing and Allied Health Literature (CINAHL), PubMed, and

Cochrane database for systematic reviews (CDSR). The keywords from the PICOT question were identified as “shared medical appointment,” “diabetes,” “hemoglobin A1c,” “individual appointments” “mental health” and “body mass index”. Additionally, “Group visits” and “usual care” were keywords identified during the searches. The search to find answers to clinical question began with CINAHL. The individual keywords were searched initially, and the results were saved in search history. Then different combinations of the keywords searched, yielding 19 citations. PubMed was searched with the same keywords and search strategy. Individual keywords were searched initially and added to search history. Different hits obtained with this strategy, then different keyword combinations were used, yielding 11 final citations. Lastly, Cochrane Database for Systematic reviews (CDSR) was searched with the same keywords and search strategy. Keyword combinations were used as in CINAHL and PubMed, first “group visits” with “hemoglobin A1C” and the yield was 6 citations. Then “shared medical appointments” and “diabetes” were searched, which yielded 12 citations.

The combined search results from the 3 data bases were reviewed for title. During this process, out of the 42 total articles that were reviewed, 22 articles were excluded because either the title was not relevant to the topic or SMA intervention was not done in diabetes. A total of 20 articles were selected for abstract review, and 3 additional articles were excluded after the review because of duplication. A total of 17 studies were selected for full review. Two of the 17 studies were only study protocols without the results and were therefore excluded. This left a total of 15 studies for critical appraisal (See appendix A, figure 1.0)

Selection of Evidence Based Practice (EBP) Model

The EBP model that guided the intervention was the *Model for Evidence Based Practice Change*. This model is a revised version of the model by Rosswurm and Larrabee (1999). The

revised steps and the schematic diagram were prompted by Larrabee's experience with educating and guiding nurses in the application of the original model since 1999 at West Virginia University Hospitals (See appendix F, figure 1.1) (Dang et al., 2015).

Chapter 2

Critical Appraisal of Evidence, Model of EBP & EPIP Plan: Part 1(EBP Process Steps 1, 2, 3, & 4)

Body of the Evidence

To find answers to the proposed clinical question, 15 quantitative studies were identified and reviewed using rapid critical appraisal. The studies used various methodologies. After the general appraisal overview (GAO) and rapid critical analysis (RCA), it was determined that all the 15 studies reviewed will be relevant to the evidence synthesis. After identifying the keeper studies, the information from GAO forms and RCA checklists was transferred to an evaluation table to make appraisal easier across the studies (See appendix B, table A).

Hierarchy of evidence provides guidance during evidence review to determine which evidence is likely to provide the most reliable answers to the clinical question. Out of the 15 studies reviewed, two were level I evidence, five were level II evidence, six were level III evidence, one was level IV evidence, none were level VI evidence, and one was level VII evidence (See appendix C, table B). Level I evidence is comprised of systematic review of randomized control trials, and they are the strongest evidence (Melnyk, Morrison-Beedy, & Cole, 2015).

Two out of the 15 studies reviewed were level I evidence. Edelman et al. (2014) and Housden et al. (2013) conducted systematic reviews to evaluate the effectiveness of the SMA in reducing HbA1c levels in patients with poor blood sugar control. Both studies included in their review randomized control trial (RCT) and observational studies. The studies included in Edelman et al. (2014) study were 13 RCT and four observational studies, with a total of 17 studies reviewed (See appendix B, table A). Housden et al. (2013) included 26 studies in their

review, out of which 13 studies were RCT (Appendix B, table A). Out of the 13 RCTs which both studies reviewed, 10 were duplicates and the other three studies were different. One study utilized meta-analysis, while the other study was systematic review only. Both studies measured hemoglobin A1c as an outcome, and the results improved in both studies among those who attended SMA. Edelman et al. (2014) also measured lipid values and blood pressure, which all improved from baseline (See Appendix C, Table C). Both studies concluded that SMA was effective in reducing hemoglobin A1c levels. Moreover, Edelman et al. (2014) additionally concluded that SMA was effective in reducing lipid values and blood pressure as well. Therefore, since level I evidence is considered the highest level of evidence in evidence hierarchy, and based on the conclusion of the two studies, SMA should be recommend as the standard of care in managing diabetic patients to improve outcomes.

Randomized control trials are considered level II evidence and are the strongest design to test for cause and effect. They usually provide reliable evidence that can be used to make decisions regarding EBP (Melynck, Morrison-Beedy, & Cole, 2015). Out of the five RCTs reviewed, one conducted SMA every month, two studies monthly, and two studies four times weekly followed by five monthly SMA booster sessions. The duration of the studies varied, two studies conducted SMA lasting 1.5 hours per session, two lasted for two hours per session and one did not mention the duration of the SMA per session. The total duration of the SMA was as follows: one lasted for 12 months, two lasted for six months, one lasted for three months and one lasted for 15 months (See Appendix C, Table D). The curriculum of the SMA education was very similar across the studies. Four out of the five RCTs reviewed included medication management, all the five studies included nutrition, three included exercises, three included behavior counseling, four included diabetes overviews, and three included foot care (See

Appendix C, Table E). For SMA logistics, five out of five studies included medical management, group support, Diabetes Self-Management Education (DSME), a nurse, and a medical provider. Two studies included 4-6 patients per group session, one study included 6-8 patients per group sessions, and one study included 20-25 patients. Out of five studies, two included dietician, one included exercise trainer, and one included counselor (See Appendix C, table F). For the outcome measures across the studies, four out of the five studies measured hemoglobin A1c and the values decreased compared to baseline. Three studies measured lipid values and all of them indicated improved values. Five studies measured blood pressure and all five reported decrease in blood pressure. One study measured weight, and reported decrease compared to baseline value (See appendix C, table C). The studies concluded that SMA was effective in improving hemoglobin A1c values, blood pressure, lipid values, and weight. These findings agree with higher level 1 studies. Therefore, SMA should be recommend as the standard of care to improve diabetes outcomes

Quasi-experimental designs are considered as Level III evidence and are experimental studies without randomization to the intervention and control groups. This kind of design is commonly used when randomization is not feasible. These designs are weaker than RCT (O' Mathuna & Fineout-Overholt, 2015). Out of the six level III studies that were reviewed, five measured hemoglobin A1c, three measured lipid values, three measured blood pressure, three measured weight, and one measured knowledge as the outcomes of the intervention. Out of all the five studies that measured hemoglobin A1c as the outcome of the intervention, the results improved in each one of them compared to baseline values. The three out of the six studies that measured lipid values, the results improved in two studies, and values reduced in one study, but it was not statistically significant. The three out of the six studies that measured blood pressure

reported improvement in the numbers. Out of the six studies, three that measured weight reported a reduction, but one study reported none statistically significant reduction. Lastly, one study measured knowledge, and the results indicated increased in the outcome (See appendix C, table C). Out of the six studies reviewed, one conducted SMA monthly, two weekly, one biweekly, and one weekly four times, then two bi monthly booster SMA sessions. Out of the six studies, two studies lasted for two hours per SMA session, two lasted for three hours, and one lasted for 1.5 hours. For the total duration of the studies, one lasted for a total of three months, one lasted for three weeks, one lasted for four weeks, one lasted for eight weeks, and one lasted for five months (See appendix C, table D). For the SMA education curriculum, four out of the six studies included medication management, four included nutrition, four included exercise, four included behavioral modification teaching, four included diabetes foot care, and two included diabetes overview education (See appendix C, table E). For SMA logistics across the studies, six out of six studies reviewed incorporated medical management in the SMA, six out six included peer support, six out six included DSME, one study utilized 4-20 patients per group session, 1 utilized 11 patients per group, and 1 utilized 4-6 patients per group, six out of six studies included a medical provider, three out six studies included a nurse, two included a dietician, and 1 included a counselor (See appendix C, table F). The studies concluded that SMA was effective in improving hemoglobin A1C values, blood pressure, lipid values and increased patient knowledge. This conclusion agrees with the findings of higher level 1 and II studies. Therefore, SMA should be recommended as the standard of the care in managing diabetes patients.

Cohort designs are considered level IV evidence. In this study design, the researchers follow a group of people who are exposed to a condition to see if they will develop an outcome of interest. The researchers follow patients for a long time, and as a result the study is usually

considered as a longitudinal study (Melnyk, Morrions-Beedy, & Cole, 2015). This was the only cohort study out of the 15 studies reviewed. The study measured hemoglobin A1c as the only outcome and the results improved (See appendix C, table C). The SMA duration per session was 1.5 hours and the total duration of the intervention lasted for 12 months (See appendix C, table D). The study included in the SMA education plan includes medication management, nutrition, exercise, behavior modification, and diabetes overview (See appendix C, table E). The study logistics included medical management of patients during the visit, peer support, DSME, the study utilized 8-15 patients per session, the study included a nurse, a medical provider, and a health psychologist (See appendix C, table F). The study concluded that SMA was effective in improving hemoglobin A1c values. This level IV study findings agrees with higher level I, II, and III studies. Therefore, SMA should be recommended as the standard of care in managing diabetes patients.

Finally, Ridge (2012) conducted a literature review regarding SMA. The review included different research designs, including randomized control trials and non- randomized control trials. Literature reviews are considered as lower tier evidence, and therefore, their findings cannot be solely used to base practice change. However, the results of this review concluded that SMA can be effective in improving hemoglobin A1c, knowledge, and quality of life in patients with diabetes, which agrees with higher tier levels of evidence. (See appendix B, table A).

Based on the evidence from the studies, diabetes self-management skill education must be included in any SMA intervention. This topic was common across all the studies reviewed (See appendix C, table E). This is an important component of the SMA intervention. Studies have found that patients are likely to participate in their own care if they have a better

understanding of their disease process and self-care measures (Caballero, 2015). Therefore, diabetes self-management should be integrated in all SMA interventions.

After an exhaustive and systematic search of the literature to help gather evidence to answer the clinical question, an evaluation table was created from which a synthesis table was also created outlining the current state of the evidence regarding SMA. Creation of the synthesis table helped bring clarity to the current state of the evidence and its practice worth. After a thorough review of the synthesis table, it is now very clear that SMA is effective in reducing hemoglobin A1c and helps patients meet their hemoglobin A1c goal of less than 7. Out of the 15 quantitative studies that were reviewed, 13 measured hemoglobin A1c as the primary outcome of the intervention, and all 13 studies found that SMA was effective in reducing A1c (See appendix C, table C). The conclusions from several studies comparing IMA to SMA supported that SMA is more effective.

Recommendation from Evidence Synthesis

SMA should be recommended as the standard of care for diabetes management, and each SMA session should include: DSME, medical management, and peer support as recommended in the body of the evidence.

Ethics and EBP

The ethics of EBP implementation involves planning a protocol that is in conformity with all the ethical standards. During the project protocol planning, all the ethical standards were observed, and all the interventions planned in way that contributed to the improvement of patient care and not put patients at risk. Unlike research methods, there is no inclusion or exclusion criteria for EBP implementation. It is unethical to include some patients in receiving best practice while excluding others. Best practices should be offered to all patients and it is up to the

patients to either participate or refused. If patients refused, they should not be coerced or forced to participate thereby violating their autonomy. SMA intervention was offered to all the diabetic patients in the clinic. The planning of the project involved designing of a logic model (See appendix H, figure 1.3). This planning included outlining the activities of the project such as process makers.

Clinicians should always provide care to their patients using evidence that has been vigorously vetted. Using evidence in clinical practice that is unvetted, is not only unethical, but it will not produce desired results. EBP implementation projects are based on research studies that have been already completed and risks associated with the intervention already known. Because of this, patients are not exposed to new risks and informed consent is not usually required. This, however, does not mean that patients will not be exposed to any risks. Data collection from patients for evaluation of the intervention effectiveness can put patients at risk for privacy violation. (O'Mathunna, 2011). The practitioner must make sure that patient data that are collected are safeguarded to prevent violations of patient right to privacy. Some of the ways this can be accomplished is by putting the data in a password protected computer or also deidentifying patient names. All patient information that was collected was safeguarded and protected by deidentifying patient names and putting the data in a password protected computer. Patients were also protected from any harm that could be cause by the implementation.

Chapter 3

Project Design and Methodology (EBP Process Steps 3-4)

Project Design and Methodology Overview

Staff education was completed on 1/19/18, this was followed by Institutional Review Board (IRB) review of the project to determine if it meets the requirement for IRB oversight. This process was initiated in January 2018 and was completed on March 8th, 2018 with exemption and approval of the project to move forward by IRB. SMA sessions started on 3/23/18 and continued weekly four times, then two biweekly booster SMA sessions. Data analysis followed the booster SMA sessions, and this lasted through June 2018. Finally, dissemination of the project results began in January 2019 through July 2019, and sustainability plan will also continue through July 2019 (See Gantt chart in appendix L, table L)

Resources Required for Project/Cost

Resources are a critical part of the success of any project. The following resources were noted as critical to the SMA implementation: Office space, staff, computer with internet connection, furniture, device for indirect non-invasive mean arterial pressure (dinamap), electronic scale, educational materials such as flyers, booklets and posters, stethoscope, budget, HbA1c machine, monofilament, microalbumin machine, microalbumin strip, other medical equipment such as ophthalmoscope and otoscope office supplies such as printers, papers, stapler, and scanners. Staff payroll was also central to the success of the project. It was estimated that 22 total SMA hours would be required to implement the project. Nurse practitioner, Registered Nurse and Certified Medical Assistant hourly pay was calculated and added to the total budget of the project. The total amount including staff pay roll and resources cost was \$22,268.93 (See appendix K, table K).

Fully Operationalized Project (Month by month-Week by week Project Plan)

On November 2017, the University of Texas Southwestern medical center (UTSW) Advance Practice Department IRB application form was reviewed and completed.

On December 2017, a conditional approval letter from Advance Practice Department at UTSW to move forward with the project pending IRB review for exemption was received. Project protocol was finalized during this month as well. All the diabetic patients were notified regarding the upcoming SMA implementation in the clinic. All the stakeholders and industry mentor were notified about the date of the implementation.

January 19th, 2018/Week 0 pre-implementation- On January 19th, the implementation team met to receive in-service training on the project protocol. We discussed the logistics of the project. All the resources were reviewed, including the room where the intervention took place. The clinic manager was not able to attend this meeting, but she was briefed on the project implementation on a different date. The process outcome of staff education on project protocol was completed on this day by the medical provider in the clinic. The entire project protocol was discussed using demonstration technique. We went through the project protocol week by week to rehearsed what is going to happen on each day of the implementation. We confirmed that patients have been informed about the upcoming SMA, and a choice was given to them to schedule appointments.

March 23rd, 2018/Week 1 implementation- First week of implementation, baseline data was collected on this day. The following occurred during the first week of implementation:

- Patient registration by the clinic medical assistant was carried out at the receptionist desk using EPIC EMR once patients walked into the clinic. Patients were escorted to the group room where vital signs, including weight were

collected by the clinic Registered Nurse (RN) and documented in the EPIC Electronic Medical Records (EMR) for each patient. Baseline data which included: HbA1c, BMI, blood pressure (BP), and lipid values, were queried from EPIC and values were transferred to Excel sheet by the nurse practitioner (NP). These values served as the baseline data. Diabetes knowledge test was also administered by the NP using University of Michigan Diabetes Research and Training Center Diabetes Knowledge Test in the group room. The scores of this initial test served as the baseline data.

- NP reviewed patient charts in provider office by going through each participant's chart while patients were being registered and vital signs taken.
- Once all the patients were registered and seated in the group room, the appointment started with icebreaker session and introduction. The staff introduced themselves, and the NP asked each patient to introduce themselves to the group. Patients were also reminded of the Health Insurance Portability and Accountability Act (HIPPA) confidentiality rules by NP not to discuss any patient information outside of the meeting (See appendix E, table H).
- NP sequentially attends to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the laboratory results including hemoglobin A1c and medication management with the participation of the group as peer support. Patients progress were discussed verbally in the group. Once every patient was seen, this marked the end of the appointment component of the visit. This segment lasted for about 5-10 minutes per patient

- After each patient's open appointment in the group, the facilitators (RN and NP) conducted patient education with focus on diabetes self-management strategies, using various methods including, pictures, handouts, cards and blackboard. The curriculum included: diabetes overview (basics) including pathophysiology, acceptable laboratory values for A1c, hypoglycemia, glucose monitoring and complications; medication management, nutrition management, exercise, foot care and behavioral modification (See appendix C, Table E) Week 1 education was focused on diabetes overview: pathophysiology, and acceptable values for HbA1c. This education was conducted by NP in the group room using American Diabetes Association (ADA) professional resource handouts on HbA1c and diabetes pathophysiology. The mode of delivery was discussion/demonstration/handouts. Some of the following questions were addressed during educational sessions: What is diabetes? What causes it? What is HbA1c? what are acceptable values? When is HbA1c measured? How is HbA1c different from serum blood glucose? And setting goals and making action plan. These are some of the questions and topics that was addressed in the educational session. This session lasted for 60 minutes (See appendix E, table H).
- After the presentation, the floor was open for open discussion among patients with the provider as the facilitator. Patients asked questions, and they were also encouraged to share their success stories with their peers in the group. Patients who met their glycemic goals were praised and were encouraged to lead the discussion and educate those who were struggling with meeting their glycemic targets. This session lasted for 30 minutes.

- The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before next meeting by writing the goal down on a paper. The session was adjourned until next week.

March 29th, 2018/Week 2-

- Patient registration by the clinic medical assistant was carried out at the receptionist desk using EPIC EMR once patients walked into the clinic. Once that was completed, patients were escorted to the group room where vital signs, including weight were collected by the clinic RN and documented in the EPIC EMR for each patient.
- NP reviewed patient charts in the provider office by going through each participant's chart while patients were being registered and their vital signs taken.
- Once all the patients were registered and seated in the group room, the appointment started with introduction. Staff introduced themselves, and the NP asked each patient to introduce themselves to the group. Patients were reminded of the HIPPA confidentiality rules by the NP (See appendix E, table H).
- NP then sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the laboratory results including hemoglobin A1c and medication management with the participation of the group as peer support. While the NP was attending to each patient, the peers supported the patient by sharing similar stories. Patient's progress was discussed verbally in the group. Once every patient was seen, this marked the end of the appointment component of the visit. This lasted for about 5-10 minutes per patient

- After each patient's open appointment in the group, the facilitators (RN and NP) conducted patient education with focus on diabetes self-management strategies, using various methods including pictures, and handouts. Week 2 education was focused on diabetes overview. The discussion included hypoglycemia and glucose monitoring. The education was conducted by the NP in the group room using ADA professional resource handouts on hypoglycemia and glucose monitoring. Some of the following questions were addressed during educational sessions: defining what is hypoglycemia? What can you do to avoid it? What are the signs and symptoms of hypoglycemia? What are the complications of hypoglycemia? What types of food can you eat to avoid hypoglycemia? The mode of delivery was discussion/demonstration/handout. Setting goals and making action plans was completed by each patient at the end of the SMA session. The session lasted for 60 minutes.
- After the presentation, the floor was opened for discussion among patients with NP as the facilitator. Patients asked questions, and they were also encouraged to share their success stories with their peers in the group. Patients who are doing well with meeting their glycemic goal were praised and were encouraged to lead the discussion and educate those who did not meet their glycemic targets. This session lasted for 30 minutes.
- The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before the next meeting by writing their goals down on a paper. The session was adjourned until the next meeting.

April 6th, 2018/Week 3

- Patient registration by the clinic medical assistant was carried out at the receptionist desk using EPIC EMR once patients walked into the clinic. Once that was completed, patients were escorted to the group room where Vital signs, including weight was collected by the clinic RN and documented in the EPIC EMR for each patient.
- NP reviewed patient charts in the provider office by going through each participant's chart while patients were being registered and their vital signs taken.
- Once all the patients were registered and seated in the group room, the appointment started with introduction. The staff introduced themselves, and the NP asked each patient to introduce themselves to the group. Patients were also reminded of the HIPPA confidentiality rules by the NP.
- NP then sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1c, and medication management with the participation of the group as peer support. While the NP was attending to each patient, peers shared their experience with similar situation. Patient's progress was discussed verbally in the group. Once every patient was seen, this marked the end of the appointment component of the visit. This lasted for about 5-10 minutes per patient
- After each patient's open appointment in the group, the facilitators (RN and NP) conducted patient education with focus on diabetes self-management strategies, using various methods including, pictures, and handouts. Week 3 education was

focused on diabetes complications and medication management. This education was conducted by the NP in the group room using ADA professional resource handouts on hypoglycemia and glucose monitoring. We discussed oral diabetes medications and the importance of adherence. We discussed which medications are insulin sensitizers, and those that can cause hypoglycemia. We also discussed insulin including self-titration using sliding scale, appropriate injection sites, and potential for hypoglycemia. We discussed diabetes complications which included macrovascular complications (coronary artery disease, stroke, and peripheral artery disease) and microvascular complications (retinopathy, nephropathy and neuropathy). The mode of delivery was discussion/demonstration/handout. Setting goals and making action plans was completed by each patient at the end of the SMA session. This session lasted for 60 minutes.

- After the presentation, the floor was opened for discussion among patients with the NP as the facilitator. Patients asked questions, and they were also encouraged to share their success stories with their peers in the group. Patients who did well with meeting their glycemic goals were praised and were encouraged to lead the discussion and educate those who did not meet their glycemic targets. This session lasted for 30 minutes.
- The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before the next meeting by writing their goals down on a paper. The session was adjourned until the next meeting.

April 13th, 2018/Week 4

- Patient registration by the clinic medical assistant was carried out at the

receptionist desk using EPIC EMR once patients walk into the clinic. Vital signs, including weight were collected by the clinic RN and documented in the EPIC EMR for each patient.

- NP reviewed patient charts in the provider office by going through each participant's chart while patients were being registered and their vital signs taken
- Once all the patients were registered and seated in the group room, the appointment started with introduction. Patients were also reminded of the HIPPA confidentiality rules by the NP
- The NP then sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1c and medication management with the participation of the group as peer support. While the NP was attending to each patient, peers shared their experience with similar situation. Patient's progress was discussed verbally in the group. Once every patient was seen, this marked the end of the appointment component of the visit. This lasted for about 5-10 minutes per patient
- After each patient's open appointment in the group, the facilitators (RN and NP) conducted patient education with focus on diabetes self-management strategies, using various methods including pictures and handouts. Week 4 education was focused on nutrition management and exercise. (See appendix C, table E). This education was conducted by the NP in the group room using ADA professional resource handouts on nutrition management and exercise. We discussed about carbohydrate counting, nutrition labels, "my food plate", eating out, meal

planning, heart healthy eating, food substitution, low fat diet, and DASH diet. We also talked about types of exercise, barriers to exercises, adopting an exercise regimen, and exercise and blood sugar. The mode of delivery was discussion/demonstration/handout. This session lasted for 60 minutes.

- After the presentation, the floor was opened for discussion among patients with the NP as the facilitator. Patients who are doing well with meeting their glycemic goals were praised and were encouraged to lead the discussion and educate those who are struggling with meeting their glycemic targets. This session lasted for 30 minutes.
- The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before next meeting by writing the goals down on a paper. The session was adjourned until next 4 weeks

April 20th/Week 5-

- No SMA was conducted this week. Patients worked on their goals.
- Individual medical appointments continued in the clinic this week.
- NP reviewed process outcomes to make sure everything is on target.
- NP prepared for the SMA booster session and reviewed the education materials for that session.

April 27th, 2018/Week 6 SMA booster session

- Project milestone was reviewed on 4/30/18 by the NP
- Evaluation of number of patients still attending the SMA sessions was reviewed by NP.
- Patient registration by the clinic medical assistant was carried out at the

receptionist desk using EPIC EMR. Once was completed, patients were escorted to the group room where vital signs, including weight were collected by the clinic RN and documented in the EPIC EMR for each patient.

- NP reviewed patient charts in the provider office by going through each participant chart, while patients were being registered and their vital signs taken
- Once all the patients were registered and seated in the group room, the appointment started with introduction. Patients were reminded of the HIPPA confidentiality rules by the NP.
- The NP then sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1c and medication management with the participation of the group as peer support. While the NP was attending to each patient, peers shared similar stories. Patients progress were discussed verbally in the group. Once every patient was seen, this marked the end of the appointment component of the visit. This lasted for about 5-10 minutes per patient
- After each patient's open appointment in the group, the facilitators (RN and NP) conducted patient education with focus on diabetes self-management strategies, using various methods including pictures and handouts. Week 6 education was focused on foot care. (See appendix C, table E) This education was conducted by the clinic RN in the group room using ADA professional resource handouts on diabetic foot care. Proper foot care for diabetics, diabetes foot ulcers, and when to visit podiatrist was discussed. The mode of delivery was

discussion/demonstration/handout. Setting goals and making action plan was completed by each patient at the end of the SMA session. This session lasted for 60 minutes.

- After the presentation, the floor was opened for discussion among patients with the NP as the facilitator. Patients asked questions, and they were encouraged to share their success stories with their peers in the group. Patients who are doing well with meeting their glycemic goal were praised and were encouraged to lead the discussion and educate those who are struggling with meeting their glycemic targets. This session lasted for 30 minutes.
- The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before next meeting by writing their goals down on a paper. The session was adjourned until next 4 weeks

May 4th/Week 7-

- No SMA conducted in the clinic this week, patients worked on their individual goals.
- NP was available to answer any patient questions in the clinic.
- Individual medical appointments continued in the clinic.

May 11th, 2018/ Week 8

- Patient registration by the clinic medical assistant was carried out at the receptionist desk using EPIC EMR once patients walked into the clinic. Once that was completed, patients were escorted to the group room where vital signs were collected by the clinic RN and documented in the EPIC EMR for each patient. Weights were obtained, and BMI re-calculated again. Hemoglobin A1C was also

obtained on this day to compare the data to baseline information. Quarterly lipid values were ordered for patients who do not have a recent value in EPIC as completion outcome data. Blood pressure was obtained on this day to serve as completion outcome data. All these data were transferred to an Excel sheet for data analysis.

- NP reviewed patient charts in the provider office by going through each participant's chart, while patients were being registered and their vital signs taken
- Once all the patients were registered and seated in the group room, the appointment started with introduction. Patients were also reminded of the HIPPA confidentiality rules by the NP
- The NP then sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1c and medication management with the participation of the group as peer support. While the NP is attending to each patient, the peers shared similar experiences. Patients progress were discussed verbally in the group. Once every patient was seen, this marked the end of the appointment component of the visit. This lasted for about 5-10 minutes per patient
- After each patient's open appointment in the group, the facilitators (RN and NP) conducted patient education with focus on diabetes self-management strategies, using various methods including pictures and handouts. Week 8 education focused on behavioral modification (See appendix C, table E) This education was conducted by the NP in the group room using motivational interviewing

techniques. Topics included readiness to change. The mode of delivery was discussion/demonstration/handout. This session lasted for 60 minutes.

- After the presentation, the floor was opened for discussion among patients with the NP as the facilitator. Patients asked questions, and they were also encouraged to share their success stories with their peers in the group. Patients who were doing well with meeting their glycemic goal were praised and were encouraged to lead the discussion and educate those who were struggling with meeting their glycemic targets. This session will last for 30 minutes.
- The SMA session ended on this day with re-administration of knowledge test that was administered on the first day of the implementation using University of Michigan Diabetes Research Training Center Diabetes Knowledge Test. The results were compiled and enter Excel sheet for analysis.
- This session concluded the SMA sessions. All the patients were thanked for their attendance.

Process Indicators with Lessons Learned, Barriers and Solutions

There were several measures that were obtained during and after the intervention. The process outcome measures included: project protocol training, staff education, and data collection. These are processes that were required to achieve the project impact outcomes. Staff training, and education was measured by the rate of completion. The completion outcomes of SMA such as hemoglobin A1c, blood pressure, lipid values, knowledge, and BMI were measured at the end of the intervention (See Appendix I, table I) Other important outcomes such as financial impacts were measured as well as cost savings. The baseline HbA1c, blood pressure, lipid values, knowledge, and BMI were obtained from each participant before the intervention,

and these values were obtained after the intervention again. The financial impacts were measured in terms of A1c reductions and prevention of potential complications.

Model for Evidence-Based Practice Change/EBP Process

Step 1 of *The Model for Evidence-Based Practice Change* (MEBPC) (See Appendix F, figure 1.1) was to assess the need for change in practice. In following the EBP process, the first step was to identify a clinical issue. Current national guidelines on diabetes recommend HbA1c goal of below 7% for adults in general and below 8% for the geriatric population. In my previous clinic, average hemoglobin A1c was 7.4%. National guidelines define normal BMI as less than 25kg/m² and obese as BMI greater than 30kg/m²; my previous clinic average BMI is 36kg/m². In comparing the internal and external data, it is evident that improvement is needed to meet the national standards for hemoglobin A1c and BMI. The clinical issue in my former clinic was that some of the diabetic patients were not meeting the recommended hemoglobin A1c goal of less than 7%. A clinical question was then formulated to help locate the best evidence from the literature.

Step 2 of the MEBPC model was to locate the best evidence with the clinical question as a guide. This is step 2 of the EBP process. Using systematic search strategy, a literature search was conducted. Using intervention, comparison, and outcome keywords from the PICOT question, CINAHL, PubMed, and Cochrane databases were systematically searched. The searches yielded articles with the following levels of evidence: two level I evidence, five level II evidence, six level III evidence, one level IV evidence, none level VI evidence, and one level VII evidence.

Step 3 of the MEBPC model was to critically analyze the evidence. Step 3 of the EBP process is critical appraisal. Critical appraisal began with rapid critical appraisal of each

individual study, using GAO/RCA forms. Relevant information was transferred from the GAO/RCA forms to an evaluation table, and then five synthesis tables were created on level of evidence, outcomes, SMA duration and frequency, SMA education curriculum, and SMA logistics. The outcome synthesis table verified that SMA has been shown to be effective in reducing hemoglobin A1c across 13 of 15 studies. What stood out from the evidence synthesis was that SMA duration and frequency in the group sessions ranged from 1.5-4 hours, with most lasting 2 hours, how often SMA was conducted ranged from weekly to monthly, with most conducted weekly, and the total duration of SMA ranged three weeks to four years, with most lasted three months. For SMA education curriculum, DSME was common to all the studies. Most of the studies included: medication management, nutrition, exercise, behavior modification, diabetes overview and foot care. Most of the studies conducted SMA with small groups ranging between 4-20, with most using 4-6 patients per session. All the SMAs included medical management, DSME and peer support. The inter-professional team in the studies consisted of a medical provider, a nurse, a dietician, an exercise counselor, and a health psychologist. Most of the studies reviewed included just a medical provider and a nurse. The synthesis tables helped in the decision-making process of appraisal for practice change based on the evidence, and the recommendations.

Step 4 of the MEBPC model was to design practice change. This is step 4 of the EBP process. Once the body of the evidence is critically appraised, evaluated, and synthesized, it should be integrated with clinician expertise plus patient's preferences and values to determine if it should warrant practice change. I have already had preliminary meetings with the clinic leadership including my industry mentor. During these meetings, we discussed what the evidence

revealed about SMA and what my vision moving forward for the clinic was going to be in terms of practice change

Step 5 of the MEBPC model is to implement and evaluate change in practice. This is steps 5 & 6 of the EBP Process, in which application of the evidence to practice is evaluated. The protocol that was designed in step 4 guided all the implementation. Since the strategies and methods that were used in the studies was successful in reducing hemoglobin A1C, the same strategies were replicated in the project. Based on the evidence, most of the studies used pre-and post -test to compare the effectiveness of the intervention. Pre-data were collected from all the patients at the beginning of the intervention, and post data collected after intervention. Baseline data included: A1c, BMI, blood pressure, lipid values, were queried from EPIC and values transferred to an Excel sheet by the NP. These values served as the baseline data. The project enrolled a small group of 4-6 patients per group session, meet weekly four times and two monthly sessions, and each session lasted for two hours per session as recommended from evidence synthesis. The total duration of the intervention lasted for three months.

Step 6 of the MEBPC model is the integration and dissemination stage. The EBP process stage for this are steps 5 and 6, which are evaluation and dissemination of the outcomes. The pre-intervention data was compared to the post intervention data to determine effectiveness. Based on the data, SMA was determined to be effective. Since SMA was effective, NP should make sure that the change is integrated and maintained into practice. NP should also promote evidence-based practice in organizations. SMA should be incorporated into the standard of care and clinical guidelines should reflect this change. The results of the project will be disseminated through presentation and manuscript.

The DNP role in upholding ethical standards is important. Since EBP interventions are mostly conducted by the DNPs, they need to ensure that each step of the EBP process is observed and abides by the ethical standards. DNP needs to further ensure that the EBP implementation is in the best interest of the patient, and they also need to make sure that no harm is done to patients during the implementation. All patients need to be treated equally during the implementation as well. Lastly, DNP need to also make sure that patients' autonomy and privacy are safeguarded.

Theoretical Framework

Self-efficacy is a concept which is derived from social cognitive theory and refers to an individual's ability to perform his/her duties and responsibilities. This concept can be used to describe the interaction between personal and behavioral factors in chronic illnesses and predicts health behavior. Self-efficacy has been found to contribute to the self-management behaviors among patients with various chronic illnesses (Lalnuntluangi, Chelli, & Padhy, 2017). Several quantitative studies have explored the relationship between self-efficacy and self-management of diabetes. Among the studies that explored this relationship, Venkataraman et al. (2012) concluded that a strong positive association exists between self-efficacy and measured blood sugar status. The study also found that self-efficacy is the strongest determinant of current blood sugar status. Other studies including Lalnuntluangi et al. (2012), Greenberger et al. (2014), Gao et al. (2013), and Alipour et al. (2012) all had similar conclusions that higher self-efficacy translates into better self-management practices, better hemoglobin A1c, and better overall management of diabetes. Self-efficacy concept is, therefore, an important concept in diabetes management.

The health belief model (HBM) (See appendix G, figure 1.2) guided the SMA intervention. Perceived susceptibility/seriousness (severity) of disease is a patient's understanding of the seriousness of the disease and susceptibility to the disease. Personal risk to the disease is a motivating factor to prompt people to adopt a healthier life style. The greater the risk is perceived, the higher the likelihood of behavior change to decrease the risk (Hayden, 2009). This concept represents uncontrolled diabetes in this project. Uncontrolled diabetes can lead to complications of diabetes, which represents a threat to the patient (perceived threat of the disease). Cues to action concept in the theory has a premise that people's behavior can be influenced by cues to action. Cues to action are events, people, or things that lead people to change behavior. Examples are a family member having a heart attack, media reports, mass media campaigns, advice and education from a healthcare provider, and warning labels from products (Hayden, 2009). Through SMA, patients became aware of health threats from diabetes. During SMA sessions, patients collaborated with the provider and their peers by sharing valuable information regarding the management of diabetes. Peer support and disease knowledge represent modifying factors such as sociopsychology and structural variables. These individual characteristics such as peer support and knowledge of the disease can influence personal perception. They also help patients to be aware of the complications of the disease and the benefits of changing behavior (perceived - benefits of preventive action) (Hayden, 2009). Perceived benefits of the preventive action versus perceived barriers to the preventive action determines the likelihood of taking recommended preventive health action (Self -efficacy), which lead to the outcome of the intervention: reduced hemoglobin A1c, BMI, and blood pressure.

Logic Model

The logic model guided the EPIP project in that it laid out the project assumptions, external influences, activities, inputs, outputs, and outcomes (See appendix H, figure 1.3) The SMA assumptions were that diabetes patients will choose SMA over IMA. The external influence was that some patients might have difficulty with transportation, and they will not be able to attend SMA regularly. Another factor was the funding status of the primary care outreach program. Project input/resources were materials that were needed to conduct the project successfully. The following resources were needed for the project: Office space, staff, computer with internet connection, furniture, dynamap, electronic scale, educational materials such as flyers, posters, stethoscope, budget, HbA1c machine, other medical equipment such as ophthalmoscope and otoscope, office supplies such as printers, papers, and scanners. The activities were the process makers that determined the success of the project and how it was going. Meeting these process makers timeline indicated that the project was going well. Outputs in the logic model are the number of SMAs conducted per week. Lastly, the outcome is divided into short, medium, and long term. The short-term goal is, patients recognize that uncontrolled diabetes can lead to serious complications, the medium-term goal is, more patients will attend SMA visits, and the long-term goal is to achieve HbA1c < 7% each patient.

The planning of the project involved designing of a logic model. This planning included outlining the activities of the project such as process makers. All process makers were ethical and followed the decision triangle principles by making sure that the evidence and theory guides the logic model and ethical principles guides the decisions making.

Evaluation of EBP Model, Theoretical and Logic Model Function within EPIP

The EBP model that guided the implementation of the project was the *model for evidence-based practice change* (See Appendix F, figure 1.1). Each of the steps of the model are like the EBP steps, which helped create a more coherent synergy between the model and EBP process. The health belief model (HBM) provided theoretical framework for the implementation of the EPIP. This model, in addition to the EBP and logic model, provided a philosophical guidance to the implementation. The logic model provided the inputs, output, and outcomes of the EPIP. The various concepts of the HBM, logic model, provided synergy with the steps of the EBP model, that helped provide motivation and self-efficacy, which helped some of the participants to change behavior.

Quality Improvement Metrics for Sustainability

The sustainability plan includes designing a new policy for a system wide implementation of SMA. The process of sustainability started on the day of implementation. This process is an important step in the implementation and will take several months (See Appendix L, table L). The new policy should be presented to the senior administrative officials for consideration. If the new policy is approved, system wide training should be conducted to prepare the staff for the system wide roll out of SMA. Once the SMA is implemented system wide, the sustainability plans should include clinic-based mentors who will be recruited to assist staff and answer any questions which they might have. These clinics-based mentors should be knowledgeable in the project protocol and SMA in general. A conceptual model such as advancing research and clinical practice through close collaboration (ARCC) should be used to strengthen EBP in organization as a system and to help sustain SMA in all the clinics. Another

strategy to sustain SMA is using the Plan-DO-Check-Act QI metric. This can help with ongoing quality improvement to further improve and sustain SMA in the organization

Sustainability is a critical step in the EBP intervention process. The goal of EBP intervention is to provide the best practice to the patients and have plans in place to make sure that the best practice is sustained. It is unethical to embark on EBP intervention without any suitability plan. If an EBP intervention cannot be sustained, the valuable resources that have been invested in the intervention are wasted; this violates the ethical standard of justice.

Project Approvals

This project required three approval processes. One was required from the IRB office to make sure that all the regulatory policies are followed. This was in the form of a review, it required an initial two-page form consisting of yes or no questions to determine if the project will require a full IRB review application process. Based on the answers on the form, the reviewers determined that this project does not meet the requirement for IRB oversight. The department of Advance Practice at UTSW also approved the project. Lastly, the project also required the approval of University of Texas at Tyler.

Chapter 4

Project Outcomes, Impact, and Results (EBP Process Step 5)

Completion Outcomes: Data collection, Data Analysis, Measurement, and Analysis of the Project Results and Impact

Baseline data was collected from all patients on the first day of the intervention by the NP after completing the registration process. The information that was collected included: Hemoglobin A1c, blood pressure, lipid values, initial knowledge test, and weight to calculate initial BMI. Data on these outcomes were queried from EPIC EMR using the report tab, then selecting “my reports”, then choosing “my diabetes patient”, and then choosing “date range” and “run” to obtain results.

The initial data was transferred to an Excel sheet. These values served as the baseline data. A diabetes knowledge test was administered by the NP using The University of Michigan Diabetes Research and Training Center Diabetes Knowledge Test in the group room. This was completed once the HbA1c, BP, and Lipid values baseline data collections were finished. The scores of this initial test served as the baseline data. Data was collected again post intervention as it was done in the studies. The HbA1c was measured using the usual Siemens DCA Vantage HbA1c Analyzer for those who did not have recent HbA1c in EPIC EMR. Blood pressure was measured using Welch Allyn Dinamap; lipids were measured using the UTSW laboratory; an electronic scale was used to capture the weights of each patient to enable BMI calculation; and, knowledge was measured using University of Michigan Diabetes Research Training Center’s (UMDRTC) Diabetes Knowledge Test. The results of post-intervention data were compared to the baseline, and the aggregate mean reduction in the outcome values were noted and recorded.

The pilot intervention for SMA was implemented on March 23rd, 2018 through May 5th, 2018. A follow up encounter to collect missing data was conducted on May 25th, 2018. Six patients participated in the intervention, but post-intervention data was collected on four patients. The two patients that participated were not available for post intervention data collection. Pre-mean intervention data for hemoglobin A1c, systolic blood pressure, diastolic blood pressure, body mass index, lipid values, and knowledge was collected on the six participants and recorded. Post mean values were collected for HbA1c, blood pressure, BMI, and knowledge (See appendix M, figure 1.4) Lipid values were available for one of the four patients. Post-mean values were calculated on four patients who attended two or more SMA sessions. Pre- and post-mean values were calculated for participants who attended three or more SMAs (See appendix M, figure 1.5).

In July of 2018, a retrospective chart review of SMA was conducted at North Dallas Shared Ministry (NDSM). Data was collected on 17 patients who participated in SMA from January 2017 to June 2018. Out of the 17 patients, 13 were females and four were males. The age range was from 32-66 years. Data was collected on outcome values of hemoglobin A1c, blood pressure, lipid values and body mass index. Data analysis revealed that outcome values improved, but were not statistically significant (See appendix M, table M). HbA1c improved from a pre-mean of 8.0% to a post mean of 7.5% ($p=0.139$); systolic blood pressure decreased from a pre-mean of 133 mmHg to a post=mean of 126 mmHg ($p=0.145$); diastolic blood pressure decreased from 81 mmHg to 75 mmHg ($p=0.043$); total cholesterol improved from a pre-mean of 190 mg/dl to a post-mean of 183 mg/dl ($p=0.337$); LDL improved from a pre-mean of 99 mg/dl to a post-mean of 95 mg/dl ($p=0.433$); and, HDL improved from a pre-mean of 47 mg/dl to a post-mean of 48 mg/dl ($p=0.470$). Triglycerides, however, increased from a pre-mean of 221mg/dl to a post-mean of 222 mg/dl ($p=0.985$); and, body max index improved from a pre-

mean of 35 kg/m² to a post-mean of 34 kg/m² ($p=0.139$) (See appendix M, figure 1.7). Another key finding includes the percentage of patients reaching their HbA1c goals which increased from 25% to 38% post-intervention (See appendix M, figure 1.9). The number of patients at goal for hypertension increased from 65% to 88% (See appendix M, figure 2.0).

Evidence from the literature was synthesized and presented in synthesis tables to better visualize the effects of SMA on outcomes. Each of the studies in the synthesis tables in body of evidence indicated that SMA was effective in reducing HbA1c, BP, BMI and lipid values levels. SMA was also found to increase patient knowledge. Findings in the pilot SMA and the retrospective chart review are consistent and comparable with the evidence. In the pilot SMA implementation, the average values for HbA1c, BP, and BMI all decreased post-intervention evaluation as suggested in the body of the evidence. The reductions in these values are more pronounced for patients who attended greater than three or more SMA sessions. Knowledge increased from 52% to 92% post intervention (See appendix M, figure 1.4). Lipid values were not evaluated due to very limited data. For the retrospective chart review, findings suggest reductions in the HbA1c, BP, BMI, and lipid values (See appendix M, figure 1.7).

Projected Project Costs/Savings

Based on the evidence, the implementation of SMA is effective in helping patients to meet their hemoglobin A1C goals and effectively achieve disease management outcomes. However, the budget is an important element of any project planning endeavor, as well. Without financial resources the project cannot be brought to actualization. The cost of diabetes care in the US is rising, and patients with diabetes complications incur more costs, placing severe burdens on the entire healthcare system. Implementation of SMA, helping patients meet their glycemic targets and avoiding complications that make diabetes care cost-prohibitive, result in substantial

cost savings. Resources that will otherwise be used for diabetes complication care, can be diverted to combat other chronic conditions. SMA has also demonstrated to improve the productivity of medical providers and, thereby, increase revenue for the organization (Caballero, 2015). Considering the evidence gathered regarding SMA, an organization can design and incorporate policies that will integrate SMA as the standard of the care, achieving optimal outcomes and maximize use of resources.

The cost of diabetes care varies depending on the type of care and where the care is being rendered. It is a well-established fact that when a diabetic patient seeks care in the Emergency Department (ED), the cost of care is usually higher than that of a diabetic who seeks care in his/her primary care provider's office. The cost of care goes even higher if the person is admitted to the hospital for a diabetes complication. For example, data from my former organization revealed an average of \$298 per visit if a diabetic seeks care in a primary care provider's office. The amount increased to an average of \$2682 if the same care is rendered at the ED. The cost of care further increased to \$27,992 if the patient is admitted to the inpatient (hospital) setting with diabetes complications (See appendix J, table J).

Considering the costs noted above, in addition to various diabetic care costs, a significant amount of money can be saved if we can keep patients in the primary care arena. For example, we can save up \$2384 if the patient can avoid using the ER for diabetes care. We can also save up to \$27,693 per visit if we can prevent diabetes complications and prevent inpatient hospitalizations. Based on five-day hospitalization care cost, we can expect a return in investment savings of \$1,993,968 per year if we can keep patients out of the hospital.

Chapter 5

Project Sustainability Discussion, Conclusions, and Dissemination Recommendations

(Step 6)

Discussion of Project Results and Impact

The results of the pilot SMA were mixed. In comparing the pre-mean of the participants to the post mean of the outcome values, HbA1c, blood pressure, and BMI dropped slightly, but the post mean knowledge increased significantly (See appendix M, figure 1.4). In comparing the pre and post mean of the HbA1c, the results indicate that those patients who consistently attended SMA sessions and attended greater than three sessions have seen a significant drop in their HbA1c values. For example, the patient with the project identification number 1003, had consecutively attended all the first three SMAs plus an additional day, and his HbA1c dropped from 10.2% to 6.9% (See appendix M, figure 1.6). This patient attended a total of four SMAs. This indicates that the dose of SMA had an impact on this patient's HbA1c level. In comparing to the patients who attended at least two SMAs, but were not consistent with attendance, have seen a slight increase in HbA1c level. Two out of three patients who also attended three or more SMAs have seen a drop in their body mass index compared to pre-intervention values (See appendix M, figure 1.6).

Although the results of the retrospective chart review outcome measures improved from baseline, but the improvements were not statistically significant. This might be due to the small sample size of the participants. Only the diastolic BP outcome was statistically significant ($P=0.043$) (See appendix M, table M). The results of both the pilot SMA intervention and retrospective chart review revealed that SMA outcomes improved including hemoglobin A1c (See appendix M, figure 1.8). The reduction that was achieved in the interventions was predicted

in the body of the evidence. Despite the interruption that occurred during the pilot SMA intervention and the impact it had on the attendance of the SMA sessions, the mean HbA1c still improved. Some of the patients' HbA1c did not improve or slightly improve; this can be attributed to the clinic closure announcement that led to some of the patients to cease attending the SMA sessions. The results of this intervention should, therefore, pave the way for adoption of SMA as the standard of care for management of patients with diabetes.

Role Impact Plan

The role of Doctor of Nursing Practice (DNP) is important in every aspect of contemporary healthcare delivery. Collaboration is an important concept in healthcare. To achieve the desired system and patient outcomes, DNP must form strategic partnerships with other members of the healthcare team to manage interdependent and interdisciplinary relationships. DNP role requires the socialization and interpersonal skills to establish strong foundations for collaboration, negotiation, consultation, and clinical leadership. (Smith, Vezina, & Samost, 2013). For the DNP role to have a meaningful impact that improves outcomes, collaboration must be one of the key pillars of the practice. Collaboration means to work together in a joint intellectual and the qualities includes: common focus, recognition of one another's expertise, and collegial exchange of ideas and knowledge (Smith, Vezina, & Samost, 2013). The qualities of collaboration and negotiation are therefore necessary for the DNP role to have impact in healthcare.

My current organization has strong structures in place that are favorable and will enable the DNP to disseminate EBP within the organization. It has an office that deals with emerging EBP and research studies and incorporates these findings into standard of practice. Presenting the

EBP findings to this department will increase the chance of adoption of SMA as the standard of care for diabetes management across all the clinics within the system.

The DNP growth in my current organization in recent years is notable. This organization went through a recent restructuring regarding Advance Practice Providers (APP) practice. New roles were created for leadership in the community outpatient primary care (COPC) for APP practice. Now most of the COPC clinics are led by APPs. Initially, this organization did not have such structures in place. Advance Practice Registered Nurse (APRN) counsel and the office of evidence-based practice are also led by DNP and PhD prepared nurses. DNP foundation in this organization is, therefore, on a strong footing and expected to grow significantly in the coming years. The weakness of the role of the DNP in this organization is that there is no specified role other than leadership for the DNP prepared APP who is on the floor seeing patients. There is an opportunity that can be seized to create a specified role for the DNP prepared APP such as the leader who directs all the care and promote evidence-based practice. There are also no monetary incentives for obtaining a DNP as an APP on the floor. If organizations do not have incentives to encourage APPs to go back to school to get DNP, the number of APPs who will go back to school to get a DNP degree will drop significantly. This threat needs to be considered with seriousness. Achieving a DNP degree requires significant financial and other resources. If APRNs sense that there is no incentive, then they will not be compelled to get the degree.

Discussion of Project Sustainability Plan and Healthcare Policy

Sustainability is a key part of the EBP process. If the gains that have been achieved during the implementation cannot be sustained, the whole exercise becomes futile. Using evidence-based models can help achieve sustainability in EBP. One such model is the ARCC model. The basic premise of this model for sustainability is: Barriers to EBP must be removed

and replaced with facilitators, for clinicians to adopt evidence-based practice, their beliefs about value of EBP and confidence must be strengthened, and EBP culture that includes mentors is necessary to sustained EBP in healthcare systems (Melnyk, Fineout-Overholt, Gallagher-Ford, & Stillwell, 2011).

Sustainability of an intervention that has shown to improve health outcomes is important to the overall health care delivery. SMA has shown to save cost and improve outcomes for diabetes patients. Therefore, sustainability of this evidence-based practice intervention is paramount. SMA does not only increased revenue for a healthcare organization, but it can also reduce the cost of healthcare spending. A provider can see up 10- 15 patients in a 90-minute visit, versus seeing four patients in traditional clinic visit. Seeing more patients in clinic translates to more revenue. SMA can also help improve outcomes for diabetes patient, reducing the number of times they seek care to the emergency room which is expensive. If seeking care to the ER can be avoided, healthcare cost can be reduced. Moreover, keeping diabetes patient healthy and avoiding complications also means no missed work days due to diabetes, and therefore no lost income.

Healthcare access is an important first step in improving outcomes. Access is the ability to obtain needed, affordable, convenient, acceptable, and effective healthcare in a reasonable time frame (Damron, Chapman, & Outlaw, 2016). Despite the passage of the Affordable Care Act (ACA), access remains a challenging problem for some patients, especially the underserved community. Under the ACA, states are supposed to expand Medicaid to improve access to more people. However, some states refused to expand Medicaid leaving some of the patients who need access to health care without any health coverage. Expanding care to more patients through health care policy changes which can be achieve through legislation, will ensure that EBP

interventions such as SMA are sustained and continue to improve outcomes. It is morally and ethically wrong to not extend an effective intervention to all patients that can benefit from it.

Improving access to healthcare will ensure that delivery of healthcare is improve as well.

Health policy is an important process which nurses need to get involved in every step of the way. It includes all the activities that are involved in policy design, including those activities that design to lobby legislators or policy makers (O'Grady, 2015). The first step in in development of a policy that will impact sustainability of my project is to present the evidence to the policy makers. Policies that will help the sustainability of SMA at local level, can be in the form of expanding care in local, national and global levels. For example, since Texas did not expand Medicaid, one can argue and present the evidence that expanding care will help improve care and save cost. At a national level, congress can strengthen the ACA which already has structures in place to increase access to care. At global level, organizations such as WHO can design policies such as programs that will help extend access to care for people who lack access. Once care access is increased at all levels, then more diabetic patients will have care through different innovative ways such as the SMA. This will help sustain the SMA and continue to improve outcomes.

Implications for EPIP Results

The findings from the implementation of SMA suggest that the concept of diabetes management in a group setting has had a positive effect on the health outcomes of diabetes patients. As suggested in the body of the evidence and seen during the implementation, SMA has the potential to improve the efficiency of healthcare providers. This also helps practices generating more revenue, which in turn help organizations to meet their budget objectives. Patients also have the additional benefit of longer visits with primary care provider and learning

and receiving support from peers with the same diagnosis. The results are also a testament that Advance Practice Nurses can independently design and implement evidence based innovative projects that can improve the health of our patients and the community as whole.

Key Lessons learned from EPIP Implementation

The three key takeaways from this project implementation are: 1) The project manager must be ready to respond to unanticipated problems and a plan put in place to mitigate those unforeseen issues 2) if one follows the interventions as stipulated in the body of the evidence, one may also expected to get results similar to those represented in the body of the evidence 3) EBP interventions can improve patient outcomes.

Many aspects of SMA implementation went well; and some did not. This is to be expected with any EBP implementation. The clinic closure in the organization where I implemented the SMA affected my project immensely. Therefore, this aspect of the implementation did not go well. If I can repeat the implementation at another site, I will be more selective of the location to be assured that the project will not be interrupted in the middle of implementation. In terms of what went well, I followed the interventions from the body of the evidence, and I achieved the results represented in the body of the evidence. I also followed the project implementation plan, even though I had to make some adjustments due to the clinic closure.

The intervention of the SMA pilot revealed some findings that raised questions that need to be further pursued for answers. For example, one participant consistently attended the sessions and has seen a significant drop in his HbA1c. However, some of the other patients who attended fewer sessions also seen an improvement in outcomes. A question that arises from this is that how much dose of SMA is needed to achieve improved outcomes? A well design quantitative

study might be needed to answer this question. This will be important for practice because if for example four weeks of SMA is as effective as three months of SMA, then utilizing four weeks of SMA will help save time and resources.

Conclusions

Based on the results of both the pilot and retrospective chart review, SMA is an effective and innovative intervention that has demonstrated improvement in hemoglobin A1c, blood pressure, lipid values body mass index and knowledge, compared to individual visits

Dissemination Plan

Dissemination of evidence is an important part of the EBP process. Sharing information that can improve patient outcomes is not only a responsibility of the scholar, but also moral and ethical responsibility. Newly discovered evidence will not achieve its maximum value and improve outcomes unless it is disseminated through a medium that can reach wider target audience (Betz, Smith, Melnyk, & Olbrysh, 2015). Dissemination of the evidence findings will be in form of power point presentations, poster, and manuscript. Another plan that is consideration is poster or PowerPoint presentation that is delivered via podcast or posted in Google Scholar. This will reach a wider national audience of clinicians. Another advantage of this is also once the content is archived, it can be used by clinicians any time at their convenience (Betz, Smith, Melnyk, & Olbrysh, 2015).

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Appendix A: Systematic Search Results

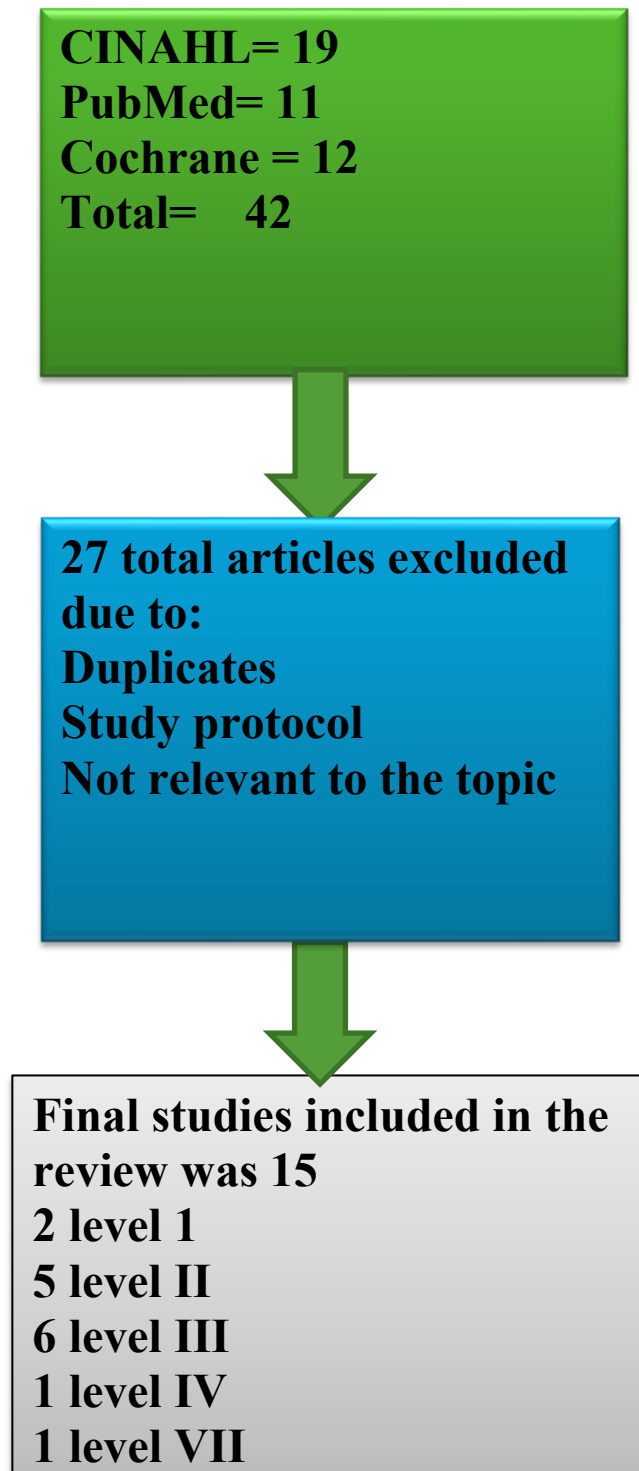


Figure 1.0. Systematic Search results showing final yield of research studies

Appendix B: Evaluation Table

Table A
Evaluation Table Showing Research Studies

Citation: author(s), date of publication & title	Purpose of Study	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
Riley, B.,S. (2012). Imp. diabetes outcomes by an innova. group visit model: a pilot study. <i>JAANP</i> , 25 (9). USA	To develop SMA model that improves Hgb A1C results, BP, lipids, depression, and satisfaction among PT. with DM that can be used in PC.	TTM (Stages of change theory)	Pilot study pre/post test Intervention: Method: Interactive SMA SMART board. and hands on activity. Duration: 2 hrs 1 st hour for group activities 2 nd hour for 1 on 1 visit with NP. Program: monthly X 3 # of PT per session: 4-20 Staff: NP, MA	N= 22 adult PT who all had DX of DM with A1C 7.5 or >, with 80% of them females and 32% were black. Setting: Private 4 provider FP in rural area	IV: SMA (SMART board , an interactive electronic white board was utilized for teaching) DV: DV1:HgbA1c DV2: Wt. DV3:,BP DV4: Lipids DV5: Depression DV6: Patient Satisfaction	DV1- % reduction DV2- Scale DV3- BP machine DV4-lab DV5: BDI DV6: SOSQ	P value	DV1= ↓ A1c MR= 1.1 points (p=0.009) DV2= 3.01lb MR (p=0.001) DV3= DBP ↓ by a mean of 5.76mmhg (p= 0.002) DV4= LDL (p=0.747) not statically significance DV5: Depression (P=0.045) DV6: PT satisfaction (P=0.028)	Weakness: <ul style="list-style-type: none"> • Small sample size • Non RCT • Lack of uniform representation on race • Short duration(Pilot) • Names of instrument used for measurement not provided Strengths <ul style="list-style-type: none"> • Level III evidence • Significant improvement in DVs Conclusion: SMA reduces A1c, BP Wt.; Lipids ↔; depression improved and PT satisfaction ↑ Risk/Benefit: Benefits of the study outweigh risks Recommendations: <ul style="list-style-type: none"> • Level III study, and the findings agree with higher level studies. • But it was a pilot study.

Legend: BDI=Beck Depression Inventory; BP= Blood pressure; BGM= Blood Glucose Monitoring; BS=blood sugar; BMI=Body Mass Index; BM; Behavioral modification; CM= cardiovascular morbidity; CHOL=Cholesterol; CG=comparison group; C=Control group; CBOC=community based outpatient clinics; DSME=diabetes self-management education ;DM= Diabetes Mellitus; DS= disease severity; DSI=diabetes severity index; DX= Diagnosis; DBP= diastolic blood pressure; DESS=Diabetes Empowerment Scale Short Form; DV=dependent variable; DE=Diabetes Educator; EMR=electronic medical records; FBG=Fasting Blood Glucose; GC=glycemic control; HS=Health Status; HDL=High Density Lipoprotein; Hx=History; Hgb A1c= hemoglobin A1c; IV= Independent variable; I=Intervention group; IMA=Individual Medical Appointment; LSM=Life Style Modification; LRM= linear regression model; LDL= low density lipoprotein; MR= mean reduction; MU=medically underserved; MA=Medical Assistant; MC=medical center; MR=Mean reduction; MC=Mean change; MD=Medical doctor; MM=medical management; NPCT=nurse practitioner coordinated team; NR=not reported; NP=nurse practitioner ; OPC=Out Patient Clinic; OR= odd ratio; PS=Peer support; PC= primary care; PCP=Primary care provider; PT=patients; RCT=randomized controlled studies; Rx=Prescription; SMA= shared medical appointment; Seattle Outpatient Satisfaction Questionnaire ;SBP=systolic blood pressure; SR=systemic review; SD=Standard Deviation; SMB=Self-management behaviors; SE= self-efficacy; T2DM= type 2 diabetes mellitus; TC=Total Cholesterol; TTM: Trans theoretical Model of Change; TG=Triglycerides; Wt.= weight; UMDRTC=university of Michigan diabetes research training center; UC= usual care; VA=veterans affairs; ↓=Decrease; ↔ Not statistically significant.

Citation: author(s), date of publication & title	Purpose of Study	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
			SMA technique: (MM, DSME, PS) DSME curriculum: diet, exercise, medication, complications, health coping						Recommendation and gather more information before using as the standard of care
Watts et al, (2015). SMA for PT with DM: Glycemic reduction in high-risk patients. <i>JAANP</i> , 27 (8). 450-456. USA	To assess the impact of GC by measuring A1C in a PC urban VA SMA	None	Retrospective pretest/posttest study. Method: Data was extracted from hosp. EMR and registry. Patients served as their own control, A1c levels were averaged for PTs who attended SMA from 4/06 to 12/10.	N=1290 PT 96% of them males. All the PT were recruited at the VA and had DX T2DM and at high risk for CM (A1C >9 and SBP>160mmhg) Setting: Clinic (Lours Stokes	IV: SMA DV: Hgb A1c	DV- HgbA1C= % reduction, DS-DSI	Paired <i>t</i> test was conducted for PT who had at least one A1c measurement in the 180 period .	DV; Hgb A1c ↓(1%) overall (n=1170) Linear regression analysis showed a significant (<i>p</i> =0.001) pre-SMA positive trend (r ² =0.90) DSI ± 3.01	Weakness: <ul style="list-style-type: none"> • Single site study • Pretest/post-test design and lacked control group • The number and timing of A1c measurement varied widely Strengths: <ul style="list-style-type: none"> • Longitudinal study • Large sample size of 1290patients • Positive sustainability > 4years • Intervention reduce over 9% of A1c • Level III evidence Conclusion: A1C ↓ in high risk diabetic PT Risk/benefits: Benefits outweigh risks

Legend: BDI=Beck Depression Inventory; BP= Blood pressure; BGM= Blood Glucose Monitoring; BS=blood sugar; BMI=Body Mass Index; BM; Behavioral modification; CM= cardiovascular morbidity; CHOL=Cholesterol; CG=comparison group; C=Control group; CBOC=community based outpatient clinics; DSME=diabetes self-management education ;DM= Diabetes Mellitus; DS= disease severity; DSI=diabetes severity index; DX= Diagnosis; DBP= diastolic blood pressure; DESS=Diabetes Empowerment Scale Short Form; DV=dependent variable; DE=Diabetes Educator; EMR=electronic medical records; FBG=Fasting Blood Glucose; GC=glycemic control; HS=Health Status; HDL=High Density Lipoprotein; Hx=History; Hgb A1c= hemoglobin A1c; IV= Independent variable; I=Intervention group; IMA=Individual Medical Appointment; LSM=Life Style Modification; LRM= linear regression model; LDL= low density lipoprotein; MR= mean reduction; MU=medically underserved; MA=Medical Assistant; MC=medical center; MR=Mean reduction; MC=Mean change; MD=Medical doctor; MM=medical management; NPCT=nurse practitioner coordinated team; NR=not reported; NP=nurse practitioner ; OPC=Out Patient Clinic; OR= odd ratio; PS=Peer support; PC= primary care; PCP=Primary care provider; PT=patients; RCT=randomized controlled studies; Rx=Prescription; SMA= shared medical appointment; Seattle Outpatient Satisfaction Questionnaire ;SBP=systolic blood pressure; SR=systemic review; SD=Standard Deviation; SMB=Self-management behaviors; SE= self-efficacy; T2DM= type 2 diabetes mellitus; TC=Total Cholesterol; TTM: Trans theoretical Model of Change; TG=Triglycerides; Wt.= weight; UMDRTC=university of Michigan diabetes research training center; UC= usual care; VA=veterans affairs; ↓=Decrease; ↔ Not statistically significant.

Citation: author(s), date of publication & title	Purpose of Study	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
				Cleveland VA MC) Attrition=NR					Recommendation: <ul style="list-style-type: none"> Level III evidence and longitudinal study. Findings agrees with higher level studies Will recommend as the standard of care
Jessee et al, (2012) Effectiveness of NP coordinated team GV for T2DM in MU Appalachia. <i>JAANP</i> , 24, 735-743. USA	Effectiveness of multidisciplinary NP coordinated team SMA in MU area on health, SE, and knowledge of PT. with T2DM.	Bandura's (1977) model of self-efficacy	Quasi experimental study Convenience sample. Subjects were assigned to comparison or study group Intervention: SMA method: Duration: 4 hours # of PT per session: 11 Curriculum: Visit#1:	Inclusion criteria: subjects age 21 and older with diagnosis of T2DM and A1C of >7. N=11(NPCT) N= 15 (IMA) Exclusion: Being <21, no T2DM, or A1c <7	IV1: was called "type of care". Intervention group participated in NPCT group visits integrating DSME and MM with team approach. IV2: IMA DV: DV1: BS DV2: A1c DV3: knowledge, DV4: SE	DV1=mean reduction DV2=% reduction DV3=mean ↑ (UMDRTC) DV4=mean SE (DESSF)	Mean comparisons of the groups pre/post blood sugars, A1c, knowledge and self-efficacy	DV1= Study group's averaged post BS ↓ 27.24mg/dl more DV2= Average post A1c ↓ 0.8% > the comparison group. DV3= Mean post knowledge ↑ DV4= SE scores ↑ 1.26 points A1c improved 2.0% in the study group, but only 0.9% post intervention in the comparison	Weakness: <ul style="list-style-type: none"> Non-randomization of the subjects Small sample size Strengths: <ul style="list-style-type: none"> Level III evidence Noted improvement in all the 4 variables measured Experimental study with intervention and comparison groups Conclusion: SMA ↓ A1C and BS, knowledge, and SE ↑ Risk/Benefit: Benefits outweigh risk Recommendations: <ul style="list-style-type: none"> Level III evidence that agrees with level I and Level II studies.

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			DM Overview Nutrition BM, stress, coping, SE, goals, planning, medications (1 hr) Visit#2 Visit to grocery store, food labels, food purchases, food alternatives Visit#3 Foot care, nutrition, progress and goal review, medications Program: Weekly X 3 Staff: Faculty Advisor Dietician Pharmacist Counselors Nurse MD	Attrition=NR				group, with 1.1% difference. SE scores improved 0.49 points more than CG	<ul style="list-style-type: none"> Recommend as the standard of care

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			SMA technique (MM, DSME, PS)						
Reitz et al, (2012). The effects of SMA program on outcomes of DM care in an urban family practice. <i>Journal of Urban Health</i> , 89 (4). 709-716. USA	To evaluate the effect of DM support and education SMA program on the achievement of Hgb A1c , LDL, and BP, and on Wt. changes several months after the program began.	None	None RCT matched controlled pre and post- test study. Method: Baseline variables collected for both groups, and compared to 7 months F/U data Intervention: SMA method: Duration: 3 hours # of PT per session: Not stated DSME Curriculum: Diabetes	PT at least 18 years of age, DX of T2DM, At least one visit to the practice between 2008-2009. N=52(SMA) N=236(IMA) Setting: Clinic (Jefferson Family Medicine)	IV1: SMA IV2: IMA DV: DV1: Hbg A1C DV2: LDL DV3: BP DV4: Weight	DV1-CMH DV2-propotion DV3- CMH DV4-Propotion	Cochran Mantel Haenszel (CMH), P value	DV1 = ↑ proportion of pts who met target A1C <7(CMH=4.6613, p=0.0309), Hgb A1c ↓ 76.9% of the participants in the SMA compared to 54.3% in the comparison group (CMH=8.9911, p=0.0027) DV2= No statistical significance achieved DV3= ↓BP <140/90(CMH=5.61, p=0.018) compared to the comparison group.	Weakness: <ul style="list-style-type: none"> Lack of randomization Strengths: <ul style="list-style-type: none"> Level III evidence Multiple ethnic representation Positive improvement in DV Control group Conclusion: <ul style="list-style-type: none"> SMA improved patient management of diabetes Risk/benefits: Benefits outweigh risks Recommendation: <ul style="list-style-type: none"> Level III evidence that agrees with level I studies Recommend as the standard of care

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			Nutrition BGM Complications Program: 4 weeks Staff: DE Nurse Pharmacist Provider SMA technique: (MM, DSME, PS)					DV4= wt. loss was similar across the groups	
Caballero et al, (2015). Effect of group medical appointments on GC of PTs with T2DM. <i>SD</i> , 28, (4).245-250	Evaluate effect of SMA on A1c	None	Cohort Study Design Method: Retrospective electronic chart review Sample: N=104 male PTs with T2DM. Intervention:	Total sample N=104 SMA: 52/1245 randomly selected . Control: 52/352 randomly selected . Inclusion for intervention:	IV1: SMA: IPP team evaluation + Education IV2: Individual visits by PCP DV: Hgb A1c	DV- Hgb- % proportion target A1C goal	Pearson's X ² , P value	IMA cohort rate of ↓ in A1c (-0.001% per week P=0.912), X ² =0.012 SMA cohort rate of ↓ in A1c over time (-0.031% per week, p<0.001), X ² =45.679.	Weakness: <ul style="list-style-type: none"> Retrospective design without randomization All male subjects in single clinical site Strengths: <ul style="list-style-type: none"> Intervention and control group compared. Level IV evidence Records were randomly assigned

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USA			<p>SMA method:</p> <p>Duration: 1.5 hours</p> <p># of PT per session: 8-15</p> <p>Program: 12 months</p> <p>DSME curriculum: Diabetes Nutrition Exercise Medications Psychosocial LSM</p> <p>Staff: NP Pharmacist Nurse Health - Psychologist</p> <p>SMA technique: (MM, DSME, PS)</p>	<p>T2DM A1c >8.0, took part in SMA within last 12 months.</p> <p>Inclusion for control: T2DM, seen by PCP within last 12 months</p> <p>Setting: OPC (VA Loma Linda Healthcare system and its CBOCs)</p> <p>Attrition: NR</p>				<p>The difference in the rates of ↓ between the SMA and IMA cohorts was significant (p=0.003).</p>	<ul style="list-style-type: none"> Positive findings from the intervention <p>Conclusion:</p> <ul style="list-style-type: none"> 50% of SMA versus 19.2% IMA PT reached target A1C goals. SMA PT had faster rate of A1C ↓ than IMA. <p>Risk/benefits: Benefits outweigh risk</p> <p>Recommendation:</p> <ul style="list-style-type: none"> Level IV evidence that agrees with high level studies. Recommend as the standard of care

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Edelman et al.,(2014) SMA for PTs with DM: A systemic review. <i>Jour. of Gen. Inter. Med.</i> ,30 (1) 99-106.	SR of the existing literature on SMA interventions for PTs with DM in order to understand their impact on outcomes	None	SR of existing literature on SMA Searched 5 database: MEDINE, EMBASE, CINAHL, PsycINFO and web of science. Publications from January 1996 through April 2012, to compare SMA with IMA. Inclusion: Of 17 total studies, 13 RCTs, 4 observational studies SMA techniques across studies:	N=1172 citations MEDLINE (n=397), CINAHL (n=290), Embase (n=145), PsychINFO (n=157) Web of science (n=186) Manual search (n=2) a total of 1174 citations. Inclusion and exclusion	IV: SMA DV: DV1:HgbA1c DV2: BP DV3: Cholesterol	DV1: % reduction DV2: mean reduction DV3: Mean reduction	Forrest plot, Mean,	DV1=SMA ↓ A1C (Δ =-0.55 % (95% CI, -0.11 to -0.99) DV2= ↓ SBP (Δ =-5.2mmHg (95% CI, -3.0 to -7.4) DV3= (Δ =-6.6 mg/dl) (95% CI 2.8 to -16.1) LDL ↓ but not statistically significant A1C result had significant heterogeneity among studies.	Weakness: <ul style="list-style-type: none"> Heterogenicity among the components of diabetes SMAs leads to uncertainty about what makes a particular SMA successful Strengths: <ul style="list-style-type: none"> Systemic review with meta-analysis of RCTs and observation studies Level 1 evidence Conclusion: <ul style="list-style-type: none"> SMA improved biophysical outcomes among patients with T2DM. Inadequate data to determine the effect on PT experience, utilization and cost. Risk/Benefits: Benefits outweigh risks Recommendations: <ul style="list-style-type: none"> SMA is feasible in practice Level 1 evidence, will recommend as the standard of care

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			MM, DSME, PS # of PT per session: 6-10 (n=10) 10-20(n=5) 25 (n=1) Visit frequency: 3 weeks -3 months Duration: medical of 2 hours (range 1 to 4hr) Staff: MD (n=13) Pharmacist (n=9) Nurse (n=10)	lead 17 studies Poor glucose control (from A1c6.5-9%)					

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Housden et al,(2013) Effectiveness of SMA for improving DM care: a SR and meta-analysis. <i>Can. Med. Asso. Journal, 185(13). E635-E64.</i> USA	SR and meta-analysis of the evidence on effectiveness of SMA for patients with DM	None	SR of RCT and observational studies. Meta-analysis studies published between 1947 to February 2012. Literature search was conducted using MEDLINE, CINAHL ect., 94studies identified 26 selected, 13 were RCT	N=28 ,347 identified through database search, n=92(abstrac t + title review) n=62 (articles identified for full text review) n=36 (studies excluded after full text review) n= 26 (studies that was selected) n= 13 (RCT)	IV: SMA DV: DV1:Hgb A1c DV2: BP DV3: Cholesterol DV4: Weight DV5: BMI	Weighted mean difference % reduction in A1C	Data from RCT was analyzed using Review Manager software (RevMan . Version 5.1 Nordic Cochran e center). A X2 for heterogeneity was used.	DV1=PTs attending SMA (weighted mean difference (-0.46%, 95% CI -0.80 to -0.31) DV2= -2.81%, 95% CI (-6.84 to 1.21) DV3: 0.04%, 95% CI (-0.21 to 0.30) DV4:-0.50%, 95% CI (-3.87 to 2.88) DV4: 0.05%, 95% (-0.90 to 1.00)	Weakness: <ul style="list-style-type: none"> Few long-term studies in the review. Search restriction to published studies only Articles written in English only were included Strengths: <ul style="list-style-type: none"> Systemic review of RCT and observational studies Level I evidence Conclusion: <ul style="list-style-type: none"> SMA reduced hemoglobin A1C for T2DM. Wider implementation of SMA will have positive impact on patient outcomes. Risk/Benefits: Benefits outweigh risk Recommendation: <ul style="list-style-type: none"> SMA should be implemented in practice to improve outcomes for T2DM PT SMA is feasible in practice Level I evidence, we should

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									use this as the standard of care.
Ridge, T. (2012) shared medical appointment in diabetes care: A Literature review. Diabetes Spectrum, 25 (2), 72-75. USA	Literature review of RCT and non-RCT studies	None	Evidence review, how the studies were chosen was not stated	7 RCT , and 2 non RCT were included in the review.	Variables reviewed in the studies: IV; SMA DV: Hgb A1c	Not stated	Not stated	The review of the different studies concluded that SMA was effective in reducing HgbA1c	Weakness: <ul style="list-style-type: none"> Level VII evidence Strength <ul style="list-style-type: none"> RCTs included in the review <ul style="list-style-type: none"> Conclusion: SMA have demonstrated effectiveness in improving knowledge, quality of life, and problem-solving skills related to diabetes Risk/Benefits: Benefits outweigh risk Recommendation: <ul style="list-style-type: none"> Level VII evidence, but in agreement with higher level studies, Will recommend with caution as the standard of care

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Berry et al, (2016). Imbedding interdisciplinary diabetes GV into a community-based medical setting. The DER, 42 (1), 96-107.	To evaluate an interdisciplinary approach and test the efficacy of diabetes SMA tailored to low-income PTs in a community based medical practice	None	RCT • Method: Intervention group -5 diabetes SMA sessions, 1 every 3 months X15 months Control group 5 individualized sessions, 1 every 3 months X 15 months with PCP. Intervention SMA method: # of PTs per SMA session: 40 Duration: Not stated Program:	N=80 n=40 Pts for intervention group n=40 control group Inclusion criteria: • age: 18 < • speak, read and write English, • primary care from Alliance Medical Ministry, • A1c > 8%. Setting: Clinic (Alliance medical ministry) Attrition: 12	IV1 : SMA IV2: IMA DV1: HgbA1c DV2: Lipids DV3: BP DV4: HR	DV1: % reduction DV2: % reduction DV3: mean reduction Dv4: mean reduction	p-value	DV1= Intervention group A1c ↓ by 1.2% to 7.6% (p=0.001); Pts in the control group ↑ their A1c by 1.3 percentage pts to 9.3% at time 5. DV2= Lipids ↓ in intervention group HDL(P=0.033), Triglycerides (p=0.033) DV3= BP ↓ by time by time5(15months) DV4=HR ↓ by time 5 (15 months) (p=0.031)	Weakness: • Single site study Strengths: • Level II evidence • Ethnic diversity Conclusion: • Diabetes group visits which included DSME and a medical visit with healthcare provider improved A1C. Risk/Benefits: Benefits outweigh risks Recommendation: • SMA is feasible and practical to implement is practice • SMA can be implemented to help ethnically diverse low income working full time PT to improve A1C • Level II evidence that agrees with higher level studies • Will recommend as the standard of care

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			15 months Staff: NP MD Nurse Dietician Exercise- educator Clergy DSME curriculum: Diabetes Foot care BGM Blood pressure Lipids Nutrition Exercise Complications SMA technique: MM individually DSME and PS in group					(finding from study, HR was never elevated)	

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Guthrie et al, (2015). Impact of a SMA life style intervention on Wt and lipid parameters in individual with T2DM: A clinical pilot. <i>Journal of Amer. Coll. of Nut.</i> , 34 (4) 300-309. USA	To evaluate the effectiveness of a DM educational program combining SMA with 8 week DVD based DM education program emphasizing a plant based diet in lowering Wt. and lipids in individuals With T2DM	None	A pilot nonrandomized own-control study Method: Procedures: 16 SMA sessions Intervention: SMA method: Duration: 90-120 minutes Program: SMA with 8week biweekly DVD video DSME Staff: Medical provider, Resident DSME video presenters(MD, dietician,	Non-randomized convenience sample Own-control N= 46 participated in the WSDP program. Attrition: N=2 Setting: Clinic (Family medicine practice in Orlando, FL).	IV: SMA with DVD video DSME DV: DV1: Cholesterol DV2: LDL DV3: HDL DV4: Triglycerides DV5: Weight	DV1: MC DV2: MC DV3: mean changes DV4: MC DV5: MC	Paired t-test	DV1= Total cholesterol ↓ (-6.20mg/dl) t= 1.01 DV2=LDL ↓ (-6.43mg/dl) t=1.31 DV3=HDL= ↑ (-1.98mg/dl) t=1.55 DV4= Triglycerides ↓ (-2.39mg/dl) t=0.24 DV5= Weight ↓ Significantly (mean of -8.90lb) t=7.05, p<0.05) Improvements seen in LDL, HDL, cholesterol and triglycerides, but did not reach statistical significance.	Weakness: <ul style="list-style-type: none"> • A pilot study • Convenient sample • No randomization • No control group • Small sample size Strength: <ul style="list-style-type: none"> • Level III study • Measured variables improved Conclusion: <ul style="list-style-type: none"> • DVD based DSME delivered as part of SMA was associated with significant Wt. loss. • Behavior changes most closely associated with weight loss were ↑ water intake, eliminating evening meals, and increasing the consumption of beans for breakfast. Risk/Benefits: Benefits outweigh risk Recommendation: <ul style="list-style-type: none"> • Level III evidence, agrees with higher level studies • Will recommend as the

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			exercise physiologist) # of PT per session: Not stated Video DSME curriculum: Exercise Nutrition Diabetes SMA technique: MM, PS, DSME(video)						standard of care. Note: SMA session flow Vital signs, behavior reporting form completion =10 to 15 minutes DVD video lecture. Exercise, and nutrition, and diabetes management: Data recorded in the EMR= 45 to 50 minutes Questions and answer session= 10 minutes Shared medical appointment with each participant= 45 to 60 minutes
Liu et al., (2012). Effe. Of using SMA to sup. DM PT self-mgt in rural comm. Of Shanghai> RCT. <i>BMC Pub Health</i> 12, 1043	To develop SMA program and examine its effectiveness on SMB, SE, HS for PT with T2DM.	The Cooperative Health care Clinic model	RCT. Intervention(n= 119) Control(n=89) IMA for 12 months SMA Method: Intervention: Program: 12 SMA sessions for 12	N=208 I-(n=119) C-(n=89) Inclusion- men and women 35-80 with T2DM Exclusion- age <35 and >80	IV1: SMA IV2: IMA DV1: SMB DV2: SE DV3: HS DV3a: SBP DV3b: BMI	SMB- questionnaire SE-SE Chineses version of 8 item DM Se scale developed by Stanford patient education research center HS- Questionnaire	MC SD P value	DV1: ↑ Aerobic exercise by > 40 minutes per week(P=0.001) DV2: Intervention group ↑ of 0.71 in mean SE score(p=0.02) DV3: Intervention group had significant	Weakness: <ul style="list-style-type: none"> Mostly older patients with higher prevalence of disease 15% of subjects did not complete the study Small sample size Strengths: <ul style="list-style-type: none"> RCT Lasted 12 months Conclusions: <ul style="list-style-type: none"> Chines diabetes SMA model was feasible acceptable and effective alternative for

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			months X monthly Duration: 1.5 hours Staff: Provider Nurse DSME curriculum: Diabetes Nutrition Exercise Foot care Medication SMA technique: MM separated from group. DSME and PS	Setting: Rural area in Shanghai Attrition: I=21: moved out (n=10) Died(n=3) Refused (n=2) Unknown (n=6) C=11: moved out (n=4) Died(n=2) Refused (n=3) Unknown (n=2)				improvement in measures of illness and SBP. DV3a=3.72mmHg ↓ on average. (p=0.04) DV3b= ↓ 0.28kg/m ² (P=0.22)	providing self-management support to PT with T2DM in Chines rural communities Risk/Benefits: Benefits outweigh risk Recommendation: <ul style="list-style-type: none"> • This model of SMA is feasible and should be implemented in practice to improve diabetes outcomes • Level II evidence that agrees with higher level I evidence • Will recommended with caution because the study did not measure A1C. More information is needed

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Cole et al., (2013) Eff. Of prediabetes nutria. SMA. <i>Diab. Edu.</i> 39(3).	To evaluate nutrition based SMA intervention in treatment of prediabetes compared to individualized counseling	None	RCT Nutrition SMA(I), and individualized counseling (C) Method: SMA group attended three 90 minutes nutrition SMA, Control group attended 60 minutes IMA registered dietician. SMA method: Nutrition based SMA Duration: 1.5 hours Program: Monthly SMA X3 months # of PT per session: 6-8	N =94 I-(n=34) C-(n=31) Inclusion: ≥18 years of age, English speaking and Dx of prediabetes Exclusion: Dx of diabetes Setting: Enrollees of TRICAR health care system Attrition: n=29	IV: Nutrition SMA DV1: FBG DV2: A1C DV3: WT DV4: BMI DV5: BP DV6: Cholesterol	FBG- MC A1C- MC Wt- MC BMI- MC BP- MC	Mean ± SD ANOVA	Outcome at 3 months compared to baseline: Repeated measures ANOVA within group (P<0.05) SMA(n=34) DV1: -6±9 IMA (n=31) DV1:-6±15 SMA(n=34) DV2: (0.1±0.4) IMA (n=31) DV2: 0.4± 1.1 SMA (n=34) DV3: -3.0± 3.0 IMA (n=31) DV3 -1.6± 3.3 SMA (n=34) DV4: -1.0±1.1 IMA (n=31) DV4: -6.6± 1.2	Weakness: <ul style="list-style-type: none"> High attrition rate Strengths: <ul style="list-style-type: none"> RCT Long duration Conclusion: <ul style="list-style-type: none"> SMA outcomes yielded a greater degree of improvements than the control group SMA is equivalent to individual appointment to support hypothesis Risk/benefits: Benefits outweigh risk Recommendation: <ul style="list-style-type: none"> SMA is feasible and should be available in practice as an alternative for patients SMA should be implemented in practice to improve outcomes Level II study that agrees with higher level study Will recommended as the standard of care

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			Staff: Dietician DE Nurse Behavioral specialist DSME curriculum: Nutrition Exercise SMA technique: MM, DSME, PS					SMA (n=34) DV5: SBP - 12±16 IMA (n=31) DV5: -12±17 SMA (n=34) DV6: -14±41 IMA (n=31) Dv6: -6±24	
Cohen et al.,(2011). Pharmacist-led SMA for multi. Cardio. Risk reduction in PT with T2DM. <i>The Diabetes Educator</i> ,37(6)	To assess whether VA MEDIC-E, a pharmacy led SMA program could improve outcomes compared to individual appointment	None	RCT I=VA MEDIC-E(SMA) C= (IMA) SMA Method: Duration: 2 hours Program: SMA (VA MEDIC-E) 4 once weekly 2 hour sessions, followed by 5	N=99 VA MEDIC-E(SMA) n=50 Individual apt (Control) n= 49 Inclusion: DX of T2DM, A1C > 7%, LDL >100,BP >130/80 Setting: Clinic, VA	IV: Va MEDIC-E(SMA) DV1; A1C DV2: LDL DV3: SBP	A1C- % reduction LDL- MC SBP- MC	Mean SD t-test percent	DV1: MEDIC arm achieved target A1C values (40.8% vs 20.4% in control (p=0.028) DV2: MEDIC arm had ↓ of LDL 96.1mg/dl vs 110.7mg/dl in control (p=0.024) DV3: SBP <130mmHg (58% cases vs 32.7% control) (p=0.015)	Weakness: <ul style="list-style-type: none"> Mostly male veterans Mostly Caucasians Names of some of instrument not stated Strengths <ul style="list-style-type: none"> RCT Multi-displenary Conclusions: <ul style="list-style-type: none"> Pharmacist led SMA was an efficacious and sustainable A collaborative care approach to managing diabetes to reduce cardiac risk.

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			monthly booster sessions. Staff: Pharmacist(provider) Dietician Nurse DSME curriculum: Diabetes Medication Stress Nutrition Exercise Foot care # of PT per session: 4-6 SMA technique: MM, DSME, PS IMA group attended once every 4 month visits	medical center Attrition n=3 Died(n=3)				At 6 months, significant improvements from baseline were noted in the VA MEDIC-E group for exercise, foot care and goal attainment of A1C, LDL, and BP, but not in the control group	Risk/Benefits: Benefits outweigh risk Recommendation: <ul style="list-style-type: none"> • Level II evidence and Supports the findings of level I evidence. • Will recommended as standard of care

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Tokuda et al.,(2016). The Utili. Of video-conference SMA in rural diabetes care. <i>Inter. Jour. Of Medical Informatics,93.</i>	To explore the feasibility of innovative modes of care delivery such as video-SMA to improve DM care at remote clinical site	None	Prospective non-randomized study SMA Method: Intervention: Weekly video SMA for 4 weeks, followed by bi-monthly booster for 5 months Duration: 2 hours # of PT per session: 3-5 Staff: NP Pharmacist DSME curriculum: Nutrition Exercise Medication Diabetes BM	N=100 Intervention(n=31) Control(n=69) Inclusion: A1C ≥ 7% Setting: rural community outpatient clinic Attrition: NR	IV: Video SMA DV1: A1C DV2: BP DV3: LDL DV4: Triglycerides	A1C-% reduction, BP- MC	Mean ±Standard Error	DV1: Greater ↓ in A1C was observed in SMA group after 1 to 3 months 9.1 ± 0.3 to 8.3 ± 0.3 vs IMA 8.6 ± 0.2 to 8.7 ± 0.2 (p=0.03) DV2: SMA group had significant ↓ in both DBP and SBP than control (p=0.04 and p=0.01, respectively) DV3: Baseline 2.4 ± 0.2 vs 5 months, 2.2 ± 0.2 (p=0.55) DV4: Baseline: 2.6 ± 0.7 vs 5 months 2.1 ± 2.3 patients in video SMA group showed lower rate of ED visits relative to the control group	Weakness: <ul style="list-style-type: none"> No randomization Mostly men Small sample size Strengths <ul style="list-style-type: none"> Quasi experimental study A1C significantly ↓ Conclusion: <ul style="list-style-type: none"> Video -SMA is feasible, well perceived and has the potential to improve diabetes outcomes in a rural setting. Risk/Benefits: Benefits outweigh risk Recommendation: <ul style="list-style-type: none"> Level III evidence that agrees with level II studies Will recommend as the standard of care

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Citation: author(s), date of publication & title	Purpose of Study	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
			SMA technique: MM, DSME, PS Control group attended IMA with PCP					(3.2% vs 17.4%, p=0.01)	
Taveira, et al.,(2011). Pharmacist-led SMA for mgt of DM with comorbid depression Ann. of Pharmacotherapy,	The study sought to determine whether SMA are feasible for the tx of DM in patients with depression	None	RCT I=(VA-MEDIC-D)(SMA) C=(IMA) Method: Program: SMA VA-MEDIC-D attended 4 once wkly SMA, followed by 5 monthly booster sessions Duration:2 hours # of PT per session: 4-6	N=88 I=VA-MEDIC-D (n=44) IMA=(n=44) Inclusion: Veterans with type 1 or type 2 DM with A1C >6.5 within the last 6 month Setting: Outpatient clinic	IV= VA-MEDIC-D DV= IMA (standard care) DV1:A1C DV2: BP DV3: Lipids DV4: Depression	AIC- Proportion of pt at goal BP- MC Depression-PHQ-9 scale	Proportion of pt who met A1C goal OR PHQ-9 Mean	DV1: The VA-MEDIC-D arm achieving guideline adherence for A1C was > IMA (29.6% vs 11.9%) with OR 3.3(95% CI 1.0 to 10.0) (p=0.04) DV2: BP ↓(IV mean 123.4mmHg vs IMA mean 127mmHg(p=0.10) DV3: IV mean LDL=92.5mg/dl vs IMA mean 93.9mg/dl)	Weakness: <ul style="list-style-type: none"> Single site homogenous population Small sample size Strengths: <ul style="list-style-type: none"> RCT Duration of SMA longer than most Conclusion: <ul style="list-style-type: none"> Pharmacist led group SMA visits are efficacious in attainment of glycemic control in patients with diabetes It improved depression symptoms Risk/Benefits: Benefits outweigh risk Recommendation: <ul style="list-style-type: none"> Level II evidence that agrees with level I evidence findings Will recommend as standard of

Legend: BDI=Beck Depression Inventory; BP= Blood pressure; BGM= Blood Glucose Monitoring; BS=blood sugar; BMI=Body Mass Index; BM; Behavioral modification; CM= cardiovascular morbidity; CHOL=Cholesterol; CG=comparison group; C=Control group; CBOC=community based outpatient clinics; DSME=diabetes self-management education ;DM= Diabetes Mellitus; DS= disease severity; DSI=diabetes severity index; DX= Diagnosis; DBP= diastolic blood pressure; DESS=Diabetes Empowerment Scale Short Form; DV=dependent variable; DE=Diabetes Educator; EMR=electronic medical records; FBG=Fasting Blood Glucose; GC=glycemic control; HS=Health Status; HDL=High Density Lipoprotein; Hx=History; Hgb A1c= hemoglobin A1c; IV= Independent variable; I=Intervention group; IMA=Individual Medical Appointment; LSM=Life Style Modification; LRM= linear regression model; LDL= low density lipoprotein; MR= mean reduction; MU=medically underserved; MA=Medical Assistant; MC=medical center; MR=Mean reduction; MC=Mean change; MD=Medical doctor; MM=medical management; NPCT=nurse practitioner coordinated team; NR=not reported; NP=nurse practitioner ; OPC=Out Patient Clinic; OR= odd ratio; PS=Peer support; PC= primary care; PCP=Primary care provider; PT=patients; RCT=randomized controlled studies; Rx=Prescription; SMA= shared medical appointment; Seattle Outpatient Satisfaction Questionnaire ;SBP=systolic blood pressure; SR=systemic review; SD=Standard Deviation; SMB=Self-management behaviors; SE= self-efficacy; T2DM= type 2 diabetes mellitus; TC=Total Cholesterol; TTM: Trans theoretical Model of Change; TG=Triglycerides; Wt.= weight; UMDRTC=university of Michigan diabetes research training center; UC= usual care; VA=veterans affairs; ↓=Decrease; ↔ Not statistically significant.

Citation: author(s), date of publication & title	Purpose of Study	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
			Staff: Dietician Nurse Provider (clinical pharmacist) DSME curriculum: Nutrition Exercise Medication BM SMA technique MM, DSME, PS IMA arm attended regular visit with PCP for 30 minutes with DSME available to them 4 once weekly for 2 hours	Attrition: 2 lost to f/u, 1 died and 1 nursing home (hip fx)				DV4: PHQ-9 score ↓ by 50% from baseline for 45.5% of VA-MEDIC-D group and 34.1% for IMA group (p=0.28)	care

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Appendix C: Synthesis Tables

Table B
Level of Evidence of the Research Studies

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Level I: Systemic review or meta-analysis						✓	✓								
Level II: Randomized controlled trial									✓		✓	✓	✓		✓
Level III: controlled trial without randomization	✓	✓	✓	✓						✓				✓	
Level IV: Case-control or cohort study					✓										
Level V: Systemic review of qualitative or descriptive study															
Level VI: Qualitative or descriptive study (includes evidence implementation projects)															
Level VII: Expert opinion or consensus								✓							

Table C
Effect of Shared Medical Appointment on Patient Outcomes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Hemoglobin A1C	↓	↓	↓	↓	↓	↓	↓	↓	↓			↓	↓	↓	↓
Lipids	↓			↔		↓			↓	↓		↓			↓
Blood Pressure	↓			↓		↓			↓		↓	↓	↓	↓	↓
Weight	↓			↔						↓		↓			
Knowledge			↑					↑			↑				

Table D
SMA duration and frequency

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
How Often?	Monthly	Weekly	Weekly			3 week to 3 months	Varied		Q 3 months	Biweekly	Monthly	Monthly	WeeklyX4 Then, Monthly boosterX5	WeeklyX4, then, 2 bi monthly booster	Weekly X4, then monthly booster X5
How many minutes per SMA session?	2hours	4hours	3 hours	90 minutes	1 to 4 hours	2 hours Average				2 hours	1.5 hours	90 Minutes	2 Hours	1.5 Hours	2 hours
Total Duration of SMA intervention	3 Months	3 weeks	4 weeks			Varied	4 months to 4 years		15 months	8 weeks	12 Months	3 Months	6 Months	5 Months	6 Months

Table E
SMA Diabetes Curriculum

Diabetes self-management strategies	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Medication Management	√		√		√				√		√		√	√	√
Nutrition management	√		√		√				√	√	√	√	√	√	√
Exercise	√		√		√				√	√	√		√	√	
Behavioral modification	√		√		√				√	√	√		√	√	√
Foot care	√		√								√		√		
Diabetes overview			√		√				√		√		√	√	√

Table F
SMA Logistics

SMA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Synthesis
Logistics																
Primary Care	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	12/15
Group Support	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	12/15
DM Self-management education	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	12/15
How many patients per Group session	4-20		11		8-15						20-25	6-8	4-6	4-6	4-6	4-6= 3 20-25=1 6-8= 1 8-15= 1 11= 1 4-20= 1
Inter-professional Team																
Nurse	✓	✓	✓	✓					✓		✓	✓	✓	✓	✓	11/15
Medical Provider	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	12/15
Dietitian	✓	✓							✓			✓			✓	5/15
Counselor			✓									✓				2/15
Exercise Trainer									✓							1/15
Health Psychologist					✓											1/15

Appendix D: Match of Plan to Evidence

Table G
Match of Plan to Evidence

Intervention	Evidence
Baseline data will be collected pre/post	1,2,4
SMA will include medical management, peer support and DSME	1,2,3,4,5,9,10,11,12,13,14,15
SMA will be held weekly x4 then booster x2	3,4,13,14,15
SMA will last 2 hours/session with intervention duration of 3 months	1,7,10,12,13,15
DSME curriculum will include: medication management, nutrition, exercise management, foot care, diabetes overview and behavior modification	1,3,5,9,10,11,13,14,15
SMA groups per session will include 4-6 patients	1, 13,14,15
The inter-professional team will include at least a medical provider and a nurse	1,2,3,4,5,9,11,12,13,14,15
Outcome measure will include A1C, BMI, Lipid values, and knowledge	A1C- 1,2,3,4,5,9,11,12,13,14,15 Lipid values- 1,4,6,9,10,12,15 BP- 1,4,6,9,11,12,13,14,15 Weight- 1,4,10,12 Knowledge- 3,8,11

Appendix E: Intervention Plan

Table H
Intervention Plan

When-Date	Who	What	Where	How
January 19th, 2018/ Week 0 pre-implementation	NP Registered Nurse (RN) Medical Assistant (MA)	Staff education/In-service	Clinic nurses station	<ul style="list-style-type: none"> • Presentation, • Logistics/protocol discussion, • Mock SMA • Resource review • SMA schedule review
March 23 rd , 2018/Week 1 implementation	MA	<ul style="list-style-type: none"> • Patient registration 	Receptionist desk	Using EPIC EMR
	RN	<ul style="list-style-type: none"> • Vital signs including weight and BP 	Group room	Using Welch Allyn Dinnamap
	NP	<ul style="list-style-type: none"> • Baseline data collection (A1C, BP, Lipid values, Knowledge) 	Group room	<p>A1c, BP, Lipid values, queried from EPIP EMR and transferred to Excel sheet</p> <p>Knowledge test was administered using University of Michigan Diabetes Research Training Center(UMDRTC) diabetes knowledge test</p>
	NP	<ul style="list-style-type: none"> • Patient chart review 	Provider office	Going through each chart one by one
	Patients, NP, RN, MA	<ul style="list-style-type: none"> • Introduction and Ice breaker session 	Group room	Each staff introduced him/herself and each patient did the same. HIPPA reminder was discussed during this session
	NP	<ul style="list-style-type: none"> • Medical management 	Group room	NP sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1C and medication management with the participation of the group as peer support. This lasted 5-10 minutes per patient
	NP RN	<ul style="list-style-type: none"> • Diabetes Self-Management Education (DSME) 	Group room	<p>Presentation using, pictures, handouts, and cards. Topic included: Diabetes overview(basics) including pathophysiology, acceptable lab values for A1c, hypoglycemia, glucose monitoring and complications; medication management, nutrition management, exercise, foot care and behavioral modification</p> <p>Week 1 education focused on diabetes overview: Pathophysiology, and acceptable values for A1C. ADA professional resources handouts on diabetes</p>

When-Date	Who	What	Where	How
				pathophysiology and A1C was utilized. The mode of delivery was discussion/demonstration/handouts. This lasted for 60 minutes
	NP RN Patients	<ul style="list-style-type: none"> Peer support in the group 	Group room	Patients asked questions, and they were also shared their success stories with their peers in the group. Patients who were doing well with meeting their glycemic goals were praised and were encouraged to lead the discussion and educate those who are struggling with meeting their glycemic targets. Peers provided support as necessary. This lasted for 30 minutes
	NP	<ul style="list-style-type: none"> Visit conclusion and goals 	Group room	The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before next meeting by writing the goal down on a paper. The session was adjourned until next week Thursday.
March 29 th , 2018/Week 2	MA	<ul style="list-style-type: none"> Patient registration 	Receptionist desk	Using EPIC EMR
	RN	<ul style="list-style-type: none"> Vital signs including weight and BP 	Group room	Using Welch Allyn Dinnamap
	NP	<ul style="list-style-type: none"> Patient chart review 	Provider office	Going through each chart one by one
	Patients, NP, RN, MA	<ul style="list-style-type: none"> Introduction and Ice breaker session 	Group Room	Each staff introduced him/herself and each patient did the same. HIPPA reminder was discussed during this session
	NP	<ul style="list-style-type: none"> Medical management 	Group room	NP sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1C and medication management with the participation of the group as peer support. Each patients progress was discussed in the group. Peers provided support as necessary. This lasted 5-10 minutes per patient
	NP RN	<ul style="list-style-type: none"> DSME 	Group room	Presentation using, pictures, and handouts. Week 2 education focused on Diabetes overview: hypoglycemia and glucose monitoring. American Diabetes Association (ADA) professional resource handouts on hypoglycemia and glucose monitoring. Defining what is hypoglycemia? What can you do to avoid it? What are the signs and symptoms of hypoglycemia? What are the complications of hypoglycemia?

When-Date	Who	What	Where	How
				What types of food can you eat to avoid hypoglycemia? This lasted for 60 minutes
	NP RN	<ul style="list-style-type: none"> Peer support in the group 	Group room	Patients asked questions, and they were also encouraged to share their success stories with their peers in the group. Patients who are doing well with meeting their glycemic goal were praised and were encouraged to lead the discussion and educate those who are struggling with meeting their glycemic targets. This lasted for 30 minutes
	NP	<ul style="list-style-type: none"> Visit conclusion and goals 	Group room	The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before next meeting by writing the goal down on a paper. The session was adjourned until next week Friday.
April 6 th , 2018/Week 3	NP	<ul style="list-style-type: none"> Patient registration 	Receptionist desk	Using EPIC EMR
	RN	<ul style="list-style-type: none"> Vital signs including weight and BP 	Group Room	Using Welch Allyn Dinnamap
	NP	Patient chart review	Provider Office	Going through each patient chart in EPIC EMR
	Patients, NP, RN, MA	<ul style="list-style-type: none"> Introduction and Ice breaker session 	Group room	Each staff introduced him/herself and each patient did the same. HIPPA reminder was discussed during this session
	NP	<ul style="list-style-type: none"> Medical management 	Group room	NP sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1C and medication management with the participation of the group as peer support. Each patients progress was discussed in the group. Peers provided support as necessary. This lasted 5-10 minutes per patient
	NP RN	DSME	Group room	Presentation using, pictures, handouts. Week 3 education was focused on diabetes complications and medication management. American Diabetes Association (ADA) professional resource handouts on hypoglycemia and glucose monitoring. We discussed about oral diabetes medications and importance of adherence, identifying the ones that are insulin sensitizers and the ones that can cause hypoglycemia. We also discussed insulin including self-titration using

When-Date	Who	What	Where	How
				sliding scale, appropriate injection sites, and potential for hypoglycemia. Complications education will include macrovascular complications (coronary artery disease, stroke and peripheral artery disease) and microvascular complications (retinopathy, nephropathy and neuropathy). This lasted for 60 minutes
	NP RN	<ul style="list-style-type: none"> Peer support in the group 	Group room	Patients asked questions, and they were also encouraged to share their success stories with their peers in the group. Patients who are doing well with meeting their glycemic goal were praised and were encouraged to lead the discussion and educate those who are struggling with meeting their glycemic targets. This lasted for 30 minutes
	NP	<ul style="list-style-type: none"> Visit conclusion and goals 	Group room	The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before next meeting by writing the goal down on a paper. The session was adjourned until next week Friday.
April 13th, 2018/Week 4	MA	<ul style="list-style-type: none"> Patient registration 	Receptionist desk	Using EPIC EMR
	RN	<ul style="list-style-type: none"> Vital signs including weight and BP 	Group room	Using Welch Allyn Dinnamap
	NP	<ul style="list-style-type: none"> Patient chart review 	Provider office	Going through each patient chart
	Patients, NP, RN, MA	<ul style="list-style-type: none"> Introduction and Ice breaker session 	Group room	Each staff introduced him/herself and each patient did the same. HIPPA reminder discussed during this session
	NP	<ul style="list-style-type: none"> Medical management 	Group room	NP sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1C and medication management with the participation of the group as peer support. Each patients progress was discussed in the group. Peers provided support as necessary. This lasted 5-10 minutes per patient
	NP RN	<ul style="list-style-type: none"> DSME 	Group room	Presentation using videos, pictures. Week 4 education focused on nutrition management and exercise. Association (ADA) professional resource handouts on nutrition management and exercise. We

When-Date	Who	What	Where	How
				talked about carbohydrate counting, nutrition labels, “my food plate”, eating out, meal planning, heart healthy eating, food substitution, low fat diet, and DASH diet. We also talked about types of exercise, barriers to exercises, adopting an exercise regimen, and exercise and blood sugar. This lasted for 60 minutes
	NP RN	<ul style="list-style-type: none"> Peer support in the group 	Group room	Patients asked questions, and they were encouraged to share their success stories with their peers in the group. Patients who are doing well with meeting their glycemic goal were praised lead the discussion and educate those who were struggling with meeting their glycemic targets. This lasted for 30 minutes
	NP	<ul style="list-style-type: none"> Visit conclusion and goals 	Group room	The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before next meeting by writing the goal down on a paper. The session was adjourned until next 4 weeks
April 20 th ,2018/ Week 5	Patients NP	<ul style="list-style-type: none"> Individual Medical Appointment (IMA) Patient goals No Shared Medical Appointment (SMA) this week 	<ul style="list-style-type: none"> Clinic Home 	NP continued with the IMA, and also reviewed the process outcomes to make sure everything is on target. Patients prepared and work on their individual goals. NP prepared for the booster session and reviewed the education materials for that session
April 30 th , 2018/ Week 6	NP	<ul style="list-style-type: none"> Project milestone 	Provider office	Evaluation of # of patients still attending the SMA sessions by reviewing the SMA census.
April 27 th , 2018 /Week 6 Booster session	MA	<ul style="list-style-type: none"> Patient registration 	Receptionist desk	Using EPIP EMR
	RN	<ul style="list-style-type: none"> Vital signs including weight and BP 	Group room	Using Welch Allyn Dinnamap
	NP	<ul style="list-style-type: none"> Patient chart review 	Provider office	Going through each patient chart
	Patients, NP, RN, MA	<ul style="list-style-type: none"> Introduction and Ice breaker session 	Group room	Each staff introduced him/herself and each patient did the same. HIPPA reminder discussed during this session
	NP	<ul style="list-style-type: none"> Medical management 	Group room	NP sequentially attended to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1C and

When-Date	Who	What	Where	How
				medication management with the participation of the group as peer support. Each patients progress was discussed in the group. Peers provided support as necessary. This lasted 5-10 minutes per patient
	RN	<ul style="list-style-type: none"> • DSME 	Group room	Presentation using, pictures, handouts. Week 8 education will focus on foot care. This education was conducted by the clinic RN in the group room using American Diabetes Association (ADA) professional resource handouts on diabetic foot care. Proper foot care for diabetics, diabetes foot ulcers, when to visit podiatrist will be discussed. This lasted for 60 minutes
	NP RN	<ul style="list-style-type: none"> • Peer support in the group 	Group room	Patients asked questions, and they were encouraged to share their success stories with their peers in the group. Patients who are doing well with meeting their glycemic goal were praised and lead the discussion and educate those who were struggling with meeting their glycemic targets. This lasted for 30 minutes
	NP	<ul style="list-style-type: none"> • Visit conclusion and goals 	Group room	The session ended with each patient setting a clear achievable goal as to how they plan to improve their diabetes management before next meeting by writing the goal down on a paper. The session was adjourned until next 4 weeks
May 4 th , 2018 /Week 7	Patients NP	<ul style="list-style-type: none"> • IMA • Patient goals • No SMA this week 	<ul style="list-style-type: none"> • Clinic • Home 	NP continued with the IMA and reviewed the process outcomes to make sure everything is on target. Patients prepared and worked on their individual goals.
May 11 th , 2018/ Week 8	MA	<ul style="list-style-type: none"> • Patient registration 	Receptionist desk	Using EPIP EMR
	RN	<ul style="list-style-type: none"> • Vital signs including weight and BP 	Group room	Using Welch Allyn Dinnamap
	NP	<ul style="list-style-type: none"> • Patient chart review 	Provider office	Going through each patient chart
	Patients, NP, RN, MA	<ul style="list-style-type: none"> • Introduction and Ice breaker session 	Group room	Each staff introduced him/herself and each patient did the same. HIPPA reminder will be discussed during this session
	NP	<ul style="list-style-type: none"> • Medical management 	Group room	NP sequentially attend to each patient in the group starting with brief medical history first, followed by brief physical examination and finally, discussion of the lab results including hemoglobin A1C and medication management with the

When-Date	Who	What	Where	How
				participation of the group as peer support. Each patients progress was discussed in the group. Peers provided support as necessary. This lasted 5-10 minutes per patient
	NP	<ul style="list-style-type: none"> • DSME 	Group room	Presentation using, pictures, handouts. Week 12 education focused on behavioral modification. NP utilized motivational interviewing techniques, and topics included readiness to change. This lasted for 60 minutes
	NP RN	<ul style="list-style-type: none"> • Peer support in the group 	Group room	Patients asked questions, and they were encouraged to share their success stories with their peers in the group. Patients who are doing well with meeting their glycemic goal were praised and lead the discussion and educate those who might be struggling with meeting their glycemic targets. This lasted for 30 minutes
	NP	<ul style="list-style-type: none"> • Visit conclusion 	Group room	The SMA session ended with the same knowledge test that was administered on the first day of the implementation using University of Michigan Diabetes Research Training Center Diabetes Knowledge Test. The results were compiled and enter Excel sheet for analysis. Each patient set a clear achievable long-term goal as to how they plan to improve their diabetes management by writing the goal down on a paper. This session will conclude the SMA sessions. All the patients were thanked for their attendance.

Appendix F: Model for Evidence Based Practice Change

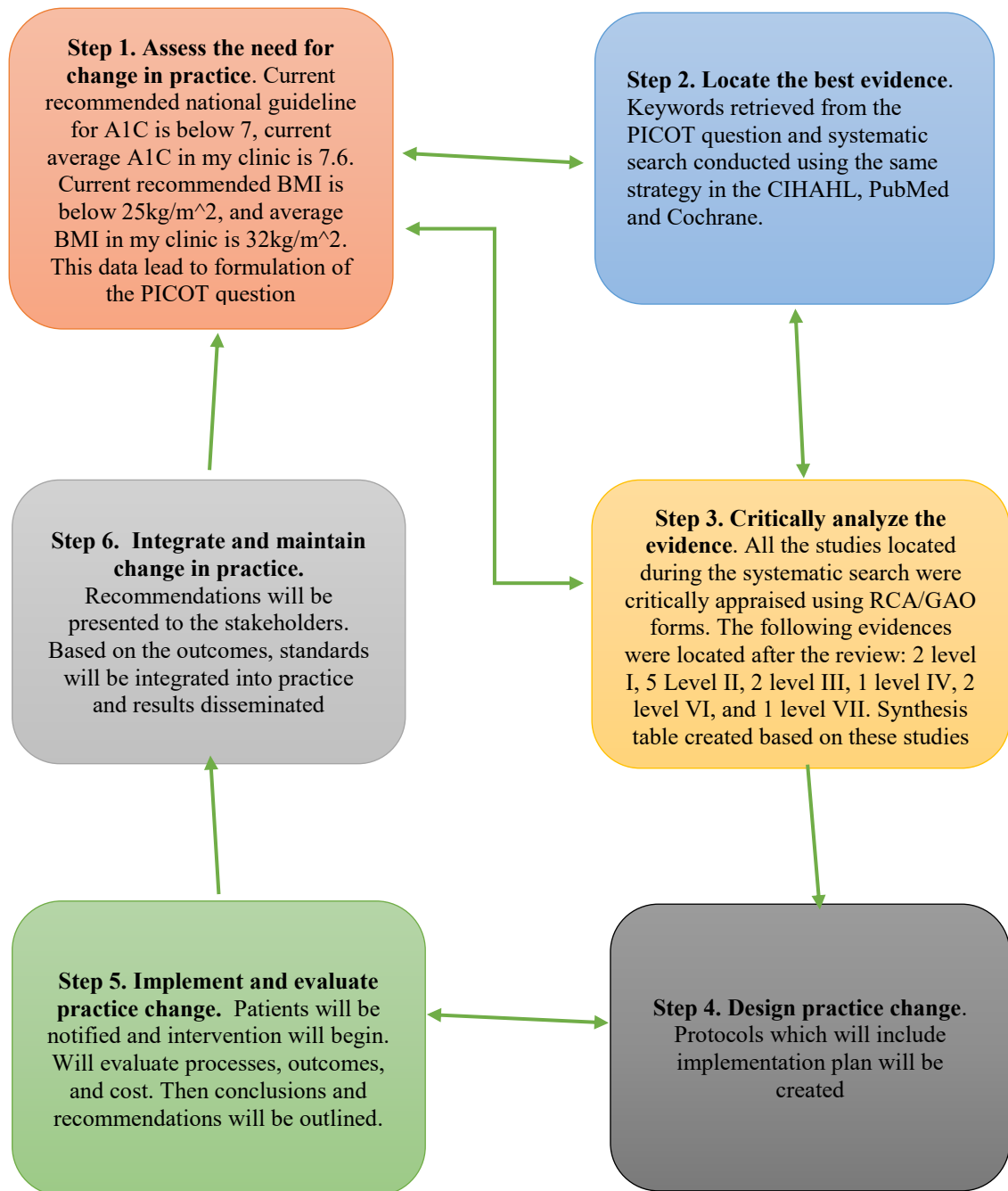


Figure 1.1. Model for Evidence Based Practice Change

Appendix G: Health Belief Model

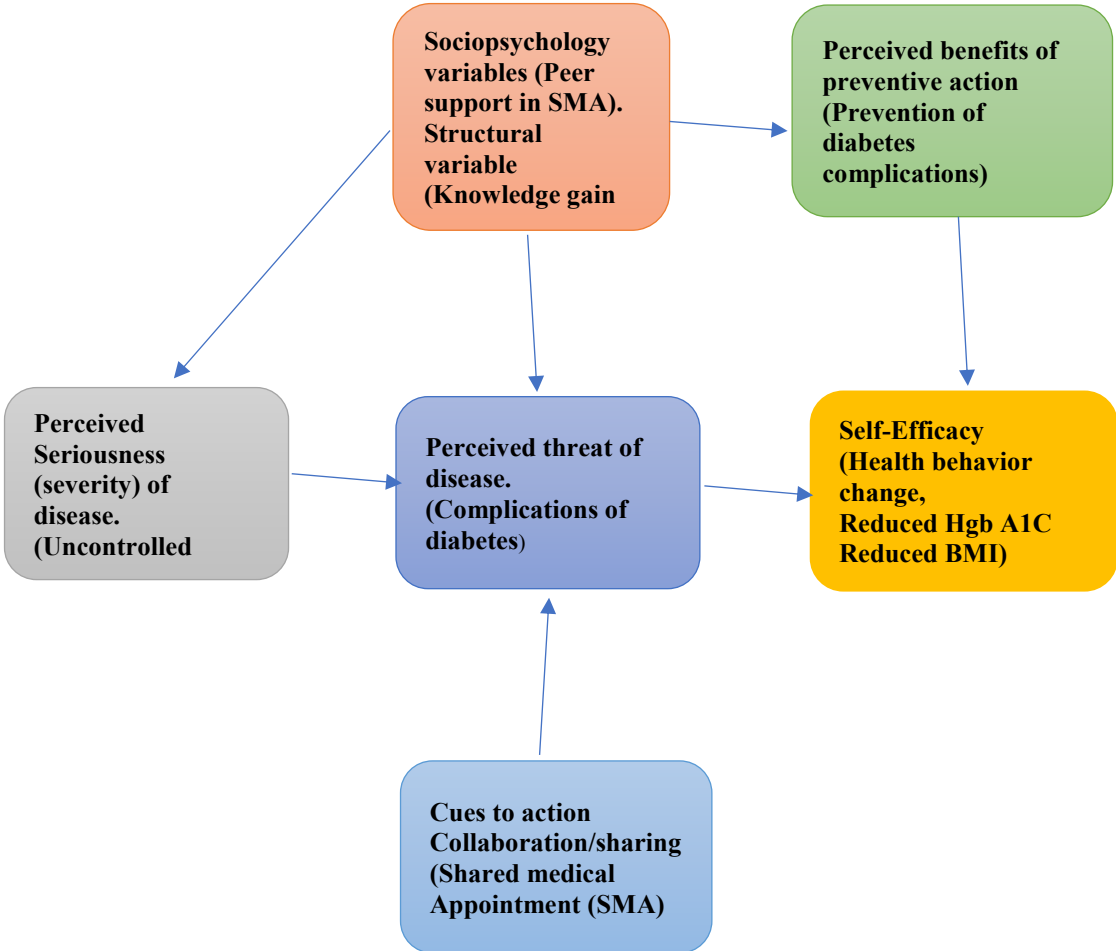
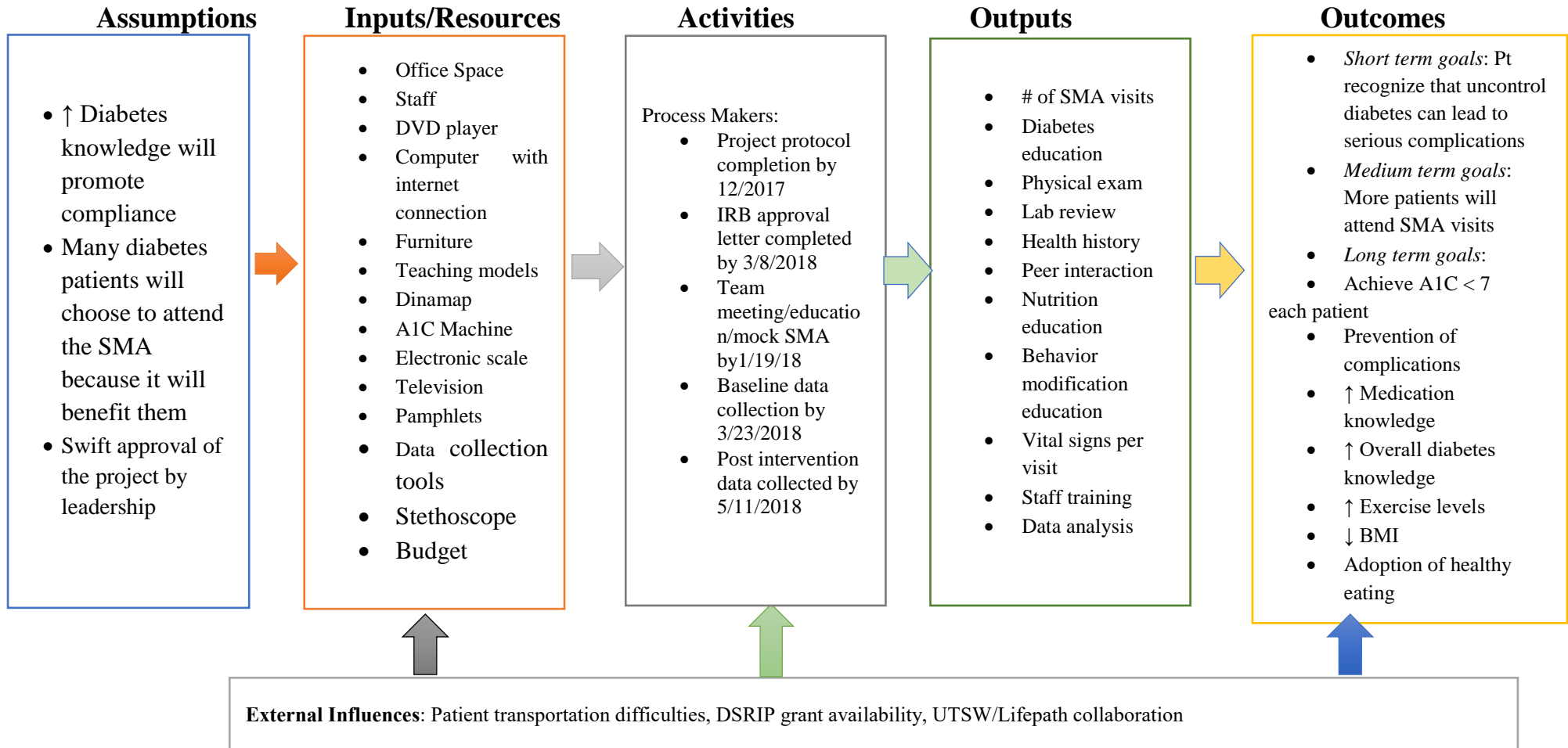


Figure 1.2. Health Belief Model

Appendix H: Logic Model



Legend: ↑=increased; SMA=shared medical appointment; ↓=decreased

Figure 1.3. SMA Logic model

Appendix I: Shared Medical Appointment Process Outcomes

Table I

SMA process outcomes with measurements

Estimated date of completion	Process Maker	Measurement
1/19/18	IRB proposal complete and submit for review	Check Mark
3/8/18	Final IRB approval for the project	Check Mark
12/15/17	Project Protocol completion	Check Mark
1/19/18	Staff education on protocol	Completion rate
3/23/18	Project Implementation and baseline data collection	A1C- Query from Epic BMI- Query from Epic Lipid values- Query from EPic BP- Welch Allyn Dinnamap Knowledge- Diabetes knowledge test
4/30/18	Project milestone assessment to check if datelines are being met	Check mark
4/30/18	Number of patients who continue to show for SMA sessions	# of attendance per session
5/11/18	Final data collection for A1C and BMI	Intake data collection form

Appendix J: Diabetes Care Cost

Table J

Average diabetes care cost comparing clinic visit, hospital inpatient and emergency room visit

Values	Diabetes Management Clinic	Emergency Room	Inpatient
Encounters	1096	320	539
Avg Length of Stay	0.00	0.00	5.21
Avg of total Charges	\$298	\$2,682	\$27,992
Avg Reimbursement	\$167	\$834	\$11,144

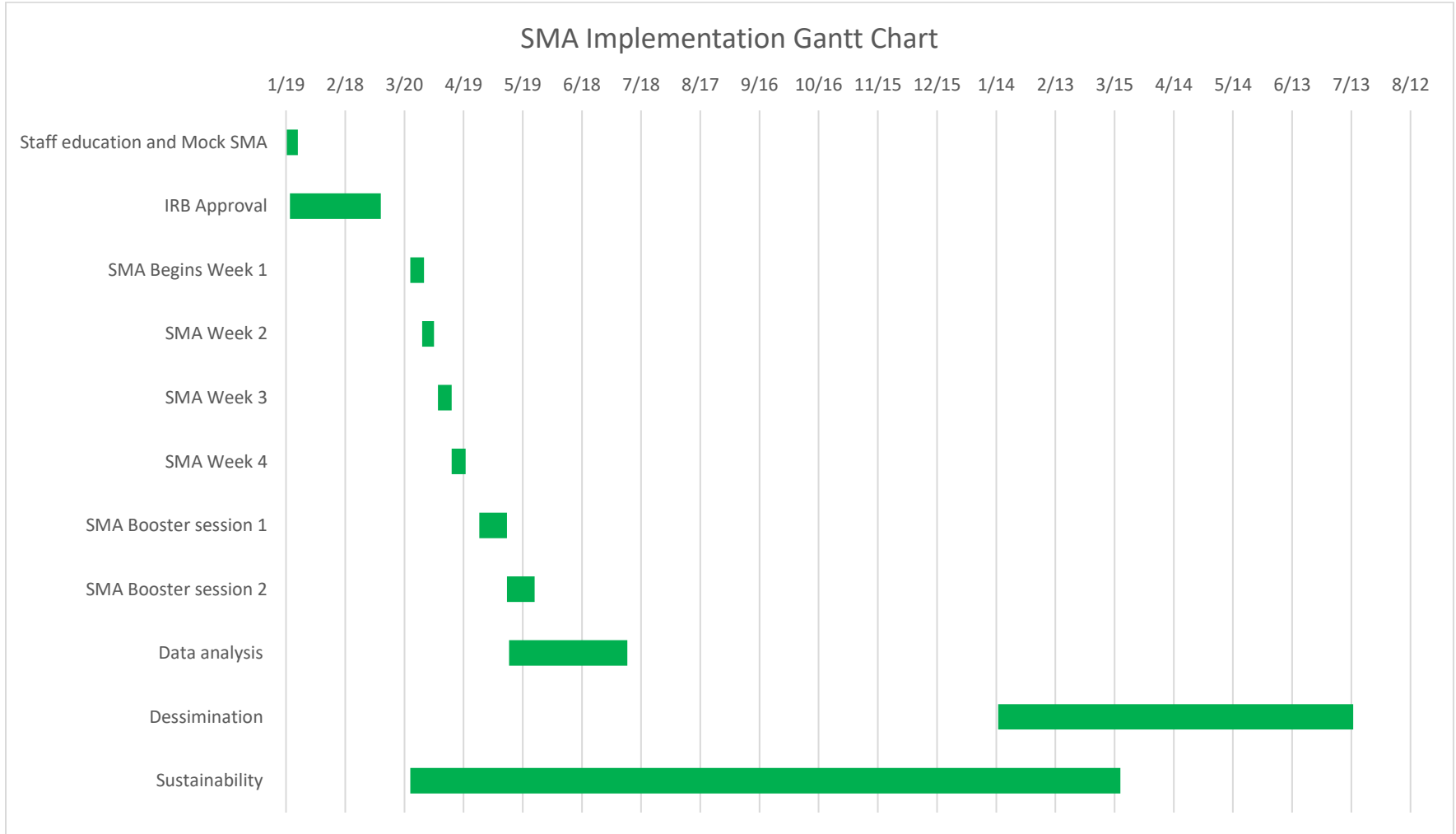
Appendix K: SMA Implementation Budget

Table K
SMA implementation budget

SMA Project Budget														
Expenses	Quantity	Unit Price	Total											
Rent per month	3	\$ 2,083.00	\$ 6,250.00											
Utility cost	3	\$ 667.00	\$ 2,000.00											
Dinamap	1	\$ 2,600.00	\$ 2,600.00											
A1C Machine	1	\$ 2,740.00	\$ 2,740.00											
Computers	3	\$ 1,500.00	\$ 4,500.00											
Electronic Scale	1	\$ 473.00	\$ 473.00											
Paper	5	\$ 3.72	\$ 18.60											
Monofilament	2	\$ 64.14	\$ 128.28											
Otoscope	1	\$ 85.00	\$ 85.00											
Stapler	2	\$ 27.99	\$ 27.99											
Printer Ink	3	\$ 31.99	\$ 95.97											
Printer/Scanner	1	\$ 99.99	\$ 99.99											
Microalbumin machine	1	\$ 873.75	\$ 873.75											
Microalbumin Strip	1	\$ 98.79	\$ 98.79											
Otoscope probe box	1	\$ 33.56	\$ 33.56											
NP Salary/Hr	22	\$ 55.00	\$ 1,210.00											
RN Salary/Hr	22	\$ 33.00	\$ 726.00											
CMA salary/Hr	22	\$ 14.00	\$ 308.00											
		Total	\$ 22,268.93											

Appendix L: Gantt Chart

Table L
Gantt showing SMA implementation timeline



Appendix M: SMA Results

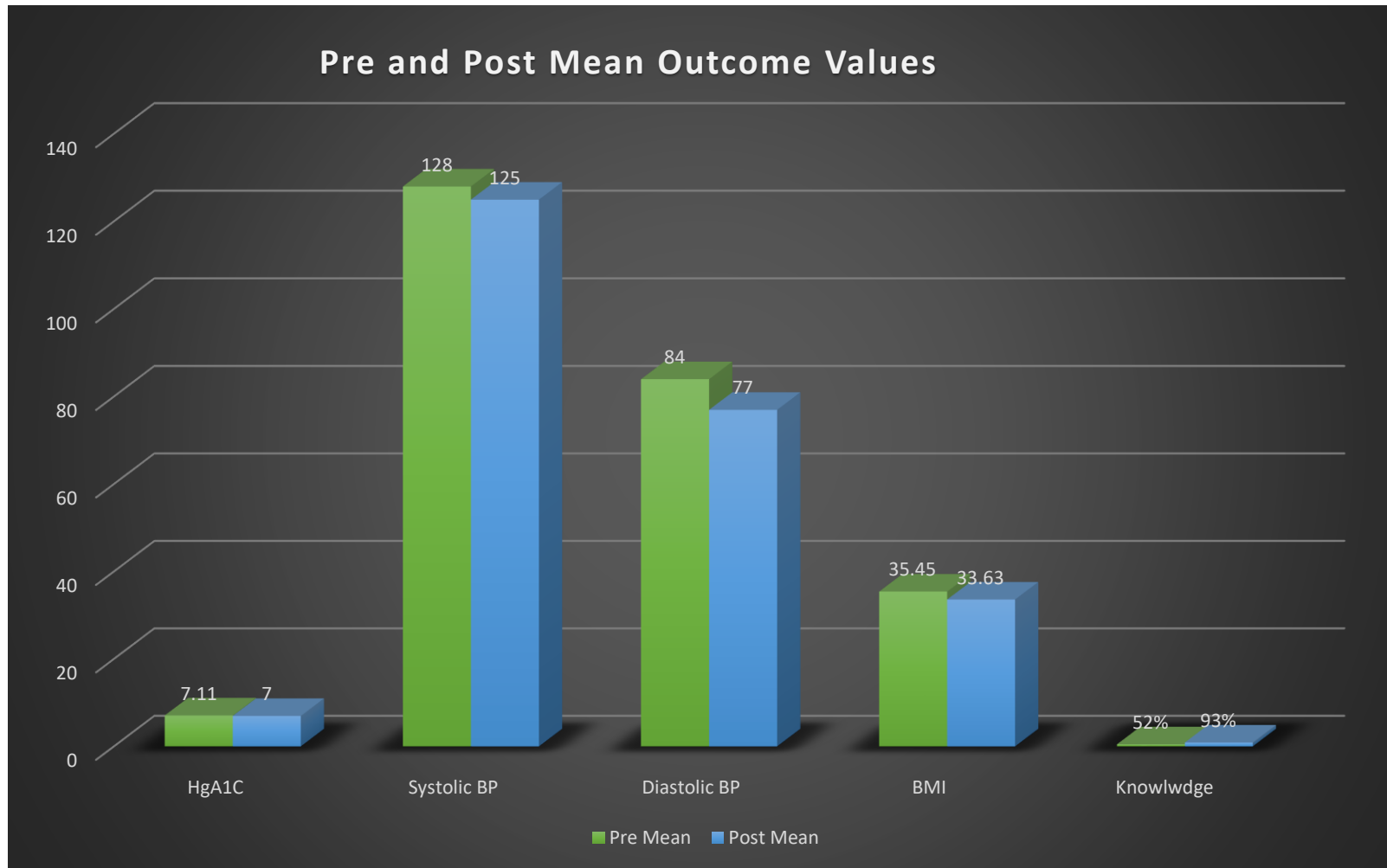


Figure 1.4. Pre and post mean outcome SMA intervention values.

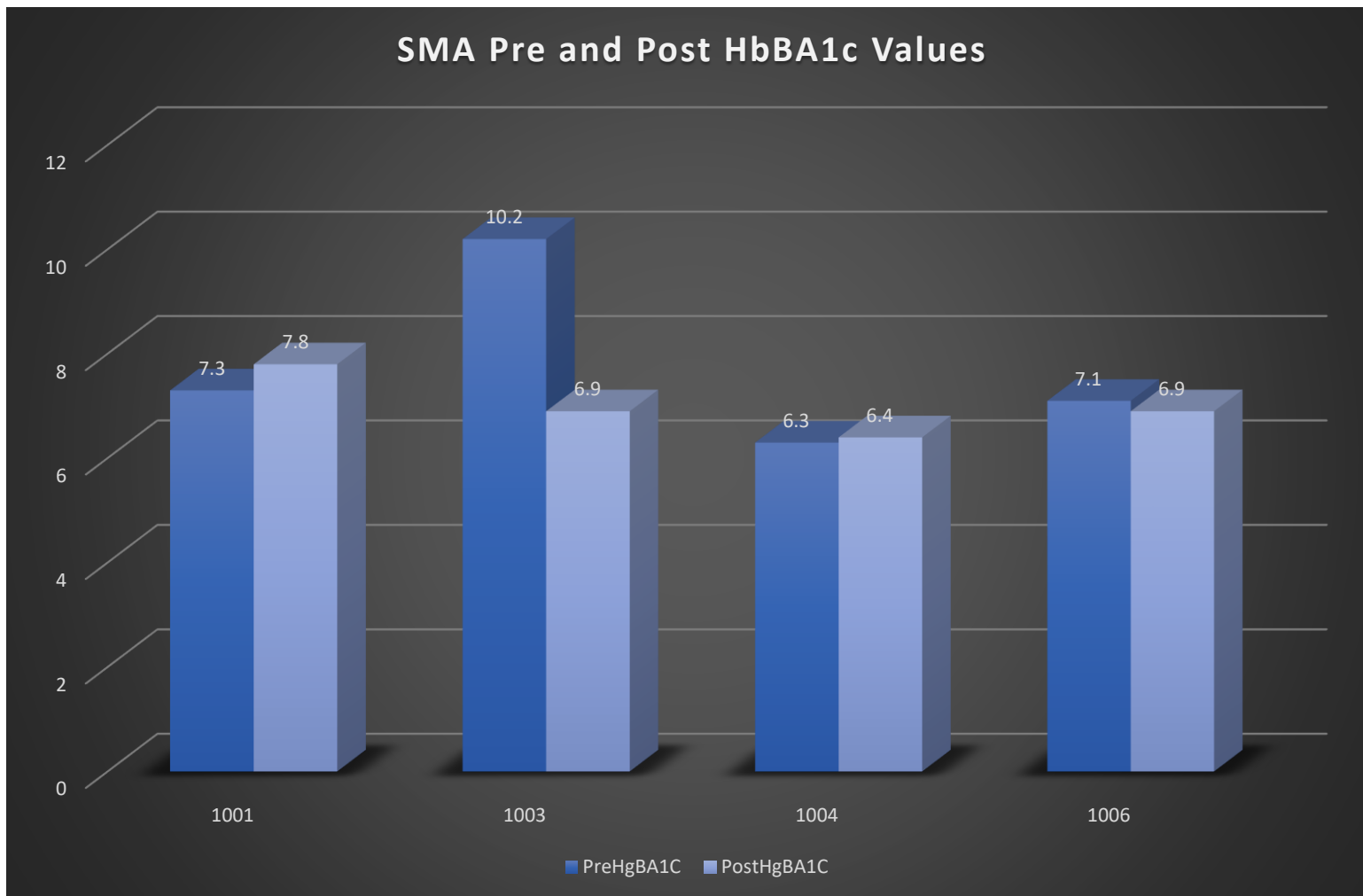


Figure 1.5. SMA pre and post hemoglobin A1C values

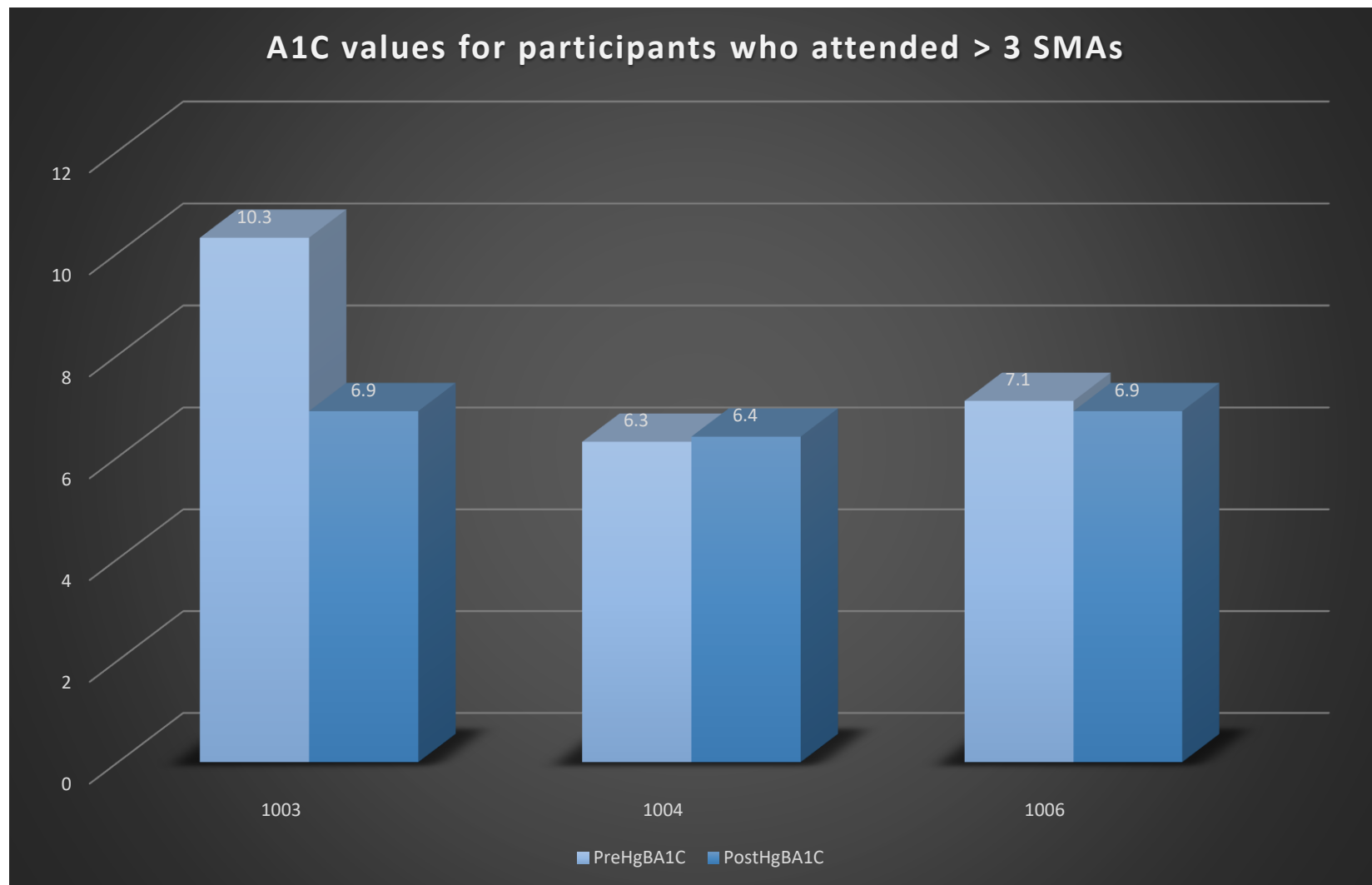


Figure 1.6. A1C Values for Participants who attended >3 SMAs

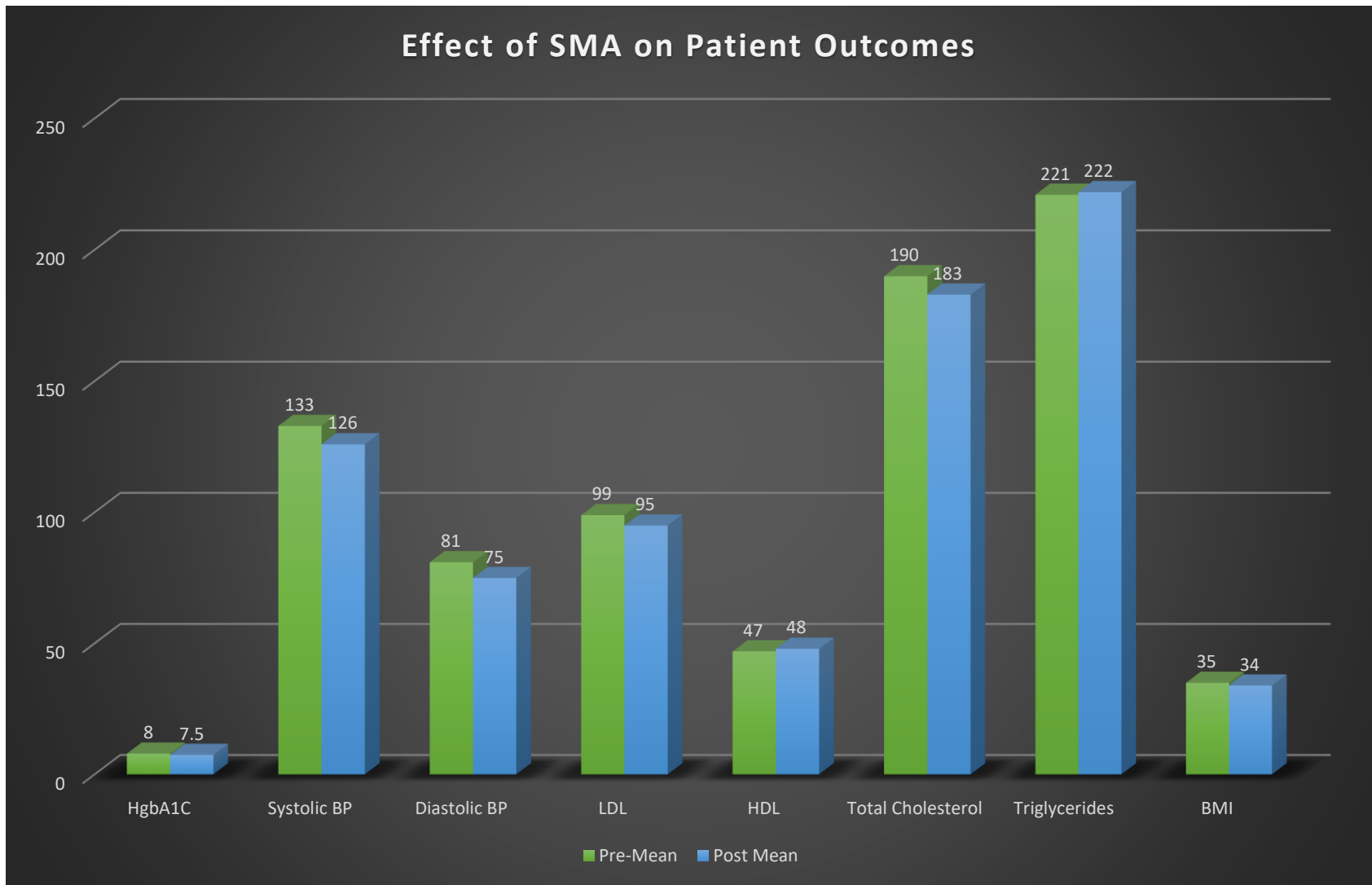


Figure 1.7. Effect of SMA on Patient Outcomes

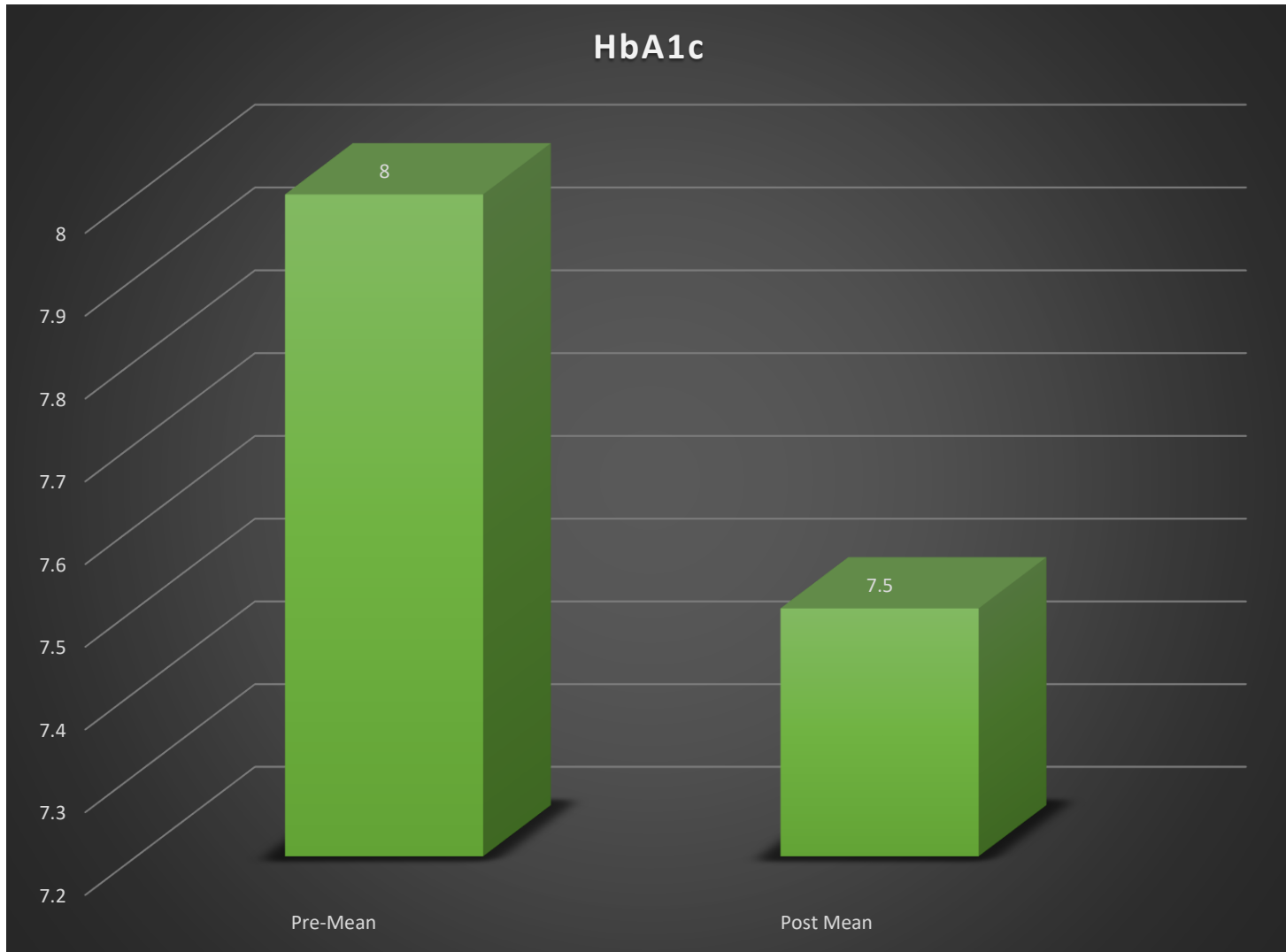


Figure 1.8. Pre and Post Mean A1C

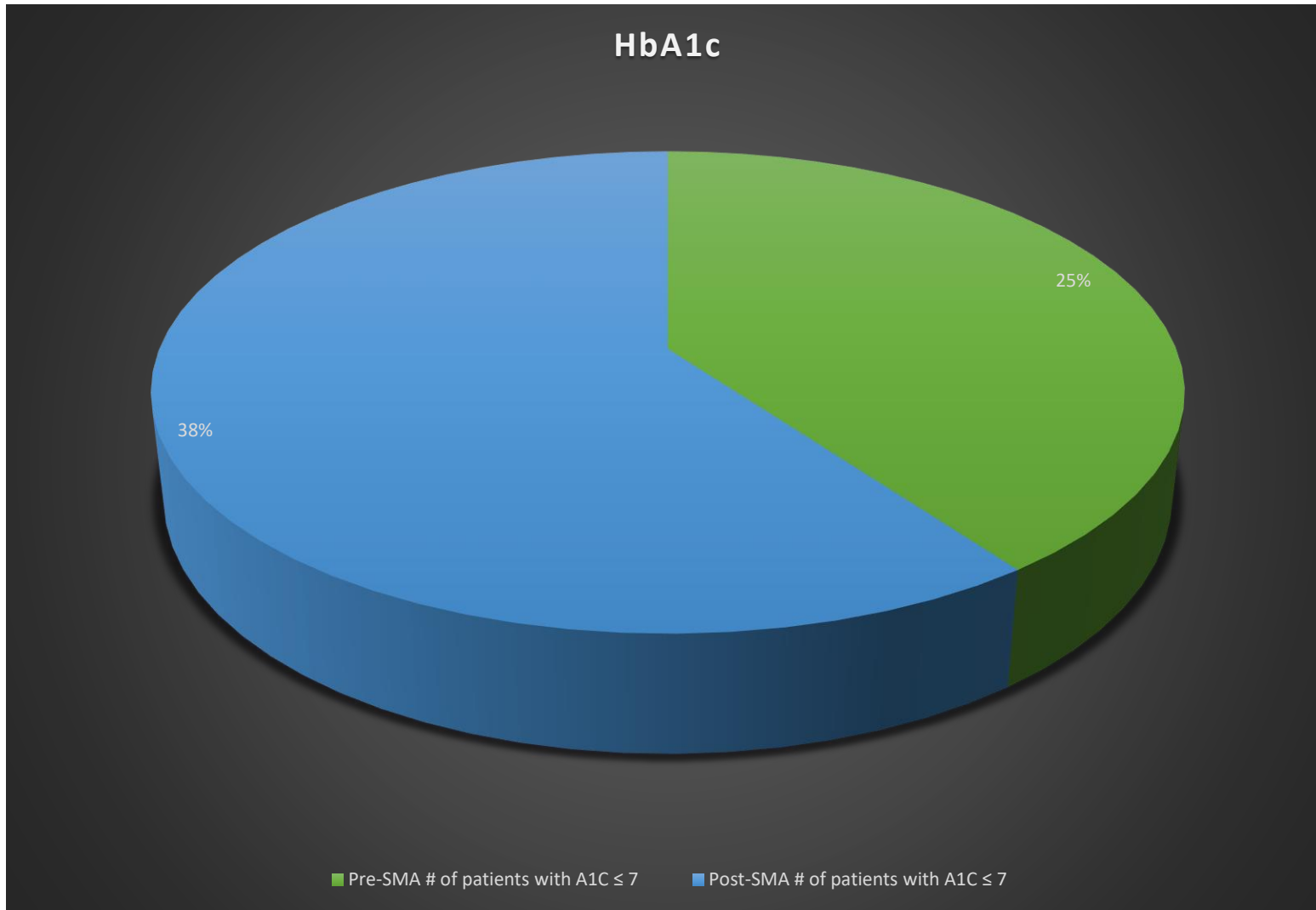


Figure 1.9. Percent of patients at A1C goal post SMA intervention

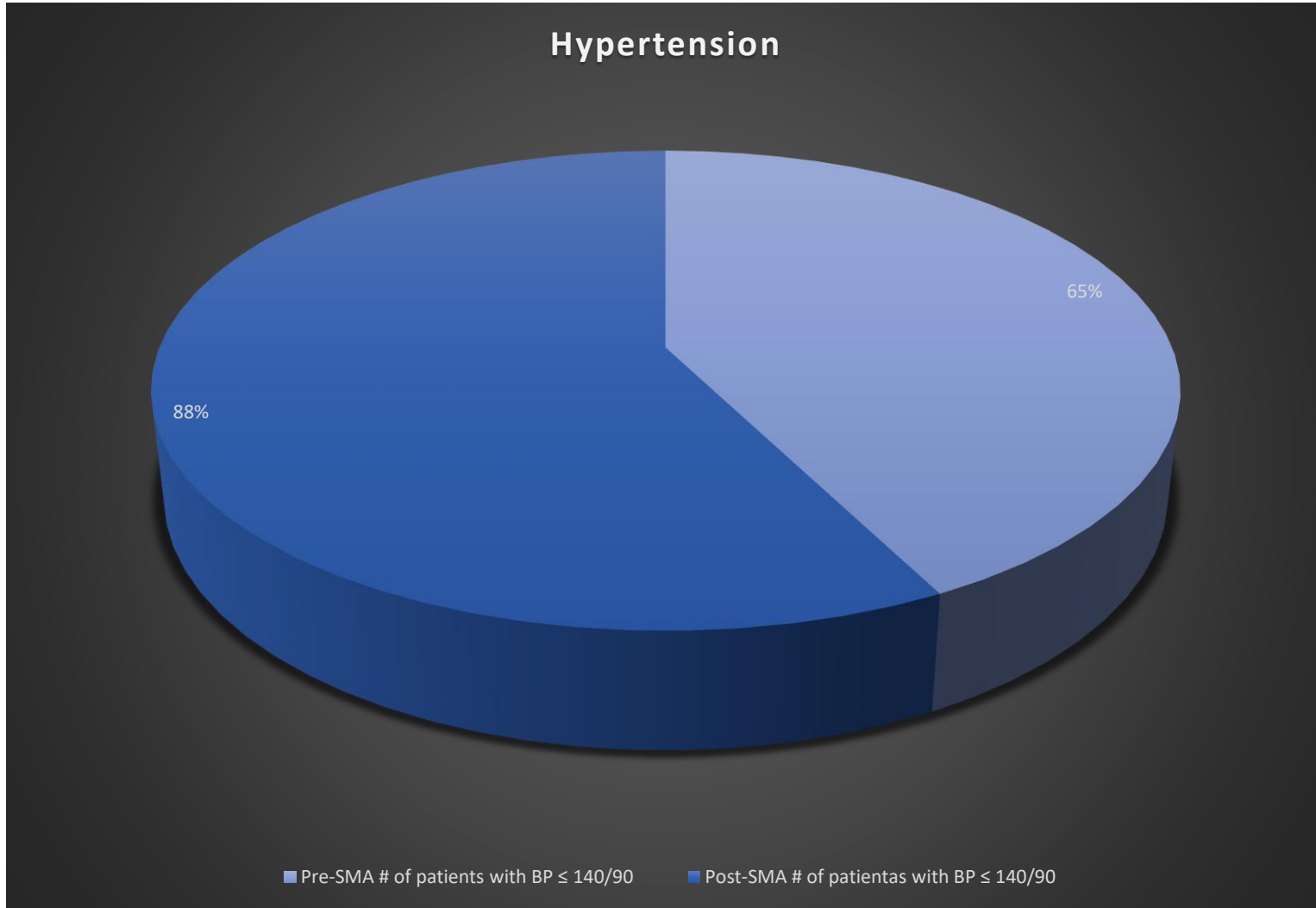


Figure 2.0. Percent of patients at blood pressure goal post SMA intervention

Table M: *SMA Clinical Outcomes, N=17*

Outcome Measure	Pre-Mean	Post-Mean	<i>p</i> value (paired t-test)
HbA1c (%)	8.0	7.5	0.139
Systolic BP (mmHg)	133	126	0.145
Diastolic BP (mmHg)	81	75	0.043
LDL (mg/dl)	99	95	0.433
HDL (mg/dl)	47	48	0.470
Triglycerides (mg/dl)	221	222	0.985
Total Cholesterol (mg/dl)	190	183	0.337
BMI (kg/m²)	35	34	0.139