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Formalized Diabetes Self-Management Education in a Safety-Net Clinic

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Structured Abstract

Diabetes is a complex and chronic illness requiring continuous medical care with multifactorial risk reduction strategies (American Diabetes Association [ADA], 2021). More than 37 million Americans are suffering from diabetes and 90% of them have Diabetes Mellitus Type 2 (DMT2) (Centers for Disease Control and Prevention, 2021). The purpose of this article is to review the background, an organizational assessment, a literature review, and the results of the quality improvement project that took place at a safety-net clinic in the Midwest. This project included 16 patients and data was analyzed through descriptive statistics. Results include improved hemoglobin (Hg) A1c, Body Mass Index (BMI), weight, blood pressure, and appointment attendance. In conclusion the quality improvement project showed positive trends of clinical significance in outcome measures over a short period of time. A larger sample size is needed, over a longer period, to assess the true impact. Implications from this project include increasing participant participation in their care through Diabetes Self-Management Education (DSME) and Care Management (CM) encounters to achieve desired outcomes. Keywords include underserved population, safety-net clinics, Hispanic/Spanish, Diabetes, case manager, DSME, face to face visits, phone calls, quality improvement.

Introduction

The prevalence and complications rate of diabetes are higher in non-Hispanic black, Hispanic, and American Indian/Alaska Native populations (Naseman et al., 2020). Low-income or uninsured people are at greater risk for omitting recommended diabetes prevention services and have higher rates of diabetes complications and mortality (Hill-Briggs et al., 2020). As the

fastest growing racial minority in the USA, Latinos are disproportionally affected by diabetes, and their risk of developing diabetes is 66% higher than Caucasians (Fallas et al., 2020).

The common complications from controlled DMT2 include retinopathy, neuropathy, and nephropathy. Uncontrolled DMT2 with health complications can lead to increased health care spending, lower quality of life, and increased mortality. Some social determinates of health (SDoH) that may affect the underserved or under resourced Hispanic population include, but are not limited to, income, social support, education, and discrimination. To improve the morbidity, mortality, and economic impact of diabetes, The American Diabetes Association's (ADA) Standards of Medical Care in Diabetes 2020 provide current evidence-based diabetes management in which DSME is a core component.

The purpose of this article is to review the organization, current peer-reviewed knowledge, and implemented quality improvement project related to formalizing diabetes mellitus type 2 (DMT2) for the Hispanic population in a safety-net clinic in the Midwest of the United States. The safety-net clinic was established in the mid 1990's to serve underprivileged and often uninsured participants. The organization has two employed physicians, one nurse practitioner, one bachelor prepared nurse, two medical assistants, two social workers, and one chaplain. The clinic also relies on volunteers from the surrounding cities to help run the clinic.

The organizational framework that was selected to assess the organization was Burke and Litwin (1992). The chosen model succinctly breaks down factors for change as shown in Figure 1. Care management for the Hispanic population with limited resources was the primary phenomenon of interest as many participants at this clinic are disproportionately affected by the social determinants of health as described by Healthy People 2030 (2020).

To better understand the organization, a strength, weakness, opportunities, and threats analysis (SWOT) was conducted at the clinic to assess the organization and is shown in Figure 2. The SWOT revealed strengths of holistic care model, accessibility to underserved population, and team-based environment with bilingual and diverse cultured staff. One weakness included participant noncompliance due to multiple social determinants of health. Opportunities include the grant funded support applications with ongoing projects. Threats include a highly variable revenue and the risk of staff shortage due to variability. Stakeholders include participants, clinic providers, leadership team, grant donors, staff, and volunteers. Participants had the largest impact regarding this project with impact on health outcomes.

To further guide the quality improvement project, the Chronic Care Model phenomenological framework was selected (Bodenheimer et al., 2002). All four of the health care organizational aspects were included in this project with focus on self-management support, delivery system design, and clinical information systems. Figure 3 shows a clear breakdown of how the four parts of the health system can be influenced to improve outcomes, with specificity focused on self-management support, delivery system design, and clinical information systems.

A rapid, systematic review of the published literature revealed 12 articles that were applicable to this project. All studies in the review were conducted in the United States with sample sizes ranging from eight to 1277. There were a multitude of different study types for this review including four systematic reviews, one quantitative/quasi-experimental study, and one clinical pilot trial. Table 1 displays details from each article while Table 2 thematically displays findings and suggested interventions from the literature review. The themes and findings will be explained next.

SDOH impacts access to healthcare services and causes health inequalities (Allen et al., 2017). Hispanic populations are more likely to suffer from DMT2 and experience greater morbidity and mortality than other populations (Turner et al., 2020) DSME is an evidence-based strategy to reduce HbA1C and improve quality of life for DMT2 participants (Bekele et al., 2021). DSME that is culturally congruent, provided by an assigned case manager with regular weekly or monthly face to face visits is an effective way of delivering DSME (Ji et al., 2019).

Methods

Intervention

This quality improvement project intervention was focused on improving diabetes management by adult participants between their quarterly scheduled appointments through individualized, progressive, written, and verbal education from care managers through introduction of DSME. The framework and approach that was used to guide this project was the Plan-Do-Study-Act (PDSA) model. The reiterative process of the PDSA cycle is well suited for continued assessment needed for this project. The PDSA was supplemented with Powell et al., (2015) and included: readiness, stakeholder engagement, staff education, workflow adjustments, facilitation, and clinical information systems.

Readiness was assessed via the organizational assessment and interviews with staff and was part of the "plan" aspect of the PDSA cycle. Stakeholder engagement continued to be completed by monthly meetings with staff with project updates by staff and was part of the "plan and act" of the PDSA cycle. Staff education was achieved by meetings with staff/volunteers and creation of written handouts and is part of the "do" part of the PDSA cycle. Workflow adjustments continued through interviewing staff and observational data and is part of the "do, study and act" of the PDSA cycle. Clinical information systems continued to be completed via meetings with staff on how to document/upload/find needed

documents and is part of the “plan, do, and study” of the PDSA cycle. Facilitation continued through collaboration on ongoing intervention and monthly check-in meetings and is part of the “plan and act” from the PDSA cycle.

Approach

The longitudinal repeat measure design of the quality improvement project will now be discussed. Before the participant’s appointment, chart preparation occurs through the work of trained nurse volunteers. The electronic medical record (EMR) allows the volunteers to select a “Reason for Visit” thus specifying to the provider the participant’s progress in the DSME program. The selection of each appropriate Reason for Visit templates the participant’s chart with the appropriate diabetes specific history of present illness, review of systems, and order sets for essential laboratory tests, referrals, and exams. Both the clinic information system and delivery system design aspects of the Chronic Care Model were employed during this part of the quality improvement project. Participants were given readiness to change survey to assess their participation in the study. They were included in the study if they scored four or five on ready to change survey and had HgA1C 9% or greater. Enrolled participants have an appointment with their provider every three months. At each of these quarterly appointments, they were given a different educational booklet. At their first appointment, participants specifically discussed lifestyle behaviors worksheet and discussed goals. The self-management support aspect of the Chronic Care Model was employed to help guide this part of the intervention. Topics include understanding diabetes, meal planning, medications, and importance of checking blood sugar.

The lifestyle behaviors worksheet shown in Figure 4 helps participants understand domains of their life that affect their diabetes which can be changed. Goals are developed with participants and recorded and collated to assess attainment and have concrete milestones for the

participant and care team. The readiness for change assessment tool was filled out to help the provider understand participant motivation specifically related to the lifestyle behavior sheet prior to starting the program. The lifestyle behaviors sheet, goals, and readiness for change were uploaded into the participant's chart so anyone on their care team can access the information. Both participant and provider focus on behaviors and goals during visits. Viewable information creates participant rapport and supports consistent participation education. It gives all care team disciplines the opportunity to re-enforce education.

Inclusion criteria for admittance to the care management program is as follows. If participant's screening demonstrated a readiness or change and they had a HgA1C of >9%, participants were referred to care management. These applications were reviewed for approval by the two physicians and the nurse for previous engagement history. Biweekly phone calls were added for the first month from a care manager regarding personalized education, additional goal setting, or any questions. After the first month, the phone calls transitioned to monthly calls. Initially, the project started with only four participants, but the number increased to 16.

Several barriers were identified in the care management workflow process. Staff expressed that time constraint was a barrier to care management in a timely manner. This barrier was resolved by ensuring that tasks were divided as a teamwork between the staff. This was part of the PDSA cycle. Documentation of the care management encounters was also improved to make sure that each encounter was documented properly.

Measures

The measures chosen for this project are shown in detail in Table 3. Measures included hemoglobin A1C, blood pressure, body mass index, weight, appointment attendance for quarterly diabetic visits, educational booklet of focus, number of care

management phone call encounters, chart prep before each appointment, and foot exams in relation to the self-management support and delivery system design aspects of the Chronic Care Model. These measures were chosen to see if CM intervention is impacting participant outcomes and to assess intervention process.

Analysis

The data for this first cohort was collected manually through the clinic's EHR using the start date of the project as day zero and the end date 90 days post intervention. All data was de-identified. The de-identified information was placed in an Excel spreadsheet. Excel was used to create graphs and develop descriptive statistics. Data analysis was completed using "One Way Repeated Measures ANOVA with a covariate". This specific analysis was used to determine one quantitative outcome that is measured at two time points (pre and post). Each participant had a covariate which was the participation score for the intervention.

Ethical Considerations

Ethical considerations for this project include de-identified data and an approved university institutional review board quality improvement review that was also approved by the organization's medical committee. There were no potential conflicts of interest. Verbal consent was given to participate in this quality improvement project. Results for each category of measure will now be discussed.

Results

Participant outcome measures will be discussed first related to participation score. The participation score was calculated by the total number of care management contacts and educational booklet use. For HgA1C, there was minimal difference between pre and post implementation scores. However, results did show that participants with high

participation scores had lower HgA1C. This is encouraging and demonstrates clinical improvement, although the small sample size cannot show to be statistically significant at this time (p value was 0.56). The histogram for HgA1C showed that only seven out of 16 participants attended the post intervention diabetic appointment, thus they are the ones who depicted change. Two of the most elevated HgA1Cs demonstrated a decrease, one very significantly from 14% to 6% in a 3-month period. The participant that demonstrated significant improvement had a high participation score, specifically in care management phone call encounters.

The results for BMI showed that pre-intervention mean BMI was 34.80 and post-intervention mean BMI was 35.07, which is not much difference. However, the overall effect was considered which was that participants with higher participation scores tend to have lower BMI. This means that they are engaged and making lifestyle changes. The p value in this case was 0.24 which is not statistically significant, but a small sample size could be the reason.

The result for weight shows that participants who had higher participation in educational booklet use and care management phone call encounters tend to have weight on the lower side. This is encouraging and has some clinical significance, the p value for weight was also 0.27. To evaluate results for blood pressure, analysis was done separately for systolic BP and diastolic BP. The p value for systolic BP was 0.24, however the results showed that participants with high participation scores had Systolic BP close to 120. The p value for diastolic BP was 0.66, again not statistically significant but sample size was very small.

The appointment attendance was also measured, for which attending five diabetic clinic appointments was the goal for each participant. Few participants met this goal. The

ideal goal for educational booklet use was that each participant enrolled in the program gets four educational booklets; slightly more than half of participants met this goal. The rest of the participants did not meet the goal because of non-compliance with scheduled appointments. The manual chart audit of the care management participants revealed that chart prep was done correctly for all 15 participants by the volunteers with the appropriate Diabetic Clinic as the Reason for Visit. There was one participant for whom the chart prep was not done because of zero appointment attendance. Seven out of 16 participants had a foot exam documented. The rest of the participants who did not have a foot exam were the ones who did not attend their post-intervention appointment.

Discussion

The use of goal setting used in the quality improvement project aligned with literature findings. Goal setting helped the care team and participants have concrete goals to work toward (Rotberg et al., 2016). In-person visits to maintain DSME aligned with literature because while statistical significance was not demonstrated, encouraging trends in HgA1c, weight, BMI, and BP were noted (Niemiec et al., 2021; Prezio et al., 2013; Turner et al., 2020). The literature suggested using phone calls as reinforcement which can also be related to the literature because care management phone calls were done during the intervention timeframe (Turner et al., 2020). The one significant finding is that the more participants participate in DSME and care management phone calls, the participant health outcomes are better. This is a very significant result of the study. It also tells the providers that participants are engaged in their care and are ready to make necessary lifestyle changes. It also shows that DSME and care management phone calls are beneficial interventions for diabetic participants.

Limitations

One significant barrier for this project included having a population of participants that are negatively affected by social determinants of health. Poor SDoH limits the participant's accessibility to the clinic, payment, and health literacy. Additionally, many participants were undocumented immigrants and practiced avoidance of formal programming. Participant noncompliance is a big factor that is impacted by poor SDoH and may have affected study results. Another limitation includes the short timeframe. The short timeframe limited participant enrollment, data collection and ability to show statistical significance related to DMT2 management. The small sample size of 16 participants was also not enough to demonstrate statistical significance of results.

Conclusion

This quality improvement project does show some significance of DSME and care management phone calls to improve the participant health outcomes such as decrease in HgA1C, weight, BMI, and BP. Even though this is not statistically significant, it does demonstrate some clinical significance. Participant non-compliance is an issue due to poor SDoH in this safety-net clinic that may have impacted the results. Identifying an adherence champion and problem solver to ensure protocols are being followed was key in ongoing sustainability for the QI project. Additionally, continual ownership from employed physicians, regular tracking of data, and future grant application support the project sustainability. More PDSA cycles in concordance with Christoff (2018) can be done to remove participant barriers of non-compliance. It can include some incentives (5-dollar coupon) to encourage them to participate in the intervention. This project data will provide support for more grants and possible funding for an employed care manager. The potential for this project to spread to other sites is great as DSME and care management intervention can be easily used in other health systems.

Implications for Practice and Further Study in the Field

An implication for practice is that implementation of a structured DMSE with culturally care management phone call follow-ups can create positive impacts on participant health outcomes. This study involved only 16 enrolled participants; a similar study with a larger sample size could clarify results. It will also be interesting to see the results in a different health clinic which is not for the underserved population. Additionally, a future study can be done regarding identifying the best delivery method for care management such as phone calls, face to face visits, or assigned case manager.

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Titus, S. K., & Kataoka-Yahiro, M. (2021). Barriers to Access to Care in Hispanics With Type 2 Diabetes: A Systematic Review. *Hispanic Health Care International*, *19*(2), 118–130. https://doi.org/10.1177/1540415320956389

Turner, B. J., Liang, Y., Ramachandran, A., & Poursani, R. (2020). Telephone or Visit-Based Community Health Worker Care Management for Uncontrolled Diabetes Mellitus: A Longitudinal Study. *Journal of Community Health*, *45*(6), 1123–1131. https://doi.org/10.1007/s10900-020-00849-1

Figures

Figure 1. Burke and Litwin

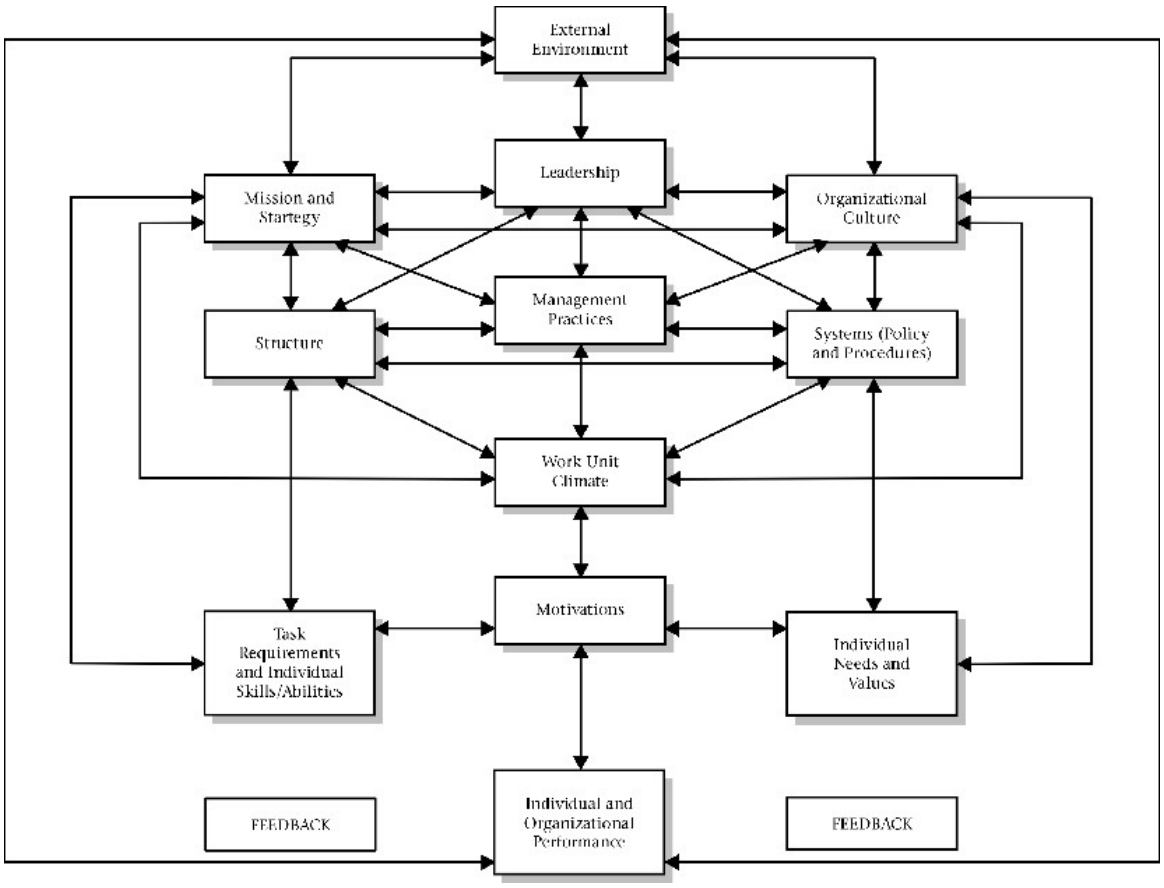


Figure 2. SWOT Analysis

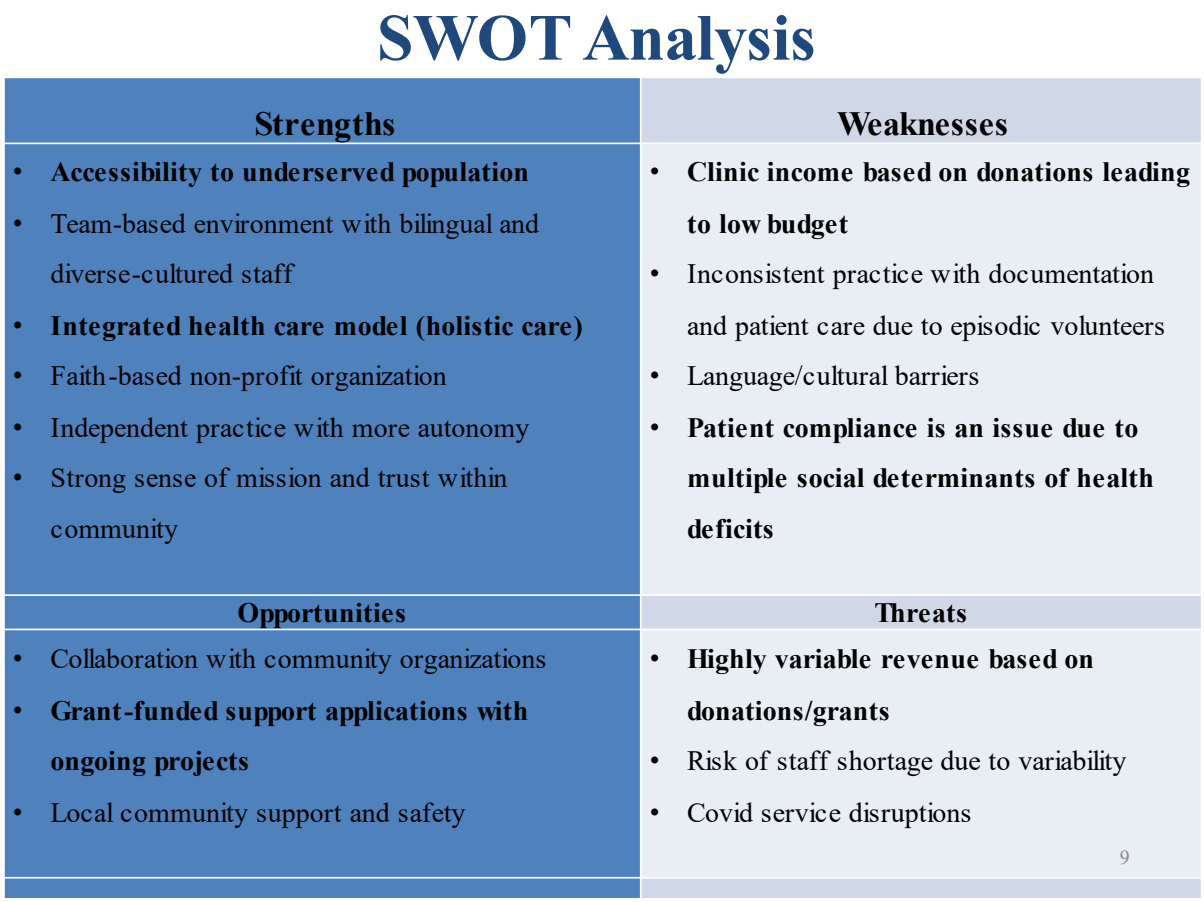


Figure 3. Chronic Care Model

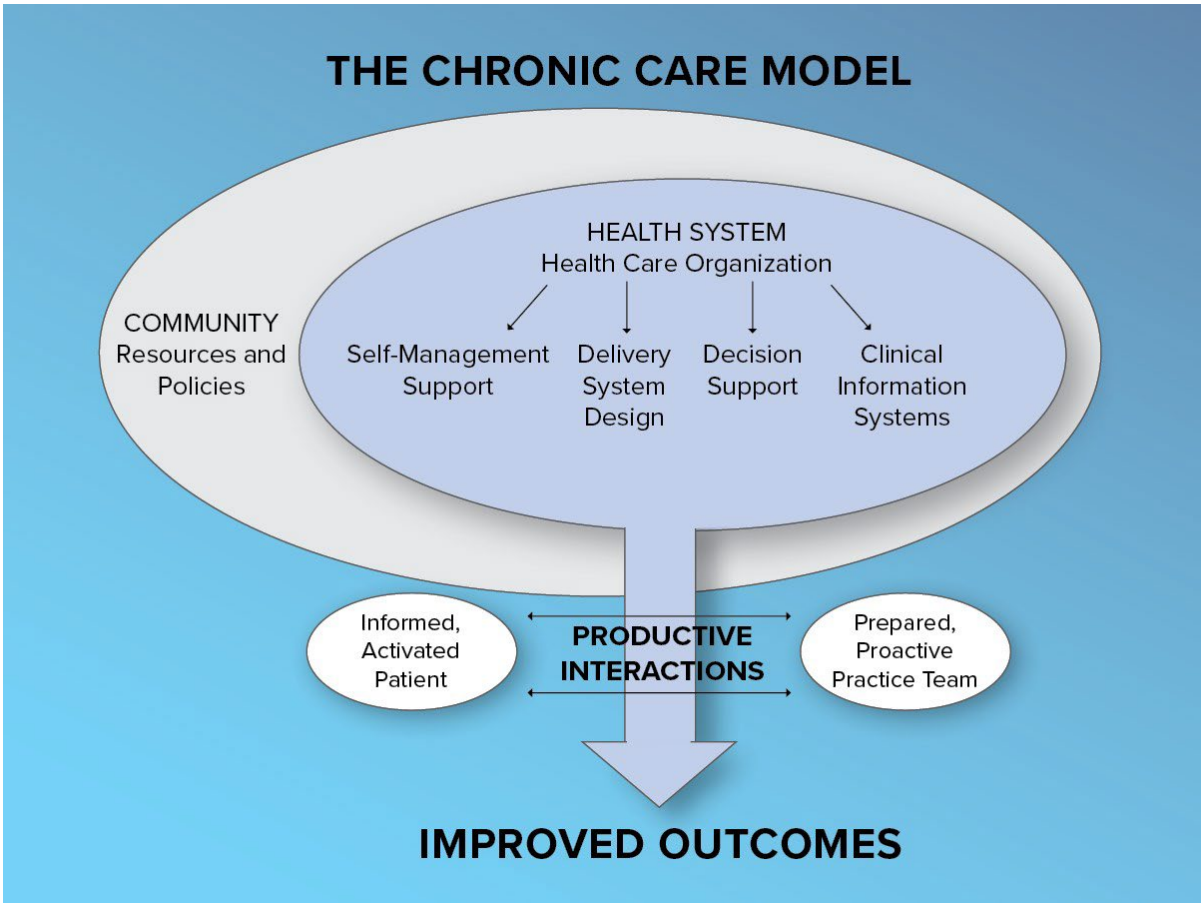


Figure 4. Lifestyle Behaviors Worksheet

Lifestyle Behaviors That Impact Your Diabetes: What You Can Do

- **Lowering & Managing Your Hemoglobin A1C (HbA1C):** This blood test will tell you overall how your diabetes is doing and measures your average blood glucose level over the previous 2-3 months.
  - ✓ **Long Term Goal** of someone with diabetes is to have an **HbA1C of <7%.**
  - ✓ **Your HbA1C now: _____**
  - ✓ **Short Term Goal: _____**
- **Increase Your Physical Activity:** Your physical activity now: ___ None ___ Occasional ___ Moderate ___ Heavy
  - ✓ **Long Term Goals:** Participate in 3 days a week (at least 150 minutes/week total) of moderate intensity aerobic physical activity (i.e., walking, jogging, swimming, etc.)
  - ✓ Participate in strength or resistance training at least twice a week
  - ✓ Reduce your time of just sitting. (i.e. no more than 90 minutes of sitting before you get up and move)
  - ✓ **Your Short Term Goal: _____**
- **Weight Loss (if needed):** A healthy weight is important to managing your diabetes. Decrease your body weight as recommended by your health care team. Your Weight Today:_____ Your BMI Today: _____
  - ✓ **Long Term Goals: Weight: _____ BMI: _____**
  - ✓ **Your Short-Term Goal: Weight: _____ BMI: _____** A good place to start is to decrease your weight by 5%.
- **Monitor Your Blood Sugar:** Maintain your fasting blood sugar range as recommended by your doctor.
  - ✓ **Target Blood Sugar: 80-130 mg/dL**
  - ✓ **Your Short Term Goal: _____**
- **Eat A Healthy Diet:** Your Diet today: ____ Excellent ____ Very Good ____ Fair ____ Poor
  Basic Recommendations:
  - ✓ Maintain optimal weight
  - ✓ Reduce Calories (if BMI is high)
  - ✓ Low Carbohydrate Diet: Limit daily carbs to 100gms/day with no meal or snack greater than 30 grams of carbs
  - ✓ Plant-based diet: high polyunsaturated and monounsaturated fatty acids
  - ✓ **Long Term Goal:** Eating Healthy is critical to taking care of your diabetes.
  - ✓ **Your Short Term Goal: _____**
- **Healthy Sleep Habits:** I currently sleep _____ hours/night.
  The quality of my sleep is: ____ Excellent ____ Very Good ____ Fair ____ Poor
  - ✓ **Long Term Goal:** 7 or more hours of quality sleep/night.
  - ✓ **Your Short Term Goal: _____**
- **Social & Behavioral Support:** What kind of emotional and social support do you have in your life today? _____ Excellent ____ Very Good _____ Fair ____ Poor
  - ✓ **Long Term Goal:** Diabetes is a challenging disease and everyone needs good support.
  - ✓ **Your Short Term Goal: _____**
- **Moderate Use of Alcohol:**
  - ✓ **Long Term Goal:** Limit use of alcohol to 1 (women) or 2 (men) standard drinks per day.
  - ✓ **Your Short Term Goal: _____**
- **No Tobacco Use:** ____ do not smoke ____1/2ppd ____1ppd ____ more than 1ppd
  - ✓ **Do you have any interest in quitting at this time? ___**

Tables

Table 1. Literature Review Table

Article	Purpose	Sample/Design/ variables/ caveats	Results	Implications
Hill-Briggs, F., Adler, N. E., Berkowitz, S. A., Chin, M. H., Gary-Webb, T. L., Navas-Acien, A., Thornton, P. L., & Haire-Joshu, D. (2020). Social Determinants of Health and Diabetes: A Scientific Review. *Diabetes Care*, *44*(1), 258–279. https://doi.org/10.2337/dci20-0053	To depict the relationship between diabetes and five SDOH: Socioeconomic status; neighborhood and physical environment; food environment; health care; and social context.	Review of Previous literature based on adults with diabetes and SDOH. It also contains review from professional organizations	SDOHs have a direct impact on biological and behavioral outcomes associated with diabetes prevention and control. Poverty, lack of quality education, or lack of health care—significantly impacts disparities in diabetes risk, diagnosis, and outcomes	This review concludes with recommendations for linkages across health care and community sectors from national advisory committees, recommendations for diabetes research, and recommendations for research to inform practice.
Berkowitz, S. A., Kalkhoran, S., Edwards, S. T., Essien, U. R., & Baggett, T. P. (2018). Unstable Housing and Diabetes-Related Emergency Department Visits and Hospitalization: A Nationally Representative Study of Safety-Net Clinic Patients. *Diabetes Care*, *41*(5), 933–939. https://doi.org/10.2337/dc17-1812	Assessed whether unstable housing was associated with increased risk for diabetes-related emergency department use or hospitalization	Data from the 2014 Health Center Patient Survey (HCPS), a cross-sectional, nationally representative survey of patients who receive care at federally funded safety-net health centers	Unstable housing is common and associated with increased risk of diabetes-related emergency department and inpatient use	Addressing unstable housing in clinical settings may help improve health care utilization for vulnerable individuals with diabetes.
Brown, F., Thrall, C., Postma, J., & Uriri-Glover, J. (2021). A Culturally Tailored	The purpose of this evidence-based	A quantitative, quasi-experimental design	Education programs that incorporate cultural elements	NPs that serve this population,

Diabetes Education Program in an Underserved Community Clinic. *The Journal for Nurse Practitioners*, *17*(7), 879–882. https://doi.org/10.1016/j.nurpra.2021.02.022	practice project was to improve glycemic control in lower socioeconomic status Hispanic/Latino patients diagnosed with DM in a medically underserved community clinic using a culturally tailored DM education program	was used to compare pre/post data of a single group of participants after a culturally tailored DM education program	have been proven successful with Hispanic/Latino patients	especially in areas where DM education is not readily available, could have more successful patient engagement and outcomes and reduce the burden of this disease if they implement culturally tailored DM education.
Miller-Rosales, C., & Rodriguez, H. P. (2021). Interdisciplinary Primary Care Team Expertise and Diabetes Care Management. *The Journal of the American Board of Family Medicine*, *34*(1), 151–161. https://doi.org/10.3122/jabfm.2021.01.200187	To examine whether care team role expertise is associated with patients' experiences of chronic care and whether the relationship is stronger for small CHC sites	Surveys of 1277 adults with diabetes that assessed nonphysician team roles involved in managing their chronic care, including community health workers, diabetes educators, nutritionists, pharmacists, mental health providers, and other general staff, were integrated with clinical and administrative data from 14 CHCs.	Patients with access to care team expertise in self-management support, including diabetes educators, nutritionists, community health workers, and other general staff report better experiences of chronic care	These team roles may reduce barriers to patient self-management and improve patients' overall experiences of chronic care, particularly in small CHC sites
Turner, B. J., Liang, Y., Ramachandran, A., & Poursani, R. (2020). Telephone or Visit-Based Community Health Worker Care	To know the effect of type of case management	Longitudinal Study: examines a pilot CHW project	DM control was less likely for CM by telephone only than face-to-face in clinic.	To benefit vulnerable patients with

Management for Uncontrolled Diabetes Mellitus: A Longitudinal Study. *Journal of Community Health*, *45*(6), 1123–1131. https://doi.org/10.1007/s10900-020-00849-1	(telephone or face to face intervention) on diabetes control for Hispanic patients	undertaken for a Texas' Transformation and Quality Improvement Program (1115 Medicaid waiver) project in urban primary care practices serving primarily Hispanic patients		uncontrolled DM, in-person engagement may be required.
Bekele, B. B., Negash, S., Bogale, B., Tesfaye, M., Getachew, D., Weldekidan, F., & Balcha, B. (2021). Effect of diabetes self-management education (DSME) on glycated hemoglobin (HbA1c) level among patients with T2DM: Systematic review and meta-analysis of randomized controlled trials. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *15*(1), 177–185. https://doi.org/10.1016/j.dsx.2020.12.030	The aim of this systematic review and meta-analysis (SRMA) was to evaluate the Diabetes Self-Management Education or Support (DSME/S) on glycosylated hemoglobin (HbA1c) among T2DM patients	Systematic Review: The relevant articles were searched from four databases: Cochrane Library, MEDLINE (EBSCOhost), MEDLINE/PubMed and SCOPUS.	In this systematic review about 85% studies revealed that the DSME was effective in reducing HbA1c among T2DM patients.	DSME can be used for better diabetes control
Ji, H., Chen, R., Huang, Y., Li, W., Shi, C., & Zhou, J. (2019). Effect of simulation education and case management on glycemic control in type 2 diabetes. *Diabetes/Metabolism Research and Reviews*, *35*(3), e3112. https://doi.org/10.1002/dmrr.3112	The aim of the study was to investigate whether simulation education (SE) and case management had any effect on glycemic control in type 2 diabetes (T2DM) patients.	Single center pilot trial	Simulation education and case management added to routine DSME effectively improved glycemic control in T2DM patients.	Both SE and CM alone or in combination cane be used to achieve better control of diabetes
Naseman, K. W., Faiella, A. S., & Lambert, G. M. (2020). Pharmacist-Provided Diabetes Education and Management in a Diverse, Medically Underserved Population. *Diabetes Spectrum*, *33*(2), 210–214.	To evaluate the intervention of Pharmacist-based case management for diabetes in an	Retrospective, descriptive study that examined change in A1C in patients with diabetes managed by	Pharmacists can be used in an expanded role to treat diverse groups of patients with diabetes. Pharmacy services should also consider targeting	The results of this study add to existing literature providing evidence that

https://doi.org/10.2337/ds19-0048	underserved population	the pharmacy team.	patients with higher A1C values (i.e., >9%), which may maximize pharmacist influence on diabetes control	pharmacists can provide effective treatment of diabetes, even in populations that may experience barriers to achieving improved health outcomes

Table 2. Literature Review Themes

Synthesis of Literature

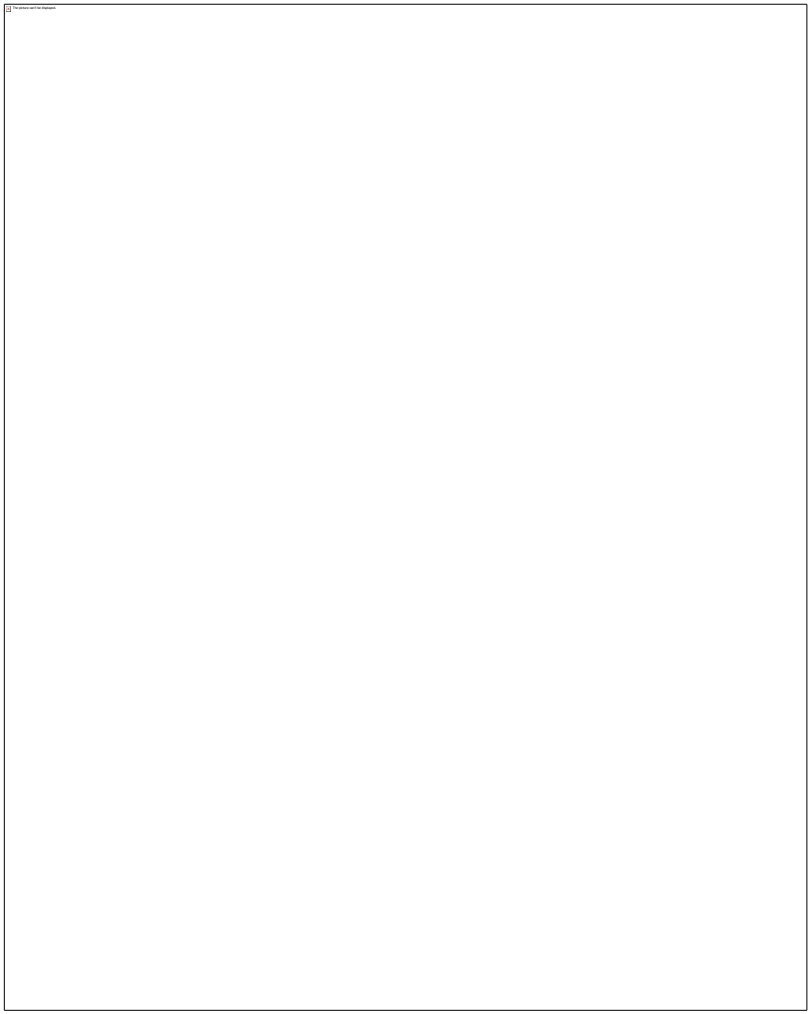
1. SDOH impact the access to healthcare services and cause health inequalities (Allen et al., 2017)
2. Hispanic population is more likely to suffer from DMT2 and experience greater morbidity and mortality than other populations (Turner et al., 2020)
3. DSME is an effective strategy to reduce HbA1C and improve quality of life for DMT2 patients (Bekele et al., 2021).
4. DSME that is culturally congruent provided by an assigned case manager with regular weekly or monthly face to face visits is an effective way of delivering DSME (Ji et al., 2019)

Formal Diabetes Self-Management Education in a Safety-Net Clinic

Emanpreet Kaur

DNP Final Defense

13 April 2023



Grand Valley State University
Kirkhof College of Nursing

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- **Project Advisor:** Dr. Dianne Slager, DNP, FNP-BC.
- **Advisory Team:**
  - Dr. Heather Chappell, DNP, FNP-BC, RN
  - Dr. Vander Molen, DO.
- **Site Expert Implementation Team.**
  - Andrea Cervantes, RN.
  - Lynette Schreur, BSN.
- **Grant Funding**
  - Safety-Net Clinic awarded grant from greater health system.

Objectives for Presentation

1. Discuss the background of Hispanic people and Diabetes Mellitus (DM) in a safety-net clinic.
2. Review synthesis of literature related to DM and Hispanic people.
3. Describe the project design, data collection, and implementation strategies.
4. Review project results and implications.
5. Discuss sustainability and Summary.

Introduction

- More than 37 million Americans are suffering from diabetes (Berkowitz et al., 2018), in which Latinos are disproportionally affected by diabetes, and their risk of developing diabetes is 66% higher than Caucasians (Fallas et al., 2020).
- Low-income are at greater risk for omitting recommended diabetes prevention services (Hill-Briggs et al., 2020).
- Complications include retinopathy, neuropathy, and nephropathy (ADA, 2018).
- Uncontrolled DM with health complications can lead to increased healthcare spending, lower quality of life, and increased mortality(Brunk, 2017).
- Social determinates of health (SDoH) affecting this Hispanic population include, but are not limited to, income, social support, education, and discrimination (Healthy People, 2020).

Organizational Assessment

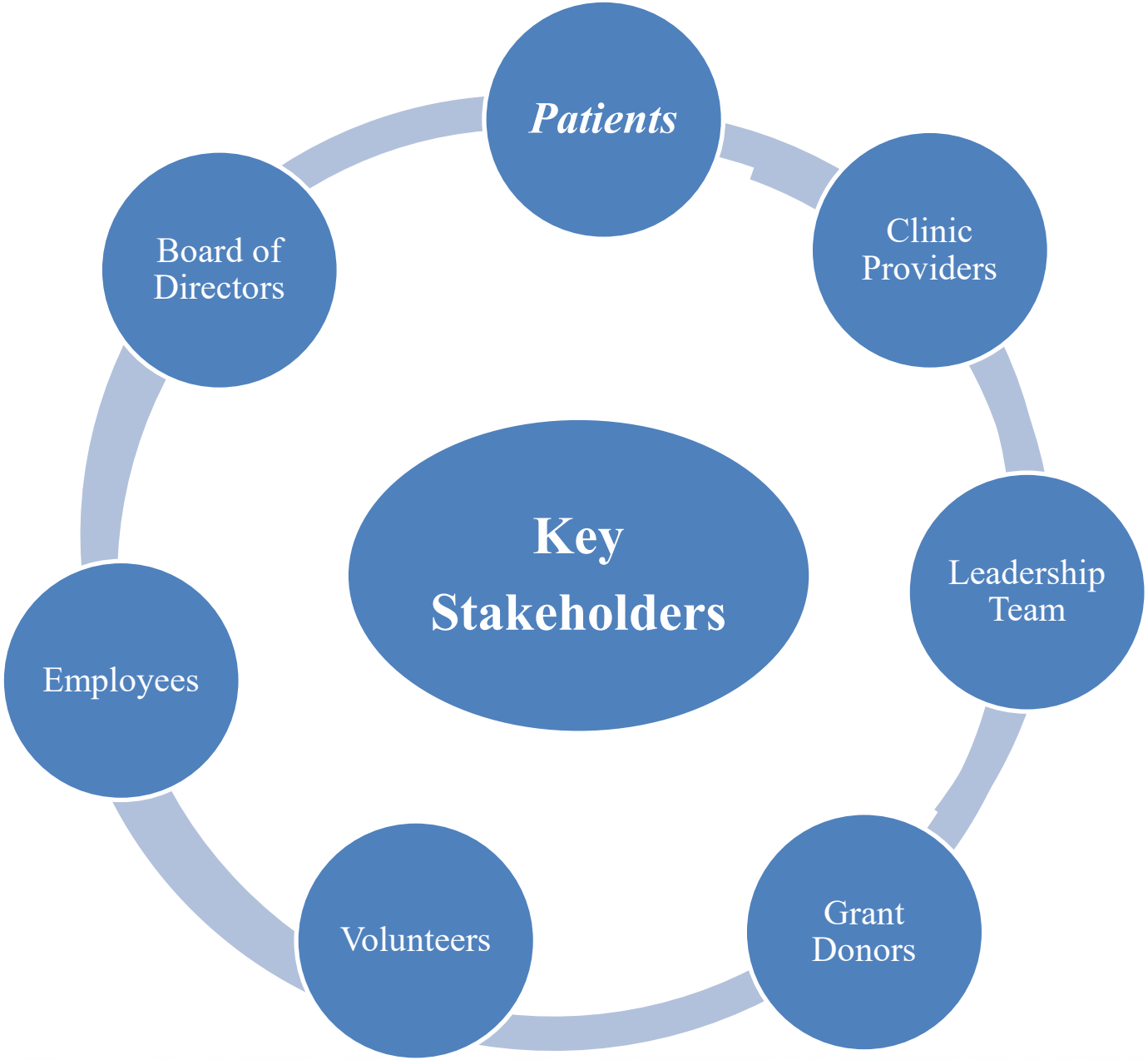
Organizational Framework

- **Burke and Litwin (1992) model**

- This model was chosen because it helps in thoroughly evaluating the organization and serves as a guide to break down the factors needed for a planned organizational change.
- The model shows the 12 variables and how they are interconnected to effect change: pertinent variables, important to this clinic and project are the mission, leadership, and climate.

Current State of the Organization

- **Setting:** Safety-net clinic in the Midwest serving underserved, under-insured population.
- **Condition:** Chronic, uncontrolled DM Type 2 (HbA1c >9%).
- **Immediate Stakeholders:**
  - **Patients:** Main stakeholder
  - **Staff:** Medical director, MD, nurse, medical assistants
  - **Volunteers:** Providers, nurses, medical assistants.


Patients
Clinic Providers
Leadership Team
Grant Donors
Volunteers
Employees
Board of Directors
Key Stakeholders

SWOT Analysis

Strengths	Weaknesses
• **Accessibility to underserved population** • Team-based environment with bilingual and diverse-cultured staff • **Integrated health care model (holistic care)** • Faith-based non-profit organization • Independent practice with more autonomy • Strong sense of mission and trust within community	• **Clinic income based on donations leading to low budget** • Inconsistent practice with documentation and patient care due to episodic volunteers • Language/cultural barriers • **Patient compliance is an issue due to multiple social determinants of health deficits**
Opportunities	**Threats**
• Collaboration with community organizations • **Grant-funded support applications with ongoing projects** • Local community support and safety	• **Highly variable revenue based on donations/grants** • Risk of staff shortage due to variability • Covid service disruptions

Literature Review

Available Knowledge

Purpose: In order to assess the most recent published literature, a rapid systematic literature review was completed to answer the following questions:

Aims:

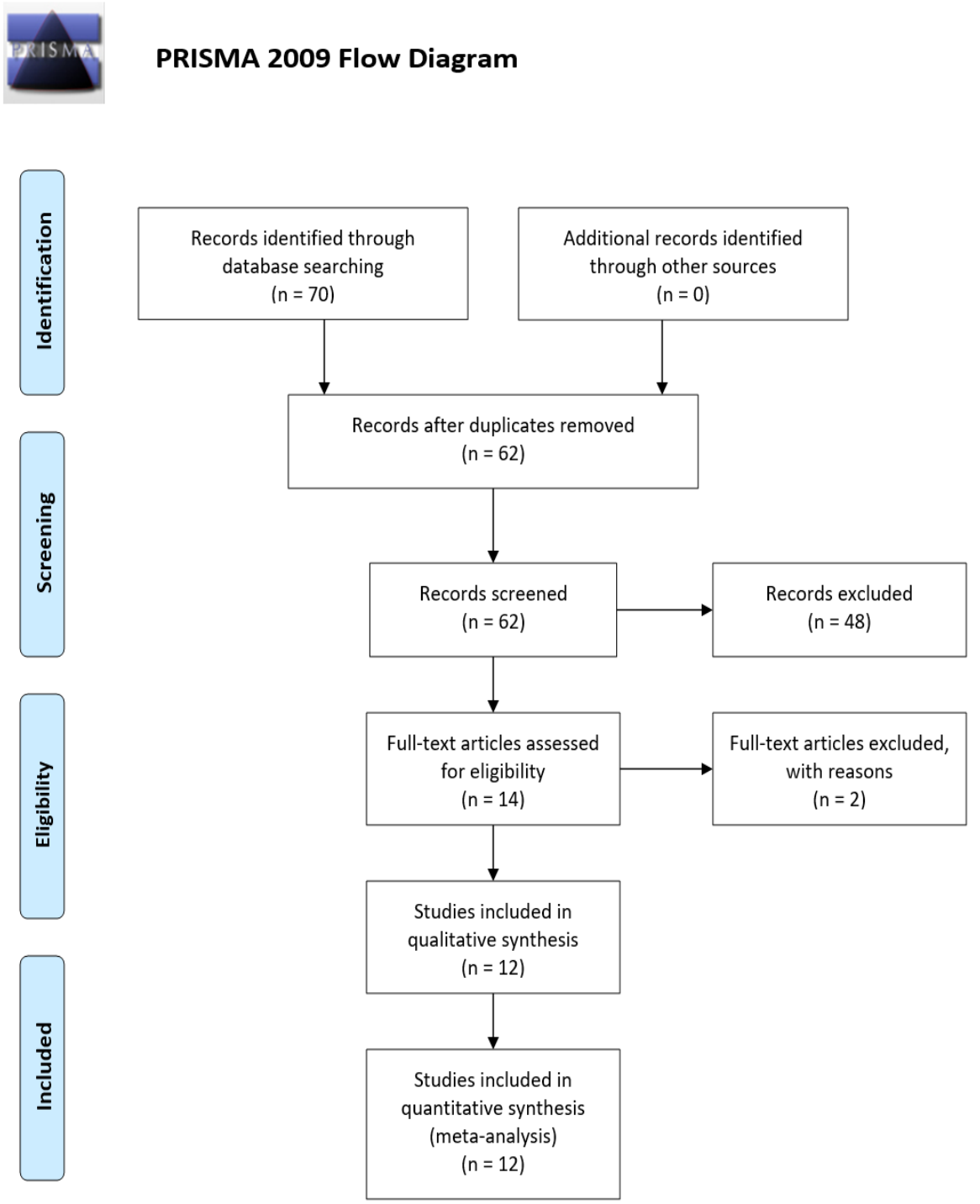
1. What are the common barriers and facilitators for managing DMT2 in medically underserved population in primary care?
2. What is the effectiveness of Diabetes Self-Management Education (DSME) on glycemic control among Hispanic DMT2 patients?
3. Does a safety-net health clinic using formal DSME protocol, and an assigned care manager have better health outcomes for adult DMT2 patients?

Databases: PubMed, CINAHL, and Cochrane Library

Keywords: *safety-net clinics, underserved population, Hispanic/Latino, case manager, DSME, face-to-face visits, phone calls, barriers, facilitators, diabetes, chronic disease* **Inclusion criteria:** Hispanic adults with type 2 diabetes mellitus, diabetes education, and primary care

Exclusion criteria: Children, diabetes type 1, geographic location outside U.S.

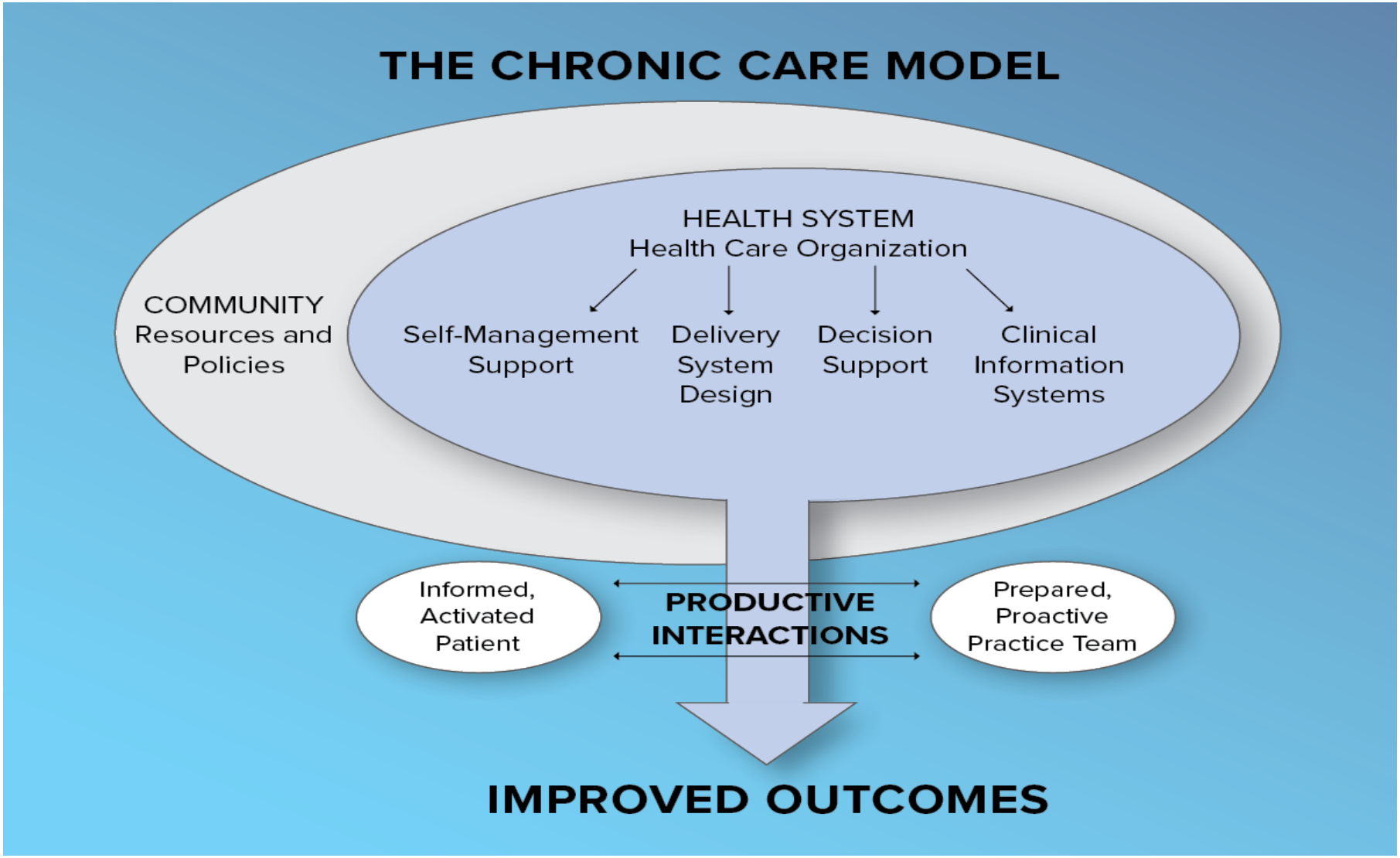
PRISMA Figure



Synthesis of Literature

1. SDOH impact the access to healthcare services and cause health inequalities (Allen et al., 2017)
2. Hispanic population is more likely to suffer from DMT2 and experience greater morbidity and mortality than other populations (Turner et al., 2020)
3. DSME is an effective strategy to reduce HbA1C and improve quality of life for DMT2 patients (Bekele et al., 2021).
4. DSME that is culturally congruent provided by an assigned case manager with regular weekly or monthly face to face visits is an effective way of delivering DSME (Ji et al., 2019)

Conceptual Model for Phenomenon



Bodenheimer, T., Wagner, E. H., & Grumbach, K. (2002). Improving primary care for patients with chronic illness: the chronic care model, Part 2. *JAMA*, *288*(15), 1909-1914.

Clinical Practice Question

- Will implementing “a formal DSME curriculum, in adult DMT2 patients demonstrating a readiness for change, with monthly CM follow-up” impact their body mass index, blood pressure, A1C levels, and appointment attendance in a safety net clinic?

PROJECT PLAN

Project Purpose, Type & Design

- **Project Purpose:**
  - Formalize Type 2 DM self management education with integration of a case manager at a safety-net clinic to improve T2DM management measures.
- **Project Type:**
  - Quality Improvement.

Project Setting and Participants

- Setting: Safety net clinic in a Midwest state
- Participants:
  - Adult Type 2 diabetic patients who have A1C greater than 9% (uncontrolled)
  - DMT2 patients who have demonstrated readiness for change via survey tool responses
- Stakeholders: Patients, Providers, Clinical Staff, Volunteers, and Grant Donors

Project Objectives

1. By November 30, 2022, complete the process of GVSU IRB application
2. By December 1, 2022, begin data collection
3. By January 20, 2023, complete PDSA assessment
4. By March 31, 2023, evaluate the implementation results
5. By April 30, 2023, disseminate quality improvement project findings and sustainability plan to the project site and GVSU faculty mentors.

Project Design

- Improve diabetes mellitus type 2 management through formal T2DME via the Chronic Care Model.
- Improve system design, and clinical information systems.
- Measured by potential changes in:
  - HbA1c
  - Weight
  - Blood Pressure
  - Appointment Attendance

Implementation Framework

Institute for Healthcare Improvement. (2018). Plan-Do-Study-Act Worksheet. Retrieved from http://www.ihi.org/resources/pages/tools/plandostudyactworksheet.aspx

Implementation Strategies (Powell et al., 2015)

1. Assess readiness.
2. Stakeholder engagement.
3. Staff education.
4. Workflow adjustments.
5. Facilitation.
6. Clinical information systems.

Implementation Strategies

Implementation Strategy	Description	Framework Alignment
Assess readiness	Organizational Assessment Interviews with staff	Plan
Stakeholder engagement	Monthly meetings with staff Project updates with staff	Plan Act
Staff education	Meetings with staff/volunteers Written handouts created	Do
Workflow adjustments	Interview staff Observational	Do Study Act
Clinical information systems	Meet with staff on how to document/upload/find needed documents	Plan Do Study
Facilitation	Collaboration on ongoing intervention Ongoing monthly check-in meetings	Plan Act

Procedures for Implementation

- Diabetic patients whose most recent A1C is greater than 9% are given the readiness to change assessment.
- If patient scores 4/5 or 5/5 on readiness for change, they are enrolled in the program and referred for CM.
- Patients who score 3 and below on readiness for change are not referred to care management but continued to be scheduled for 3-month DM appointments.
- The enrolled patient is given the following items at their visit.
  - Educational booklets, with verbal review, lifestyle behaviors
- Care management consisted of:
  - Biweekly phone calls x1 month.
  - Then monthly phone calls.

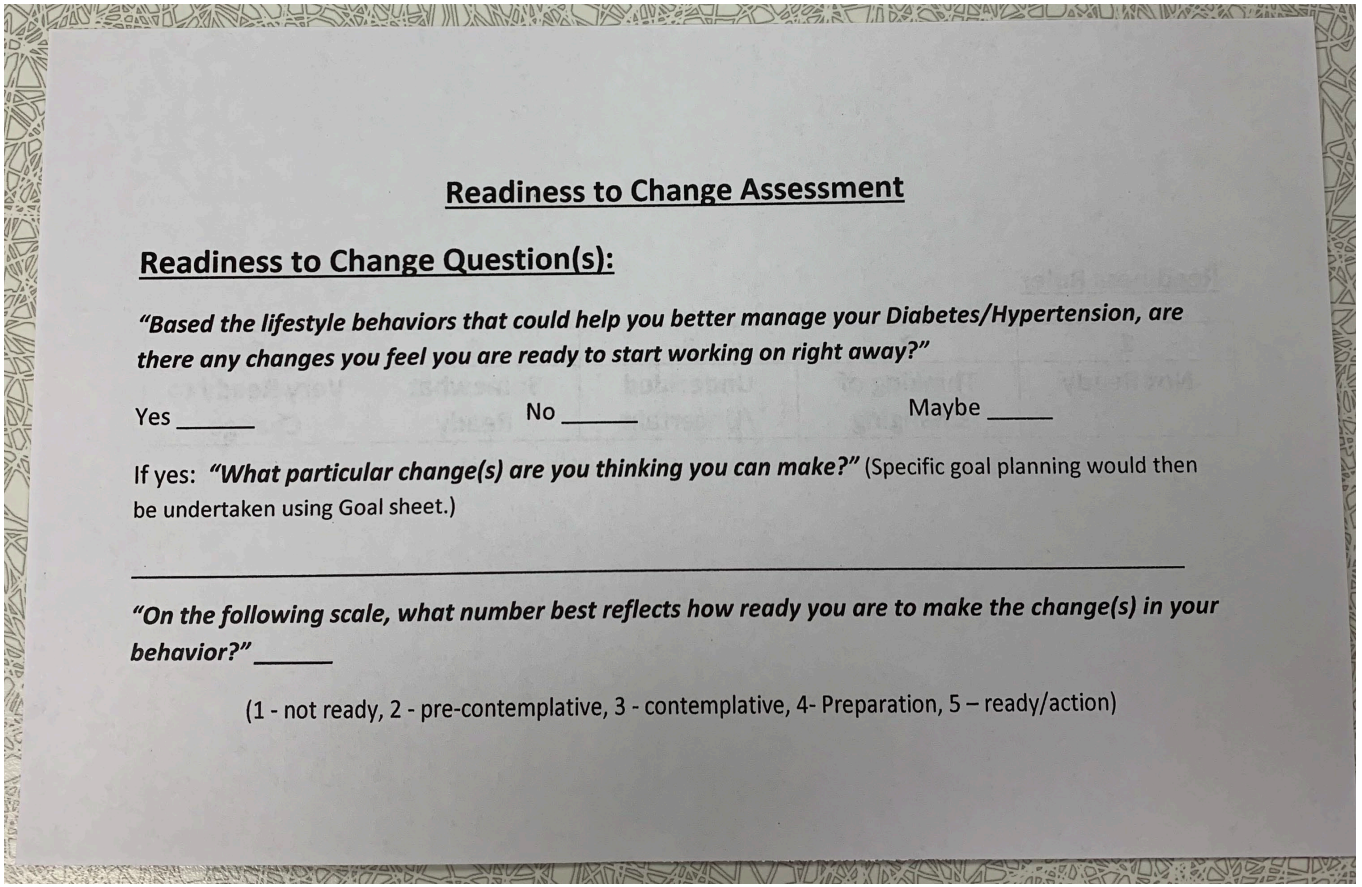
Detailed Plan

- Before the enrolled patient's appointment, chart preparation occurred through the work of professional, trained volunteers.
- The EMR allowed the volunteers to select a "Reason for Visit" which has the options of: Diabetic Clinic 1-4.
- The selection of the clinic prepopulates the patient's chart with the appropriate HPI, review of systems, physical exam, and order sets

Detailed Plan

- Enrolled patients have an appointment with their provider every 3 months
- At every appointment:
  - Educational booklets were used corresponding to the visit
  - Lifestyle worksheet was reviewed

Tools- Readiness for Change



Readiness to Change Assessment

Readiness to Change Question(s):

"Based the lifestyle behaviors that could help you better manage your Diabetes/Hypertension, are there any changes you feel you are ready to start working on right away?"

Yes _____ No _____ Maybe _____

If yes: ***"What particular change(s) are you thinking you can make?"*** (Specific goal planning would then be undertaken using Goal sheet.)

_____

"On the following scale, what number best reflects how ready you are to make the change(s) in your behavior?" _____

(1 - not ready, 2 - pre-contemplative, 3 - contemplative, 4- Preparation, 5 – ready/action)

Tools

Favorably reviewed by:

AADE FAVORABLY REVIEWED
1/2011
American Association of Diabetes Educators
The favorably reviewed logo indicates this material has been reviewed for educational content and does not imply endorsement of any product.

These Novo Nordisk patient education materials were developed using information from the following sources: American Association of Diabetes Educators, American Diabetes Association, and American Dietetic Association. These booklets do not replace the advice of your diabetes care team. Be sure to consult your diabetes care team regarding your individual diabetes care plan.

Quotes reflect the opinions of the people quoted and not necessarily those of Novo Nordisk. Novo Nordisk does not verify the information in the quotes. Individual results may vary.

Tools- Lifestyle Factors Checklist

Lifestyle Behaviors That Impact Your Diabetes: What You Can Do

- **Lowering & Managing Your Hemoglobin A1C (HbA1C):** This blood test will tell you overall how your diabetes is doing and measures your average blood glucose level over the previous 2-3 months.
  - ✓ **Long Term Goal** of someone with diabetes is to have an **HbA1C of <7%.**
  - ✓ **Your HbA1C now: _____**
  - ✓ **Short Term Goal: _____**
- **Increase Your Physical Activity:** Your physical activity now: ___ None ___ Occasional ___ Moderate ___ Heavy
  - ✓ **Long Term Goals:** Participate in 3 days a week (at least 150 minutes/week total) of moderate intensity aerobic physical activity (i.e., walking, jogging, swimming, etc.)
  - ✓ Participate in strength or resistance training at least twice a week
  - ✓ Reduce your time of just sitting. (i.e. no more than 90 minutes of sitting before you get up and move)
  - ✓ **Your Short Term Goal: _____**
- **Weight Loss (if needed):** A healthy weight is important to managing your diabetes. Decrease your body weight as recommended by your health care team. Your Weight Today:_____ Your BMI Today: _____
  - ✓ **Long Term Goals: Weight: _____ BMI: _____**
  - ✓ **Your Short-Term Goal: Weight: _____ BMI: _____** A good place to start is to decrease your weight by 5%.
- **Monitor Your Blood Sugar:** Maintain your fasting blood sugar range as recommended by your doctor.
  - ✓ **Target Blood Sugar: 80-130 mg/dL**
  - ✓ **Your Short Term Goal: _____**
- **Eat A Healthy Diet:** Your Diet today: ____ Excellent ____ Very Good ____ Fair ____ Poor
  Basic Recommendations:
  - ✓ Maintain optimal weight
  - ✓ Reduce Calories (if BMI is high)
  - ✓ Low Carbohydrate Diet: Limit daily carbs to 100gms/day with no meal or snack greater than 30 grams of carbs
  - ✓ Plant-based diet: high polyunsaturated and monounsaturated fatty acids
  - ✓ **Long Term Goal:** Eating Healthy is critical to taking care of your diabetes.
  - ✓ **Your Short Term Goal: _____**
- **Healthy Sleep Habits:** I currently sleep _____ hours/night.
  The quality of my sleep is: ____ Excellent ____ Very Good ____ Fair ____ Poor
  - ✓ **Long Term Goal:** 7 or more hours of quality sleep/night.
  - ✓ **Your Short Term Goal: _____**
- **Social & Behavioral Support:** What kind of emotional and social support do you have in your life today? _____ Excellent ____ Very Good _____ Fair ____ Poor
  - ✓ **Long Term Goal:** Diabetes is a challenging disease and everyone needs good support.
  - ✓ **Your Short Term Goal: _____**
- **Moderate Use of Alcohol:**
  - ✓ **Long Term Goal:** Limit use of alcohol to 1 (women) or 2 (men) standard drinks per day.
  - ✓ **Your Short Term Goal: _____**
- **No Tobacco Use:** ____ do not smoke ____1/2ppd ____1ppd ____ more than 1ppd
  - ✓ **Do you have any interest in quitting at this time? ___**

Evaluation and Measures (Handout 7)

- **Timeframe: December 2022 – March 2023**.
- Patient outcomes: HgA1c, blood pressure, weight, BMI.
- Process outcomes: Appointment attendance (diabetic clinic visits and CM phone calls), educational booklet use, phone calls, foot exams.
- System outcomes: Chart prep

Data Collection

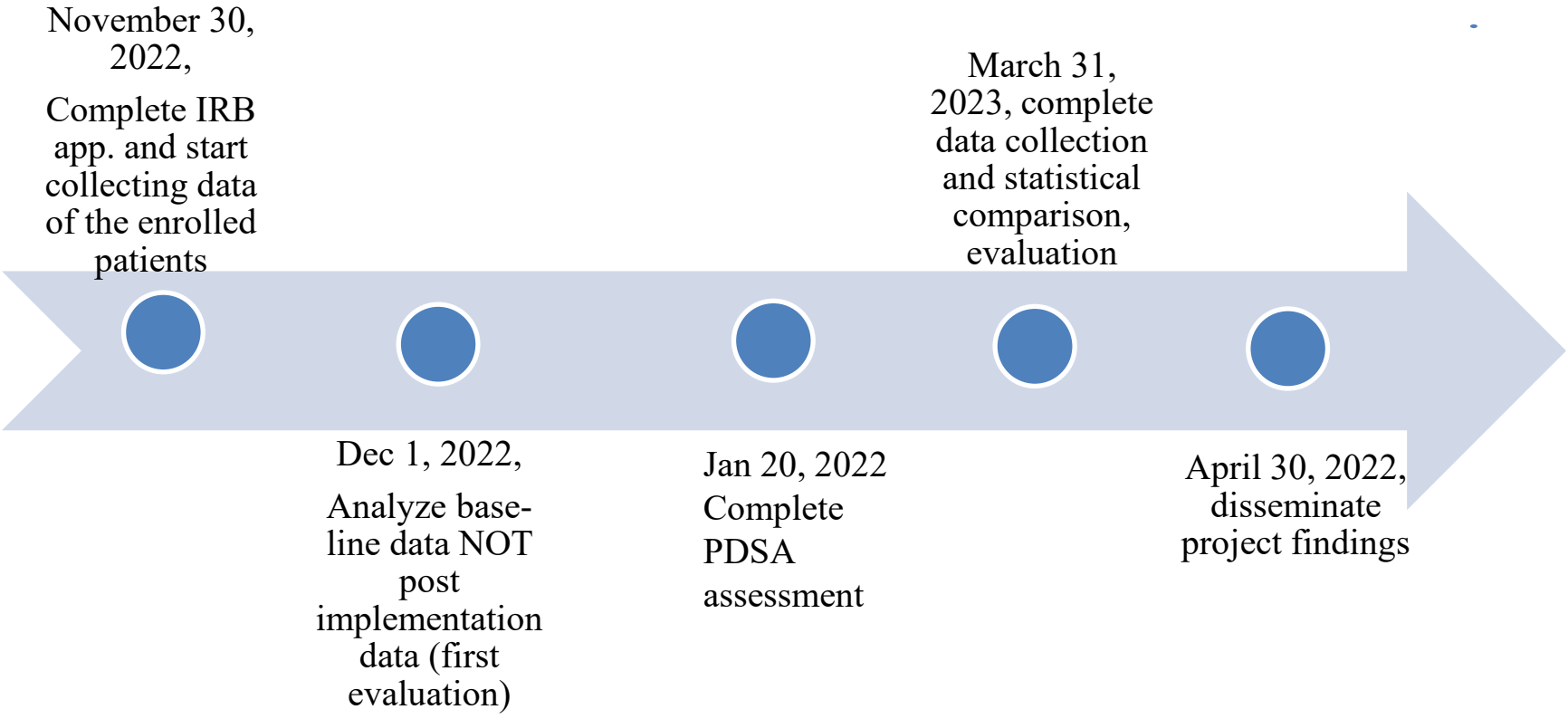
- Data was collected via manual chart reviews.
  - Conducted via clinic electronic health record.
  - Baseline data collection: completed by December 2022.
  - Secondary data collection: completed March 2023.
- Removed identifiers (name, DOB, and dates of service/lab tests) to de-identify data prior to placing in an Excel spreadsheet.

Budget & Resources

Cost Mitigation if DM is well-controlled	(ADA, 2018; Nguyen, 2020)
1 controlled DM patient	$10,541
10 controlled DM patients	$105,410

Expenses for Implementation of Project	
Project Manager (DNP Student)	$20,000 *in kind donation
Physician (Site Mentor)	$450
RN (x2)	$700
Social Work (x2)	$700
Medical Assistants (x2)	$300
Site meetings $125/hour x 7 hours	$875
Statistician $30/hour x 1 hours	$30 *in kind donation
Supplies	$16
Total Expenses	$3,041
Cost Mitigation of DM Control for 10 Patients over 1 year	**$102,369**

Timeline


November 30, 2022,
Complete IRB app. and start collecting data of the enrolled patients
Dec 1, 2022,
Analyze base-line data NOT post implementation data (first evaluation)
Jan 20, 2022
Complete PDSA assessment
March 31, 2023, complete data collection and statistical comparison, evaluation
April 30, 2022, disseminate project findings

Ethical Considerations

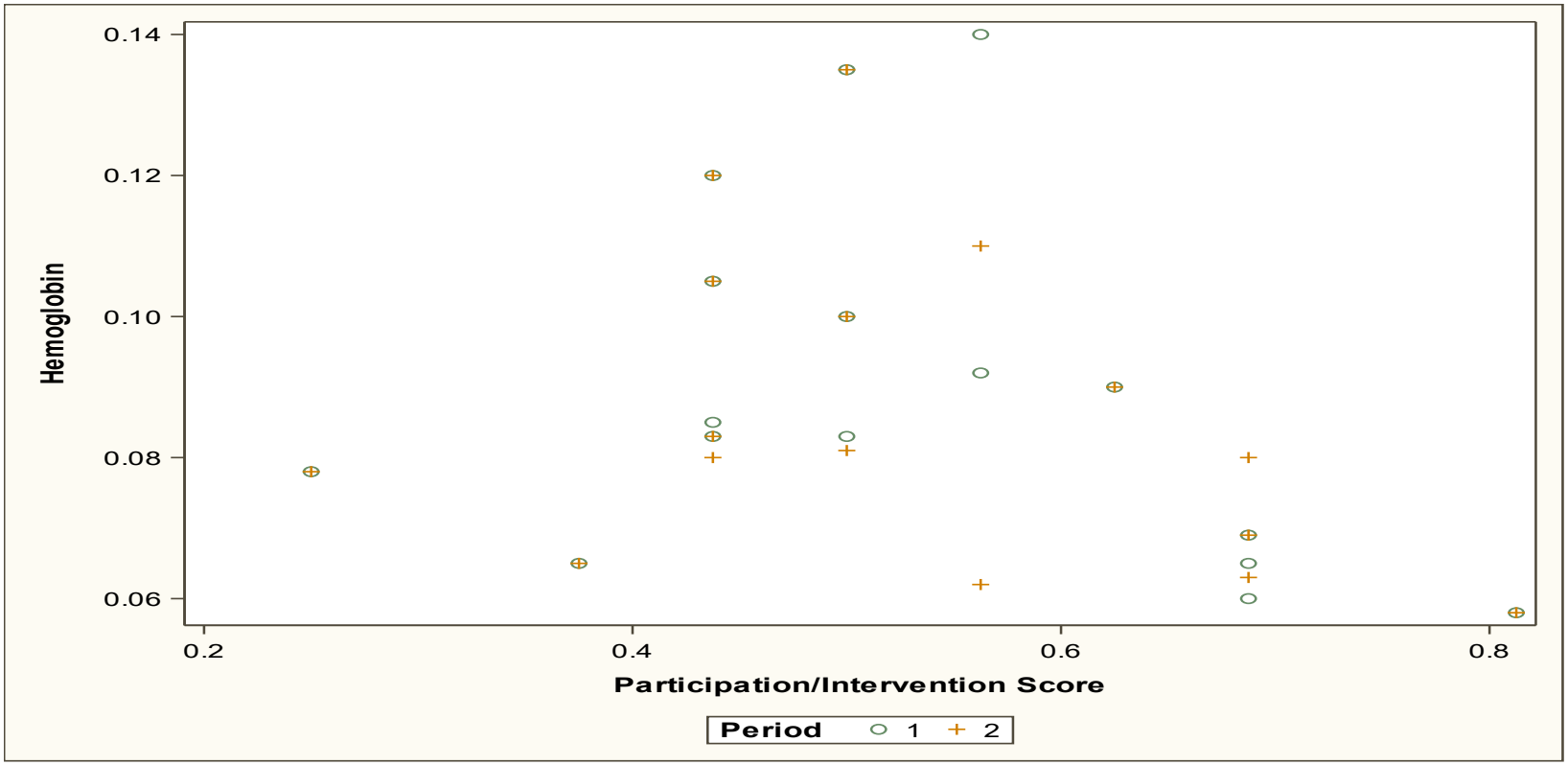
- **GVSU IRB Determination:**
  - As Quality Improvement.
  - Letter available upon request.
- **No potential conflicts of interest.**
- **Data storage:**
  - Data was obtained from a 3–4-month period.
  - Data was deidentified (of name, DOB, DOS, gender etc).
- **Data safety:**
  - Password protected flash drive.

Analysis Plan

- Statistical plan
- GVSU Biostats graduate student support
- Graphs of pre/post intervention measures.
- Use SPSS to run a paired t-test
  - The p value will be set at 0.05
  - Graphs of pre/post intervention measures

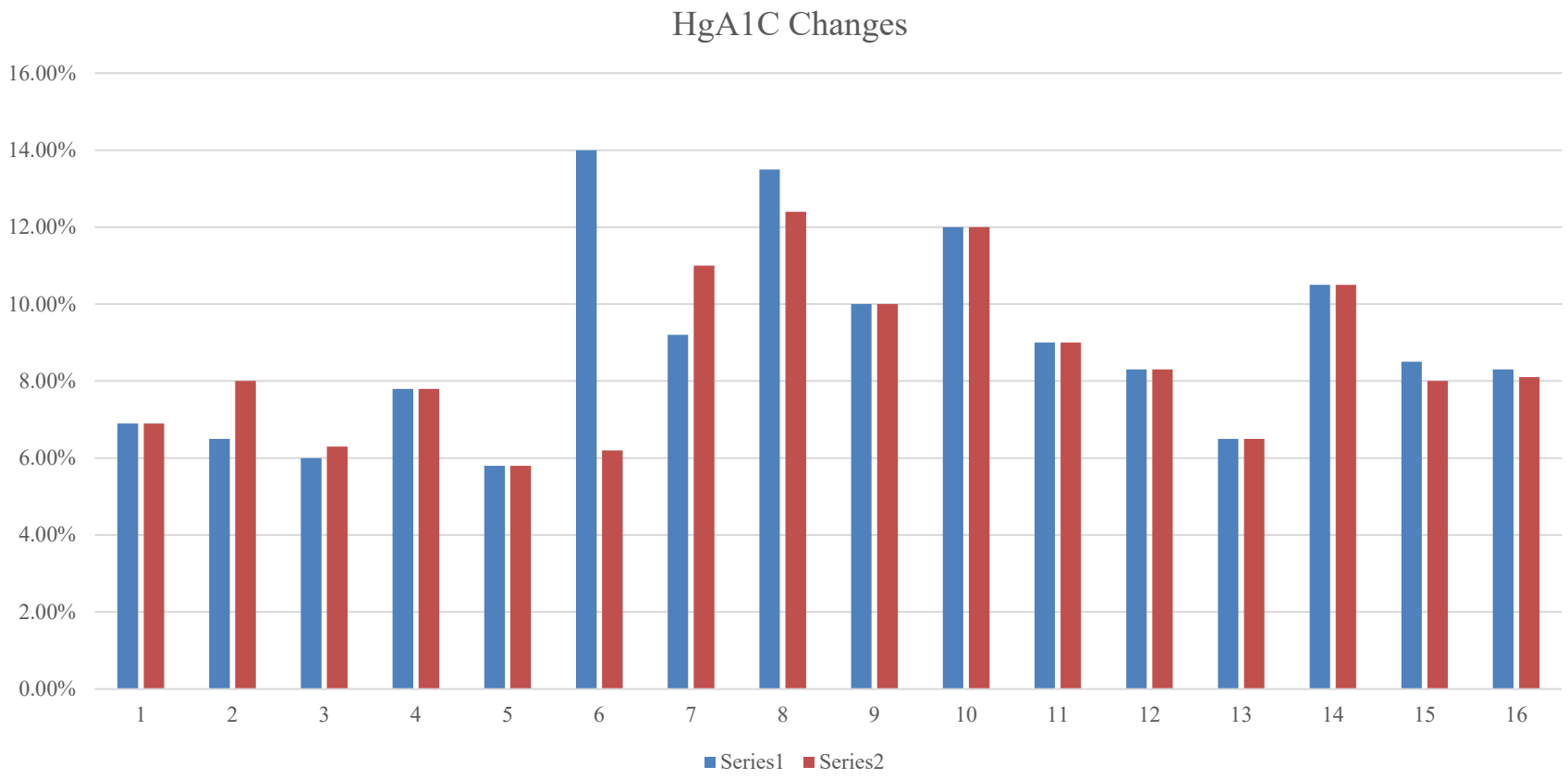
Results

Patient Outcome- HgA1c

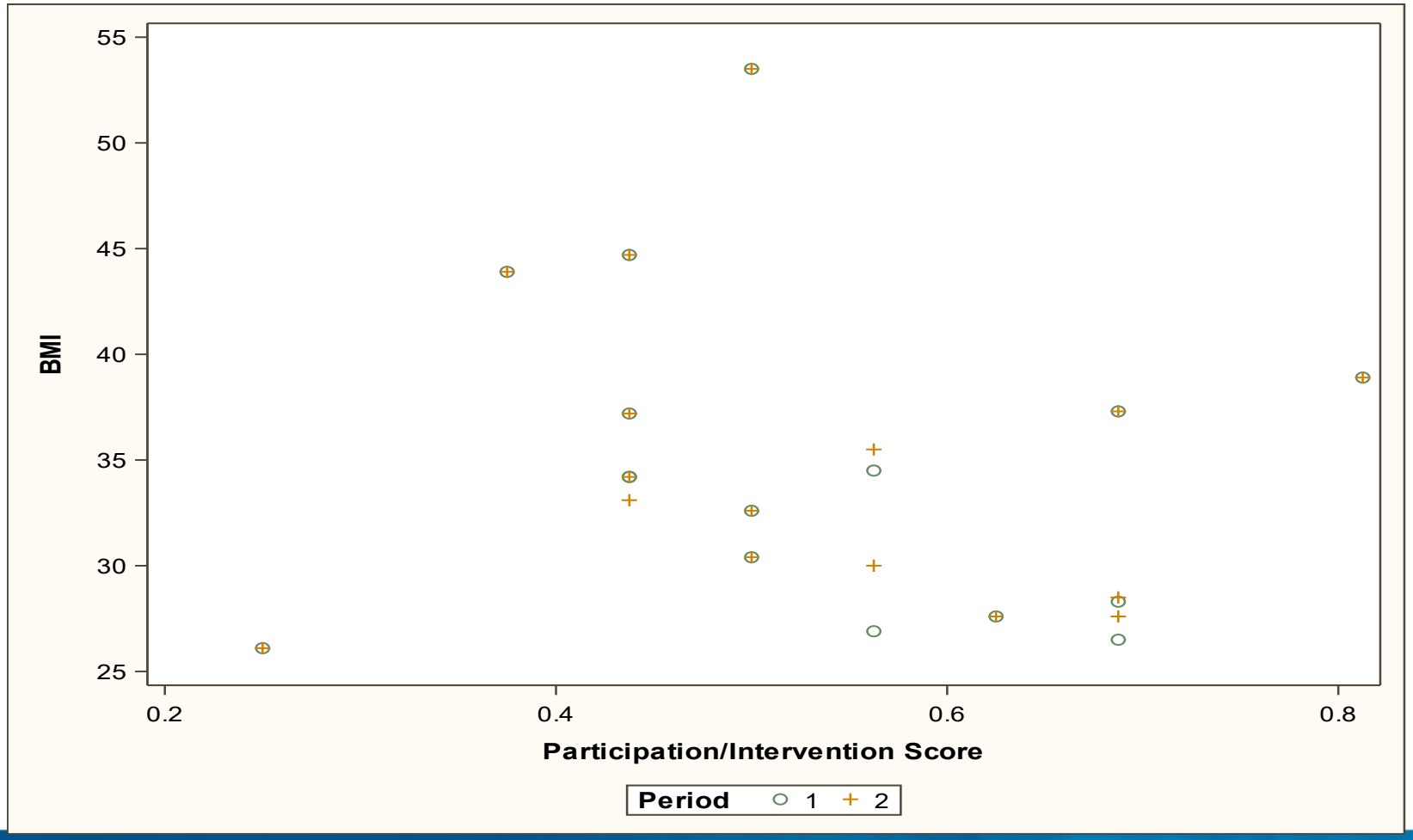


Period	N Obs	Variable	Label	N	Mean	Std Dev	Minimum	Maximum
1	16	A1C	A1C_Pre	16	0.09	0.03	0.06	0.14
		score_prop		16	0.53	0.14	0.25	0.81
2	16	A1C	A1C_Pre	16	0.09	0.02	0.06	0.14
		score_prop		16	0.53	0.14	0.25	0.81

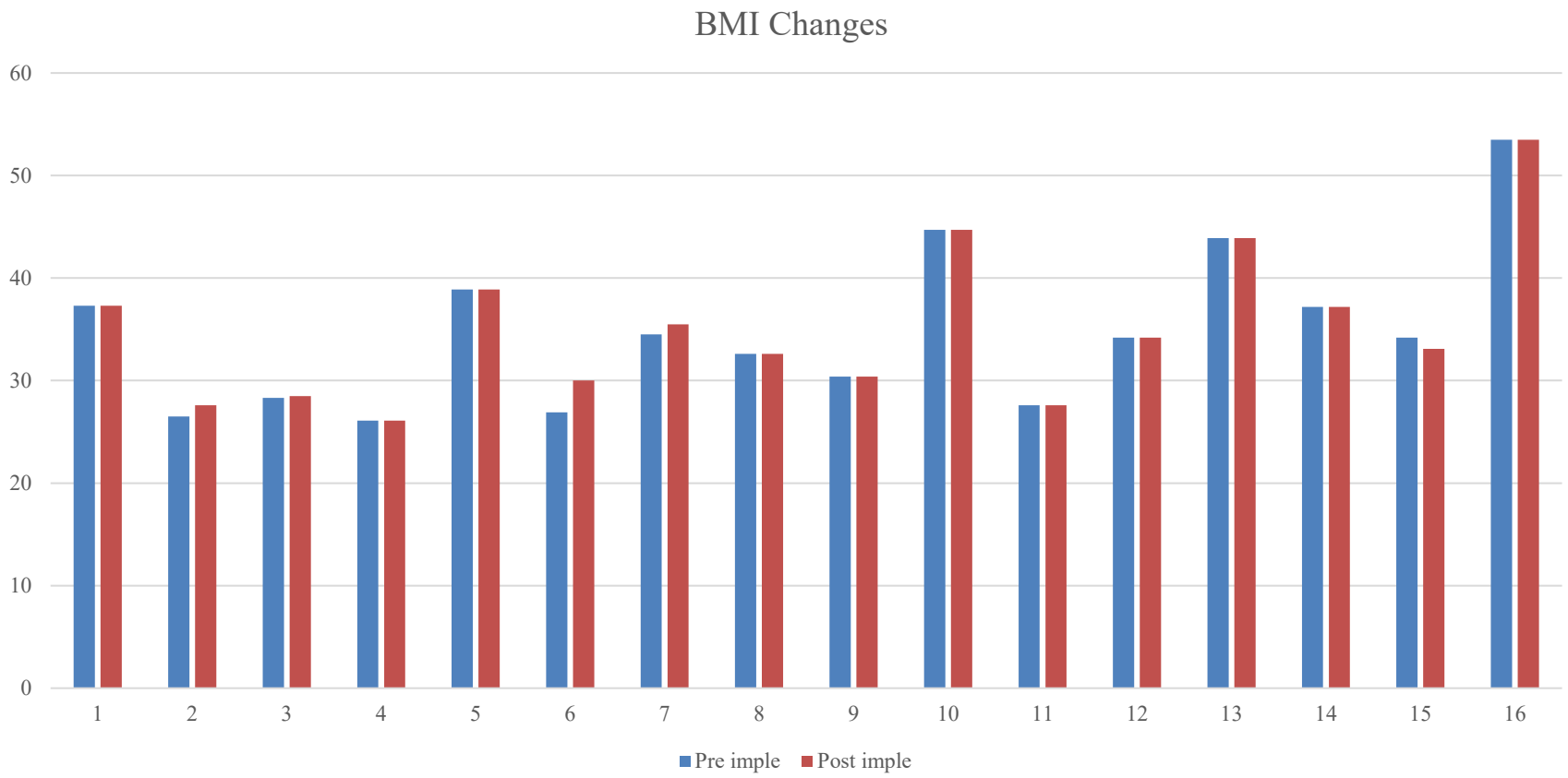
Patient Outcome- HgA1c



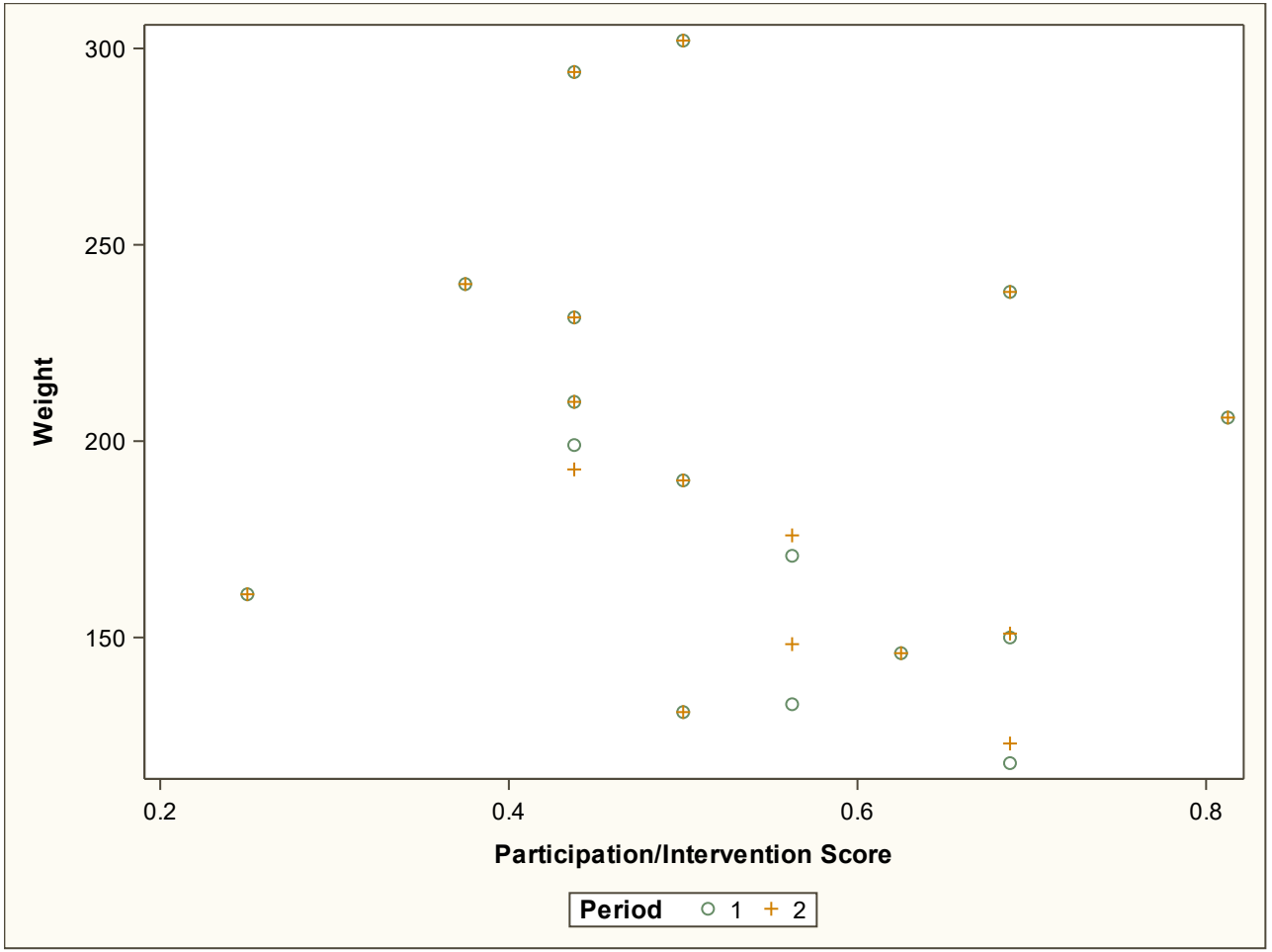
Patient Outcome- BMI



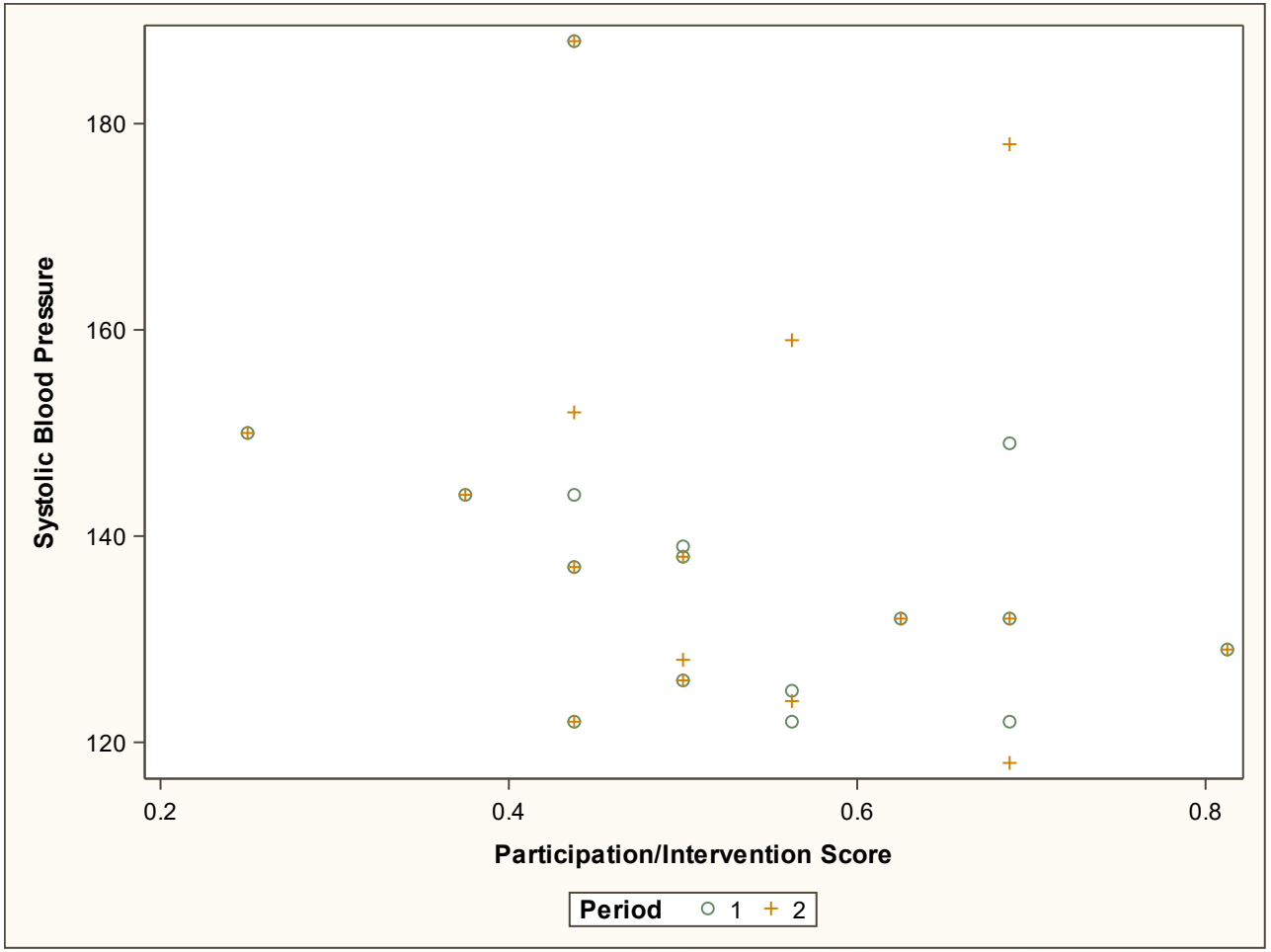
Patient Outcome- BMI



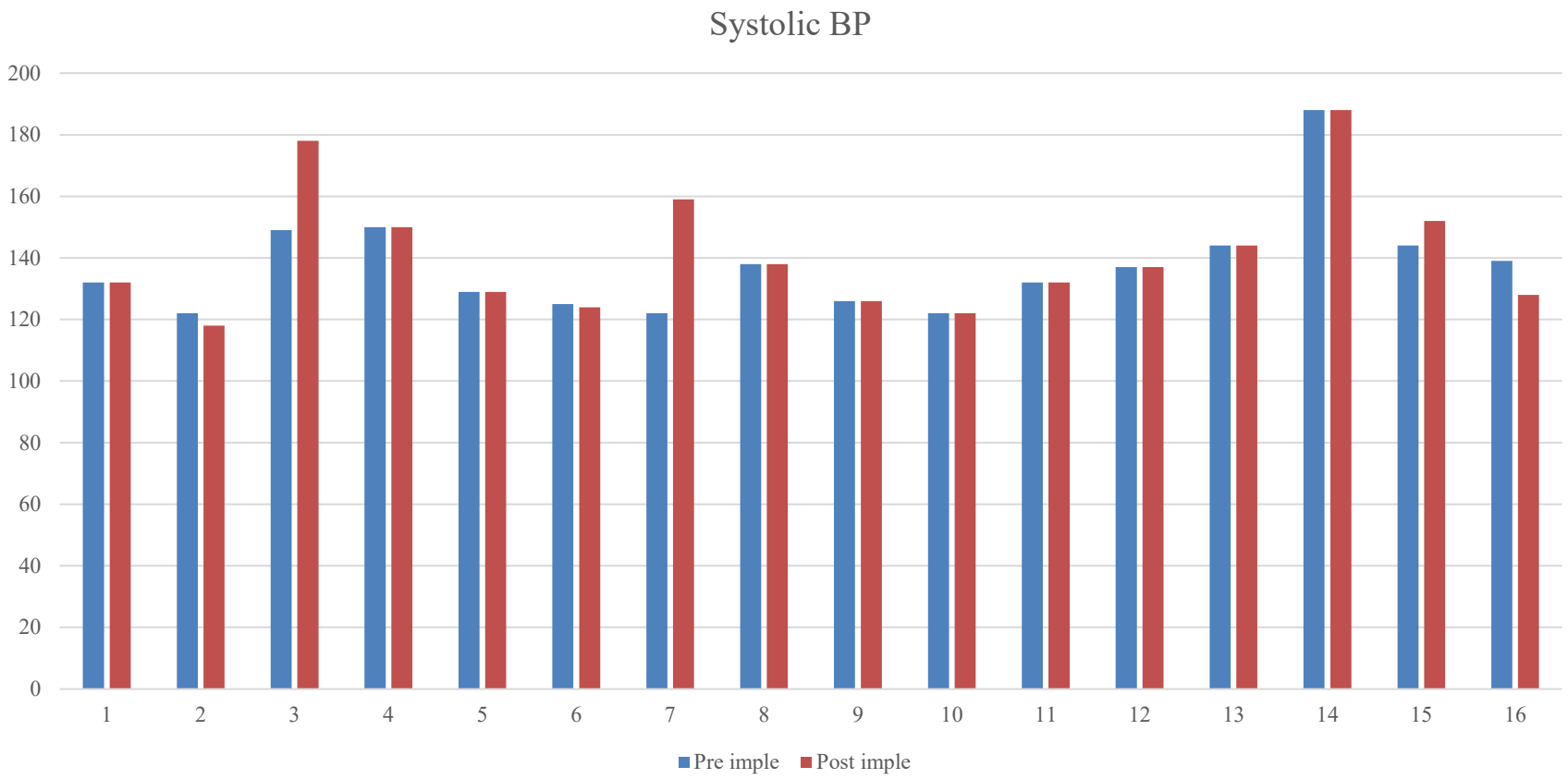
Patient Outcome- Weight



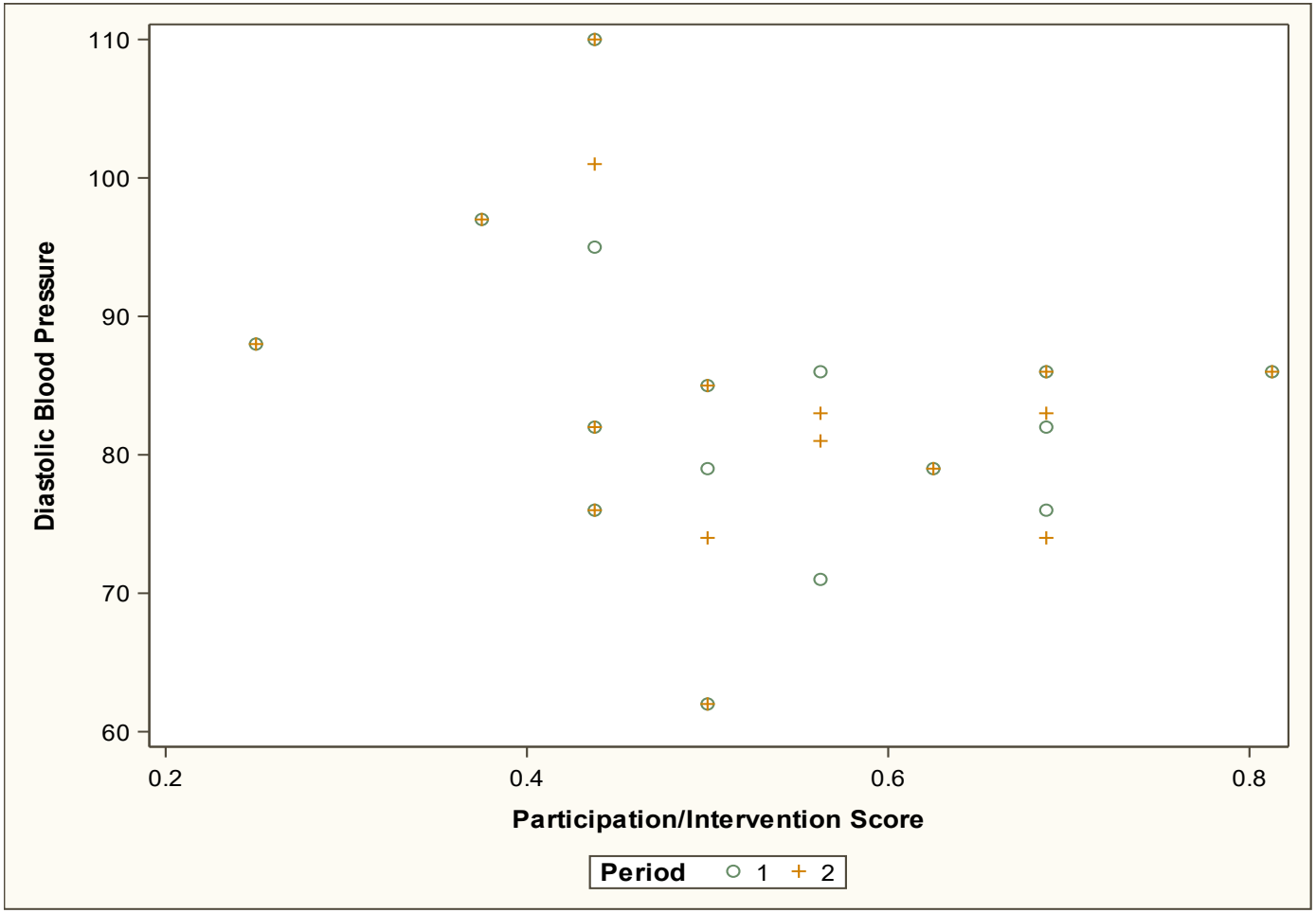
Patient Outcome- Systolic BP



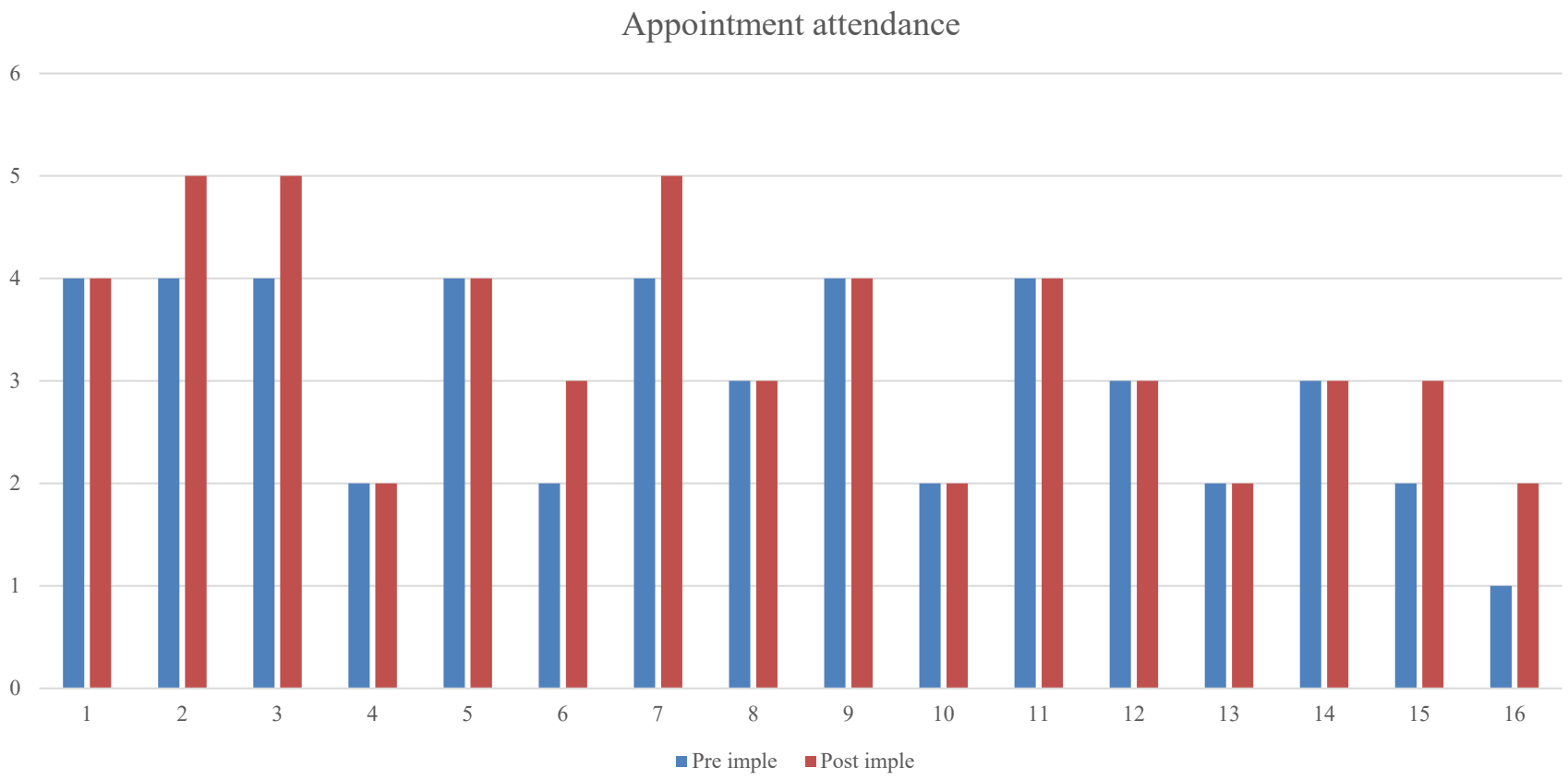
Patient Outcome- Systolic BP



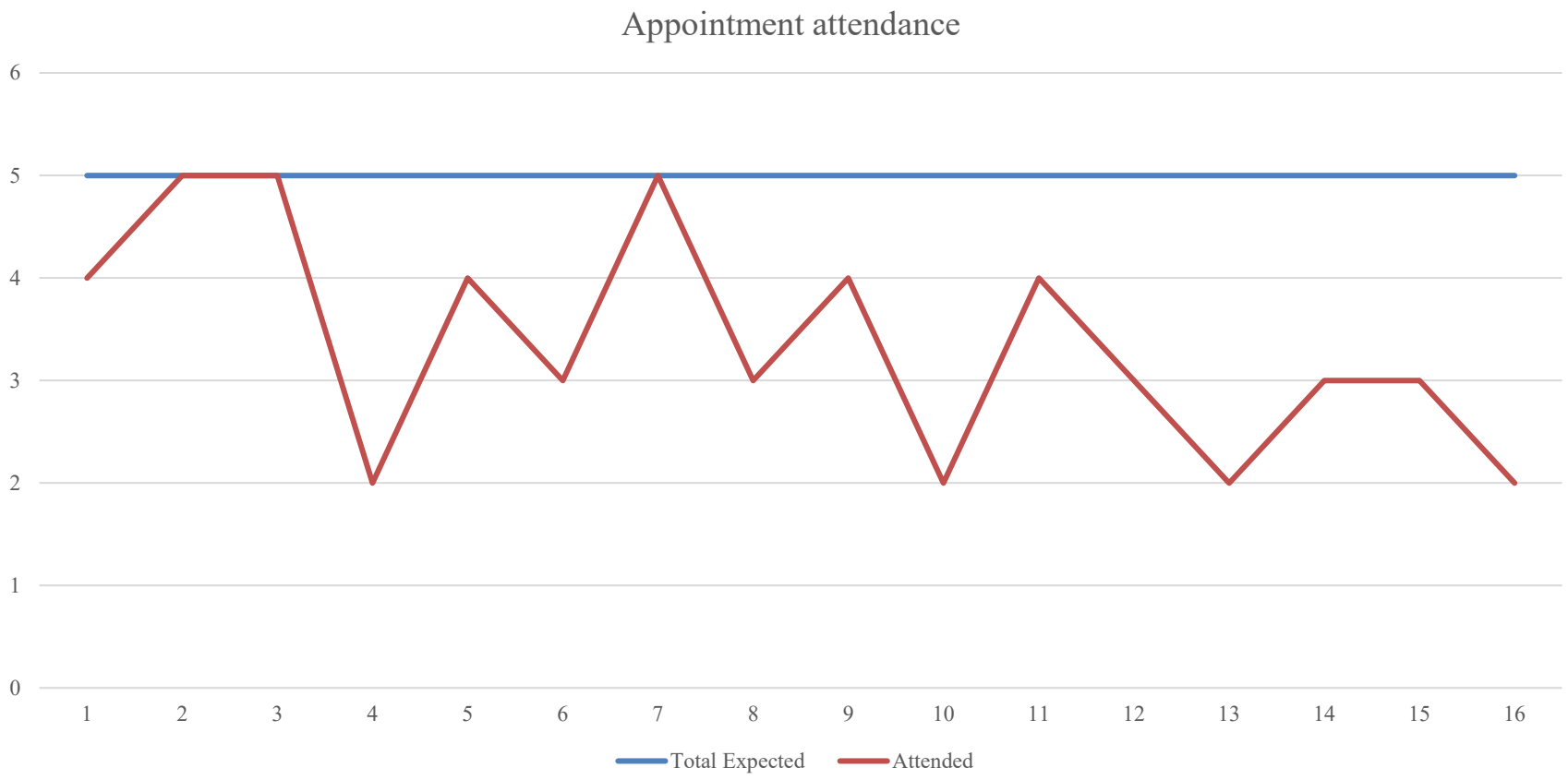
Patient Outcome- Diastolic BP



Appointment attendance



Appointment attendance



Care Management

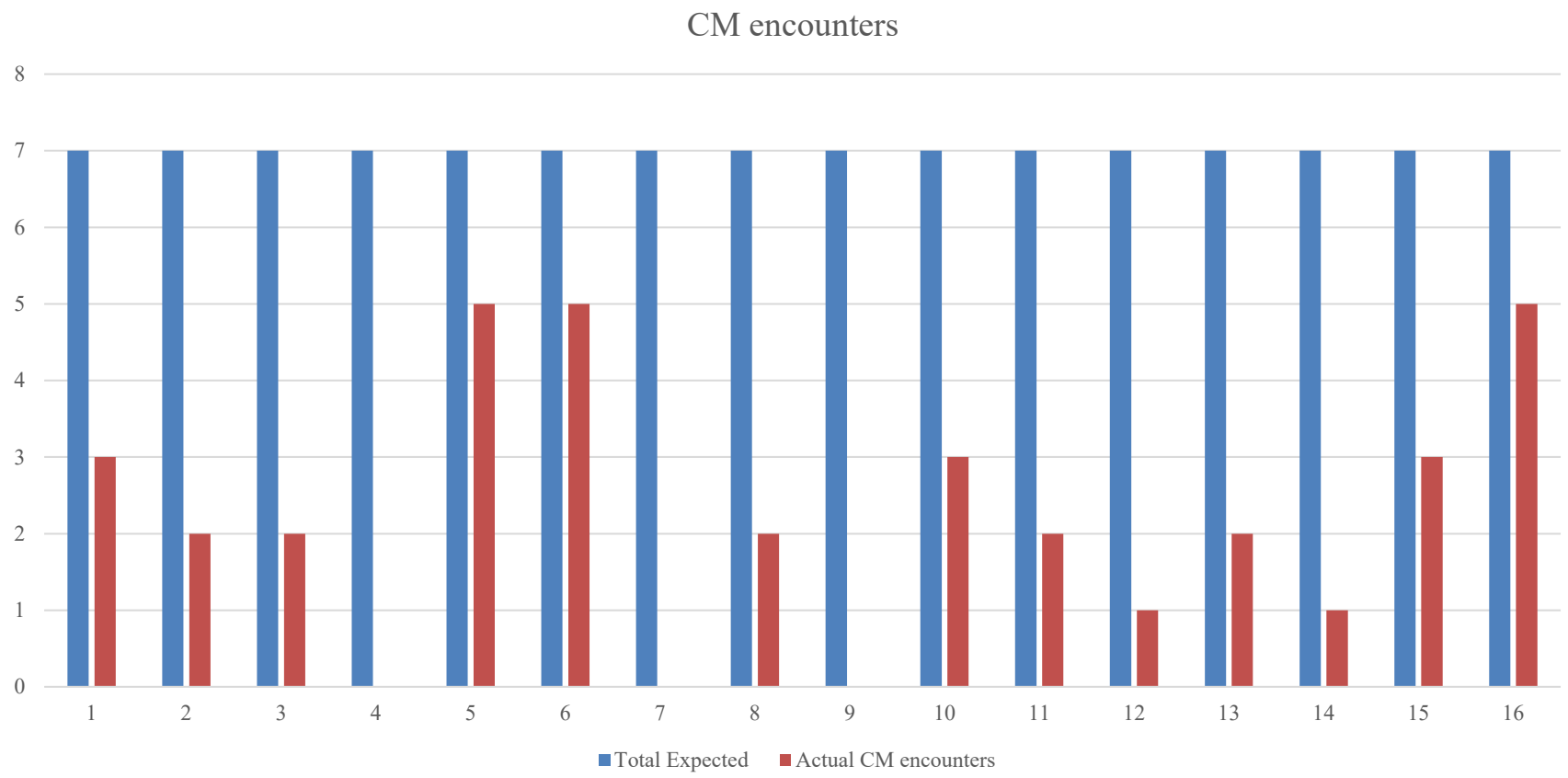
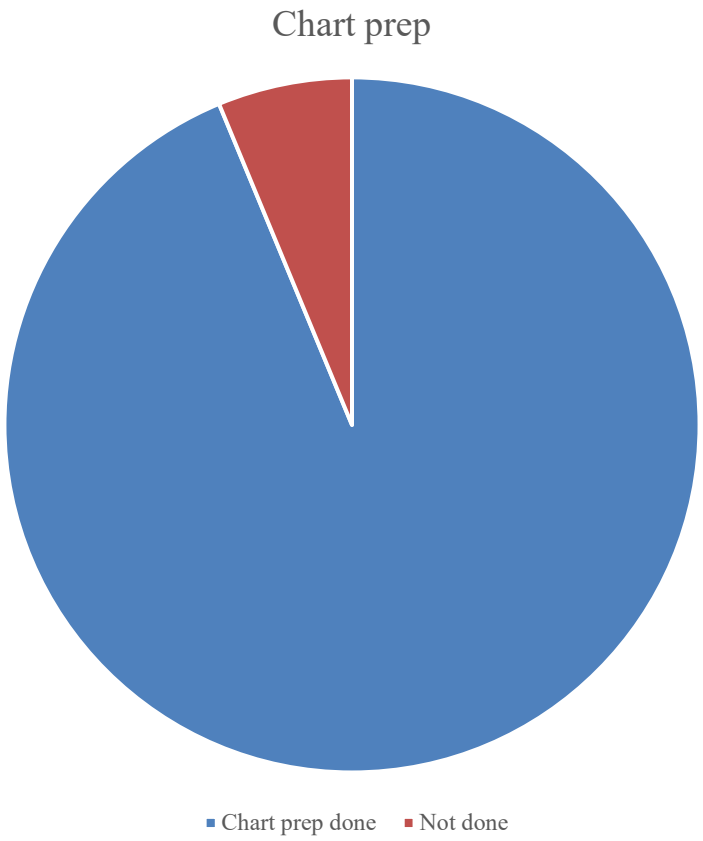
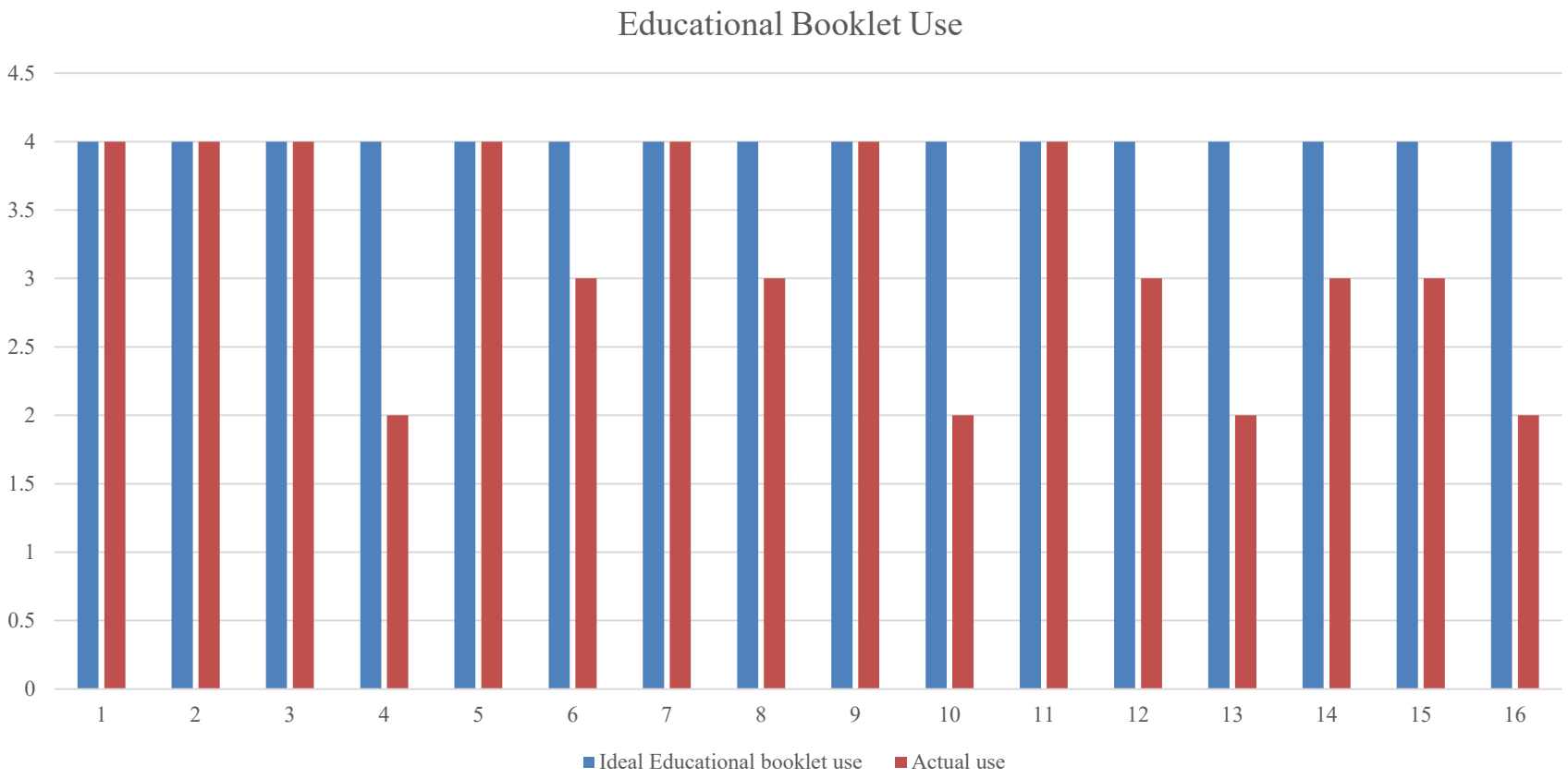


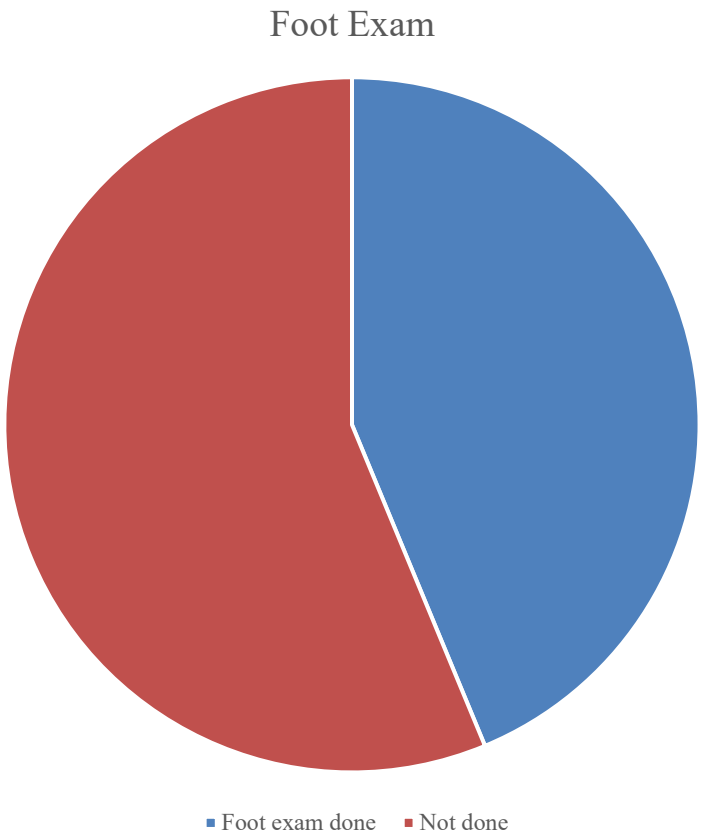
Chart Prep



Educational Booklet Use



Foot Exam



Discussion

- There were not much changes in pre and post implementation data.
- However, this is a continuous project, and the data tells us that patient who participated more in educational booklet use, and Care Management have a lower HgA1c, BP, Weight, and BMI which is very encouraging. This was the expected outcome.

Discussion

- Non-compliance is an issue in a safety-net clinic. However, the more the patients are participating in the intervention, the better results we are seeing.
- The staff was very helpful to ensure the success of the project.
- More PDSA cycles can be done to remove patient barriers for not picking up the phone calls such as giving them some incentives (5-dollar coupon) to encourage them more to participate in the intervention. However, this was not done in this study.

Discussion

- This study only involved 16 patients which is a small sample size. The same study can be replicate in a large sample size to see if the results will be statistically significant.
- It will also be interesting to see if the intervention in a safety-net clinic and non-safety-net clinic has different results.
- Overall, the more the patients participate in the intervention, the results are encouraging.

Sustainability and Summary

Sustainability Plan

- Identify adherence champion (Powell et al., 2015)
- Potential project endurance: high
- Ensure sustainability: continual buy-in from employed physicians, tracking data, grant application
- Continue PDSA cycles (Christoff, 2018)

Summary

- Quality improvement project
- Key Findings: More participation in intervention of educational booklets and Care management results in low HgA1C, weight, BMI, and BP.
- Continual PDSA Cycles for Improvement, specially with patient participation in the intervention.

DNP Essentials: Reflection

DNP Essential:	Achieved by:
I: Scientific Underpinnings for Practice	Completing literature review and using evidence to create population focused DSME
II: Organizational and Systems Leadership	Organizational assessment, SWOT analysis, stakeholder engagement/facilitation, sharing findings to leadership and team. Used nursing theories to guide the DNP project.
III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice	Developing and implementing formalized diabetes education curriculum. Chart reviews, evaluating and analyzing collected data.
IV: Information Systems/Technology Using EHR for implementing protocol to assess and chart SDOH. SDOH data collection	Using EHR for documentation and reportability. Data collection was done through chart audits.
V: Advocacy for Health Care Policy	Advocated for appropriate diabetic screenings and education for all diabetic patients in the organization to improve health outcomes. Wrote letters to various Michigan representatives and senators regarding full practice authority.
VI: Interprofessional Collaboration	Meetings with physicians, SWs, RNs, MA's and IT.
VII: Clinical Prevention and Population Health	Analyzing statistical data on patient outcome measures and health improving screenings through staff engagement/facilitation (meetings) and explaining steps to workflow process.
VIII: Advanced Nursing Practice	Completed >1000 hours (clinical at project site and local spine/pain rehabilitation clinic and project hours).

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Questions?

- Thank you