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Implementation of Diabetes Self-Management Education and Training for Clinical Nurses

Appolonia Okereke

Submitted to Dr. Alma Jackson in partial fulfillment of

NR 706C DNP Final Project

Regis University

4/8/2021

Executive Summary

Project Title: Implementation of Diabetes Self-Management Education and Training for Clinical Nurses

Problem:

Type 2 diabetes mellitus leads to various complications, such as increased risks for heart illness, lower-limb amputations, adult-onset blindness, and kidney failure. The practice problem was the clinical nurses' lack of evidence-based protocols for managing T2DM. The PICO question was: Among clinicians offering care to admitted patients with T2DM in the project clinic, does a DSME educational training on diabetes management as compared to no DSME program result in enhanced confidence, skills, and knowledge of diabetes management for clinic nurses and improved glycemic control among T2DM Hispanic patients?.

Purpose:

This project aimed to educate clinical nurses about diabetes self-management to improve their knowledge and confidence level in educating T2DM Hispanic patients to improve their glycemic control.

Goal:

The goal of this project was to strengthen diabetes self-management skills and increase understanding and awareness by 25% among clinical nurses participating in the DSME training program.

Objective:

The objective was to provide clinical nurses with evidence-based DSME training for 4 weeks.

Plan:

A convenience sample of 15 clinical nurses was recruited and provided DSME for 4 weeks. The project adopted a pretest-posttest quasi-experimental design. A pre- and post-test were conducted, and the scores for the two tests were compared. The data was analyzed using paired sample t-tests.

Outcomes and Results:

After completing a 4-week DSME training, all 15 clinical nurses scored correctly on all the 23 items on DKT2. The nurses' confidence level in educating patients measured with mean CLQ was 80 before and 100 after the DSME implementation. The results showed that implementing DSME improves their clinical nurses' knowledge of diabetes self-management and confidence level in educating diabetic patients.

Conclusion:

The implementation of DSME programs for nurses can improve the outcomes of patients with T2DM in inpatient and outpatient settings.

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Implementation of Diabetes Self-Management Education and Training for Clinical Nurses

Problem Recognition**Problem Statement**

Diabetes mellitus is a chronic metabolic condition characterized by microvascular and macrovascular complications due to high blood glucose levels (CDC, 2014). Diabetes results in various complications, such as increased risks for heart illness by about two to four-folds, adult-onset blindness, lower-limb amputations, and kidney failure. It also lowers life expectancy by about 15 years (Al-Saeed et al., 2016). Type 2 diabetes mellitus (T2DM) represents about 90-95% of all patients with diabetes globally. CDC (2014) estimates revealed that there were 422 million individuals in 2014 (increased from 108 million in 1980).

Diabetes claimed 1.6 million lives in 2016. In Hispanics (the project's target population), 2.5 million Hispanics and Latino Americans above 20 years have diabetes (CDC, 2019a). According to CDC (2019a), over their lifetime, American adults have about 40% chances of suffering from T2DM; however, Hispanic or Latino US adults have chances of over 50% and are likely to have the condition at a younger age. This population also experiences increased rates of diabetes-connected complications, including kidney failure, diabetes-associated blindness, and vision loss. The project clinic serves a large population of patients, many of whom are Hispanics with diabetes.

The project clinic lacks a diabetes management program and has limited resources. The project clinic has a registered dietitian, who apart from addressing patients' nutritional needs, also acts as a diabetes educator and gives the clinic diabetes updates. The dietitian's main role as an educator is to concentrate on patients' education requirements in managing the condition. The

project clinic has high readmissions into acute care hospitals (about 50%) for patients with a secondary or primary diabetes diagnosis.

A nurse leader from the progressive care unit at the clinic expressed a lack of evidence-based practice and ineffective communication among providers in the management of diabetes patients. Additionally, several novice nurses fail to provide hand-off reports of clients with hypoglycemic incidents during care coordination with house care nurses and acute care nurses during transfers to home or inpatient care. Waheed (2017) indicates that it is essential to be aware of the outcomes of patients experiencing hypoglycemic episodes to improve and monitor care by implementing interventions that minimize the episodes and their related severe outcomes. The nurse leader also indicates that some providers are sluggish in intervening in episodes of hypoglycemic episodes. Hypoglycemia is connected with longer hospital stays and increased inpatient mortality (Waheed, 2017).

McBrien et al. (2017) suggest that the main factors connected with poor glycemic control among T2DM patients include providers' care and poor patient self-management. According to Krall et al. (2016), although clinical nurses have basic knowledge in health promotion and prevention, they may lack the required teaching strategies and skills to offer content and support associated with diabetes education to patients. Educating clinical nurses using current diabetes evidence, competency evaluations, and protocols helps maintain nurses' professional knowledge base and enhance patient outcomes. Increased knowledge of diabetes management increases nurses' confidence and ability to educate patients effectively in managing the condition (Modic et al., 2014). There were knowledge gaps identified in the delivery of diabetes self-management education (DSME) by the clinical nurses in the project clinic, which is evident in the rates of readmission into acute hospitals, especially among Hispanic patients.

The practice problem addressed by this project was the absence of evidence-based guidelines and protocols for the management of diabetes, which is evident in the clinic's 2017 yearly report. The report suggested that for every three clients in the clinic, two of them had T2DM, with more than half of these patients having HbA1c of more than 9%. This project focused on T2DM and educating clinical nurses about diabetes self-management to improve glycemic control among Hispanics with T2DM. There is a deficit of knowledge about evidence-based guidelines and protocols for DSME among clinical nurses (Guo et al., 2019). Garcia et al. (2015) found DSME to be an effective intervention in improving glycemic control through increasing self-efficacy among T2DM patients. The high prevalence of T2DM among Hispanics makes this group a priority for clinical nurses to teach them about diabetes self-management.

Statement of Project Purpose

This project evaluated methods of promoting clinical nurses' skills and knowledge while providing care to diabetic patients. It also offered clinical nurses education/tools to encourage them to educate Hispanic T2DM patients who visit the clinic about self-management. To achieve the purpose of this quality improvement project, the change agent completed the implementation of the DSME sessions for clinical nurses and evaluate changes in clinical nurses' knowledge of diabetes management.

PICO Question

For this quality improvement project, the population, intervention, comparison, and outcomes were as follows:

Population (P): Clinical nurses offering care to admitted patients with T2DM in the project clinic

Intervention (I): Education to clinical nurses on the management of diabetes

Comparison (C): Current clinic's status quo of not having an educational program

Outcome (O):

- Enhanced confidence, skills, and understanding of diabetes management for admitted diabetic patients in the project clinic
- Improved glycemic control (reduction in HbA1c) among T2DM Hispanic patients

The PICO question for this project:

Among clinicians offering care to admitted patients with T2DM in the project clinic, does a DSME educational training on diabetes management as compared to no DSME program result in enhanced confidence, skills, and knowledge of diabetes management for clinic nurses and improved glycemic control (reduction in HbA1c) among T2DM Hispanic patients who visit the clinic?

Foundational Theory

The theoretical model that informed the evaluation of literature and supported practice change was Rosswurm and Larrabee's (1999) conceptual framework. Rosswurm and Larrabee's (1999) conceptual model integrates components of evidence-based practice (EBP), research, and compulsory change theory. Patricia Benner's nursing theory was utilized to guide quality improvement in this project. This model is designed to act as a theoretical foundation for clinical practice. The Malcolm Knowles theory of andragogy was used for designing the educational program for the clinical nurses. The use of diverse theoretical frameworks provides broad information on understanding events in clinical practice. Additionally, the theories are essential in proposing suitable nursing interventions and anticipated patient outcomes while addressing clinical practice gaps.

Theoretical Model

Rosswurm and Larrabee's model guided this project. The Rosswurm and Larrabee's (1999) conceptual model has six main elements that include (**Appendix C**):

Step 1: Evaluating the necessity for quality improvements

This stage involves involving the stakeholders, gathering internal information about the current practice, comparing internal and external information, and recognizing the practice problem. It also entails defining a PICOT question that categorizes the target population, interventions, comparisons, outcomes, and time, which helps refine the practice problem and provide support from the literature search.

Step 2: Linking clinical problem, intervention, and outcome

This phase comprises using standardized language and arrangement systems, finding possible interventions, and choosing outcomes indicators.

Step 3: Appraising and synthesizing available evidence

This involves searching the identification of available evidence, critically reviewing and weighing the strengths of current research, synthesizing the best literature, and appraising the benefits, risks, and feasibility of the practice change. In this project, a rapid critical critique is performed for every study included or excluded.

Step 4: Designing Change in Practice

This step includes the definition of suggested practice change, identification of the required resources, planning the pilot test assessment, and developing the implementation strategy. The change strategies identified include opinion leaders, change agents, a reminder system, educational materials, educational sessions, audits, and feedback.

Step 5: Applying and appraising change

The main tasks in this phase include implementing the pilot test, assessing the process, costs, and outcomes, and creating recommendations and conclusions.

Step 6: Incorporating and upholding change in practice

The main tasks in this phase include communicating the change recommendations to the stakeholders, integrating the new practices into practice principles, observing the outcome and process, and sharing the project findings.

The main rationale for using this model is that it systematically offers guidance to develop and incorporate evidence-based interventions. Additionally, the model is suitable for an educational project; therefore, it was appropriate for DSME and training. The model is also well-structured, easy to implement, and permits continuous monitoring of executed projects.

Nursing Theory

Benner's novice to expert theory proposes five nurse competency levels: expert, proficient, competent, advanced beginner, and novice. The majority of the novice nurses in the project clinic lacked knowledge of insulin management and depended on experienced providers when providing care to diabetic patients. The theory suggests that nurses go through these competency levels as they acquire skills and understand patient care from a mixture of personal experience and education (Benner, 1982).

Level One: Novice

At this level, nurses are beginners with no experience who are just aware of general rules to help them perform tasks and depend on rules.

Level Two: Advanced Beginner

At this stage, nurses demonstrate acceptable competency and have gained experience in real clinical cases to understand recurring meaningful elements. They also start formulating principles based on experience to guide their clinical actions.

Level Three: Competent

Competent nurses are those with about 2 to 3 years of experience, are more mindful of their long-term goals, and develop perspectives from developing actions founded on analytical, abstract, and conscious thinking.

Level Four: Proficient

At this stage, nurses identify and understand the situation entirely and practice with a holistic approach. They also learn from experience what to anticipate in specific cases and how to adjust strategies.

Level Five: Expert

At this stage, nurses do not rely on guidelines, rules, or principles to connect clinical situations and establish actions. They are highly experienced, have an intuitive grasp of clinical cases, and their performance is highly proficient, flexible, and fluid.

This theory is essential in understanding that it is necessary to create an environment of continuous learning in the project clinic to encourage novice nurses to think critically and solve problems about clinical issues they may encounter and support experienced nurses' retention. DNP-prepared nurses have an essential role in collaborating and supporting other healthcare practitioners to assist providers in staying competent and knowledgeable.

Educational Theory

Malcolm Knowles developed his theory of andragogy that assumes that adults are self-directed and expected to take responsibility for their decisions. According to Ozuah (2016), the theory has five main assumptions:

1. *Self-concept*: As adults mature, they move from depending on others to self-directing
2. *Experience*: As adults grow, they acquire experiences that become a useful tool in learning
3. *Ready to learn*: Adults are at a stage where they understand the value of learning and are prepared to learn about their roles in the society
4. *Orientation to learning*: As adults grow, they change their perspective on education. They look for practical, problem-based methods of learning.
5. *Motivated*: Adults shift from external to internal motivation as they mature and grow

This theory is essential in designing an educational program for adults. The theory was also vital as it guided the principal investigator while training the nurses. According to the model, instructions for adults should concentrate on the process and less on the content. The instructor should adopt the role of a resource or facilitator instead of a grader or lecturer (Ozuah, 2016). In light of this evidence, the researcher used strategies such as self-evaluation, simulations, role-playing, and case studies while training the nurses.

Systematic Review of Literature

The project reviewed current peer-reviewed scientific articles focusing on diabetes self-management education for clinical nurses. Online databases like Medline, PubMed, EMBASE, Cochrane, ScienceDirect, CINAHL, JSTOR, or any other academic electronic database were searched. Search engines such as Google Scholar and Google were also used. These databases store credible peer-reviewed scientific articles or evidence. The validity and reliability of these

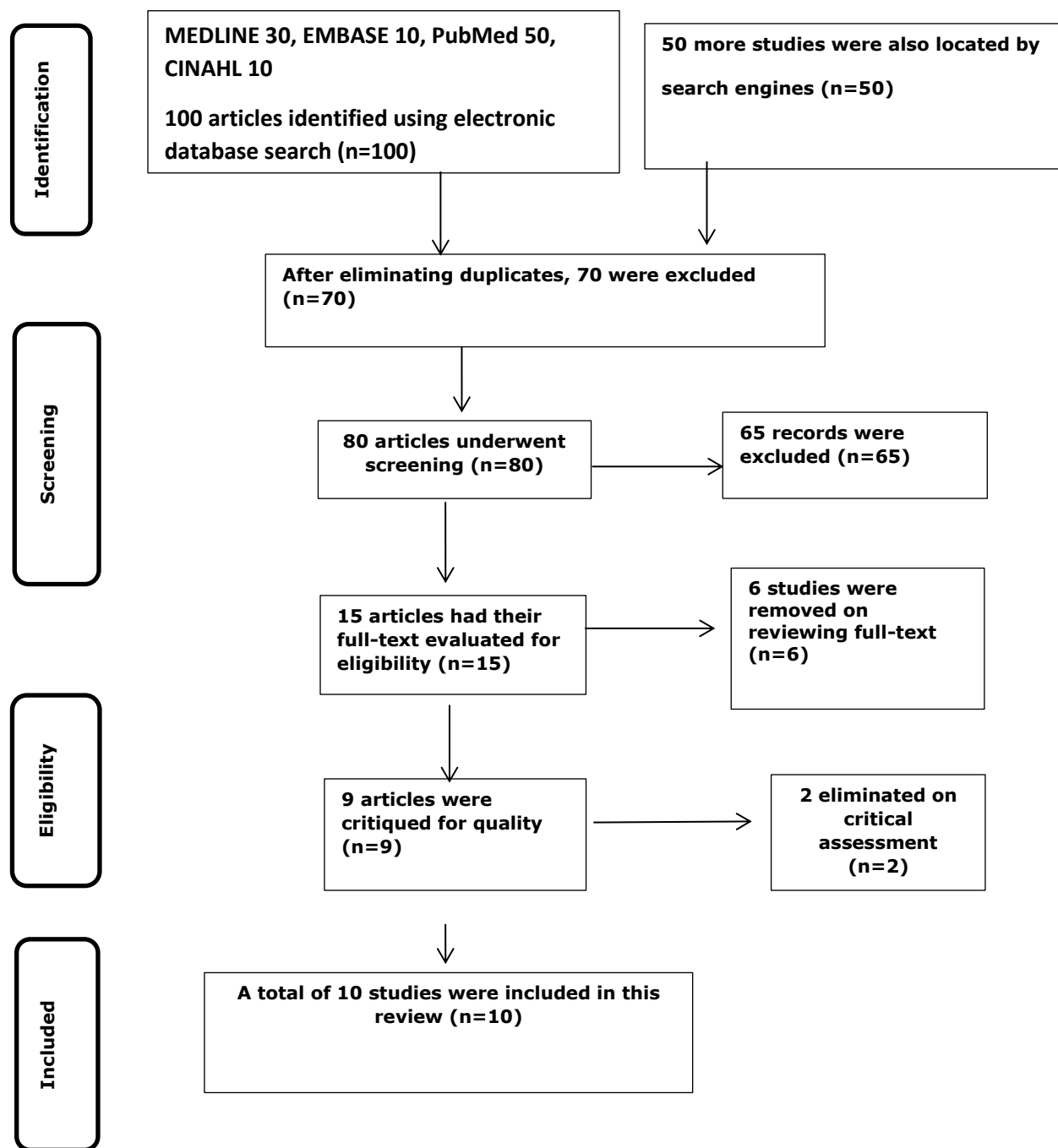
articles were verified from the number of participants used and methods used. The search terms included Hispanics, diabetes self-management education, type 2 diabetes mellitus, glycemic control, diabetes education, and effective diabetes self-management. The researcher also used English articles published between January 1, 2009, and December 31, 2019. The search included those dates since most articles were published after 2009. The search identified 150 studies; after screening and reviewing the articles, only 10 met the inclusion criteria and were included in the study, as shown in **Appendix A**.

Level of Evidence

The studies included were ranked on level of evidence the Melnyk and Fineout-Overholt seven levels of the evidence hierarchy. According to Melnyk and Fineout-Overholt (2011), there are seven levels of evidence hierarchy:

- Level 1: Systematic reviews and meta-analyses of RCTs; clinical guidelines founded on meta-analyses or systematic reviews
- Level 2: RCTs
- Level 3: Controlled trials without randomization
- Level 4: A cohort study or case-control
- Level 5: Systematic reviews of qualitative and descriptive studies
- Level 6: A descriptive or qualitative study
- Level 7: Expert opinion

One systematic review (Level I), one randomized controlled trial (Level II), three quasi-experimental studies (Level III), two correlational studies (Level IV), one cross-sectional study (Level IV), one Expert opinion (Level VII) on DSME were included in this project.

Results of the Search

Emergent Themes

While performing a literature search based on the DNP project's PICO question, two main themes were identified. The themes were enhanced nurses' knowledge and skills; and lack of adequate diabetes management among nurses. The first theme was enhanced nurses' knowledge and skills. Various studies discussed how to assist nurses in advancing their skills and knowledge about caring for diabetic patients (Holmes & Dyer, 2013; Sugiharto et al., 2017; Modic et al., 2014; Tschannen et al., 2013). The studies suggest that DSME training for nurses was an effective way to increase nurses' knowledge and competency about caring for diabetic patients. According to the studies, DSME training helps providers with clinical judgment, discernment, and reasoning. It also increases their confidence and ability to educate patients effectively on managing the condition that helps improve glycemic control through increasing self-efficacy among T2DM patients. Tschannen et al. (2013) indicate that after participating in the educational sessions, nurses reported that the training offered an exceptional chance to advance knowledge and apply it to different settings. The study also noted that learning strategies such as simulation and problem-based learning effectively provided essential knowledge and competency about chronic disease case management.

The other theme was the lack of adequate knowledge of diabetes management among nurses. Studies suggested that nurses lacked the competency and knowledge needed to provide quality care and DSME to diabetic patients (Hollis et al., 2014; Lange & Pearce, 2017). Hollis et al. (2014) suggest that nurses' lack the necessary knowledge needed for DSME, especially in dietary and medication management. Lange and Pearce (2017) also identified an inconsistency between supposed and actual diabetes knowledge and competency among nurses. Three studies

also reported low levels of knowledge of diabetes concepts before implementing DSME training (Holmes & Dyer, 2013; Sugiharto et al., 2017; Modic et al., 2014).

Project Significance

The project clinic lacks an educational program for clinical nurses on diabetes management. Consequently, nurses have knowledge gaps and may lack the ability to offer better patient care to yield positive outcomes. Various studies have indicated that providers' diabetes management knowledge was enhanced after undertaking a DSME training on diabetes management (Holmes & Dyer, 2013; Sugiharto et al., 2017; Modic et al., 2014; and Tschannen et al., 2013). According to Alotaibi et al. (2016), providers' knowledge about diabetes is positively related to their level of education; and perceived competence and knowledge.

Many conditions can be treated successfully by observing the medication regimen. Nonetheless, proper diabetes management needs knowledge of nutritional status, physical activity, glucose monitoring, and medication management. Insufficient short-term interventions can rapidly cause long-term problems. The condition also increases financial and economic burdens. The private primary care practice settings in the American southwest, where this quality improvement project was implemented, lack EBP guidelines and protocols for clinical nurses and physicians to utilize to address the self-management needs for diabetic patients. The region consists of about 90% of Hispanics in America, and the average household income in 2013 was about \$39,450. The project clinic 2017 annual report suggested that among every three clients in the clinic, two of them had T2DM. The ideal HbA1c is 7%; however, more than half of these patients had an HbA1c of more than 9%. According to Beck et al. (2020), considerable skills and knowledge gaps have been reported in about 50% to 80% of diabetic patients nationally. Additionally, most of these patients do not receive appropriate, safe, and high-quality care.

In light of this evidence, implementing DSME and training for clinical nurses will significantly enhance the quality of diabetes care. It will positively affect our health care system, as it will provide findings that can encourage a large-scale quality improvement study, thus giving more generalized findings. The project will also positively influence social change in the community by promoting better health care delivery to Hispanics.

This quality-improvement project pre-tested the clinical nurses, conduct the training and then perform a post-test to appraise the nurses' knowledge of diabetes management. The project was first implemented in a single clinic and involved clinical nurses only. This was a way of evaluating its effectiveness. The quality improvement project will be evaluated yearly. After evaluating the project's success, it may be applied to other clinical settings and involve a larger population.

The rationale of this quality improvement project was to facilitate a nurse-led DSME and management of T2DM to facilitate and promote effective self-management. Through DSME education, clinical nurses can also:

- Ensure that clinical decisions are timely, based on EBP, and patients participate in the clinical decision-making process.
- Align approaches to diabetes management with the Chronic Care Model
- Evaluate the quality of diabetes self-care and develop quality improvement strategies

Market and Risks Analyses

SWOT Analysis

The project performed an analysis of the practice change strengths, weaknesses, opportunities, and threats and considered both external and internal factors. This analysis is

useful because it helps build on the strengths, address the weaknesses, minimize the risks, and take the greatest advantage of success chances.

Strengths

Providing nurses with DSME education helps maintain their professional knowledge base, enabling them to take holistic actions while offering care to diabetic patients, thus leading to strong primary care. Additionally, Modic et al. (2014) suggest that increased knowledge of diabetes management increases providers' confidence and ability to educate patients on managing the condition effectively. DSME training also helps improve glycemic control by increasing self-efficacy among diabetic patients due to the DSME education provided by knowledgeable nurses (Garcia et al., 2015). Quality care, together with the well-informed education offered by nurses, supports patient's self-management that results in improved patient outcomes.

Weaknesses

The project's weaknesses included clinical nurses' lack of commitment to learning, resistance to practice change, and limited time to work and still attend training.

Opportunities

This quality improvement project provides a chance to implement EBP guidelines or protocols, opportunity to build professional networks during learning, a chance to apply DSME to other chronic illnesses and clinical settings. Others include achieve benchmarks and increased community engagement.

Threats

The threats posed by this project included other clinic's adopting this teaching. Constantly changing protocols and medications from the Diabetes Association. Other threats include disruption of normal workflow and clinic closure.

Restraining and Driving Forces

This project's driving forces included improving the quality of care offered to diabetic patients, enhancing clinical nurses' skills, knowledge, and strategies on diabetes management, and improving adherence to available EBP guidelines and protocols. On the contrary, the restraining forces were clinical nurses' lack of commitment to participate, lack of training time, and busy schedules. For a change in practice to occur successfully, the driving forces must surpass the restraining forces. To address the restraining forces, the change champion in this project provided flexible training schedules to avoid schedule clashes. Another refraining force included nurse's inability to learn well from the investigator since the investigator had to wear mask while presenting due to Covid-19. Also that Covid-19 restrictions made the training difficult because people had to sit too far from each other.

Sustainability

According to Clepper (2018), sustainability happens when process outcomes become part of organizational culture after implementation has occurred. Without sustainability, valuable resources and time are wasted on quality improvements. Quality improvements should be continuously incorporated into a clinic's culture to offer quality care and use safe, reliable practices. Additionally, sustainability helps prevent project fatigue and engages providers in developing a safety culture that lasts after project implementation.

Various models are used to facilitate sustainable change; the investigator used Kotter's 8-Step Change Model (Orr & Davenport, 2015). The model has eight steps that include:

1. Creating urgency
2. Creating the guiding team
3. Developing a change strategy and vision
4. Having Buy-In
5. Empowering others
6. Making short-term successes
7. Building on the change
8. Developing a new culture

These steps were essential in ensuring the sustainability of the project. Ensuring buy-in from the clinical nurses and clinics' management was essential as they were the key stakeholders of the project and determined the project's success. A reduction in the rate of acute hospital admission and emergency room visits and reduced diabetes complications for diabetic patients will also be a significant facilitator for the project's sustainability. It was also essential that the participating nurses and management have high satisfaction levels with the program to encourage them to adopt it in their standards of care. Collaboration between the clinic's health care professionals was also necessary. Sustainability with increased costs or reduced quality of care is a financial concern for many facilities (Orr & Davenport, 2015). However, in this project, these issues were not a concern as the quality of care is anticipated to increase, and costs are minimal. The principal investigator worked with the clinic's management, nurse leader, clinical mentor, and clinical nurses to formulate plans to sustain the DSME training program.

Stakeholders and Project Team

The success of this project significantly depended on the teamwork of stakeholders. The key stakeholders are patients, clinic management, RN case managers, the clinic's diabetic educator, clinical nurses, principal investigator, medical director, and clinical mentors.

Cost-Benefit Analysis

According to the CDC (2019b), cost-benefit analysis is a process of comparing the benefits and costs of interventions, where the costs are subtracted from the benefits. The actual costs associated with this project was \$8,380.

<i>Faculty salaries</i>			
<i>Faculty</i>	Cost	University Amount	Total
Principal investigator	\$7,000	0	\$7,000
Data analyst	\$700	0	\$700
Clinical nurses	-	-	0
Total wages			\$7,700
<i>Supplies</i>			
Printing papers	\$80	0	\$80
DKT2	Free	0	0
Total costs of supplies			\$80
Total costs			\$7,780

The principal investigator prepared the DSME education program. The principal investigator is a DNP-prepared nurse with vast experience in clinical practice. This allows the researcher to design an educational program consistent with current EBP and share their skills and knowledge in preparing the nurses for effective practice. The researcher also has excellent

skills and experience as an educator and leader; therefore, qualified to offer other nurses the current evidence-based education.

The change champion requested the clinic management to adjust participating clinical nurses' schedules to allow them to attend the training together before or after their shifts. This arrangement allowed the participating clinical nurses to work their normal hours and not interfere with their workload. The educational curriculum was also prepared digitally as pamphlets and PowerPoint presentations by the principal investigator. Hard copies of the curriculum were printed out using the clinic's printing equipment. The principal investigator also conducted the evaluation process of the project.

The benefits of the project include clinical nurses stand to gain skills, knowledge, and strategies to help educate patients on how to self-manage their diabetes and blood sugars. Consequently, patients were able to reduce HbA1c levels using the tools provided by clinical nurses. No physical or social risks were expected to nurses or patients since participation in the study was voluntary. Recommended EBP guidelines and protocols were followed while designing the educational materials and implementing the practice change. However, the included articles' findings may not be generalized to other care settings, and there may be discrepancies in procedures used in the reviewed articles.

Project Objectives

Mission and Vision

The mission of this quality improvement project was to provide current evidence-based DSME training to clinical nurses to improve their understanding, confidence, and skills in offering DSME to patients. The vision was to prepare the next generation of nurses, ensure the

provision of quality care, and support continuous learning for clinical nurses while improving glycemic control (reduction in HbA1c) among T2DM Hispanic patients.

Goals

This quality improvement project aimed to strengthen diabetes self-management skills or increase understanding and awareness by 25% among clinical nurses participating in this training program within 3 months. Since this project was successful, DSME training should be incorporated into the clinical practice standard for clinical nurses that provide care to diabetic patients.

Smart goal

To improve clinical nurses' diabetes self-management knowledge, skills, and confidence level in educating patients with diabetes through utilizing DSME training in the next 3 months.

Outcomes

This project's outcomes were enhanced clinical nurses' knowledge of diabetes management and confidence level in delivering DSME among T2DM patients. Therefore, nurses can use this knowledge to promote EBP in clinic settings, which will enhance patients' knowledge and skills in diabetes self-care management, thus improving glycemic control among patients. To achieve the outcomes of this project, the following processes were undertaken:

1. Developed a DSME education curriculum based on current evidence-based practices in the first week
2. Adopted the DSME training sessions for clinical nurses in the clinic for about 30 days
3. Assessed clinical nurses' change in knowledge, skills, and confidence in diabetic management for admitted patients using a pre and post-training examination (pre-test in 1st week while post-test in 7th week of the project). Additionally, a follow-up test was conducted 3 months after training to evaluate knowledge retention.

4. Disseminated the conclusions and recommendations of the project to the clinic's management after DNP capstone defense

Project Plan and Evaluation

Research Design Methodology and Measurement

This quality improvement project was based on current evidence-based practice. It involved a quality improvement plan, DSME training, and program evaluation. The project was performed in a single healthcare clinic (Elite Patient Care) to address the quality of care offered to patients, patients' satisfaction, and health care costs. The outcomes of this quality improvement project are not meant to produce new information and are not generalizable to different settings. However, this project's outcomes were meant to provide evidence-based interventions for the issues the project clinic is facing.

This project addressed this PICO question: *Among clinicians offering care to admitted patients with T2DM in the project clinic, does a DSME educational training on diabetes management as compared to no DSME program result in enhanced confidence, skills, and knowledge of diabetes management for clinical nurses in the project clinic; and improved glycemic control (reduction in HbA1c) among T2DM Hispanic patients who visit the clinic?*

This QI project conducted a pre- and post-test on the clinical nurses and compared the scores of the two tests. This arrangement made it a pre- and post-test quasi-experimental design with good quality as it is Level III evidence on Melnyk and Fineout-Overholt (2011) seven levels of the evidence hierarchy. With this design, a pre-test to assess diabetes education level was performed, followed by the DSME training, and then a post-test of their knowledge was conducted, and the tests' results were compared. This design was effective because it allowed the principal investigator to assess whether the DSME training effectively increases the clinical

nurses' confidence level, skills, and knowledge of diabetes and diabetes management. Campbell and Stanley (2015) indicate that the main advantage of a pre- and post-test quasi-experimental design is useful in providing direction to research, suggesting that there is the testing of a dependent variable pre- and post-intervention with an independent variable. In this project, the independent variable was DSME training, while the dependent variables were clinical nurses' confidence level and knowledge of diabetes management (project outcomes).

The project was performed in the following steps:

Step 1: After receiving the clinic's management approval to conduct the project at Elite Patient Care (**Appendix H**), the investigator applied for Regis University's Institutional Review Board (IRB) approval. After receiving the Regis university IRB approval, clinical nurses in the project clinic were recruited.

Step 2: Conducting the pre-test to the participating clinical nurses during the first week of the project implementation and recording the scores

Step 3: Planning for the DSME training curriculum occurred during the second week of the project, which involved adjusting the learning materials to address the areas of concerns based on the results of the pre-test. The investigator determined clinical nurses' workload and scheduling the DSME training appropriately to avoid schedule clashes

Step 4: The DSME training was conducted during the 3rd and 6th weeks. Daily email reminders were sent to the participating clinical nurses via email.

Step 5: During week 7 of the project, a post-training test was conducted immediately after training, and the results of this examination were compared to those of the pre-test to establish the project's outcomes.

Step 6: A post-test to be conducted after 3 months after training to evaluate the level of information retention by the nurses.

Conducted Statistics

The principal investigator used the IBM SPSS Statistics version 24 software to analyze the project's data. The statistical analysis included inferential and descriptive statistics.

According to Mishra et al. (2019), descriptive statistics are data analyses that assist in summarizing, describing, or showing data in a meaningful way, while inferential statistics draw conclusions from data. Descriptive statistics was utilized to describe data from the pre- and post-test results. The descriptive statistics that the investigator used in this project included standard deviation and mean of the pre- and post-test results. Additionally, the frequencies of the participating clinical nurses' demographics were included. The inferential statistics used in the project were Pearson's correlation, confidence interval, level of significance, and paired samples t-test. The investigator used these inferential statistics to draw conclusions from the project's collected data.

Population and Sampling Parameters

The target sample size of the project was a convenience sample of 15 clinical nurses. According to Taherdoost (2016), convenience sampling is a non-probability technique involving a sample comprised of participants that are most accessible to a researcher. This sampling technique has a high chance of bias, as the sample is not randomly selected (Taherdoost, 2016). However, it is an inexpensive and easy way to collect initial data, but the sample does not represent an entire population, and the findings are not generalizable (Taherdoost, 2016). Convenience sampling is effective for this project because the clinical nurses represent the nurses caring for diabetes patients. Additionally, it would have been costly and time-consuming

to perform the quality improvement project on an entire population. The inclusion criterion was clinical nurses offering care to diabetic patients in the study site. The principal investigator worked closely with the nurse leaders to plan and announce the DSME training in the implementation stage.

Setting

The setting was Elite Patient Care Clinic, a medium-sized clinic located in the southwest portion of the United States. The clinic setting was appropriate as it provides care to a large population of diabetic patients.

Logic Model

Logic models act as roadmaps explaining related activities' order while linking the planned program's needs with the outcomes (Yap et al., 2016). For this project, a logic model was used to guide its activities. The logic model components included inputs, outputs, and outcomes, and impact, as shown in **Appendix B**.

Inputs involve considering the resources that the project needed for it to be implemented successfully. The resources identified included clinical nurses, a diabetes educator, diabetes patients, educational materials, printing equipment and papers, Diabetes Knowledge Test (DKT2), time, and conference room to conduct the training.

Outputs include the activities and participation needed by the project. The project needed activities such as determining clinical nurses' workload, scheduling the DSME training appropriately to avoid schedule clashes, and ensuring the conference room had computer resources. Other activities included printing educational materials and pre- and post-training tests and conducting the pre-training test in the first week of project implementation, and using pseudo names for participating nurses to maintain confidentiality. Planning and implementing

the educational intervention occurred between the 2nd and 6th weeks of the project. The post-training examination was conducted during Week 7 immediately after training. Additionally, a follow-up test was conducted 3 months after training to evaluate knowledge retention. The final activity was sharing the conclusions and recommendations of the project with the clinic management after the DNP capstone oral defense. The project required all the key stakeholders that include patients, clinic management, clinical nurses, principal investigator, medical director, and clinical mentors, to take an active role.

Outcome and impacts involve the short- and medium-term results and the long-term impact the project is expected to accomplish. The short-term results that were expected in this project included enhanced clinical nurses' confidence, skills, knowledge of diabetes self-management and care for diabetic patients, and adherence to recommended EBP while providing care to diabetes patients. The medium-term results were improved glycemic control (reduction in HbA1c) among T2DM Hispanic patients and reduced acute care readmission rates of diabetic patients. Another medium-term result was an increased number of clinical nurses qualified to teach diabetes patients effectively based on current evidence.

The long-term impacts were reduced diabetes complications in the community, especially Hispanics, and increased nursing skills and knowledge of diabetes and diabetes management. Another impact was continuous DSME training support by the clinic management and engagement with key stakeholders for improved community health.

Instrument Reliability and Validity

The project utilized the Revised Brief Diabetes Knowledge Test (DKT2) (**Appendix D**). Fitzgerald et al. (2016) indicate that the tool comprises 2 parts, and each is scored independently. The first section is the general knowledge segment with 14 items and assesses type 1- and type

2-diabetes knowledge. The second segment has 9 items and addresses the insulin use subscale suitable for type 1 and type 2 diabetes patients. The test can be completed in about 15 minutes. The tool's readability level was evaluated using the Flesch-Kincaid grade level that rated it as a fourth-grade reading level (Fitzgerald et al., 2016). The tool offers a low-cost and quick way of evaluating a population's basic knowledge of diabetes (Fitzgerald et al., 2016). According to Fitzgerald et al. (2016), the DKT2 was reliable, with an alpha coefficient of greater or equal to 0.7 ($\alpha \geq 0.70$). The item-level content validity index for the instrument scales ranged from .83 to 1 with a mean scale-level index of .96 (Alhaiti et al., 2016).

The tool is scored by adding up the items answered correctly, with higher scores indicating higher diabetes knowledge. Any unanswered or missed questions are counted as incorrect. According to Zowgar et al. (2018), the maximum score is 100%, and scores can be categorized into the following sections: 75% and above, 75% to 60%, and 59% and below. For this project, the principal investigator considered a score of 75% and below a low score indicating a low level of knowledge. The pre- and post-test was modified to address the specific knowledge gaps among clinical nurses. This was done after consultations with the clinical mentor and nurse leader at the clinic.

The questionnaire shown in **Appendix E** was used to evaluate nurses' confidence level in educating patients about diabetes before and after training.

Protection of Human Rights Procedure

Before starting the quality improvement project, the principal investigator applied and waited for the approval of IRB after receiving the clinic's management approval. The IRB acts as an impartial third party, regulated by federal guidelines to manage and protect risks to human participants involved in studies. IRB specific goals are promoting the well-being and safety of

human participants, ensuring the research upholds related ethical principles and values, and guaranteeing that only scientifically valid and ethical research is employed (Grady, 2015).

Additionally, IRB aims to alleviate public concerns about the responsible study conduct (Grady, 2015).

The principal investigator maintained the confidentiality of all participants. According to Petrova et al. (2016), studies depend on participants to volunteer information concerning individual actions and beliefs on the subject matter. Participants are more likely to give honest responses when their identities are not exposed. In light of this evidence, the participants remained anonymous throughout the project. The principal investigator used acronyms for the participating clinical nurses when collecting their demographics and throughout the project. Additionally, the investigator obtained an attendance record to monitor the participant's attendance at the training room. This was essential in understanding the nurses that missed certain sessions and providing them later at a convenient time. The attendance record was stored securely in the investigator's secure files and destroyed immediately after the training.

The pre- and post-tests were handed personally to the clinical nurses. They were encouraged to use their assigned acronym during the examination. While presenting the tests to the clinical nurses, a different information document containing information such as voluntary participation, the project's purpose, any benefits or risks, how privacy was maintained in the study, and the investigator's contact information. Additionally, the clinical nurses were verbally informed that their participation is voluntary, and the project prioritizes their privacy. After gathering data on both tests, the data was de-identified and reported as aggregate data. The data was stored in the principal investigator's laptop that is secured with a strong password. The data was then be analyzed using SPSS with the help of a data analyst. Additionally, the results were

stored in a secured locked cabinet (only the principal investigator can access the information) and will be kept for at least 3 years.

Project Findings and Results

SPSS was used to analyze the data. The independent variable was DSME training, which had two categories or levels (before and after the implementation of DSME). Nurse knowledge of diabetes management and nurse's confidence level to educate patients were the dependent variables. Nurse knowledge of diabetes management measured with DKT2 and Confidence level measured with Confidence Level Questionnaire (CLQ) (**Appendix E**) are scalar variables. The impact of DSME on nurse knowledge and confidence level was assessed using the related sample-test. According to Kim and Mallory (2017), investigators can employ the paired *t*-test or the related sample *t*-test when comparing the group means of the same group before and after the administering treatment. Both inferential and descriptive statistics were performed. The sample size was 15, and the mean age of the clinical nurses was 43 years, with a standard deviation of 13.37. six of the nurses in the project had BSN, three had MSN, and six had ADN (Table 1). More than 50% of the participants had nine and above years of nursing experience.

Participant Demographics

Table 1: Participant Demographics

Characteristics	Total sample N=15	Results	Mean	Standard deviation
Age, In years	24 – 39	5	43	13.37
	40 – 55	7		
	56 – 71	2		
	72 or above	1		
Years of Practice	1 or less	2		

	2 - 4	1		
	5-10	5		
	11 or above	7		
Degree in nursing	BSN	6 (40%)		
	MSN	3 (20%)		
	ADN	6 (40%)		

Regression Results

The table below display regression analysis of the variables that influence nurses' knowledge about diabetes self-management which is reflected in knowledge of diabetes management and confidence level in educating T2DM Hispanic patients to improve their glycemic control. The main variables included are degree level, years of practice, and age.

Table 2: Results for regression analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.949 ^a	.900	.873	.760

a. Predictors: (Constant), degreelevel, yrsofpractice, age

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	57.382	3	19.127	33.129	.000 ^b

Residual	6.351	11	.577		
Total	63.733	14			

a. Dependent Variable: pretest

b. Predictors: (Constant), degreelevel, yrsofpractice, age

Coefficients^a

Model		Unstandardized		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	25.008	.633		39.482	.000
	age	-1.862	.583	-.771	-3.195	.009
	yrsofpractic	-.279	.282	-.139	-.990	.344
	e					
	degreelevel	-.222	.699	-.081	-.318	.756

a. Dependent Variable: pretest

The results above show that the variables scored a multiple correlation coefficient R of 0.949, indicating that there was a good level of prediction of the dependent variable by the independent variables. The R square or coefficient of determination from the data was equal to 0.900, which shows that the independent variables age, years of practice, and degree level explains 90% of the variability in pre-test or knowledge of diabetes self-management.

The coefficients table is used to assess the statistical significance of each independent variable. The results from the table show that the coefficient for the independent variable age is

statistically significantly different from zero. However, the coefficients for independent variables (years of practice and degree level) are greater than 0.05, indicating that the coefficients are not statistically significant different from zero.

Results from the DKT2 (23 Items)

Before DSME training, only eight of the participants were able to correctly score 21 out of 23 items on DKT2. However, after completing a four-week DSME training (Post-test), all 15 clinical nurses recorded a correct score on all 23 items on the DKT2 tool.

Table 3: Knowledge on Diabetes Management

Number of Nurses	Correct Score on DKT2 (Pretest)	Correct Score on DKT2 (Protest)
1	23	23
3	22	23
4	21	23
3	20	23
1	19	23
1	18	23
1	17	23
1	15	23
Total = 15		

Results from Confidence Level Questionnaire

CLQ had 3 point scale: Not at all, Moderate, and Very confident

Not at all – Nobody selected this option in all 5 questions (CLQ)

Q1: How confident are you in providing insulin education to patients?

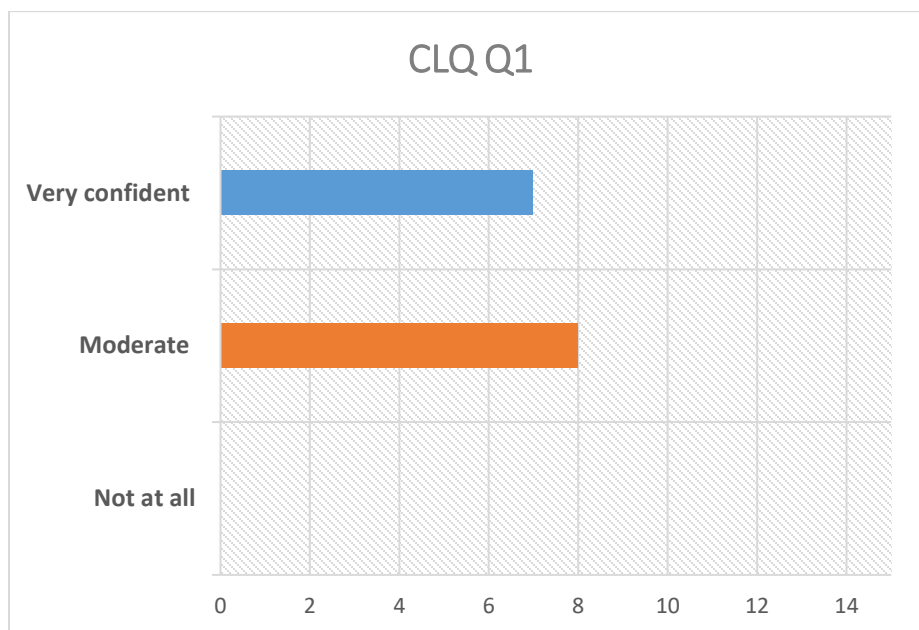
Not at all = 0

Moderate

{ BSN = 3, MSN = 2, ADN = 3 } = 8

Very confident (Nurses):

{ BSN = 3, MSN = 1, ADN = 3 } = 7



Q2: How confident are you in providing oral medication education to patients?

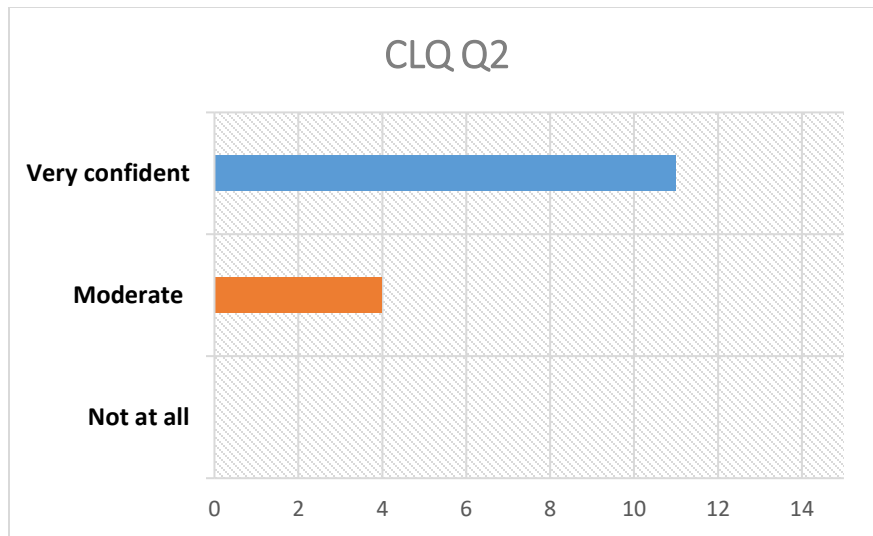
Not at all = 0

Moderate

{ BSN = 2, MSN = 0, ADN = 2 } = 4

Very confident (Nurses):

{ BSN = 4, MSN = 3, ADN = 4 } = 11



Q3: How confident are you in providing nutrition education to patients?

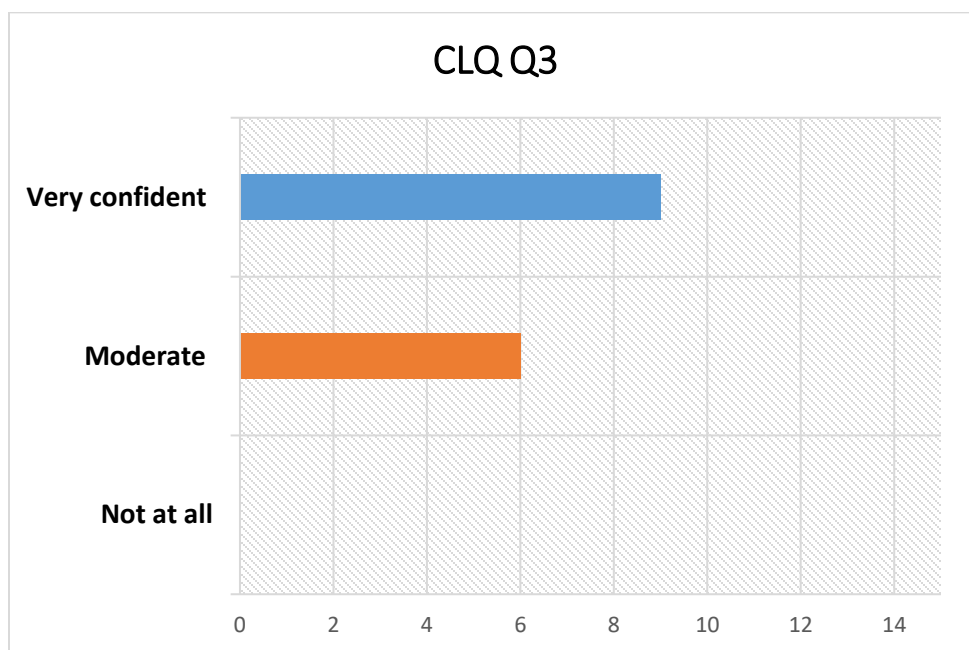
Not at all = 0

Moderate

{ BSN = 1, MSN = 2, ADN = 3 } = 6

Very confident (Nurses):

{ BSN = 5, MSN = 1, ADN = 3 } = 9



Q4: How confident are you in the management of Hypoglycemia?

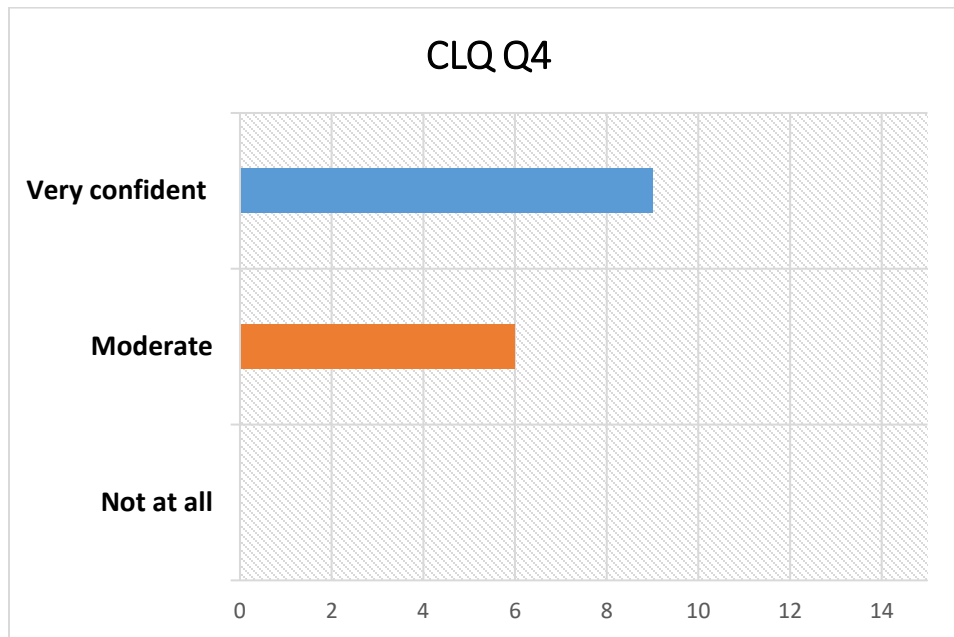
Not at all = 0

Moderate

{ BSN = 3, MSN = 0, ADN = 3 } = 6

Very confident (Nurses):

{ BSN = 3, MSN = 3, ADN = 3 } = 9



Q5: How confident are you in the management of hyperglycemia?

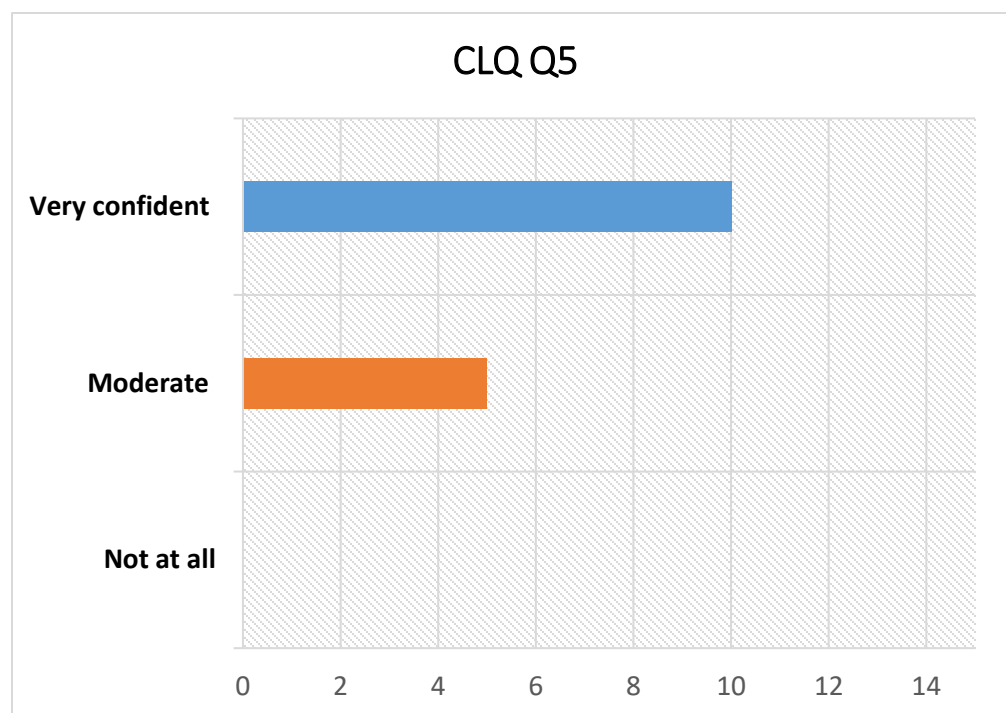
Not at all = 0

Moderate

{ BSN = 2, MSN = 0, ADN = 3 } = 5

Very confident (Nurses):

{ BSN = 4, MSN = 3, ADN = 3 } = 10



Inferential statistics were performed with data obtained of nurses' knowledge on diabetes management with mean DKT2 before the implementation of DSME program (DKT2 pre-test) compared to the mean nurses' score on DKT2 after implementation of DSME program (DKT2 posttest) (Table 2). To convert the data from non-parametric to parametric data to allow the application of sample t-tests, a marking criterion was employed (Table 3). The mean DKT2 pre-test was 20.13 with a standard error of 0. The nurses' confidence level in educating patients measured with mean CLQ was 80 (pre-test) and 100 after the DSME implementation, showing the positive effect of the DSME program (Table 4).

Table 4: Marking Criterion

Abbreviation	Scores
A (not at all)	0
B (moderate)	10 marks

C (very confident)	20 marks
--------------------	----------

Table 5: Paired Sample statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	correctscoreonDKT2pre test	20.13	15	2.134	.551
	correctscoreonDKT2posttest	23.00	15	.000	.000
Pair 2	Confidence CLQ pretest	80.00	15	16.903	4.364
	Confidence CLQ posttest	100.00	15	.000	.000

After calculations, the t -statistic for DKT2 was -5.204. The p -value was .00. This is less than the preset alpha of .05. Thus, we reject the null hypothesis (DSME program does improve nurses' knowledge and confidence level). The mean DKT2 ($M=23$, $SE=0$) was much higher after the implementation of the DSME program as compared to the mean DKT2 before implementing the DSME program ($M=20.13$, $SE=0.551$), $t(14) = -5.204$, $p=.00$. The t -statistic for CLQ was -4.583. The p -value was .00, which is smaller than .05, the preset alpha. Thus, we reject the null hypothesis (which was that the provision of a DSME program has no effect on clinical nurses' confidence level in educating patients about diabetes management). The mean CLQ ($M=100$,

SE=0) was much higher after DSME implementation as compared to the mean CLQ before DSME implementation ($M=80$, $SE=4.364$), $t(14) = -4.583$, $p=.00$ (Table 5). This shows the positive effect of implementing DSME.

Table 6: Paired Samples Test

Paired Samples Test									
		Paired Differences							
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2- tailed)
					Lower	Upper			
Pair 1	correctscoreon DKT2pretest - correctscoreon DKT2posttest	-2.867	2.134	.551	-4.048	-1.685	- 5.204	14	.000
Pair 2	Confidence CLQ pretest – Confidence CLQ posttest	-20.000	16.903	4.364	-29.361	-10.639	- 4.583	14	.000

Besides the statistical results, the researcher also found that the age of the nurse does not affect their confidence in providing nutrition education to their clients. Secondly, the project established that the higher the nursing education, the more confidence in providing nutritional education to their clients. Furthermore, the higher their education, the more confident a clinical

nurse is in managing hypoglycemia. Fourthly, the study also found that the higher the education, the more confident a clinical nurse is in managing hyperglycemia. During a post-test, the researcher found that out of 5 patients, 4 had a significant reduction in HbA1c. One patient did not have any improvement because of non-compliance. The patient that was non-compliant was young.

Discussions and Conclusions

The results confirmed the effectiveness of diabetes self-management education delivered to clinical nurses to improve their knowledge of diabetes self-management and confidence level in educating diabetic patients. Although the study involved a small sample of only 15 clinical nurses, the project's results were consistent with the literature concerning the effectiveness and benefits of diabetes self-management programs (Guo et al., 2019; Sugiharto et al., 2017). The diverse nurse population (in terms of age, years of experience, and level of nursing education) had similar outcomes in the knowledge of diabetes management after the implementation of the DSME. However, the study's results extend these findings in a major way; the researcher used a complicated statistical approach to convert the non-parametric data to parametric data to allow the comparison between two sample means (DKT2 pre-test and post-test).

The program was implemented according to American Diabetes Association standards and recommendations. The data obtained showed that DSME has a positive effect on HbA1c levels and patient satisfaction. Nurses with higher nursing education were very confident in educating patients about diabetes self-management. The results confirm that ADNs are equipped with knowledge and skills that can help them execute the nurse educator role effectively. From the observations made after the clinical nurses implemented what they had learned in the program, out of 5 patients, 4 reported a significant reduction in HbA1c. One patient did not have

any improvement because of non-compliance. The non-compliant patient was young. This showed that DSME was beneficial to both patients and nurses at this clinical site. Helping clinical nurses who handle patients with T2DM to learn and embrace DSME was an important step in the DSME implementation. Knowledge and confidence level improvement in administering diabetes education to patients are the overall program outcomes. The project enhanced clinical nurses' knowledge and confidence level by equipping them with diabetes self-management skills. Diabetes education helped the clinical nurses to understand diabetes, its progression, and potential complications. This will encourage nurses to educate their patients about self-care management for optimal health.

As a result of this project, clinical nurses at the Elite Patient Care Clinic now have the competencies as diabetes educators to improve diabetes knowledge and skills of patients with T2DM. These findings will encourage other hospitals with the state to implement DSME in their settings. The aims and objectives of the project were realized as all clinical nurses working at the Elite Patient Care Clinic were committed to enhancing quality care services in terms of diabetes care.

To conclude, T2DM is a growing epidemic in America and worldwide. The project has shown that implementing a DSME program for clinical nurses positively impacts both nurses and patients. The implementation of DSME can improve nurses' knowledge of DM and confidence level in educating patients about diabetes self-care. This project supports that DSME can help healthcare professionals to reduce hospitalizations and length of hospital stay wrought by diabetes. From the project results, we can conclude that poor self-management skills and inadequate knowledge is associated with increased hospitalizations from unmanaged T2DM. Therefore, the DSME program is a promising intervention to improve self-care in diabetes

management. DSME program is also linked to improved quality of life and self-care behaviors among patients.

Limitations, Recommendations, Implications for Change

Limitations Addressed

This project's limitations were linked to sample size, clinical nurse demographics, and nurse learning preferences. A major challenge with completing this project was the task of convincing the clinical nurses to spend the time needed to complete the test. Therefore, to persuade them to create time for this study, the investigator offered to buy lunch for the nurses, which motivated them to complete the test. Another limitation of this project was the limited time available to implement the intervention, collect data, analyze and write the report. This prompted the researcher to include only 15 clinical nurses (a small sample size). The investigator managed to address this limitation by creating a work plan that allowed timely execution of different project activities. The researcher also hired two research assistants to help collect and organize the data. Using a small sample size was a problem to the credibility and generalizability of the project results. The researcher did not conduct any power analysis to determine the minimum number of participants needed to obtain generalizable results. The mean age of the clinical nurses was 43 years old, with ages ranging from 24 to 72. The nurses' age spectrum was broad, with different nursing degrees and specific individual needs. The use of convenience sampling was another challenge for this project. According to Jager, Putnick, and Bornstein (2017), convenience sampling often yields less generalizable results than probability sampling. To address this challenge, the researcher strived to increase the generalizability of findings from this project by studying a more diverse population of clinical nurses.

Recommendations

The results of this project added to the burgeoning body of literature and showed that the DSME program for clinical nurses was effective in advancing nurse knowledge of DM and confidence level in educating patients with T2DM. Patients that these clinical nurses care for at the Elite Patient Care Clinic benefited from the evidence-based DSME program by showing a significant reduction in HbA1c. Therefore, as the prevalence and incidence of T2DM, other HCPs in the primary care setting can replicate this project to advance their knowledge. Future DSME programs should be designed to incorporate online education or use electronic devices to avoid complaints regarding tight work schedules from nurses. Future researchers must strive to involve many nurses and other healthcare providers. Future DSME programs should capture the race and ethnicity aspects of the participants.

The DSME program can be implemented in other health organizations, including outpatient clinics and hospitals. The implementation of the DSME is not expensive, and nurses, including advanced practice nurses, do not need any special training to embrace this program. No special sessions and venues are needed to implement this project. Therefore, all small and large facilities should introduce DSME programs for nurses to help them provide quality care to patients with T2DM. Future researchers need to implement DSME programs in different languages to determine the impacts of DSMEs on different ethnicities. Finally, clinical studies should focus on delivering diabetes management education directly to patients rather than clinical nurses and compare those results with this project's outcomes.

Implication to Change

QI projects like the DSME give health practitioners an opportunity to introduce evidence-based interventions to enhance health outcomes and impact health-related policies. Healthcare

professionals who are experts in diabetes management can apply for state and federal funding and secure a chance to reform health care policies through DSME implementation in an attempt to enhance the quality of life of people with diabetes. Interprofessional collaboration between nurses and other healthcare providers helps them share the knowledge learned in DSME programs. This similar approach can be used to manage other chronic diseases. This DSME program affects a large patient population at the same time, thus, allowing optimal use of community and medical resources. AHRQ backs DSME programs as innovative programs designed to enhance outcomes in diabetic patients (AHRQ, 2013). Based on the effectiveness, benefits, and sustainability, it is highly recommended to continue offering DSME in primary care settings. The program's evaluation shows an improvement in outcome and structure measures based on quality indicators. In the post-project survey, nurses acknowledged the need for DSME programs.

Appendices

Appendix A: Systematic Review

Criteria	Article 1	Article 2	Article 3	Article 4	Article 5	Article 6	Article 7
Authors	Mary Beth Modic, Nancy Kaser, Rebecca Sauvey, Christina Yager, Sandra L. Siedlecki, and	Sugiharto, Nuniek Nizmah Fajriyah, Yun Hsu, and Matthew Stephenson	Philip Dyer and Catherine Holmes	Ruth Pearce and Christina Lange	Dana Tschannen, Martha M. Funnell, Cecilia Sauter, and Michelle Aebersold	Hollis Margaret, Lapsley Jennifer Anne, Glaister Karen.	Margaret A. Powers, Eva Vivian, Joan Bardsley, Paulina Duker, Marjorie Cypress, Martha M. Funnell,

	Anne Vanderbilt						Melinda D. Maryniuk, Amy Hess Fischl, and Linda Siminerio.
Article Title and Year Published	Diabetes management unawareness: what do bedside nurses know? 2014	Diabetes Self-Management Education Training for Community Health Center Nurses in Indonesia: A Best Practice Implementation Project	Diabetes training for nurses: The effectiveness of an inpatient diabetes half-day workshop 2013	Exploration of diabetes knowledge among registered nurses working in an NHS Trust 2017	Improving Nurses' Perceptions of Competency in Diabetes Self-Management Education Through the Use of Simulation	Do practice nurses have the knowledge to provide diabetes self-management education? 2014	Diabetes Self-management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American

		2017			and Problem-Based Learning 2013		Association of Diabetes Educators, and the Academy of Nutrition and Dietetics 2017
Purposes/Aim of the Study	To evaluate knowledge of inpatient diabetes management concepts among nurses pre- and post a structured	To enhance nurses' confidence and skills in DSME among diabetic patients through the promotion of	To evaluate knowledge level about inpatient diabetes management among nurses before and	To evaluate the service of diabetes training preferences and knowledge among	To enhance opinions of competency in empowerment -founded skills needed for DSME among	To determine diabetes knowledge levels among practice nurses	The position statement aimed to enhance the patient experiences of education and care, to improve population and individuals'

	education program	EBP in community health facilities, thus improving patients' skills and knowledge in self- management.	after a workshop	registered nurses.	ambulatory nurses ambulatory after participating in a multi-layered educational sessions that entail simulation and problem- based learning		health, and minimize diabetes-related costs
Design/ Levels of Evidence	Descriptive correlational study	A quasi- experiment Level III	A quasi- experiment Level III	A quantitative study using	A quasi- experiment Level III	A cross- sectional study Level IV	Expert Opinion Level VII

	Level IV			questionnaire design Level IV			
Setting/Sample	A quaternary health care center 2250 registered nurses	Community health setting	Three hospitals in the Heart of England National Health Services Foundation Trust 286 providers completed both the before and	NHS Foundation Trust Hospitals 304 nurses	Ambulatory setting 21 nurses	Hospital setting 52 primary care nurses	Not Applicable

			after workshop questionnaires				
Intervention	Structured diabetes education programs	DSME Training	Half-day diabetes workshop	Not applicable	A multifaceted educational session	Not applicable	Not Applicable
Key Findings	Before implementing the structured education program, nurses had low levels of knowledge about diabetes	The pre-test revealed providers had low compliance with current evidence on diabetes management.	The pre- workshop mean scores of the nurses' knowledge were reasonably low, which proved	The study identified an inconsistency between supposed and actual diabetes knowledge.	After participating in the educational sessions, providers alleged that the training offered an	The study found that nurses had good diabetes knowledge in pathophysiolog y and blood glucose. However,	DSME for patients is cost- effective as it reduces hospital admissions and readmissions. DSME improves hemoglobin A _{1c} .

	management concepts. There was no relationship between knowledge level and clinical specialty, years of experience, employment status, education, or age.	After the implementation of the DSME Training, there was 100% compliance with current evidence.	knowledge gaps. The post-workshop scores increased, proving that the workshop was effective in enhancing providers' knowledge		exceptional chance to receive knowledge and apply it to different settings.	nurses had lower knowledge in dietary, and the lowest knowledge was in medication management.	The number of patients receiving DSME is low despite its proven benefits.
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	There was an overall increase in knowledge scores in the post-program test.						
Conclusion	Providers are not sufficiently prepared to offer survival skill education or make patient care decisions	The training improved nurses' confidence and skills in providing DSME to diabetic patients.	The delivery of an education program is vital and continuous evaluation of its	Due to the significant knowledge gaps in diabetes, it is vital registered nurses have current	Using simulation and problem-based learning, providers can have essential skills to offer effective	The study concluded that practice nurses lack the necessary knowledge needed for DSME, and professional	It is essential that health care professionals in charge of providing quality care put in efforts to address and explore DSME

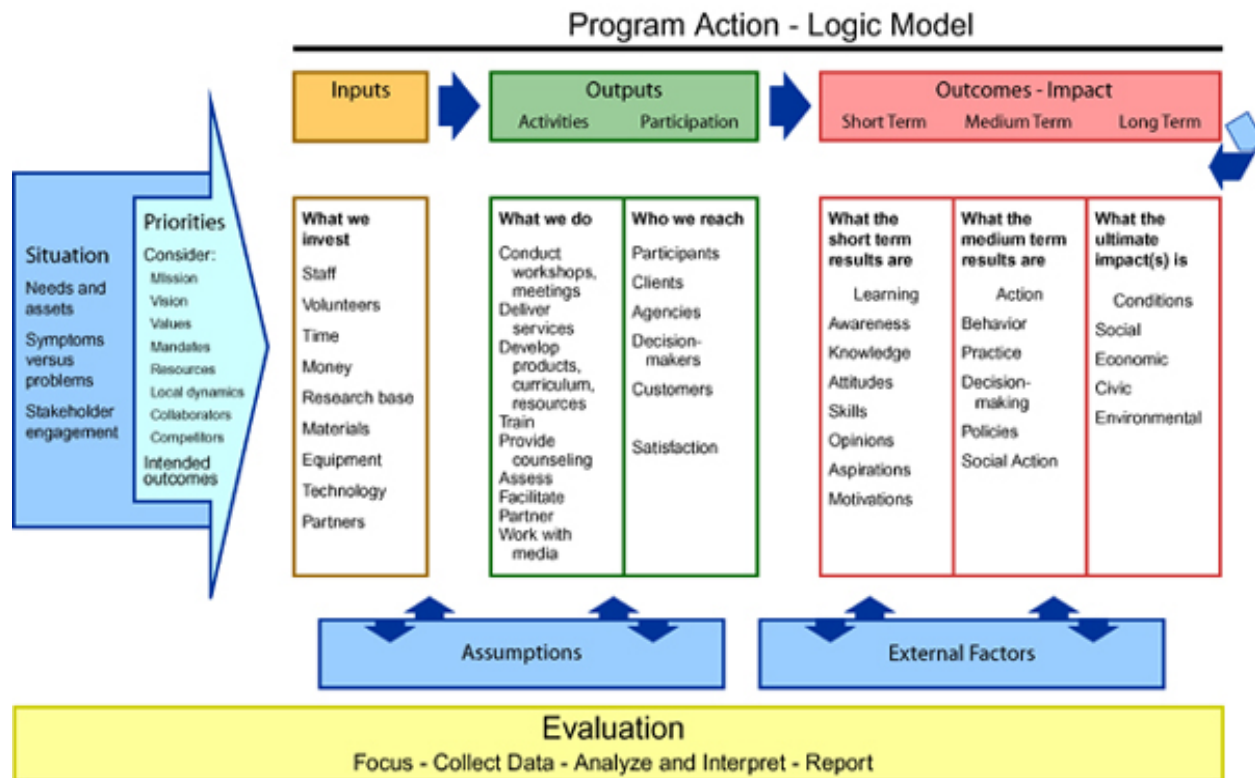
	<p>for patients with diabetes in the clinical setting.</p> <p>Providers' knowledge of the factual content of diabetes management increased after the structured educational program.</p>		<p>effectiveness is necessary.</p>	<p>diabetes knowledge.</p>	<p>chronic disease case management.</p>	<p>development can help address these gaps.</p>	<p>resources to fulfill patients' needs.</p>
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How the Study Supports Capstone Project	This study is relevant as it helps highlight the lack of adequate skills among nurses in diabetes management in the clinical setting. It also shows that an educational program is effective in	The study is helpful as it shows the importance of implementing DSME training for nurses. The study indicates that it improves their confidence and skills to offer DSME to patients.	The study is relevant as it proves that even a half- day workshop can meaningfully increase nurses' knowledge of diabetes management.	This study is relevant to the study as it proves the need for DSME training among nurses to address the knowledge gaps.	This study is helpful because its findings suggest that educational sessions effectively increase nurses' knowledge in case management of chronic diseases such as diabetes. It	The study is helpful, as it shows that nurses have knowledge gaps in the knowledge needed for DSME.	The statement supports the project by discussing the benefits of DSME and the necessity for healthcare professionals to mobilize efforts to fulfill patients' needs.
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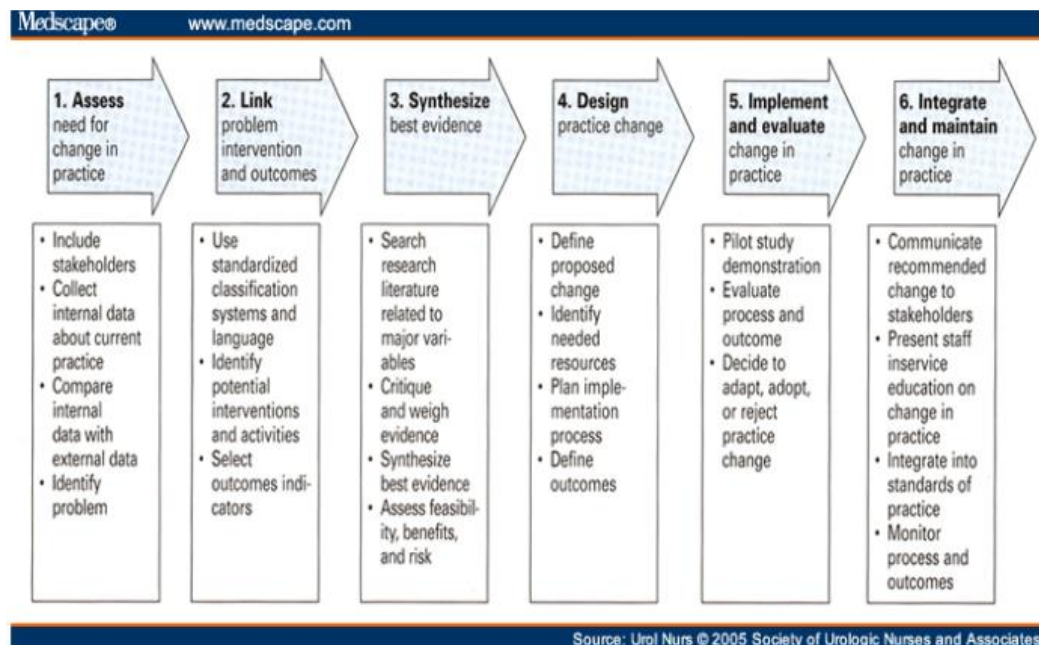
	increasing providers' knowledge of diabetes management. Additionally, it supports Benner's novice to expert theory through its findings that There was no relationship between knowledge				also provides evidence that learning strategies, such as simulation and problem- based learning, effectively offer education. This will be an essential factor to consider		
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	level and clinical specialty, years of experience, employment status, education, or age.				while developing the educational program.		
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Appendix B: Logic Model



Appendix C: Conceptual Diagram



Source: Rosswurm and Larrabee (1999)

Appendix D: DKT2

Michigan Diabetes Research and Training Center's Revised Diabetes Knowledge Test^a

- | | | |
|---|---|--|
| 1. The diabetes diet is:
a. the way most American people eat
b. ^a a healthy diet for most people
c. too high in carbohydrate for most people
d. too high in protein for most people | 9. For a person in good control, what effect does exercise have on blood glucose?
a. ^a Lowers it
b. Raises it
c. Has no effect | 17. If you have taken rapid-acting insulin, you are most likely to have a low blood glucose reaction in:
a. ^b Less than 2 hours
b. 3-5 hours
c. 6-12 hours
d. More than 13 hours |
| 2. Which of the following is highest in carbohydrate?
a. Baked chicken
b. Swiss cheese
c. ^b Baked potato
d. Peanut butter | 10. What effect will an infection most likely have on blood glucose?
a. Lowers it
b. ^b Raises it
c. Has no effect | 18. You realize just before lunch that you forgot to take your insulin at breakfast. What should you do now?
a. Skip lunch to lower your blood glucose
b. Take the insulin that you usually take at breakfast
c. Take twice as much insulin as you usually take at breakfast
d. ^b Check your blood glucose level to decide how much insulin to take |
| 3. Which of the following is highest in fat?
a. ^b Low fat (2%) milk
b. Orange juice
c. Corn
d. Honey | 11. The best way to take care of your feet is to:
a. ^a look at and wash them each day
b. massage them with alcohol each day
c. soak them for 1 hour each day
d. buy shoes a size larger than usual | 19. If you are beginning to have a low blood glucose reaction, you should:
a. exercise
b. lie down and rest
c. ^b drink some juice
d. take rapid-acting insulin |
| 4. Which of the following is a "free food"?
a. Any unsweetened food
b. Any food that has "fat free" on the label
c. Any food that has "sugar free" on the label
d. ^b Any food that has less than 20 calories per serving | 12. Eating foods lower in fat decreases your risk for:
a. nerve disease
b. kidney disease
c. ^a heart disease
d. eye disease | 20. A low blood glucose reaction may be caused by:
a. ^b too much insulin
b. too little insulin
c. too much food
d. too little exercise |
| 5. A1C is a measure of your average blood glucose level for the past:
a. day
b. week
c. ^b 6-12 weeks
d. 6 months | 13. Numbness and tingling may be symptoms of:
a. kidney disease
b. ^b nerve disease
c. eye disease
d. liver disease | 21. If you take your morning insulin but skip breakfast, your blood glucose level will usually:
a. increase
b. ^b decrease
c. remain the same |
| 6. Which is the best method for home glucose testing?
a. Urine testing
b. ^a Blood testing
c. Both are equally good | 14. Which of the following is usually <u>not</u> associated with diabetes:
a. vision problems
b. kidney problems
c. nerve problems
d. ^b lung problems | 22. High blood glucose may be caused by:
a. ^b not enough insulin
b. skipping meals
c. delaying your snack
d. skipping your exercise |

(continued)

7. What effect does unsweetened fruit juice have on blood glucose? a. Lowers it b. ^b Raises it c. Has no effect	15. Signs of ketoacidosis (DKA) include: a. shakiness b. sweating c. ^b vomiting d. low blood glucose	23. A low blood glucose reaction may be caused by: a. ^b heavy exercise b. infection c. overeating d. not taking your insulin
8. Which should <u>not</u> be used to treat a low blood glucose? a. 3 hard candies b. 1/2 cup orange juice c. ^b 1 cup diet soft drink d. 1 cup skim milk	16. If you are sick with the flu, you should: a. Take less insulin b. Drink less liquids c. Eat more proteins d. ^b Test blood glucose more often	

Appendix E: Confidence Level Questionnaire (CLQ)**Section A**

- a) Age
- b) Years of nursing experience
- c) How long have you worked at Elite Patient Clinic?
- d) Are you a Registered nurse?
- e) Highest level of education

Section B

1. How confident are you in providing insulin education to patients?
 - a) Not at all
 - b) Moderately confident
 - c) Very confident
2. How confident are you in providing oral medication education to patients?
 - a) Not at all
 - b) Moderately confident
 - c) Very confident
3. How confident are you in providing nutrition education to patients?

a) Not at all

b) Moderately confident

c) Very confident

4. *How confident are you in the management of Hypoglycemia?*

a) Not at all

b) Moderately confident

c) Very confident

5. *How confident are you in the management of hyperglycemia?*

a) Not at all

b) Moderately confident

c) Very confident

Appendix F: Timeframe

DNP Capstone Project	Dates	Duties
Current Semester	June to July 2020 (currently continuing)	Work with my mentor to prepare the DNP proposal.
	August 2020	Submit and present the proposal
	September 2020	Receive the clinic and IRB management approvals
Fall, 2020 Semester	October 2020 to March 2021	Witting the final project Implementing the intervention phase of the project and collecting data

		Data analysis
Spring, 2021	April 2021	Preparing and defending the DNP project

Appendix G: Budget and Resources

<i>Faculty salaries</i>			
<i>Faculty</i>	Cost	University Amount	Total
Principal investigator	\$7,000	0	\$7,000
Data analyst	\$700	0	\$700
Clinical nurses	-	-	0
Total wages			\$7,700
<i>Supplies</i>			
Printing papers	\$80	0	\$80
DKT2	Free	0	0
Total costs of supplies			\$80
Total costs			\$7,780

Appendix H: CITI Training Certificate

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Appolonia Okereke (ID: 8764102)
- **Institution Affiliation:** Regis University (ID: 745)
- **Institution Email:** okere157@regis.edu
- **Institution Unit:** Nursing
- **Curriculum Group:** Human Research
- **Course Learner Group:** Social Behavioral Research Investigators
- **Stage:** Stage 1 - Basic Course
- **Record ID:** 34819618
- **Completion Date:** 16-Jan-2020
- **Expiration Date:** 15-Jan-2023
- **Minimum Passing:** 80
- **Reported Score*:** 91

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	12-Jan-2020	4/5 (80%)
Populations in Research Requiring Additional Considerations and/or Protections (ID: 16680)	12-Jan-2020	5/5 (100%)
Conflicts of Interest in Human Subjects Research (ID: 17464)	12-Jan-2020	4/5 (80%)
History and Ethical Principles - SBE (ID: 490)	12-Jan-2020	5/5 (100%)
The Federal Regulations - SBE (ID: 502)	12-Jan-2020	5/5 (100%)
Assessing Risk - SBE (ID: 503)	12-Jan-2020	4/5 (80%)
Informed Consent - SBE (ID: 504)	12-Jan-2020	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	12-Jan-2020	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	12-Jan-2020	5/5 (100%)
Cultural Competence in Research (ID: 15166)	16-Jan-2020	4/5 (80%)
Research and HIPAA Privacy Protections (ID: 14)	16-Jan-2020	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?ka43dd3a2-23b2-4a86-9e92-5702c0df1c72-34819618

Collaborative Institutional Training Initiative (CITI Program)

Email: support@citiprogram.org

Phone: 888-529-5929

Web: <https://www.citiprogram.org>



Completion Date 16-Jan-2020
Expiration Date 15-Jan-2023
Record ID 34819618

This is to certify that:

Appolonia Okereke

Has completed the following CITI Program course:

Human Research

(Curriculum Group)

Social Behavioral Research Investigators

(Course Learner Group)

1 - Basic Course

(Stage)

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

Under requirements set by:

Regis University



Verify at www.citiprogram.org/verify/?wf142e256-f25a-40a1-a803-17b63f347e3e-34819618

Appendix I: IRB Approval Letters

Institutional Review Board (IRB)

Proposal Preparation:

- **A clear description of the problem to be studied.**

The study will focus on type 2 diabetes (T2DM) and how educating clinical nurses about self-care management to improve glycemic control among Hispanics with type 2 diabetes. There is a deficit of knowledge about evidence-based guidelines and protocols for diabetes self-management (DSME) among clinical nurses (Guo et al., 2019). Garcia et al. (2015) found DSME to be an effective intervention in improving glycemic control through increasing self-efficacy among T2D patients. The high prevalence of T2D among Hispanics makes this group a priority for clinical nurses to teach them about diabetes self-management.

- **Succinct background and the rationale addressing the problem and the need to conduct the project**

Diabetes mellitus is a chronic metabolic condition characterized by microvascular and macrovascular complications due to high blood glucose levels (CDC, 2014). Type 2 diabetes mellitus accounts for 90-95% of all patients with diabetes in the world. CDC (2014) estimates revealed that 422 million individuals in 2014 (increased from 108 million in 1980). Diabetes claimed 1.6 million lives in 2016. In Hispanics (a population that this project is targeted), 2.5 million Hispanics and Latino Americans above 20 years have diabetes (CDC, 2019). Adherence to self-management training in primary care remains a critical issue for clinical nurses. Therefore, the rationale for addressing this problem is implementing DSME programs for clinical nurses in primary care settings to enhance diabetes care for T2D patients.

- **Statement of the purpose of the project.**

The purpose of this project will be to provide clinical nurses with education/tools to promote self-management education among Hispanic T2DM patients.

- **Detailed Methodology|**

IRB

4

The project will employ a quasi-experimental design, where the principal investigator will conduct pre-and post-test to assess the clinical nurses' knowledge in diabetes management. The educational curriculum will be prepared during the second week of implementation after the pre-test results that will help identify areas of concern.

- **Target population**

The project's target population is clinical nurses. The inclusion criteria will be clinical nurses offering care to diabetic patients in the project clinic. The principal investigator will work with nurse leaders to recruit the nurses by announcing the project details to the nurses. Since the questionnaire used in this project is relatively short (23 items), takes about 15 minutes, and has a fourth-grade reading level, the subject burden is minimal (Fitzgerald et al., 2016). However, the cognitive load required for completing the questionnaire might strain the subjects, especially those with low diabetes knowledge.

- **Instruments**

The project will utilize the Revised Brief Diabetes Knowledge Test (DKT2). The Michigan Diabetes Research Center (MDRC) developed the tool. According to Fitzgerald et al. (2016), the DKT2 was valid and reliable, with an alpha coefficient of greater or equal to 0.7 ($\alpha \geq 0.70$). According to MDRC (2020), MDRC permits the use of DKT2 and gives the condition of acknowledging the MDRC as the source.

- **Risks and Benefits**

The benefits of the project include Clinical nurses stand to gain skills, knowledge, and strategies to help educate patients on how to self-manage their diabetes and blood sugars. Consequently, patients will be able to reduce HbA1c levels using the tools provided by clinical nurses. No physical or social risks are expected to nurses or patients since participation in the study will be voluntary. The only risk involved in the project is psychological distress due to the cognitive load required to complete the questionnaires. This will be addressed through psychological debriefing by the principal investigator. This will help reduce nurses' distress and ensure it does not affect their practice.

- **Confidentiality**

The investigator will use acronyms for the participating clinical nurses when collecting nurses' demographics and throughout the project. After gathering data on both tests, the data will be de-identified and reported as aggregate data. The de-identification process will involve deleting the nurses' identifiers and generalizing quasi-identifiers, such as work experience, qualifications, and age. The data will be stored in the principal investigator's laptop that is secured with a strong password. The de-identification rosters will be stored separately in the principal investigator's external hard drive, secured with a strong password. After three years, the stored data will be destroyed.

Informed Consent/Participant Information Sheet:

- **A Statement That the Study Involves Research**

The quality improvement project involves research because, like research, the project involves identifying a problem, assessing the literature, developing and implementing an intervention to solve the problem, and evaluating the effects the intervention has on the problem.

- **A Statement That You Are a Doctoral Student**

I am currently pursuing a Doctor of Nursing Practice Program at Regis University. I am conducting this quality improvement project because a DNP capstone project is required for the successful completion of my degree.

- **Purpose of the Study**

The private primary care practice settings in the American southwestern, where this quality improvement project will be implemented, lack EBP guidelines and protocols for clinical nurses and physicians to utilize to address the self-management needs for diabetic patients. The project clinic 2017 annual report suggested that among every three clients in the clinic, two of them had T2DM. In light of this evidence, the project aims to evaluate methods of promoting clinical nurses' skills and knowledge while providing care to diabetic patients. It will also provide clinical nurses with education/tools to encourage self-management education among Hispanic T2DM patients that visit the clinic.

- **Procedures Involved in the Project**

The project will be performed in the following steps:

Step 1: Conducting the pre-test to the participating clinical nurses during the first week of the project implementation and recording the scores

Step 2: Planning for the DSME training curriculum will occur during the second week of the project, which will involve adjusting the learning materials to address the areas of concerns based on the results of the pre-test. Determining clinical nurses' workload and scheduling the DSME training appropriately to avoid schedule clashes

Step 3: The DSME training will be conducted during the 3rd and 6th week. Daily email reminders will be sent to the participating clinical nurses via email.

Step 4: During week 7 of the project, a post-training test will be conducted, and the results of this examination will be compared to those of the pre-test to establish the project's outcomes.

- **The "Experimental" Activities in the Project**

The project is experimental, as it will use a quasi-experimental design. This involves experimental activities such as the principal investigator testing the clinical nurses' knowledge before any intervention, implementing the intervention, and testing their knowledge again after intervention.

- **Expected Duration**

The anticipated duration of participation by the nurses is seven weeks, for steps 1 to 3 of the above-stated procedure.

- **Foreseeable Risks or Discomforts**

No foreseeable physical or social risks are expected. The only risk that may be involved in the project is psychological distress due to the cognitive load required to complete the questionnaires. This will be addressed through psychological debriefing by the principal investigator.

- **Benefits Subjects Might Receive**

Though participating in the study, clinical nurses will have increased knowledge and skills while providing care to diabetic patients. They will also have the necessary tools and education needed to provide self-management education to diabetic patients.

- **Confidentiality**

Acronyms will be used for all the participating nurses throughout the project. The nurses will also use the assigned acronyms in the attendance record and questionnaires. After gathering data, the data will be de-identified and reported as aggregate data. All the data will be stored securely in the researcher's locker and laptop.

- **Voluntary Participation**

Participation in his project is voluntary, and if a participant decides to withdraw for the project at any time, they are allowed. Withdrawing will not result in a penalty or loss of benefits. Additionally, protection of confidentiality will still be maintained even after withdrawal.

Appendix J: Agency Letter of Support

	<h1>Elite Patient Care</h1>
Letter of Agreement	
<p>[06/24/2020]</p>	
<p>To Regis University Institutional Review Board (IRB):</p>	
<p>I am familiar with Appolonia Okereke 's quality improvement project entitled Implementation of Diabetes self management Education and Training for Clinical Nurses in a clinic setting. I understand Elite Patient Care's involvement to be allowing employees (clinical nurses) to be interviewed.</p>	
<p>I understand that this quality improvement project will be carried out following sound ethical principles and provides confidentiality of project data, as described in the proposal.</p>	
<p>Therefore, as a representative of Elite Patient Care, I agree that Appolonia Okereke's quality improvement project may be conducted at our agency/institution.</p>	
<p>Sincerely,</p>	
<p>Marquita Murray, APRN, FNP-c Elite Patient Care Phone: 512-653-4500</p>	
<p>Instructions:</p>	
<ul style="list-style-type: none"> Email as pdf file with original signature to DNP student and DNP Capstone Chair RegisNet addresses from an official agency email address. 	

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