DIABETES SELF-MANAGEMENT EDUCATION SERVICE AT A RURAL MINNESOTA HEALTH CLINIC

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DOCTOR OF NURSING PRACTICE

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ABSTRACT

In 2015, there were an estimated 30.3 million Americans living with diabetes, and 95% of them were diagnosed with type 2 diabetes (T2D) (Centers for Disease Control and Prevention, 2017b). Patients living in rural America have an increased prevalence of diabetes, and their participation rates in preventative care practice are lower (Rutledge, Masalovich, Blacher, & Saunders, 2017). The increased prevalence of the T2D in rural communities does not positively correlate with the number of diabetes self-management education (DSME) services in these areas, which poses a gap in healthcare services (Rutledge et al., 2017).

Diabetes self-management education can be defined as "the process of facilitating the knowledge, skill, and ability necessary for diabetes care" (Powers et al., 2015, p. 71). Diabetes self-management education has shown to decrease participant's A1c by as much as 0.9%, which has been associated with a 25% reduction in microvascular complications, a 10% decline in diabetes-related mortality, and a reduction in all-cause mortality by 6% (Chrvala, Sherr, & Lipman, 2016). The utilization of DSME services in rural health clinics has the potential to improve health outcomes by decreasing complications directly related to diabetes in those patients participating in the service.

The practice improvement project established a pilot DSME group service, which was consistent with the *Standards of Medical Care in Diabetes - 2019* (ADA, 2018d). The practice improvement project was structured using the Chronic Care Model and Model for Improvement to help provide a functional and sustainable DSME service. The overall goal of the practice improvement project is to have the organization continue the service after the conclusion of the practice improvement project.

The practice improvement project yielded positive results. The organization's surveys indicated strong support for the service and the ability of the DSME service to fill a gap in their current diabetic education. The DSME participant's skills and confidence increased through completing the curriculum, positively correlated to improved glycemic control. The organization's stakeholders also felt that the service would be marketable to the organization's patient population and profitable by increasing quality numbers and providing the opportunity for reimbursement.

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I want to extend my appreciation to my family, parents, and in-laws for providing me support through this journey and having an open ear when I needed it. I thank my sister-in-law Heidi for your helping me brainstorm dissertation ideas and ultimately bringing up the idea of self-management education. Lastly, I want to thank my husband Ethan. You have been my biggest fan and encouraged me to follow my dream of becoming a Doctor of Nursing Practice. The journey would not have been possible without you by my side, thank you!

DEDICATION

I am dedicating the dissertation to my Aunt Cathy, whose life was taken from us too soon, passing away from a short battle with pancreatic cancer in July 2018. Cathy was always there for me, supporting and encouraging me from a young child to young adult. She was one of the most hardworking, strong-willed, and caring individuals I knew. Her love for the Vikings and Twins will always put a smile on my face. I know she is watching over me as I start my journey as a nurse practitioner. I would also like to dedicate the dissertation to patients living with chronic diseases, especially type 2 diabetes. Living with a chronic disease can be a daily battle but know there is support available to assist you in the self-management of living successfully with your diagnosis. I encourage you to take the time and dedication to educate yourself on how to successfully manage your disease allowing you to live the best life possible!

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CHAPTER 1. INTRODUCTION

Background and Significance

In 2015, there were an estimated 30.3 million Americans living with diabetes, equating to 9.4% of the United States population, with 95% of these individuals diagnosed with type 2 diabetes (T2D) (Centers for Disease Control and Prevention [CDC], 2017b). The prevalence of the chronic disease is on the rise. By the year 2050, one-third of the adult American population is projected to be affected by the costly disease (Boyle, Thompson, Gregg, Barker, & Williamson, 2010). The complexity of T2D and the sheer number of patients suffering from the chronic condition has led to an economic burden for the patients themselves and America. In 2017, diabetes cost the nation $327 billion, which is up from $245 billion in 2012 (American Diabetes Association [ADA], 2018c). Diabetes continues to be a costly disease associated with multiple complications that can accompany the chronic condition if not managed appropriately.

Diabetes is a multi-faceted chronic disease, and the outcome is dependent on the patient's ability to self-manage their diagnosis. Mismanagement of the disease can lead to numerous complications. Vasculature complications of diabetes are a pathologic hallmark of the disease (Chawla, Chawla & Jaggi, 2016). Microvascular complications of the eyes, nerves, and kidneys can lead to long-term organ or tissue damage, while macrovascular complications can cause cerebrovascular and cardiovascular damage, both of which may ultimately lead to premature death (Chawla et al., 2016). According to the CDC (2017a), individuals diagnosed with T2D are two times more likely to develop heart disease or have a stroke than non-diabetic patients. Diabetes is the number one cause of kidney failure, adult-onset blindness, and lower-limb amputations (CDC, 2017a). The chronicity of the disease can also take a toll on a patient's

quality of life (Powers et al., 2015). Patients need to have the knowledge and support to make the vast number of daily decisions to manage their chronic condition.

Diabetes self-management education and support can be defined as "the process of facilitating the knowledge, skill, and ability necessary for diabetes care" (Powers et al., 2015, p. 71). Diabetes self-management education and support (DSME) is a crucial component in living successfully with the disease. Patients who have a better understanding and knowledge of the disease have better self-care behaviors leading to improved clinical and psychological outcomes (Powers et al., 2015). Diabetes self-management education and support has shown numerous benefits in its implementation including a reduction in healthcare costs, hemoglobin A1c (A1c), and the onset or advancement of diabetic complications (Powers et al., 2015). An A1c is a blood test to measure blood glucose, but instead of showing a blood glucose level at a moment in time, the A1c monitors glycemic control over a three-month period. The extended window allows healthcare providers to determine the risk of complications or need for adjustment in the management of the disease through A1c monitoring (Chawla, et al., 2016). Diabetes self-management education group participants have been shown to decrease their A1c by as much as 0.74% (Chrvala et al., 2016). The United Kingdom Prospective Diabetes Study revealed a 0.9% reduction in A1c that has been associated with a 25% reduction in microvascular complications, a 10% decline in diabetes-related mortality, and a reduction in all-cause mortality by 6% (Chrvala et al., 2016). The implementation of a DSME service in a rural health clinic has the potential to improve the health outcomes of patients enrolled in the service.

Problem Statement

There are approximately 18,000 new cases of diabetes diagnosed each year in Minnesota. In 2015, 7.6% of adult Minnesotans were diagnosed with diabetes, which is a lower rate than the

national average of 9.4% (CDC, 2017b; Minnesota Department of Health [MDH], 2016). The CDC (2017c) found in 2013, that the rate of diabetes was 9.6% in Polk County and 8.7% in Red Lake County, the counties served by the rural northwest Minnesota clinic, RiverView Health (RVH). This finding is near the national average. Individuals living in rural America have an increased prevalence of diabetes, and their participation rates in preventative care practice are lower (Rutledge, Masalovich, Blacher, & Saunders, 2017). The increased prevalence of the T2D in rural communities does not positively correlate with the number of DSME services in these areas, which poses a gap in healthcare services (Rutledge et al., 2017).

The implementation of a DSME service is an avenue for the prevention and reduction of the complications directly related to diabetes. Individuals with T2D worldwide have significant knowledge deficits with 50-80% of people with diabetes lacking the information and skills to successfully manage their diagnosis (Formosa, McInnes, & Mandy, 2012). Type 2 diabetes is a chronic condition that takes continuous medical care with multifactorial strategies to help reduce complications of the disease (ADA, 2018a). By providing individuals with evidence-based knowledge, they have the opportunity to improve their decision-making, problem-solving, and self-care skills (Rutledge et al., 2017). Power et al. (2015) presented that diabetes self-management education has also been shown to reduce A1c in T2D patients by as much as 1%. The 1% reduction in A1c has been correlated by Stratton et al. (2000) to reduce diabetes-related deaths by 21%, myocardial infarction by 14%, and microvascular complications by 37%.

RiverView Health (RVH), a community healthcare organization which serves the people of Crookston, MN and its surrounding communities, partnered in the co-investigator's practice improvement project (Appendix A-B). The organization is committed to providing the best quality care for its residents and providing the appropriate resources to assist them in achieving

positive health outcomes and improving their quality of life. In the last year, providers at RVH have provided service to over eight hundred patients with a diagnosis of type 2 diabetes (D. Larsen, personal communication, May 2018). To serve the T2D patient population, RVH currently holds Prevent Type 2 Diabetes classes and offers a Diabetes Support Group; however, they currently do not have a structured DSME service. Providing comprehensive DSME has been shown to have positive effects on the clinical, behavioral, and psychosocial health outcomes of diabetic patients which is currently the missing piece at RiverView Health (Powers et al., 2015). The *2017 National Standards for Diabetes Self-Management Education and Support* recommends participants of DSME services participate in ongoing self-management support to facilitate the resources necessary for the participant to sustain the skills, knowledge and self- care behaviors taught in DSME which are essential in managing their chronic condition (Beck et al., 2017). The implementation of DSME will enhance their current Diabetes Support Group.

Purpose of the Project

RiverView Health's current educational programs for patients diagnosed with T2D has the opportunity for growth and improvement with the implementation of a DSME service. The organization's last Community Health Needs Assessment in 2016 identified diabetes as a significant community health need (RVH, 2016). The purpose of the practice improvement project was to collaborate with the dietitian at RVH in the establishment of a comprehensive DSME group service at RVH. Diabetes self-management education is consistent with the *Standards of Medical Care in Diabetes - 2018* set forth by the American Diabetes Association (ADA) to improve patient outcomes and quality of care (ADA, 2018a). In addition, the practice improvement project was structured to help provide a functional and sustainable service to allow

RVH to continue the group service even after the conclusion of the practice improvement project. The creation of the DSME service was to improve skills, confidence, and preparedness in the self-management of patients diagnosed with T2D in order to improve patient outcomes and quality of care.

Project Objectives

Four objectives were formulated to drive the practice improvement project. The purpose of the objectives was to create a framework to measure the areas of success or areas for improvement during the implementation of the project. Each objective pertains to the implementation of the DSME service at RVH.

1. The first objective of the practice improvement project was to increase the senior leader's, healthcare provider's, and nursing staff's knowledge on the benefits of DSME and elicit their support in referrals to the DSME group service in the T2D patient population by the end of the co-investigator's presentation.
2. The second objective was to establish a referral system to the DSME service within the electronic health record already utilized at RVH to secure participants of the DSME group service by the time of the co-investigators presentation.
3. The third objective was to show an increase in DSME participant's skills, confidence, and preparedness to self-manage their diabetes by the end of the DSME pilot service.
4. The fourth objective was to promote sustainability of the DSME service at RVH by the completion of the practice improvement project.

CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Diabetes Mellitus Type 2

Pathogenesis

Type 2 diabetes (T2D) is a complex, chronic disease characterized by hyperglycemia due to insulin resistance, insulin deficiency or a combination of both (McCulloch & Robertson, 2018). Although T2D may be a combination of insulin resistance and an insulin deficiency, McCulloch and Robertson, (2018) identify the best indicator of T2D is insulin resistance. Copstead and Banasik (2015, p. 824) state, "the insulin resistance of type 2 diabetes is defined as a requirement for more insulin for the same biological action, along with lowered glucose utilization at all levels of insulin concentration." The pathogenesis of insulin resistance is due to the decline in the number of insulin receptors, which in turn decreases the action of glucose transportation (Copstead & Banasik, 2015). The progression of the disease has been shown to intensify as insulin production is impaired by the pancreatic beta cells and the pancreatic alpha cells increase glucagon, further increasing glucose production creating hyperglycemia (Copstead & Banasik, 2015; Inzucchi et al., 2012).

Genetic and Environmental Factors

Hyperglycemia leading to T2D is likely related to a complex interaction between an individual's genes and environmental factors (McCulloch & Robertson, 2018). Type 2 diabetes has a strong genetic component with 39% of those diagnosed having a parent also diagnosed with the disease (Copstead & Banasik, 2015; McCulloch & Robertson, 2018). Individuals of the same age and weight are five to ten times more likely to develop diabetes if they have a first-degree relative with the disease than without (McCulloch & Robertson, 2018). Ethnicity plays a significant role in the development of T2D. African Americans, Native Americans, Pima

Indians, and Hispanic Americans living in the United States are two to six times more likely to develop T2D (McCulloch & Robertson, 2018).

In addition to the genetic components of diabetes, the high prevalence of T2D is correlated with environmental factors. The rise of obesity and the westernization of the American lifestyle are two significant components associated with the increase in the prevalence of the disease (Inzucchi et al., 2012; McCulloch & Robertson, 2018). The role of environmental factors was apparent in a study performed on the Pima Indians. Schulz et al. (2006), investigated the Pima Indians of Mexico and the Pima Indians of the United States, in which they identified that the prevalence of T2D was 6.9% versus 38% respectively in each population. The authors determined that the increased prevalence was likely due to environmental factors including diet and lifestyle (McCulloch & Robertson, 2018; Schulz et al., 2006). In the United States, the rise in obesity and living a sedentary lifestyle are two robust features commonly associated with the development and progression of the disease (McCulloch & Robertson, 2018). Approximately 80% of those diagnosed with T2D are overweight or obese by estimation (Inzucchi et al., 2012). McCulloch and Robertson (2018) state that obesity "causes peripheral resistance to insulin-mediated glucose uptake and may also decrease the sensitivity of the beta cells to glucose" (para. 12). Weight loss has shown to reverse these defects and, although not proven to be as effective as an increase in physical activity, can improve glucose tolerance, which helps prevent cardiovascular complications of T2D (Inzucchi et al., 2012; McCulloch & Robertson, 2018).

Prevalence and Economics

Diabetes affects over 1 in 10 Americans and is the 7th leading cause of death in the United States (Healthy People [HP] 2020, 2018). Type 2 diabetes accounts for 90-95% of all individuals diagnosed with diabetes (CDC, 2017b). The number of cases of diabetes is on the

rise in the United States due to a positive correlation with the steady rise of obesity (HP 2020, 2018). A diagnosis of diabetes has also been correlated to an increase in age and is associated with ethnicity. Diabetes is more common in those greater than the age of 45 years, accounting for 33.5% of all diabetics (CDC, 2017b). The prevalence among males and females are nearly equal at 9.4 % and 9.2%, respectfully (CDC, 2017b). The incidence of diabetes is highest among American Indians in the United States accounting for 15.1% of all diabetics (CDC, 2017b; HP 2020, 2018). After that are non-Hispanic blacks at 12.7%, Hispanics at 12.1%, Asians at 8%, and lastly non-Hispanic whites at 7.4% (CDC, 2017b; HP 2020, 2018). Diabetes is also associated with socioeconomic status. Those with less than a high school diploma accounted for 12.6% of people diagnosed with diabetes compared 9.5% of diabetic patients with a high school diploma (CDC, 2017b).

The rural health organization, RVH, serves patients of primary Polk and Red Lake Counties in northwest Minnesota. Polk County's demographics consist of a population of over thirty-one thousand people with nearly 50% of those living rurally, while Red Lake County's population is only four thousand people with 100% living rurally (County Health Rankings [CHR], 2018a, County Health Rankings [CHR], 2018b). Rutledge et al. (2017) state, "rural populations have higher prevalence of diabetes and lower rates of participation in preventative services" (p. 2). Disparities in the rural, diabetic population are due to a complex array of factors including education, insurance, income, health literacy, transportation, poverty, and race/ethnicity (Rutledge et al., 2017). Another challenge in rural communities is the sustainability of DSME services due to the shortage of healthcare workers in these rural areas and challenges in recruiting healthcare professionals to meet the required standards of DSME service recognition (Rutledge et al., 2017).

In Polk County, 17.3% of the population is greater than the age of sixty-five and Red Lake County has 19.5%, which is higher than 15.1% average for the state of Minnesota (CHR, 2018a; CHR, 2018b). The largest ethnic group for both counties is non-Hispanic white at 88.2% in Polk County and 92.9% in Red Lake County; the second highest ethnic group is Hispanic at 6.1% and 3.5%, respectfully (CHR, 2018a; CHR, 2018b). As mentioned previously, Hispanics and those over the age of 45 years old are among one of the highest prevalent ethnic and age groups to be diagnosed with diabetes. There are other health-related factors that can be attributed to an increased risk for diabetes compared to the state average.

Obesity accounts for 35% of adults living in Polk County and 34% in Red Lake County. 7-8% higher than the state of Minnesota (CHR, 2018a; CHR, 2018b). The increased prevalence of obesity may be attributed to the limited access to healthy foods and exercise opportunities. The rate of limited access to healthy food outlets is higher than the national and state average in these two counties (CHR, 2018a; CHR, 2018b). The smaller towns and rural areas may confine some individuals to buy groceries at gas stations or convenience stores which are their only available grocery source, limiting the variety of healthy foods and also driving up the cost. The limited access to exercise opportunities can be attributed to a number of factors including limited exercise facilities, cost to utilize these facilities and even outdoor factors such as the cold climate and the community infrastructure of walking and biking paths.

A combination of the above factors contributes to the low ranking of each county on Minnesota's overall health factors with Red Lake seventieth and Polk County seventy-seventh out of the states eighty-seven counties (CHR, 2018a; CHR, 2018b). As far as health outcomes, Red Lake County is ranked ninth and Polk County seventy-first out of the states eighty-seven counties (CHR, 2018a; CHR, 2018b). These results can be interpreted as today's health factors

will lead to tomorrow's health outcomes, which indicates although Red Lake County is ranked in the top ten for health outcomes in Minnesota the future health of the county may see a negative shift due to poor health choices (RVH, 2016). Polk County is ranked low in both categories indicating room for improvement.

The increasing prevalence of the disease also correlates with increased health care costs. There are direct and indirect costs associated with the T2D diagnosis. By estimation, one in four health care dollars are spent on diabetes each year (ADA, 2018c). Diabetics average $16,750 per year in health care costs with approximately $9,600 spent directly on diabetic management, which equates to 2.3 times higher costs than non-diabetic patients (ADA, 2018c). In Minnesota, an estimated $2.3 billion dollars was spent on the routine medication care for diabetic patients in 2012 (MDH, 2016). Indirect costs also create a negative economic impact. Indirect costs associated with diabetes include absenteeism, reduced work productivity, and lost productivity due to inability to work or mortality resulting in an $89.9 billion deficit (ADA, 2018c). In total, according to the ADA (2018c), there was a 26% increase in diabetic costs within 5 years, an estimated $245 billion in 2012 to $327 billion in 2017. To break the 2017 costs down further $237 million billion dollars were spent on direct medical costs and $90 billion was attributed to reduced productivity (ADA, 2018c). Overall, diabetes creates a substantial financial burden for our nation.

Healthy People 2020

Healthy People (HP) is a government organization that has been directing efforts to improve the health of Americans for the last three decades (HP 2020, 2018). The organization uses scientific evidence to drive the implementation of 10-year objectives to improve the nation's health (HP 2020, 2018). Diabetes is included in their 2020 agenda.

Healthy People 2020's overarching diabetes goal is to "reduce the disease burden of diabetes mellitus and improve the quality of life for all persons who have or are at risk for diabetes mellitus" (2018, para. 1). The HP 2020 objective that correlates directly to the practice improvement project is "D-14: Increase the proportion of persons with diagnosed diabetes who receive formal diabetes education" (HP 2020, 2018, para. 18). In 2008, an estimated 56.8% of people living with diabetes over the age of 18 reported no formal diabetes education (HP 2020, 2018). The objective aims for a 10% improvement in a 10-year span, which would target the goal by the year 2020. The implementation of the DSME service will positively correlate with the purpose and formal diabetic education objective of Healthy People 2020 by contributing to the 10% increase of type 2 diabetics receiving formal diabetic education.

Diabetes Self-Management Education (DSME)

The chronic nature of diabetes proves to be a challenge to manage. Individuals diagnosed with the disease have to make numerous decisions on a daily basis regarding their self-monitoring, medication, diet choices, and physical activity. They also need to have the knowledge to manage any complication that might arise. In 1986, the National Diabetes Advisory Board, the ADA, and other professional organizations identified the need and implemented the initial standards for diabetic education (Schreiner & Ponder, 2017). Powers et al. (2015) define DSME as the following:

- "The ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes care
- This process incorporates the needs, goals, and life experiences of the person with diabetes or prediabetes and is guided by evidence-based research

- The overall objectives of DSME are to support informed decision making, self-care behaviors, problem-solving, and active collaboration with the health care team and to improve clinical outcomes, health status, and quality of life" (p. 71).

The organizations listed above have thus made diabetic education a priority since 2007 to revise the *National Standards for Diabetes Self-Management Education* every five years to keep up to date on the most current literature (Schreiner & Ponder, 2017). The latest national standards were released in 2017 with a few minor updates. The 2017 national standards highlighted the need to focus on the individual making them the center of the care team (Beck et al., 2017). Another change made was transition from DSME *program* to DSME *service* to further delineate the need to individualize care (Beck et al., 2017). These revisions are crucial to keeping up to date on the dynamic nature of T2D. The *2017 National Standards for Diabetes Self-Management and Support* provide a framework for the development and continuation of DSME services (Beck et al., 2017).

In addition to providing a framework for the development of DSME services the standards are utilized to evaluate the comprehensiveness of the services provided as well as for accrediting organizations. Accreditation is needed for organizations to have ability to receive reimbursement from the Centers for Medicare and Medicaid Services (CMS) along with other private insurers (Powers et al., 2015). An organization can receive accreditation through a National Accreditation Organization (NAO). Currently in the United States, the ADA and the American Association of Diabetic Educators (AADE) are the only two available NAOs (Powers et al., 2015). The accrediting organizations ensure the quality and compliance of the services to the national standards.

Centers for Medicare and Medicaid Services (CMS) will currently reimburse a facility for an initial ten hours of DSME service with two hours each subsequent year per patient (Powers et al., 2015). To allow for reimbursement the patient must be referred to the service from his or her provider, which can be an advanced practice provider or physician (ADA, n.d.). The patient may receive up to one hour of one on one DSME. The next nine hours must be in a group setting unless there are no group classes available in the next two months or the provider indicates a barrier to group learning such a hearing, vision or learning deficits or need for one on one insulin training (ADA, n.d.). Patients are available for two hours of follow-up DSME either in month thirteen after the initial DSME was billed or the January after the initial ten hours were billed (ADA, n.d.). The DSME is billed in thirty-minute increments and the billing codes are as follows: G0108 for outpatient individual DSME reimbursed at a rate of approximately $50 per unit and G0109 for outpatient group DSME, two to twenty participant groups, reimbursed at a rate of approximately $14 per unit (ADA, n.d.; McNeill, 2017).

There are four critical times when a diabetic patient should be referred to the DSME services and are considered the algorithm of care for DSME. These times include initially upon diagnosis; annually upon assessment of his or her educational, nutritional, or emotional needs; during a time of new complicating factors that affect self-management; and during times of transitions in care including living situation, medical team, insurance coverage, or age-related changes (Powers et al., 2015). The algorithm of care is endorsed by the ADA, AADE, and the Academy of Nutrition and Dietetics (AND) (Powers et al., 2018). Although the algorithm of care is considered a guiding principle for DSME, one must recognize that diabetes is a chronic, dynamic condition and other times may arise that a patient may benefit from the services.

Benefits of Diabetes Self-Management Education

The goal in utilizing DSME services focuses on empowering the patient and improving his or her quality of life, health status, and clinical health outcomes (Powers et al., 2015). Multiple components go into the management of diabetes. The three main clinical target areas include an A1c < 7%, low-density lipoproteins <100mg/dL, and blood pressure < 140/90mg/dL (ADA, 2018). These clinical health outcomes are managed through a combination of medication management and self-care behaviors. Shrivastava, Shrivastava, and Ramasamy (2013, p. 2) define diabetes self-care "as an evolutionary process of development of knowledge or awareness by learning to survive with the complex nature of diabetes in a social context." There are seven essential self-care behaviors most commonly known as American Association of Diabetic Educators 7 (AADE7) Self-Care Behaviors taught in DSME which include healthy eating, physical activity, monitoring of blood sugar, medication compliance, development of problem solving skills, healthy coping skills, and risk reduction behaviors along with education regarding the pathophysiology and treatment options (Beck et al., 2017; Powers et al., 2015; Shrivastava et al., 2013). The development and adherence to the AADE7 self-care behaviors have shown a positive correlation in the reduction of complications and improved quality of life (Shrivastava et al., 2013). Brunisholz et al. (2014, p. 533) state, "an enormous opportunity for quality improvement and cost reduction lies within identifying pragmatic interventions that are effective in the management of diabetes…" Although numerous benefits are identified in the literature, the following paragraphs describe the main benefits of the effective use of DSME service (Beck et al., 2017; Powers et al., 2015).

The effect of A1c plays a significant driving force behind the implementation of DSME services. Hemoglobin A1c is one of the primary tests used in diagnosing and treating T2D. An

A1c, or at times referred to as glycated hemoglobin or hemoglobin A1c, assesses an individual's blood glucose over the last three months. The glucose attaches to the hemoglobin in the blood; therefore, A1c measures the amount of hemoglobin with attached glucose (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2018). Management and control of A1c have been shown as a strong predictor of complications at the micro and macrovascular levels (Chrvala, et al., 2016). Currently, it is estimated that nearly 50% of diabetic patients do not achieve or sustain the target recommendation of an A1c less than 7% for most nonpregnant adults (ADA, 2018; Chrvala et al., 2016). Although the recommendation for an A1c is typically less 7%, the target goal needs to be individualized for each patient (ADA, 2018). Chrvala, Sherr, and Lipman (2016) performed a systematic review to determine the effects of glycemic control in T2D patients who received diabetes self-management education. Upon review, there was an A1c reduction of 0.74% in patients who participated in DSME versus 0.17% in control groups (Chrvala et al., 2016). The most significant decline of 0.88% was found in patients who engaged in both group and individual education services (Chrvala et al., 2016). Beck et al. (2017) and Powers et al. (2015) also confirm a reduction in A1c from 0.6-1% in T2D patients who participate in DSME services. A 0.9% reduction in A1c has been associated with a 25% reduction in microvascular complications, a 10% decline in diabetes-related mortality, and a reduction in all-cause mortality by 6% revealed in the United Kingdom Prospective Diabetes Study (Chrvala et al., 2016). The above reductions in A1c were immediately following the participation in DSME services.

Few researchers have analyzed the long-term sustainability of reduced A1c post-DSME. A small retrospective evaluation performed by Nicoll et al. (2014) assessed the sustainability of glycemic control two years after receiving DSME. The study conducted by Nicoll et al. (2014),

revealed a majority of the participants were able to sustain their goal A1c of less than 7% two years after receiving DSME services, while Beck et al. (2017) have found that metabolic and other outcomes have been shown to diminish after six months if continued support is not utilized. Interestingly, Nicoll et al. (2014) also found that those diagnosed with T2D less than one year were able to sustain their results from the DSME service longer than those diagnosed greater than one year. Weaver et al. (2014) synthesized newly diagnosed diabetics may have the most significant and most lasting effects of targeted glycemic control. Although Nicoll et al. (2014) and Weaver et al. (2014), suggest earlier interventions of DSME, the ADA still recommends there are four critical times to refer patients to DSME as previously mentioned and the importance of continued education throughout their diagnosis (Powers et al., 2015). Beck et al. (2017), Chrvala et al. (2016), and Powers et al. (2015), and also recommend the utilization of diabetes support groups and follow-up education to assist in sustaining the benefits gained from initial self-management education. Improved glycemic control, although the primary intended outcome from participation in DSME services, is not the only benefit participants may receive.

Secondary outcomes attributed by DSME services include reflections on an individuals' quality of life. Quality of life is a subjective perception and is multidimensional encompassing a person's physical, emotion, and cognitive, and emotional well-being (VG, 2018). Diminished quality of life has a negative impact on self-care and glycemic control, which in turn increases an individual's risk for complications (VG, 2018). Researchers have used different questionnaires to determine any changes in the secondary measures, which will be discussed later in the chapter. Clinically, researchers must take into account any statically significant improvement in a patient's quality of life, as quality of life is a powerful predictor of how well a patient will successfully manage his or her disease (Cochran & Conn, 2008; VG, 2018). Quality of life

benefits identified in recent studies indicated an improvement in optimizing glycemic control, improving knowledge, promoting self-efficacy, and decreasing diabetes-related distress (Cheng et al., 2016; Power et al., 2015). Other lifestyle behaviors that may positively correlate with an improved quality of life after completing DSME include eating a healthy diet and engaging in regular activity, which in turn may improve metabolic control (Cochran & Conn, 2008; Powers et al., 2015; Steinbekk, Rygg, Lisulo, Rise, & Fretheim, 2012). Another positive contributor to quality of life is the social support and camaraderie built while attending DSME classes (Cochran & Conn, 2008).

There are numerous benefits individuals receive from participating in DSME; however, there are also organizational and national benefits from an economic standpoint. The economic impact of DSME is the driving force behind the support of the services from insurance companies and the government. Klonoff and Schwartz (2000) performed a literature review on the cost-benefit analysis of interventions for diabetes and stratified their economic impact Teljeur et al. (2016) also systematically reviewed the more recent literature to identify the cost and cost-effectiveness of self-management interventions and synthesized similar findings. Klonoff and Schwartz (2000) concluded a net savings of $0.44 to $8.76 savings for every $1 spent on DSME. Zhang et al. (2004) also concluded that for every $1 distributed towards a self-management service, there was a $2 reduction in hospital costs. In the literature reviewed, previous researchers were weak in their methodology and only examined the short-term cost-benefit of DSME; in turn, there are future opportunities for randomized controls trials to identify the long-term economic implications (Klonoff & Schwartz, 2000; Teljeur et al., 2016). Although there were minimal data on the actual cost of DSME, it was synthesized as a cost-effective option (Klonoff & Schwartz, 2000; Teljeur et al., 2016). In summary, the organization will

anticipate cost savings and improve patient outcomes. The variability in the cost-effectiveness of DSME may underestimate the impacts on glycemic control and quality of life, therefore should not undermine the benefits of DSME services.

Group-Based Diabetes Self-Management Education

Diabetes self-management education is most commonly delivered in one of two ways, individually or in a group setting. There are other means of delivery including telemedicine or computer-based learning. Utilization of telemedicine and computer-based learning may best be used for reinforced learning as there is little evidence of their effectiveness when used independent of group based structured curriculum, therefore won't be reviewed in-depth; instead, the focus will be on individual and group learning (Davies, Fradkin, Mathieu, Rossing, & Wexler, 2018).

In the past, diabetes education was traditionally delivered in the office setting on a one-to-one basis, however the means of delivery has begun to take a shift. The momentum of group-based education is on the rise with a shift from a didactic approach to an interactive, empowering experience (Lawal & Lawal, 2016). Lawal and Lawal (2016) define "group" as a face-to-face encounter between two or more individuals. Davies et al. (2018, pg. 2672) state, "The best outcomes are achieved in those programs with theory-based and structured curriculum and with contact of time over ten hours." Group education is a dynamic process and can vary from class to class.

There are few studies that have compared the effectiveness of individual versus group education (Lawal & Lawal, 2016). The results of the studies also vary in the nature of their findings. Lawal & Lawal (2016) synthesized the efforts of Deakin et al., Gucciardi et al., and Merakou et al. and conclude that group education revealed a greater improvement in A1c, body

weight, and knowledge compared to individual education alone. Lawal and Lawal (2016) identified the interaction of the group education may enhance the knowledge and understanding of diabetes. Alternatively, Lawal and Lawal (2016), revealed no significant difference in effectiveness between individual education versus group-based education. However, compared to individual education, group-based education has also been characterized as a more cost-effective option in the delivery of DSME (Merakou, Knithaki, Karageorgos, Theodoridis, & Barbouni, 2015). In conclusion, patients should be given the option of individual versus group-based education to provide individualized care, but group classes should be the preferred option in most instances (Lawal & Lawal, 2016).

Barriers to Diabetes Self-Management Education

There are a variety of barriers preventing patients from participating in the DSME services, and many participants may be faced with one or more in the process of engaging in diabetes self-management education. Chrvala et al. (2016) discussed that less than 7% of individuals on private insurance and less than 5% covered by Medicare have participated in DSME upon diagnosis. Barriers to participation in DSME can be broken down into two main categories, which include provider and patient barriers.

Provider

Barriers attributed to the providers will be discussed first as they can be the foundation of other obstacles in the process for participation in DSME. The breakdown in care stems from a misunderstanding by providers of the necessity and effectiveness of DSME, which can impede on the number of referrals to DSME services (Powers et al., 2015). The referral process can also be a barrier to care. Providers have reported that the referral process can be cumbersome; therefore, those who lack the knowledge, or the time, may neglect to refer their patients to the

service (Kent et al., 2013; Powers et al., 2015). Informing providers of the benefits of DSME and creating a streamlined referral process can be the solution in eliminating these barriers.

Patient-provider time and relationships can also have an effect on diabetes self-management education. Beck et al. (2017) present data that a diabetic patient visits their primary care provider on average four times a year for approximately an eighteen to twenty-minute appointment, which equates to less than 1% of their lifetime spent on accessing and utilizing health care services to manage their chronic condition. The complexity and dynamic nature of diabetes can lead to confusion and time is needed to understand the disease entirely. Patient appointments are also a stressful time, and patients may only recall one-fifth of information communicated and immediately forget 40-80% of the content discussed at their chronic disease medical appointments (Richard, Glaser, & Lussier, 2017). Richard et al. (2017) found that patients were able to better recall general information about their chronic disease, however, recall of lifestyle interventions such as exercise and diet drops to 70% and 50%, respectively and medication recall less than 50%. The poor recall of information of medications and self-management behaviors indicates the need for clear, concise communication between patient and provider for improved understanding and the empowerment and active participation of patients (Lawal, Woodman, Fanghanel, & Ohl, 2017; Richard et al., 2017). Communication and support of the self-care behaviors taught in DSME are crucial in encouraging patients to participate in the service and take advantage of the ongoing support to achieve improved treatment and quality of life goals (Power et al., 2015; Shrivastava, Shrivastava, & Ramasamy, 2013). Providers also need to be conscious of their patients who participate in DSME and follow-up with them, which will reinforce their support of the services as patients are influenced by a providers' knowledge, attitude, and beliefs (Ahola & Groop, 2012).

Patient

Barriers to DSME are not all provider related, as there are barriers identified that also affect the patient and are influenced solely by the patient. Patient barriers can be broken down into personal, sociocultural, sociodemographic, and financial barriers. Personal barriers that may affect participation in DSME including denial, feelings of loss of control, time constraints in attending classes, and psychological impairments such as depression (Ahola & Groop, 2012; Kent et al., 2013). Schwennsen, Henriksen, and Willaing (2015) attributed the most notable personal factor related to non-attendance was related to the inappropriate timing of referral to DSME, emphasizing essential timing in the offering of the services, which is when the patient is motivated to participate in DSME.

A lack of social support negatively impacts a patient's perceived self-efficacy in performing diabetes self-management behaviors specifically eating a healthy diet, routine exercise, medication compliance, and blood glucose monitoring (Ahola & Groop, 2012; Kent et al., 2013). Socio-demographic barriers to DSME include lack of transportation, unsafe neighborhoods, lack of access to fresh produce and lower socioeconomic status (Kent et al., 2013). Lastly, financial barriers can prevent DSME attendance due to inadequate reimbursement or lack of funding to pay for out of pocket expenses (Kent et al., 2013). Through reviewing the literature, the co-investigator found apparent evidence that patients must overcome numerous obstacles in obtaining a referral to and participating in DSME services.

Skills, Confidence, and Preparedness Index

A number of different tools have been developed over the years to quantify different factors related to diabetes care behaviors such as knowledge, self-efficacy, quality of life, and diabetes self-management, however most are over ten years old and not as comprehensive

(Aronson et al., 2017; Mbuagbaw, Aronson, Walker, Brown, & Orzech, 2017). One of the latest tools developed was the LMC Diabetes Skills, Confidence, and Preparedness Index (SCPI). The SCPI was developed by a multidisciplinary team comprised of endocrinologists, dietitians, nursing staff, primary care providers, and psychiatrists in November 2013 (Mbuagbaw et al., 2017). Previous tools were unidimensional and not comprehensive in measuring the multidimensional components of diabetes (Mbuagbaw et al., 2017). Mbuagbaw et al. (2017) reported that members of the multidisciplinary team reviewed previously published and validated assessment tools and utilized the Social Cognitive Theory and Transtheoretical Model of Health Behavior Change to incorporate the AADE7 Self-Care Behaviors into their series of questions to measure a patient's self-efficacy. Self-efficacy in relation to diabetes is "defined as a person's beliefs or confidence about his or her ability to perform a skill, is associated with better self-management behaviors, and more optimal glycemic control" (Mbuagbaw et al., 2017, p. 3). The SCPI takes approximately ten minutes to complete and is written at eighth or ninth grade reading level (Mbuagbaw et al., 2017).

The SCPI was tested for internal and external validity to determine its future as a successful, multidimensional tool in measuring diabetes self-care behaviors. The tool demonstrated a high degree of internal consistency with Cronbach's alpha ranging 0.81 to 0.95% and age, gender, ethnicity, or educational level attained having no significant effect on the SCPI scores (Aronson et al., 2017; Mbuagbaw et al., 2017). The SCPI also was found to have a high degree of external validity with a correlation to A1c for the total SCPI score and the subscales of skills and confidence (Aronson et al., 2017; Mbuagbaw et al., 2017). Aronson et al. (2017) reported that A1c could be reliably predicted by total SCPI scores and by the subscales of skills and confidence. The SCPI has been shown to be a reliable tool that can easily be administered in

any setting to provide insight in the AADE7 self-care behaviors to allow optimization into individualized teaching and serve as a means to predict glycemic control (Aronson et al., 2017).

Theoretical Framework

The Model for Improvement

The Model for Improvement was used as an additional tool to guide the project. The Model for Improvement was developed by the Associates in Process Improvement and has been proven as a powerful tool in accelerating quality improvement projects (Langley et al., 2009). There are two different parts of the model, which include a set of fundamental questions and the Plan-Do-Study-Act (PDSA) cycle to test the quality improvement project.

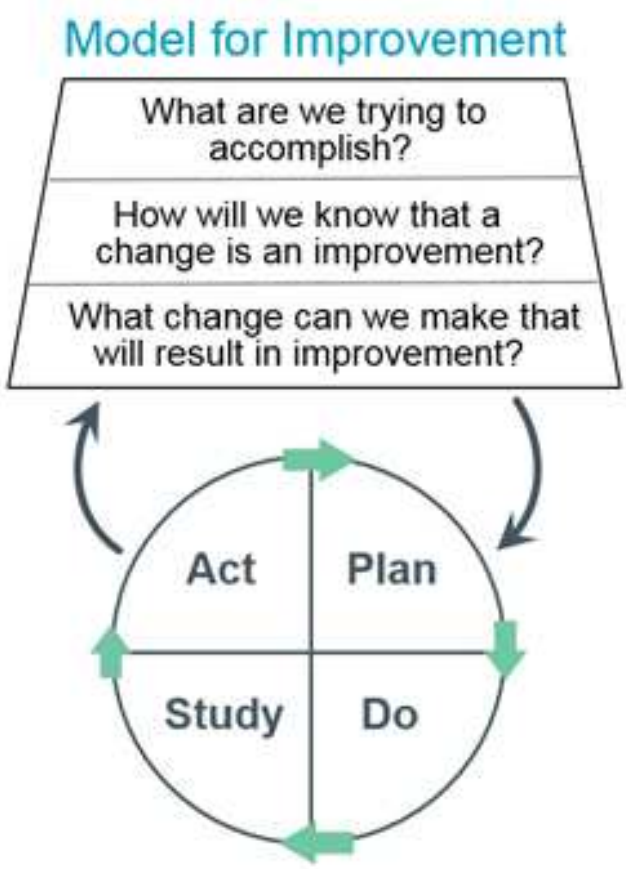

Figure 1. The Model for Improvement.
From "The improvement guide: A practical approach to enhancing organizational performance," by Langley et al., 2009, 2. Copyright 2009 by Copyright Holder. Reprinted with permission from John Wiley and Sons. For permission to use or reproduce, please contact the Copy Right Clearance Center at http://www.copyright.com/.

The first part of the Model for Improvement aimed to answer the following questions in no particular order:

- "What are we trying to accomplish?
- How will we know that a change is an improvement?
- What change can we make that will result in improvement (Langley et al., 2009)?"

The second element of the Model for Improvement incorporates the Plan-Do-Study-Act (PDSA) cycle which is a scientific method for enhancing quality improvement and action-oriented learning (Agency for Healthcare Research and Quality [AHRQ], 2013). There are four stages in the PDSA cycle. The stages include plan, do, study, act (Langley et al., 2009).

- Plan – Planning the implementation of a quality improvement project and means of data collection (AHRQ, 2013).
- Do – Implement the quality improvement project on a small scale (AHRQ, 2013).
- Study – Analyze the data collected and allow time for studying the results (AHRQ, 2013).
- Act – Based on the information gained from the project make the appropriate changes to refine and enhance the quality improvement project (AHRQ, 2013).

Langley et al. (2009) set forth the following steps in achieving success in the Model for Improvement: forming a team, setting aims, establishing measures, selecting changes and testing changes.

Forming a team.

The first step in the process was forming an interdisciplinary team and diabetes stakeholders to successfully implement a DSME service at RVH. The co-investigator for the practice improvement project recruited two team members from RVH, the dietitian and RN

Health Coach who are currently involved in providing one-on-one nutrition education sessions and medical home services for T2D patients. The dietitian and RN Health Coach both are also leaders of the organization's Prevent Type 2 Diabetes classes and Diabetes Support Group. The co-investigator and dietitian worked together to implement the comprehensive DSME group service at RVH, while the dietitian and RN Health Coach taught the sessions. The collaborative effort was to ensure the implementation of an evidence-based project that is supported by current literature and to promote the project's sustainability.

Setting aims.

The second step in the Model for Improvement, is setting aims to answer the first of the aforementioned fundamental question, "What are we trying to accomplish (Langley et al., 2009)?" In creating the practice improvement project, each objective is time-specific, measurable and defines the population that will be served (Langley et al., 2009). The team was working towards implementing a sustainable DSME service at RVH for the rural community of Crookston, Minnesota and its surrounding areas. The DSME service took place in a group setting over the course of 4 weeks, holding two-hour and thirty-minute classes each week. The project was an attempt to improve the health outcomes of T2D patients by increasing the participants' knowledge, confidence, and preparedness in managing their chronic condition on a daily basis.

Establishing measures.

The third step in The Model for Improvement is establishing measures, which answers the second question of "How will we know that a change is an improvement?" (Langley et al., 2009). The change in improvement was measured by using the Skills, Confidence, and Preparedness Index (Appendix D). Participants in the group DSME service completed the SCPI

at the first session and again upon completion of the curriculum at the end of the fourth session. The education provided throughout the course focused on increasing the patient's knowledge and prepared them to perform self-care behaviors to manage their chronic disease successfully. A change in the values of their scores was used as a tool in determining possible improvement in the patients' self-management behaviors.

Selecting change.

The last question of the three in The Model for Improvement is "What change can we make to result in improvement?" (Langley et al., 2009). The ADA supports that every diabetic patient should participate in DSME (ADA, 2018a). Currently, RVH offers Prevent Type 2 Diabetes classes and Diabetes Support Group. In meeting with the dietitian, support was received in pursuing the implementation of DSME classes (Appendix B). The implementation of a DSME service in addition to the classes offered currently was viewed by stakeholders as having the potential to decrease healthcare costs, improve A1c, reduce the onset or advancement of diabetic complications and provide psychosocial and behavioral health benefits (Powers et al., 2015).

Testing changes.

The second part of The Model for Improvement tested changes by implementing the PDSA cycle. The PDSA cycle is an evaluative tool to systematically plan and implement change into an organization on a small scale, monitor its effectiveness, and allow for modification in the future of the project on a larger scale (Langley et al., 2009). The PDSA was utilized during the implementation of the pilot DSME group service at RVH.

Plan.

The planning stage for the implementation of the DSME group service began, September 2017, when contact was made with the dietitian at RVH to gain buy-in for the implementation of the practice improvement project. The co-investigator partnered with the dietitian to form a pilot DSME service. Other members of the planning team included the RN Health Coach. Surveys were created by the co-investigator to gauge knowledge of the benefits of DSME, level of support for DSME, and to help identify any barriers in the referral process or the implementation of the service by the RVH staff (Appendix E-J). A literature search was performed to find the latest research on DSME and find a tool to measure the patient's self-management skills. The SCPI was found to be the latest, comprehensive tool and was used to test the participant's knowledge (Appendix D).

Do.

Step 2 in the PDSA cycle was to test the change a small group of individuals (Langley et al., 2009). Phase one included educating the healthcare providers, nursing staff, and senior leaders on the benefits of DSME services, the critical times of when to refer, and the referral process through a PowerPoint presentation (Appendix C). The surveys were administered before the implementation of the DSME service to determine the level of support, elicit referrals, and gather qualitative feedback in implementing the performance improvement project (Appendix E-J). An electronic referral system was put into place in the EHR to ease the process of referrals and ensure sustainability of the service. A pilot group of T2D patients was formed for the DSME group service. The "Type 2 Diabetes Basics" curriculum was implemented over the course of 4 weeks where DSME participants met for two hours and thirty minutes each week (Appendix K). The SCPI was administered to the participants at the first session and again upon

completion of the course (Appendix D). A Client Satisfaction Survey was given to the participants after each class to illicit feedback on the delivery of the DSME service (Appendix L).

Study.

The study phase began concurrently with the "do" phase in studying the surveys collected from the RVH staff. The pre-implementation surveys were gathered and compiled into themes. Upon completion of the pilot DSME service, the results of the DSME participants SCPI and Client Satisfaction Surveys were disseminated to the RVH staff. Post-implementation surveys were then administered to each cohort including senior leaders, providers, and nursing staff. The pre and post-implementation survey were then analyzed to compare the knowledge of the benefits of DSME, level of support for the service, gain knowledge into the referral process, and elicit qualitative feedback to for the future of the DSME group service. The SCPI and Client Satisfactions Survey's completed by the DSME participants was also studied to identify knowledge gained during the service or if there were gaps in the education during any of the sessions or the self-care behaviors presented. The analysis of the data collected was necessary to determine if the expected outcomes were achieved and, if not, aid in the investigation as to why there were unintended results. The study phase allowed for time to summarize and reflect on what was learned during the "do" phase before moving to the final step in the PDSA cycle.

Act.

The act phase is time to take action and make changes to the quality improvement project based on the information synthesized in the study phase (Langley et al., 2009). In the practice improvement project, the last phase was to make recommendations to the organization on improvement for the future of the DSME group service. Implementation of the PDSA cycle was

used in aiding the sustainability of the project and setting the facility's DSME services up for a future of success in accordance to the organization's mission and with the current ADA recommendations.

Implementing changes.

Upon completion of the PDSA and refinement of the project, the project is ready for implementation on a broader scale (Langley et al., 2009). The implementation of change may be after several rounds of the PDSA cycle. The goal of implementing change after completion of the PDSA cycle is that the change will be adopted as permanent change within the organization. The results from the practice improvement were utilized in making suggestions and implementing changes for the future of the DSME service at RVH.

Spreading change.

The final process in The Model for Improvement is spreading change. During the spreading change phase, the project is replicated in the organization or other organization (Langley et al., 2009). Dissemination of project allows for others to learn from the practice improvement project and possibly benefit or implement change in their setting to potentially benefit an even broader population. The practice improvement project was disseminated through poster presentations and through the three-minute information video.

Chronic Care Model

The theoretical framework that was used to drive the practice improvement project was the Chronic Care Model (CCM). The CCM was developed in the mid-1990's by staff from the MacColl Center for Health Care Innovation and was supported by the Robert Wood Johnson Foundation who funded testing of the model nationwide (Improving Chronic Illness Care [ICIC], 2018; Wagner, 1998). Research has shown that DSME services should have a strong theoretical

foundation at the base of service development (Davies et al., 2018; Formosa et al., 2012). Positive outcomes have been reported when using the CCM in primary care in the United States for diabetes care (Stellefson, Dipnarine, & Stopka, 2013).

The development of the CCM focused on creating a comprehensive redevelopment of medical care in developing a partnership with the health systems and the community when providing patients with self-management skills (Stellefson et al., 2013). There are six components to the CCM which include the health system, delivery system design, decision support, clinical information systems, self-management support, and the community (ICIC, 2018). Each component was utilized in the design and creation of the practice improvement project.

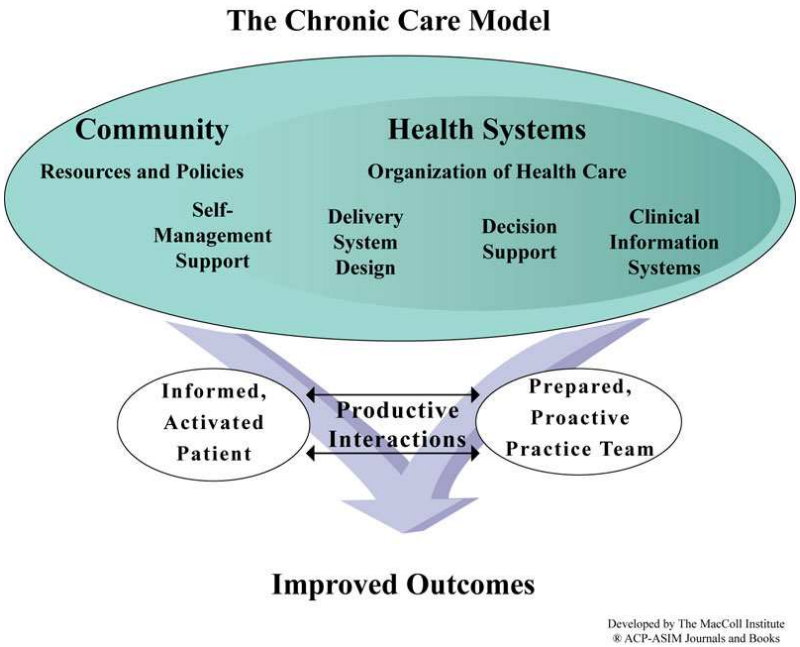

Figure 2. The Chronic Care Model.
From "Chronic disease management: What will it take to improve care for chronic illness?," by E. Wagner, 1998, *Effective Clinical Practice*, 1, p. 2-4. Copyright 1998 by Copyright Holder. Reprinted with permission from American College of Physicians. For permission to use or reproduce, please contact the Copy Right Clearance Center at http://www.copyright.com/.

Health system.

According to Improving Chronic Illness Care (2018) a health system aims to "create a culture, organization and mechanism that promotes safe, high-quality care" (Health System section, para 1). The health system is the foundation of the practice improvement project, and RVH's passion for enhancing lives by engaging in the best practices aligns with the purpose of the project (RiverView Health [RVH], 2018). The PowerPoint presentation was to be delivered by the co-investigator to gain three levels of support from the organization before the implementation of the DSME group service (Appendix C). The presentation was delivered to three cohorts: the healthcare providers, nursing staff, and senior leaders. The benefits of DSME and its value to patient outcomes and quality of care were presented to each of these cohorts to gain their support and garner referrals from the healthcare providers in the implementation of the project. Without organizational support, the success of the project would have been dampened.

Delivery system design.

The delivery system design focused on effective and efficient clinical care and self-management support; therefore, the goal was to be proactive versus reactive in striving to keep an individual healthy (ICIC, 2018). The DSME group classes were structured around the framework of the "10th Edition American Diabetes Association Education Recognition" requirements which were developed from the *2017 Revised National Standard for Diabetes Self-Management Education and Support* (American Diabetes Association, 2018b). Diabetes self-management education focused on giving participants the tools necessary to prevent the complications of the chronic disease proactively (Powers et al., 2015). The group setting allowed education to be given to a group of individuals at one time reaching a more significant number of the target population at one time. In addition to reaching a more substantial number

of individuals in the target population, holding group education was anticipated to decreased organizational costs by decreasing the need to employ additional staff to meet the needs by utilizing the dietitian and RN Health Coach already working during the meeting times for the organization.

Decision support.

Clinical care should be consistent with scientific evidence, therefore supporting the decision making of providers (ICIC, 2018). Decision support was utilized in the referral of patients to the DSME group service. According to the *Standards of Medical Care in Diabetes – 2018*, "all people with diabetes should participate in diabetes self-management education to facilitate the knowledge, skills, and ability necessary for diabetes self-care" (2018a, S38). Referring to DSME during one of the four critical periods in recommend by the American Diabetes Association, which include upon diagnosis, annually, in the presence of complicating factors, and during transitions of care (ADA, 2018a). Education regarding DSME purpose and timing of referrals was given to the healthcare providers who attended the luncheon to help produce referrals to the pilot service for eligible participants who would benefit based on provider knowledge and support.

Clinical information systems.

The incorporation of the clinical information system was used to organize patient data and allow for effective and efficient care (ICIC, 2018). A referral was built within the electronic health record utilized by RVH. The healthcare providers were then able to submit referrals in the EHR that would automatically drop into the dietitian's inbox to allow for seamless continuity of care.

Self-management support.

Self-management support aims to give patients the tools to manage their health and empower them to play a central role in their chronic disease (ICIC, 2018). The DSME service utilized the "Type 2 Diabetes Basics" curriculum to educate the patients on the self-care behaviors of diabetes management (Appendix K). The sessions aided in empowering the participants to take responsibility of their diagnosis and instill the appropriate tools to manage their disease successfully.

The community.

The creation of a holistic service includes incorporating the community and opportunities for resource utilization outside of the organization. Upon completion of the DSME classes, patients were encouraged to continue their self-management journey in participating in Diabetes Support Group and continued yearly follow-up education. RiverView Health's Diabetes Support Group is free of charge is available for diabetic patients, and the group meets monthly for continued community support.

The success of patients in the self-management of diabetes was not only to occur from one or two of the above components of the CCM, as a holistic approach was necessary. The CCM was used systematically in the development of the practice improvement project. Through the use of the CCM, patients completing the DSME service should have success and improved clinical outcomes (Stellefson et al., 2013).

CHAPTER 3. PROJECT DESIGN

Congruence of the Project to the Organization's Strategic Plan

The project was implemented at RiverView Health (RVH) a non-profit healthcare system located in Crookston, a rural northwestern Minnesota community (Appendix A-B). The vision of RVH is to provide "world-class healthcare through a culture of excellence" (RVH, 2018). The organization's mission is based off of three core measures: exceptional people, exceptional care, and exceptional outcomes (RVH, 2018). People employed within the organization including the senior leaders, healthcare providers, nursing staff, and dietitian all contributed to the implementation of the practice improvement project. The implementation of the pilot DSME service aligned with the organization's mission to provide exceptional care with exceptional outcomes since the service is recommended as a national standard for diabetes care and has been shown to have positive clinical outcomes in addition to improved health status and quality of life (ADA, 2018a).

RiverView Health performed a community health needs assessment in 2016 to better understand the needs of the community and the individuals served in the area. The community health assessment performed by RVH in 2016 included both qualitative and quantitative data (RVH, 2016). Quantitative data was gathered through a variety of publicly available databases and the qualitative data were gathered through one-on-one and small group interviews with key community stakeholders in the spring of 2016 (RVH, 2016).

RiverView Health identified diabetes and obesity as the top two priorities. Obesity has shown to increase an individual's risk of developing diabetes, therefore is a relevant risk factor directly associated to diabetes management (RVH, 2016). Obesity has been a community health priority since 2013 for RVH. RiverView Health has taken actions in attempting to meet the

needs of their community by adding a dietitian and registered nurse health coach to their health care team. RiverView Health has also utilized the dietitian and RN Health Coach to increase the educational opportunities for individuals with diabetes by offering Prevent Type 2 Diabetes and Diabetes Support Group. The organization has made strides in meeting the needs of the T2D patients, but they are still not meeting the national standards for diabetes care. The latest national standards in diabetes care report all individuals diagnosed with diabetes should participate in diabetes self-management education (ADA, 2018a). RiverView Health did not offer DSME services prior to the implementation of this practice improvement project, therefore the co-investigator had the opportunity for practice improvement in T2D management in the form of implementing a pilot group DSME service. The organization was able to utilize the dietitian and RN Health Coach, two qualified individuals to facilitate the DSME group sessions (Beck et al., 2017). The DSME service has shown to assist patients in facilitating improved knowledge, skills, and ability for self-care (ADA, 2018).

The aim of the project was to correlate with the organization's first priority by addressing the obesity and diabetes health concerns in the community and surrounding areas, specifically diabetes management. The focus was to offer the tools necessary for T2D patients to successfully self-manage their disease on a daily basis. The improvement in their self-management skills was geared towards improving their clinical outcomes.

Project Implementation

Phase 1

The first phase in the implementation of the practice improvement project was to obtain organizational support at RVH for the pilot DSME service (Appendix B). The dietitian at RVH, who is one of the educators of the Prevent Type 2 Diabetes classes and the leader of the Diabetes

Support group, was the first to buy-in to the service and became the liaison between the organization and co-investigator. Support from the senior leaders, healthcare providers and nursing staff was elicited after providing information through a PowerPoint presentation on DSME and the importance of utilizing the service including the supporting literature on diabetic education (Appendix C). The presentation was given to the senior leaders and nursing staff during their monthly staff meetings, while the providers' education was delivered during a luncheon. RVH employees support was evaluated by administering a pre-implementation survey that took less than five minutes to complete (Appendix E, G, & I). The aim for providing information on the benefits of DSME services and allowing for feedback from the employees was to elicit support in the implementation of the project and to garner referrals for the piloting of the DSME group service.

Phase 2

The second phase in the project development was to work with information technology (IT) to develop an electronic referral. The purpose of developing an electronic referral system was for efficiency and smooth coordination of care from healthcare provider to DSME educators, in addition to sustain the service. To achieve efficient and sustainable referrals, a process was developed in which the referrals were dropped into the dietitian's inbox within the EHR.

Phase 3

The third step in the practice improvement project was the implementation of the DSME service. The classes were led by the dietitian and RN Health coach via a didactic approach in a classroom setting held within RVH's organization. The class size was limited to the first ten participants per the dietitian and RN Health Coach's preference to create an environment

conducive for learning. CMS also recommends DSME class sizes be limited to two to twenty patients to allow for an individualized experience (Tang, Funnell, & Anderson, 2006).

Beck et al. (2017) report in the *2017 National Standards for Diabetes Self-Management Education and Support* that the criteria for the curriculum must include content on the seven self-care behaviors of diabetes which are:

- diabetes pathophysiology and treatment
- healthy eating
- physical activity
- medication usage
- monitoring and using patient-generated health data
- preventing, detecting, and treating acute and chronic complications
- healthy coping with psychosocial issues and concerns
- problem solving.

Education on these seven self-care behaviors has been positively correlated with improving glycemic control, reducing complications and improving the quality of life of T2D patients (Shrivastava et al., 2013). The International Diabetes Center's (IDC) "Type 2 Diabetes Basics" 5th Edition curriculum was chosen as personal preference from the dietitian and co-investigator and is an approved curriculum found in the *2017 National Standards for Diabetes Self-Management Education and Support* (Beck et al., 2017). Powers, Carstensen, Colon, Rickheim, and Bergenstal (2006) found a decrease in A1c by 2.5% three months after completion of the "Type 2 Diabetes Basics" curriculum and sustained results were seen after six months due to the healthy lifestyle changes taught in the course. The outline of the Type 2 Diabetes Basics curriculum in listed in Appendix K. The Type 2 Diabetes Basics curriculum is

written at a 6th grade and is available in Spanish. Each participant was given Type 2 Diabetes Basics workbook to utilize as an interactive teaching guide. The workbook was utilized during each session as a guide for the participants to follow along during the four-week DSME service.

The DSME participants were given the SCPI at the first session of the DSME course, which took less than ten minutes to complete (Appendix D). The tool was utilized in measuring the patient's knowledge of diabetes, confidence in managing their diagnosis, and preparedness to manage challenges as they arise. The SCPI is the latest of tools developed to assess self-management skills of T2D patients and provides a correlation to glycemic control both currently and in the future for patients (Aronson, 2017; Mbuagbaw et al., 2017). The SCPI is free to use and permission for use and reproduction was granted through the Creative Common Public Domain Waiver (Mbuagbaw et al., 2017). The SCPI was distributed again upon completion of the DSME course for comparison to the previous screening in order to evaluate change correlated to glycemic control. The DSME participants were also administered the Type 2 Diabetes Basics Curriculum's Client Satisfaction Survey after each session to evaluate knowledge gained during each session and recommendations for the future of the program (Appendix L & M).

Phase 4

The results of the DSME service were disseminated to RVH's senior leaders, healthcare upon completion of the pilot DSME course. Post-implementation surveys were administered at their monthly staff meeting (Appendix F, H, & J). The surveys were utilized to measure their support for future referrals to the DSME service and to allow for qualitative feedback for the future of the DSME service at RVH.

Timeline of Project Phases

Table 1
Timeline of Project Phases

September 2017 - December 2017
- Met with dietitian to express interest in the implementation of a group DSME service at RiverView Health - Met with the Diabetes Quality Initiative group to gain knowledge of current projects and proposed the practice improvement project of implementing DSME service
February – March 2018
- Weekly meetings with dietitian to develop DSME service
April – May 2018
- Initial poster presentation - Developed dissertation proposal
June 2018
- Proposed to committee
July 2018
- Submitted IRB application and approval received
September 2018
- Presented the DSME education to the RVH senior leaders, healthcare providers, and clinic nursing staff to obtain buy-in and administered pre-implementation surveys - Elicited referrals to the DSME service - Began data collection
October 2018
- Analyzed data collected from pre-implementation surveys
November – December 2018
- Implemented 4-week long, 2 hours per week pilot DSME course - Distributed the SCPI to participants in DSME service - Collected data from SCPI and Client Satisfaction Surveys - Distributed the SCPI to participants in DSME service upon completion of the DSME course - Analyzed data collected from SCPI and surveys
January 2019
- Disseminated results from pilot DSME service to RVH senior leaders, health care providers, and nursing staff and administered the post-implementation surveys - Finalize dissertation
February 2019
- Final defense of dissertation

Protection of Human Subjects

Risk to Subjects

Human subjects' involvement and characteristics.

The first sample of participants were the senior leaders, health care providers including medical doctors, nurse practitioners, physician assistants, and clinic nursing staff employed at RVH. These participants were recruited to participate while attending their monthly staff meetings or luncheon. The healthcare staff targeted included five senior leaders, four medical doctors, five nurse practitioners, two physician assistants, and ten clinic nursing staff. The demographics of healthcare staff population ranged from 20-75 years of age and included both male and female genders. The second sample of participants were the patients of the DSME group service which was a convenience sample of the first ten T2D participants. The class size was limited per CMS's recommendation of DSME class sizes of two to twenty patients (Tang, Funnell, & Anderson, 2006). The DSME participants were patients 45-75 years old with a diagnosis of T2D.

Potential risk to subjects.

The potential risk to the subjects involved in the practice improvement project included potential emotional and psychological distress in both sample populations, the first sample including senior leaders, healthcare providers, and nursing staff and the second sample including the DSME participants. All participants may find filling out the surveys, SCPI, or Client Satisfaction Survey's stressful and/or cumbersome. Each participant received a cover letter stating the potential emotional and/or psychosocial distress prior to participating in the practice improvement project. No patient identifiers were linked to survey responses or collected throughout the practice improvement project; therefore, their identity and personal information

was not compromised. The participants were informed that their participation was voluntary, and they had the right to with draw at any time without penalty.

Adequacy of Protection Against Risk

Recruitment and informed consent.

The first sample population, the RVH senior leaders, healthcare providers, and clinic nursing staff were recruited at their monthly staff meetings or luncheon. No specific incentive was provided, other than the educational opportunity supporting the benefits of utilizing DSME services to potentially improve patient outcomes, reduce costs for the patient and organization, and potentially help improve provider quality improvement measures. The information of the DSME service was provided to the staff via a PowerPoint presentation. A cover letter explaining the extent of the practice improvement project was administered to RVH staff (Appendix M & N). The RVH staff's consent was obtained by their completion of the pre and post-implementation surveys. The second sample population, T2D patients who participated in the DSME sessions. On the first meeting session of the DSME service, the participants were provided a cover letter explaining the practice improvement project and that they had the option to participate in the project or continue with the DSME service independently of the co-investigator's practice improvement project (Appendix O). By completing the SCPI at the beginning of that first DSME session indicated consent to participate in the practice improvement project and this was clearly discussed in the consent form, as well as verbally by co-investigator during the introduction of the first DSME session in order to address any questions or concerns. Completion of the SCPI during the last DSME session indicated continued voluntary participation by the participant, as participants could choose to quit participation in the practice improvement project or DSME service at any time without penalty.

Protection against risks.

Any individuals whom were unable to make their own medical decisions, possess the ability to understand and comprehend the informed consent were excluded from participating in the practice improvement project. The projects' participants were informed that they had the right to withdraw at any time during the implementation or completion of the study. If the participants experienced any emotional or psychological distress throughout the completion of the project the dietitian was available to counsel them and inform and/or explain their right to remove themselves from the study and refer them to the appropriate services if needed. No personal information was gathered for the purpose of the practice improvement project; therefore, the participants' personal data did not have the potential to be compromised.

Potential benefits of proposed project to the subjects.

There was no compensation for the subjects whom participated in the study. The organization had the potential see an increase in patient satisfaction scores, improvement in quality improvement numbers, and reimbursement rates. An indirect benefit for providers was possibly gaining a sense of contribution by providing feedback in the implementation and the future of the DSME group service at RVH for the organization as well. Lastly, they may have received gratification through seeing their patients' success in completing the DSME service.

The DSME participants, through completing the DSME curriculum, had the potential to increase their knowledge of the self-care behaviors in managing their chronic diagnosis of T2D. They may have felt more prepared to manage their disease on a daily basis. The participants may also have felt an increased self-efficacy in the management of their disease, which has the potential to improve their quality of life and health outcomes

Importance of knowledge to be gained.

The pre and post-implementation surveys were used to determine the organization's knowledge of the benefits of DSME, illicit referrals, gauge the level support from the senior leaders, healthcare providers, and nursing staff to promote sustainability of the service. If the participants did not feel the project would be beneficial to the patients of RVH, they had the opportunity to provide their opinions, which were to be utilized in the implementation of the practice improvement project and the future of the DSME group service at RVH. The SCPI filled out by the DSME participants was used as a tool to determine if the classes improved the patient skills, confidence, and preparedness in the management of T2D diagnosis. The index was also utilized to determine and identify any gaps in the self-care behaviors presented in the classes. The knowledge gained was utilized to sustain the DSME service and determine the potential for expansion.

Inclusion of women, minorities and children.

Participants in the practice improvement project potentially included women and minority populations in both sample populations if they met inclusion criteria. The inclusion criteria for staff was anyone working at RVH in the Family and Internal Medicine Departments. Inclusion criteria of the DSME participants were anyone with an A1C greater than 6.5% and between the ages of 45-75 years of age, as well as the proper referral from a participating provider at RVH. Children and pregnant women were intended to be excluded in the participation of the study.

Institutional review board.

The practice improvement project was submitted to the North Dakota State University Institutional Review Board to seek approval for continuation of the project. RVH does not have

an Institutional Review Board. The organization provided a letter of support and partnership in the implementation of the practice improvement project (Appendix B).

Project resources.

The dietitian, RN Health Coach, and co-investigator worked together to build the framework of the DSME service and provided the information of the DSME group service to senior leaders, healthcare providers, and nursing staff to improve knowledge and importance of the service and garner support. The cost of the luncheon for the healthcare providers was funded by the diabetes fund within the RVH Foundation and cost approximately $130. The co-investigator was in charge of administering the surveys to the RVH staff along with collecting them and analyzing the data. The dietitian and RN Health Coach worked with information technology to fill out the paper work necessary to obtain a best practice alert to trigger when a patient's A1c is greater than 6.5 and implemented an electronic referral within the EHR the DSME group service that will go directly in the dietitian's inbox with the EHR. No expenses were needed to fund location of the DSME classes as they were held at RVH in a classroom utilized for the Prevent T2D and Diabetes Support Group. The curriculum and Client Satisfaction Surveys for the DSME classes was funded by RVH's Foundation, which cost $95 for the curriculum guide and approximately $8 per workbook. The classes were taught by the dietitian and RN Health Coach during their regularly, scheduled paid time. The SCPI was a free tool administered to the DSME participants. The co-investigator administered and collected the SCPI and Client Satisfaction Survey's from the DSME participants and analyzed the data. The dissertation committee members dedicated their time in providing suggestions and feedback to the co-investigator throughout the practice improvement project implementation process. In

summary, the cost of getting the service up and running was not considered any significant cost to the organization or co-investigator for the DSME service or practice improvement project.

Institutional Review Board Approval

Approval received for protocol #PH19011 was received from North Dakota State University Institutional Review Board (IRB) on July 19, 2018 (Appendix P). The practice improvement project was certified as exempt under category #2b in accordance to federal regulation. The IRB certification expires July 18, 2021.

CHAPTER 4. EVALUATION

Objective One

The first objective of the practice improvement project was to increase the senior leader's, healthcare provider's, and nursing staff's knowledge on the benefits of DSME and elicit their support and referrals to the DSME group service in the T2D patient population by the end of the co-investigator's presentation. The co-investigator delivered information regarding DSME through a PowerPoint presentation (Appendix C). The knowledge of DSME benefits and the level of support for referrals from the senior leaders, healthcare providers, and nursing staff was measured through distributing surveys (Appendix E-J). The surveys were distributed to the RVH staff after the presentation on DSME and the benefits of the service. The survey consisted of five to nine questions that were measured on a Likert scale and provided an opportunity for qualitative feedback. The purpose of administering the surveys was to gauge the level of support for the implementation of the practice improvement project. The surveys also measured whether the employees felt the project would be beneficial to the patients, quality scores, and reimbursement rates. The opportunity to provide quality feedback allowed the staff to convey any concerns or suggestions as the project was implemented. The co-investigator met with the senior leaders, healthcare providers, and nursing staff post-implementation to disseminate the results of the pilot DSME service and update them on the successes and challenges of the project. A post-implementation survey was administered to each group. The objective was evaluated by comparing the themes of pre- and post-implementation support, and the qualitative feedback also allowed for suggestions into the future and sustainability of the DSME group service.

Objective Two

The second objective was to establish a referral system to the DSME service within the EHR utilized at RVH to secure participants of the DSME group service. The aim was to implement a referral process that was efficient, systematic, and sustainable. The referral process was developed into the EHR with the referrals automatically dropping into the dietitian's inbox. Quantitative data were collected on the number of referrals made to the DSME service and the number of individuals who completed the curriculum. The number of referrals was tracked by the dietitian from the time the pre-implementation education was given to the healthcare providers to the time the pilot DSME service started. Data were also obtained on the pre- and post-implementation survey regarding the referral process including questions measured on a Likert Scale and the opportunity for qualitative feedback.

Objective Three

The third objective was to show an increase in DSME participant's skills, confidence, and preparedness to self-manage their diabetes by the end of the DSME pilot service. The SCPI is the latest, multi-dimensional tool in assessing a patient's self-management of diabetes (Mbuagbaw et al., 2017) (Appendix D). The tool was utilized to measure improvement in the DSME participants' self-management skills, their confidence in their self-care skills, and their preparedness to handle diabetes-related situations (Mbuagbaw et al., 2017). The tool was scored on a zero to ten scale where the participants draw a line where they most likely saw themselves in answering each question. The co-investigator then notched one-centimeter marks along the ten-centimeter line to determine the participant's numeric outcome for each question according to the literature recommendation (Aronson et al., 2017). The following total average score and subscales of skills, confidence, and preparedness was also calculated per the literature

recommendations (Aronson et al., 2017). The total average score of the SCPI was determined by adding up all the answers for each question, dividing by twenty-five and then dividing by the total number of participants. The skills subscale was determined by adding up the score from questions 1, 2, 4, 5, 7, 8, 10,12 and 22, dividing by nine and then divided by the total number of participants. The confidence subscale was measured by adding the participants scores for questions 3, 6, 11, 14, 16, 18, 19 and 21, divided by eight and then divided by the total number of participants. Lastly, the participant's preparedness was measured by adding up their scores for questions 9, 13, 15, 17, 20, 23, 24 and 25, dividing by eight, and then divided by the total number of participants. For the practice improvement project, the SPCI was administered to the DSME participants at the first session, pre-implementation, of their classes and again upon completion of the course, post-implementation, and comparing the initial and post-DSME SCPI scores. The desired outcome was to show an improvement in self-management skills, confidence, and preparedness through completing the DSME course. The third objective was also evaluated by the question "Please rate your overall control of your diabetes" on the Client Satisfaction Survey (Appendix L). The DSME participants were asked to complete the Client Satisfaction Survey after every session and rate their overall control of their diabetes on a five-point scale. The desired outcome was to show an improvement in the DSME's perception in their control of their diabetes.

Objective Four

The fourth objective was to promote sustainability of the DSME service at RVH by the completion of the practice improvement project. Both sample populations were utilized in the measure of the fourth objective. The RVH pre and post-implementation surveys were utilized to gather feedback on the implementation and the future of the DSME service at RVH (Appendix

E-J). The Client Satisfaction Survey was administered to the DSME participants after each session was also utilized to gather feedback on the DSME course itself and provide an opportunity for recommendations for the future of the service (Appendix L).

CHAPTER 5. RESULTS

Staff Pre and Post-Implementation Surveys

Three cohorts of RVH staff: providers, nursing staff, and senior leaders were educated on the DSME service. The co-investigator provided a fifteen-minute pre-implementation PowerPoint presentation to each cohort (Appendix C). The provider pre-implementation presentation was during a luncheon where a total of five providers attended. The nursing staff and senior leader's pre-implementation presentation was given during their staff meetings. A total of nine nursing staff attended, however, two participants were excluded as they were medical assistants and did not meet the IRB criteria of LPN or RN. Two senior leaders were in attendance for the pre-implementation presentation. Demographic data were gathered from the providers and nursing staff to determine gender, ethnicity, credentials, years of experience, and to determine whether the participants provide diabetic healthcare. The demographic data gathered from the providers and nursing staff are in figures 3 and 4 below. Demographic data were not gathered from the senior leader's cohort. The senior leader cohort was a small sample size and gathering their demographic data may have compromised their identity.

After the implementation of the DSME pilot service, the co-investigator gave a post-implementation synopsis of the results of the SCPI and Client Satisfaction Surveys to each cohort updating them on the successes and areas for improvement in the future of the DSME service at RVH (Appendix D & L). The ten-minute presentation took place during each cohort's staff meeting. The provider meeting was comprised of ten RVH providers, two of whom chose not to participate in the study. The nursing staff had a total of nine in attendance at their staff meeting, and one participant was excluded as they were medical assistants and did not meet the

IRB criteria of LPN or RN. Lastly, there were seven senior leaders present at the post-implementation presentation.

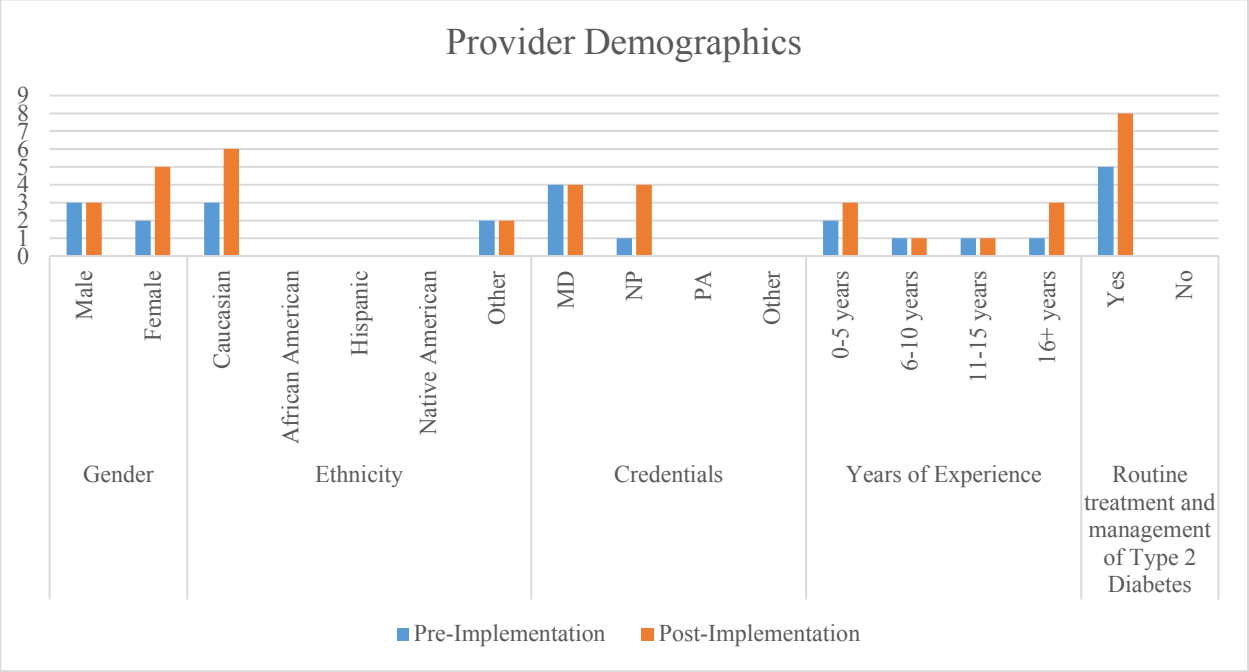

Figure 3. Provider demographics.

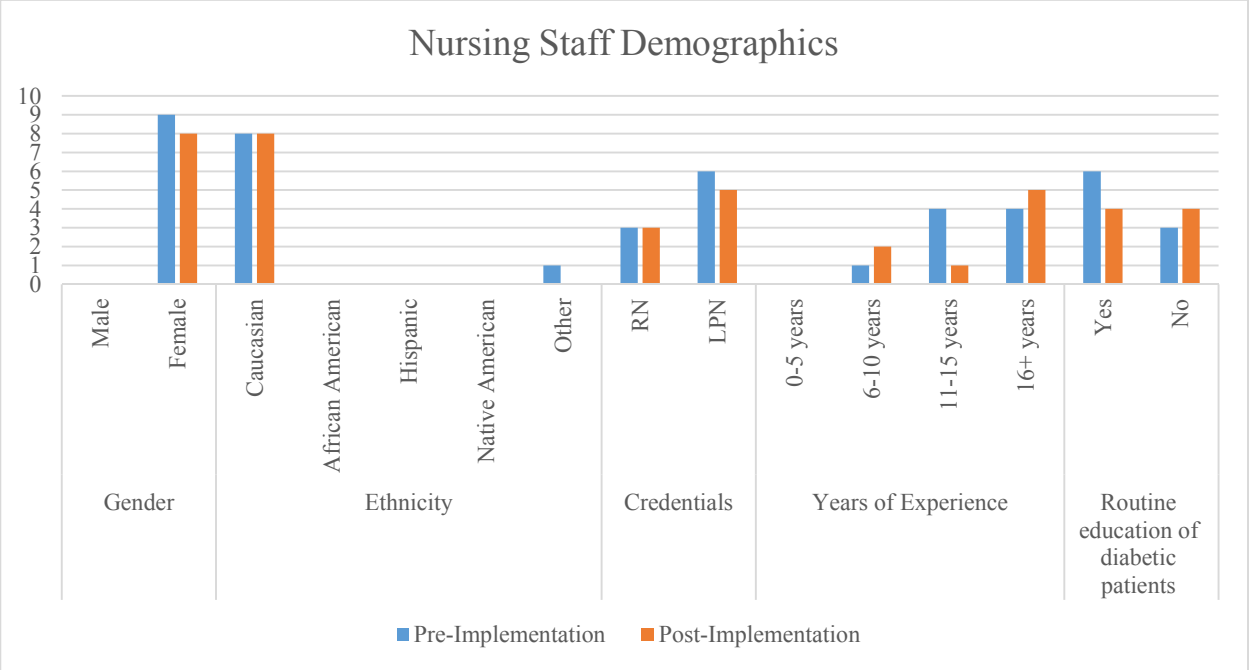

Figure 4. Nursing staff demographics.

After the pre-implementation PowerPoint education and post-implementation results presentations, the co-investigator administered pre and post-implementation surveys specific to each cohort (Appendix E-J). The surveys consisted of quantitative and qualitative feedback. Quantitative feedback was gathered from each specific cohort from questions on a 5-point Likert scale. The results of the pre and post-implementation surveys for each cohort are displayed below in figures 5 and 6. RiverView Health staff from each cohort were also given the opportunity to give qualitative feedback on the quantitative questions to elicit comments or concerns with the project. Each question on the surveys allowed for comments. The qualitative feedback from each question is displayed in the tables below.

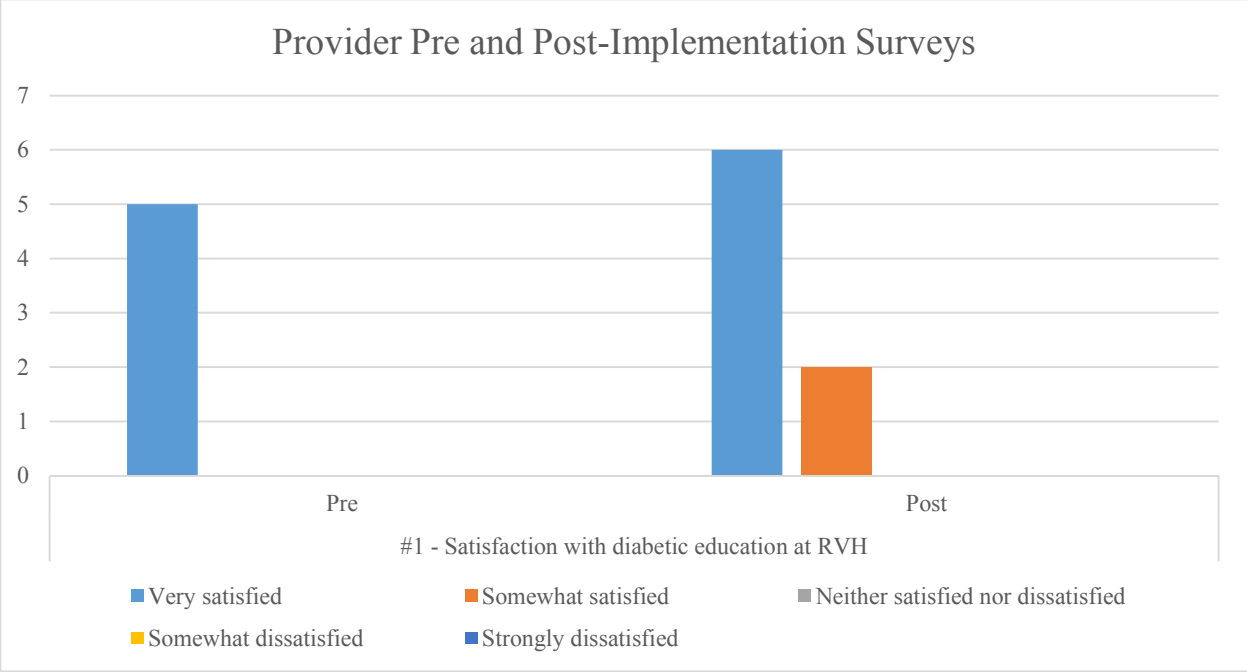

Figure 5. Provider pre and post-implementation survey question #1 results.

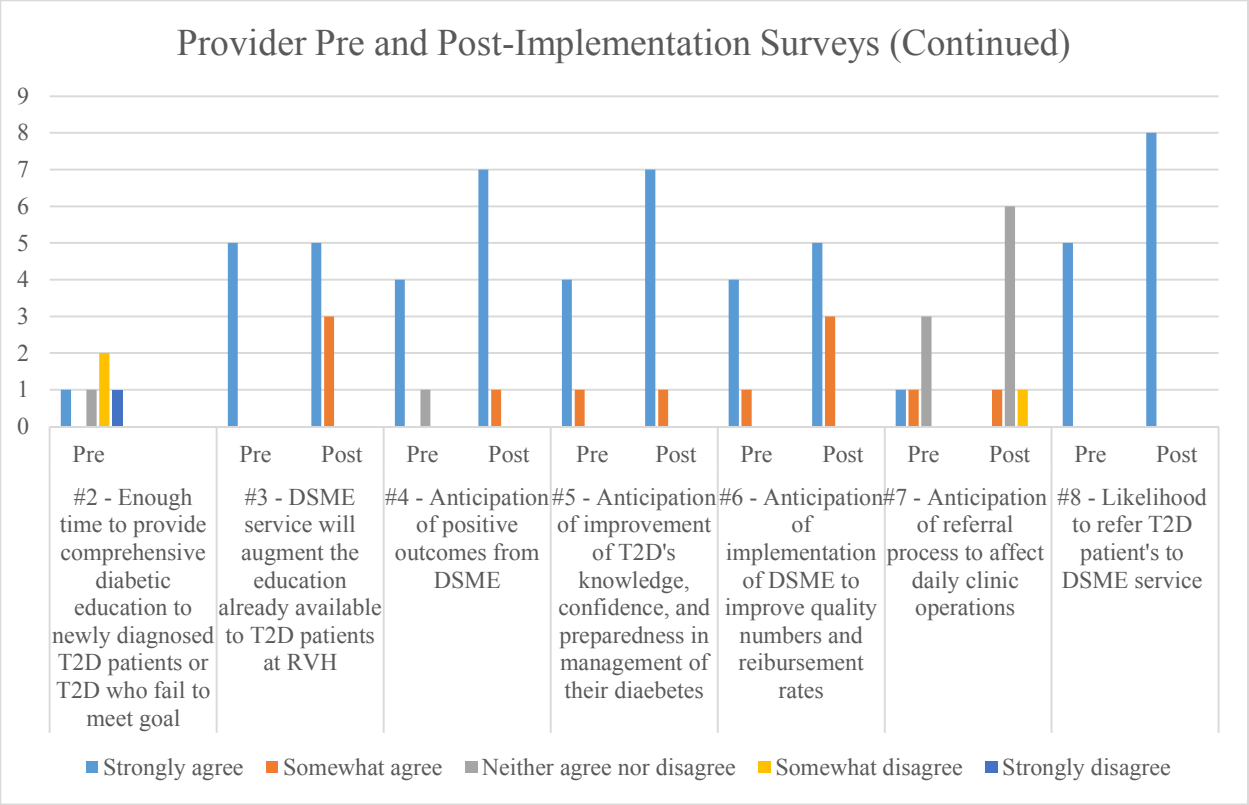

Figure 6. Provider pre and post-implementation survey question #2-8 results.

Table 2

Provider's Qualitative Feedback to Quantitative Questions on Pre and Post-Implementation Surveys

Pre-Implementation	Post-Implementation
Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?	
"Good support from dietician and health coach." "Very committed and passionate diabetes education providers."	"Patients are able to be seen right away by health coach and I feel like I have a safety net once medical home oversees their care." "Dietitian and health coaches do a great job communicating with our patients." "Haven't used these services a lot." "Excellent support and resources. Nutrition and pharmacotherapy education is available with provider counseling."
Do you feel you have enough time to provide comprehensive diabetic education to newly diagnosed type 2 diabetic (T2D) patients or T2D patients who fail to meet goal?	
"Not enough time." "Time constraints with scheduling." "No, they need more in-depth education and supervision."	Not assessed
Do you feel the diabetes self-management education (DSME) service has augmented the education already available to type 2 diabetic (T2D) patients at RiverView Health?	
No feedback	"Hands on training/interactive session is always helpful when you have a life changing diagnosis." "Great resource for our patients." "Great resource."
Do you anticipate patients with type 2 diabetes to have positive outcomes from participating in a diabetes self-management (DSME) service?	
No feedback	"Knowledge is power" "Diet and lifestyle are so important."
How likely do you anticipate the continuation of the DSME to service to improve T2D patient's knowledge, confidence, and preparedness in the management of their diabetes?	
Not assessed	"Excellent resource."
Do you anticipate the implementation of a DSME service to improve your quality numbers and reimbursement rates?	
No feedback	"Improved compliance."
Do you feel the referral process has affected the daily clinic operations?	
No feedback	"Doesn't take more than a second." "Haven't use it or ref(erred)" "More efficient referrals and follow-up."
How likely are you to refer T2D patients to the DSME service?	
No feedback	"Great support."

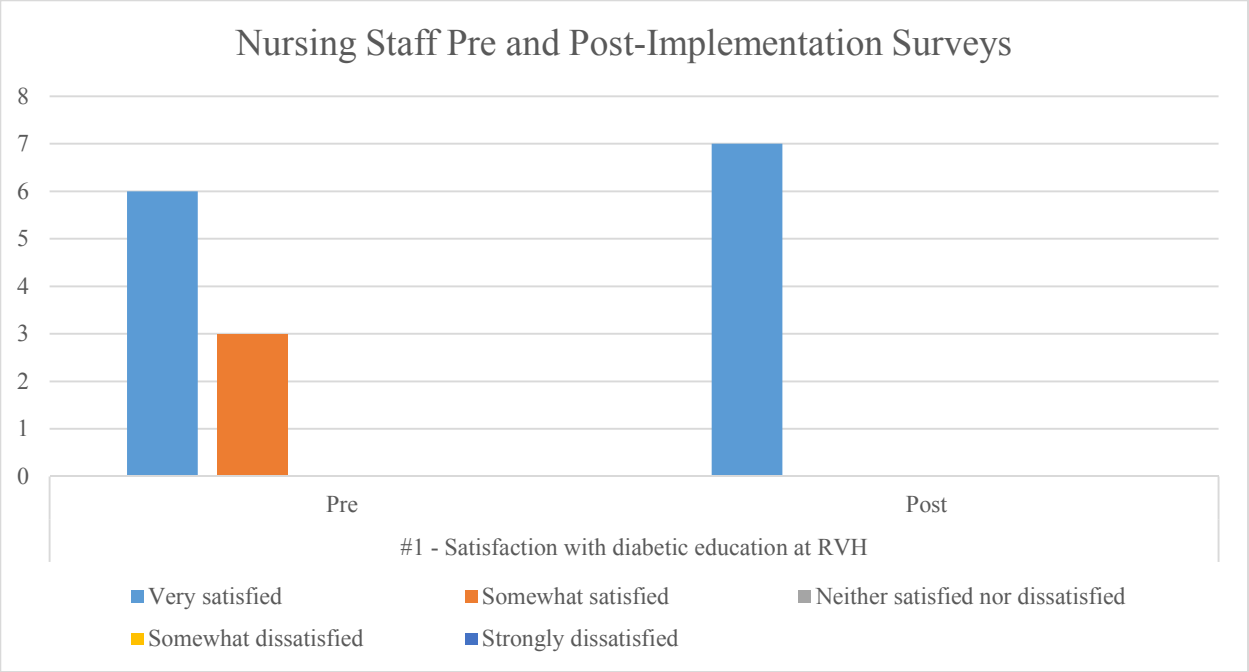

Figure 7. Nursing pre and post-implementation survey question #1 results.
One participant did not answer question #1 on the post-implementation survey.

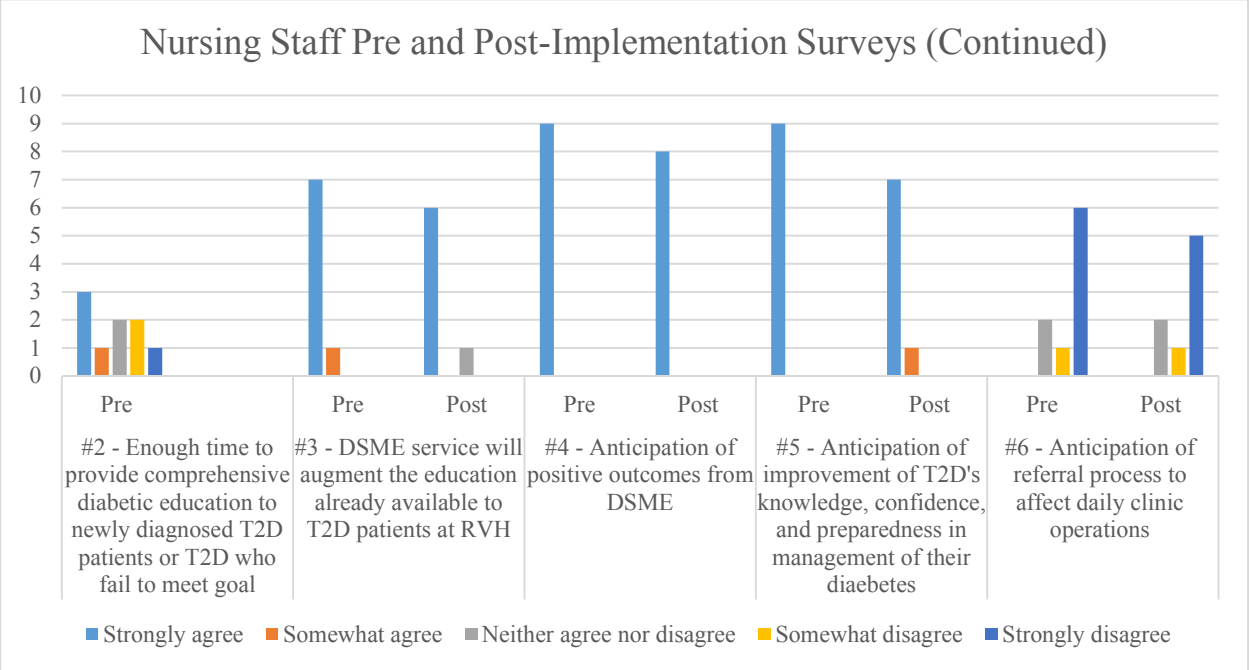

Figure 8. Nursing pre and post-implementation survey questions #2-6 results.
Question #2 was not asked on the post-implementation survey and one participant did not answer question #3 on the pre-implementation survey and one participant did not answer question #2 on the post-implementation survey.

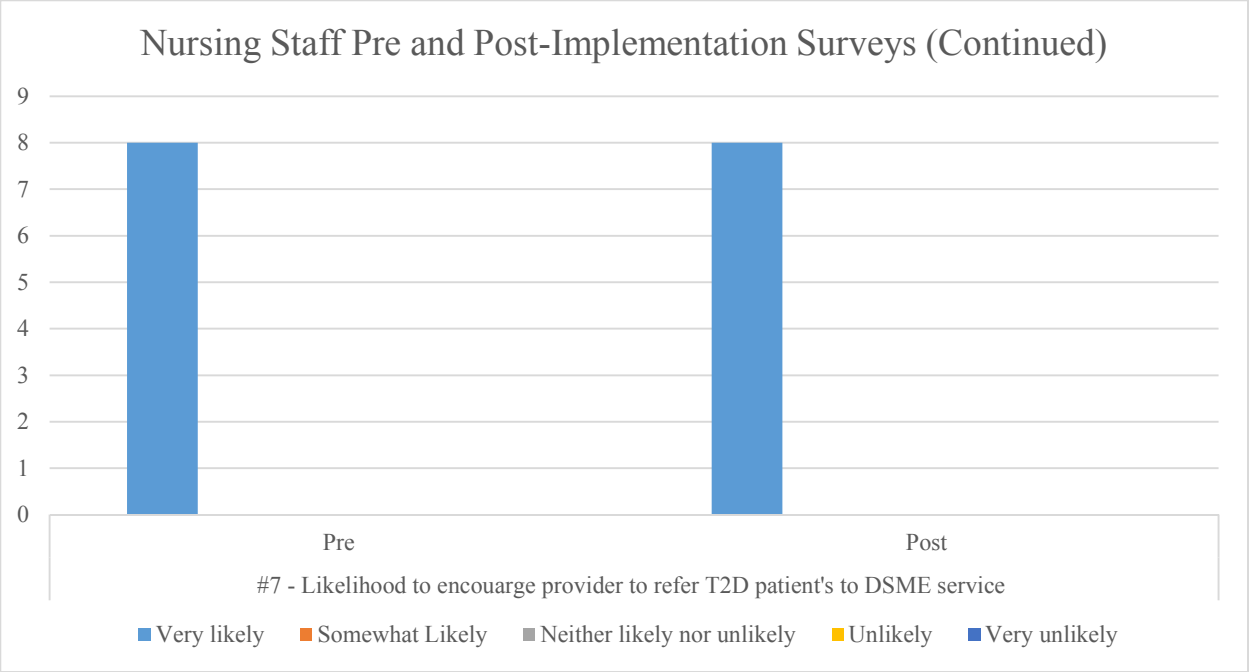

Figure 9. Nursing pre and post-implementation survey question #7 results.
One participant did not answer question #7 on the pre-implementation survey.

Table 3

Nursing Staff's Qualitative Feedback to Quantitative Questions on Pre and Post-Implementation Surveys

Pre-Implementation	Post-Implementation
Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?	
"I feel that we offer many opportunities to educate diabetes to the general public and staff we are fortunate to have an advocate like Darcey." "Darcey and Kelsey do an amazing job with type 2 diabetes and diabetes support group."	"Very nice program" "We have a wonderful diabetes team who offer a great amount of education for these patients." "These classes have been amazing, such a wonderful opportunity for our patients. You have done an amazing job!"
Do you feel you have enough time to provide comprehensive diabetic education to newly diagnosed type 2 diabetic (T2D) patients or T2D patients who fail to meet goal?	
"It takes a lot of education time to spend with diabetics unfortunately time doesn't allow." "No time at office visit." "No time."	Not assessed
Do you feel the diabetes self-management education (DSME) service has augment the education already available to type 2 diabetic (T2D) patients at RiverView Health?	
No feedback	"Yes – nice addition." "Yes, positive feedback from patients."
Do you anticipate patients with type 2 diabetes to have positive outcomes from participating in a diabetes self-management (DSME) service?	
No feedback	"The material is extremely comprehensive."
How likely do you anticipate the continuation of the DSME to service to improve T2D patient's knowledge, confidence, and preparedness in the management of their diabetes?	
Not assessed	"Patients leave the class with a wealth of knowledge that they may not have had before."
Do you feel the referral process has affected the daily clinic operations?	
"It takes little to no time to place referral"	"Providers are not willing to refer when nurses suggest it."
How likely are you to encourage or continue to encourage your provider to refer T2D patients to the DSME service?	
No feedback	"Thank you for starting this here." "This is a great opportunity for our patients."

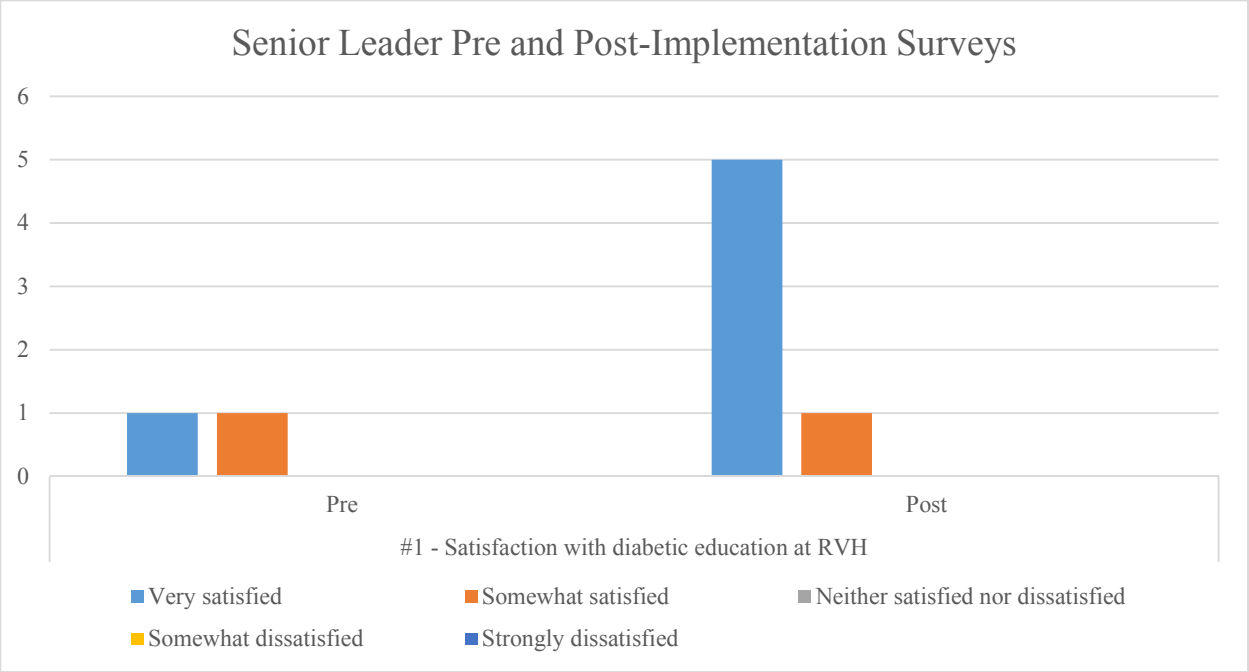

Figure 10. Senior leaders pre and post-implementation survey question #1 results.

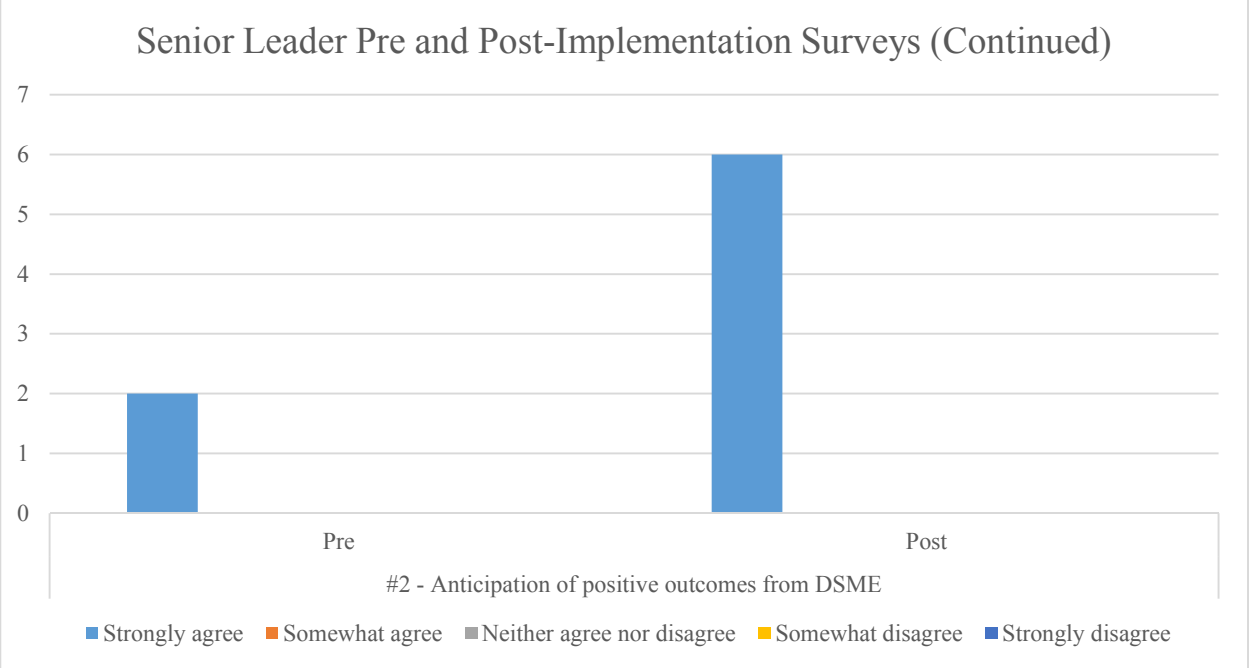

Figure 11. Senior leaders pre and post-implementation survey question #2 results.

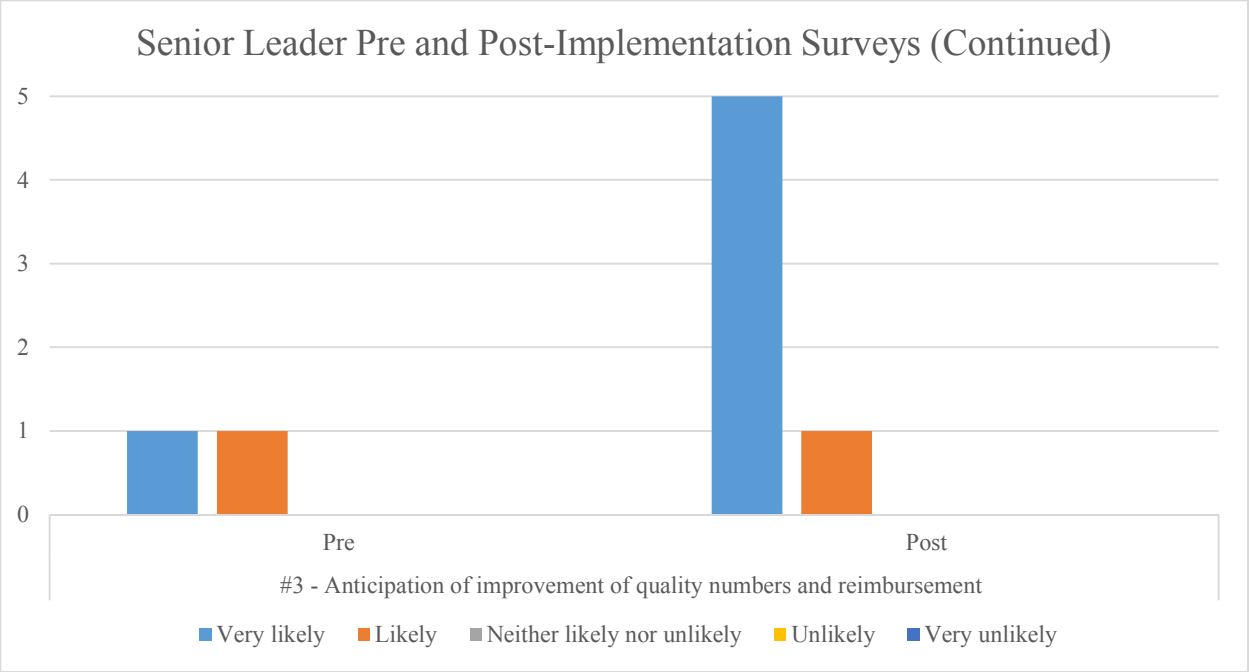

Figure 12. Senior leaders pre and post-implementation survey question #3 results.

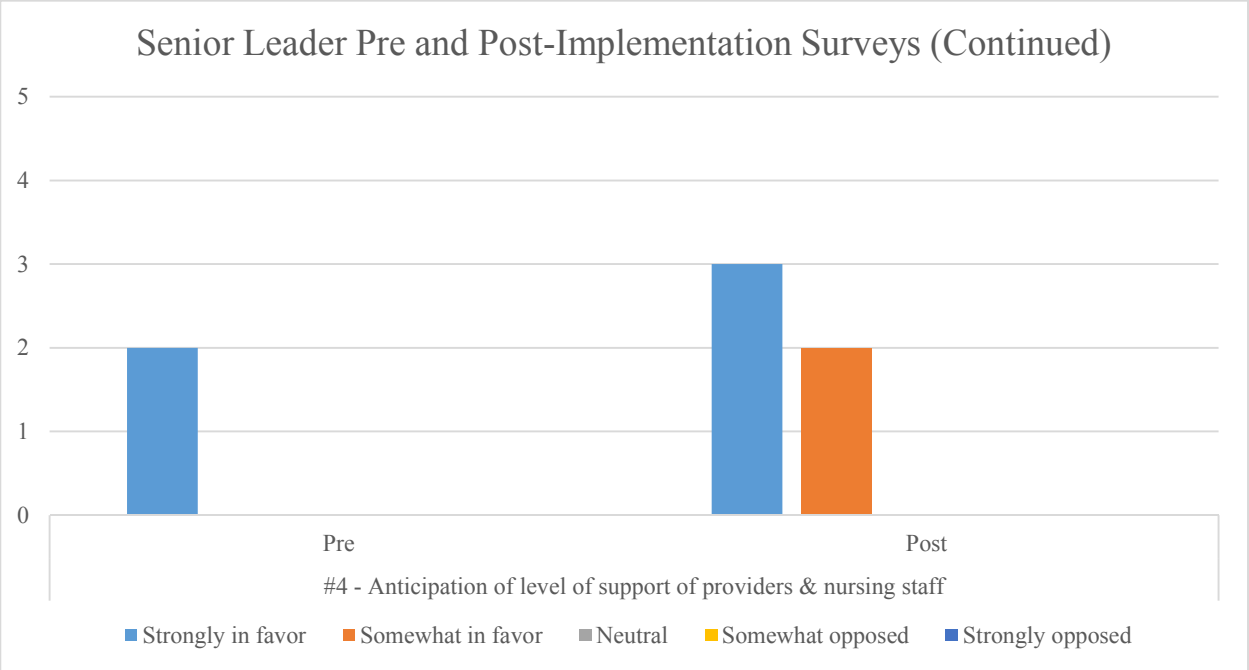

Figure 13. Senior leaders pre and post-implementation survey question #4 results.

Table 4

Senior Leader's Qualitative Feedback to the Quantitative Questions on Pre and Post-Implementation Surveys

Pre-Implementation	Post-Implementation
Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?	
"A lot work has been done to add educational services related to diabetes in the past two years." "I have been pleased at the level of diabetes educational services engagement by our customers. Having self-management tools available would increase the comprehensiveness of our service line."	"I think regionally we are a leader in this arena." "I am satisfied with the education opportunities, but providers are not consistent in referring." "This class filled a gap."
Do you anticipate patients with type 2 diabetes to have positive outcomes from participating in a diabetes self-management (DSME) service?	
"Great evidence to support."	"It's always helpful for those that work to make a change to have the tools that help." "The presence of education and support creates an environment of success and accountability."
How likely do expect the implementation of a DSME service to improve quality numbers and reimbursement rates?	
"Increase quality numbers related to diabetic care (A1c, etc.)" "As an organization we always strive to have complex medical diagnoses as a quality indicator."	"It sounds like there is a path to obtain reimbursement. I like the proactive approach."
What level of support do you anticipate from the healthcare providers and nursing staff in the implementation of the DSME service?	
"With the addition of our healthcare home model having DSME will help fill gaps in expected self-care we like to see in our customers."	"Data helps drive support, particularly if outcomes can be demonstrated." "Would love to make strongly in favor but there is not a consistency in referring – speaking from personal experience." "Intermittent re-education is important. My experience is that at least every 6 months would be needed."

Lastly, each cohort was asked to provide any additional comments on any barriers they foresaw in the implementation and future of the DSME service and had the opportunity on their post-implementation surveys to provide suggestions on the improvement of the DSME service and referral process. The barriers were broken down into the barrier categories of patient, staff, financial, time, and other. The table below displays the qualitative feedback received from the pre and post-implementation surveys. Feedback provided and suggestions for improvement of future of the DSME service and referral process is displayed in table 5.

Table 5

Qualitative Feedback on the Barriers of the DSME Service at RiverView Health

	Pre-Implementation	Post-Implementation
Patient Barriers:		
Providers	"Compliance, those that need it most are sometime resistant." "Transportation." "Time, denial." "Compliance issue and committing to new lifestyle changes." "Non-complaint DMII patients."	"Patients think they may not have enough time to attend classes. They also think they know most of it anyway." "Willingness, compliance" "Travel, time" "Some concerns regarding pro/cons of additional counseling/appointments." "Patient needs to want to learn and give their time."
Nursing Staff	"Understanding of program." "No current phone numbers, Spanish speaking." "Follow through." "Denial, transportation." "Refusal to be complaint."	"Continued compliance" "Schedules with work and personal life." "Patient accountability, language." "Not aware of classes."
Senior Leaders	"Making sure that explanation of how important management is versus allowing the disease to progress." "Time, transportation, ownership." "Assuring staff are educated on the role of DSME and our current Healthcare Home Model."	
Staff Barriers:		
Providers	"None, we have committed staff."	"Staffing" "Streamline referrals and follow-up plus communication between provider/nutrition/staff."
Nursing Staff	"Willingness to refer." "Not everyone on the same page." "Taking time to refer." "Referrals." "Time." "Time." "Not enough time in an appointment, patients do not stay problem focused."	"MD/NP not willing to refer as much as I would hope to see." "Lack of knowledge of classes and when." "Promote DSME to providers when seeing diabetes patients." "Provider push back and unwillingness to refer."
Senior Leaders	"Competing priorities, ease of referral"	
Financial barriers:		
Providers	"Depends on the patient." "Insurance denials."	"Not yet a concern." "Transportation to class."
Nursing Staff	"None, offered free of charge in our facility." "Insurance if self-pay or high deductible." "Possible."	

Table 5. *Qualitative Feedback on the Barriers of the DSME Service at RiverView Health (continued)*

Time:		
Providers	"Time constraints are possible barrier." "Flexible."	"It's a time commitment."
Nursing Staff	"Commitment."	"Patient not willing to take the time to attend sessions for 6 months to year."
Other:		
Providers		"Technology – putting in referrals."

Table 6

Post-Implementation Qualitative Feedback on the Suggestions for Improvements of the DSME service and referral process

Do you have any suggestions for improvement of the DSME service and/or referral process at RiverView Health? Please explain.	
Nursing Staff	"Getting MD's on board to refer each patient." "If possible, offer more classes times, days."
Senior Leaders	"Question skype option if not able to expand to other communities." "Program sounds great!" "Work with marketing on how to present all diabetes related services together for the medical staff and consumers."
Providers	"I think Kelsey and Darcey are already doing a stellar job." "Keep up the great work, more analytics using larger data sets to analyze use/benefit of program."

Referrals

An electronic referral was available within the organization's EHR. The referral consisted of four questions to be answered by the ordering provider. The questions included:

1. "Reason for visit?" The provider would select "Type 2 Diabetes."
2. "Preferred provider" The provider would input dietitian's name.
3. "Requested training?" The provider would select "Comprehensive Initial Training (DSME)."
4. "Medicare beneficiaries will be scheduled into a group class unless the patient has one of the following concerns:" The provider would select "No limitations" or select limitations of the patient.

The providers and nursing staff were instructed on how to place the referrals during the pre-implementation PowerPoint presentation by the co-investigator in late September. The presentation was given at a later date than anticipated due to staff vacations and full schedules at the staff meetings after the organization took the summer off from holding staff meetings. The delay in the presentations created a six-week timeframe from the provider and nursing staff education to the scheduled implementation of the pilot DSME service. Before the start of the DSME service, only one referral was received for participants to partake in the program. Through word of mouth individuals from RVH's Diabetes Support Group displayed interest in the DSME service. Referrals were requested from the RVH primary care providers by the RN Health Coach for those participants who met the criteria.

Skills, Confidence and Preparedness Index

The demographic data of the DSME participants were gathered on the first and last day of the sessions. Initially, there were seven participants, however one participant had to be excluded due to age per the IRB criteria, so six participants filled out the pre-implementation SCPI (Appendix D). After the first session, one participant dropped out of the DSME service for an unknown reason. Five of the original six participants attended the fourth and final session and completed the Skills, Confidence, and Preparedness Index.

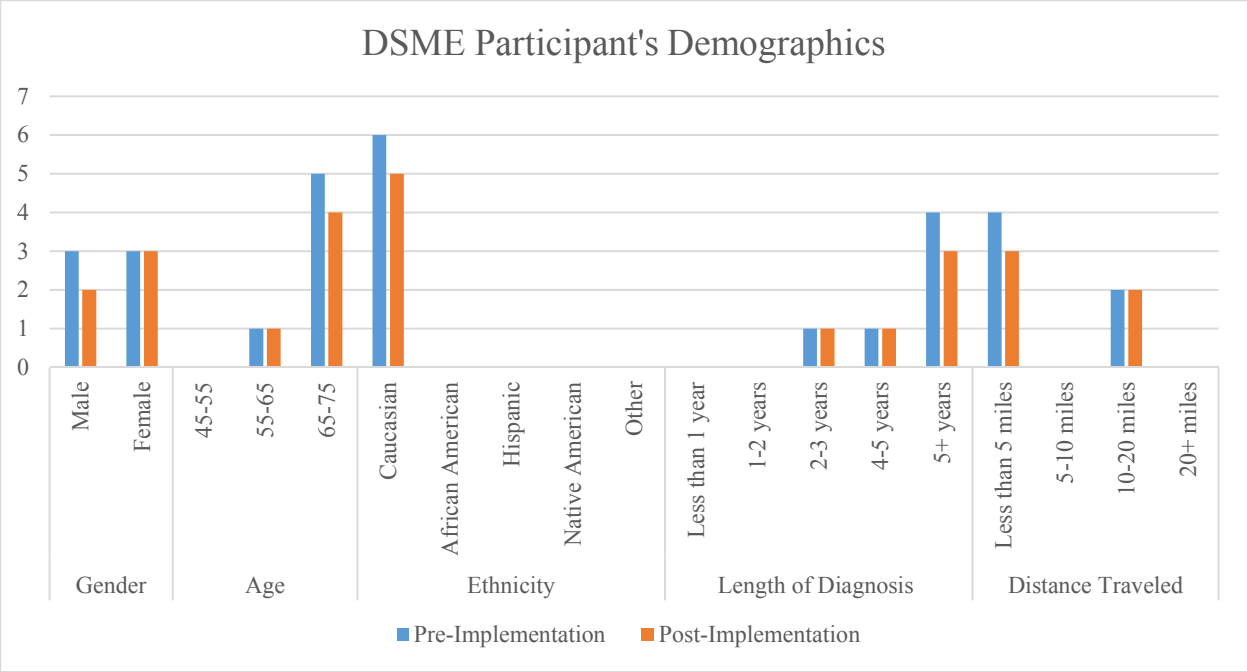

Figure 14. DSME participant's demographics.

The Skills, Confidence, and Preparedness Index was administered to the DSME participants before starting the DSME at the first sessions and upon completion of the of the DSME curriculum at the fourth session. The score of the SCPI was taken as a group to assist in determining whether improvement was made the group as a whole throughout completing the DSME service. The pre-implementation SCPI had six participants and the post-implementation SCPI had five participants. The participant individual scores and totals for each question can be found in Appendix Q and R. Four total scores were calculated from the SCPI including the total, skills, confidence, and preparedness. The following figure displays a comparison of the pre-implementation and post-implementation SCPI scores.

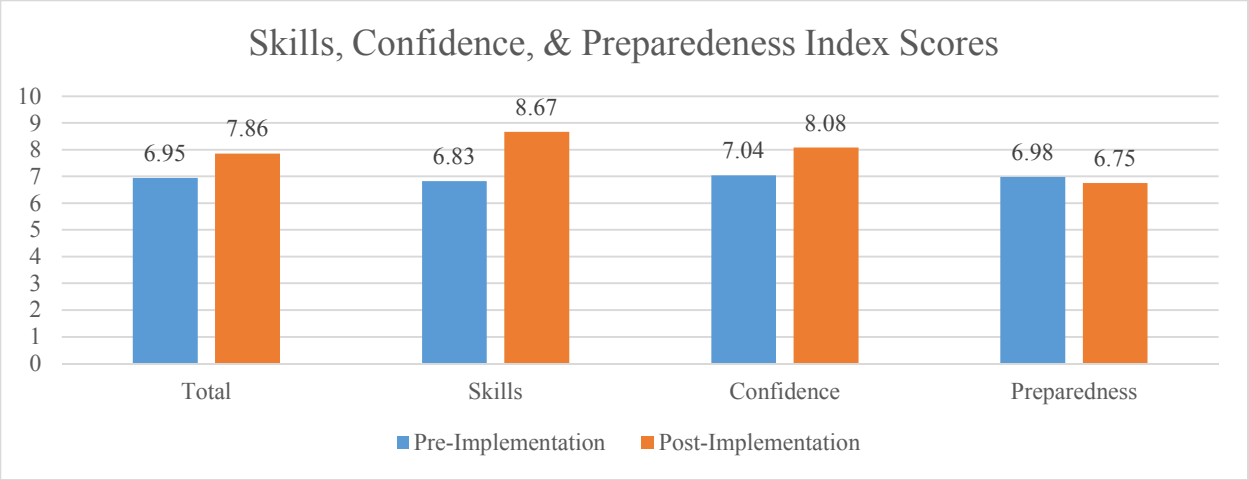

Figure 15. SCPI pre and post-implementation results.

Client Satisfaction Surveys

The Client Satisfaction Survey included in the Type 2 Diabetes Basics Curriculum package, was administered to the DSME participants after each DSME session (Appendix L). There were six participants for the first session. After the first session, one participant dropped out of the DSME service. Attendance for the second and third sessions were down as a result of absenteeism due to sicknesses. During the fourth and final session, five of the original six participants attended. The Client Satisfaction Survey was comprised of fill-in the blank questions, yes-no questions, and ranking questions.

The first questions on the Client Satisfaction Survey, "What did you learn today?". The question allowed the participants to fill-in their comments to the question. The participant's responses are listed in the table below.

Table 7

Qualitative Feedback on What the Participants Learned During Each Session

Session 1
"Dieting"
"More understanding of how insulin works"
"It opened my eyes on a lot of stuff"
"Medicines & affects, type 1 diabetes explained"
"Learned about glucose, insulin and cell doors"
"Symptoms, causes cell, glucose, inhibitors, and healthy eating"
Session 2
"About using my insulin when sick."
"Eat slowly so you don't over eat"
"Mindful eating, hunger scale, effects of stress, and glucose levels"
Session 3
"We had a lot of individual questions answered that the group was interested in."
"How the diabetes and heart disease are connected."
"Learn what eat the foods to maintain good health."
"Hypertension issues and complications. Diet concerns."
Session 4
"A lot"
"I learned how alcohol can affect diabetes – the interaction of medicine and alcohol."
"It's just good to review diabetes information."
"Different effects that various activities can play on the body. Rest, alcohol, etc."
"Not to feel overwhelmed/burnout."

The second question was "Did the information about managing your diabetes and blood glucose levels meet your needs and expectations?." The question was yes-no and prompted if answering yes, explain how and if answering no, explain what needs to be improved. The following figure and table display the DSME participant's responses.

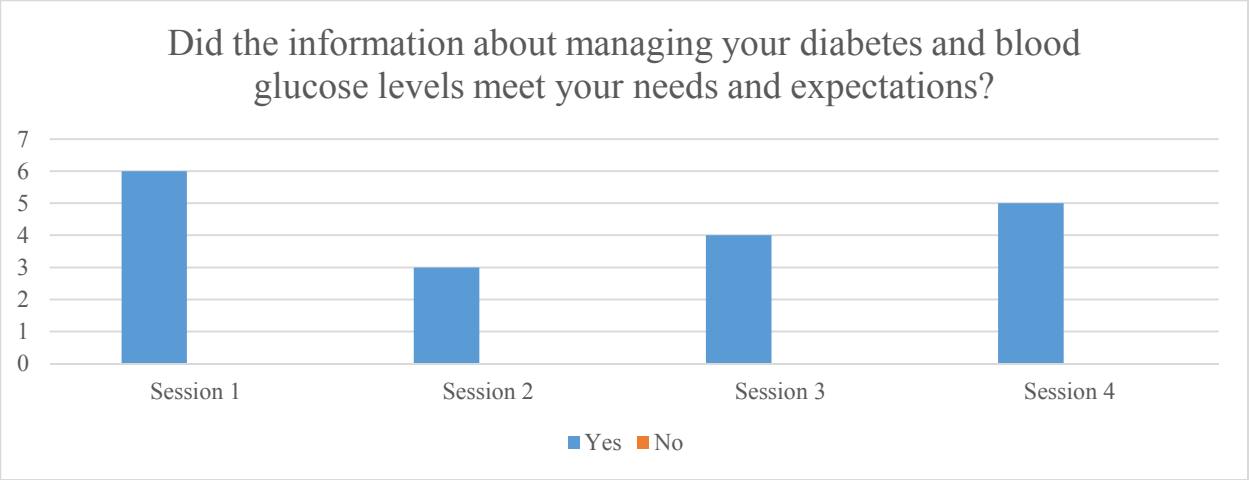

Figure 16. Information on managing diabetes and blood glucose levels met expectations.

Table 8

Qualitative feedback on how expectations were met in managing diabetes and blood glucose

Session 1
"To adjust the food, you should be eating"
"A lot of new knowledge"
"A reminder of plate division"
Session 2
"Use your strips, make health choices"
Session 3
"Increased knowledge is always welcome"
"Excellent, the way to control diabetes"
"I feel this is getting more in depth with the info and the interaction between everyone"
Session 4
"Awareness"
"Covered all areas"

The third question on the Client Satisfaction Survey was, "Did the information about food planning and activity meet your needs and expectations?" The question was yes-no and prompted if answering yes, explain how and if answering no, explain what needs to be improved. The following figure and table display the DSME participant's responses.

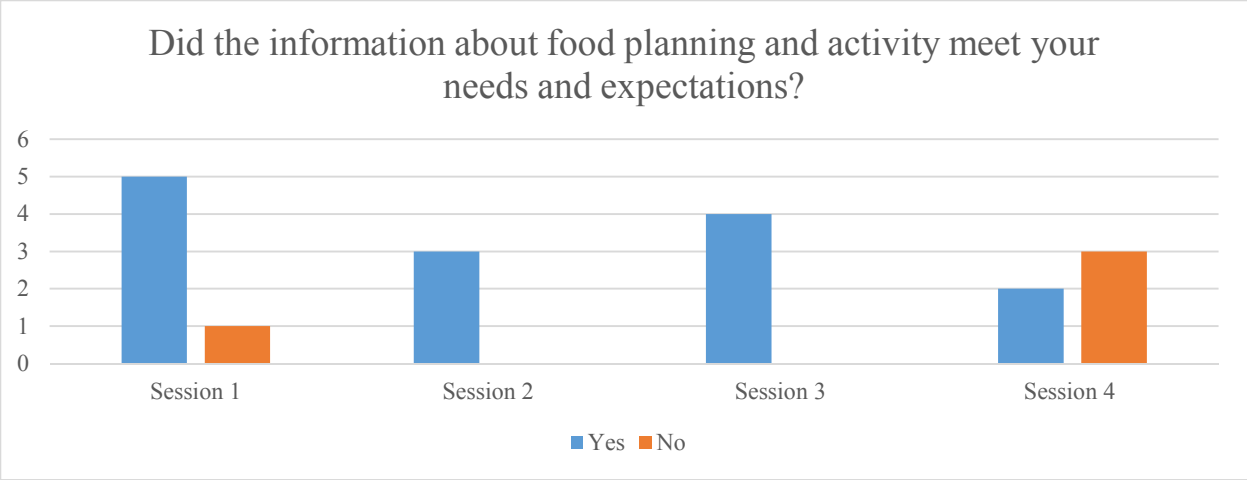

Figure 17. Did the information about food planning and activity meet your needs and expectations?

The level of satisfaction on whether the participant's needs and expectation were met on food planning and activity varied from week to week. Respondents provided the following remarks in table 9 on how it met their expectations and in table 10 on what needs improvement.

Table 9
Qualitative feedback on how expectations were met on food planning and activity

Session 1
"Explaining how much to eat, what portions take"
"Not typical conversation for me on a normal basis"
Session 2
"Plan ahead"
Session 3
"I am single and food knowledge and effects are very important"
"Having the daily logs and going through them"

Table 10
Qualitative feedback on improvement of food planning and activity

Session 1
"I'd like to know more concerning starchy veggies"
Session 4
"I'd like more on meal planning"
"I feel more time with nutrition is very important"
"We need more time talking of nutrition"

The fourth question asked the participants to rate the overall program content. The rating was on a scale from excellent to poor. The participant's responses are displayed in figure 18.

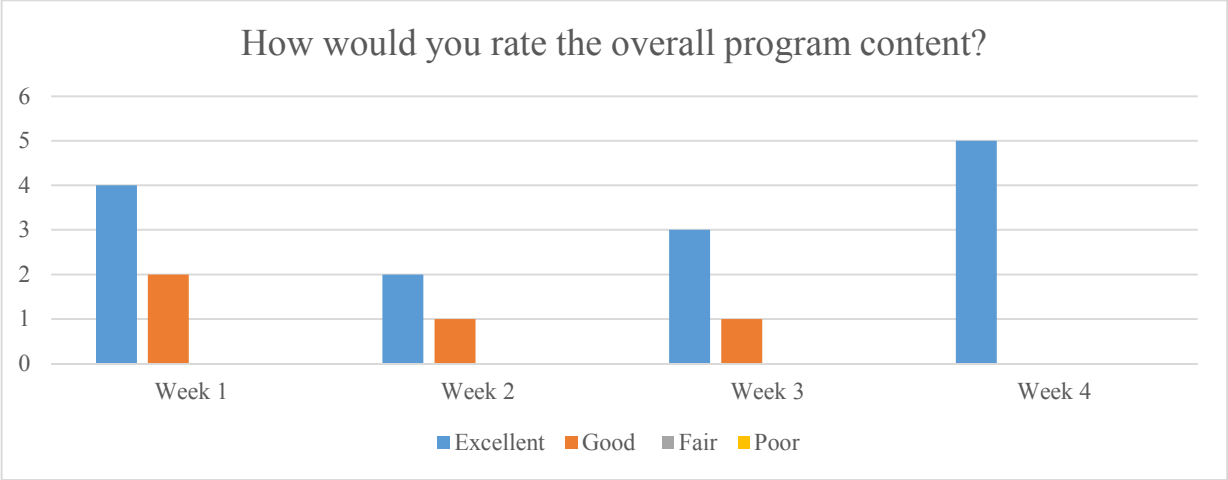

Figure 18. Rating of program content.

The fifth question asked the participants if they would recommend the education program to others with diabetes. The question was yes-no with the opportunity to provide comments on why or why not. The participant's responses to the question are displayed in figure 19 and the comments provided displayed in table 11.

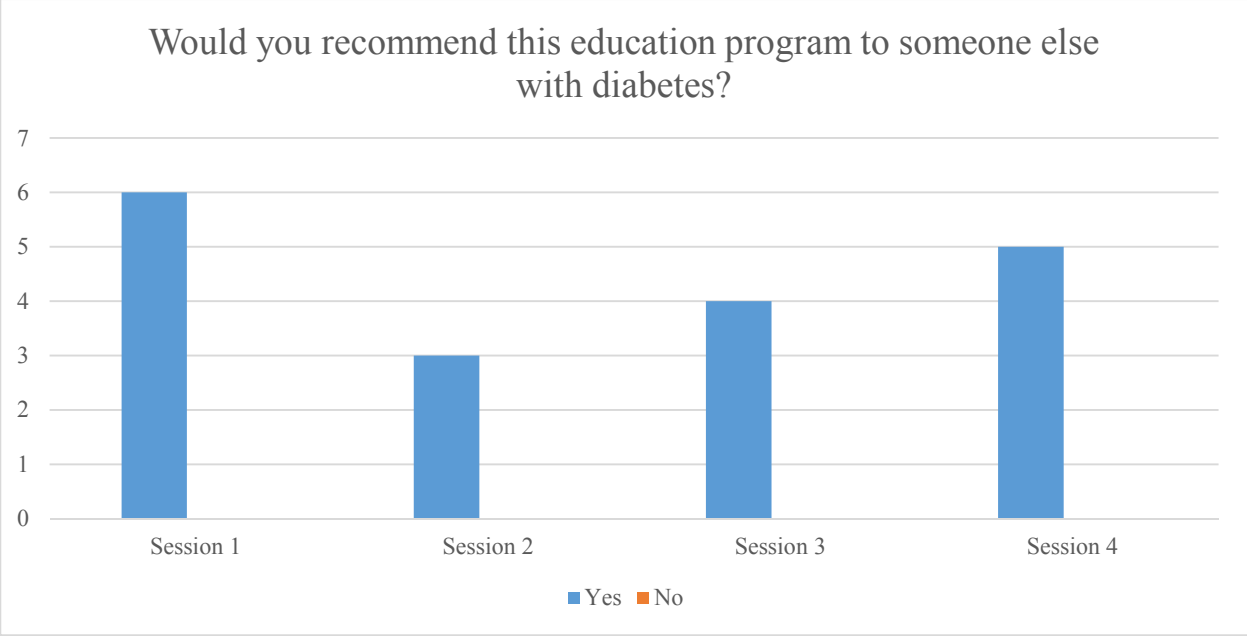

Figure 19. Recommendations of program to others with diabetes.

Table 11
Qualitative Feedback on Recommending Program to Others with Diabetes

Session 1
"To help prevent diabetes before gets to bad"
"Very educational, presenters are awesome"
"A wealth of information discussed"
Session 2
"Great support system, answers to questions/many ideas"
"There is a lot of information that is worth hearing more than once"
Session 3
"Increased knowledge is always good to help with the disease"
"It has so much info, 4 weeks is not a long enough to get really in depth on some things"
"Informal, with a lot of my questions answers without having to talk to a doctor"
Session 4
"This was a very casual informative program. There was a lot of information given."
"It was a comfortable group"
"Education is huge so you can deal with the disease"
"Great information and positive support"

The sixth question asked the participant to rate their feelings of control over their diabetes. The participants rated their diabetes during each session. The rating scale was from 1 – "I do not feel in control of my diabetes" to 5 – "I feel I can successfully live with my diabetes." The participant's responses are displayed in figure 20 below.

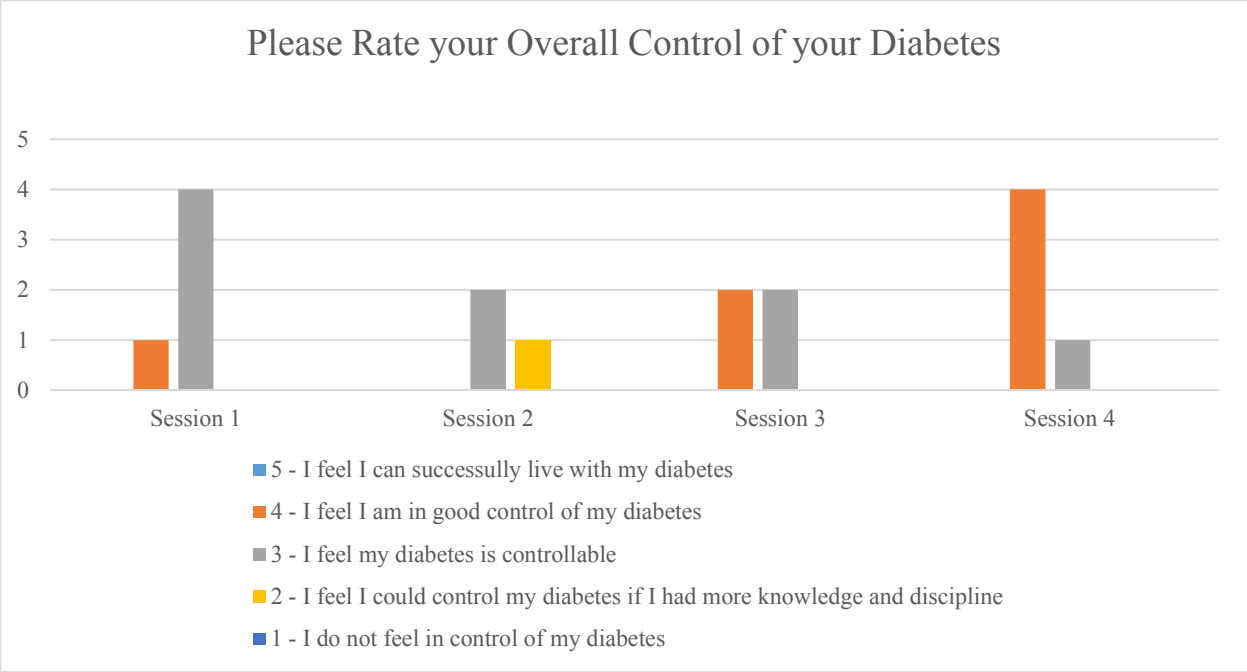

Figure 20. Rate of overall control of diabetes.
One participant did not answer the question on the pre-implementation survey.

The last question of the session survey asked the participants to describe in their own words how their diabetes has changed since the last DSME visit. The question was open-ended allowing the participants to write in their responses. The participant's qualitative feedback is listed in table 12 below.

Table 12
Qualitative Feedback on how the Participant's Feelings of Diabetes have Changed Since the Last Visit.

Session 2
"Somewhat frustrated with myself, great support." "I think I can have more control of it, it feels more manageable."
Session 3
"The more you know the more it helps a person deal with it. I am amazed at how everything with diabetes ties into other areas and how that can complicate the body."
Session 4
"I feel I can make the necessary changes. This class reinforced the things I had heard and learned in the past. Through this class I can take control of my life." "That is manageable but have to make the necessary changes to adapt your body." "I've recently been ill and that has had an effect on my confidence in managing my diabetes."

CHAPTER 6. DISCUSSION AND RECOMMENDATIONS

Interpretations of Results

The purpose of the practice improvement project was to establish a comprehensive DSME group service at RVH, which is consistent with the *Standards of Medical Care in Diabetes - 2018* and the *Standards of Medical Care in Diabetes – 2019*, released in December 2018 set forth by the ADA (ADA, 2018a; ADA, 2018d). The creation of the DSME service was to improve the skills, confidence, and preparedness in the self-management of patients diagnosed with T2D in order to improve patient outcomes and quality of care. The practice improvement project was structured using the Chronic Care Model and Model for Improvement to help provide a functional and sustainable DSME service. The overall goal of the practice improvement project is to have RVH continue the group service after the conclusion of the practice improvement project. The results of the practice improvement project's objective are discussed and interpreted below.

Objective One

The first objective of the practice improvement project was to increase the senior leader's, healthcare provider's, and nursing staff's knowledge on the benefits of DSME and elicit their support in referrals to the DSME group service in the T2D patient population by the end of the co-investigator's presentation. The objective was met by the co-investigator giving a PowerPoint presentation on DSME and administering a pre-implementation survey (Appendix C). The co-investigator then presented the findings of the pilot DSME service to each cohort upon completion of the pilot DSME service implementation period and administered a post-implementation survey to identify support for refers in the future the DSME service.

Overall, each cohort displayed satisfaction with the diabetic education provided at RVH and thought the DSME service would augment the services already available to the T2D patients. The cohorts also largely agreed that the DSME participants would benefit from positive outcomes, improvement in their knowledge, confidence, and preparedness to manage their diagnosis, in addition to improving quality numbers and reimbursement rates. The senior leader cohort added that the service would be marketable to the organization's patient population and profitable by increasing quality numbers and providing the opportunity for reimbursement.

The provider and nursing cohorts displayed mixed reviews on their thoughts having enough time to provide comprehensive diabetic education to T2D patients. Although, mixed reviews were provided by the RVH cohorts looking at feedback from the DSME participants a response indicated that ten hours of DSME education was not enough time to go in-depth with all the education. The perception of the DSME participants could also indicate that there is not enough time during office visits to provide comprehensive DSME education indicating a need for referrals and utilization of the DSME service.

The RVH cohorts pre and post-implementation surveys indicated strong support for referrals by providers and the likelihood providers would refer to the DSME service. The providers, although they were in favor of referring patients to the DSME service, indicated they would like to extend time to see the effectiveness of the service in their practice on a larger scale with RVH's patient population. The indication of wanting further time to see the full benefits of the service could be skewed due to only having five providers at the pre-implementation education where the benefits of DSME were described. The nursing staff cohort felt that the T2D patients would benefit from the DSME service, however felt limited in their role not being

able to provide a referral themselves or receiving kickback from providers in suggesting a referral for a T2D patient. The referral process was tied into the second objective.

Objective Two

The second objective was to establish a referral system to the DSME service within the electronic health record already utilized at RVH to secure participants of the pilot DSME service by the time of the co-investigators presentation. The goal was met by the establishment and education of the electronic referral. The number of referrals was not as favorable as the co-investigator had anticipated. Although, one referral was received by the dietitian that was not requested by the RN Health Coach. The low number of referrals could be associated with the low attendance rate at the provider pre-implementation educational PowerPoint presentation that included the education on the DSME service and referral process. Another factor could be the short timeframe from the pre-implementation education to the implementation of the pilot DSME service. It is anticipated that referrals would increase in the future through familiarity of the service and potential marketing of the service.

Objective Three

The third objective was to show an increase in DSME participant's skills, confidence, and preparedness to self-manage their diabetes by the end of the DSME pilot service. The third objective was met by the DSME participants completing the Type 2 Diabetes Basics curriculum through attending the four DSME sessions. Achieving the objective was made possible by the support, time and effort put in by RVH's dietitian and RVH Health Coach. The two RVH staff who teach the Prevent Type 2 Diabetes classes at the organization took on the role of learning and teaching the "Type 2 Diabetes Basics" curriculum to the DSME participants. The goal was met by interpreting the SCPI scores and by looking at the participant's responses to "Please rate

your overall control of your diabetes" on the Client Satisfaction Survey. The groups' pre-implementation and post-implementation scores from the SCPI included the total: 6.95 increasing to 7.86; skills subset: 6.83 increasing to 8.67; confidence subset: 7.04 increasing to 8.08; and preparedness subset: 6.98 decreasing to 6.75. Aronson et al. (2017) correlated a score of 6.7 or less on the total, skills, or confidence subscales with poor glycemic control and it could be anticipated the higher the scores on these scales would indicate improved glycemic control and a lower the A1c. Although the groups' score did not display poor glycemic before starting the DSME service, it was positive to see the total, skills, and confidence scores increase through the completion of the curriculum indicating the potential for increased glycemic control and lower A1c scores. The preparedness subscale has not been found to correlate to current A1c control but was found to be more reflective of the potential change in A1c in the future (Aronson et al., 2017). The preparedness subscale decreased slightly, however possible factors contributing to the decrease could have been increased realization of the lack of preparedness after completing the DSME sessions, the participant who dropped out of the service, or the absenteeism of certain participants due to illness. The participant's responses to the question "Please rate your overall control of your Diabetes" on the Client Satisfaction Survey increased from a majority of the class responding "3 – I feel my diabetes is controllable" to majority of the responding, "4- I feel I am in good control of my diabetes" (Appendix L). The scores from the SCPI and the Client Satisfaction Survey display how the third objective was met by the DSME participants completing the Type 2 Diabetes Basics Curriculum.

Objective Four

The fourth objective was to promote sustainability of the DSME service at RVH by the completion of the practice improvement project. The fourth objective was met by receiving both

quantitative and qualitative feedback. The data were obtained from the RVH cohorts pre and post-implementation surveys particularly the questions regarding the barriers of the DSME service and suggestions for improvement of the DSME service and referral process. In addition, to the Client Satisfaction Survey completed by the DSME participants. The goal of the fourth objective was to identify the participant's perceptions on the DSME service and used to provide the organization recommendations for the future of the DSME service.

The barriers identified on the RVH cohorts pre and post-implementation surveys were consistent with the barriers identified in the literature review. Common themes identified on the pre and post-implementation surveys as patient barriers to the DSME service include compliance, time constraints, and transportation. Transportation listed as a barrier highlights that some staff are unaware of the free transportation services RVH offers to patients who live within city limits to and from the clinic. The one common theme identified for staff barriers was the willingness of providers to refer to the DSME service. Provider support in referring to the program was also identified on the suggestions for improvement in addition to the offering other means of delivery of the DSME service such telehealth options for those where travel and transportation are a barrier to attendance. Other suggestions for the future of the DSME service from the RVH cohorts include marketing the service and offering more class times.

The DSME participants also displayed support for the future of the DSME service at RiverView Health. Throughout the DSME service, 100% of the DSME participants replied that they would recommend the education program to someone else with diabetes. The common themes identified in the qualitative feedback include comprehensive information, great support system, and comfortable group setting. Lastly, one suggestion for the future of the service was that four weeks was identified as not enough time to get in-depth with some of the information.

The perceptions received from the RVH cohorts and DSME participants was valuable information in providing recommendations for the future of the DSME service at RiverView Health.

Project Limitations

Throughout the implementation of the practice improvement project and upon reflection there were several limitations identified by the co-investigator. The first limitation identified time was the short time period from the provider and nursing staff's education session to start of the DSME classes for referrals. The educational sessions were presented at a later date than initially anticipated due to vacations and full staff meeting schedules. The education sessions for the providers and nursing staff were presented in mid-late September, and the DSME pilot service started late November. The six-week timeframe between the educational session and the start of the DSME pilot service could have been a contributing factor to the low number of referrals to the service. Another contributing factor to the low utilization of the electronic referral could be correlated to the low attendance of the providers at the provider educational luncheon. There were only five participants out of the twelve healthcare providers at the clinic who attended the educational luncheon and completed the pre-implementation survey versus ten who attended the provider monthly staff meeting and completed the post-implementation survey. The co-investigator was unable to present the pre-implementation educational PowerPoint at the provider's monthly staff meeting in September due to a full agenda. The organization had also taken the summer months off from staff meetings and waiting until the November staff meeting would not have been conducive with the implementation of the pilot DSME service starting the end of the month.

The pre and post-implementation surveys administered to the RVH staff were not tested for validity and reliability like the SCPI and Client Satisfaction Surveys, creating a limitation to the project. The pre and post-implementation surveys although similar were not the same, therefore comparing the pre and post-implementation responses for some questions were not available. Additionally, all the surveys, pre and post-implementation, SCPI, and Client Satisfaction Surveys, were not coded. If they were coded, it would have allowed for individualized interpretation and further correlation of each question throughout the progression of the practice improvement project.

There were a few limitations with the participants. The first being the limitation of the nursing staff credentials. Medical assistant was not included on the IRB application, therefore some participants had to be excluded from the RVH nursing staff pre and post-implementation surveys. The age range of the DSME participants on the IRB application also led to having to exclude a participant. The demographic data would have been amended on the IRB application to include the above participants increasing the participation rate. There were also unforeseen illnesses of the DSME participants, which created some absenteeism throughout the course of the service. The absenteeism could have had an overall effect on the results obtained from the Skills, Confidence, and Preparedness Index. The co-investigator was also not able to correlate the DSME participants A1c levels pre and post-participation in the DSME pilot service due to not having IRB approval and it was not asked for due to HIPPA with RVH. The co-investigator could have had the DSME participants self-report their A1c before the DSME service and then again at their next scheduled diabetic appointment after the service. The results would have been beneficial to bring to the RVH stakeholders to show first-hand the results of patient's with T2D

participation in a DSME service. In hindsight, the co-investigator could have addended the IRB application to ask for permission to collect retrospective data of the DSME participants A1c.

Recommendation for Site Project

The co-investigator recommended RVH continue the DSME service, which is also strongly supported by the dietitian. The results of the RVH cohorts' surveys indicate strong support for the service and the ability of the DSME to fill a gap in their current diabetic education provided. The ADA's latest *Standards of Medical Care in Diabetes – 2019* continues to recommend DSME to all T2D patients with evidence supported by well-conducted cohort studies (ADA, 2018d). Following the recommendations for medical care in diabetes, providers should encourage their patients to participate in and refer their patients to the DSME service, which is cost effective and will assist T2D patients to achieve their A1c goals and decrease diabetes-related complications (Chrvala, Sherr, & Lipman, 2015).

The patient's participation in DSME could also have the potential of assisting the providers in meeting the quality diabetes measures for optimal diabetes care. The quality measures are driven by MN Community Measurement, which empowers community driven data to improve health care costs and quality (MN Community Measurement, 2018). The measures for optimal diabetes care, according to MN Community Measurement (2018), includes assisting patients in achieving all of the following:

- A1c less than 8.0mg/dL
- Blood pressure less than 140/90mmHg
- Use of statin medication, unless contraindicated
- Smoking cessation

- Use of daily aspirin or antiplatelet therapy with history of ischemic vascular disease, unless contraindicated

Reimbursement from CMS is also driven by quality indicators, which is another reason for providers to support the program.

The recommends for the DSME sessions includes a variety of considerations. The pilot DSME service was offered on Mondays afternoons in a group setting. Monday afternoons were chosen by the DSME participants, which fit best into their schedules. There was positive feedback on the group setting of the DSME service from the Client Satisfaction Surveys. One hundred percent of the participants of the pilot DSME service reported they would recommend the service to other with type 2 diabetes. The DSME service could benefit from additional session times such as night or early morning sessions or even weekend sessions to reach a wider variety of patients as not all patients are able to take time off during the day if working to attend educational sessions. The pilot DSME sessions were two and a half hours each week for four weeks. Comments made by the DSME participants and the dietitian and RN Health Coach suggest that the current length of time was not long enough to be able to go in-depth on all topic areas. Although ten hours of initial DSME is reimbursable by CMS, that may not be individualized care for all patients and longer class times or extending the service to more than four weeks may be beneficial depending on the patient's individualized needs (Powers et al., 2015).

The organization may also need to consider involving more personnel to teach the DSME sessions to allow for greater flexibility in scheduling since the pilot sessions were limited to the time offered due to the RN Health Coach's schedule. There also was no marketing done for the DSME sessions since the initial class was a pilot run for the service. The organization may

benefit from receiving increased interest in the service if marketing both internally within the organization and externally in the community and surrounding communities served by RiverView Health.

RiverView Health may also want to consider additional methods of delivery due to the rural setting of their clinic and the large territory they serve. In the small sample of the DSME participants, two of the individuals traveled ten to twenty miles to sessions each week. The dietitian and RN Health Coach have recently expanded the offering of the Prevent Type 2 Diabetes classes to outlying communities at the organization's outreach clinics. The dietitian has expressed interest in offering the DSME service in these communities in conjunction with the Prevent Type 2 Diabetes classes. Transportation was a common theme brought on the pre and post-implementation surveys as a barrier for the DSME participants. A refresher to the staff that RVH offers transportation through Tri-Valley Opportunity counsel, which is free to the patient in town and out of town patients are eligible to apply for coverage through their insurance companies. Another avenue that the organization could consider includes expanding the method of delivery from didactic brick and mortar setting to the use of digital technology such as using Skype or other means of communication may be beneficial to individuals who do not have the ability to travel to the clinic every week or for those who need a flexible schedule.

A common theme in the qualitative feedback from the DSME participants on the Client Satisfaction surveys was more information on the topic of nutrition. Healthy eating is one of the seven self-care behaviors to successful self-management of diabetes (Beck et al., 2017). Determining what to eat, developing, and following an individualized meal plan can be one of the most challenging aspects of diabetes self-management (ADA, 2018d). The ADA's *Standards of Medical Care in Diabetes – 2019* recommends that all T2D patients be offered a

referral to Medical Nutrition Therapy (MNT) with a registered dietitian (ADA, 2018d). RiverView Health's dietitian is actively involved in diabetes education, therefore encouraging providers to follow the *Standards of Medical Care in Diabetes – 2019* and utilize the DSME service and MNT would be most beneficial to their T2D patients.

The nursing staff and senior leaders brought forth concerns regarding providers placing referrals to the DSME service in the pre and post-implementation surveys. The providers also mentioned they would see more analytics on a larger data set to see the full benefits of the service in the patients they serve. Additional education on DSME, may be beneficial to the providers as the literature supports and recommends the service for T2D patients. A larger data set within the organization can only take place if providers continue to refer patients to the DSME service. The co-investigator would recommend that the organization continue to utilize the electronic referral within the EHR as it takes less than one minute to complete and is a streamlined process of the referral then automatically drops into the dietitian's inbox for follow-up. RiverView Health could consider making the referral a standing order to allow the nursing staff to place referrals to the DSME service if the patient meets one of the four critical times for referral that is then cosigned by the provider. Edwards, Davies, Ploeg, Virani, and Skelly (2007) indicate that nurses are in a position to play a vital role in initiating and supporting referrals for patients to appropriate services when following best practice guidelines. The nursing staff are the front-line staff and are well positioned to educate patients on referral resources, therefore allowing them to be advocates for the DSME service could have the potential to expand the coverage to the T2D patients at RiverView Health (Edwards et al., 2007). The organization could also consider creating a best practice alert (BPA) within the EHR. The BPA could alert the providers and nursing staff of a new diagnosis of T2D or when a patient's A1c is out of

range. The BPA could then prompt the provider then could refer the patient to the DSME service, MNT, or defer the alert. The BPA would act as a reminder and assist in capturing all patients who may benefit from the DSME service and/or medical nutrition therapy.

Implications for Practice and Future Research

The practice improvement project impacted the lives of the T2D patients who completed the pilot DSME service and they will benefit from the positive effects of completing the sessions. The positive outcomes identified, and the program recommendations may be beneficial to other organizations planning on starting a DSME service, especially in those in a rural setting. The practice improvement project is also be an addition to the current literature on DSME services available. Through completing the pilot DSME sessions, the organization has the ability to apply for accreditation through the American Diabetes Association, which is planned and supported by the dietitian. RiverView Health's ability to be accredited will allow them to bill for the DSME service and receive reimbursement for the education they provide to their T2D patient population. Accreditation will support the longevity of the service within the organization. RiverView Health can also expand the offering of the program to patients of other healthcare organizations in their community and surrounding areas.

There are other avenues for future research by nursing scholars on diabetes self-management education. A gap identified in the literature was the effectiveness other avenues of delivery of DSME besides an individualized approach or group setting. The future of medicine is taking a turn towards telemedicine in rural areas and interactive group visits. Another scholar could identify how to implement DSME into telemedicine or other modalities of the delivery of the educational material and the effectiveness of these alternative methods.

The practice improvement project was and is planned to be disseminated to an array of audiences in the form of a poster presentation and three-minute video. The first poster presentation displayed the initial project design and took place in April 2018 at the North Dakota State University's (NDSU) School of Nursing Poster Presentation. A second poster presentation is planned to display the project's analysis and results in April 2019 at NDSU' School of Nursing Poster Presentation. The co-investigator will also create a three-minute video that will give a non-technical language synopsis of the practice improvement project. North Dakota State University has an online repository in which the video will be kept, allowing other students or NDSU faculty to access the video if they are interested in the topic or project itself. Lastly, the co-investigator plans to submit an article reflecting the manuscript of the practice improvement project to a journal for publication.

Applications to the Doctor of Nursing Practice Roles

A doctorally prepared nurse practitioner poses many roles, which includes but is not limited to scholar, advocate, educator, leader, innovator, and clinician. The co-investigator applied these roles throughout the implementation of the practice improvement project. Scholarly work was performed by the co-investigator performing a thorough literature review identifying evidence-based practice for diabetes self-management education for T2D patients. The practice improvement project was also disseminated through a poster presentation and the co-investigator plans to disseminate through a three-minute video and publication in a journal. Advocacy and educator were demonstrated through increasing the awareness for the need of DSME in rural areas and increasing the knowledge of others on DSME through poster presentations and presenting to the RVH cohorts. The co-investigator displayed leadership and interprofessional collaboration by collaborating with colleagues at RVH to identify an area

where improvement was needed and provided an evidence-based solution to the organization's gap in diabetic education. A group setting for DSME was an innovative approach to reaching a large number of patients cost-effectively by utilizing the resources of the rural Minnesota health clinic. The co-investigator's future role as a clinician will be essential to continue to advocate for DSME service for patients living in rural areas and collaborating with other healthcare professionals to meet to needs of T2D patients.

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APPENDIX A. CONSENT TO USE ORGANIZATION'S NAME

3/30/18

Dear Samantha,

Thank you for your proposal to help us develop and implement a DSME (Diabetes Self-Management Education) program at RiverView Health.

You have permission to use "RiverView Health" and the RiverView Health logo when referring to our facility in your proposal and dissertation.

Thank you,

Amy Seaver RN

Amy Seaver, RN

Director of Clinics

323 South Minnesota Street | Crookston, MN 56716 | p: 218.281.9200 | f: 218.281.9222
www.riverviewhealth.org

APPENDIX B. ORGANIZATION'S LETTER OF COLLABORATION

RIVERVIEW HEALTH
Exceptional People. Exceptional Care.

1/31/18

Dear Sam,

Thank you for your proposal to help us develop and implement a DSME (Diabetes Self-Management Education) program at RiverView Health. We currently see patients with Type 2 Diabetes on an individual basis. Based on research, we know that DSME programs significantly improve A1c control and empower patients to make informed knowledge-based decisions regarding their diabetes management.

Your project fits our desire at RiverView to make our community a healthy place to live, learn and work. We look forward to partnering with you to bring an accredited DSME program to the communities that RiverView Health serves.

We look forward to working with you!

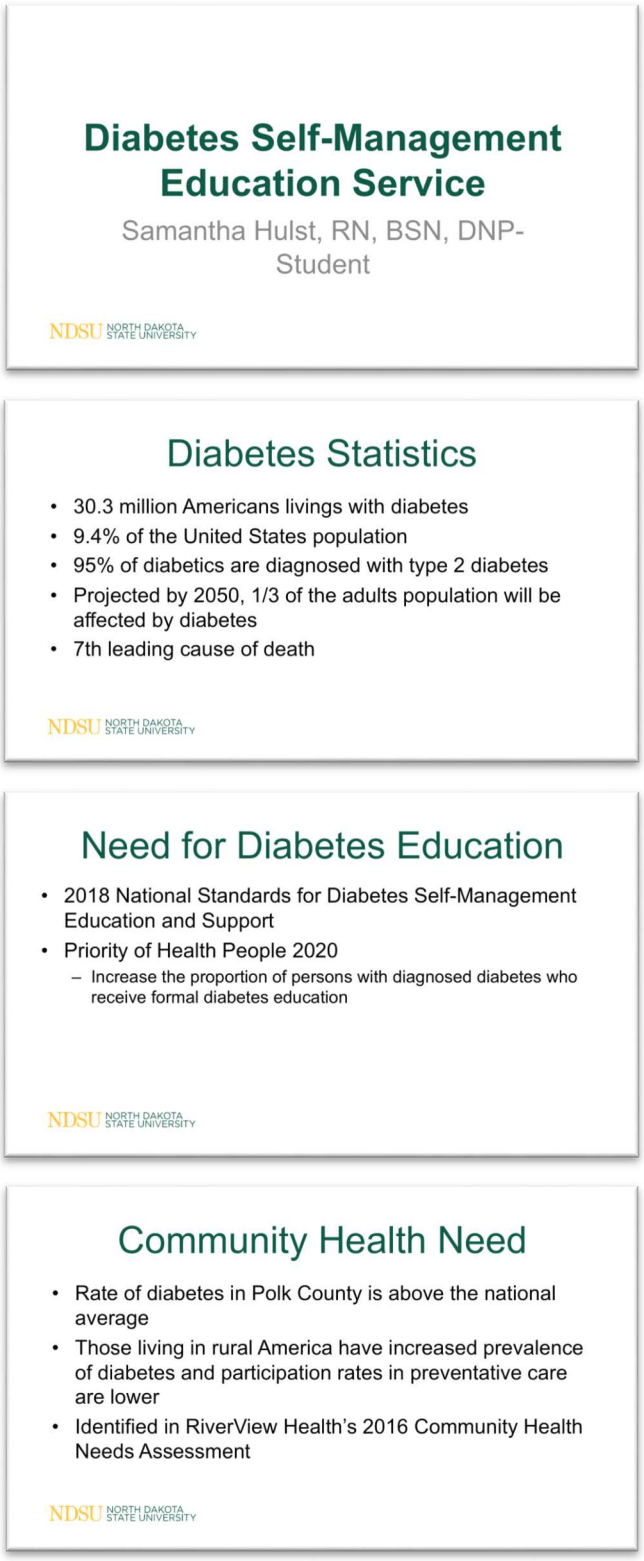
With thanks,

Amy Seaver, RN
Director of Clinics

Darcey Larsen, RD LD
Registered Dietitian

323 South Minnesota Street | Crookston, MN 56716 | p: 218.281.9200 | f: 218.281.9222
www.riverviewhealth.org

APPENDIX C. POWERPOINT PRESENTATION



Diabetes Self-Management Education (DSME) Definition

- "The ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes care
- This process incorporates the needs, goals, and life experiences of the person with diabetes or prediabetes and is guided by evidence-based research
- The overall objectives of DSME are to support informed decision making, self-care behaviors, problem-solving, and actively collaboration with the health care team and to improve clinical outcomes, health status, and quality of life" (Power et al., 2015, p. 71).

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Benefits of Diabetes Self-Management Education

- Improvement in Hgb A1c
- Reduction in or delayed onset of diabetic related complications
- Positive effects on psychosocial and behavior related to diabetic management
- Reduction in healthcare costs

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Underutilization of DSME

- 50-80% of diabetics display knowledge deficits regarding the management of their disease
- Recent studies have shown that less than 7% of individual on private insurance and less than 5% covered by Medicare have participated in DSME upon diagnosis

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Barriers

Patient

- Denial, feelings of loss of control, time constraints
- Inappropriate timing of referral
- Lack of social support, transportation, lack of fresh produce, lower socioeconomic status
- Financial barriers

Provider

- Misunderstanding and effectiveness of DSME
- Burdensome referral process

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Demands of diabetes

Time consuming and complicated

Partner with the healthcare team

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Critical Times to Refer to DSME

1. At diagnosis
2. Annually upon assessment of their educational, nutritional or emotional needs
3. During time of new complicating factors that affect self-management
4. Lastly during times of transitions in care including living situation, medical team, insurance coverage, or age-related changes

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Conclusion

- Establish a functional and sustainable DSME service
- Improve patient health outcomes and quality of care
- Improve diabetes self-management behaviors

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APPENDIX D. SKILLS, CONFIDENCE, AND PREPAREDNESS INDEX

LMC Diabetes Skills, Confidence & Preparedness Index (SCPI)

Answer the following questions on a scale of 1-10 (1= very little and 10= a lot). Please do this by drawing a line on the scale where you see yourself for each question.

1. I am able to portion out and choose foods that have the optimal balance between carbohydrates, proteins and vegetables to help keep my blood sugars in target.

   1 (very little) 10 (a lot)

2. I know how my diabetes insulin or medication works in my body and at which time of day I should check my blood sugars to make sure my dose is correct.

   1 (very little) 10 (a lot)

3. I feel confident that I can plan balanced meals and snacks effectively.

   1 (very little) 10 (a lot)

4. If I miss a dose of my insulin or medication, I know how my body will react and the steps to take to get back on track.

   1 (very little) 10 (a lot)

5. When I am planning to exercise, I know what changes I need to make to avoid a low blood sugar before, during, and after exercise.

   1 (very little) 10 (a lot)

6. I am confident that I can implement stress management techniques into my lifestyle.

   1 (very little) 10 (a lot)

7. I know when to check my blood sugar if I want to see how my body reacted to a meal.

   1 (very little) 10 (a lot)

8. When I am sick, I know what to do differently with my medications, fluid intake, food intake, blood sugar testing, and when to go to the hospital.

   1 (very little) 10 (a lot)

9. I intend to start planning and eating balanced meals and snacks starting next week.

   1 (very little) 10 (a lot)

10. I know how to identify stress in my life and how it can impact my diabetes management & overall health.

    1 (very little) 10 (a lot)

11. I'm confident that I can plan ahead for what to do, and how to react, either before, during or after exercise to avoid a low blood sugar.

    1 (very little) 10 (a lot)

12. When I look at my blood sugars in my meter or in my logbook in a given week, I could explain to my diabetes educator or doctor what my blood sugar pattern is.

    1 (very little) 10 (a lot)

13. I plan to choose an activity and begin incorporating it into my schedule in the coming week.

    1 (very little) 10 (a lot)

14. I am confident that at the next time I am eating out of my home, I will be able to plan and select the foods that best keep my blood sugars under control.

    1 (very little) 10 (a lot)

15. I plan to start using my blood sugar levels to make changes to my diet and/or insulin starting next week.

    1 (very little) 10 (a lot)

16. I am confident that I can choose a healthy activity for me and include it into my schedule.

    1 (very little) 10 (a lot)

17. I plan to start making a list of stress management techniques which will work for me in the upcoming week.

    1 (very little) 10 (a lot)

18. I am confident that I can adjust my insulin or medication doses, on my own, to reach the target blood sugar levels.

    1 (very little) 10 (a lot)

19. I am confident that I can commit to preventing and monitoring my diabetes complications such as seeing my eye doctor at least once a year and checking my feet on a daily basis.

    1 (very little) 10 (a lot)

20. I plan to start adjusting my insulin or medication doses on my own starting next week.

1 (very little) 10 (a lot)

21. I am confident that I will use my blood sugar results to make changes to my diet and/or insulin to help keep my blood sugars in target.

1 (very little) 10 (a lot)

22. I know what the ABCs (A1c, Blood Pressure, and Cholesterol) of Diabetes are, what my targets are and how they impact my diabetes.

1 (very little) 10 (a lot)

23. I plan to start looking for patterns in my meter or logbook starting next week.

1 (very little) 10 (a lot)

24. The next time I am sick, I will make the necessary changes to my medications, insulin and/or eating depending on my blood sugars.

1 (very little) 10 (a lot)

25. With my next exercise, I am going to make a plan to reduce the chance of a low blood sugar, or to react with a good response if I do have a low blood sugar.

1 (very little) 10 (a lot)

APPENDIX E. SENIOR LEADER'S PRE-IMPLEMENTATION SURVEY

1. Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?
    a. Very satisfied
    b. Somewhat satisfied
    c. Neither satisfied nor dissatisfied
    d. Somewhat dissatisfied
    e. Strongly dissatisfied

    Please explain your response.
2. Do you anticipate patients with type 2 diabetes to have positive outcomes from participating in a diabetes self-management (DSME) service?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

    Please explain your response.
3. How likely do expect the implementation of a DSME service to improve quality numbers and reimbursement rates?
    a. Very likely
    b. Likely
    c. Neither likely nor unlikely
    d. Unlikely
    e. Very unlikely

    Please explain your response.
4. What level of support do you anticipate from the healthcare providers and nursing staff in the implementation of the DSME service?
    a. Strongly in favor
    b. Somewhat in favor
    c. Neutral
    d. Somewhat opposed
    e. Strongly opposed

    Please explain your response.
5. What potential barriers do you anticipate in the implementation of the DSME service at RiverView Health? Please explain.
    Patient barriers:
    Staff barriers:
    Financial barriers:
    Time:
    Other:

APPENDIX F. SENIOR LEADER'S POST-IMPLEMENTATION SURVEY

1. Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?
    a. Very satisfied
    b. Somewhat satisfied
    c. Neither satisfied nor dissatisfied
    d. Somewhat dissatisfied
    e. Strongly dissatisfied

    Please explain your response.
2. Do you anticipate patients with type 2 diabetes to have positive outcomes from participating in a diabetes self-management (DSME) service?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

    Please explain your response.
3. How likely do you expect the continuation of the DSME service to improve quality numbers and reimbursement rates?
    a. Very likely
    b. Likely
    c. Neither likely nor unlikely
    d. Unlikely
    e. Very Unlikely

    Please explain your response.
4. What level of support do you anticipate from the healthcare providers and nursing staff in the continuation of the DSME service?
    a. Strongly in favor
    b. Somewhat in favor
    c. Neutral
    d. Somewhat opposed
    e. Strongly opposed

    Please explain your response.
5. Do you have any suggestions for improvement of the DSME service at RiverView Health? Please explain.

APPENDIX G. PROVIDER'S PRE-IMPLEMENTATION SURVEY

Gender: Male _____ Female _____

Race: Caucasian _____ African American _____ Hispanic _____
Native American _____ Other _____

What are your credentials? MD _____ NP _____ PA _____ Other _____

How many years experiences do you have working as a provider?
0-5 years _____ 6-10 years _____ 11-15 years _____ 16 + years _____

Do you regularly manage and treat diabetic patients in your current role and practice?
Yes _____ No ____

Survey Questions:

1. Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?
    a. Very satisfied
    b. Somewhat satisfied
    c. Neither satisfied nor dissatisfied
    d. Somewhat dissatisfied
    e. Strongly dissatisfied
    Please explain your response.
2. Do you feel you have enough time to provide comprehensive diabetic education to your newly diagnosed type 2 diabetic (T2D) patients or T2D patients who fail to meet goal?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.
3. Do you feel the diabetes-self management education (DSME) service will augment the education already available to T2D patients at RiverView Health?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.
4. Do you anticipate your T2D patients will have positive outcomes from participating in a DSME service?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.

5. Do you anticipate the implementation of a diabetic self-management education service will improve T2D patient's knowledge, confidence, and preparedness in the management of their diabetes?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

    Please explain your response.
6. Do you anticipate the implementation of a DSME service to improve your quality numbers and reimbursement rates?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

    Please explain your response.
7. Do you anticipate the referral process will affect your daily clinic operations?
    a. Strongly disagree
    b. Somewhat disagree
    c. Neither agree nor disagree
    d. Somewhat agree
    e. Strongly agree

    Please explain your response.
8. How likely are you to refer T2D patients to the DSME service?
    a. Very likely
    b. Somewhat likely
    c. Neutral
    d. Somewhat unlikely
    e. Very unlikely

    Please explain your response.
9. What potential barriers do you anticipate in the implementation of the DSME service and/or referral process at RiverView Health? Please explain.

    Patient barriers:
    Staff barriers:
    Financial barriers:
    Time:
    Other:

APPENDIX H. PROVIDER'S POST-IMPLEMENTATION SURVEY

Gender: Male _____ Female _____

Race: Caucasian _____ African American _____ Hispanic _____
Native American _____ Other _____

What are your credentials? MD _____ NP _____ PA _____ Other _____

How many years experiences do you have working as a provider?
0-5 years _____ 6-10 years _____ 11-15 years _____ 16 + years _____

Do you regularly manage and treat diabetic patients in your current role and practice?
Yes _____ No ____

Survey Questions:

1. Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?
    a. Very satisfied
    b. Somewhat satisfied
    c. Neither satisfied nor dissatisfied
    d. Somewhat dissatisfied
    e. Strongly dissatisfied
    Please explain your response.
2. Do you feel the diabetes-self management education (DSME) service has augmented the education already available to type 2 diabetic (T2D) patients at RiverView Health?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.
3. Do you anticipate your T2D patients will have positive outcomes from participating in a DSME service?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.
4. Do you anticipate the implementation of a diabetic self-management education service will improve T2D patient's knowledge, confidence, and preparedness in the management of their diabetes?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.

5. Do you anticipate the continuation of the DSME service will improve your quality numbers and reimbursement rates?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

    Please explain your response.
6. Do you feel the referral process has affected your daily clinic operations?
    a. Strongly disagree
    b. Somewhat disagree
    c. Neither agree nor disagree
    d. Somewhat agree
    e. Strongly agree
    f. NA

    Please explain your response.
7. How likely are you to refer or continue to refer your T2D patients to the DSME service?
    a. Very likely
    b. Somewhat likely
    c. Neutral
    d. Somewhat unlikely
    e. Very unlikely

    Please explain your response.
8. If you have referred T2D patients to the DSME service, what barriers have you experienced? Please explain.

    Patient barriers:
    Staff barriers:
    Financial barriers:
    Time:
    Other:
9. Do you have any suggestions for improvement of the DSME service and/or referral process at RiverView Health? Please explain.

APPENDIX I. NURSING STAFF'S PRE-IMPLEMENTATION SURVEY

Gender: Male _____ Female _____

Race: Caucasian _____ African American _____ Hispanic _____
Native American _____ Other _____

What are your credentials? LPN _____ RN _____

How many years experiences do you have working as a nurse?
0-5 years _____ 6-10 years _____ 11-15 years _____ 16 + years _____

Do you regularly provide education to diabetic patients in your current role?
Yes _____ No ____

Survey Questions:

1. Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?
    f. Very satisfied
    g. Somewhat satisfied
    h. Neither satisfied nor dissatisfied
    i. Somewhat dissatisfied
    j. Strongly dissatisfied
    Please explain your response.
2. Do you feel you have enough time to provide comprehensive diabetic education to newly diagnosed type 2 diabetic (T2D) patients or T2D patients who fail to meet goal?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.
3. Do you feel the diabetes-self management education (DSME) service will augment the education already available to T2D patients at RiverView Health?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.
4. Do you anticipate the T2D patients to have positive outcomes from participating in a diabetes self-management (DSME) service?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.

5. Do you anticipate the implementation of a diabetic self-management education service will improve T2D patient's knowledge, confidence, and preparedness in the management of their diabetes?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

    Please explain your response.
6. Do you feel the referral process will affect your daily clinic operations?
    a. Strongly disagree
    b. Somewhat disagree
    c. Neither agree nor disagree
    d. Somewhat agree
    e. Strongly agree
    f. NA

    Please explain your response.
7. How likely are you to encourage your provider to refer T2D patients to the DSME service?
    a. Very likely
    b. Somewhat likely
    c. Neutral
    d. Somewhat unlikely
    e. Very unlikely

    Please explain your response.
8. What potential barriers do you anticipate in the implementation of the DSME service and/or referral process at RiverView Health? Please explain.

    Patient barriers:
    Staff barriers:
    Financial barriers:
    Time:
    Other:

APPENDIX J. NURSING STAFF'S POST-IMPLEMENTATION SURVEY

Gender: Male _____ Female _____

Race: Caucasian _____ African American _____ Hispanic _____
Native American _____ Other _____

What are your credentials? LPN _____ RN _____

How many years experiences do you have working as a nurse?
0-5 years _____ 6-10 years _____ 11-15 years _____ 16 + years _____

Do you regularly provide education to diabetic patients in your current role?
Yes _____ No ____

Survey Questions:

1. Overall, are you satisfied with the diabetic education opportunities provided at RiverView Health?
    a. Very satisfied
    b. Somewhat satisfied
    c. Neither satisfied nor dissatisfied
    d. Somewhat dissatisfied
    e. Strongly dissatisfied
    Please explain your response.
2. Do you feel the diabetes-self management education (DSME) service has augmented the education already available to type 2 diabetic (T2D) patients at RiverView Health?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.
3. Do you anticipate the T2D patients to have positive outcomes from participating in a DSME service?
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    Please explain your response.
4. How likely do you anticipate the continuation of the DSME service to improve T2D patient's knowledge, confidence, and preparedness in the management of their diabetes?
    a. Very likely
    b. Likely
    c. Neither likely nor unlikely
    d. Unlikely
    e. Very unlikely
    Please explain your response.

5. Do you feel the referral process has affected the daily clinic operations?
    a. Strongly disagree
    b. Somewhat disagree
    c. Neither agree nor disagree
    d. Somewhat agree
    e. Strongly agree
    f. NA

    Please explain your response.
6. How likely are you to encourage or continue to encourage your provider to refer T2D patients to the DSME service?
    a. Very likely
    b. Somewhat likely
    c. Neutral
    d. Somewhat unlikely
    e. Very unlikely

    Please explain your response.
7. What barriers have you experienced during the implementation of the DSME service at RiverView Health? Please explain.

    Patient barriers:
    Staff barriers:
    Financial barriers:
    Time:
    Other:
8. Do you have any suggestions for improvement of the DSME service and/or referral process at RiverView Health? Please explain.

APPENDIX K. TYPE 2 DIABETES BASICS CURRICULUM OUTLINE

Session 1

- Your Feelings about Having Diabetes
- Support Systems, What is Diabetes?
- Types of Diabetes
- Diagnosing Type 2 Diabetes the A1c Test
- Type 2 Diabetes Risk Factors and Symptoms
- Type 2 Diabetes Care Plan
- Checking your Glucose
- Eating for Better Health,
- Being Physically Active
- Are you Ready to Make Changes?

Session 2

- Your Emotional Health, Stress and Diabetes
- Reviewing Your Daily Log, High Glucose and Low Glucose
- When You are Sick
- Mindful Eating for Better Health, Dining Out
- Challenges to Being Physically Active
- Weight Loss for Better Glucose Management
- Goal Setting and Working Towards Your Goal

Session 3

- Goal-Setting Checkpoint, Glucose Checkpoint, Problem Solving Using Your Records
- Glucose Patterns
- Heart Health, Blood Pressure and Heart Health
- Tobacco Use, Diabetes, and Heart Health
- Eating for Better Heart Health
- Diabetes and Alcohol
- Physical Activity and Heart Health
- Weight Loss and Heart Health

Session 4

- Diabetes Changes over Time
- Diabetes Complications
- Delaying or Preventing Diabetes Complications
- Diabetes Care Schedule for Adults
- Taking Care of Your Feet
- Getting Enough Good Sleep
- Planning for Pregnancy
- Eating Mindfully, Not Emotionally
- Keeping Physically Active
- When Life Gets in the Way
- Setting More Goals
- Your Support System
- Staying in Charge of Your Diabetes
- Looking to Your Future

APPENDIX L. CLIENT SATISFACTION SURVEY

Client Satisfaction Survey

1. What new information did you learn today? _____

   _____

2. Did the information about managing your diabetes and blood glucose levels meet your needs and expectations?

   ❑ Yes If yes, how? _____

   _____

   ❑ No If no, what needs to be improved? _____

   _____

3. Did the information about food planning and activity meet your needs and expectations?

   ❑ Yes If yes, how? _____

   _____

   ❑ No If no, what needs to be improved? _____

   _____

4. How would you rate the overall program content?

   ❑ Excellent ❑ Good ❑ Fair ❑ Poor

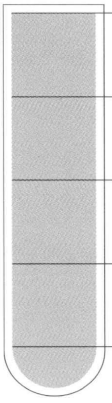
5. Would you recommend this education program to someone else with diabetes?

   ❑ Yes ❑ No

   Why or why not? _____

   _____

Please rate your feeling of control over your diabetes.



5 I feel I can successfully live with my diabetes.

4 I feel I am in good control of my diabetes.

3 I feel my diabetes is controllable.

2 I feel I could control my diabetes if I had more knowledge and discipline.

1 I do not feel in control of my diabetes.

Please describe in your own words how your feelings about diabetes have changed since your last visit.

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX M. CLIENT SATISFACTION PERMISSION

Park Nicollet International Diabetes Center
3800 Park Nicollet Boulevard
Minneapolis, MN 55416
idcpublishing.com

Park Nicollet®
International Diabetes Center
HealthPartners®

February 27, 2019

Samantha Hulst, BSN, RN, DNP-Student
North Dakota State University
1919 N. University Drive
Fargo, ND 58102

Dear Samantha:

International Diabetes Center, a division of HealthPartners Institute, grants Samantha Hulst non-exclusive permission to use the copyrighted Client Satisfaction Survey (part of the Type 2 Diabetes BASICS curriculum) ©*2008 International Diabetes Center at Park Nicollet*. Permission is granted at no fee under the following conditions:

1. It is understood the Client Satisfaction Survey will be used as part of a practice improvement project (dissertation). The title of the work is, "Diabetes Self-Management Education Service at a Rural Minnesota Health Clinic." The author is Samantha Hulst. It is for an academic audience and will be distributed digitally for free.

2. Permission for use of the Client Satisfaction Survey beyond that stated above must be requested separately.

3. As part of this agreement, International Diabetes Center requires the following reference be included with the Client Satisfaction Survey: **©2008 International Diabetes Center at Park Nicollet, Minneapolis, MN. Used with permission.**

If these terms are agreeable, sign below, scan and email this agreement to Thomas.D.McGrane@healthpartners.com

Signed,

Gregg D Simonson

Gregg D. Simonson, PhD
Director, Professional Training & Consulting
International Diabetes Center

2/27/19
Date

S Hulst

Samantha Hulst, BSN, RN, DNP-Student
North Dakota State University Student

2/27/19
Date

APPENDIX N. SENIOR LEADER CONSENT FORM

NDSU **North Dakota State University**
School of Nursing
1919 N University Drive
NDSU Dept. 2670
PO Box 6050
Fargo, ND 58108-6050
701.231.7395

Diabetes Self-Management Education Service at a Rural Minnesota Health Clinic

Dear RiverView Health Senior Leaders:

My name is Samantha Hulst. I am a graduate student at North Dakota State University in the Doctor of Nursing Practice program. I am working with Darcey Larsen, RD, LD to conduct a practice improvement project focused on the implementation of a diabetes self-management education (DSME) service at RiverView Health.

The purpose of the practice improvement project is to implement a comprehensive DSME service that is consistent with the *Standards of Medical Care in Diabetes - 2018* set forth by the American Diabetes Association. The overall goal of the project is to improve patient outcomes and the quality of care for the community's type 2 diabetic patients. We hope to achieve this goal by improving the DSME participant's skills, confidence, and preparedness in the self-management of their chronic disease.

Because you are an integral member of the healthcare team, we invite you to participate in the project by completing a survey that will coincide with the implementation of the project. Participation is voluntary. You may change your mind and choose to stop participating at any time, with no penalty to you. Although impossible to identify every potential risk in the conduction of this research, we have taken the appropriate safeguards to minimize the known risks. The known potential risk includes emotional or psychological distress as filling out the surveys may feel stressful and/or cumbersome.

By taking part in the practice improvement project, you may benefit from participating by increasing your knowledge on the value and benefits of the utilization of a DSME service. The DSME participants may benefit from your participation as your input will be of value in the implementation and future of the DSME service at RiverView Health.

The survey will be administered prior to the implementation of the DSME group service and then again upon completion of the practice improvement project. The survey will take 5-10 minutes of your time. The surveys will be used as a tool to identify support from staff, assist in identifying potential barriers to the implementation of the project, and allow for feedback in the future of the DSME group service at RiverView Health. The completion of the survey is your consent to participate in the project, if you choose not to participate, please do not fill out the survey.

It is also of utmost importance to us to maintain your confidentiality in the conduction of this project. We will keep all research records that identify you private. Your name will not be collected during the project and your information will be combined with information from other people taking part in the study. We will write about the combined information that we have gathered. You will not be identified in these written materials. We may publish the results of the study; however, we will keep your name and other identifying information private.

If you have any questions about the project, please feel free to contact myself at samantha.hulst@ndus.edu, committee member Darcey Larsen, RD, LD at 218-281-9598 or dlarsen@riverviewhealth.org, or my advisor Heidi Saarinen at 701-231-7821 or heidi.saarinen@ndus.edu.

You have rights as a research participant. If you would like more information on your rights or have complaints about this research, please contact the principal investigator, Heidi Saarinen at the above information or contact the NDSU Human Research Protection Service at 701-231-8995, toll-free at 1-855-800-6717, or by email at ndsu.irb@ndus.edu, or by mail at: NDSU HRPP Office, NDSU Dept. 4000, P. O. Box 6050, Fargo, ND 58108-6050. The role of the Human Research Protection Program is to see that your rights are protected in this research; more information about your rights can be found at: www.ndsu.edu/irb.

We thank you for your willingness to be a part of this practice improvement project. If you would like to receive a copy of the overall project results, please email, Darcey Larsen at dlarsen@riverviewhealth.org.

APPENDIX O. PROVIDER & NURSING STAFF CONSENT FORM

NDSU **North Dakota State University**
School of Nursing
1919 N University Drive
NDSU Dept. 2670
PO Box 6050
Fargo, ND 58108-6050
701.231.7395

Diabetes Self-Management Education Service at a Rural Minnesota Health Clinic

Dear RiverView Health Physicians, Nurse Practitioners, Physician Assistants, and Nursing Staff: My name is Samantha Hulst. I am a graduate student at North Dakota State University in the Doctor of Nursing Practice program. I am working with Darcey Larsen, RD, LD to conduct a practice improvement project focused on the implementation of a diabetes self-management education (DSME) service at RiverView Health.

The purpose of the practice improvement project is to implement a comprehensive DSME service that is consistent with the *Standards of Medical Care in Diabetes - 2018* set forth by the American Diabetes Association. The overall goal of the project is to improve patient outcomes and the quality of care for the community's type 2 diabetic patients. We hope to achieve this goal by improving the DSME participant's skills, confidence, and preparedness in the self-management of their chronic disease.

Because you are an integral member of the healthcare team, we invite you to participate in the project by completing a survey that will coincide with the implementation of the project. Participation is voluntary. You may change your mind and choose to stop participating at any time, with no penalty to you. Although impossible to identify every potential risk in the conduction of this research, we have taken the appropriate safeguards to minimize the known risks. The known potential risk includes emotional or psychological distress as filling out the surveys may feel stressful and/or cumbersome.

By taking part in the practice improvement project, you may benefit from participating by increasing your knowledge on the value and benefits of the utilization of a DSME service. The DSME participants may benefit from your participation as your input will be of value in the implementation and future of the DSME service at RiverView Health.

The survey will be administered prior to the implementation of the DSME group service and then again upon completion of the practice improvement project. The survey will take 5-10 minutes of your time. The surveys will be used as a tool to identify support from staff, assist in identifying potential barriers to the implementation of the project, and allow for feedback in the future of the DSME group service at RiverView Health. The completion of the survey is your consent to participate in the project, if you choose not to participate, please do not fill out the survey.

It is also of utmost importance to us to maintain your confidentiality in the conduction of this project. We will keep all research records that identify you private. Your name will not be collected during the project and your information will be combined with information from other people taking part in the study. We will write about the combined information that we have gathered. You will not be identified in these written materials. We may publish the results of the study; however, we will keep your name and other identifying information private.

If you have any questions about the project, please feel free to contact myself at samantha.hulst@ndus.edu, committee member Darcey Larsen, RD, LD at 218-281-9598 or dlarsen@riverviewhealth.org, or my advisor Heidi Saarinen at 701-231-7821 or heidi.saarinen@ndus.edu.

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We thank you for your willingness to be a part of this practice improvement project. If you would like to receive a copy of the overall project results, please email, Darcey Larsen at dlarsen@riverviewhealth.org.

APPENDIX P. DSME PARTICIPANT CONSENT FORM

NDSU **North Dakota State University**
School of Nursing
1919 N University Drive
NDSU Dept. 2670
PO Box 6050
Fargo, ND 58108-6050
701.231.7395

Diabetes Self-Management Education Service at a Rural Minnesota Health Clinic

Dear Diabetes Self-Management Education (DSME) Participant:
My name is Samantha Hulst and I am a graduate student at North Dakota State University in the Doctor of Nursing Practice service. I am working with Darcey Larsen, RD, LD on a practice improvement project to improve patient outcomes and quality of care in the education of type 2 diabetic patients in our community and surrounding areas.

The purpose of the practice improvement project is to implement a comprehensive DSME service that is consistent with the *Standards of Medical Care in Diabetes - 2018* set forth by the American Diabetes Association. The overall goal of this practice improvement project is to help you improve your ability to manage diabetes and knowledge of the condition by improving your skills, confidence, and preparedness in the self-management of your condition.

You are being asked to participate in this practice improvement project because you have been referred to the DSME group service and have a diagnosis of type 2 diabetes. Participation is voluntary. You may change your mind and choose to stop participating at any time, with no penalty to you.

Although impossible to identify every potential risk in the conduction of this research, we have taken the appropriate safeguards to minimize the known risks. The known potential risk includes emotional or psychological distress, as filling out the Skill, Confidence, and Preparedness Index (SCPI) may feel stressful and/or cumbersome.

Personal benefits from completing the SCPI may include identification of ways to help manage your diabetes that you may not have known before and feeling like you have improved knowledge and control about your condition through completing the DSME course. The SCPI will be administered prior to the start of the DSME group service and upon completion of the course. The survey will take 5-10 minutes of your time. If you choose not to participate, please do not fill out the SCPI and you are still able to continue in the DSME service with no penalty. The SCPI will be used as tool to measure your skill, confidence, and preparedness in the self-management of your type 2 diabetes. The tool will also help better individualize your educational needs. Lastly, the SCPI will be utilized to help determine if the service was successful and if the DSME service should be used in the future for other individuals.

You will also be asked to fill out a Client Satisfaction Survey upon completion of each session. The survey will take 5-10 minutes of your time. The information collected on the Client Satisfaction will be used to identify strengths, weakness, and areas for improvement in the administration of the DSME service. If you choose not to participate, please do not fill out the Client Satisfactions Survey and you are still able to continue in the DSME service with no penalty.

It is also of utmost importance to us to maintain your confidentiality in the conduction of this project. We will keep all research records that identify you private. Your name will not be collected during the project and your information will be combined with information from other people taking part in the study. We will write about the combined information that we have gathered. You will not be identified in these written materials. We may publish the results of the study; however, we will keep your name and other identifying information private.

If you have any questions about the project, please feel free to contact myself at samantha.hulst@ndus.edu, committee member Darcey Larsen at 218-281-9598 or dlarsen@riverviewhealth.org, or my advisor Heidi Saarinen at 701-231-7821 or heidi.saarinen@ndus.edu.

You have rights as a participant. If you would like more information on your rights or have complaints about this research, please contact the principal investigator, Heidi Saarinen at the above information or contact the NDSU Human Research Protection Service at 701-231-8995, toll-free at 1-855-800-6717, or by email at ndsu.irb@ndus.edu, or by mail at: NDSU HRPP Office, NDSU Dept. 4000, P. O. Box 6050, Fargo, ND 58108-6050. The role of the Human Research Protection Service is to see that your rights are protected in this research; more information about your rights can be found at: www.ndsu.edu/irb.

We thank you for your willingness to be a part of this practice improvement project. If you would like to receive a copy of the overall project results, please email, Darcey Larsen at dlarsen@riverviewhealth.org.

APPENDIX Q. INSTITUTIONAL REVIEW BOARD APPROVAL

NDSU NORTH DAKOTA STATE UNIVERSITY

July 19, 2018

Dr. Heidi Saarinen
School of Nursing

Re: IRB Determination of Exempt Human Subjects Research:
Protocol #PH19011, "Diabetes Self-Management Education Service at a Rural Minnesota Health Clinic"

Co-investigator(s) and research team: Samantha Hulst
Date of Exempt Determination: 7/19/2018 Expiration Date: 7/18/2021
Study site(s): RiverView Health Systems
Sponsor: n/a

The above referenced human subjects research project has been certified as exempt (category #2b) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, Protection of Human Subjects). This determination is based on the original protocol submission (received 7/16/2018).

Please also note the following:
• If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.
• The study must be conducted as described in the approved protocol. Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
• Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
• Report any significant new findings that may affect the risks and benefits to the participants and the IRB.

Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Kristy Shirley

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.
Sincerely,

Kristy Shirley, CIP, Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult http://www.ndsu.edu/research/integrity_compliance/irb/. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb
Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

APPENDIX R. SCPI PRE-IMPLEMENTATION RESULTS

SCPI Questions	Individual Scores						Group Total
1. I am able to portion out and choose foods that have the optimal balance between carbohydrates, proteins and vegetables to help keep my blood sugars in target.	5	3	9	5	6	3	31
2. I know how my diabetes insulin or medication works in my body and at which time of day I should check my blood sugars to make sure my dose is correct.	9	2	10	4	9	8	42
3. I feel confident that I can plan balanced meals and snacks effectively.	7	3	10	5	6	3	34
4. If I miss a dose of my insulin or medication, I know how my body will react and the steps to take to get back on track. meals and snacks effectively.	5	3	10	10	9	9	46
5. When I am planning to exercise, I know what changes I need to make to avoid a low blood sugar before, during, and after exercise.	5	1	10	2	8	10	36
6. I am confident that I can implement stress management techniques into my lifestyle.	8	3	4	10	8	9	42
7. I know when to check my blood sugar if I want to see how my body reacted to a meal.	8	4	10	10	8	9	49
8. When I am sick, I know what to do differently with my medications, fluid intake, food intake, blood sugar testing, and when to go to the hospital.7	7	1	8	10	7	5	38
9. I intend to start planning and eating balanced meals and snacks starting next week.	9	7	10	10	1	9	45
10. I know how to identify stress in my life and how it can impact my diabetes management & overall health.9	8	3	10	10	5	9	45
11. I'm confident that I can plan ahead for what to do, and how to react, either before, during or after exercise to avoid a low blood sugar.	9	2	10	10	9	6	46
12. When I look at my blood sugars in my meter or in my logbook in a given week, I could explain to my diabetes educator or doctor what my blood sugar pattern is.	8	3	10	10	8	7	46
13. I plan to choose an activity and begin incorporating it into my schedule in the coming week.	7	5	10	10	10	9	51

14. I am confident that at the next time I am eating out of my home, I will be able to plan and select the foods that best keep my blood sugars under control.	6	2	10	10	7	2	37
15. I plan to start using my blood sugar levels to make changes to my diet and/or insulin starting next week.	7	6	10	10	1	8	42
16. I am confident that I can choose a healthy activity for me and include it into my schedule.	7	2	10	10	1	4	34
17. I plan to start making a list of stress management techniques which will work for me in the upcoming week.	8	2	5	10	1	1	27
18. I am confident that I can adjust my insulin or medication doses, on my own, to reach the target blood sugar levels.	9	4	10	10	8	7	48
19. I am confident that I can commit to preventing and monitoring my diabetes complications such as seeing my eye doctor at least once a year and checking my feet on a daily basis.	9	7	10	10	10	4	50
20. I plan to start adjusting my insulin or medication doses on my own starting next week.	4	1	10	10	1	1	27
21. I am confident that I will use my blood sugar results to make changes to my diet and/or insulin to help keep my blood sugars in target.	8	4	10	10	10	5	47
22. I know what the ABCs (Hemoglobin A1c, Blood Pressure, and Cholesterol) of Diabetes are, what my targets are and how they impact my diabetes.	9	4	8	5	8	2	36
23. I plan to start looking for patterns in my meter or logbook starting next week.	9	6	10	10	1	9	45
24. The next time I am sick, I will make the necessary changes to my medications, insulin and/or eating depending on my blood sugars	6	5	10	10	9	5	45
25. With my next exercise, I am going to make a plan to reduce the chance of a low blood sugar, or to react with a good response if I do have a low blood sugar.	7	7	10	10	10	9	53
Total							6.95
Skills							6.83
Confidence							7.04
Preparedness							6.98

APPENDIX S. SCPI POST-IMPLEMENTATION RESULTS

SCPI Questions	Individual Scores					Group Total
1. I am able to portion out and choose foods that have the optimal balance between carbohydrates, proteins and vegetables to help keep my blood sugars in target.	7	6	8	8	9	38
2. I know how my diabetes insulin or medication works in my body and at which time of day I should check my blood sugars to make sure my dose is correct.	8	8	10	10	10	46
3. I feel confident that I can plan balanced meals and snacks effectively.	9	7	9	8	8	41
4. If I miss a dose of my insulin or medication, I know how my body will react and the steps to take to get back on track. meals and snacks effectively.	8	7	10	10	10	45
5. When I am planning to exercise, I know what changes I need to make to avoid a low blood sugar before, during, and after exercise.	7	9	10	8	10	44
6. I am confident that I can implement stress management techniques into my lifestyle.	9	6	10	8	4	37
7. I know when to check my blood sugar if I want to see how my body reacted to a meal.	7	10	10	10	10	47
8. When I am sick, I know what to do differently with my medications, fluid intake, food intake, blood sugar testing, and when to go to the hospital.7	10	8	10	8	9	45
9. I intend to start planning and eating balanced meals and snacks starting next week.	8	8	9	8	3	36
10. I know how to identify stress in my life and how it can impact my diabetes management & overall health.9	9	7	10	8	7	41
11. I'm confident that I can plan ahead for what to do, and how to react, either before, during or after exercise to avoid a low blood sugar.	8	8	9	9	10	44
12. When I look at my blood sugars in my meter or in my logbook in a given week, I could explain to my diabetes educator or doctor what my blood sugar pattern is.	9	7	10	9	10	45
13. I plan to choose an activity and begin incorporating it into my schedule in the coming week.	9	8	8	0	10	35
14. I am confident that at the next time I am eating out of my home, I will be able to plan	6	6	8	8	10	38

and select the foods that best keep my blood sugars under control.						
15. I plan to start using my blood sugar levels to make changes to my diet and/or insulin starting next week.	7	7	9	10	4	37
16. I am confident that I can choose a healthy activity for me and include it into my schedule.	7	7	9	9	10	42
17. I plan to start making a list of stress management techniques which will work for me in the upcoming week.	8	6	1	7	5	27
18. I am confident that I can adjust my insulin or medication doses, on my own, to reach the target blood sugar levels.	4	5	8	9	10	36
19. I am confident that I can commit to preventing and monitoring my diabetes complications such as seeing my eye doctor at least once a year and checking my feet on a daily basis.	10	9	7	10	10	46
20. I plan to start adjusting my insulin or medication doses on my own starting next week.	2	1	1	1	10	15
21. I am confident that I will use my blood sugar results to make changes to my diet and/or insulin to help keep my blood sugars in target.	8	6	5	10	10	39
22. I know what the ABCs (Hemoglobin A1c, Blood Pressure, and Cholesterol) of Diabetes are, what my targets are and how they impact my diabetes.	8	8	8	5	10	39
23. I plan to start looking for patterns in my meter or logbook starting next week.	8	7	8	10	10	43
24. The next time I am sick, I will make the necessary changes to my medications, insulin and/or eating depending on my blood sugars	6	6	8	1	10	31
25. With my next exercise, I am going to make a plan to reduce the chance of a low blood sugar, or to react with a good response if I do have a low blood sugar.	9	9	10	8	10	46
Total						7.86
Skills						8.67
Confidence						8.08
Preparedness						6.75

APPENDIX T. EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Diabetes Self-Management Education Service at a Rural Minnesota Health Clinic

Background

In 2015, there were an estimated 30.3 million Americans living with diabetes, equating to 9.4% of the United States population, with 95% of these individuals diagnosed with type 2 diabetes (T2D) (Centers for Disease Control and Prevention [CDC], 2017b). The prevalence of the chronic disease is on the rise. By the year 2050, one-third of the adult American population is projected to be affected by the costly disease (Boyle, Thompson, Gregg, Barker, & Williamson, 2010). Diabetes is a multi-faceted chronic disease, and the outcome is dependent on the patient's ability to self-manage their diagnosis. Mismanagement of the disease can lead to numerous complications. Vasculature complications of diabetes are a pathologic hallmark of the disease (Chawla, Chawla, & Jaggi, 2016). Microvascular complications of the eyes, nerves, and kidneys can lead to long-term organ or tissue damage, while macrovascular complications can cause cerebrovascular and cardiovascular damage, both of which may ultimately lead to premature death (Chawla et al., 2016). The chronicity of the disease can also take a toll on a patient's quality of life (Powers et al., 2015). Patients need to have the knowledge and support to make the vast number of daily decisions to manage their chronic condition.

Problem Statement

Individuals living in rural America have an increased prevalence of diabetes, and their participation rates in preventative care practices are lower (Rutledge, Masalovich, Blacher, & Saunders, 2017). The increased prevalence of T2D in rural communities does not positively correlate with the number of diabetes self-management education services (DSME) in these areas, which poses a gap in healthcare services (Rutledge et al., 2017). Additionally, individuals with T2D worldwide have significant knowledge deficits with 50-80% of people with diabetes lacking the information and skills to successfully manage their diagnosis (Formosa, McInnes, & Mandy, 2012). Type 2 diabetes is a chronic condition that takes continuous medical care with multifactorial strategies to help reduce complications of the disease (American Diabetes Association [ADA], 2018a). By providing individuals with evidence-based knowledge, they have the opportunity to improve their decision-making, problem-solving, and self-care skills (Rutledge et al., 2017). The implementation of a DSME service is an avenue for the prevention and reduction of the complications directly related to diabetes.

Purpose of the Project

The purpose of the practice improvement project was to collaborate with the dietitian at the rural Minnesota Health Clinic in the establishment of a comprehensive DSME group service. Diabetes self-management education and support can be defined as "the process of facilitating the knowledge, skill, and ability necessary for diabetes care" (Powers et al., 2015, p. 71). Diabetes self-management education is consistent with the *Standards of Medical Care in Diabetes - 2018* set forth by the American Diabetes Association (ADA) to improve patient outcomes and quality of care (ADA, 2018a). In addition, the practice improvement project was structured to help provide a functional and sustainable service to allow the organization to continue the group service even after the conclusion of the practice improvement project. The creation of the DSME service was to improve skills, confidence, and preparedness in the self-management of patients diagnosed with T2D in order to improve patient outcomes and quality of care.

Project Design

There were four phases in the implementation of the project.

1. The first phase in the implementation of the practice improvement project was to obtain organizational support for the pilot DSME service. Support from the senior leaders, healthcare providers, and nursing staff was elicited after providing education through a PowerPoint presentation on DSME and the importance of utilizing the service including the supporting literature on diabetic education. The aim for providing information on the benefits of DSME services and allowing for feedback from the employees on pre-implementation surveys was to elicit support in the implementation of the project and to garner referrals for the piloting of the DSME group service.
2. The second phase in the project development was to work with information technology (IT) on developing an electronic referral. The aim was to implement a referral process that was efficient, systematic, and sustainable.
3. The third step in the practice improvement project was the implementation of the DSME service. The classes were led by the dietitian and RN Health coach via a didactic approach in a classroom setting held within the organization. The International Diabetes Center's "Type 2 Diabetes Basics" curriculum was taught, and each participant was given a workbook that was utilized during each session to guide the participants during the four-week DSME service. The DSME participants were asked to complete the Skills, Confidence, and Preparedness Index before starting the sessions and again upon completion of the curriculum. They were also asked to complete a Client Satisfaction Survey after each session.
4. The fourth and final phase was to disseminate the results for the DSME pilot service to each cohort at the organization and obtain their feedback on the future of the service through the completion of a post-implementation survey.

Discussion of Project Results

Overall, each cohort displayed satisfaction with the diabetic education provided and thought the DSME service would augment the services already available to the T2D patients. The cohorts also largely agreed that the DSME participants would benefit from positive outcomes, improvement in their knowledge, confidence, and preparedness to manage their diagnosis. The nursing staff cohort felt that the T2D patients would benefit from the DSME service, however felt limited in their role not being able to provide a referral themselves or receiving kickback from providers in suggesting a referral for a T2D patient. The senior leader cohort added that the service would be marketable to the organization's patient population and profitable by increasing quality numbers and providing the opportunity for reimbursement.

The DSME participant's pre-implementation and post-implementation scores from the SCPI included the total: 6.95 increasing to 7.86; skills subset: 6.83 increasing to 8.67; confidence subset: 7.04 increasing to 8.08; and preparedness subset: 6.98 decreasing to 6.75. Aronson et al. (2017) correlated a score of 6.7 or less on the total, skills, or confidence subscales with poor glycemic control and it could be anticipated the higher the scores on these scales would indicate improved glycemic control and a lower the A1c. Although the groups' scores did not display poor glycemic before starting the DSME service, it was positive to see the total, skills, and confidence scores increase through the completion of the curriculum indicating the potential for increased glycemic control and lower A1c scores. The preparedness subscale has not been found to correlate to current A1c control but was found to be more reflective of the potential change in A1c in the future (Aronson et al., 2017). The preparedness subscale decreased slightly, however possible factors contributing to the decrease could have been increased realization of the lack of preparedness after completing the DSME sessions, the participant who dropped out of the service, or the absenteeism of certain participants due to illness.

The DSME participants also displayed support for the future of the DSME service at the rural Minnesota Health Clinic. Throughout the DSME service, 100% of the DSME participants replied that they would recommend the educational service to someone else with diabetes. The perceptions received from the stakeholders and DSME participants was valuable information in providing recommendations for the future of the DSME service at the organization.

Recommendations

First and foremost, the co-investigator recommended the organization continue the DSME service. The recommendation is also consistent with the *Standards for Medical Care in Diabetes - 2019,* the continuation of the national initiative. The patient's participation in DSME could also have the potential of assisting the providers in meeting the quality diabetes measures for optimal diabetes care. The measures for optimal diabetes care, according to MN Community Measurement (2018), includes assisting patients in achieving all of the following:

A1c less than 8.0mg/dL
Blood pressure less than 140/90mmHg
Use of statin medication, unless contraindicated
Smoking cessation
Use of daily aspirin or antiplatelet therapy with history of ischemic vascular disease, unless contraindicated

The pilot sessions of the service were two and a half hours each week for four weeks. Comments made by the DSME participants, dietitian, and RN Health coach, suggested that the current length of time was not long enough to be able to go in-depth on all topic areas. Although ten hours of initial DSME is reimbursable by the Centers for Medicare and Medicaid Services, that may not be realistic for all patients and extending the service to more than four weeks may be beneficial, depending on the patient's individualized needs.

The organization may also want to consider additional locations of the service due to the rural setting of the clinic and the large territory they serve. The DSME service could be expanded to surrounding communities at the organization's outreach clinics. Another avenue that the organization could consider includes expanding the method of delivery from didactic brick and mortar setting to the use of digital technology, such as using telehealth, Skype, or other online options that may be beneficial to individuals who do not have the means to travel to the clinic every week or for those we need a flexible schedule.

A common theme in the qualitative feedback from the DSME participants on the Client Satisfaction surveys was the desire for more information on the topic of nutrition. Healthy eating is one of the seven self-care behaviors to successful self-management of diabetes. The dietitian is actively involved in diabetes education, therefore encouraging providers to follow the *Standards of Medical Care in Diabetes – 2019* and utilize the DSME service and medical nutrition therapy (MNT) would be most beneficial to their T2D patients.

The nursing staff and senior leaders brought forth concerns regarding providers placing referrals to the DSME service in the pre and post-implementation surveys. The co-investigator recommended that the organization continue to utilize the electronic referral within the EHR, due to efficiency (takes less than one minute to complete) and is a streamlined to automatically transfer the referral into the dietitian's inbox for follow-up. The organization could consider making the referral a standing order to allow the nursing staff to place referrals to the DSME service if the patient meets one of the four critical times for referral that is then cosigned by the provider.

An additional prompt for the provides would be to create a best practice alert (BPA) within the electronic health record. The BPA could alert the providers and nursing staff of a new diagnosis of T2D or when a patient's A1c is out of range. The BPA could then prompt the provider to refer the patient to the DSME service, MNT, or defer the alert. The BPA would act as a reminder and assist in capturing all patients who may benefit from the DSME service and/or medical nutrition therapy.

Implications for Future Practice

The practice improvement project impacted the lives of the T2D patients who completed the pilot DSME service, who continue to benefit from the positive effects of completing the sessions. The positive outcomes identified, and the program recommendations may be beneficial to other organizations planning on starting a DSME service, especially those in a rural setting. The practice improvement project is also be an addition to the current literature on DSME services available.

Through completing the pilot DSME sessions, the organization has the ability able to apply for accreditation through the ADA. The organization's ability to be accredited will then allow them to bill for the DSME service and receive reimbursement for the education they provide to their T2D patient population. Accreditation will support the longevity of the service within the organization.

There are other avenues for future research by nursing scholars on DSME. A gap identified in the literature was other avenues of delivery of DSME besides an individualized approach and group setting. The future of medicine is taking a turn towards telemedicine in rural areas and interactive group visit. Another scholar could identify how to implement DSME into telemedicine or interactive group T2D visits and the effectiveness of these alternative methods.