GROUP DIABETES SELF-MANAGEMENT EDUCATION (DSME) FOR ADOLESCENTS

WITH TYPE 1 DIABETES TO IMPROVE KNOWLEDGE AND UNDERSTANDING

OF SELF-MANAGEMENT SKILLS

by

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of the requirements for the degree

of

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in

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DEDICATION

Dedicated to the people who have supported me through school for their entire lives, my daughters Eden and Emily, and to my husband Brett for encouraging my continued life-long learning.

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ABSTRACT

Those with type 1 diabetes mellitus (T1DM) are required to perform many self-care activities, such as monitoring blood glucose and taking insulin, every day to prevent long term complications associated with the disease, such as retinopathy, neuropathy, nephropathy and heart disease (American Diabetes Association, ADA). Knowledge of the self-management skills required to care for diabetes is known as Diabetes Self-Management Education (DSME). Adolescents with T1DM struggle with management of their disease for many reasons, and most often it is the family who receives the education at diagnosis. This leaves the adolescent vulnerable to a gap in understanding their disease process and proper management skills. Implementation of group DSME that is led by a diabetes specialist is showing promise in the adult setting and has implications for youth with T1DM as well (Raymond, et al, 2015). Surveys assessing knowledge and confidence in management of T1DM were given before and after a group DSME class were given to nine participants. Results of the post surveys show that there was an increase in both knowledge and confidence after the class among all participants. These results suggest that there is a benefit to group, adolescent specific DSME classes.

CHAPTER ONE INTRODUCTION

Background

Type 1 Diabetes Mellitus (T1DM) is a chronic illness and it affects one in every

400-500 children and adolescents in the United States (Mulvaney, et al., 2011). Those

with T1DM are required to perform many self-care activities every day in order to

prevent long term complications associated with the disease, such as retinopathy,

neuropathy, nephropathy and heart disease. Knowledge of the self-management skills

required to care for diabetes, known as Diabetes Self-Management Education (DSME), is

vital in the prevention of complications and improvement of health outcomes and

quality of life (Clark, 2008). Assessment of the adolescent population and the current

knowledge base regarding diabetes, the management of the disease, benefits of DSME,

the provider's role in education, improved self-management skills and health outcomes

will be the purpose of this project.

DSME is a recommended by the American Diabetes Association (ADA) in the

clinical practice guidelines developed by their organization. DSME consists of seven

healthy lifestyle behaviors. These behaviors include healthy eating, physical activity,

self-monitoring of blood glucose levels, medication compliance, problem solving skills,

coping skills, and risk reduction behaviors. These behaviors are taught by Certified

Diabetes Educators, nurse specialists, and the diabetes providers who specialize in

T1DM. The Advanced Practice Registered Nurse (APRN) scope of practice includes the

role of educating patients on disease management and planning patient specific care for improved outcomes, which includes providing DSME. Diabetes providers have an important role in adherence to diabetes care plans and in educating patients to improve diabetes self-management skills (Dayte, Moore, Russel, & Jaser, 2015).

DSME has multiple benefits both clinically and emotionally for patients with diabetes. Research has shown that those who never receive DSME have an increased risk, more than fourfold, of complications when compared to those diabetics who have received even minimal amounts of DSME (Clark, 2008). At diagnosis, it is generally the parent or care provider that is educated on these skills, not the patient themselves (Law, Walsh, Queralt, & Nouwen, 2013). This leads to lack of knowledge of management skills once the patient reaches the adolescent age and has more responsibility for caring for their diabetes, according to Raymond, et al (2015). The earlier DSME can be offered in this age group, the more success the adolescent will have once they become an adult in preventing complications (Garvey, et al, 2017).

<u>Definitions</u>

Definitions for the purpose of this project were taken from the ADA Standards of Care (2018). T1DM is an autoimmune disease in which life-long exogenous insulin is required due to beta cells that no longer produce insulin. DSME: Diabetes Self-Management Education, which is diabetes specific content delivered to patients by a diabetes specialty provider or a diabetes educator. Self-management skills are the skills

necessary to care for one's illness, such as glucose testing, taking insulin, knowledge of diet, exercise, and coping skills. For the purpose of this project, adolescent will be defined as age 13-18. Blood Glucose (BG) is the level of glucose within the blood, with target levels for most diabetics being 80-130. Hyperglycemia is blood glucose levels over recommended target and can be individualized. Hypoglycemia are low blood sugar levels under target and can also be individualized. A Hemoglobin A1C (A1C) level is a blood test that reports an overall average of BG levels over the previous three months, with the target A1C for this population of 7.5% or less, denoting an average BG of 154 mg/dL.

<div align="center">Problem</div>

Adolescents are at high risk for complications due to their developmental state and poor adherence to their diabetes regimen, and also due to their lack of knowledge and understanding of the disease (Mulvaney, et al., 2011). Adolescents with T1DM also have a higher rate of anxiety and depression related to their disease, which adds to the problem of poor self-management (Buchberger,et al, 2016). Because diabetes is a chronic illness with multiple long-term complications if not cared for properly, identifying knowledge deficits and teaching age specific self-management skills is imperative for positive health outcomes. Complications from poorly controlled diabetes in adolescents and young adults are often more acute, such as diabetic ketoacidosis, however continued poor control will lead to long term complications (Beck, et al2015) .

Lack of these skills, added to the depression and anxiety in adolescents, lead to higher A1C levels (Law, et al, 2013). Adolescents and parents who scored higher on a pre-knowledge assessment survey also had a lower overall A1C level, indicating better controlled diabetes related to increased disease and management knowledge (Beck, et al, 2015).

Significance

T1DM is a chronic illness in which the beta cells of the pancreas no longer function to produce insulin, a hormone needed for metabolism of glucose, storage of fat, and overall growth. Those with T1DM require life-long exogenous insulin and there is no cure. An increased number of children and adolescents are being diagnosed with this disease each year, and the number is only predicted to grow. According to Chilton and Pires-Yfantouda, (2015), it is expected that over 79,000 children worldwide under the age of 15 will be diagnosed annually. Newer data shows T1DM cases have risen to almost 21.7 per 100,000 youth (Mayer-Davis, et al, 2017). As of 2016, greater than 170,000 youth in the United States (U.S.) had T1DM, with a rate of predicted growth at 3-5% per year (Cato & Hershey, 2016).

Chronic illness requires lifelong management by the healthcare team, family, and patient. Type 1 diabetes is no different. According to the ADA, the cost associated with those diagnosed with the disease in 2017 was over 327 billion dollars, up from 245 billion in 2012 (See Figure 1)

Figure 1. Increase in Diabetes Related Costs
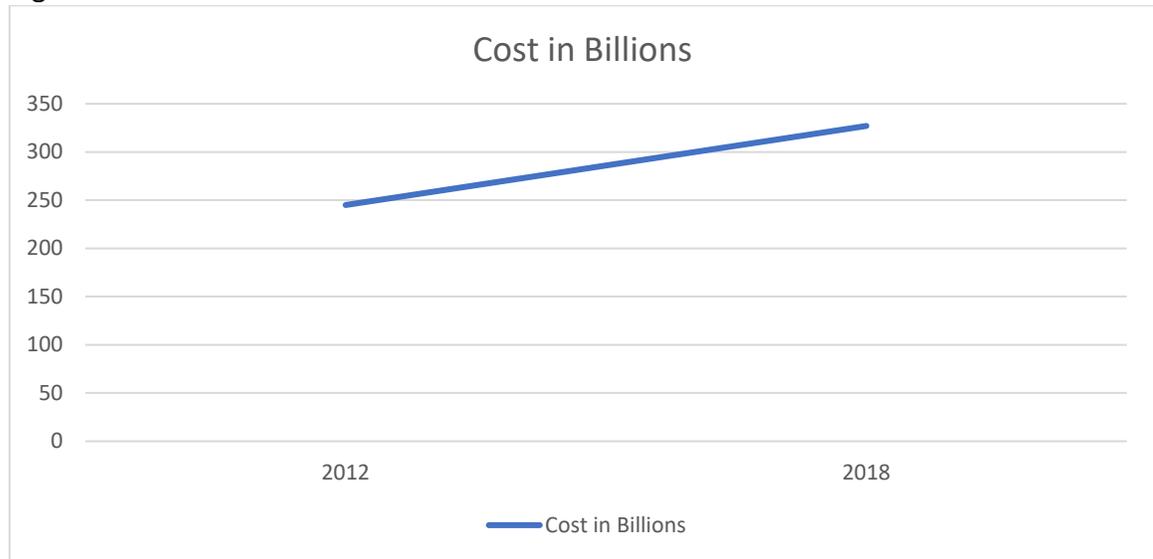
A large part of this expenditure, over one-third, was related to inpatient treatment of diabetes complications, according to the latest cost analysis done by the American Diabetes Association, released in 2018 (ADA, 2018). The majority of these inpatient costs arise from poorly controlled diabetes, defined as chronic hyperglycemia leading to complications of the eyes, heart, kidneys, circulation, nerves, and cognitive function, or acute complication such as diabetic ketoacidosis (Cato & Hershey, 2016).

Control in T1DM is generally measured with a Hemoglobin A1C level, which is a blood test that results an average of blood glucose (BG) readings over the previous three months and is a clinical practice guideline for those caring for these children (ADA, 2018). Children with poorly controlled diabetes also can have wide glycemic excursions, which is having multiple, large differences in blood glucose (BG) readings, known as hypoglycemia and hyperglycemia. These glycemic excursions, along with prolonged

elevation of Hemoglobin A1C levels, have been shown to cause decreases in academic

function (Cato & Hershey, 2016). Adolescents with T1DM have also been found to have

a decreased quality of life (QOL) when compared to their peers without T1D

(Abualula , 2016).

The goal for A1C as recommended by the ADA is 7.5% or less, and unfortunately,

only 21% of adolescents with T1DM in the U.S. meet this goal (Dayte, Moore, Russell, &

Jaser, 2016). Dayte, Moore, Russel and Jaser (2016) discuss that diabetes control is often

at its poorest levels during adolescence, so it is vital that education on self-management

education and prevention of complications is done early. One reason diabetes control is

at their poorest during this age is brain developmental stage and the many demands on

the adolescent, such as school, social, and possible environmental demands that

compete with their time for diabetes self-management (Garvey, et al, 2017).

DSME is strongly recommended by the ADA, the body that defines most of the

clinical practice guidelines (CPG) for those who care for all types of people with

diabetes. DSME curriculum that is most commonly used is from the American

Association of Diabetes Educators (AADE, 2012). The AADE developed seven areas of

behavior to focus on during DSME, and those are BG monitoring, healthy eating,

exercise, taking medications, problem solving, reducing risk for complications, and

coping skills. Though all these components are important for management of T1DM,

exercising and healthy eating will not cure T1DM, and the curriculum for these two

components are very heavily weighted with information that focuses more on Type 2

diabetes, which is seen more in overweight adults. Tailoring these topics to fit the needs of the adolescent is important to their understanding of the relevance to their disease process, as well as improving QOL (Abualula, 2016).

The ADA clinical practice guidelines (2018) discuss the importance of the medical team acknowledging the fundamental differences of understanding and cognitive function in this age group, and therefore tailoring interventions and education to fit the needs of the adolescent with T1DM for better outcomes. The recommendation of the ADA is DSME at diagnosis, and at least annually there-after, if not more frequently based on the needs of the adolescent as they grow and become more independent in their care. Although adolescents are receiving DSME related to survival skills, such as BG testing, insulin dosing, and basic nutrition, a gap in continued education that is tailored to the youth's evolving needs and understanding has been identified (Raymond, et al, 2015). DSME is most commonly delivered by Certified Diabetes Educators (CDE), but the provider plays an important role in education as well.

Gap in Knowledge

Adolescents with T1DM have a gap in knowledge on the disease and self-management skills. Although guidelines exist for DSME and recommendations for educational topics, the literature suggests that the current interventions may not work for this specific age group (Babler & Strickland, 2015) and that there is no singular approach to DSME. Research of T1DM and adolescents is pointing to a new direction of

age specific, group DSME that is directed at educating adolescents on their specific

needs and capabilities (Garvey, et al, 2017). Current guidelines are general and based

on both T1DM and T2DM and do not have age specific recommendations for

educational topics or outcomes, and researchers report that there is no singular

approach to DSME (Clark, 2008). Implementing a group DSME program for adolescents

with T1DM has the potential to improve knowledge, coping and self-management skills.

Theoretical Underpinning

The self-care deficit theory of nursing is a grand theory. A grand theory is a

theory that guides general nursing practice (Moran, Burson, & Condrad, 2017). The self-

care deficit theory of Dorthea Orem is comprised of three separate theories. These

theories include the theory of self-care, the theory of self-care deficit, and the theory of

nursing systems. Self-Care deficit was the theory that guided this project. The

metaparadigm concepts of the grand theory are person, environment, health, and

nursing. The person is described as the person under the care of the nurse and the

environment is the factors, elements and conditions that may affect the person. Health

is described as the state of soundness and wholeness of both body and mind, and the

nurse is to supplement self-care requisites either completely, partially or as a supportive

educator (Masters, 2015).

The theory of self-care deficit describes that people deliberately learn and act on

behaviors that will guide their health and their survival (Masters, 2015). There are

multiple components to this theory, such as the explicit assumptions that education and

culture influence the health of individuals, self-care is learned through interaction and

communication, and each person possess the power and capabilities of caring for their

needs. These components will be a framework for interaction during the group DSME

class, as each adolescent is at a different stage in their lives and other factors will affect

their knowledge and ability to care for their needs, and the group setting allows for

learning self-care skills through peer to peer communication and collaboration in a safe

learning environment.

Figure 2. Orem's Theory

Conceptual framework of Orem's theory
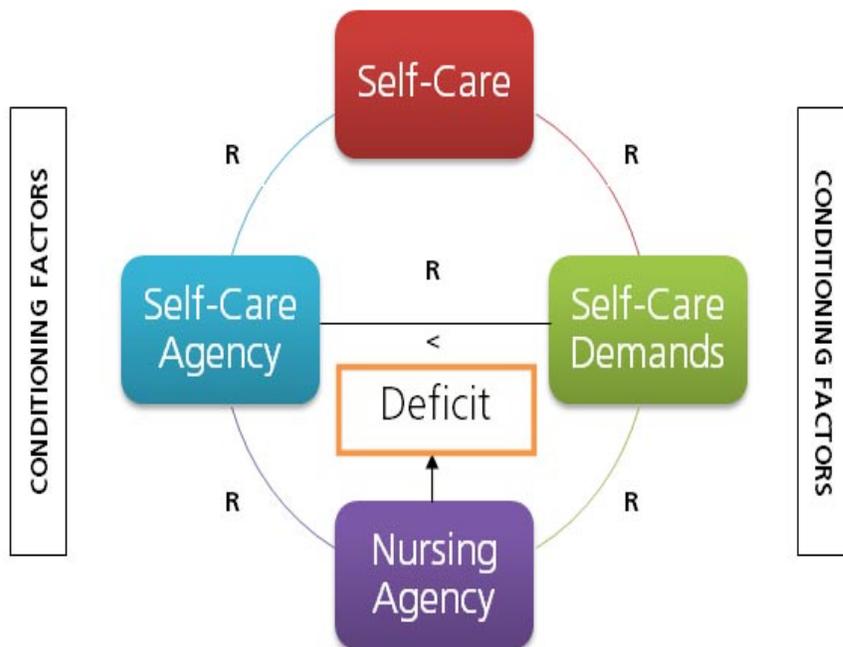
Purpose

Implementation of age specific DSME in adolescents could improve patient outcomes as well as decrease healthcare costs associated with disease complications. The project lead seeks to understand if lack of knowledge and understanding of T1DM and self-management skills in adolescents will improve with age specific, group DSME classes based on pre- and post-survey scores.

CHAPTER TWO – REVIEW OF LITERATURE

To begin the literature review, the search terms related to T1DM, adolescent, DSME, health outcomes, attitudes toward TIDM, and group classes were used in CINAHL, PubMed, Google Scholar, and Medline. Of the returned articles, over 23 were found to be fitting for the project. Of those 23, thirteen were directly related to DSME and adolescents and health outcomes, and the top ten that are directly related to the project are highlighted in Appendix D.

Health Outcomes

Evidence of current research concludes that use of DSME has positive outcomes on the health of people with diabetes (ADA, 2018, Standards of Care). Investigators show that educating patients with diabetes is a cornerstone of care. In one systematic review by Clark (2008), multiple studies related to DSME were reviewed for outcome effectiveness, and the author highlighted 11 studies. Although most of the studies reviewed were on adults, Clark (2008) determined that patient focused DSME had proven to have positive effects on patients with diabetes both in clinical indicators and QOL, and that DSME must be individualized and on-going throughout the life-span for the patient to be even more successful.

Pillay, et al, (2015) did a systematic review and meta-analysis on behavioral and skills enhancement programs that were implemented in youth with T1D. The authors looked at 36 prospective studies for outcomes related to A1C, behavior, and overall

health. The conclusion showed an A1C reduction at six months after the program was completed**.**

<center>Educational Methods</center>

In reviewing the literature, multiple methods of education for self-management of T1DM have been suggested. With the ever- increasing use of online applications, and the amount of time adolescents spend on the internet, the implementation of an online self-management app for group DSME was also recommended as a means of delivering education (Mulvaney, et al., 2011). Mulvaney,et al, (2011) looked at 41 adolescents with T1DM who enrolled in an Internet based DSME class and whether diabetes problems faced, such as social issues and time constraints related to diabetes could be solved through this program. The authors reported that this form of education improved 92% of the problems and can be done either with each individual adolescent and family, although group education has proven to provide increased benefit as the adolescent is among peers who also live the day to day of T1DM.

Researchers suggest education and behavioral programs directed at this age group do improve self-management skills and therefore improve health outcomes (Beck, et al., 2015). Beck, et al (2015) used a correlation descriptive study with a 25 question survey to assess current diabetes knowledge among adolescents with T1DM and their parents. Those who scored higher on the knowledge survey also had lower A1C levels.

Clinical Practice Guidelines

Clinical Practice Guidelines (CPG) written by the ADA (2018) are the standard for

clinicians caring for those with diabetes. The CPG related to DSME suggests that

education follow a basic curriculum that is not necessarily individualized to different age

groups. Objectives in the guideline follow the same seven health behaviors mentioned,

such as BG testing, health eating, coping, problem solving, reducing risk, medication,

and exercise, in a basic curriculum format. The guideline also suggests that DSME be

provided at diagnosis, and then annually, if not more frequently.

The current guideline for DSME is also aimed at both T1DM and T2DM, again

with no specific recommendations that acknowledge the difference between the two

diseases, or no recommendations aimed directly at the high-risk age group of

adolescents. The lack of these recommendations in the guidelines, when compared to

the current recommendations in the literature, supports the need for clinical practice

change for improved outcomes in this age group.

Motivational Interviewing

Motivational interviewing is a method of assessing patient specific knowledge

and gaps, and also identifies key areas for education and health improvement.

Motivational Interviewing can assess readiness to change certain behaviors, and this is

important when planning care. Kaugars, Kichler & Alemzadah, (2011) discuss the

importance of assessing readiness to change to create specific education, and used a

survey for 69 adolescents and their caregivers, and found the results to be beneficial for

providers who are caring for this population to create patient specific education and

care plans based on current level of understanding and readiness to change habits.

During DSME, it is recommended that a patient pick a specific goal to work on,

such as checking blood glucose levels more frequently, and that is the focus of the

appointment and education (AADE, 2012). This tailored approach seems to help the

adolescent focus on one thing at a time and allows for healthy habits to be created.

According to the National Standards for Diabetes Self-Management Education and

Support it is important that education is individualized as much as possible and tailored

to the particular audience that is participating (AADE, 2018).

<u>Assessing Risk</u>

Adolescents with T1DM have more depression and are at higher risk for

complications (Buchberger, et al, 2016). Buchberger, et al, (2016) looked at 14 different

studies related to depression and anxiety in this population, and recommend early

screening for depression and anxiety in this group to identify diabetes risks and

complications that may arise and develop appropriate treatment plans.

<u>Patient Preferences</u>

Patient preferences have also been identified during this process. Adolescents

prefer autonomy from their family related to diabetes care, but often lack the

knowledge to do so (Babler & Strickland, 2015). They also want to be with peers who

have T1DM, as it provides comfort in knowing they are not alone. When asked,

adolescents are very interested in group DSME classes to gain knowledge and accept

diabetes in their everyday life (Babler, & Strickland, 2015). The response from this age

related to group classes seems to mirror what has been found in the literature regarding

this topic in studies done in the adult population (Raymond, et al, 2015).

Approaches to DSME

There are many proposed recommendations in the literature with how to

approach and implement DSME in the adolescent with T1DM. Based on the current

evidence and recommended interventions, protocol changes could be implemented not

only at the CPG level, but also inform practice in the interim. Chilton, et al, (2015)

conducted 13 interviews to understand the barriers faced by adolescents with T1DM

and how providers can decrease these barriers. The results recommend the first step for

the provider are to identify gaps and deficits to guide the practitioner in building patient

specific education.

According to interviews (n=27) performed by Spencer, Cooper, & Milton (2013) it

is also important for the practitioner to evaluate demographic information and

psychosocial information, as this can impact self-care management skills as well as

health outcomes. Through these interviews, it was found that identifying social and

environmental situations that may impact self-management is imperative for

practitioners and will assist in planning patient specific education and treatment for

patients with T1DM.

<div align="center">Group DSME</div>

Group DSME is also a recommendation that appears in multiple different studies.

Assessing current knowledge of diabetes and self-management skills should be done at

each appointment to identify areas for teaching, as recommended by the ADA. Group

DSME classes aimed at specific age groups should be offered in clinics that specialize in

the disease (Garvey, et al, 2017). The APRN's role in DSME is aimed at identifying need

and tailoring education to the adolescent's specific problem areas. It is also

recommended that psychosocial and demographic needs be evaluated before

developing education.

<div align="center">Themes in Literature</div>

Key recommendations and themes were identified in the literature . The first is

that there are gaps in self-management skills and knowledge deficits in the youth with

T1DM that need to be identified to guide the practitioner in building patient specific

education (Chilton, et al, 2015). Another theme was the importance of the practitioner

evaluating demographic information and psychosocial information, as well as risk

factors to poor control, as this can impact self-care management skills as well as health

outcomes, especially in this population (Spencer, et al, 2013). The third theme identified

was that group therapy is recommended and has proven to decrease A1C and improve

overall understanding and self-management of T1DM (Raymond, et al, 2015) and that

DSME should be individualized to optimize understanding and improve outcomes (ADA,

2018, Standards of Medical Care).

Summary of Literature

Although somewhat limited on this specific topic, the overall synthesis of current

literature and practice guidelines supports the notion that group DSME aimed at

adolescents and at patient specific concerns does improve understanding and ability to

manage T1DM and improves health outcomes in the present time as well as decreasing

long-term complications and decreasing health care costs.

CHAPTER THREE – METHODS

Human Subjects Consideration

Applications for IRB were sent in to Montana State University and Billings IRB.

Exemption was granted by both. Consents and assents were not needed based on IRB

exemption related to the minimal risk involved in the study. No identifying patient

information was gathered. Participant information sheets were also mailed to their

homes two weeks before class.

Population

Criteria for participation include the diagnosis of T1DM and being age 13-18. The

setting was an outpatient pediatric diabetes clinic serving approximately 200 adolescent

patients with T1DM. Ten participants were chosen to participate in a four hour DSME

class that would be used to gather current knowledge and obtain information on what

topics are important to adolescents with Type 1 diabetes. Participants were chosen

using convenience sampling from the project lead's patient population by a nurse in the

diabetes clinic to prevent bias. Once the names were given to the project lead, current

A1C levels were gathered, but not tied to the participant, as the project lead looked to

report overall average of those attending, not individual lab results. At the time of

selection, the parents and patients were given in depth explanation of the project and

the class. The most recent A1C levels were obtained from each of the ten selected

participants to be reported as an average for the group and not linked to any one

participant for this project. Nine participants attended the class.

Setting

The DSME class was held at an outpatient pediatric diabetes clinic in Billings,

Montana. The pediatric diabetes center is part of a large hospital.

Project Design and Tool

Letters containing the date, time, and purpose of the class were sent to

participants and their caregivers. The topics to be covered were also in the letters. Of

the ten participants selected, nine attended the class, the tenth later reported

forgetting about the class date and time. A group adolescent DSME class was held for

four hours on a Saturday in the Diabetes Clinic. The class was started at 10 am and

concluded at 2 pm. Using a pre and post survey tool, Appendix A, the purpose of the

class was to assess pre and post DSME scores in this patient population to identify gaps

in the current knowledge level regarding their disease process.

At the class, participants were given packets with their identification numbers

one through nine. The packets contained pre- and post-surveys with the linking

identification number. The participant number was randomly assigned as packets were

handed to participants as they entered class. Demographics, such as age, year of

diagnosis, and sex, as well as current level of diabetes knowledge and confidence levels

were collected prior to the start of class. The packets were sealed after class and kept by

the project lead, with no participant identifiers, to be analyzed at a later date.

Knowledge Survey

The survey included twelve evaluation questions regarding diabetes knowledge

of self-management and utilized a numeric rating scale of 1 through 5. A score of one

was poor understanding, and the score of five was excellent understanding. Participants

filled out the before class to assess baseline knowledge.

Confidence Survey

This survey also had eight evaluation questions related to confidence level in

performing diabetes self-management skills. The numeric scale for these questions was

1 through 10, with one being not at all confident, and ten being completely confident.

Participants filled out the survey prior to class to assess baseline confidence in managing

diabetes.

Post Class

The post survey on knowledge and confidence was done at the end of class and

was the exact same surveys done prior to class. The knowledge and confidence surveys

were developed by the Advancing Diabetes Self-Management program with the support

of the Robert Wood Johnson Foundation (APPENDIX A).

Class topics and related curriculum from the AADE 7 components (APPENDIX B) were given to each participant and they were encouraged to ask specific questions related to their needs as we discussed each component. The participants were also asked to discuss their biggest concerns, questions, or areas of confusion related to their disease and the management of it.

The seven components discussed at the class were blood glucose monitoring, healthy eating, exercise, taking medications, problem solving, reducing risk for complications, and coping skills. Each component was explained by the project lead, and then open discussion was encouraged to identify what part about that component is important to the group, and how could it be tailored to better suit all adolescents in the future. The class lasted approximately four hours, although time was allotted for six. The majority of the time was spent in open group discussion on the seven components, based on recommendations for motivational interviewing (Kaugars, Kichler, & Alemzadeh (2011).

Figure 3: Class Curriculum

1. Diabetes: Disease process and anatomy and insulin effects
2. Glucose Monitoring
3. Carb Counting and Heathy Eating
4. Exercise and diabetes
5. Problem Solving in the day to day
6. Reducing Risk, acute and long term complications
7. Coping with T1DM

<u>Methods Summary</u>

After obtaining IRB, exempt status was granted as no patient identifiers were gathered. The participant and parents were informed about the purpose of the project, and gave verbal consent for the participant to be in the project. The pre- and post-survey tools were used to evaluate knowledge and confidence levels before and then again after the four hour class. The packets given to the participants were numbered and contained pre and post surveys with the same number as the packet to link the surveys to each individual participants. Nine of the ten selected participated and completed their pre- and post-surveys and engaged in group discussion and DSME for over four hours. Group discussion seemed to be popular among the participants and the discussions did lead to participants sharing their stories and ideas regarding living with

diabetes with each other. Participant packets were sealed and collected after class for

analysis at a later time by the project lead.

CHAPTER FOUR – RESULTS

Demographics

Each of the nine participants filled out the same demographics form, listed in

Appendix A. Participants were asked not to share address or date of birth, and just put

age on the demographics page. The average age was 15.5. Individual demographics

collected and individual pre and post scores are listed in below in Table 1.

Table 1: Demographics and scores

| Partici-pant	Age	Length of Dx	Method Rx	Pre Know	Post Know	Pre Conf	Post Conf
#1	16	13	Pump	4.6	4.8	9.1	9.3
#2	15	1	pump	3.8	4.1	8	8.9
#3	16	4	shots	3.6	4.9	8	9.4
#4	17	7	pump	3.4	3.9	6.8	8.4
#5	14	4	shots	3.4	4.2	6.9	8.9
#6	17	9	pump	4	4	8.6	8.6
#7	13	1	pump	4.3	4.3	8.4	8.5
#8	15	7	pump	3.3	4.2	8.4	8
#9	17	7	pump	4.2	4.6	8.1	7.4
Mean	15.5	5.89 years	78% pump	3.84	4.33	8.03	8.60

Average Length of Diagnosis

Of the nine participants, the average length of diagnosis was 5.89 years, with a

range of one year to 13 years (Table 1).

Average A1C

The average A1C of the group was 8.28%. Individualized A1C scores were not

linked to the participant, but gathered for an average during participant selection. The

recommended A1C is 7.5% or less for healthy young adults (ADA, 2018). The average for

this group is well over the recommendation, and could be correlated with running a

higher A1C due to history of hypoglycemia in which case the adolescent is fearful of

hypoglycemia, lack of self-management skills or low knowledge of the disease process.

The table below shows the difference between the class mean A1C and the A1C level

recommended by the ADA (2018).

Table 2. Recommended A1C versus class mean A1C
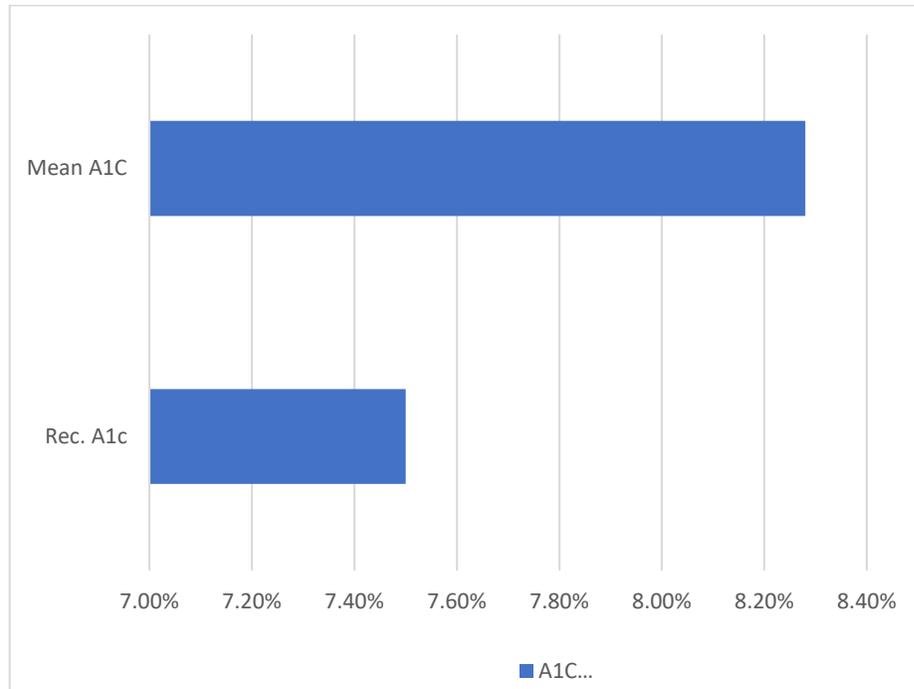
Insulin Delivery Method

Those with T1DM can take their insulin by injections, known as Multiple Daily Injections (MDI) or by continuous subcutaneous insulin infusion (CSII), commonly known as an insulin pump. Of the nine participants, 78% were on CSII therapy and 22% were on MDI (see Table 1).

Pre and Post Knowledge Survey Score

There were nine observations for the survey. Using a comparative means T-Test, the t-test statistic was found to be 3.35, which is outside of the accepted range of -2.31 to 2.31. Figure 4 depicts these results, and the t-score being outside of the accepted range rejects the null hypothesis that there is no change in pre and post knowledge means.
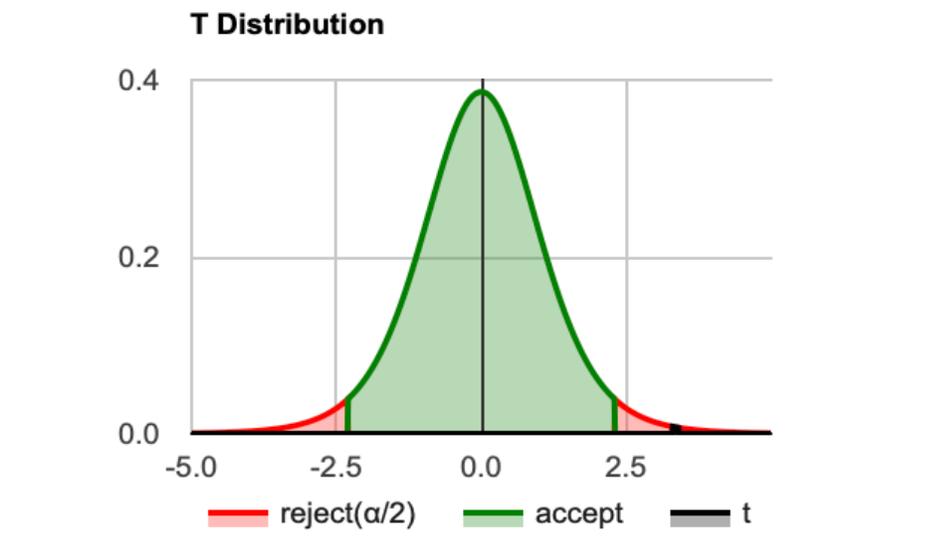
Figure 4: T-test

Table 3 depicts the scores before and after class. The maximum score for the Knowledge Survey is five, with five indicating perfect knowledge and understanding. Of the nine participants, the mean score for Pre-Knowledge was 3.84 with a standard deviation(SD) of 0.46. The Post-Knowledge mean value score was 4.33 with a SD of 0.35. This is a positive change of 0.49 in score means from pre class to post class.

Table 3: Pre versus post knowledge mean scores

Pre Knowledge: 3.84

Post Knowledge: 4.33

Pre Knowledge   Post Knowledge
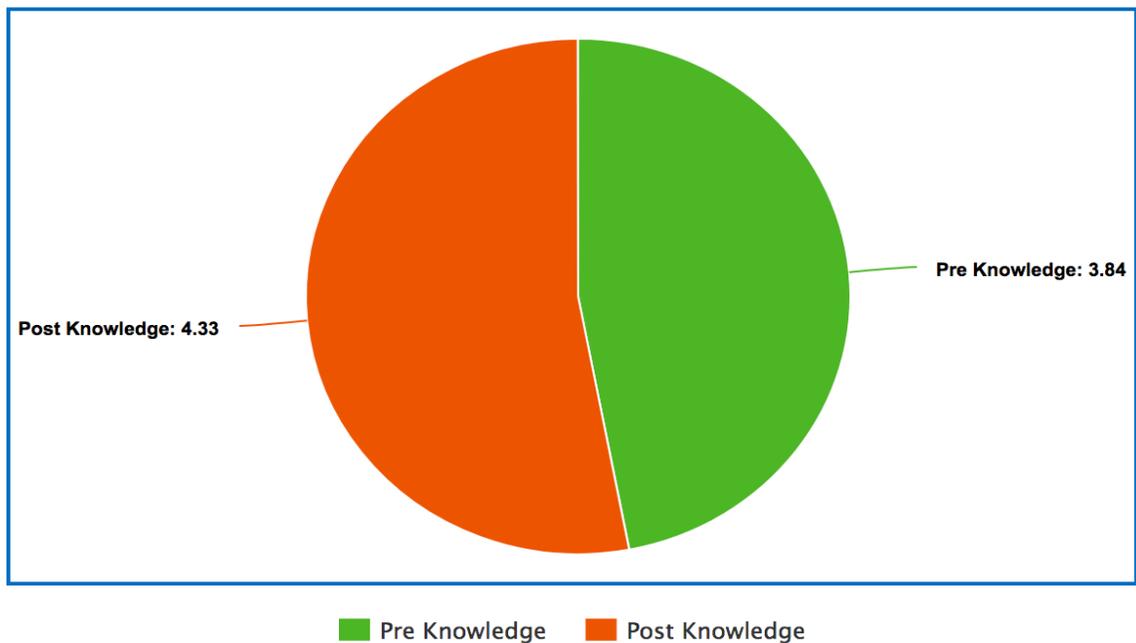
Pre and Post Confidence Scores

The maximum score for the Confidence Survey was 10 with a score of 10 indicating complete confidence in diabetes management. Again, there were nine observations. Using a comparative means T-test, the t-statistic equals -1.73, and falls within the accepted range of -2.12 to 2.12 (Figure 5). This result indicates that the

difference between the pre-confidence and post-confidence means are not statistically

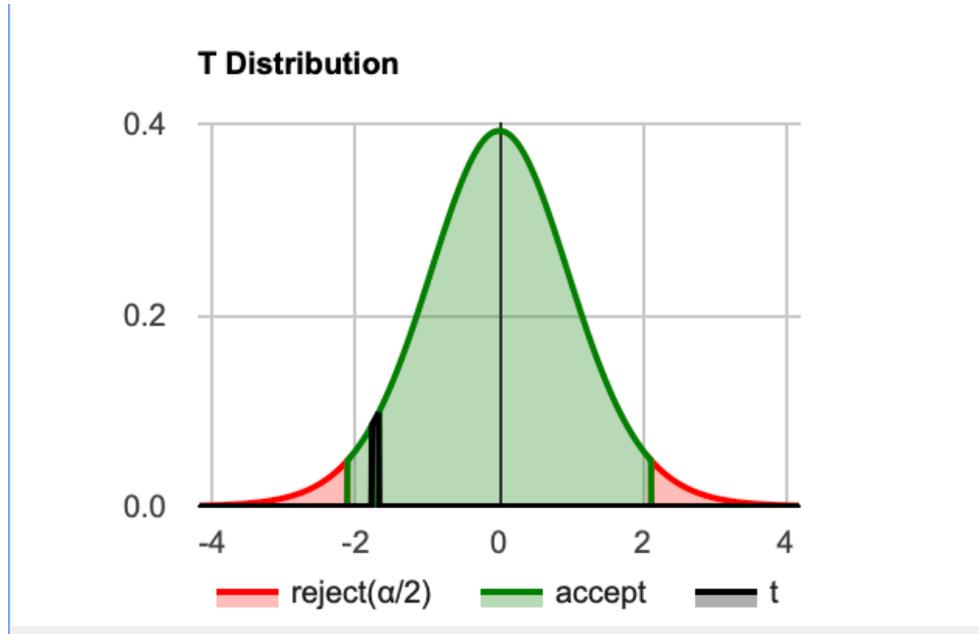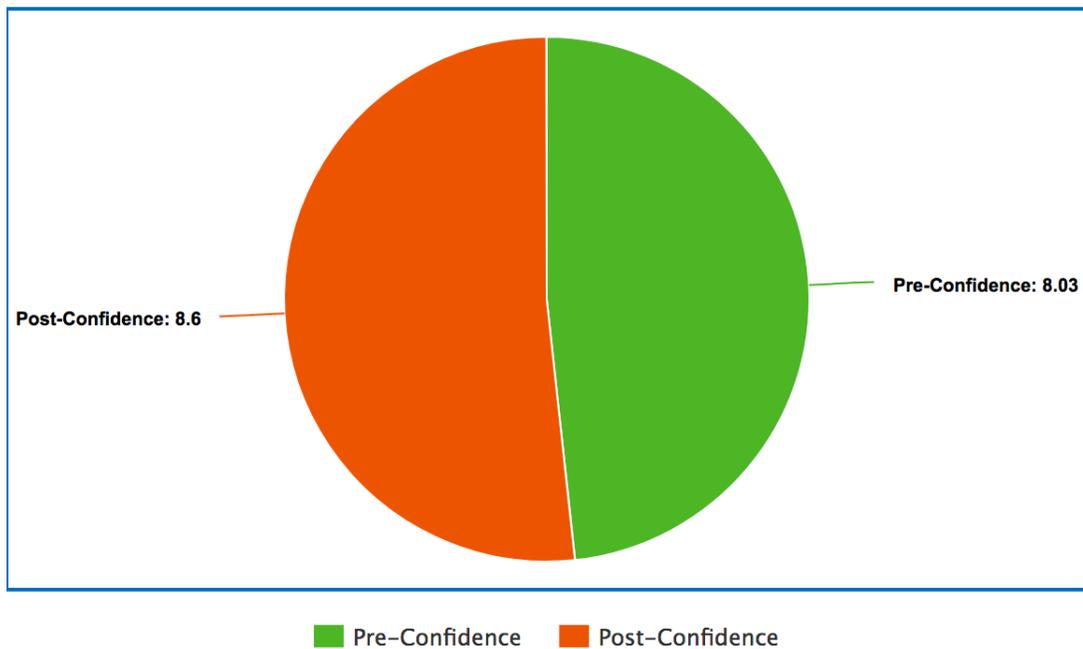significant.

Figure 5: T-test Confidence

Table 4 below shows the change in score. The mean score for pre-confidence

was 8.03 and the mean score for post-confidence was 8.60 with respective SD for pre-

confidence being 0.75 and 0.62 for post-confidence. This is a positive increase in score

mean of 0.57.

Table 4. Pre and Post confidence mean scores

Group Discussion

Group discussion among the participants was robust during class. They all shared stories and tips related to diabetes feelings, management, and even insulin delivery methods. Participants reported to the project lead that being able to have peer to peer discussions led to feelings of support and not being the "only one" with T1DM. Other key finding that resulted from the group discussion was the need for a possible support group or Facebook group where adolescents with diabetes could go to chat or vent about living with T1DM, as well as offer guidance and tips for living the day to day with the disease.

Results Summary

The average Hemoglobin A1C for the group was 8.2%, over the target of 7.5% by 1.2%. There were more females than males, 67% of the participants being female, although this did not seem to be related to scores. The average length of diagnosis was 5.89 years, with the newest diagnosis being <1 year and the longest being >10 years. Over 78% of the group were using CSII for their insulin delivery. The overall average of post scores on the knowledge survey did increase with 100% of the group have overall higher post scores, although only 78% of the participants had higher post scores on the confidence survey. These cumulative results from both surveys lend to the assumption that age specific DSME content can contribute to improved understanding and confidence in management of T1DM.

CHAPTER FIVE – DISCUSSION

<u>Findings</u>

Results of the post survey do show an increased score in knowledge and confidence. The participants had an average A1C 0.7% greater than the recommended A1C of 7.5%. Of the participants, 78% used CSII versus those on MDI. The group was 67% female, and the average length of diagnosis was 5.89 years. Age ranged from 13-17, with mean age being 15.5 years.

The top score on the pre-knowledge score is a five, and the mean pre-knowledge score was 3.84, compared to the post knowledge score of 4.33. On the pre-confidence survey, the highest self-score is a ten, and the mean score was 8.03 compared to a post-confidence score of 8.6. Pre and post scores for both knowledge and confidence showed no statistical difference related to age, however did seem correlate with length of diagnosis (Table 1). The results also show that participants scored higher in their pre-knowledge versus pre-confidence surveys, possibly indicating that adolescents in this group have some diabetes self-management knowledge but lack the confidence to use that knowledge and apply it to daily diabetes life.

There was a significant difference in the means of the pre and post knowledge scores. The mean score on the confidence survey did go up after class, however there was no significant difference in the means for the pre and post confidence survey.

Only 22% of the participants scored lower on the post confidence survey versus the pre-survey which could be related to the phenomenon of not knowing what they didn't know before class. Of the nine adolescents attending, 100% of participants scored higher on the post knowledge survey than on the pre-survey.

A secondary finding was the common theme from the group of DSME being more age appropriate and discussing the pathophysiology behind the disease on a level that is understood by adolescents. The group listed pathophysiology of T1DM as their number one component for education. The group felt that this important part of DSME allows for a better understanding as to why they must manage their diabetes every day to stay healthy.

Other topics the group would like to see in adolescent DSME are:

- Description of what hyperglycemia and hypoglycemia are, specific targets for age and activity level, and treatment of both high and low blood sugars. They also suggested including specific discussion and education related to back up plans if they experience insulin pump failure.

- Carbohydrates and how to calculate servings, as well as the action of carbohydrates in the body and the effects on BG. They also would like it to be added in to the curriculum that those with T1DM are not generally restricted on food intake

- Difference between T1DM and Type 2 Diabetes Mellitus (T2DM)

- Different insulin and the action in the body

- Complications that can affect them at their age, as talking long term

  complications seems to be more than what they can apply to their current

  life stage

- How to be prepared daily and what the basic management skills that are

  needed to maintain health, as well as information on how to be prepared to

  be out on their own (how to navigate insurance, refills, doctor appointments)

- More information to the public regarding their disease, as they felt there was

  too much focus on T2DM that leads to misunderstanding among peers and

  teachers, leading to stress among the adolescents.

- How to cope with a chronic illness

Limitations

The small sample size (n=9) of the class is a limitation to generalization of results

among all adolescents with T1DM. Another limitation is the length of the class, which in

this age group can sometimes lead to information fatigue, which may poorly affect post

scores and not reflect true survey responses.

Recommendations and Implications for Practice

Adolescence is an age of seeking independence and finding one's identity.

Adding in a chronic illness such as T1DM can make this age even more difficult. Among

the struggle of finding independence, the day to day requirements of being diabetic is

overwhelming and the knowledge and coping skills related to daily management for this age is often lacking. DSME is already a recommendation for diabetes care, but the current curriculum does not address adolescent specific topic content in which they feel they can apply to their life. Group diabetes classes for adults are already being conducted in larger diabetes centers and are showing great promise for increased understanding and improved health outcomes, indicating that utilizing this technique for adolescents could show the same results. Although this project had a small sample, the outcomes did show improvement in both knowledge and confidence in caring for T1DM. Recommendations for clinical practice would be to continue offering this type of DSME to the adolescent population to obtain long term results and determine replication of results with each class of different participants.

Including more age specific content for DSME for this age group would also be recommended to those who work in diabetes care. Whether or not the current curriculum is changed to include adolescent specific areas of concern will require further study but having a set of specific adolescent DSME guidelines would ensure that all diabetes educators and specialists are relaying the same message. Individualizing any DSME curriculum would still have to take place in certain situations, as there is not a one size fits all approach to educating patients.

Conclusion

Adolescents with T1DM have a gap in knowledge on the disease and self-management skills. Although guidelines exist for DSME and recommendations for educational topics, the literature suggests that the current guidelines may not work for this specific age group. Research in the area of T1DM and adolescents is pointing to a new direction of age specific, group DSME that is directed at educating adolescents on their specific needs and capabilities. Current guidelines are general and based on both T1DM and T2DM and do not have age specific recommendations for educational topics or outcomes. Implementing a group DSME program for adolescents can improve knowledge, coping and self-management skills, ultimately increasing health outcomes and decreasing costs.

Results of this project reveal the need for further research into short and long-term outcomes, such as changes in A1C, after adolescents attend group DSME classes that are tailored to their age group. Further changes in adolescent specific DSME curriculum should be examined as well, so there is consistency among diabetes health professionals and the information that is being share with diabetics in this population. The group also voiced the benefit of having a group class was the opportunity to discuss concerns and troubleshoot ideas among their peers, as well as meeting other with T1DM and creating relationships. The group setting also allowed open discussion on what topics in DSME curriculum is important to them at this stage of their life. Results of this project were significant enough that the diabetes center in which the class was held

will implement group classes quarterly over the next year as part of quality improvement for both the facility and patients who attend the clinic.

Increasing knowledge on disease processes and self-management at an early age is vital to long term outcomes for those with chronic health issues. Engaging and educating this population as soon as possible could lead to better lifestyle choices, improved disease management and improve overall quality and quantity of life. By offering an environment in which adolescents with T1DM can network with their peers while receiving education on their disease will also lend to a better sense of support to this population.

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APPENDICES

APPENDIX A

DIABETES PROJECT PARTICIPATION QUESTIONNAIRE

Pump or MDI? (Circle one)

Diabetes Project Participation Questionnaire

All of this information will be kept **CONFIDENTIAL**.

PID#_____ (office use only)

1. Name_____   Age:

2. Address _____City _____State ____ Zip
    Code _____

3. Phone_____ Insurance _____

4. Do you have Diabetes? ☐Yes   ☐ No

    If Yes, what type?   ☐1   ☐2   ☐Gestational

5. When were you diagnosed with Diabetes? (what year?) _____

6. If you do not have diabetes, do you have a ☐ family member or ☐friend with
    diabetes

Health Status

Height_____ Weight_____ Date_____   Blood Pressure_____
Date_____

11.   Is there one particular doctor that you think of as your regular personal doctor?
        ☐Yes ☐No

12. Are you currently receiving regular medical care for your   ☐Yes   ☐No
    diabetes?

13. Have you had a Hemoglobin A1c test in the past 6 months?   ☐Yes   ☐No

Diabetes Knowledge

Circle one answer for each line

14.	How do you rate your understanding of:	Poor		Good		Excellent

a)
overall
diabetes
care

12   3   4   5

	b) ways to cope with stress	1	2	3	4	5

c)   1 2   3   4   5
meal
plan
for
blood
sugar
control

	d) the role of exercise in diabetes care	1	2	3	4	5

e)   1 2   3   4   5
medications
you are
taking

	f) how to use the results of blood sugar monitoring	1	2	3	4	5

g) how diet,   12   3   4   5
   physical
   activity,
   and
   medicines
   affect
   blood
   sugar
   levels

	h) prevention and treatment of high blood sugar	1	2	3	4	5

i) prevention   1   2   3   4   5
    and
    treatment
    of low
    blood
    sugar

	j) prevention of long-term complications of diabetes	1	2	3	4	5

k)   12   3   4   5
taking
care
of
your
feet

l) benefits of improving blood sugar control   1   2   3   4   5

How sure are you?

Having a condition like diabetes means doing different tasks and activities to manage your health. (**Circle** the number that corresponds to your confidence that you can do the tasks regularly at the **present time**.)

How confident are you that you can,

15.   do all the things necessary to manage your condition on a regular basis?

     Not at all   1   2   3   4   5   6   7   8   9   10   Completely
     confident   confident

16.   keep stress and worry from interfering with the things you want to do?

Not at all   1   2   3   4   5   6   7   8   9   10   Completely
confident   confident

17.   follow your meal plan when you have to prepare or share food with other people who do not have diabetes?

Not at all   1   2   3   4   5   6   7   8   9   10   Completely
confident   confident

18.   choose the appropriate foods to eat when you are hungry (for example, snacks)?

Not at all   1   2   3   4   5   6   7   8   9   10   Completely
confident   confident

19.   exercise at least 15 to 30 minutes a day, 4 to 5 most days of the week?

Not at all   1   2   3   4   5   6   7   8   9   10   Completely
confident   confident

20.   know what to do when your blood sugar level goes higher or   lower than it should be?

Not at all   1   2   3   4   5   6   7   8   9   10   Completely
confident   confident

21.   judge when the changes in your health mean you should visit the doctor?

Not at all   1   2   3   4   5   6   7   8   9   10   Completely
confident   confident

22.   control your diabetes so that it does not interfere with the things you want to do?

Not at all   1   2   3   4   5   6   7   8   9   10   Completely
confident   confident

Health Behavior

PLEASE ANSWER THE FOLLOWING PERTAINING TO AFTER YOU TOOK THE DIABETES – SELF MANAGEMENT CLASS:

23.   How often have you been told to check your blood sugar?

_____

_____

24.   How often did you follow that schedule for checking blood sugar during the past week?

☐   None of the time   ☐   Some of the time

☐   A good bit of the time ☐   All of the time

25.   What type of meal plan have you been told to follow to manage your diabetes?

☐   Small frequent meals ☐   Food Guide Pyramid

☐   Plate Method   ☐   Counting Carbohydrates

☐   Five a day   ☐   Other (please specify)

_____

26.   Thinking about your meal plan, how often did you follow this plan during the past week?

☐   None of the time   ☐   Some of the time

☐   A good bit of the time ☐   All of the time

27.   During the past week, how often did you participate in regular exercise, and for how long did you exercise each time?

Number of times _____

Length of time _____

Type of exercise _____

28.   What do you find to be the hardest part of living with diabetes?

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX B

AADE7 SELF-CARE BEHAVIORS

AADE7 Self-Care Behaviors™

Diabetes is a complex and serious disease and managing it every day can be challenging. To help you, diabetes educators have developed seven key areas to focus on. A diabetes educator can help you set priorities and coach you on each of these areas.

Healthy Eating

Having diabetes doesn't mean you have to give up your favorite foods or stop eating in restaurants. In fact, there is nothing you can't eat. But you need to know that the foods

Being Active

Being active not just about losing weight. It has many health benefits like lowering cholesterol, improving blood pressure, lowering stress and anxiety, and improving your mood. If you have diabetes, physical activity can also help keep your blood sugar levels to normal and help you keep your diabetes in control.

Monitoring

Checking your blood sugar levels regularly gives you vital information about your diabetes management. Monitoring helps you know when your blood sugar levels

are on target and it helps you make food and activity adjustments so that your body can perform at its best.

Taking Medication

There are several types of medications that are often recommended for people with diabetes. Insulin, pills that lower your blood sugar, aspirin, blood pressure medication, cholesterol-lowering medication, or a number of others may work together to lower your blood sugar levels, reduce your risk of complications and help you feel better.

Problem Solving

Everyone encounters problems with their diabetes control; you can't plan for every situation you may face. However, there are some problem-solving skills that can help you prepare for the unexpected -- and make a plan for dealing with similar problems in the future.

Reducing Risks

Having diabetes puts you at a higher risk for developing other health problems. However, if you understand the risks, you can take steps now to lower your chance of diabetes-related complications.

Healthy Coping

Diabetes can affect your physically and emotionally. It's natural to have mixed feelings about your diabetes management and experience highs and lows. The important thing is to recognize these emotions as normal but take steps to reduce the negative impact they can have on your self-care.

APPENDIX C

EVIDENCE TABLE

AUTHORS(s)	TYPE OF STUDY	SAMPLE	SUMMARY OF RESULTS
Babler, et al (2016)	Qualitiative grounded theory 15 interviews aimed at assessing knowledge, ability, and responsibility towards accepting diabetes in everyday life and promoting diabetes self – management (DSM) skills	N=15 Age: 11-15 Knowledge Assess/DSME? **YES**	Interview results showed that adolescents move into a phase where they can perform DSM skills at their own pace, and that they were more likely to achieve this with education, praise, and continued support from both family and practitioner to improve health outcomes with T1D.
Beck, et al (2015)	Correlation Descriptive study: 25 question surveys for assessing current knowledge of youth and parent and associated A1C	N=75 Ages 15-25 Knowledge assess/DSME? **YES**	Those who scored higher knowledge scores had lower A1C levels which indicated the better educated the youth is, the better controlled their diabetes is.
Buchberger, et al (2016).	Meta-Analysis/systematic review	N=14 studies Age: adolescent with Type 1 diabetes and depression and self-management skills; Knowledge assess/DSME**? NO**	Youth with T1D have higher report of depression/anxiety related to disease, lack of knowledge of disease, and therefore poor glycemic control.
Clark (2008)	Systematic Review	N=11 Age: all ages Knowledge assess/DSME? **YES**	Patient focused DSME has a positive effect on health outcomes of patients with diabetes.
Chilton, et al (2015).	Qualitative Grounded Theory; Social Constructivist	N=13 Age: 13-16 Knowledge Assess/DSME? **YES**	Provides a framework for Understanding the road blocks and frustrations and gaps in self-management knowledge in the

			youth, allowing for practitioners to better understand and create patient specific education and support.
Kaugars, et al (2011).	Qualitative Motivational Interviewing and self-reported questionnaire	N=69 Age: 12-17 and primary care givers Knowledge assess/DSME? **YES**	Practitioner who assess and understand a youth and family's difference in stages of readiness to change and the youth to take on more DSM is critical for patient continued education and outcomes.
Law, et al (2013).	Qualitative; self reported questionnaire	N=203 adolescents and primary caregiver Age: 11-18 Knowledge Assess/DSME? **YES**	Lack of self-management and distress among youth and parent lead to higher A1C. Indications for practitioner to provide adolescent and family direct education and care plans
Mulvaney, et al (2011).	RCT	N=41 Age: 13-17 Knowledge Assess/DSME? **YES**	63% of participants gave a grade of A (excellent) for the online DSM interactive online program. Youth felt the program provided support and education for the DSM needs.
Pillay, et al (2015).	Systematic Review	N=36 studies Age: all Knowledge Assess/DSME? **YES**	Reduction of A1C at 6 months after use of a diabetes management behavioral program when compared to controls:A1C was lower in adults than in youth although youth had improvement as well: improvement a 12 months was not significant; individual diabetes

			therapy showed some benefit
Spencer, et al (2013).	Qualitative Interpretive phenomenological approach	N=20 Age: 13-16 Knowledge Assess/DSME? **YES**	Study assessed individual needs for DSM and identified social and environmental causes that lead to poor self-management of T1D. Practitioners should understand these issues and create individual plans of care for education and treatment with these social and environmental issues in mind.