School Nurses' Roles in Diabetes Education and Management for Students with Type 1 Diabetes in School Settings

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Abstract

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for Students with Type 1 Diabetes in School Settings

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Background: Type 1 diabetes (T1D) is one of the most common pediatric chronic diseases in schools. Students with T1D experience challenges in schools related to disease management, development, and in-school support. School nurses, designated health care professionals, are responsible for helping and supporting students with T1D manage their disease and needs through continuous interactions with students, families and school personnel.

Purpose: The overall purpose of this research is to gain a broad understanding of school nurses' roles in diabetes education and management for children with T1D in school settings through

examination of the following: 1) the interrelations between school nurses' attitudes about diabetes and self-efficacy in diabetes management and education including diabetes care behaviors, 2) the nature of school nurses' attitudes and support for transitional care for children with T1D in school settings, 3) the interrelations between the levels of school nurses' educational preparation and their self-efficacy as well as attitudes related to delivering diabetes education and management to children with T1D, and 4) school nurses' attitudes about their actual and potential activities related to diabetes education.

Methods: A total of 114 school nurses who provided diabetes care in schools participated in a descriptive study. Participants completed online surveys about demographic information, school nurses' roles, diabetes attitudes, self-efficacy in diabetes education, self-efficacy in diabetes management, and diabetes education/transitional care. From those who completed the surveys, 20 convenience sample participants participated in semi-structured interviews.

Results: School nurses had positive attitudes toward diabetes related issues, a moderate level of confidence in diabetes education and diabetes management, and a moderate or higher level of implementation of recommended nursing practice for students with T1D. School nurses' diabetes attitudes were not related to their self-efficacy in providing diabetes education, but nurses' attitudes towards the psychosocial impact of diabetes were significantly related to their self-efficacy in providing diabetes management (managing insulin pumps, administering glucagon, and counting carbohydrates) and the number of diabetic students school nurses took care of was a significant contributor to this interrelation. Holding a higher nursing credential was associated with having positive diabetes attitudes, but not with having higher levels of self-efficacy in diabetes education and diabetes management. Having a national school nurse certification was positively related to school nurses' self-efficacy in diabetes education and counting

carbohydrates. Nurses' work status and the type of school they worked in were significantly related to their self-efficacy in providing diabetes education. The interview data revealed the core construct of school nurses' perceptions of transitional care to be "supporting students to gain autonomy in diabetes management based on continued care in school systems." School nurses' perceptions focused on care continuity of diabetes management in a new school along with increasing independence in diabetes management. Both the survey and interview data revealed that school nurses providing care for transitional care focused on preparation for upcoming changes involved with diabetic students' transitions to a new school environment including attaining diabetes self-management. School nurses also suggested coordinating care, transferring health documents to the next school, and promoting students' independent diabetes management for successful transitional care in schools. The core construct of the reasons for initiating diabetes education for students with T1D was "instantly responding to a diabetes-relevant situation" in schools. School nurses provided diabetes education to meet diabetic students' immediate diabetes management needs. School nurses also suggested three possible formats for diabetes education in schools to ensure a proper approach with systemic preparation: short, one-on-one education enhancing diabetes management skills, group sessions for social-emotional support, and systemic readiness for diabetes education that includes a standardized curriculum and fulltime school nurses.

Conclusions: School nurses having positive diabetes-related attitudes was related to having a higher level of self-efficacy in providing diabetes management not to having self-efficacy in diabetes education; however school nurses' self-efficacy in diabetes management was highly correlated with their self-efficacy in diabetes education. Also, school nurses' credentials were a significant contributor only to their diabetes-related attitudes. In contrast, holding a national

certification of school nurse was associated with self-efficacy in providing diabetes education and diabetes management in carbohydrate counting. Attitudes of school nurses assisting students in diabetes management were significantly related to their experience of providing transitional care to students with T1D. Also, nurses' self-efficacy in diabetes education was significantly associated with their experiences providing transitional care. School nurses perceived transitional care as support for enhancing students' independence in diabetes management in schools and relevant care content focused on preparing students and families for new school environments and maintaining similar levels of diabetes care. School nurses' diabetes education was mainly initiated based on the immediate needs of students in diabetic situations, not on the long-term goals of diabetes management. In addition, systemic approaches to diabetes education were identified as possible formats for diabetes education based on diabetic students' levels of self-management and development. The new knowledge generated from the findings provides information about school nurses' practices for caring of students with T1D and relationships between their diabetes-related attitudes and confidence in diabetes education and management, so current practices can be developed to more effectively support diabetic students in schools. In addition, the study findings help school nurses understand the importance of transitional care and necessary nursing care in school systems for students with T1D.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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DEDICATION

To my father, Nak-Jong Lee, and my mother, Ok-Hee Choi,

who have always supported me in challenging life

Chapter 1. Introduction

Growing populations suffering from diabetes are one of the major health care issues in the Unities States (Centers for Disease Control and Prevention [CDC], 2015). According to the CDC, in the United States, 29.1 million people who are 20 years or older have diabetes, including undiagnosed diabetic populations, meaning that one out of four people suffer from the disease (CDC, 2014). In 2009, the prevalence of type 1 diabetes (T1D) among populations younger than age 20 was 1.93 per 1,000 and the prevalence of type 2 diabetes (T2D) was 0.24 per 1,000, (Pettitt et al., 2014). Also, diabetes is considered one of the major chronic illnesses that must be managed in school settings (Jaser et al., 2012; Marshall, Carter, Rose & Brotherton, 2009).

Statement of Problem

Diabetes management is challenging for people with diabetes due to its complicated medication regimens, and required nutrition and exercise routines (Haas et al., 2014). Understanding and performing diabetes management takes time. The majority of people with T1D are diagnosed during childhood (Gan, Albanese-O'Neill, & Haller, 2012; Gregory, Moore, & Simmons, 2013; Sperling, 2014). Children with T1D face complicated disease management tasks with or without developmental capabilities (Scott, 2013; Silverstein et al., 2005). Parents are the primary caregivers who provide necessary diabetes care for their children who do not have the ability to perform all required tasks, such as insulin injections, food choices, and carbohydrate counts (Martin et al., 2012; Silverstein et al., 2005).

Students with diabetes spend most of their daytime in schools (Benassi, Drobny, & Aye, 2013; Faro, Ingersoll, Fiore, & Ippolito, 2005; Izquierdo et al, 2009), and they face many challenges related to managing their disease during school hours, such as difficulties taking

medication, psychosocial issues, and lack of school support (Edwards, Noyes, Lowes, Haf Spencer, & Gregory, 2014; Marks, Wilson, & Crisp, 2013; Silverstein et al., 2005; Tolbert, 2009; Whittemore, Jaser, Guo, & Grey, 2010). Fortunately, in many countries, school nurses are available to support students by providing necessary health care in school settings (Wang & Volker, 2012).

Many researchers have studied the roles of school nurses as care providers, educators, supporters, and coordinators. However, there is little literature concerning how school nurses' attitudes, experiences, and backgrounds might influence their current practice of diabetes education and management in school settings for improving diabetes self-management in children with T1D. Little is known about how diabetes education may be delivered differently depending on the credentials school nurses have, their education levels, or the topic of education. Even though the importance of age- and developmentally-appropriate diabetes education has been emphasized in the literature, there is very little information about: 1) educational formats and programs that school nurses can apply to their practice; 2) reasons that school nurses initiate diabetes education in school settings; and 3) transitional care (e.g., care related to discharging from hospital, transferring schools or grade levels, and moving from childhood to adolescence, in addition to emerging from pediatric care to adult care) provided by school nurses.

Purpose/Specific Aims

The purpose of the study is to gain a broad understanding of school nurses' roles in diabetes education and management for students with T1D in school settings.

The study aims are the following:

1. Describe the interrelations between school nurses' attitudes about diabetes and self-efficacy in diabetes management and education including diabetes care behaviors.

2. Describe the nature of school nurses' attitudes and support for transitional care for students with T1D in school settings.
    - Identify relationships between nurses' experiences of providing transitional care to diabetic students, diabetes attitudes, self-efficacy in diabetes education and management, and practice in schools.
    - Explore nurses' perceptions of transitional care, care provided and transitional care suggested.
3. Explore the interrelations between the levels of school nurses' educational preparation and their self-efficacy and attitudes related to delivering diabetes education and management to students with T1D.
    - Describe the relationship between the different credentials held by school nurses and their diabetes-related attitudes and self-efficacy in diabetes management and diabetes education for students with T1D.
    - Describe the relationship between number of school nurses attending any educational training for diabetes management and their self-efficacy and diabetes-related attitudes management education.
4. Explore school nurses' attitudes about their actual and potential activities related to diabetes education.
    - Explore potential cues for initiation of diabetes education in students with T1D.
    - Explore a possible format for diabetes education provided by school nurses in terms of improving diabetes self-management in students with T1D.

Background and Significance

Diabetes self-management behaviors are viewed as an outcome of systematic interactions across four domains: the individual, the family, the community, and the healthcare system (Modi et al., 2012). Furthermore, as school nurses occupy a unique position blending community health nursing and public health nursing, the following roles they play in promoting health for children with diabetes have been highlighted: skilled clinicians, advocates for meeting students' needs, health educators, counselors, and health liaisons to the community (Selekman, 2013). Factors affecting diabetes management and diabetes education for children with T1D in school settings, which school nurses are involved in, are presented in this section.

First, diabetes management for children with T1D in school settings is a challenge for children themselves, as well as for parents, and school nurses (Edwards et al., 2014; Kelo, Martikainen, & Eriksson, 2011). Lack of school support, difficulties in insulin administration, misunderstanding of necessary snacking, frequent bathroom use, peer-related issues, and emotional distress are reported by children and parents (Edwards et al., 2014; Marks, Wilson, & Crisp, 2013; Tolbert, 2009). Lack of knowledge about diabetes among teachers and school staff is one of the challenges for students with T1D in school settings (Edwards et al., 2014; Marks et al., 2013; Tolbert, 2009). Also, some school nurses perceived that they lacked knowledge about T1D (Edwards et al., 2014). Lack of access to resources is another challenge faced by school nurses (Wang & Volker, 2012).

Second, developmental expectations for children with T1D are important considerations in diabetes management (Coffen, 2009; Knowles et al., 2006; Lange, Swift, Pańkowska, & Danne, 2014; Silverstein et al., 2005). Diabetes management is not easy to perform even for adults with diabetes (Haas et al., 2014). Children with T1D need to achieve their own

developmental milestones, as well as master their disease management skills in shared management with their parents (Guo, Whittemore, & He, 2011; Scott, 2013; Silverstein et al., 2005). During the shared management processes, children and adolescents with T1D acquire an autonomy in diabetes management consistent with their developmental capabilities (Dashiff, Hardeman, & McLain, 2008; Guo et al., 2011; Lange et al., 2014; Modi et al., 2012). The American Diabetes Association (ADA), and the International Society for Pediatric and Adolescent Diabetes (ISPAD) have recommended consideration of developmentally- and age-appropriate diabetes education for children with T1D (ADA 2014; Lange et al., 2014; Silverstein et al., 2005). For example, checking blood glucose (BG) and beginning insulin self-administration under supervision, and reporting hypoglycemia symptoms were expected diabetes management behavior for elementary school-aged children (ADA, 2014). Independently performing self-care was expected for middle school and high school-aged children, depending on capability (ADA, 2014). In one of the SEARCH for Diabetes in Youth studies, which are multi-center and population-based studies, 41.6 % of children ages 10 years and above with T1D (n= 1043) took responsibility for all of their own diabetes management (Jaacks et al., 2014).

Third, the importance of school nurses' roles in diabetes care for children with T1D has been emphasized. According to the National Association of School Nurses (NASN, 2017), school nurses play multiple roles for children with chronic diseases, including T1D. School nurses are care coordinators, case managers, care providers, educators, and advocates for appropriate care not only for children with chronic diseases, but also for their parents, teachers, and other school staff (NASN, 2017). Traditional roles, such as those of care provider and educator, have been reported (Engelke, Swanson, Guttu, Warren, & Lovern, 2012; Tolbert, 2009), including that of case manager with effectiveness in diabetes care in school settings

(Engelke, Guttu, Warren, & Swanson, 2008; Engelke et al., 2012). School nurses are also considered resources for education and information related to diabetes for school staff and teachers who deal with children with diabetes in classrooms (Engelke et al., 2012; Maughan, Bobo, Butler, & Schantz, 2016; NASN, 2012; Tolbert, 2009).

Fourth, consideration of school nurses' preparedness is one of the factors affecting diabetes management in schools (Bachman & Hsueh, 2008). Studies have shown that, once diabetes education is provided to school nurses, their perceived competence in performing diabetes management improves (Bachman & Hsueh, 2008) and the levels of school nurses' confidence increase (Bobo, Kaup, McCarty, & Carlson, 2011; Bullock, Libbus, Lewis, & Gayer, 2002; Eaton-Spiva & Day, 2011). Eaton-Spiva and Day (2011) report that a computerized education module slightly increased knowledge, skills, and confidence related to diabetes management in acute care nurses, but the results were not statistically significant ($p=.412$ for knowledge and skills, and $p=.137$ for confidence). Breneman, Heidari, Butler, Porter, and Wang (2015) find that a continuing education program for school nurses significantly improved experience and competence of diabetes care ($p <.001$).

In summary, diabetes management for children with T1D in school settings involves multiple stakeholders (children, parents, teachers, school staff, and school nurses) and challenges and roles regarding the environmental uniqueness of school settings must be considered. Studies about diabetes management in children and adolescents with T1D have been conducted rigorously. Also, many recommendations are contained in the literature from various professional organizations regarding diabetes management in school settings. However, while school nurses provide diabetes care to children with T1D, very little research has been conducted regarding education that school nurses provide to children with T1D. Studies addressing school

nurses' experiences in diabetes care address diabetes management, but generally do not address the relationships among school nurses' preparation, attitudes, and self-efficacy related to educating children about diabetes. To fill this gap, research is needed to explore integrated views of school nurses' preparation, attitudes, and self-efficacy in diabetes management and diabetes education.

Chapter 2. Review of Related Literature

This study focuses on school nurses who take care of students with T1D in school settings. For a general understanding of T1D, a brief description of diabetes is included in this section. Then, diabetes management in schools, including nurses' diabetes attitudes, self-efficacy in diabetes management, and transitional care, and the Transition Theory (Meleis, 2010) will be discussed.

Overview of Type 1 diabetes

Type 1 diabetes. Type 1 diabetes (T1D) is a chronic, autoimmune disease characterized by progressive insulin deficiency and resultant hyperglycemia associated with destruction of pancreatic islet β cells (Gan, Albanese-O'Neill, & Haller, 2012; Kliegman, Stanton, St. Geme, Schor, & Behrman, 2011). The etiology of T1D is not clear, but the suggested risk factors include genetic, environmental, and autoimmune issues (Gan et al., 2012; Gregory et al., 2013; Sperling, 2014). T1D can occur at any age, but most patients are diagnosed during childhood (Gan et al., 2012; Gregory et al., 2013). This disease is generally viewed as unpreventable, but some studies suggest that intake of high doses of vitamin D in early childhood may prevent developing T1D (Skyler, 2013). According to the SEARCH for Diabetes in Youth study, in the United States, the prevalence of T1D among people younger than 20 years was 1.93/1,000 in 2009 (Dabelea et al., 2014; Pettitt et al., 2014).

Based on the Diabetes Control and Complications Trial (DCCT, The Diabetes Control and Complications Trial Research Group, 1993), it is recommended that patients with T1D have an intensive-therapy regimen of multiple BG checks (at least four times a day) and three or more insulin administrations to decrease diabetes complications and to achieve target BG and hemoglobin A1c (HbA1c) levels. This intensive therapy regimen is intended to reduce and

minimize potential complications of diabetes, such as cardiovascular disease, retinopathy, neuropathy and nephropathy (ADA, 2014; The Diabetes Control and Complications Trial Research Group, 1993). Hence, as per DCCT recommendations, children with T1D need to check BG levels before meals (as a fasting status) and at bedtime, and before snacks between meals as needed (Gan et al., 2012; Sperling, 2014). Older children may not need snacks to maintain BG levels, but younger children need snacks between meals for prevention of hypoglycemia (Sperling, 2014).

Diabetes Management for Children with Type 1 Diabetes

Before discussing diabetes management in school, diabetes self-management and expected development in students with T1D are described, because diabetes self-management is the ultimate goal in diabetes management for children with T1D.

Definition of diabetes self-management. Self-management is a lifetime task for people who are responsible for day-to-day management of chronic disease (Lorig & Holman, 2003, p. 1), and is focused on continuous education or training (Lange, Swift, Pańkowska, & Danne, 2014; Wilde & Garvin, 2007). Schilling et al. (2002) define self-management specifically for children and adolescents with T1D as "an active, daily, and flexible process in which youth and their parents share responsibility and decision-making for achieving disease control, health, and well-being through a wide range of illness-related activities" (p. 92). Therefore, diabetes self-management education (DSME) for children is crucial in supporting these changes among parents and children, in terms of increasing abilities to gain management skills (Lange et al., 2014).

Diabetes management tasks for students with type 1 diabetes. Normal development for children with T1D is expected to be the same as that of children without T1D (Kelo et al.,

2011). In addition to normal development, children with T1D have another task related to their disease: performing or anticipating self-management (Scott, 2012). However, children do not have fully developed cognitive capabilities for understanding and performing complex diabetes self-management behaviors (Berk, 2006; Scott, 2013; Silverstein et al., 2005; Wong, Hockenberry, & Wilson, 2007). They can anticipate diabetes tasks, but task performance needs to be supervised (ADA, 2014). Appropriate diabetes self-management tasks are determined based on a child's age and developmental status, because physical, cognitive, and emotional development are often viewed in terms of chronological age or competency (Bandura, 1997; Silverstein et al., 2005).

School-aged children are expected to learn diabetes management skills based on their development and the duration of diabetes (Jackson et al., 2015). Parents and families mainly provide diabetes management to their children with T1D. Age-adjusted education for school-age children with T1D is recommended in Europe: this includes learning techniques, self-management and self-esteem, adjustment to school, and peer issues (Lange et al., 2012; Robert & Martin, 2010). Self-BG monitoring may begin when children are aged 4-5 years (Scott, 2012). Children aged 5-7 years can participate in learning food choices with food models or pictures (Kawamura, 2007), recognition of symptoms of hypoglycemia or hyperglycemia, behaviors for BG monitoring (fingerstick), and numeric values, although parents need to deliver diabetes care (Jackson & Albanese-O'Neill, 2016; Jackson et al., 2015; Nurrenbern, 2001; Scott, 2013). Children aged 8-10 years can be involved in insulin administration, BG monitoring, and nutritional management in school under adults' supervision (Silverstein et al., 2005). Schilling, Knafl, and Grey (2006) report that parents are involved in much of diabetes care (insulin administration, BG monitoring, treating hypoglycemia or hyperglycemia) for youth aged 8-11

years, who are aware of the meaning of hypoglycemia or hyperglycemia in simple words (lows and highs). However, many parents reported that their children aged 8 or above perform BG monitoring alone in school (Amillategui, Mora, Calle, & Giralt, 2009). Children aged 10-12 years can master and perform insulin self-administration (Clarke, 2011; Scott, 2013). Children aged 11-12 years can take responsibility for snacks under supervision (Clarke, 2011; Students with Diabetes in Colorado Schools Collaborative, 2006). Adult supervision is critical for diabetes self-management in school-aged children (Silverstein et al., 2005).

Adolescents, aged 12-18 years, are capable of insulin self-administration, insulin dose calculation, and BG testing, but they still need adult supervision with reference to the duration of diabetes and developmental maturity (Jackson & Albanese-O'Neill, 2016; Jackson et al., 2015; Scott, 2013). Schilling et al. (2006) reported that adolescents, aged 17-19 years, performed independent self-management with parents' reminders. Adolescents can take responsibility for knowing healthy food choices (Scott, 2013). They gradually recognize the importance of prevention of diabetic complications and well-controlled glycemic status (Students with Diabetes in Colorado Schools Collaborative, 2006). Insulin dose calculation can be performed by the child during early adolescence, and mid-adolescent children can anticipate dose change needs. Adolescents can display skills for adjustment of intake needs to prevent hypoglycemia and hyperglycemia (Scott, 2012). For adolescents, recommended education includes promoting independence along with accepting continued parental involvement, knowledge and self-care, and negotiating targets and priorities (SWEET, 2010). Overall, adolescents are expected to gain autonomy in diabetes management, which is predominantly performed by parents during childhood (Guo et al., 2011).

Students with type 1 diabetes in schools. Children with T1D need to deal with their conditions in school with or without support from parents (Silverstein et al., 2005; Whittemore, Jaser, Guo, & Grey, 2010). The frequency of visits to school nurses related to diabetes care or management is an average of 2.9 times a day per child in elementary schools (Bobo et al., 2011). In the U.S. children with diabetes are protected by federal laws, including Section 504 of the Rehabilitation Act of 1973, the Individuals with Disabilities Education Act, and the Americans with Disabilities Act. Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act protect students with diabetes from discrimination on the basis of disabilities in schools receiving federal funding. Under these federal laws, diabetes is considered a disability. Schools must accommodate the needs of students with disabilities based on individualized assessment. State laws also provide additional protections for children with diabetes in school settings for them to get adequate care, although the level of delegation of nursing care to non-nursing staff varies in each state (Jackson et al., 2015).

Parents, children, teachers, and school staff have expressed concerns about diabetes care in school (Amillategui et al., 2009; Boden et al., 2012; Lewis, Powers, Goodenough, & Poth, 2003; Nabors et al., 2003). Using semi-structured interviews with 22 primary school staff members, Boden et al. (2012) examined the concerns about diabetes care, and identified issues of concern including responsibility for children with T1D in class, diabetes care involvement, such as supporting insulin administration and BG monitoring, and working with families. In this study, five healthcare providers reported fears related to responsibility for diabetes care at school, school system policies, teachers' abilities to deal with hypoglycemia, and dynamics of home/family life (Boden et al., 2012).

Lewis et al. (2003) conducted a study with 47 parents of children with diabetes in a clinic and 65 schools (elementary, middle, high, and middle-high schools) with children with diabetes in three counties to identify barriers to diabetes care in schools and currently available school support. The results of parents' surveys indicated that parents felt there was insufficient school support for children with diabetes (Lewis et al., 2003). Schools reported inadequate support for training personnel, on-site nurses, and parental involvement as barriers to diabetes care (Lewis et al., 2003). Inadequate parental communication regarding medical information and parental involvement were also identified by 50% of schools as inhibitors of diabetes care for children with diabetes. Similarly, Amillategui et al. (2009) reported parents' negative experiences communicating with schools and teachers' lack of knowledge about hypoglycemic episodes and emergency actions (N=430 including 167 parents, 152 children with T1D and 111 teachers). In this cross-sectional survey study, about 65% of children (n= 152) monitored BG at school, and children reported fears related to hypoglycemia and self-administration of insulin, and the need for education of school personnel.

As medical technology develops, insulin can be administered by using an insulin pump, known as a continuous subcutaneous insulin infusion (CSII), in addition to traditional insulin injections with syringes and needles (Churchill, Ruppe, & Smaldone, 2009; Hirsch, 2010). Darby (2006) reports in a phenomenological study with 11 school nurses about their experiences caring for students with CSII, that school nurses initially experienced fear when they took care of children with CSII.

In a mixed-method study with 175 children aged 5 to 14 years in interviews and groups, and 78 parents in surveys, Nabors et al. (2003) reports that 61% of parents indicated the needs for adult supervision for diabetes care, and children indicated a need for improving staff

knowledge, needs for on-site nurses, availability of supplies and snacks, help managing hypoglycemia, teachers' flexibility in diabetes care, reminders for diabetes care, and support from others when facing difficulties managing their disease in schools. In an integrated review of 11 research articles, Tolbert (2009) identifies lack of trained staff, absence of school policies, fear of hypoglycemic events and emergency treatment, no school support for caring for young children with T1D, and needing help from teachers and nurses for BG monitoring as areas of concern. Lack of appropriate school support, shortage of school nurses, and inadequate diabetes intensive treatment in schools are noted in a review of diabetes care in primary schools (Marks et al., 2013). Edwards et al. (2014) conducted a mixed-method systematic review using 11 intervention studies and 55 non-intervention studies to determine the effectiveness of interventions and to identify barriers and facilitators in achieving optimal diabetes self-care of children and young people with T1D in educational settings. In this study, Edwards et al. (2014) report that most educational interventions were effective in increasing knowledge and confidence for short durations in education settings for children and people up to 27 years old. In addition, lack of school support for diabetes care, training of school nurses and staff, interventions for hypoglycemia and hyperglycemia, and communication were identified as barriers to self-care at schools (Edwards et al., 2014). Several studies advocate school nurses' roles as vital for staff education, communication, and diabetes care for children and people with T1D at schools (Edwards et al., 2014; Marks et al., 2013; Tolbert, 2009). Even though parents, children, and staff expressed needs for diabetes care support from school nurses, there are no reported requests for diabetes education for promoting their children's management skills while they are receiving healthcare services in schools.

School Nurses' Diabetes Management for Students with Type 1 Diabetes

General roles of school nurses. School nursing was defined in 2011 as "a specialized practice of professional nursing that advances the well-being, academic success and lifelong achievement and health of students" (NASN, 2011). This definition was recently updated and indicates the following specifics:

> School nursing, a specialized practice of nursing, protects and promotes student health, facilitates optimal development, and advances academic success. School nurses, grounded in ethical and evidence-based practice, are the leaders who bridge health care and education, provide care coordination, advocate for quality student-centered care, and collaborate to design systems that allow individuals and communities to develop their full potential (NASN Board of Directors, 2017).

Most states (44 out of 50) require a school nurse to have RN licensure with a bachelor's or higher degree, according to the National Association of State Boards of Education (NASBE, 2013). However, school nurses who are licensed practical nurses (LPNs) have been the focus of studies, as have nurse practitioners (NPs) (Darby 2006; Fisher 2006).

According to the 2015 NASN school nurse survey, approximately 96.8% of school nurses (N= 8,006) provide direct care to students in one or multiple buildings (Mangena & Maughan, 2015). School nurses' roles are classified as assisting students and parents with health care program enrollment, collaborating with community partners, and advocating for student health through reports and letters to officials and decision makers (Mangena & Maughan, 2015). In addition to individual health care, another role of school nurses is collecting data including nursing staffing, numbers of nursing visits, numbers of students with certain chronic diseases, such as asthma, diabetes, and seizures, as well as those with allergies to answer a call to meet the need for building a national school nursing data set (Patrick et al., 2014).

In addition to the NASN survey results, other groups have different perceptions about school nurses' roles. In a descriptive, qualitative study with 12 school nurses, 11 parents and 10 educators, including principals, teachers, and other school staff, school nurses perceived their roles in individual health care as including medication administration and caring for chronic diseases, and participating in school-level health activities, such as staff training and health education (Maughan & Adams, 2011). In contrast, parents and educators viewed the school nurses' major roles as providing first-aid and administering medication (Maughan & Adams, 2011), which was similar to results in other countries (Alexandropoulou, 2013; Mastrogiannis et al., 2013). In addition, health screenings, such as vision and immunization, crisis management, and health education were included among school nurses' roles as perceived by parents (Maughan & Adams, 2011). These different perceptions about school nurses' roles were similarly reported in a quantitative study with nine school nurses and 28 school administrators with significant differences in providing direct care, chronic disease management, and health education, developing health care plans, and connecting students, families, and health care providers (Green & Reffel, 2009).

School Nurses' Roles in Diabetes Care. Several health professional organizations have described school nurses' roles in school settings. School nurses are expected to implement their roles in providing care for individual health needs; supplying education for school staff and students; and acting as bridges for communities, schools, families, and healthcare professionals (Council on School Health, 2016; NASN, 2016). In a statement from NASN about general school nurses' roles, the role of the school nurse is defined as: 1) leading the policy/programs, and procedures for school health service development; 2) advocating for students; 3) providing system-level leadership; 4) promoting community/public health including health promotion,

disease prevention, control of infectious diseases, and health equity; 5) coordinating care including communication/collaboration with other professions, providing direct care, and nursing delegation; and 6) improving quality of nursing care (NASN, 2016). These were consistent with the seven school nurses' roles proposed by the American Academy of Pediatrics (AAP): 1) providing both individual and population health (e.g. promoting health and safety, educating development, managing health problems, providing case-management services, and collaborating with physicians in schools), 2) providing team-based care with pediatricians, 3) caring for students with special health needs, and 4) participating in public health (e.g. communication, obesity prevention, substance abuse assessment, tobacco control, and asthma education) (Council on School Health, 2016). Based on both recommendations, school nurses are a bridge between students, parents, providers, and schools. School nurses are expected to assist with students' normal development and health needs by coordinating care between different stakeholders, facilitating safe school environments, contributing to the development of school policies, and providing direct care and education.

As stated by NASN and AAP, school nurses provide direct care for students with T1D (Council on School Health, 2016; NASN, 2016; NASN, 2012). Supervision of diabetes management in school settings is recommended by the ADA (Silvestein et al., 2005). Hellems & Clarke (2007) conducted a study with 185 parents of children with T1D in Virginia to determine which school personnel assist in students' diabetes care in schools. The results indicate that school nurses were primarily in charge of diabetes-related care in school regardless of the grade level of students, but care was shared by teachers, school staff, and parents.

For effective diabetes management, using the Diabetes Medical Management Plan (DMMP), the Individualized Health Care Plan (IHP), and the Emergency Care Plan for

Hypoglycemia and for Hyperglycemia are recommended by the National Diabetes Education Program (NDEP, 2016). Usually DMMPs are filled out by a student's diabetes health care providers and submitted to a school by parents before or at the beginning of a new school year. DMMPs usually provide medical orders. IHPs are usually developed by the school nurse based on the medical orders in DMMPs and reviewed with parents/guardians/students to meet the treatment goals and accommodations (NASN, 2012; NDEP, 2016). Emergency Care Plans are distributed to school personnel for students with diabetes to prepare proper actions for emergency situations (NDEP, 2016). Nabors, Troillett, Nash, & Masiulis (2005) find that 29% of school nurses (N= 110) developed written care plans for children with diabetes. Ninety-eight percent of school nurses agreed that adolescents with diabetes needed more support at school and 89% of respondents agreed that adolescents with diabetes needed to improve their knowledge (Nabors et al., 2005). These agreements included improving communication among adolescents, teachers, and friends, providing medical care, and developing written care plans involving youth, parents, teachers, nurses, and medical teams (Nabors et al., 2005). However, interestingly, the results of this study did not reveal how school nurses can improve knowledge about diabetes in adolescents with diabetes through health education in school settings. The focus of this research was primarily on increasing knowledge about diabetes in teachers and school staff through education by school nurses (Nabors et al., 2005). Also, years of work experience is correlated with developing written health care plans for adolescents with diabetes ($r= .22$, $p= .025$).

Nguyen, Mason, Sanders, Yazdani, & Heptulla (2008) report on the effectiveness of school nurses' supervision of BG monitoring, insulin administration and insulin dose adjustment in a randomized control study with 36 children and adolescents with T1D: 16 students in an intervention group improved glycemic control (HbA1c 9.2±1.1 % (7.4 – 11.0 %), $p< .0001$)

compared to their HbA1c levels at the beginning of the three-month study (10.8±1.6 % (8.5-14.0 %)). Allen et al. (2012) conducted an online survey with 2,049 current or former school nurses to understand schools' experience and management of emergency situations involving asthma, anaphylaxis and diabetes, and pharmacologic treatment devices used in those situations. In this study, school nurses reported that they gave glucagon to children with T1D who may have had altered consciousness due to hypoglycemia (a glucose level of less than 70mg/dl) in order to increase BG immediately during these potentially life-threatening episodes (Allen et al., 2012). These studies suggest that school nurses may intervene in emergency situations alone and that this could cause fear related to providing diabetes care. However, school nurses' fears about providing direct care regarding insulin administration and emergency care are rarely reported in the literature (Allen, Henselman, Laird, Quinones, & Reutzel, 2012; Darby 2006).

Wang & Volker (2012) conducted a qualitative study with five school nurses to understand nurses' experiences of caring for students with T1D in Taiwan. School nurses reported lack of practice protocols and education, heavy workloads, and relying on their clinical experiences for solving school problems (Wang & Volker, 2012). Wilt (2015) has explored relationships among the school nurse to student ratio, self-efficacy for T1D management, and glycemic control in adolescents aged 10-16 (N= 89 parent-adolescent dyads) and reports a negative correlation (r= -.244, p= .021) between the school nurse to student ratio and glycemic control, and no relationships between self-efficacy for management in adolescents with T1D and the school nurse to student ratio.

Preparation for providing diabetes care and education is vital for school nurses who perform professional nursing practices in school settings (Bachman & Hsueh, 2008; Bobo et al., 2011; Wang & Volker, 2012). Calls for diabetes education for nurses related patient education

and better care for patients with diabetes have been emphasized by researchers (Eaton-Spiva & Day, 2011; El-Deirawi & Zuraikat, 2001; Engvall, Padula, Krajewski, & Rourke, 2014; Wang & Volker, 2012). Griffis, Morrison, Beauvais, and Bellefountaine (2007) report on nurses' needs for education about therapeutic goals, medications, types of diabetes, and therapies in a study with 152 acute care nurses.

School nurses use different ways of learning to gain diabetes-related knowledge and skills (Bachman, & Hsueh, 2008; Ramos et al., 2014). Allen et al. (2012) report that 95.7 % of school nurses (N=2040) had at least adequate knowledge about diabetes in a study of potential life-threatening events involving medication administration for asthma, anaphylaxis, and diabetes. In a study of school nurses' experiences of caring for students with insulin pumps, Darby (2006) reports that school nurses utilized available resources and gained more knowledge and hands-on experiences. Available resources for diabetes are often introduced in school nursing journals (Gallivan, & Greenberg, 2014). Griffis et al. (2007) report that acute care nurses' preferred continuing education (CE) modes were in-services (82%), workshops (62%), 1-page fact sheets (47.3%), videos (40%), online courses (30%), in-depth booklets (22.7%), online information (22%), and teleconferences (20.7%). In a study involving urban and rural school nurse workforces in New Mexico (N=311), school nurses preferred to receive in-service trainings (71.1%), online courses (67.2%), conferences (70.4%), and teleconferencing (12.5%, Ramos, Fullerton, Sapien, Greenberg, & Bauer-Creegan, 2014). Importantly, diabetes education for school nurses has been shown to be effective (Bachman & Hsueh, 2008; Bobo et al., 2011; Breneman et al., 2015). NASN developed Helping Administer to the Needs of the Student with Diabetes in Schools (H.A.N.D.S.) in 2007 as a CE program of 1-day on-site or online education to promote diabetes knowledge among school nurses (Breneman et al., 2015; Ramos et al.,

2014). Breneman et al. (2015) have evaluated the effectiveness of the H.A.N.D.S. program for improving diabetes care abilities of school nurses. With 105 school nurses who mostly held Bachelor's degrees (43.3%) and had over five years of experience (71.6%), the H.A.N.D.S. program for diabetes care in schools was demonstrated to increase school nurses' knowledge and their levels of confidence in care. The results also showed no relationships between school nurses' self-rated experience and competence gained with regards to diabetes care including insulin administration, interpretation of blood glucose levels and years of working experience as a school nurse. Yet, school nurses' self-rated experience and competence gained differed significantly by their level of highest educational degree ($p = .003$). School nurses with a bachelor's degree gained more experience and competence than nurses with an associate degree or a master's degree (Breneman et al., 2015). However, the study did not describe how school nurses could deliver their updated knowledge and care practice to children with T1D and what protocols or education programs are available to them in terms of providing diabetes care and education for children with T1D.

School Nurses' Diabetes-related attitudes

Defining attitudes. "Attitudes" can have several meanings, including physical or mental positions. Altmann (2008) has identified three characteristics of attitudes in a concept analysis: "a mental state indicating conscious or unconscious; a value, belief, or feeling; and a predisposition to behavior or action" (p. 146). Also, "a cognitive, affective, and behavioral component" is considered a critical attribute of an attitude (Altmann, 2008 p. 149). Therefore, attitudes can be positive or negative as responses to a stimulus (Altmann, 2008).

Diabetes attitudes in nurses. Health care professionals' attitudes influence their care practices and patients' health outcomes (Anderson, Fitzgerald, Funnell, & Gruppen, 1998;

Anderson, Fitzgerald, Gorenflo, & Oh, 1993; Williamson, Shute, King, & Lehmann, 1996). To measure health care professionals' diabetes-related attitudes, the Diabetes Attitude Scale (DAS) was developed in 1989 and revised in 1990 (DAS-2) and 1998 (DAS-3). The DAS was originally developed to measure only health care professionals' diabetes-related attitudes, but the third version of DAS (DAS-3) was developed to measure both health care professionals and diabetic patients' (T1D and type 2 diabetes (T2D)) diabetes-related attitudes and to study relationships between diabetes attitudes and health outcomes. Anderson et al. (1998) conducted a study with health care professionals (321 physicians, 540 nurses, and 569 dietitians) and 384 patients with diabetes (5% T1D, and 96% T2D) to develop the third version of the DAS. As a result, the DAS-3 includes 33 items in five subscales (the need for special training in education, seriousness of T2D, value of tight glucose control in diabetes care, psychosocial impact of diabetes on patients, and patient autonomy). The results of that study reveal different attitude scores among health care professionals. The results indicate that nurses had significantly higher scores on each subscale, compared to physicians. The researchers note that nurses had the highest score on psychosocial impact of diabetes when compared to dietitians and physicians ($p<.01$). Also, the results indicate that as health care professionals spend more time providing care to patients with diabetes, their scores on each subscale increase regardless of profession ($p<.01$).

Gagliardino, González, & Caporale (2007) conducted a study with 252 heath care professionals (46% physicians, 27% nurses, 12% nutritionists, 7% social workers, 3% podiatrists, 5% educators), and 279 adult patients with diabetes (32% T1D, and 68% T2D) in Argentina. The DAS-3 was translated into Spanish with permission of the developer (Cronbach's $\alpha=.987$ for the translated version). In this study, health care professionals agreed that the need for special training was a highly important issue (mean ± SD=4.58 ± 0.35). They showed a slight

agreement on seriousness of T2D (mean ± SD=3.80 ± 0.54), value of tight control (mean ± SD=3.50 ± 0.34), and psychosocial impact of diabetes (mean ± SD=3.29 ± 0.46). In contrast, patient autonomy was not considered as an important issue among health care professionals (mean ± SD=2.79 ± 0.38). However, there was no information about different scores among different groups of health care professionals. The researchers hypothesize that these results originated in how local medical environments and care differed from those in developed countries, such as the U.S.

Siminerio, Funnell, Peyrot, & Rubin (2007) examined nurses and physicians' perceptions of specialist and generalist nurses' roles in diabetes care in the U.S. using data from the Diabetes Attitudes Wishes and Needs (DAWN). The DAWN study aimed to identify attitudes, wishes, and needs in people with diabetes and care providers to improve diabetes care. The study was conducted in 13 countries with nurses, physicians, and patients with T1D or T2D in 2001, and cross-sectional self-reports were collected by structured interviews (in-person or telephone). The researchers selected items from the full set of survey data for the U.S. sample, including 317 U.S. health care providers (51 generalist nurses, 50 diabetes specialist nurses, 166 generalist physicians and 50 diabetes specialist physicians). The results showed that nurses had higher perceived needs for better understanding of patients' psychosocial issues and better communication than physicians. Also, nurses perceived that they had more time with patients, a better understanding of patients, and were better at educating patients than physicians. Nurses were eager to take on more responsibilities for diabetes management, although specialists had more involvement in diabetes management compared to generalists. Also, nurses perceived that their roles included providing therapeutic environments to patients in order to improve diabetes care (Siminerio et al., 2007).

As previously described, studies presenting nurses' diabetes-related attitudes have included nurses in hospital/clinics, not those in schools. As a designated health care professional in a school, school nurses help and support students with T1D to adjust to life in school and to manage their disease and needs through continuous interactions with students, families and school personnel (Hitchcock, 2011). School nurses are responsible for coordinating and providing proper care to students with diabetes in order to improve health outcomes as well as academic achievement (Gagliardino et al., 2007; Jackson et al., 2015). Given the previously discussed studies, school nurses' diabetes-related attitudes may influence nursing practices in taking care of students with T1D and their health outcomes. Although school nurses meet with diabetic students more frequently than with other students, their diabetes-related attitudes are not well known. Knowing school nurses' diabetes-related attitudes and relationships with their nursing practices in diabetes management and education could provide evidence for better practice in schools.

School Nurses' Self-Efficacy for Diabetes Care

Self-efficacy is "a judgment of one's ability to accomplish a certain performance" (Bandura, 1986, p. 391). In other words, self-efficacy concerns an individual's capability to generate behavior. Self-efficacy is strongly related to how much effort a person needs to expend in the achievement of a behavior, which behaviors a person engages in, and how long a person persists (Bandura, 1997).

Several studies have revealed that school nurses gained confidence from diabetes resources and education (Bobo et al., 2011; Bullock et al., 2002; Fisher, 2006). Fisher (2006) developed a tool to measure nurses' confidence levels in diabetes care. Then, the developer reported three factors positively correlating with school nurses' self-efficacy in providing

diabetes care and education: participation in the care of children with diabetes, having children with T1D in the school system, and supervision of children with BG meter testing (p. 227). Based on these results, Fisher (2006) suggests that direct care for children with T1D increases self-efficacy as per Bandura's Social Cognitive Theory.

Kaufman, Rajataramya, Tanomsingh, Ronis, & Potempa (2012) conducted a study with 468 nurses working in outpatient, inpatient, family medicine, or special clinics in Thailand to examine nurses' preparedness for caring for chronic diseases. Researchers report that 34 to 42% of participants were confident or very confident in their general skills, providing information, and counseling about chronic diseases (hypertension, heart disease, cerebrovascular diseases, pulmonary diseases, diabetes, and cancer). Nurses were most confident in care of hypertension and diabetes, $F(5, 458)=66.64$, $p<.001$. Nurses' confidence in chronic disease skills and management were influenced by their province and training experience in the past three years ($p<.001$). Nurses with greater training experience showed higher confidence in chronic disease care, $F(2, 450)=9.13$, $p<.001$. Also, types of nursing education were a significant factor in nurses' confidence by disease types ($p< .05$). Nurses with higher educational levels were more confident in their skills, providing information, and counseling. This study provided information about relationships between nurses' educational preparedness, training experiences, and their self-efficacy in disease management, by using a modified Bandura's Self-Efficacy Scale design. However, it was not clear how self-efficacy was correlated with school nurses' level of educational preparation, credentials, and years of nursing experience.

Transitional Care

Transitions in any situation create challenges for people. Providing care for youth with chronic diseases during transitions is a rapidly growing practice area focusing on transferring

from child-centered to adult-centered health care systems. Youth with T1D and their families also experience transitions (e.g. sharing responsibilities, independent diabetes management, and puberty) in their lives while dealing with challenges in managing diabetes. Published literature focuses on clinical practice, including hospital/clinic settings and managed care systems (Findley, Cha, Wong, & Faulkner, 2015). To support a smooth transition to the school setting, focused interventions are warranted.

Defining Transition. Transition is viewed differently by discipline. In a concept analysis by Chick & Meleis (1986), transition is defined as "passage from one life phase, condition, or status to another" (p. 239) and is viewed as a central concept in nursing. Also, Meleis et al. (2010) define transitions as complex, multidimensional, and interrelated properties of a complex process.

Similar terms are used in defining transitional care. Transition has been defined by the Society for Adolescent Medicine as "the purposeful, planned movement of adolescents and young adults with chronic physical and medical conditions from child-centered to adult-oriented health-care systems" (Blum et al., 1993, p. 570). In line with this definition, transitional care for youth with T1D is mainly focused on helping them to have a smooth transition from pediatric diabetes care to adult diabetes care in healthcare systems (Lotstein et al., 2013; Nakhla, Daneman, To, Paradis, & Guttmann, 2009; Van Staa, Jedeloo, van Meeteren, & Latour, 2011).

Similarly, health care transition (HCT) is the process of changing from pediatric care to adult care and requires a systematic process of supporting youth to achieve independent management skills, to prepare for an adult care, and to transfer to new providers without gaps in care (The National Alliance to Advance Adolescent Health 2014–2015). In a newly published position statement of the Society of Pediatric Nurses (Betz, 2017), HCT is defined as "the

comprehensive services based on an interdisciplinary frame of care" addressing the biopsychosocial needs of youth with diabetes based on lifespan (p. 161). Six core elements of health care transition were suggested to support youth and young adults to transition to adult care in clinical practices including pediatric, family medicine, medical-pediatrics, and internal medicine practices: transition policy, transition tracking and monitoring, transition readiness, transition planning, transfer of care, and transfer completion (Got Transition, 2014). Heath care transition is more inclusive and specific than transitional care. In some of the literature, HCT and transitional care are used interchangeably (Gentles, 2013).

Transition planning is another term related to transitional care and HCT. This term focuses on practical issues in clinical practice. Betz (2007) specified components of health care transition planning as the following:

1) transfer of care from pediatricians/pediatric nurse practitioners/pediatric specialty care providers to adult specialty and primary care physicians/nurse practitioners;
2) access to continuous and uninterrupted health insurance coverage for primary and specialty care needs once pediatric coverage terminates;
3) acquisition of knowledge and skills necessary to independently manage daily treatment regimen;
4) learning to identify and advocate for accommodations needed to function more effectively in the work or school environment; and
5) being referred to transition and adult community agencies and resources based on the individual's need for services (p. 104).

In another practical definition, NASN refers to transition planning as “a coordinated set of activities to assist students with chronic health conditions to begin in school, and then move from one school to another, from hospitalization back to school, and from the secondary school system into the next stage of life” (NASN, 2015). To elaborate on this coordinated set of activities, NASN proposed the following roles of school nurses to prepare for the transitional events of students with chronic diseases: being knowledgeable about relevant laws; maintaining competence in providing necessary nursing care to children with chronic health conditions; establishing a relationship with the student’s health care providers and family for successful implementation of individual health plans; providing consultation/referral to the medical home and community resources; identifying needs of the care team for continuing education; influencing policies and school health programs for chronic disease management; assuring adequate communication between the student, family, health care provider, school personnel, and providers of community resources; and assuring continuity, compliance, and supervision of care (NASN, 2015). Although transitional care and related terms are defined differently, the ultimate goal of transitional care is having a successful move from one system to another or situation to another based on capability of independent care for maintaining continuity of care. Based on previously discussed diabetes care in schools and developmental expectations of children with T1D, transitional care is approached as a broad concept within the frame of the Transitional Theory (Meleis, 2000) including “transitional planning” as described by NASN for students with chronic health conditions. Therefore, transitional care is considered care for promoting a passage from one life phase, condition, or status to another, as this will clarify the dynamics involved, based on the Transitional Theory (Meleis, 2010).

Transitional Care for Emerging from Adolescence to Adulthood. Care for children with diabetes moves from parent-dominant care during childhood to independent care in adolescence and adulthood (Findley et al., 2015; Jackson & Albanese-O'Neill, 2016). The majority of research about transitional care is focused on adolescents with T1D who emerge into adulthood from the perspective of transferring healthcare systems from pediatric clinics to adult clinic for diabetes care. Transitional care is based on the Adolescent Medicine definition (1994). This idea is widely used for patients with chronic health conditions who are emerging from childhood to adulthood or from pediatric care to adulthood or adult care (Findley et al., 2015). Therefore, healthcare professionals and/or health professional organizations have suggested protocols, guidelines, potential considerations, or recommendations. Also, the H.A.N.D.S. program provided by NASN introduces the concept of transitional care to school nurses working with high school students (NASN, 2014), but it is not well described with respect to the implications of transitional care in school settings.

In terms of shifting of care in health care systems, an ultimate goal of diabetes care for children with T1D is to attain diabetes self-management. This goal is embedded in a process of transitional care. Using 31 research articles published between 2004 and 2014, Findley et al. (2015) synthesized contributing factors to promote transitional care successfully in a systematic review which focused on a specific time period, adolescence to adulthood, with regards to transition from pediatric care to adult care. For successful transition during this period, at least one year of preparation is highly recommended and a time identified to start providing transitional care is that when patients are aged 14 years up to 25 years (American Academy of Pediatrics, American Academy of Family Physicians, and American College of Physicians, Transitions Clinical Report Authoring Group, 2011; Findley et al., 2015). Documents are the

most commonly used communication methods among providers. Communications among healthcare providers as well as patients' perceived well-preparedness enhance the quality of transitional care and outcomes (Findley et al., 2015). Six elements have been emphasized as affecting factors to accomplish successful transitional care in adolescents and young adults with diabetes: 1) healthcare providers' consultation and guidance with appropriate information about adult care based on adolescents' changing lifestyles and growth, 2) parents providing safety nets for independent diabetes management, 3) structured transitional care programs, 4) age-appropriate clinics as buffering systems, 5) individual support using in-person communications and technology-based programs, and 6) follow-up care in college and adults clinics after transitions (Findley et al., 2015). Support from pediatric care providers, parents and families and structured programs are critical for successful transition, until youth with diabetes completely achieve diabetes self-management (Findley et al., 2015; Sonneveld, Strating, van Staa, & Nieboer, 2013). In addition, structured transitional care programs contribute to reducing the length of transition from pediatric care to adult care (Findley et al., 2015). The effectiveness of structured transitional care programs has been identified in a retrospective study with 62 adolescents and young adults with T1D (Cadario et al., 2009). In this study (Cadario et al., 2009), a structured transitional care program was found to significantly reduce the time of transition from pediatric care to adult (0.8±0.6 years), compared to transition without a structured program (4.6±1.2 years, $p<.001$).

However, not all pediatric care clinics or hospitals have structured transitional care programs. De Beaufort, Jarosz-Chobot, Frank, de Bart, & Deja (2010) conducted a study with 92 out of 578 members of the International Society for Pediatric and Adolescent Diabetes (ISPAD) from 36 countries that evaluated the practices for transitions from pediatric to adult diabetes care

by using a 21-item questionnaire developed by the authors. The study participants were different pediatric diabetes healthcare professionals: 88 physicians (95.65%) and 4 nurses (4.5%). Fifty percent of participating centers had a systematic transitional program. Sixty percent of participants reported no follow-up or evaluation after transition. The suggested age range of transition was between ages 14 and 25 years (44%) or ages 18 years and 25 years, as initiated by pediatric units. Several communication methods were utilized to initiate transition: phone contacts, letters, and meetings between pediatric and adult care team. One year of preparation period was highly recommended among study participants (90%). This study reveals a mixed, inconsistent practice with pediatric patients with diabetes in terms of care for transitions in different types of clinical settings (hospitals run by universities, local agencies, and national organizations, and private practice) with a lack of systematic transitional care. However, this study does not describe how each professional got involved in providing transitional care.

Multidisciplinary team approaches can contribute to smoothing transitions for youth with T1D (de Beaufort et al., 2010; Findley et al., 2015). In particular, patient-centered transitional care is the key to promoting successful transition from adolescence to adulthood with regards to continuity of care (Carson, 2003; Day, 2006). Bridgett, Abrahamson, & Ho (2015) have presented stories about two adolescents with T1D (16 and 17 years old) who were enrolled in a service, *Trapeze: a supported leap into adult health*, in Sydney, Australia. This service provided not only care for medical transfer from pediatric to adult care, but also multifactorial care with medical and psychosocial approaches which positively impacted their self-management behaviors and smooth transitions to adult care. Also, health information was distributed to schools these two adolescents attended to increase schools' awareness and understanding of health issues they had. Although the authors did not present any statistics to confirm their

positive outcomes, their cases may provide evidence about how ongoing medical and psychosocial care is important for adolescents with T1D who face major changes in their lives.

Diabetes Self-Management. Most children with T1D are diagnosed in early childhood (Sperling, 2014). During adolescence, children with T1D have progressively acquired care responsibilities from their parents (Schilling et al., 2006). Therefore, it is important to support children with T1D in having smooth transitions from childhood to adolescence, in terms of acquiring care responsibilities and mastering necessary knowledge and skills for diabetes self-management, for better health outcomes (Lange et al., 2014; Modi et al., 2012). This is because adolescents with T1D who perform diabetes self-management often suffer uncontrolled metabolic conditions and emotional distress, compared to children with T1D who maintain well-controlled metabolic status by parent-dominated diabetes care (Guo et al., 2011; Modi et al., 2012).

Babler & Strickland (2015a) have explained these gradual transitions to independence among adolescents with T1D with a substantive theory, "Normalizing my life with diabetes during adolescence," based on grounded theory. This study was conducted with 11 non-Hispanic White adolescents (8 girls and 3 boys) ages 11 to 15 (mean age= 13.9) who had T1D. Six phases of the process of transition to independence in adolescents aged 11-15 years are proposed: remembering the journey, balancing blood sugar/preventing a crisis, integrating diabetes into the world outside the home, moving the journey toward independence, figuring it out, and helping others (Babler & Strickland, 2015a). Specifically, moving the journey toward independence phase describes challenges related to achieving diabetes self-management in transitioning periods for being independent (Babler & Strickland, 2015b). This phase is defined as "the ability of the adolescents to successfully transition to independence from their parent by taking on

primary responsibility for their diabetes management tasks" (Babler & Strickland, 2015b, p. 650). Three categories are included in this phase: gradual shifts of care responsibilities (independent BG monitoring, insulin administration and diet and activity management) from parents to adolescents, increased conflicts with parents, and recognition of difficulty in managing diabetes (Babler & Strickland, 2015b). There are conditions for self-management: parents' agreement and support for doing independent care, adolescents' readiness in terms of performing diabetes management skills, ages, and emotional readiness (Babler & Strickland, 2015b). If these conditions are not met properly, transitioning from parents will be postponed. While transitioning to independent care from parent-dominant care, adolescents with T1D need to achieve the following major tasks as they gain autonomy in diabetes management: monitoring blood glucose, administering insulin, and managing diet including carbohydrate count and insulin dose calculation (Babler & Strickland, 2015b). Also, adolescents with T1D express having an emotional burden related to managing diabetes and recognizing themselves as being different from others because of their having diabetes. The study shows early transitions from parent-dominated care to independent care in this population, but the reason or motivation for the early shift is not identified. Moreover, the importance of providing support during these transitions could lead to smooth and successful achievement of diabetes self-management.

Transitional Care in School. Every summer, the ADA and NASN publish an article to ask parents to prepare documents related to their children who are back in school for a new academic year. In these articles, they advise parents to prepare documents, such as DMMPs or 504 plans. Each district updates their website with necessary documents that should be submitted by parents.

For a student who is newly diagnosed with diabetes and their family, meeting with a school nurse is an essential step for discussing diabetes care in schools and adjusting to the new disease (Siminerio, 2015). School nurses are expected to shared DMMPs with the school health team and to provide proper diabetes management to students with diabetes in addition to providing resources, education, and support as needed (Chiang, Kirkman, Laffel, & Peters, 2014; Siminerio, 2015).

For supporting care for transitions in adolescents and young adults with diabetes, NDEP provides the Pediatric to Adult Diabetes Care: Transition Planning Checklist. This checklist suggests a timeline and topics to discuss among health care providers, adolescents, young adults, and their families (NDEP, 2014). This checklist contains tasks for systematic preparation for transitions before anticipated transition to adult care. The time line starts one to two years prior to the transition. One year prior to the transition, frequent visits at intervals of every three to six months are recommended for youth with T1D. This checklist is more applicable to clinical settings rather than school settings, but school nurses could provide this information to students with T1D and parents for their preparation with their health care providers (Siminerio, 2015).

Bargeron, Contri, Gibbons, Ruch-Ross, & Sanabria (2015) conducted a descriptive study as a part of project, ‘Transition Planning for Youth with Special Health Care Needs (YSHCN)’ to explore current practices, knowledge, and attitudes about health care transition planning among representatives of Illinois high schools. They developed a 26-item survey and collected data via an online survey platform. A total of 240 representatives were from the approximately 600 schools in Illinois, excluding 10 people from Chicago high schools. Among the participants, school nurses were not identified due to the survey design, so the researchers assumed that people who identified themselves as ‘others (12.8%)’ included school nurses. The results

indicate that approximately 90% of participants spent a lot of time working with students in special education and 5.6 % of participants (n=9) knew a great deal about HCT, followed by 54% of participants knowing something about HCT. In addition, 75.8% of participants reported knowing a great deal about secondary Individualized Education Plans (IEPs) and transition plans. Approximately 37% of participants reported that health-related issues were often or always addressed in secondary IEPs and transition plans at schools. However, 95% of participants considered that parents were responsible for facilitating HCT for their children. For successful HCT in schools, school nurses' roles are crucial in supporting and educating students in improving their skills. Bargeron et al. (2015) suggested that school nurses could provide an opportunity to practice communicating with health care providers and others in terms of gathering medical information and informing their health needs in living or work situations. These interactions were considered an extension of already implemented nursing practice for teaching and educating health management skills to students. However, there is a lack of knowledge about transitional care by school nurses to support children with T1D who transition from childhood to adolescence, in addition to transitions from adolescence to adulthood, in terms of diabetes-management tasks, while progressing through grade levels and/or transferring schools. Also, there is a lack of information about school nurses' perceptions of transitional care and their current practice in school settings.

Conclusions

Diabetes self-management can be facilitated through interactions with those who are involved in care for children with T1D. Ongoing education is key to promoting diabetes self-management in this population. School nurses should be equipped to provide appropriate care to

children with T1D while considering developmental, situational and/or environmental changes for promoting diabetes self-management while in schools regardless of their credentials.

School nurses' diabetes-related attitudes most likely influence their care practices and diabetic students' health outcomes, as reported in the previous studies indicating nurses showed positive attitudes toward diabetes care in that they seriously consider the psychological impact of diabetes on patients and value of tight blood glucose control, as well as patients' autonomy in diabetes care. However, most of the information about nurses' diabetes attitudes is associated with nurses in hospitals or clinical settings, not school nurses. Also, school nurses' self-efficacy in diabetes management and education is vital to providing proper diabetes care to students with T1D because nurses' self-efficacy is directly related to their care performance. School nurses are in a unique position in health care systems, because most of them are hired by public sectors, such as public-school districts (Bergren & Monsalve, 2012; Mangena & Maughan, 2015). They provide nursing care to students based on information from students' health care providers in hospitals or clinics, without immediate working relationships with any designated health care providers. Also, there is limited information about school nurses' self-efficacy in diabetes management and education. Therefore, it is important to have an understanding of relationships between school nurses' diabetes-related attitudes and their self-efficacy in diabetes management and education in their practices in order to have better outcomes for students with T1D in schools.

Transitions for students with T1D could be viewed as a process of moving from one care setting to another, and transitional care is considered as emerging from pediatric care to adult care in the diabetes-related literature. Whenever transitional care is discussed, performing diabetes self-management is treated as a prerequisite for having successful transitions, along with

support from families and systematic care plans. The reason for this is that adult care providers assume that young adults with diabetes manage their diabetic condition independently. Professional organizations identify school nurses' roles in transitional care. However, transitional care in school systems is not well researched and there is limited evidence about how nurses perceive transitional care and what kinds of care are provided to students with T1D. As a designated health care professional in school, school nurses communicate with diabetic students' health care providers who are responsible for successful transitions from pediatric care to adult care. In addition, school nurses are in a position to communicate with students with T1D and families on daily basis, if needed. School nurses closely monitor diabetic students' management skills and provide education if necessary. Moreover, school nurses provide resources when diabetic students and families need additional support in addition to that which they receive from their providers related to diabetes management. If school nurses participate in transitional care supporting these transitions, students with T1D could have a better chance of making these transitions smoothly when they leave secondary education for higher education. In addition, if how school nurses perceive transitional care and what they provide for diabetic students transitions in school settings are identified, their roles could be clearly characterized in a manner that identifies their roles as a part of transitional care for students with T1D as a collaborative, additional resource outside of health care settings.

Therefore, this study aims to explore the following: 1) relationships between school nurses' attitudes about diabetes and self-efficacy in diabetes management and education; 2) school nurses' perceptions of transitional care and care content for transitional care in schools; 3) relationships between school nurses' preparation and their self-efficacy in diabetes education and

management and diabetes-related attitudes; and 4) school nurses' reasons for initiating diabetes education and possible formats for diabetes education for students with T1D.

Theoretical Background

Transition Theory. Transition Theory (TT) has been developed since the mid-1960s by Afaf I. Meleis, a nurse scientist and nurse sociologist, as a middle-range theory to explain the nature and human experience of transitions (Im, 2010). This theory has been developed based on multiple sources such as Meleis' background in nursing and sociology including results and experiences in research, educational programs, and clinical practice, systematic literature reviews, and collaboration with other researchers who have used the TT framework in studies. TT has been widely used for describing transitions in different populations such as immigrants, people with chronic illness, menopausal women, mothers, and family caregivers (Im, 2010; Meleis, 2010; Meleis, Sawyer, Im, Hilfinger Messias, & Schumacher, 2000).

Chick & Meleis (1986) defined transition as "a multiple concept embracing the elements of process, time span, and perception" (p. 239). Meleis et al. (2000) has defined transitions as complex, multidimensional and interrelated properties of a complex process. TT is comprised of six major concepts: types and patterns of transitions, properties of transition experience, transition conditions, process indicators, outcome indicators, and nursing therapeutics. The first three concepts compose the nature of transition, and the rest are standalone concepts in the framework (Im, 2010; Meleis, 2010).

Types of transitions have been identified as developmental, health/illness, situational, and organizational (Im, 2010; Meleis, 2010; Meleis et al., 2000). Health and illness transitions include "the recovery process, hospital discharge, and diagnosis of chronic illness" (Meleis & Trangenstein, p. 257). Patterns of transitions are explained by multiplicity and complexity (Im,

2010; Meleis, 2010; Meleis et al., 2000). It is also important to consider whether multiple transitions are sequential or simultaneous, and whether they are related or unrelated to each other. Figure 2.1 presents the relationships among six major concepts proposed by Meleis et al. (2000).

Properties of the transition experience include awareness, engagement, change and difference, time span, and critical points and events. Awareness is connected to "perception, knowledge, and recognition of a transition experience" (Meleis et al., 2000, p. 18). Levels of awareness influence the degree of congruence between recognition of processes and responses, and constitution of an expected set of responses and perceptions of individuals with similar transitions. However, Meleis et al. (2000) asserted that lack of awareness cannot hinder the onset of transition experience. Engagement is "the degree to which a person demonstrates involvement in the processes inherent in the transition" (p. 19). The levels of awareness influence the levels of engagement, and awareness may be a precursor for the occurrence of engagement (Im, 2010; Meleis et al., 2000). Therefore, the level of engagement will be different in an individual with awareness of physical, emotional, social, or environmental changes from an individual without awareness of those changes. Meleis and Trangenstein (1994) defined change as "to take, instead of substitute one thing for another, put, adopt a thing in place of another, and tends to be abrupt" (p. 257). Meleis et al. (2000) notes that confronting difference is characterized by unmet/divergent expectations, feeling different, perceived difference, and different viewpoints. Time span, flowing and moving over time, characterizes all transitions, but constraints on the time span of certain transition experiences may be unfeasible (Im, 2010; Meleis et al., 2000). To support their suggestion, Meleis et al. (2000) provided examples of the experiences of parents of children with chronic heart defects and immigrants' experiences of living in another county.

Their experiences were described as ongoing, continuous, and rolling transitions, but their transitions did not follow the same chronological course all the time. Critical points and events are markers that are involved in most transitions, but specific marker events are not obvious in some transitions (Im, 2010; Meleis et al., 2000). Meleis et al. (2000) provided birth, death, the cessation of menstruation or the diagnosis of an illness as identifiable marker events. Critical points and events usually contribute to increasing the levels of awareness, difference, and engagement in dealing with transition experiences.

Transition conditions consist of personal, community, and societal conditions that facilitate or inhibit the processes and the outcomes of transitions (Meleis et al., 2000). Personal conditions include meanings, cultural beliefs and attitudes, socioeconomic status, and preparation and knowledge. Community conditions include community resources (e.g. support and information), and societal conditions include society at large and marginalization. Im (2010) pointed out that subconcepts of community and societal conditions are underdeveloped, compared to personal conditions.

Patterns of response consist of process indicators and outcome indicators that characterize healthy transitions (Meleis et al., 2000). Process indicators include feeling connected, interacting, location and being situated, and developing confidence and coping that can lead individuals towards health, or vulnerability enabling early interventions in the facilitation of healthy outcomes. Outcome indicators include mastery of new skills and behaviors and fluid integrative identities (identity reformulation) that are determinants of a healthy completion of a transition (Im, 2010; Meleis, 2010; Meleis et al., 2000).

Nursing therapeutics is proposed in the TT framework, but the concept of nursing therapeutics is not mentioned by Meleis et al (2000). Im (2010) explained nursing therapeutics

by using three measures that were applicable to therapeutic interventions during transitions, proposed by Meleis's earlier work in TT (Schumacher & Meleis, 1994): assessment of readiness, preparation for transition, and role supplementation. Im (2010) also pointed out that nursing therapeutics is an underdeveloped concept in the middle-range theory of transition.

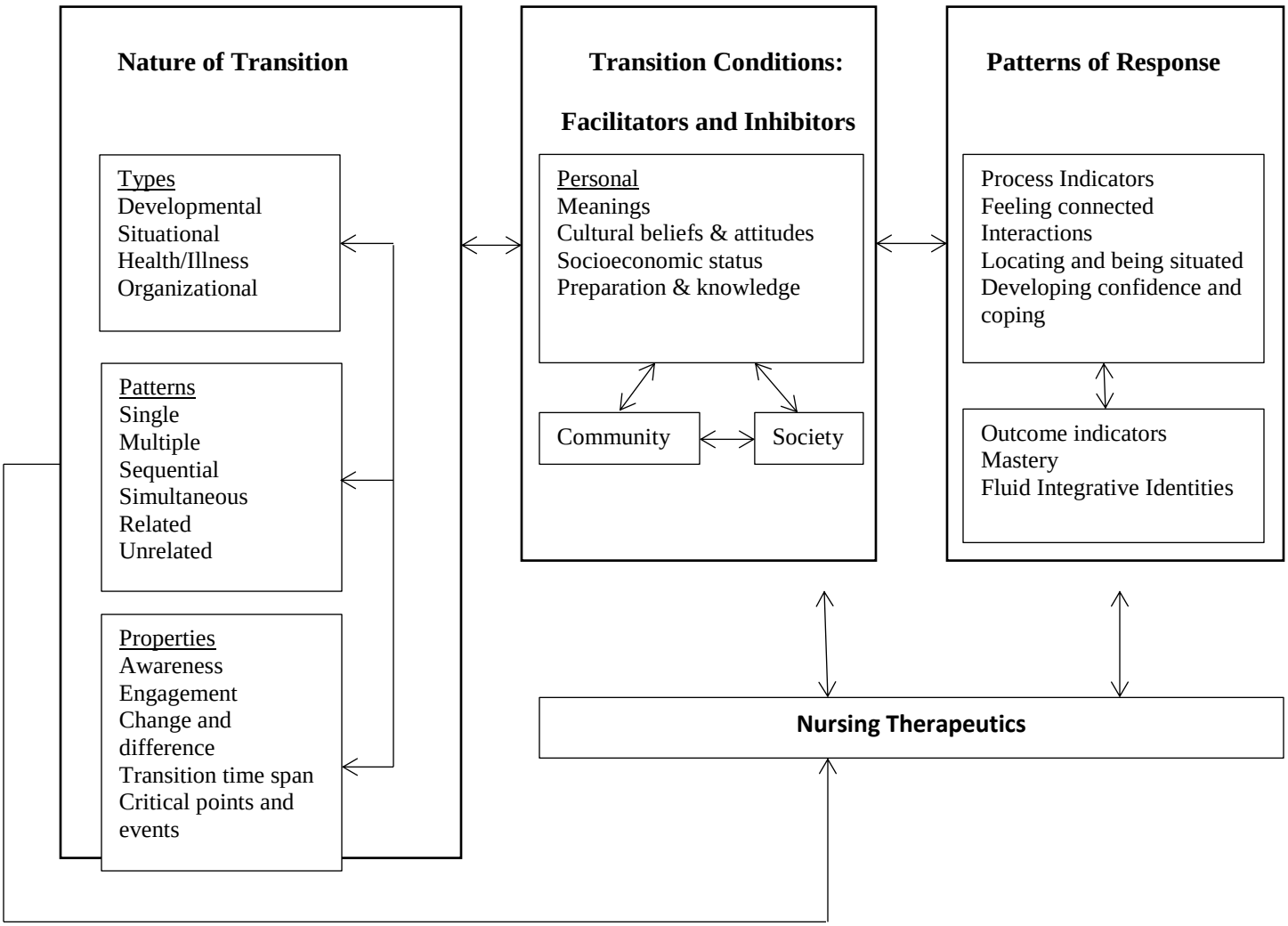

Figure. 2.1. The Midrange Transition Theory from Meleis et al. (2000)

Applications

TT can be applied to people with diabetes as a population with chronic illness (Im, 2010). Chang and Im (2014) have developed a situation-specific theory for the Korean elderly with T2D based on TT foundations. Interestingly, the TT framework is rarely used in studies of transitional care for youth with T1D. One possible reason for this could be a lack of attention on transitional care in nursing research. Caring for students with T1D during transitions is not a major research topic in nursing as it is in adolescent medicine. Nursing interventions for students with T1D in school that consider a systemic approach based on a theoretical framework may be a new area for developing evidence-based practices in school nursing, so TT might not be utilized in nursing research with youth with T1D. Although one nursing scholar has suggested a framework for youth with T1D who emerge from adolescence to adulthood (Hanna, 2012), this framework does not adopt any existing nursing theories to describe transitions of youth with T1D. Also, this framework does not provide evidence that school-aged children with T1D can be considered one of their target populations, although the researcher has suggested that early adolescents with T1D could be subjects of their framework. However, as described in the literature review, transition is a major concern in clinical practice for youth with T1D, specifically when they move from pediatric health care to adult health care (ADA, 2015; Lotstein et al., 2013; Nakhla et al., 2009; Van Staa et al., 2011). In addition, diabetes management shifts from parents and other adults to youth with T1D through childhood and adolescence (ADA, 2015). These transitions can be considered types of transitions described in the TT framework, depending on their characteristics. See Figure 2.2 for an adaptation of Meleis's model for this study.

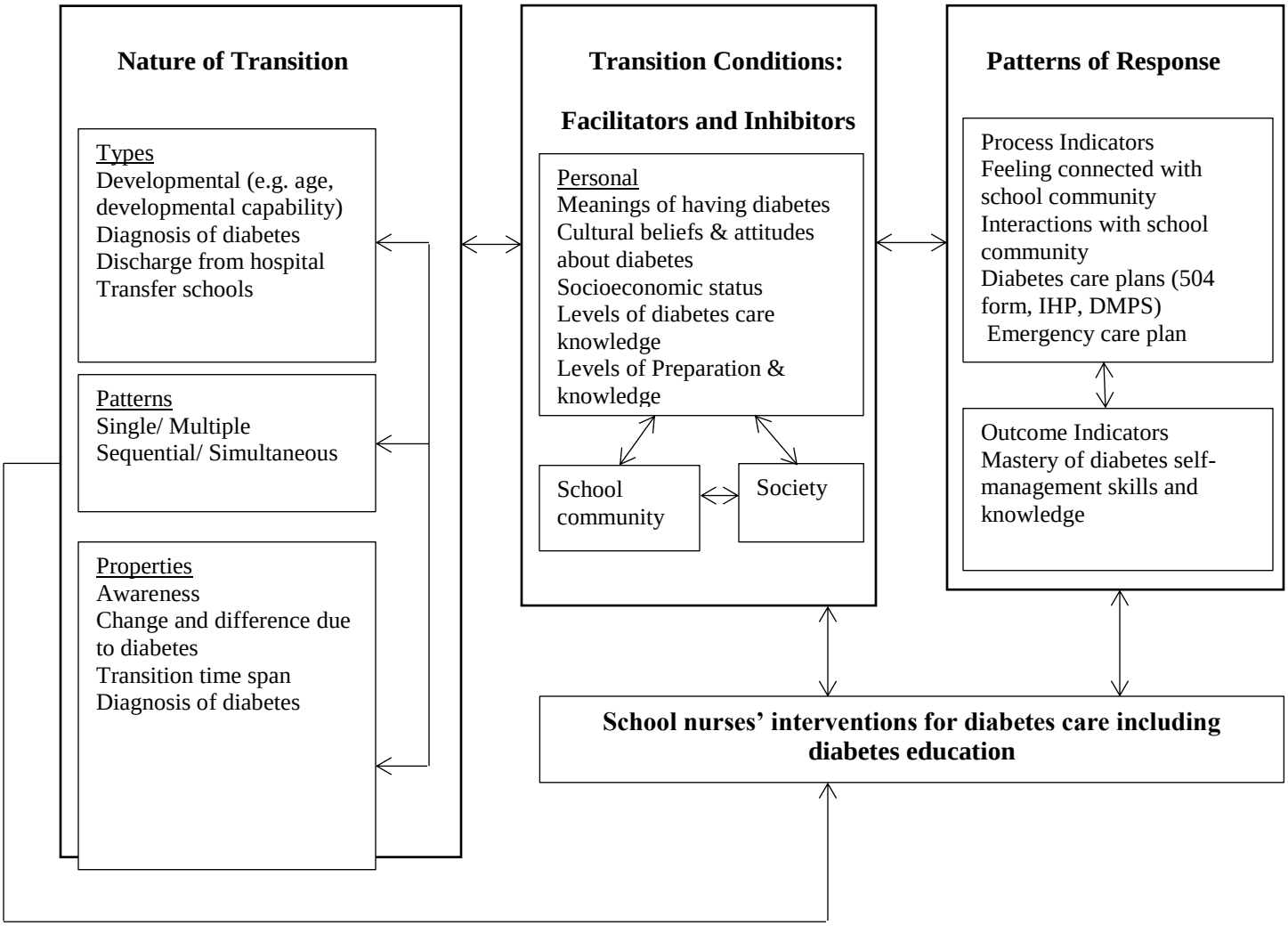

Figure 2.2. A model for school nurses' roles and children with T1D adapted from the Transition Theory framework (Meleis et al., 2000)

Chapter 3. Methods

The major goal of this study is to gain a broad understanding of school nurses' roles in diabetes care, specifically diabetes education and transitional care, provided by school nurses for students with type 1 diabetes (T1D) in school settings. This information can be used to build a practical foundation for diabetes education and transitional care provided by school nurses that promotes effective diabetes self-management in students with T1D. Since the focus of this study is to gain visibility on how current recommendations are being implemented in practice, the methodology combines quantitative and qualitative approaches to gain a more comprehensive picture of what this practice consists of, not just whether recommendations are being implemented or not.

Study Design

This study is a descriptive, exploratory study using data from online surveys and semi-structured interviews collected specifically for this study. The survey questionnaires provide information about school nurses' practical roles, levels of self-efficacy, and diabetes-related attitudes care and diabetes education for students with T1D. Semi-structured interviews, which are conversations with knowledge-producing purposes (Brinkmann, 2014), were used to explore current practice related to diabetes management and education for students with T1D. Content analysis is utilized to analyze the raw data collected using semi-structured, open-ended questions. Detailed information about content analysis will be provided later in this chapter.

Study Sample

The population of interest in this study is school nurses in public school districts within Washington State. Convenience sampling was used to recruit participants. Inclusion criteria for the study were that participants must be active, English speaking school nurses who have

provided diabetes care to students with T1D in school and who currently work in a school district. Exclusion criteria were school nurses who do not actively work in school districts or do not provide care to students with T1D in schools. Initially, all school nurses at one school district in Washington were invited to participate in the study. To expand study participation, an e-mail was sent to members of the NASN affiliate chapter in Washington State. Then, school nurses who currently work in other local school districts in Washington, who are not on the list serve of the NASN affiliate chapter, were additionally invited to the study.

Human Subjects

Prior to initiation of the study, approval was obtained for the study procedures from the University of Washington Institutional Review Board (UW IRB). The school district in Washington where initial recruitment was conducted did not require any additional IRB applications for their institution once the UW IRB board approved the human subject application, nor did NASN. An information statement was substituted for written consent (See Appendix B). The study participants were informed of the study purpose and processes, that their participation was voluntary, and of their right to withdraw from the study at any time via the information statement, which was attached to the invitation email and introduced as the first page of the online survey. If the potential participants did not want to participate in the study, then they could simply not reply to the invitation email. After they agreed to participate in the study through the email communication, they could select “no” at the beginning of the online survey page to not proceed to the further survey, or they could inform the investigator that they had chosen to drop out of the study.

Each participant was given a unique code number that was used to link their name to their responses. All participants’ information was stored in an Excel file, which was stored in a

password-protected computer. Any paper documents related to the study were stored in a double-locked cabinet for security purposes. Any identifiable information from the semi-structured interviews, such as names and specific locations, was altered to maintain the confidentiality and privacy of each participant. Interviews were recorded with a recording application on a password-protected smart phone or a voice recorder with permission from each participant. Specifically, for in-person interviews, a recording application on a smartphone was used, while a voice recorder was used for phone interviews. All recordings were transferred from the recording equipment to a password-protected computer and stored in an encrypted mp3 file format. Each interview was transcribed by a transcription service company hired by the investigator, and reviewed by the investigator independently. In appreciation for their participation in the study, $20 gift cards were offered to survey participants, and $30 gift cards were offered to interview participants, for a maximum of $50 to people who participated in both aspects of the study.

Recruitment

A total of 127 participants were recruited to this study. A total of 117 out of 127 school nurses participated in the surveys, and a total of 114 school nurses were included in the study due failure to complete the survey beyond the demographic questions (n=2) and misinformation about current workplace (n=1). A total of 20 out of 114 school nurses participated in the interviews following the surveys. Previous qualitative studies with school nurses related to diabetes care have included sample sizes that ranged from five with a purposive sampling method (Wang & Volker, 2012) to 47 (Marshall, Gidman, & Callery, 2013). The current study involves interviews with 20 school nurses who completed the survey. Interviews exploring possible educational formats for students with T1D and transitional care provided in school

settings were conducted with those who provided a range of responses to survey items. Sample selection criteria for the interview will be described later in this chapter.

Online survey. The initial recruitment process was conducted at a school district in Washington. The manager of Student Health Services at the school district in Washington agreed to serve as a liaison between the investigator and school nurses. Before conducting the recruitment process, an institutional memorandum of understanding (MOU) was established between the UW School of Nursing (SoN) and the school district in Washington in February 2016. Then, a mutual agreement between the investigator and the manager of Student Health Services at the school district in Washington was obtained in February 2016. The manager was asked to send an IRB-approved email and a flyer to school nurses informing them about the study purpose and participant involvement, and providing instructions about how those interested could participate. Ten copies of the IRB-approved recruitment flyer were mailed to the manager to post in the Office of Student Health Services and staff meeting areas frequented by nurses, after providing detailed instructions for sending the invitation emails to school nurses and posting the flyer in the target area. One month after the initial invitation email, the manager was asked to send the invitation email with the flyer to school nurses two more times in 2-week intervals. Therefore, the initial recruitment was conducted for two months at a school district in Washington. Based on information from Student Health Services, a pool of approximately 80 school nurses were available for invitation. The initial target sample size, N= 67, for the surveys was estimated to achieve a 95% confidence level for calculating a minimum sample size for this study. However, during the recruitment period, only 22 out of 80 school nurses responded to the invitation email and a total of 20 study participants completed the online surveys. A response

rate for the initial recruitment was 27.5% at the Washington State School district that was initially approached.

The second recruitment process was conducted with a NASN affiliate in Washington State to expand the participant pool. Similar to the initial recruitment process, a letter of support from the President of the NASN affiliate in Washington was obtained in April 2016. Then, a MOU between the University of Washington and the Washington State NASN affiliate was established prior to obtaining a mutual agreement between the investigator and the President of the NASN affiliate in Washington, who agreed to serve as a liaison between the investigator and school nurses enrolled in the NASN affiliate in Washington. Similar recruitment strategies were applied when recruiting NASN members. The modified email invitation with the modified flyer were sent two times in 3-week intervals to enrolled members of the NASN affiliate in Washington through their listserv between the end of April and the middle of May 2016. A total of 580 members subscribed to the listserv, including active school nurses, retirees, faculty members, and nursing students as of May 2016, based on information from the President of the NASN affiliate in Washington. A total of 86 school nurses were recruited and 79 of 86 (92%) participated in the survey. The overall response rate was 14% (79/580), though this is confounded by the fact that some members had already participated in the project at the initial school.

The list of other local districts where the investigator's home institution has an active agreement was obtained, to make contacts for further recruitment. Also, some study participants who were in the management/coordinator position contacted the investigator to send out the email invitation to their school nurses, who are not on the listserv of the NASN affiliate in Washington. The IRB-approved email text, the information statement, and the flyer were sent to

them along with instructions in May, 2016. As a result, a total of 19 additional school nurses were recruited and 18 out of 19 nurses participated in the surveys.

A total of 128 participants were recruited through these three recruitment processes. One participant wanted to drop out of the study before proceeding to the survey. One hundred seventeen of 127 participants fully or partially completed the survey, and a total of 114 participants were included in this study after screening of the survey data (N=114, See Figure 3.1).

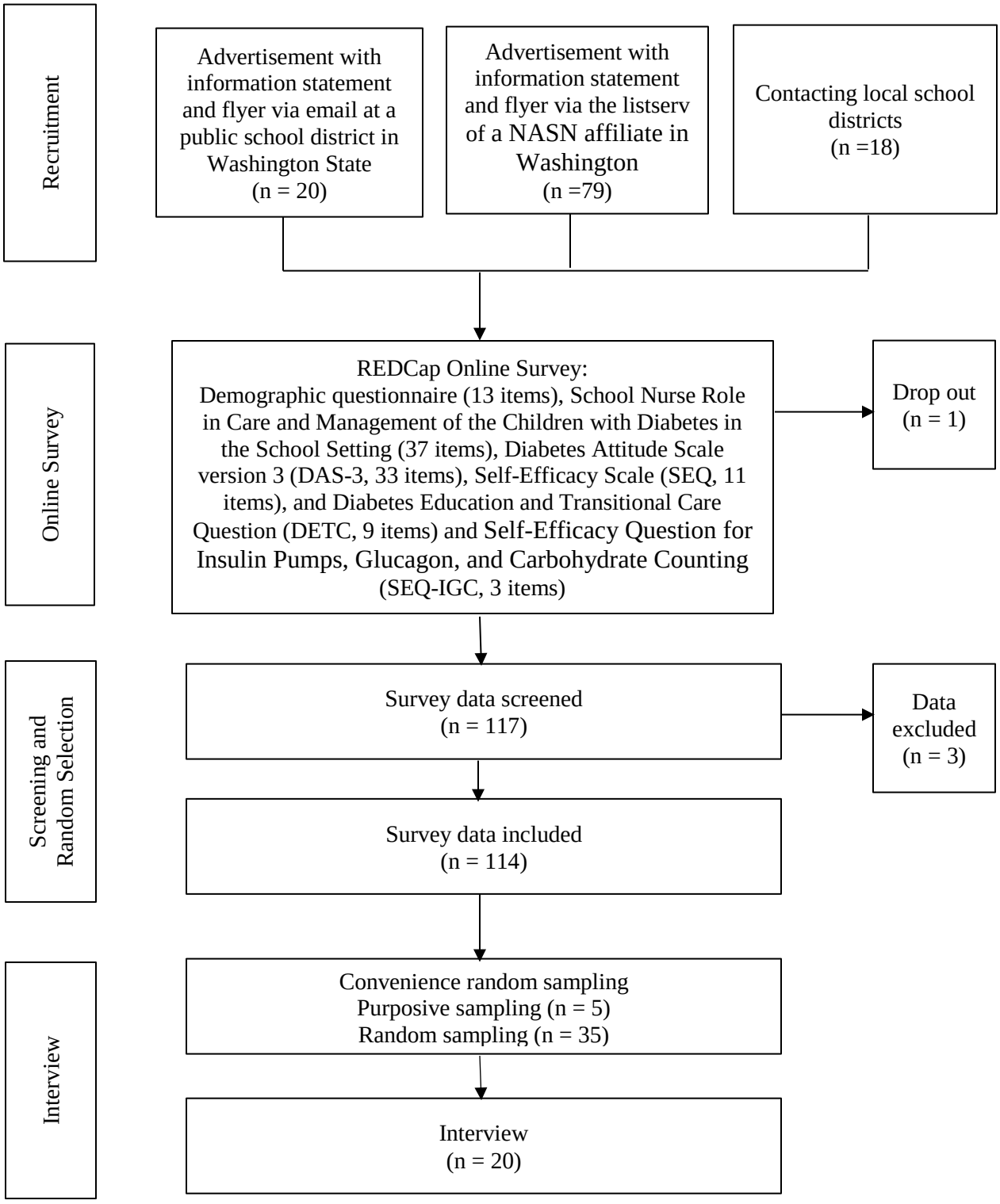

Figure 3.1. Flow Diagram of the Recruitment Process

Interview. A total list of 40 potential participants were selected based on the selection criteria.

Selection criteria for the interview participants. A total of 20 participants were targeted to be recruited for the interview, following the online survey. Twice as many as the desired number of participants were selected as potential interviewees, given that some might decline to participate in the interview. Selection criteria were: participants must have completed the online survey. Prior to data collection, the potential interview participants were expected to be selected based on the results of preliminary data analysis with scores of subscales in the Diabetes Attitude Scale (DAS-3), and self-efficacy levels of the Self-Efficacy on Diabetes Education (SEDE) and the diabetes practice scale that might present contrast in strata and credentials. However, there were no clear contrasts in self-efficacy levels and DAS-3 scores, but a pattern of information related to participants' credentials was found.

In preliminary analysis of the highest nursing credentials of participants, 93.91 % held RN licenses and only 6.09 % reported different credentials, such as NPs or LPNs. Therefore, five participants who held NP or LPN credentials were initially contacted to create diversity in the sample before proceeding with preliminary analysis of self-efficacy scores and DAS-3 scores. Regardless of credentials, participants were stratified into three groups based on self-efficacy levels (no or low confidence and moderate or high confidence) and scores on DAS-3 subscales (strongly disagree or disagree, neutral, agree or strongly agree) to compare and contrast. Participants presented diverse combinations of self-efficacy levels and DAS-3 scores. Therefore, because initial contacts for the first five potential interviewees were made based on their highest credential, another 15 potential interviewees were randomly selected to maintain integration of

sampling methods. A second list of 20 participants was randomly generated to be approached in the case that anyone on the initial list of 20 declined or could not be reached for an interview.

Recruitment for interviews. The first email invitations with the information statement were sent to the first 20 participants; these were five preselected school nurses with LPN or NP credentials in the middle of June, 2016, and 15 nurses at the beginning of September, 2016, in consideration of school nurses' vacation from the middle of June to August. Three attempts were made in one-month intervals to recruit interview participants via email communication. All individual interviews were scheduled based on participants' preferences. A total of 12 nurses responded to the first email. One participant declined to participate in an interview. For those who did not respond to the first email invitation, second email contacts were made in late September and early October, 2016. A total of six nurses responded to the second email invitation. For those who did not respond to the second email invitation, a third invitation was sent to them in late October and early November, 2016. After the third email contacts, 16 school nurses out of 20 were recruited from the first list which included five pre-selected participants and 15 randomly selected participants (response rate = 80%). Therefore, the first email contacts were made in October, November, and December, 2016 to recruit four additional nurses from the list of the second 20 selected interviewees. Participants were contacted in order, and none of the 4 refused; therefore 20 of 24 individuals approached (83%) agreed to be interviewed. The recruitment for the interviews was completed in December, 2016.

Data Collection

Data were collected via online survey from March 2016 to July 2016. The Research Electronic Data Capture (REDCap) system was used. REDCap is funded by the National Institutes of Health (NIH), granted to the UW, and supported by the Institute of Translational

Health Sciences (ITHS) at the UW. The online survey consisted of six sections after an introductory information statement: demographic questions, School Nurse Role in Care and Management of the Children with Diabetes in the School Setting (SNR), Diabetes Attitude Scale version third (DAS-3), Self-Efficacy on Diabetes Education (SEDE), Diabetes Education and Transitional Care Questionnaire (DETC), Self-Efficacy Question for Insulin Pumps, Glucagon, and Carbohydrate Counting (SEQ-IGC), and resources for managing potential risks. The resource page contained contact information about the investigator, the faculty sponsor, and crisis clinics for getting help or interventions related to potential mental/emotional issues that might arise during and after the surveys (See Appendix C). The surveys were created in the REDCap system and were then pre-tested with the investigator and a nursing doctoral student at the UW to ensure that the REDCap system captured the data as intended and that the online survey was intelligible to a user before study activation. The estimated time for survey completion was 17 minutes.

Once a school nurse agreed to participate in the study, the study participant was asked about her/his preferred email address to receive a survey link. The preferred email address was entered into the system and the system automatically generated a unique survey link for this specific address. The survey link was sent to the participant with an email which described the estimated time for the survey completion, how to access the survey through the given link, how to initiate the survey, and instructions for stopping and returning to the survey. Although the survey system was set to allow the study participants to stop and return to the survey with an access code or to restart entire surveys, participants were encouraged to complete the surveys in one sitting.

As described previously, a total of 24 individuals were approached for a follow-up interview; three attempts were made to interview. Interview data were collected from 20 participants between September, 2016 and January, 2017.

Instruments

Demographic questions. Demographic information, such as age, gender, ethnicity, race, educational background, credentials, years of experience, frequency of attending diabetes-related education, number of schools currently covered, and the number of students in their current caseload was collected using a survey developed by the investigator. A total of 12 items were developed by the investigator and reviewed by two pediatric nurse practitioners in school settings and the manager of Student Health Services at the school district in Washington State to establish content validity. See Appendix D.

School Nurse Role in Care and Management of the Children with Diabetes in the School Setting. This 37-item survey was developed to assess the criteria in the NASN position statement that was released in 2006 (West & Holmes, 2014). The criteria outlined school nurses' roles for caring for children with diabetes in school settings are: providing daily management and services, coordinating children and parents, health care provider plans of care, assessing and supporting children with diabetes, and developing/implementing emergency care plans.

The survey consists of three parts and employs a simple branching logic. (See Appendix E.) The response to the last item in each of the first two parts of the survey determines whether a participant will be asked to continue answering further questions. The first part of the survey asks for demographic information (6 items). Once a participant answers "yes" to question six ("My current job responsibilities include providing assistance and care to the student with diabetes"), then the person was able to continue with the survey. Otherwise, the person stops the

survey. The second part of the survey consists of 19 items which measure providing daily management and services and preparedness of school nurses for diabetes care/management. As with the first section, if the person answers "yes" to question 25, the person can proceed with additional questions in the survey. The last part consists of 12 items measuring coordinating and implementing individualized care plans; assessing; supporting children with diabetes; and developing/implementing emergency care plans.

Three of the 37 items are yes or no questions, and 28 items are rated on a 5-point Likert scale (A= do not agree to E= strongly agree) to identify school nurses' levels of implementation of diabetes management in school settings (West & Holmes, 2014). In the current study, the 5-point Likert scale with an alphabetical order from A to E was converted to a corresponding score from one to five for the purposes of statistical analyses. This survey has demonstrated content validity with NASN officers (West & Holmes, 2014). Also, West and Holmes have used this survey with 604 school nurses to measure comfort levels with their roles for caring for children with diabetes. The author of the scale gave permission for this scale to be used in the present study. (See Appendix P.) The psychometric properties were not reported in the West and Homes study (2014). Therefore, another contact was made to obtain information about psychometric properties and scoring guidelines from the authors. No psychometric properties and scoring guidelines were established by the authors. A Cronbach's alpha of the SNR for this study was computed and the detailed information is presented in the Results chapter.

Computing SNR Reliability. Since the developer did not present an estimation of psychometric properties, a Cronbach's alpha of the SNR is computed in the present study. However, there are some statistical, constructional, and conceptual limitations on an estimation of reliability of the SNR. Initially, a factor analysis was attempted to evaluate psychometrics and

to validate the construct of the measure, but the attempt was unsuccessful because the available sample size was too small (n=74) to run a factor analysis. As previously described, the SNR consists of three parts divided by the two branching logic questions. Although the first part collecting demographic information can be excluded from a statistical computation of reliability, the second and the third parts of the SNR cannot be combined together to estimate its reliability because these two parts are not conceptually connected. In detail, the second part consists of questions covering several different aspects of diabetes care to describe how school nurses, diabetic students, and school staff are involved in diabetes care and features of school environments. Some content is addressed by one question that is not sufficient to estimate an alpha or a correlation coefficient. However, questions in the third part mostly describe a health plan used for diabetes care. To estimate a Cronbach' alpha of the SNR, questions using different scales, such as yes/no, were excluded from the analyses. Thus, a total of 11 questions (six from the first part, three from the second part, and two from the third part) were excluded from the analysis. Based on similarity of content due to no available guidelines for scoring and grouping items from the developers, a total of 26 questions are initially categorized into nine domains (Table 3.1)

Then, alphas and correlation coefficients for four domains (students' accessibility to diabetes care-related equipment or systems, school staff, health care plans, and managing blood glucose levels) are calculated to evaluate whether categorized variables are sufficient. However, the two items in the managing blood glucose levels domain were not significantly correlated (p=.99). The Cronbach's alphas for the three domains are 0.60 for the domain of students' accessibility, 0.67 for the domain of school staff, and 0.88 for the domain of health care plans.

Table 3.1
Domains of the School Nurses Roles

Domains	Number of Questions (Included Questions)
Access to support systems and equipment	7 (Questions 7, 9, 10, 11, 13, 14, and 15)
Nurses' preparedness for diabetes care	1 (Question 23)
Nursing delegation	1 (Question 21)
Support from school staff	3 (Questions 17, 18, and 19)
Safe school environment	1 (Question 20)
A protocol for students who manage diabetes independently	1 (Question 16)
Students' competence in managing equipment	1 (Question 12)
Health care plans	9 (Questions 26, 27, 28, 29, 32, 33, 35, 36, and 37)
Managing blood glucose levels	2 (Questions 22 and 34)

Note. See Appendix E for the information of the SNR.

Supplemental Questions of School Nurse Role in Care and Management of the Children with Diabetes in the School Setting. Supplemental questions were developed by the investigator based on comments from one of the reviewers, the manager of a school district in Washington (See Appendix E). These questions measure information about additional staff, nursing time per visit, cognitive levels of students with T1D, and preferred educational formats for school nurses in diabetes care and management of students with T1D in school settings. It consists of 8 items using various formats of questions: 1 yes/no question, 3 multiple-choice items and 1 descriptive question. It was reviewed by the manager of the school district in Washington and one pediatric nurse practitioner to establish content validity. The reliability coefficients for the two domains of the SNR items (the support from school staff and the students' competence in managing equipment) and the corresponding questions were 0.63 and 0.89 in this study.

Diabetes Attitude Scale. The third version of the Diabetes Attitude Scale (DAS-3) measures attitudes related to diabetes (Anderson et al., 1998). It consists of 33 items rated on a 5-point Likert scale (1= strongly disagree to 5= strongly agree, Appendix F) with five subscales (the need for special training in education, seriousness of T2D, the overall value of tight glucose

control in diabetes care, psychosocial impact of diabetes on patients, and attitude toward patient autonomy). Ten items are reverse scored (items 2, 3, 7, 11, 13, 15, 16, 23, 26, and 28). The range of possible scores of each subscale is 1 to 5, and a high score represents positive diabetes-related attitudes. The survey can be completed by patients with diabetes and healthcare professionals such as physicians, nurses, or dietitians (Anderson et al., 1998). This scale was initially validated with a total of 384 adult patients with diabetes and 1,430 healthcare professionals (321 physicians, 540 nurses, and 569 dietitians; Anderson et al., 1998). The range of the subscale reliability scores was from 0.65 (psychosocial impact of diabetes) to 0.80 (seriousness of T2D). In the current study, the results of the seriousness of T2D subscale were not reported, except as descriptive statistics, because the subject of interest is T1D. No prior studies have used this survey for T1D only. Cronbach's alpha for all items was 0.81 in this study. Also, the reliability coefficient for each subscale was calculated; 0.51 for the needs for special training subscale, 0.65 for the seriousness of T2D subscale, 0.63 for the value of tight control, 0.65 for the psychosocial impact of diabetes subscale, and 0.59 for patient autonomy.

Self-Efficacy in Diabetes Education (SEDE). This scale measures self-efficacy levels of school nurses in diabetes care and education (Fisher, 2009, p. 225). It was developed based on Bandura's Social Cognitive Theory to measure self-efficacy, which is a core concept of the theory (Fisher, 2009). It consists of 11 items, rated using a 5-point Likert scale (1 = not at all confident to 5 = completely confident, Appendix G). The range of possible scores is from 11 to 55, with higher scores representing higher confidence in providing diabetes care and diabetes education. Lower scores represent lower confidence levels (44= high confidence, 33= moderate confidence, 22= lower confidence and 11= absolutely no confidence). The scale demonstrated content validity with three diabetes educators and five school nurse experts (Fisher, 2009). At the

initial validation in the developmental phase, reliability (Cronbach's alpha) was 0.88 (Fisher, 2009). A reliability coefficient of .94 was reported in a study with 70 school nurses (Fisher, 2009). The author of the scale gave permission for this scale to be used in the present study (See Appendix P). Cronbach's alpha was 0.90 in this study.

Diabetes Education and Transitional Care Questionnaire (DETC). A total of nine questions were developed by the investigator to address diabetes education and transitional care in schools. The questions measure diabetes educational contents, the top three educational priorities, any forms used in diabetes education, communication with providers, and contents of transitional care provided by school nurses (Appendix H). The items consist of various formats, for example, yes/no (three items), multiple choice (four items), and short descriptive questions (two items). One diabetes expert, one diabetes educator, two school nurse practitioners, and one school nurse reviewed the questions to finalize selection of items and to establish content validity.

Self-Efficacy Question for Insulin Pumps, Glucagon, and Carbohydrate Counting (SEQ-IGC). Three questions were developed by the investigator to identify self-efficacy levels of school nurses related to nursing practice in operating insulin pumps, administering glucagon, and counting the amount of carbohydrate in food. The items are rated using a 5-point Likert scale (1 = not at all confident to 5 = completely confident). The format of questions was adapted from Self-Efficacy Questionnaires (SEQ; Fisher, 2006), as well as Confidence in Teaching Diabetes Education Scale (Eaton-Spiva & Day, 2011), which measured nurses' perceived confidence in patient self-management education. One diabetes expert, one diabetes educator, two nurse practitioners, and one school nurse reviewed the questions to establish face validity. These three

items are included in the Diabetes Education and Transitional Care Questionnaire item numbers 2-4. Cronbach' alpha was 0.62 with the study sample. (See Appendix I.)

Qualitative Method

Overview of content analysis. Content analysis is a qualitative research method widely used in health-related studies. There are three distinct approaches in content analysis categorized by Hsieh & Shannon (2005) based on coding schemes, coding sources, and dealing with trustworthiness: conventional, directed, or summative. This study employed directed content analysis for the interview data and summative content analysis for short descriptive answers from the online surveys.

Directed content analysis. Directed content analysis can be used when a certain phenomenon is incompletely described by existing theory or previous research findings. Directed content analysis uses deductive analytic processes based on existing theory to predetermine variables of interest or relationships of variables at the study design step. This content analysis aims for the validation of an existing theoretical framework or conceptual extension of a theory. Because this approach utilizes existing theory or prior research, it has more organized and structured analytic processes than conventional content analysis.

In the present study, Meleis's three stages of transitions affected by nursing therapeutics served as an initial framework to identify how school nurses provide diabetes management, education, and transition care for students with diabetes. This study used semi-structured, open-ended questions in seven predetermined categories (current job description related to diabetes care, current diabetes practice, perception of school nurses' roles, perception of transitional care, applied developmental perspectives, barriers for diabetes education and management in schools, and clinical evidence and reason for diabetes education, excluding introduction questions, See

Appendix J). To minimize loss of contextual features of the interviews, all interview transcriptions were reviewed initially and any texts containing examples of study content areas were highlighted. Next, a coding process was initiated. Also, frequently reported codes were reported in rank order comparisons. To maintain objectivity and trustworthiness of the study, a faculty member who is an expert in qualitative research and a faculty member who is an expert in quantitative research reviewed the analytic process.

Trustworthiness

Establishing trustworthiness in a qualitative research is critical, similar to establishing validity and reliability in quantitative research. Trustworthiness can be established through credibility, dependability, confirmability, and transferability (Graneheim & Lundman, 2004; Lincoln & Guba, 1985; Polit & Beck, 2012). Credibility can be initially considered when designing a qualitative study, such as "making decisions about the focus of the study, selection of context, participants and approach to gathering data" (Graneheim & Lundman, 2004, p. 109). Dependability "seeks means for taking into account both factors of instability and factors of phenomenal or design induced changes" (Lincoln & Guba, 1985, p. 299) and it indicates consistency and replication of the study findings in a qualitative study. Transferability refers to "the extent to which qualitative findings can be transferred to other settings or groups" (Pilot & Beck, 2012, p. 745) and indicates applicability of the study findings to other situations. Confirmability represents intensity of neutrality of the results and levels of corroboration of the findings with respondents or others; it also refers to "a criterion for integrity in a qualitative inquiry, referring to the objectivity or neutrality of the data and interpretation" (Pilot & Beck, 2012, p. 723).

In this study, the trustworthiness was maintained by using methodological triangulation, peer debriefing, and member-checking. Methodological triangulation was achieved by using two different methods of data collection (online surveys and semi-structured interviews) exploring transitional care content and diabetes management behaviors. Both of the survey data and interview data were compared during a data analysis stage. During the data analysis stage, peer debriefing with a senior researcher occurred by presenting written and oral summaries of the data, categories, and themes and interpretation of the data. The investigator also sent out a summary of an interview to the interview participants and encouraged them to provide any feedback or comments to the investigator, if possible. This process was briefly written about in the information statement and the process was also mentioned by the investigator after completing each interview.

Semi-structured interview questions. Based on the literature review, interview questions were developed for the semi-structured interview with school nurses. An initial pool of 22 questions was developed by the investigator. One diabetes expert, two pediatric nurse practitioners, and one school nurse reviewed the selected interview questions. A total of 34 questions was finalized (18 questions and 17 probes). The topics of the 18 questions were sorted into eight content areas (See Appendix J): interview initiation (2 questions), current job description (1 question), current diabetes practice (4 questions and 10 probes), school nurses' roles (1 question and 3 probes), diabetes education for nurses (1 question and 1 probes), perceptions of transitional care and care content (4 items), applied developmental perspectives (2 questions and 1 probe), and barriers for diabetes education and management in school (3 items and 2 probes).

The length of actual interviews with participants varied from approximately 35 minutes to approximately 90 minutes.

Data Analysis

Survey data analysis. All survey data were analyzed by using STATA/IC 13 (STAT Corp. LP, College Station, TX). The collected data were reviewed for valid responses, missing data, and outliers. All short answers in the surveys were reviewed and transformed into categorical data depending on patterns of each answer. The survey data were retrieved from the REDCap system, which generates Excel files, and exported into the STATA program for statistical analyses. Descriptive analyses were applied to demographic data (e.g. gender, race, ethnicity, age, years of experience, number of schools covered, and number of students cared for). Also, the Cronbach's alpha for each survey was calculated where appropriate. (See Instruments section, pp. 54-60 for this information.) Pearson's correlation coefficients were computed among items initially. For dichotomous variables, logistic regressions were computed. To describe relationships between demographic data and each survey instrument, Chi-squared-tests and Fisher's exact tests for categorical variables, and t-tests and one-way ANOVAs for interval variables were computed. To describe relationships between school nurses' diabetes attitudes, their self-efficacy in diabetes education and management, multivariate regression models were constructed through an approach involving three steps. First, univariate regression models were constructed between two instruments. Second, backward-stepwise regressions with covariates were estimated. Next, final models were selected after adjusting models based on the results from univariate analyses and backward-stepwise estimations. All statistical tests utilized a 95% confidence interval (CI).

A total of 15 items in the online surveys (demographic questions, the SNR, and the DETC) were answered by participants with short descriptive answers, if needed. These were analyzed by using the summative content analysis method to extract information from the responses of the study participants and quantify them. Initially, the short descriptive answers were read, then counted, and the commonly used words or content were extracted along with words, phrases, and/or sentences containing similar meanings. These commonly used words were labelled and organized to develop categories. Simultaneously, the commonly used words were counted and quantified in a table. Then, themes/factors were generated as needed.

Interview data analysis. Interview data were transcribed verbatim using a transcription company hired by the investigator, and were reviewed by the investigator and a faculty member. The audio-recorded interview data were transcribed verbatim in Word documents which were exported to ATLAS. ti version 7 (Scientific Software Development GmbH, Berlin, Germany) for data management and analyses. The collected descriptive responses by the DETE survey were retrieved from the REDCap system as Excel documents. The retrieved responses were reviewed by the investigator multiple times and a number of missing responses were counted. The verbatim transcribed interviews were reviewed by the investigator and the faculty member. In the meantime, the transcribed interviews were also compared with the audio-recorded interview data to evaluate accuracy of the transcribed texts. As described previously, directed content analysis, which aims to describe phenomena, was used in an deductive way with the interview data to identify themes and categories about the current practices of nurses regarding diabetes education and management for students with T1D (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005). Meaning units were extracted from the text, and themes and categories were labeled with codes and categorized based on relationships and linkages among different codes (Duncan, 1989; Elo

& Kyngäs, 2008; Hsieh & Shannon, 2005). Then, categories were organized and clustered into meanings, and a hierarchical structure was generated based on these clustered categories (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005). As suggested by Lincoln and Guba (1985) for establishing trustworthiness, summaries were sent out to each participant after interviews. Scrutiny of the data was done by a qualitative methods expert during the analytic process. To synthesize both survey and interview data, results of the statistical analysis were described first, and then results from the interview data analysis were added based on identified themes and categories.

Chapter 4. Results

A total of 114 school nurses participated in the six online surveys. Then, 20 of the 114 participants were randomly selected to participate in the semi-structured interview. Interviews were transcribed and analyzed. In this chapter, findings from the survey and the interview are described including: 1) descriptive data analyses and findings from the online survey, 2) findings from the interview, and 3) integrated study findings.

Basic Demographics of Study Participants

A total of 127 school nurses were recruited and 117 participants answered the online survey questions. Two of the 117 participants only completed the demographic questionnaire, and one participant indicated a college as a work place in the SNR, so these participants were excluded. Therefore, a total of 114 participants were included in the final data analyses (See Figure 3.1).

Participants were demographically homogeneous: predominantly female (97.37 %), non-Hispanic (94.74 %), White (90.35 %), and RNs (95.61 %, Table 4.1). Two of the 114 participants were male and one did not report gender. The majority of participants (78.95 %) were between ages 35 years and 64 years.

The study participants were a highly-educated group. 19.3 % of participants reported that they hold other degrees, such as a 3-year Diploma from an RN program (9.09 %), Associate degrees (68.18 %), Bachelor's degree in Business Management (4.05 %), Bachelor's degree in Education (13.64 %), Bachelor's degree in Psychology (9.09 %), Master's degree in Physical Education, Health and Leisure (4.55 %), post-Master's Family NP (4.55 %), and Doctor of Education in Nursing Administration (4.55%). In addition, three of those who indicated other

degrees (13.63%) had two different degrees, such as an Associate degree in Nursing and a Bachelor's degree in another field.

Table 4.1
Basic Demographic Information about Study Participants

Characteristics	Frequency (N= 114)	%
Gender		
Female	111	97.37
Male	2	1.75
Age range		
18-24 years	1	0.88
25-34 years	15	13.16
35-44 years	26	22.81
45-54 years	31	27.19
55-64 years	34	28.95
65-74 years	8	7.02
Ethnicity		
Hispanic	2	1.75
Non-Hispanic	108	94.74
Race		
White	103	90.35
Black or African American	1	0.88
Asian	4	3.51
Other	4	3.51
Educational background		
BSN	66	57.89
MSN	21	18.42
M ED	4	3.51
MPH	1	0.88
Other	22	19.30
Credentials		
RN	109	95.61
NP	3	2.63
LPN	2	1.75
NCSN		
Yes	18	15.65
No	95	82.61
Full-time		
Yes	89	77.39
No	25	21.74

Among the participants, there was a broad range of years of working experience in schools, from less than 1 year to over 26 years (Table 4.2).

Table 4.2
Years of Experience in School Nurses

Characteristics	Frequency (N= 114)	%
Less than 1 year	8	7.02
1-5 years	44	38.60
6-10 years	30	26.32
11-15 years	14	12.28
16-20 years	5	4.39
21-25 years	6	5.26
Over 26 years	7	6.14

Seventy school nurses (61.4 %) covered more than one school (up to six schools) and six school nurses (5.26%) covered more than six schools. Most participants (84.35 %) were responsible for up to three schools. The median size of school that participants worked in was 1,300 students per school.

The number of students per full-time equivalent (FTE) was measured. The calculation method was provided in the survey question; FTE caseload = the number of students/ the percentage of FTE (see Appendix D). The responses ranged widely from 100 students per FTE to more than 1,800 students. More than 1,800 students per FTE was the most frequently given response (24.56 %). Caseloads between 401 and 500 students/FTE (8.77 %) and 701-800 students/FTE (8.77 %) were the next most common responses. Student numbers per FTE for participants were correlated with the number of school nurses covered on a weekly basis, r (111)= 0.40, $p < .05$. The State of Washington has a total of 39 counties with 310 school districts, and participants worked in 21 of 39 counties (See Table 4.3). School districts in King county (40.35 %) and Snohomish county (12.28%) were frequently indicated among participants.

Table 4.3
Counties of School Nurses' Working School Districts

County	Frequency (N= 114)	%
Benton	2	1.75
Clallam	2	1.75
Clark	4	3.51
Douglas	2	1.75
Franklin	2	1.75
Grant	2	1.75
Grays Harbor	1	0.88
Island	1	0.88
Jefferson	1	0.88
King	46	40.35
Kitsap	4	3.51
Lewis	3	2.63
Mason	2	1.75
Pend Oreille	1	0.88
Pierce	7	6.14
Skagit	1	0.88
Snohomish	14	12.28
Spokane	9	7.89
Stevens	1	0.88
Thurston	4	3.51
Yakima	3	2.63

Participants' work settings are presented in Table 4.4. Eighteen school nurses (15.65%) worked in elementary, middle, and high schools; 16 nurses (13.91%) worked in two types of schools; 37 nurses (32.17%) worked in one type of school; and 44 nurses (38.26%) did not indicate their work settings.

Table 4.4
Work Setting and Job Responsibilities (N=114)

Item	Frequency	Percent
Work setting		
Elementary school		
Yes	54	47.37
No	60	52.63
Middle school		
Yes	37	32.46
No	77	67.54
High school		
Yes	31	27.19
No	83	72.81
Current job responsibilities providing diabetes care		
Yes	112	98.25
No	2	1.75

Note. SNR= School Nurse Role in Care and Management of the Children with Diabetes in the School Setting.

Demographic Information for Interview Participants

As was the case with the full sample, those selected for interviews were also demographically homogeneous: predominantly female (95%), non-Hispanic (90%), White (85%), and RNs (85%, Table 4.5). The interview participants were a well-educated group. Seven of the interviewees reported that they held other degrees: Associate degrees (n=5), a Master's degree in physical education, health, and leisure (n=1), and a post-Master's Family Nurse Practitioner (n=1). One of those who indicated other degrees had two different degrees, an Associate's degree in nursing and a Bachelor's degree in another field. Years of experience working as a school nurse ranged broadly, from less than 1 year to over 26 years. The majority of the interview participants covered up to three schools, but three interviewees covered six or more schools. The median size of school that participants worked in was 1,350 students per school.

Table 4.5
Demographic Information about 20 Interviewees

Characteristics	Frequency	%
Gender		
Female	19	95
Male	1	5
Age range (%)		
18-24 years	1	5
25-34 years	4	20
35-44 years	5	25
45-54 years	3	15
55-64 years	5	25
65-74 years	2	10
Ethnicity		
Hispanic	0	0
Non-Hispanic	18	90
No answer	2	10
Race		
White	17	85
Other	2	10
No answer	1	5
Educational background		
BSN	8	40
MSN	4	20
M ED	1	5
Other	7	35
Credentials		
RN	17	85
NP	2	10
LPN	1	5
NCSN	5	
Yes	5	25
No	14	70
No answer	1	5
Full-time		
Yes	14	70
No	5	25
No answer	1	5

Note. NCSN=Nationally certified school nurse.

The responses ranged from 300 students per FTE to more than 1,800 students. As was the case with the full sample, more than 1,800 students per FTE was the most frequent response (40%, n=8). Caseloads between 601 and 700 students/FTE (20 %, n=4) and 1,101-1,200

students/FTE (10%, n=2) were the next most common responses. School districts in King County (30%) Snohomish County (12.12%), and Spokane County (15%) were frequently indicated among participants, and four interview participants did not indicate their regions (20%).

DAS-3 Descriptive Statistics

Descriptive statistics for the DAS-3, SEDE, and SEQ-IGC are presented in Table 4.6. The mean scores of the DAS-3 ranged from 4.02 (n=113, SD=.43, patient autonomy) to 4.55 (n=113, SD=.36, need for special training), indicating school nurses had generally positive diabetes-related attitudes.

Table 4.6
Descriptive Statistics of School Nurses' Diabetes Attitudes

Characteristics	N	Mean ± SD (Range)
DAS-3		
Need for Special Training	113	4.55 ± .36 (4.19 - 4.91)
Seriousness of Type 2 Diabetes	113	4.20 ± .43 (3.77 - 4.63)
Value of Tight Control	113	4.31 ± .38 (3.93 - 4.69)
Psychosocial Impact of Diabetes Millets	113	4.51 ± .43 (4.08 - 4.94)
Patient Autonomy	113	4.02 ± .38 (3.64 - 4.40)

Note. DAS-3= Diabetes Attitudes, Version 3. Scale score range: DAS-3 subscales= 1 (=Strongly Disagree) -5 (=Strongly Agree).

The relationships among the five subscales of the DAS-3 are presented in Table 4.7. Most of the DAS-3 subscales showed significant associations ($p<.05$), except the relationship between the needs of special training and the value of tight control.

Table 4.7
Correlation Matrix for DAS-3 subscales (n=113)

Subscale	Need for special training	Seriousness of type 2 diabetes	Value of tight control	Psychosocial impact of diabetes	Patient autonomy
Needs for special training	1.00				
Seriousness of type 2 diabetes	.22*	1.00			
Value of tight control	.14	.47***	1.00		
Psychosocial impact of diabetes	.25**	.22*	.30**	1.00	
Patient autonomy	.45***	.27**	.15*	.24*	1.00

Note. DAS-3 = diabetes attitude scale version 3.
*p<.05. **p<.01. ***p<.001.

SNR Descriptive Statistics

The SNR results illustrated implementation of recommended nursing interventions for diabetes management in schools. If caring for diabetic students was not a current job responsibility, participants did not complete the remainder of the survey. Therefore, two school nurses (1.74%) were excluded from the analysis of the first part of SNR based on its first branching logic question.

The descriptive statistics for the first part of the SNR and supplemental questions are presented in Table 4.8.

Part 1 includes questions about the following criteria: providing daily management and services, assessing and supporting students with diabetes. Part 2 includes questions about individualized care plans by health care providers, developing and implementing emergency care plans, and coordinating children and parents.

Table 4.8
Descriptive Statistics of School Nurses Roles and Supplemental Questions- Part 1 (n=112)

Items	Mean	SD
Students with diabetes have an RN's assistance with their diabetes management	4.17	1.13
Numbers of students with diabetes	2.29	1.05
Having additional staff	3.31	0.99
Students' access to diabetes care related equipment		
BG monitoring	4.96	0.25
Medication	4.86	0.51
Nutritional supplements	4.71	0.62
Students' competency in		
Equipment	3.71	0.11
Math to calculate insulin doses	3.18	0.22
Knowledge of affecting factors for correct doses	3.16	0.16
Nursing time for managing the equipment	2.03	0.90
Student access		
Document for BG readings	4.18	0.19
Document for Insulin coverage	4.23	0.14
Bathrooms	4.94	0.34
Protocols in place to document students' diabetes self-management ability	3.69	1.40
School personnel are		
Knowledgeable about student's diabetes	4.02	0.97
Trained by the school nurse	3.78	1.36
Knowledgeable about student's emergency care plan	4.22	0.87
Willing to assist students	4.01	1.00
Safe school environment managing hypo/hyperglycemic episodes	4.29	0.84
Accessible to school nurses, if delegated	4.16	1.43
Weight reduction plans for overweight students with T2D	1.97	1.19
Feeling prepared to meet the needs of diabetic students	4.30	0.90
Participation in the H.A.N.D.S. education	0.48*	0.50
Plans in place in school	0.97*	0.16

Note. M = mean, SD = standard deviation, T2D = type 2 diabetes, H.A.N.D.S.= Helping Administer to the Need of the Student with Diabetes in Schools. Score range =1 (=Do Not Agree) -5 (=Strongly Agree), except helping increased preparedness items=0 (=No) -1 (=Yes). Items with * mark have the score range zero to one.

Students' competence in using equipment, such as syringes, insulin pens, and insulin pumps, for diabetes management was higher (M=3.71, SD=1.11) than their cognitive competence in math to calculate correct insulin doses (M=3.18, SD=1.22) and knowledge of affecting factors for correct doses (M=3.16, SD=1.16). The latter two were highly correlated

(r=.83, p<.001). School nurses reported moderate agreement on safe school environments for diabetic students in regard to managing hypoglycemic or hyperglycemic episodes. This was significantly associated with most staff's knowledge about diabetes (r=.35, p<.001) and ECPs (r=.38, p<.001), training (r=.21, p<.05), and willingness to support diabetic students with their plans (r=.37, p<.001).

The nursing time for assisting students who were competent in managing their equipment for each visit varied. Most school nurses (n=51) spent five to ten minutes with diabetic students in each visit, followed in frequency by less than five minutes (n=33), 10 to 15 minutes (n=18), 15 to 20 minutes (n=7), and over 20 minutes (n=1). These findings indicate that school nurses spent 10 minutes or less with diabetic students managing equipment competently.

The number of diabetic students whom a school nurse took care of was widely distributed, and three to five diabetic students (33.63%) was the most frequently reported range (Table 4.9).

Table 4.9
Numbers of Diabetic Students per Individual School Nurse

Number of students	Frequency	%
Less than 3 students	30	26.79
3 – 5 students	38	33.93
6 – 8 students	25	22.32
More than 8 students	19	16.96

Note. n=112.

Some school nurses (n=13, 11.50%) had additional staff regardless of the number of diabetic students. There was significant evidence that the possibility of having additional staff was higher when school nurses cared for a higher number of diabetic students (trend test p<.05).

The credentials of additional staff varied (Table 4.10): medical staff (37.5%, n=42), non-medical staff (33.93%, n=38), and no answer (28.57%, n=32).

Table 4.10
Credentials or Types of Medical and Non-Medical Staff

Groups	Category	n	%
Medical staff	Nursing assistant	4	9.52
	Licensed practical nurse	20	47.62
	Associate degree in nursing	7	16.67
	Registered nurse	8	19.05
	Emergency medical technician	2	4.76
	School-based health center including PA, ARNP, and Naturopaths	1	2.38
Non-medical staff	Parent-designated adult (PDA)	10	26.32
	Paraprofessional	4	10.53
	Teachers	1	2.63
	Office staff	2	5.26
	School assistant	2	5.26
	Health technician	1	2.63
	Secretary	1	2.63
	Health room assistant	9	23.68
	Other	8	21.05

Note. PA= Physician Assistant; and ARNP= Advanced Registered Nurse Practitioner.

School nurses described their reasons for determining their perceived safe school environments (Table 4.11). Some of the reasons were not supported by existing variables captured by the SNR. These five dimensions influenced school nurses' views on the safety of school environments for managing students' hypo or hyperglycemic episodes.

Table 4.11
Reasons for School Nurses' Perceived Safe School Environment (n=109)

Domains	Categories
School nurses	Accessibility
	Providing well-developed care plans
	Supervising diabetes care
	Limited delegation
	Accessibility to supplies
School staff/teachers	Trained, supportive staff
	Sensitive to students' symptoms
Supportive school systems	Implementation of well-developed health plans
	Accessibility to emergency supplies
	Access to adults
	Safe referring systems for students with symptoms
Individual students	providing information about needs for their symptoms
	Self-management capabilities
Parents	Parental involvement

School nurses listed ways to increase their perceived preparedness for providing diabetes care (Table 4.12). These results indicate that school nurses who provide diabetes care to students have high perceived preparedness for meeting the needs of students. This can be increased by using in-person Continuing Education, which may provide opportunities to practice hands-on care with insulin pumps and/or glucagon, and real-time support from diabetes care experts via telephone, which may be highly applicable when nurses provide care with questions or issues.

Table 4.12
Preferred Forms Increasing School Nurses' Preparedness (n=112)

Items	Frequency	%
In-person CE	80	71.43
Online CE	61	54.46
On-site information resources	22	19.64
Online-information resources	42	37.50
On-call diabetes clinical specialist	63	56.25
Others	20	17.86
Additional staff or better staffing	8	40.00
More time with students, including more FTE, full-time in the building, or smaller caseloads	9	45.00
Practice with new technology	3	15.00
Diabetes camp experience	1	5.00
Specific training meeting school needs	1	5.00
Release of information, and communication with endocrinologists	1	5.00

Note. CE= continuing education. FTE= full-time equivalent.

Fifty-three nurses (47.75%) had attended the NASN diabetes education program, H.A.N.D.S. Attendance was positively correlated with years of nurses' experience (r=.25, p=.008) and the numbers of schools (r=.28, p=.003). This result indicates that school nurses who had longer working experience might have had a better chance to participate in this education program compared to nurses who had shorter working experience. One-hundred and eleven of 112 nurses (99.11%) who completed the first part of the SNR, indicated implementation of students' IHPs, ECPs, or IEPs. This indicates that school nurses perceived that school systems and/or school nurses are prepared to provide individualized diabetes care, including emergency

care, and that their documents were in place. This result was also a precursor to the next set of questions. One person who did not respond to this question was excluded from further analysis based on the second branching logic system in the SNR. The descriptive statistics for the second part of the SNR are presented in Table 4.13.

Table 4.13
Descriptive Statistics of School Nurses Roles and Supplemental Questions- Part 2 (n=111)

Items	Mean (SD)
The plans are	
Considering students' knowledge base	4.32 (.99)
Considering students' developmental levels	4.35 (.98)
Considering students' individual needs	4.61 (.81)
Describing nursing interventions and school accommodations	4.49 (.85)
An RN is responsible for coordinating the implementation of the plan	0.97 (.16)*
A school administrator is responsible for coordinating the implementation of the plan	0.19 (.39)*
The plan integrates preferred management strategies of students and families	4.70 (.69)
School nurses feel adequate managing students' diabetes with the plan of care coordinated with students and families	4.67 (.64)
Students have BG levels close to the desired range as possible	3.41 (.99)
The plans determine nursing interventions and school accommodations based on students' developmental status	4.34 (.80)
The plans identify and coordinate interventions for school activities	4.15 (.92)
Students have a plan assisting in determining personal goals for attaining independent self-care	3.44 (1.26)

Note. The score range of most items is one to five. Items with * mark have the score range zero to one. SD= standard deviation; and BG= blood glucose.

Health care plans coordinated by school nurses integrating preferences of diabetic students and families in diabetes management were positively associated with nurses' perceived adequacy in managing students' diabetes ($r=.58$, $p<.001$). These results indicate that participants believed that the health care plans school nurses developed, coordinated, and implemented in

schools for caring of students with type 1 diabetes can accommodate the needs of students and families to provide adequate, individualized diabetes care to students.

Controlling students' BG levels close to the desired levels was significantly positively associated with the following factors: school nurses having additional staff (r=.28, p<.01); staff training by nurses (r=.21, p<.05); nurses' perceived safe school environments (r=.30, p<.01) and preparedness (r=.29, p<.01). In addition, it was also correlated with implemented care plans based on students' developmental status (r=.26, p<.01) and individual needs, (.29, p<.01) which include nursing interventions and accommodations (r=.26, p<.01). These results indicate that diabetic students can control their BG levels within a desired range in schools with well-prepared school nurses working with well-developed, individualized care plans, additional staff helping nurses, and well-prepared school personnel.

SEDE and SEQ-IGC Descriptive Statistics

The mean score of the SEDE was 36.16 (n = 112, SD=6.70, Table 4.14). Two participants were excluded from computation of the total score, due to missing data on 3 or more items.

Table 4.14
Descriptive Statistics of School Nurses' Self-Efficacy Levels in Diabetes Education and Management

Characteristics	N	Mean ± SD (Range)
SEDE	112	36.16 ± 6.70 (29.46 - 42.86)
SEQ-IGC	108	9.92 ± 2.42 (7.50 - 12.34)
Insulin Pump	111	2.93 ± 1.05 (1.88 - 3.98)
Glucagon	110	3.05 ± 1.20 (1.85 - 4.25)
Carbohydrate count	111	3.95 ± 0.91 (3.04 - 4.86)

Note. SEDE= Self-Efficacy in Diabetes Education instrument; and SEQ-IGC= Self-Efficacy Question for Insulin Pumps, Glucagon, and Carbohydrate Counting. Scale score range: SEDE=11 -55; SEQ-IGC=3 -15; and each item of SEQ-IGC=1 (Not at all confident) -5 (Completely confident).

After individual scores were categorized in 11-point intervals to evaluate levels of self-efficacy in diabetes education based on the score guideline provided by the developer, results indicated that 68 school nurses (60.71%) presented moderate confidence, 14 school nurses (12.50%) had high confidence, and 30 school nurses (26.78%) reported low or no confidence in diabetes care and education. No participant reported complete confidence. These SEDE results indicate that the majority of school nurses had at least moderate confidence in diabetes education and diabetes care.

The mean total score of SEQ-IGC was 9.92 (n = 108, SD=2.42), and the mean score of each item is detailed in Table 15. Forty-nine school nurses (45.37%) presented moderate confidence and 31 nurses (28.70%) had high confidence overall in operating insulin pumps, administering glucagon, and counting carbohydrates. However, 23 nurses (21.30%) showed low or no confidence. School nurses presented higher confidence scores in counting carbohydrates (mean±SD = 3.96±.91) in comparison with operating insulin pumps (mean±SD = 2.93±.10), $t(109)=9.54$, $p<.05$. Similarly, school nurses had higher confidence scores in counting carbohydrates in comparison with administering glucagon, and the mean difference between glucagon administration and carbohydrate count was statistically significant from 0 ($df=110$, $p<.05$). However, they had lower confidence in insulin pump operation (mean±SD = 2.93±.10) than in glucagon administration (mean±SD = 3.05±1.20), but this difference was not statistically significant, $t(108)=-.93$, $p=.35$. These results indicate that school nurses had lower confidence in insulin pump operation than in glucagon administration and carbohydrate count, although overall confidence in these three nursing interventions was moderate or high.

The relationships among the SEDE and the SEQ-IGC are presented in Table 4.15. The results indicated that school nurses' self-efficacy in diabetes management were highly correlated with their self-efficacy in diabetes management.

Table 15
Correlations Between SEDE and SEQ-IGC Items (n=112)

	SEDE	SEQ-IGC	SEQ-IGC item 1	SEQ-IGC item 2	SEQ-IGC item 3
SEDE	1.00				
SEQ-IGC	.59**	1.00			
Insulin Pump	.48**	.73**	1.00		
Glucagon	.40**	.80**	.31*	1.00	
Carbohydrate count	.48**	.75**	.35**	.42**	1.00

Note. SEDE = self-efficacy in diabetes education scale; SEQ-IGC = self-efficacy questions for insulin pump, glucagon, and carbohydrate counting.
*p<.01. **p<.001.

Descriptive Analysis of DETC

One hundred and twelve out of 114 participants responded to the DETC. Two participants did not answer these surveys entirely. The descriptive statistics of the DETC are presented in Table 5. Out of 112 participants, 96% of nurses had provided some diabetes education for students with T1D: 103 RNs, 3 NPs, and 2 LPNs.

The most frequently provided forms of educational content were carbohydrate counting (96%), hypoglycemia management (94%), nutrition (heathy eating, snacks, and food choices, 89%), hyperglycemia management (88%), and exercise (82%). Diabetes education about developmental perspectives was the most infrequently provided educational content (41%). In addition, 6% of nurses described the contents of the diabetes education they provided: "referrals to appropriate healthcare providers," "consultation with diabetes educators," discussion about diabetes management, "goal setting," modified education for students with autism, integrating parental wishes into care plans, updating information from healthcare providers, and multi-

disciplinary care for homeless students and their families. These results indicate that diabetes education for students with type 1 diabetes is commonly provided in school settings. Diabetes education in school focuses on potential events that can affect academic activities. For example, carbohydrate counting may be highly related to students' lunches in schools, including nutritional education as well. Hypoglycemic or hyperglycemic events can occur during school days, and these can affect students' learning in class and result in further absence.

Regarding the top three educational priorities in school diabetes management for students with type 1 diabetes, the majority of nurses reported hypoglycemia management (85%), followed by carbohydrate counting (52%), and emergency protocols (42%). Three percent of nurses reported other educational priorities, including "steps toward independence," assessment/assurance of students' knowledge then identifying learning needs, and initial assessment of cognitive/developmental capability.

Among 112 nurses who completed the DETC, 78% of participants used IHPs for diabetes education, followed by 504 forms (62%). Also, 16% of nurses (n=17) did not use any forms for diabetes education. Those who indicated other forms used various formats: forms created by a school nurse (n=1), forms from the H.A.N.D.S. educational material (n=2), posters (n=1), emergency action plans/ECPs (n=4), "Section 504 Life Threatening ECPs (n=1)," PDA forms (n=1), district specific forms (n=2), diabetes care plans from healthcare providers (n=1), and different usages of DSMPs, 504 forms, and IHPs (n=1). Although IHPs are the most frequently used form for diabetes education, most school nurses used several forms simultaneously: DSMPs, 504 forms, IHPs, and other forms together (0.89%, n=1), a combination of three different forms (28.57%, n=32), two different forms (33.04%, n=37) and one type of form (20.54%, n=23). These results indicate that school nurses commonly used IHPs for diabetes

education of students with diabetes, but IHPs may not contain all the necessary information which school nurses need during education. Also, these reveal no uniform educational forms are applied in current practice for diabetes education in schools.

Over one-third of participants (38%) used IHPs (31%), DSMPs (4%), or other forms (4%) as an evaluation form whenever they provided diabetes education to students with type 1 diabetes. Other formats included a log sheet developed by diabetic specialists, a local hospital diabetic form, a report developed by a school nurse, and using IHPs as tools to get students' and parents' input and evaluation. However, 62% of participants reported that they did not currently use a form to evaluate the effects of the diabetes education they provided. This result reveals that school nurses do not commonly use an evaluation form to measure the effectiveness of their diabetes education for students or to identify whether their students need more education on a certain topic or not, although diabetes education is commonly provided to diabetic students in school.

Most school nurses (86%) reported that they have communicated with students' healthcare providers. Also, 69% of nurses claimed that they have provided transitional care to diabetic students in schools. The two items requiring descriptive answers are presented in Aim 2.

Aim 1: Describe the interrelations between school nurses' attitudes about diabetes and self-efficacy in diabetes management and education including diabetes care behaviors

The DAS-3, the SEDE, the SEQ-IGC and the SNR were utilized to address Aim 1. To describe the relationships between demographic variables, school nurses' attitudes about diabetes, and self-efficacy in diabetes management and education including diabetes care behaviors, Pearson's correlation coefficients were computed. Differences in school nurses' diabetes-related attitudes between groups by demographic factors (*age, ethnicity, race, degree,*

credential, NCSN, years of experience, fulltime employment status, number of schools covered weekly, total caseloads per FTE) and numbers of diabetic students they took care of were also examined using two-way t-test for binomial variables (*ethnicity, NCSN, and fulltime*), and one-way ANOVA for categorical variables (*age, race, degree, credential, years of experience, numbers of school, total caseloads per FTE, and numbers of diabetic students)*. Similarly, differences in school nurses' self-efficacy levels in diabetes management and education as measured by SEDE and SEQ-IGC by demographic factors were also examined using two-way t-tests for binomial variables (*ethnicity, NCSN, and fulltime*), and one-way ANOVA for categorical variables (*race, degree, credential, years of experience, numbers of school, total caseloads per FTE, and number of diabetic students*). Furthermore, differences in diabetes care as measured by the SNR between groups by demographic factors were examined using chi-squared tests for binomial and categorical variables.

DAS-3 Descriptive Statistics and Demographic Factors

One-way ANOVA and t-test were used to determine if there were significant mean differences in DAS-3 subscales (need for special training in education, value of tight control in diabetes care, psychosocial impact of diabetes on patients, and attitude toward patient autonomy) among groups by school nurses' demographic characteristics. The two subscales (needs for special training, and patient autonomy) did not have any significant relationships with demographic variables ($p>.05$). Therefore, the results measured relationships between demographic variables and the two subscales of DAS-3 (value of tight control and psychosocial impact of diabetes).

There was a significant difference in diabetes attitudes toward the value of tight control with regards to nurses' age groups, $F(112) = 2.52$, $p=.04$. Nurses aged 18 - 24 years had the

highest mean scores (M=4.86) and nurses aged 25 – 34 years had the lowest mean scores (M=4.16±0.49). However, despite reaching a statistically significant level, the actual difference in mean scores among groups was quite small. A Tukey-Kramer post-hoc test revealed that there were no statistically significant mean differences in different age groups ($p>.05$).

There was not enough variation in ethnicity to conduct any test to evaluate its relationship with any surveys; the sample was predominantly homogenous. However, there was a significant mean difference in attitudes to the psychosocial impact of diabetes with regards to groups by race. A post hoc analysis using the Tukey-Kramer criterion revealed that the mean of the psychosocial impact of diabetes was not significant in the different racial groups ($p>.05$). This result may be caused by the high percentage of Whites among study participants. The main effect of nurses' education on their diabetes attitudes towards need for special training was significant, $F(4,108)=3.49$, $p=.01$. The main effect of nurses' credential on their attitudes towards the psychosocial impact of diabetes was significant, $F(2,110)=4.16$, $p=.02$. A Tukey-Kramer post hoc analysis indicated that the mean score of the psychosocial impact of diabetes was significantly higher in the nurses with RN (M= 4.53) than in the nurses with NP (M=3.94, $p<.05$). School nurses working full-time had higher scores on the psychosocial impact of diabetes scale (M = 4.56, SD = .05) than did those working part-time (M = 4.36, SD = .08), $t(110)=-2.01$, $p=.047$.

The main effect of the number of diabetic students cared for by school nurses on nurses' attitudes towards the psychosocial impact of diabetes was significant, $F(2,119)=7.83$, $p=.006$. A Tukey-Kramer post hoc analysis indicated that the main effect of the number of diabetic students was significant with nurses who had six or more students scoring higher than nurses with five or fewer students ($p<.05$).

As described in the participants' demographics, three different types of school were possible as participants' work settings: elementary, middle, and high school. T-tests revealed that there were no significant differences in scores on the five diabetes attitudes scales, based on groups by work settings ($p>.05$). In addition, other demographic factors including caseloads per FTE, County, and being NCSN did not have significant relationships with the subscales of DAS-3 ($p>.05$).

SEDE Descriptive Statistics and Demographic Factors

One-way ANOVAs and t-tests were computed to examine relationships between SEDE and demographic variables. Main effects of race and job status were found. A post hoc test using a Bonferroni correction indicated that the mean SEDE score was significantly lower in other races than in White, Black, and Asian nurses ($p<.05$). Nurses working full-time had higher SEDE scores (M=37.27, SD=6.21) than did those working part-time (M=32.96, SD=7.64), $t(109)=2.73$, $p = .007$. The number of diabetic students was also significantly related to the mean SEDE score ($p<.05$). A Tukey-Kramer post hoc test indicated that the mean SEDE score was significantly higher in nurses taking care of more than eight diabetic students, compared to nurses taking care of less than three diabetic students ($p<.05$). However, other demographic variables did not show significant relationships ($p>.05$).

Descriptive Statistics of SEQ-IGC and Demographic Factors

To determine relationships between SEG-IGC and demographic factors, one-way ANOVAs and t-tests were computed. The main effect of the number of diabetic students was significant, $F(3,102)=4.61$, $p=.005$. A Tukey-Kramer post hoc analysis using the criterion indicated that the mean SEG-IGC score was significantly lower in nurses caring for five or fewer diabetic students than in those caring for six to eight ($p<.05$) and in those caring for more than

eight diabetic students (p=.01). Nurses working in elementary schools had higher scores on self-efficacy in managing insulin pumps (M=3.15, SD=1.02) than did those working in middle and/or high schools (M=2.50, SD=.85), t(66)=-2.19, p=.03. However, other demographic factors did not have significant relationships with SEG-IGC.

Relationship between Diabetes Attitudes, Self-Efficacy in Diabetes Education and Management

Multiple regression models were used to determine whether nurses' diabetes-related attitudes were a predictor of their levels of self-efficacy related to diabetes after controlling for the covariates (years of experience working as a school nurse, job status, type of schools, the number of diabetic students cared for by a school nurse, types of school worked in, and students' competence in managing pumps, math, and cognitive knowledge). Because of the sample size, multiple regression models could contain up to five independent variables while maintaining the stability of the models. Therefore, three steps were performed to build multiple regression models. First, univariate analysis between diabetes attitudes measured by DAS-3 subscales, self-efficacy in diabetes education measured by SEDE, and self-efficacy in diabetes management measured by SEQ-IGC were run initially. Second, backward-stepwise estimations with all covariates were examined between DAS-3 subscales, SEDE, and SEQ-IGC. Last, after adjusting models, final models are reported.

Diabetes attitudes and self-efficacy in diabetes education. Need for special training, and patient autonomy were not significant predictors of school nurses' self-efficacy in diabetes education in the univariate models. The final regression models were constructed to examine relationships between diabetes attitudes and self-efficacy in diabetes education based on the results of univariate analyses and the results from the stepwise-regressions. Need for special

training was not a significant predictor of nurses' self-efficacy in diabetes education ($p>.05$). In this model, working fulltime and working in middle schools were significantly related to nurses' self-efficacy in diabetes education after controlling for need for special training ($p=.008$). Those working full time and/or working in middle schools were more likely to report higher SEDE scores than those working part-time and/or not working in middle schools. This model explained 10.9% of the variance of self-efficacy in diabetes education.

Value of tight control was not a significant predictor of school nurses' self-efficacy in diabetes education after controlling for their job status and working in middle schools. In this model, nurses' job status and working in middle schools had significant relationships with their self-efficacy in diabetes education ($p=.02$). These results indicate that nurses working full-time were more likely to have higher SEDE scores than did those working part-time and nurses working in middle schools were more likely to have higher SEDE scores than did those not working in middle schools ($p<.04$).

Psychosocial impact of diabetes was not a significant predictor of school nurses' self-efficacy in diabetes education after controlling for their job status and working in middle schools, $F(3, 107)=3.63$, $R^2=.113$. The model explained 11.3% of the variance of self-efficacy in diabetes education. An F-test revealed that nurses' job status and working in middle schools were significant contributors to their self-efficacy in diabetes education after controlling for psychosocial impact of diabetes in this model ($p=.02$). Full-time school nurses were more likely to have higher SEDE scores than those working part-time ($p=.02$). Furthermore, nurses working in middle schools were more likely to have higher SEDE scores than those not working in middle schools ($p=.02$).

The multivariate model for patient autonomy was significant, $F(5, 100)=3.37$, $R^2=.11$. Patient autonomy was not a significant predictor of nurses' self-efficacy after controlling for their job status and the type of school in which they worked, namely middle schools ($p>.05$). The model demonstrated that nurses' job status significantly predicted nurses' self-efficacy in diabetes education ($p=.01$), as did their working in middle schools ($p=.02$). In other words, full-time nurses were more likely to have higher self-efficacy in diabetes education, and nurses in middle schools were more likely to have higher self-efficacy in diabetes education than those not in middle schools.

In summary, nurses' diabetes attitudes measured by DAS-3 were not significantly related to their self-efficacy in diabetes education. Nurses' job status and their working in middle schools were significantly related to their self-efficacy levels in diabetes education in the constructed models, explaining the relationship between their attitudes towards need for special training, value of tight control, psychosocial impact of diabetes, and patient autonomy, and self-efficacy in diabetes education. However, although constructed models were significant ($p<.05$), their power to explain the relationships between nurses' attitudes and their self-efficacy in diabetes education was limited.

Diabetes attitudes and self-efficacy in diabetes management. Nurses' attitudes towards need for special training, and patient autonomy were not significant predictors of their self-efficacy in diabetes management with insulin pumps, glucagon, and carbohydrate count ($p>.05$). Need for special training, patient autonomy, value of tight control, and psychosocial impact of diabetes were selected for constructing multivariate models. The final models contained the same covariates (the number of diabetic students and types of schools in which nurses worked).

The multivariate model for need for special training was significant, $F(5, 100)=3.16$, $R^2=.159$. Diabetes attitudes regarding need for special training were not a significant predictor of nurses' self-efficacy in diabetes management after controlling for the number of diabetic students and types of schools worked in ($p>.05$). However, multiple F-tests revealed that the number of diabetic students and types of schools worked in were significantly related to nurses' self-efficacy in diabetes management after controlling for need for special training ($p=.01$). In the model, the number of diabetic students and working in high schools significantly contributed to nurses' self-efficacy in diabetes management ($p<.05$). In other words, nurses taking care of six or more diabetic students were likely to have higher SEQ-IGC scores than those taking care of five or fewer diabetic students ($p=.005$). In addition, working in a high school was a significantly negative predictor of nurses' self-efficacy in diabetes management ($p=.015$).

The regression model for value of tight control was significant, $F(5, 100)=3.54$, $R^2=.147$. School nurses' attitudes about value of tight control were not a significant predictor of their self-efficacy in overall diabetes management with insulin pumps, glucagon, and carbohydrate count ($p>.05$). Taking care of six or more diabetic students was a significant contributor to nurses' higher self-efficacy scores in diabetes management ($p=.003$), as well as their working in high schools ($p=.02$) in the model. An F-test revealed that the types of schools that nurses worked in significantly contributed to their self-efficacy in diabetes management after controlling for value of tight control and the number of diabetic students ($p=.04$).

The final regression model for psychosocial impact of diabetes was significant, $F(5, 100)=4.53$, $R^2=.170$. See Table 4.16. Nurses' attitudes towards psychosocial impact of diabetes was a statistically significant predictor of their self-efficacy in diabetes management after controlling for the number of diabetic students and type of schools ($p=.027$). Also, the number of

diabetic students was a significant contributor to nurses' self-efficacy in diabetes management (p<.05). This means that nurses caring for six or more diabetic students were likely to have higher SEQ-IGC scores representing higher self-efficacy in diabetes management. However, types of schools worked in were marginally significant contributors to self-efficacy in diabetes management in multiple F-tests (p=.08).

Table 4.16
Regression Model for Psychosocial Impact of Diabetes and Self-Efficacy in Diabetes Management

Variables	B	SE	t	p
Psychosocial impact of diabetes	1.03	.46	2.24	.03*
Number of diabetes students				
> 6	1.12	.47	2.41	.02*
Types of schools				
Elementary	.82	.48	1.70	.10
Middle	.51	.50	1.04	.30
High	-.97	.50	-1.94	.06
Constant	4.49	2.04	2.21	.03*
R2	.17			
F	4.53			
p value	.001**			

Note. SE=robust standard error.
*p<.05. **p<.01.

The regression model for patient autonomy was significant, F(5, 100)=2.97, R^2=.139. In this model, nurses' attitudes towards patient autonomy was not a significant predictor of their self-efficacy in diabetes management (p>.05). However, having six or more diabetic students and working in high schools were significant predictors of self-efficacy in diabetes management (p>.05). In other words, nurses taking care of six or more diabetic students were likely to have higher SEQ-IGC scores than did those taking care of five or fewer diabetic students, and nurses in high school were likely to have lower SEQ-IGC scores than did those not in high schools. In addition, working in elementary schools was marginally significant in the model (p=.07), indicating that nurses in elementary schools might have higher SEQ-IGC scores than did those

not in elementary schools. After controlling for patient autonomy, the number of diabetic students and types of schools worked in were significantly associated with nurses' self-efficacy in diabetes management (p=.008).

In summary, nurses' attitudes towards psychosocial impact of diabetes were significantly related to their self-efficacy in diabetes management. However, attitudes toward need for special training, value of tight control, and patient autonomy did not have relationships with nurses' self-efficacy in diabetes management, although the number of diabetic students and types of schools worked in were significant contributors. The number of diabetic students was a significant contributor to nurses' self-efficacy in overall diabetes management. Nurses caring for six or more diabetic students were more likely to have higher self-efficacy in diabetes management.

Diabetes attitudes and self-efficacy in individually managing insulin pumps, glucagon, and carbohydrate count.

Insulin pumps. Need for special training was not a significant predictor of self-efficacy in managing of insulin pumps after controlling for nurses' job status, their students' competency in using pumps, math for calculating correct insulin doses, and knowledge about factors affecting determination of correct doses (p>.05). Multiple F-tests showed statistical significance such that nurses' self-efficacy in managing insulin pumps had an additional relationship with selected covariates after controlling for need for special training (p=.002). This model explained 14.1% of the variance of self-efficacy in managing pumps.

Nurses' attitudes toward the value of tight control was a significant predictor of their self-efficacy in managing insulin pumps (p=.03, Table 4.17). In other words, nurses placing higher value on tight control were more likely to have higher self-efficacy in managing pumps than were those reporting lower value of tight control. The final model explained 15% of the variance

of nurses' self-efficacy. In this model, after controlling for value of tight control, self-efficacy in managing pumps had a significant relationship with nurses receiving diabetes training, and students' competence in using pumps, math, and knowledge about affecting factors of correct insulin doses (p=.001). However, individual covariates were not significant in the model (p>.05).

Table 4.17
Regression Model for Value of Tight Control and Self-Efficacy in Managing of Insulin Pumps

Dependent variables	*B*	SE	t	p
Independent variables				
Value of tight control	.57	.27	2.18	.03*
H.A.N.D.S.	-.21	.19	-1.07	.29
Students' competence in				
Insulin pumps	-.01	.12	-0.08	.93
Math	-.18	.16	-1.14	.26
Knowledge	-.13	.18	-0.74	.46
Constant	1.57	1.14	1.38	.17
R^2	.15			
F	4.69			
p value	.001**			

Note. SE=robust standard error.
*p<.05. **p<.01.

Nurses' attitudes towards the psychosocial impact of diabetes was a significant predictor of their self-efficacy in managing insulin pumps after controlling for their job status, the number of diabetic students, taking educational training, and students' competence in knowledge about factors affecting determination of correct insulin doses (p=.004, Table 4.18). In other words, nurses having higher consideration of psychosocial impact of diabetes were more likely to have higher self-efficacy levels in managing insulin pumps (p<.05). The model explained 19.2% of the variance of self-efficacy in managing insulin pumps. In this model, students' competence in knowledge about factors affecting determination of correct insulin doses was a significantly negative predictor (p<.05).

The model examining patient autonomy was significant (F(5, 101)=3.92, R2=.146), but patient autonomy was not a significant predictor of nurses' self-efficacy in managing pumps

(p>.05). However, after controlling for nurses' attitudes towards patient autonomy, their self-efficacy in managing of pumps had a significant relationship with their job status and students' competency factors (p=.001).

Table 4.18
Regression Models for Psychosocial Impact of Diabetes and Self-Efficacy in Managing of Insulin Pumps

Dependent variables	*B*	SE	t	p
Independent variables				
Psychosocial impact of diabetes	.58	.19	2.98	.004*
Fulltime	.41	.27	1.52	.13
Number of diabetes student				
> 6	-.19	.19	-1.00	.32
H.A.N.D.S.	-.21	.18	-1.13	.26
Students' competence in				
Knowledge	-.27	.08	-3.33	.001*
Constant	1.00	.92	1.08	.28
R^2	.192			
F	6.08			
p value	.0001*			

Note. SE=robust standard error.
*p<.05.

In summary, nurses' attitudes toward the value of tight control and the psychosocial impact of diabetes were significantly related to their self-efficacy in managing insulin pumps for students with diabetes. In particular, higher agreement regarding the psychosocial impact of diabetes predicted higher self-efficacy in managing pumps. However, students' competence regarding knowledge about determining factors for correct doses had a negative relationship with nurses' self-efficacy in using insulin pumps and pens in the model for nurses' attitudes towards the psychosocial impact of diabetes.

Glucagon. The multivariate model for need for special training was significant (F(5, 100)=3.49, R^2=.134). However, nurses' attitudes towards need for special training was not a significant predictor of their confidence in managing glucagon in hypoglycemic situations after

controlling for their years of working experience, job status, taking educational training, and the number of diabetic students ($p>.05$).

The model for value of tight control was significant ($F(5, 100)=3.25$, $R^2=.131$). Nurses' consideration of the value of tight control was not a significant predictor of their confidence in managing glucagon after controlling for their years of working experience, job status, taking educational training, and the number of diabetic students ($p>.05$). However, in this model, the number of diabetic students was a significant contributor to nurses' self-efficacy in managing glucagon ($p=.002$).

The model for the psychosocial impact of diabetes was significant ($F(5, 103)=3.19$, $R^2=.131$). However, nurses' attitudes towards the psychosocial impact of diabetes did not have a significant relationship with their confidence in managing glucagon after controlling for their years of working experience, job status, taking educational training, and the number of diabetic students ($p>.05$). In this model, the number of diabetic students was significantly related to nurses' self-efficacy in managing glucagon ($p<.05$).

The multivariate model for patient autonomy was significant, $F(5, 100)=3.09$, $R^2=.124$. In this model, nurses' attitudes towards patient autonomy was not a significant predictor of their confidence in managing glucagon after controlling for their years of work experience, job status, taking educational training, or the number of diabetic students ($p>.05$).

However, similar to the previous model, the number of diabetic students was significant in the model ($p=.001$), indicating that having six or more students was significantly related to nurses' confidence in managing glucagon.

In summary, nurses' attitudes and their self-efficacy in managing glucagon in hypoglycemic situations did not show significant relationships in the multivariate models.

However, in each multivariate model, taking care of six or more diabetic students had a significant relationship with nurses' self-efficacy in managing glucagon.

Carbohydrate counting. The multivariate model for need for special training was significant ($F(5, 103)=4.48$, $R^2=.136$). However, nurses' attitudes toward the need for special training was not a significant predictor of their confidence in carbohydrate count after controlling for types of schools worked in, and the number of diabetic students ($p=.16$). In this model, the number of diabetic students had a significant relationship with nurses' confidence in carbohydrate count ($p =.002$).

The final model for the value of tight control was significant ($F(5, 100)=4.89$, $R^2=.123$). Nurses' consideration of the value of tight control was not a significant predictor of their confidence in carbohydrate count after controlling for the number of diabetic students and types of schools worked in ($p>.05$). However, the number of diabetic students and working in high schools had a significant relationship with nurses' self-efficacy in carbohydrate count ($p<.05$).

The model for psychosocial impact of diabetes was significant ($F(5, 103)=4.32$, $R^2=.134$). However, nurses' attitudes toward the psychosocial impact of diabetes did not have a significant relationship with their confidence in carbohydrate count after controlling for the number of diabetic students and types of schools worked in ($p>.05$). In this model, the number of diabetic students had a significant relationship with nurses' self-efficacy in carbohydrate count ($p=.006$).

The multivariate model for patient autonomy was significant ($F(5, 103)=4.74$, $R^2=.12$). In this model, nurses' attitudes towards patient autonomy were not a significant predictor of their confidence in carbohydrate count after controlling for the number of diabetic students and types of schools worked in ($p>.05$). However, similar to the previous model, the number of diabetic

students was significant in the model (p=.001), indicating that having six or more students had a significant relationship with nurses' confidence in carbohydrate count. Working in a high school had a significantly negative relationship with nurses' self-efficacy in carbohydrate count (p=.01).

In summary, nurses' diabetes-related attitudes and their self-efficacy related to carbohydrate count did not show statistically significant relationships in the multivariate models. However, the number of diabetic students was the common significant predictor in each model. Caring for six or more diabetic students was a significant predictor for higher self-efficacy in carbohydrate count in nurses.

Aim 2: Describe the nature of school nurses' attitudes and support for transitional care for children with T1D in school settings

To describe the nature of school nurses' diabetes attitudes and support for transitional care for students with T1D, two separate approaches were employed: a survey and an interview. In the survey, the aim was to identify relationships between nurses' experiences of providing transitional care to diabetic students, their diabetes-related attitudes, self-efficacy in diabetes education and management, and their practice in schools. Pearson's Correlation coefficients and regressions among the survey items were computed initially, then multiple logistic regressions were computed based on the results. Then, to add a richer description of transitional care, the short descriptive responses from the DETE and the semi-structured interviews from 20 interview participants were analyzed using content analysis. The results from the short descriptive data and the interviews are presented as three topics: a) perception of transitional care, b) content of care provided, and c) suggested care content for transitional care. The participants' interview data provided study participants' perceptions of transitional care, content of care provided, and

suggested care content. The short descriptive data from the DETE survey provided information about content of care provided and suggested content for transitional care in schools.

Sub-aim 1: Identify relationships among nurses' experiences of providing transitional care to diabetic students, diabetes attitudes, self-efficacy in diabetes education and management, and practice in schools

In this aim, relationships between school nurses' diabetes care practice in schools and their experiences providing transitional care were examined by using the SNR and one item from the DETE asking about nurses' experience providing transitional care. Relationships between school nurses' diabetes attitudes and their experience providing transitional care were explored by using the DAS-3 and the same item from the DETE. Then, relationships between school nurses' self-efficacy in diabetes education and management and their experience providing transitional care were explored by using the SEDE, the SEQ-IGC, and the same item from the DETE. The DETE item asking about their experiences providing transitional care was a dichotomous variable. Therefore, univariate logistic regressions were utilized in the analysis to identify factors contributing to school nurses' providing transitional care.

Relationships Between Nurses' Diabetes Care Practice in Schools and Their Experience Providing Transitional Care

Logistic regressions were computed to describe relationships between nurses' diabetes care practice in schools and their experiences providing transitional care. Although items from the SNR were grouped based on conceptual similarities and relationships in order to calculate Cronbach's alpha values, relationships between variables were analyzed per individual item. The reason for this is that there is no available, established scoring guideline for the SNR.

Therefore, a series of simple logistic regressions were computed. The results are presented in Table 19 and Table 20, as previously described. Nurses' assisting students in diabetes management during the school day and nurses' participation in the H.A.N.D.S. training were significant predictors of their practice in providing transitional care to students with T1D ($p<.05$, Table 4.19).

Table 4.19
Univariate Logistic Regressions of SNR Part 1 and Nurses' Experience Providing Transitional Care to Students with T1D

	B	SE	Wald	p	OR	95% CI
Students with diabetes have an RN's assistance with their diabetes management	.56	.20	2.82	.005*	1.76	(1.19, 2.60)
Participation in the H.A.N.D.S. education	1.53	.47	3.26	.001*	4.61	(1.84, 11.58)

Note. SE= Standard Error. OR= Odds Ratio.
*p<.05.

Among the variables in the second part of the SNR, some characteristics of health care forms were significantly associated with nurses' providing transitional care to diabetic students in schools (Table 4.20). Specifically, when all of the health care forms considered students' levels of knowledge about diabetes and the health care forms determined the nursing interventions during school days based on students' developmental, cognitive, and physical capabilities, the possibility that transitional care was provided to students with T1D was higher ($p<.05$). In addition, the possibility that transitional care was provided to students with T1D was higher when the form coordinated the interventions and accommodations ($p<.05$), and when diabetic students had a health plan assisting them in setting up long-term goals for diabetes self-management ($p<.05$). However, other items in the SNR, such as students' levels of competence in using insulin pumps, math skills, and cognitive understanding of diabetes, nurses'

preparedness, and having extra staff, did not have significant relationships with nurses' providing transitional care to students (p>.05).

Table 4.20
Univariate Logistic Regressions of SNR Part 2 and Nurses' Experience Providing Transitional Care to Students with T1D

	B	SE	Wald	p	OR	95% CI
The plans consider students' knowledge base	.56	.23	2.39	.02*	1.75	(1.10, 2.76)
Consider students' developmental levels	.31	.21	1.45	.15	1.36	(.90, 2.07)
Consider students' individual needs	.24	.24	.97	.33	1.27	(.79, 2.04)
Describe nursing interventions and school accommodations	.33	.23	1.46	.14	1.39	(.89, 2.17)
The plans determine nursing interventions and school accommodations based on students' developmental status	.54	.26	2.10	.04*	1.72	(1.04, 2.85)
The plans identify and coordinate interventions for school activities	.44	.22	1.97	.048*	1.56	(1.00, 2.42)
Students have a plan assisting in determining personal goals for attaining independent self-care	.37	.17	2.17	.03*	1.45	(1.04, 2.03)

Note. SE= Standard Error. OR= Odds Ratio.
*p<.05.

In summary, school nurses' providing transitional care to students with T1D had a significant relationship with assisting students in management of diabetes in schools. Nurses' participation in diabetes training was a significant predictor of providing transitional care to students. Substantive issues incorporating students' understanding of diabetes, nursing interventions for school activities, and goals for achieving diabetes self-management in health care forms were also associated with providing transitional care to diabetic students.

Relationships Between Nurses' Diabetes Attitudes and Their Experience Providing Transitional Care

To identify relationships between nurses' diabetes-related attitudes and their providing transitional care to students with T1D, univariate logistic regressions were computed between four subscales of the DAS-3 (need for special training, value of tight control, psychosocial impact of diabetes, and patient autonomy) and one item of the DETC asking whether nurses had provided transitional care to students with T1D. No univariate models were significant ($p>.05$), indicating that nurses' diabetes-related attitudes was not a significant predictor of whether providing transitional care to students with T1D was part of their practice.

Relationships Between Nurses' Self-Efficacy in Diabetes Education and Management and Their Experience Providing Transitional Care

A series of univariate logistic regressions was computed to identify relationships between nurses' self-efficacy in diabetes education and management and their experience providing transitional care to students with T1D. The results are presented in Table 4.21.

Table 4.21
Univariate Logistic Regressions of SEDE, SEQ-IGC, and Nurses' experience Providing Transitional Care

Variables	B	SE	Wald	p	OR	95% CI OR
SEDE	.08	.03	2.68	.007*	1.09	(1.02, 1.16)
SEQ-IGC	.42	.08	.44	.66	1.04	(.88, 1.22)
Insulin pumps	-.06	.20	-.29	.77	.94	(.64, 1.40)
Glucagon administration	.08	.17	.44	.66	1.08	(.77, 1.51)
Carbohydrate count	.22	.21	1.02	.31	1.25	(.82, 1.91)

Note. SEDE = self-efficacy in diabetes education scale; SEQ-IGC = self-efficacy in insulin pump, glucagon, and carbohydrate count; OR= Odds Ratio; and SE= Standard Error.
*$p<.05$.

Nurses' self-efficacy in diabetes education was a significant predictor of their experience providing transitional care ($p<.05$). Specifically, the results indicate that each additional point in the total score on the SEDE was associated with a 1.09% increase in the odds of providing

transitional care to students with T1D (95% CI for the OR: 1.02-1.16; p=.007). However, models examining relationships between nurses' SEQ-IGC total scores, scores on the three individual items in the SEQ-IGC, and their experience providing transitional care to students with T1D were not significant (p>.05).

In summary, school nurses' self-efficacy in diabetes education and management was a positive predictor of whether they had provided transitional care to students with diabetes. In other words, school nurses having higher self-efficacy in diabetes education and management were more likely to provide transitional care to students with T1D. However, neither nurses' individual self-efficacy in managing insulin pumps, glucagon, and carbohydrate count nor their diabetes-related attitudes were associated with having provided transitional care to students. These results indicate that whether or not transitional care is provided to students with T1D in schools might be related to nurses' confidence in diabetes education, not their confidence in diabetes management and diabetes attitudes. This might be because providing transitional care was more closely related to educating students with T1D rather than directly taking care of them.

Sub-aim 2: Explore nurses' perception of transitional care, care provided, and suggested care for transitional care

The semi-structured interviews were analyzed to explore school nurses' perceptions of transitional care, and the interviews and the short descriptive responses from the two items on the DETE were analyzed to explore care content provided and suggested care content for transitional care. According to the study design, the survey data were collected from the 114 school nurses first, then the interview data of 20 convenience sampled school nurses from the survey participants were collected later. The response rates to the two descriptive survey questions were between 73.6% and 75.4%. Twenty-two out of 114 school nurses did not answer both descriptive

questions in the survey (19.3%). The characteristics of the participants in both of the survey and interviews were similar: predominantly female, White, RN, non-NCSN, 10 years or less of work experience, and full-time. School nurses were asked about their perceptions of transitional care and similar questions regarding content of transitional care in the survey and the interviews. The survey questions were: a) What kinds of transitional care have you provided for children with T1D? and b) What should be included in transitional care in school settings for children with 1D? The interview questions were: a) What are your perceptions of transitional care for children with diabetes, as a school nurse? b) Have you provided any transitional care for children with diabetes? c) What kind of transitional care do you provide for children with diabetes? and d) What kind of transitional care does a school nurse need to provide to children with T1D? Nurses' perceptions of transitional care can be described as supporting a diabetic student to attain independent diabetes management through constant nursing care in schools. Three major codes for school nurses' perception of transitional care concerned independent diabetes management, transferring from one to another environment, and continuity of diabetes management in schools. Also, three major themes were extracted from both the survey and interviews with regards to provided care content: communication for diabetes management in schools, transferring from one situation/environment to another, sharing students' health information, and assisting independent diabetes management. In addition, three major areas of suggested content were about communication, transferring health documents to the next school, and promoting students' autonomy in diabetes management from the survey and the interviews. The results consisted of three parts of the data analysis, followed by the summary of findings: school nurses' perceptions of transitional care using only the interview, care content provided for transitional care using the

survey and the interview data, and suggested care content for transitional care using the survey and the interview data. The descriptions of major themes and categories are presented below.

School Nurses' Perception of Transitional Care

Twenty school nurses participated in the interviews. Three major themes extracted were: 1) care for moving toward independent diabetes management; 2) care for transferring from one school environment to another; and 3) maintaining continuity of care in school settings. School nurses perceived transitional care as care for moving to independent diabetes management, care for changing school environments, and for maintaining continuity of diabetes management in settings. Most of study participants were not familiar with the term and the concept of transitional care. When participants were asked about their perception of transitional care, most of them asked the interviewer for clarification, for example,

> *Transitioning from where to where? From elementary to middle? From school to home? Interview #9.*

Therefore, the definition of transitional care (emerging from pediatric care to adult care) was provided as needed during the interviews.

Core perception: Supporting students to gain autonomy in diabetes management based on continued care in school systems. The core perception for transitional care among school nurses was described as "supporting students to gain autonomy in diabetes management based on continued care in school systems." School nurses' perceptions were based in their own experiences of caring for transitions that they dealt with involving students with T1D, families, health care professionals, school staff, and teachers. Their core perception was a combination of three major themes extracted from the interviews: care for moving toward independent diabetes management; care for changing management environments related to school/transferring from one to another school environment; and maintaining continuity of diabetes management in

school settings. The major themes were situation-oriented in that these represented transitions related to diabetes management in school circumstances. The major themes and categories are presented in Appendix M.

Major theme 1: Care for moving toward independent diabetes management. School nurses described transitional care in schools as care for moving toward independent diabetes management with regards to an aspect of students' development. They described that an ultimate goal is students achieving independent diabetes management. The categories of moving toward independent diabetes management consisted of the following: supporting students to be more independent in diabetes management, and managing diabetes independently based on the types of schools into which students transfer.

Supporting students to be more independent in diabetes management. The majority of school nurses described transitional care as assisting independent diabetes management as diabetic students were growing.

> *I think transitional care should be more focused on being independent. Interview #20.*

> *..That is the ultimate goal. No matter what developmental level, what grade level, what gender, what psychosocial dynamic factors are going on, your main goal is independence! Interview #20.*

> *You know, we don't think a lot about that. These kids are 11, 12 and 13, so they're not gonna be an adult for quite a while. So basically, we're just reinforcing what they know about their diabetes and how to take care of themselves. Interview #10.*

Nurses described that supporting students for independent management depended on daily communication with students. Nurses' assistance was described as an ongoing process, not as for a specific moment. In communication, nurses reinforced in students what they knew about diabetes and how to take care of themselves.

> *…not by the time they go in to high school, that by the time they're reaching their eleventh-- definitely their twelfth-grade year that we have supported them in such a*

> *manner that they are able to become independent in that management. And then once they've become independent while still within our schools that I'm not seeing them consistently for low blood sugars or high blood sugars. You know, that they are truly independent. Interview #12.*

Nurses also took relationships with parents and families, healthcare providers' management, and students or parents' willingness into account, while they expressed the importance of independent management in students with T1D:

> *It's a team, including the provider, the parents, the nurse, the teachers and other staff in the building that might work with them, and every year all the staff gets annual training in diabetes, so I feel like the transition of care goes pretty smooth. Interview #15.*

Therefore, in describing this major theme, they addressed shared responsibilities between parents, nurses, and diabetic students.

Managing diabetes independently based on types of schools where students transfer. School nurses described how transitional care supported a diabetic student to prepare for managing their disease more independently as they moved on to higher education. This category is associated with a specific timeline, a year before graduating from their current school, such as 5^{th} or 6^{th} grade, 8^{th} grade, and 12^{th} grade. Participants addressed their expectation of students' independent management based on the student's level in school: dependent care or a combination of dependent and independent care in elementary schoolers; dependent and independent care but close to independent care in middle schoolers; and independent care with supervision as needed in high schoolers:

> *So I, a lot of the goals that I have set were thinking long-term and thinking how can we create an individual that's able to be independent when the time is right which it's generally in the middle school age or it's the middle school student should be able to calculate their own insulin, inject their insulin, do their own carb counting and understand their diabetes and understand their own care. Interview #2.*

> *It's a huge goal to get these kids independent, okay? When they come into me, I assess what level of self-care they're performing. And that applies, you know, to ketones,*

> *injecting, blood glucose level, determining carbs, you know, can they correlate the relationship between insulin and carbs? So first it involves assessing where they're at, and the parents are very helpful for that as well as the students. So if they're dependent which means they require my assistance or care-- because at my high school, I don't have a PDA, my Health Room Assistant didn't volunteer-- it is a volunteer position, so which is why she works closely with me, and I manage. My goal for them is to have them independent by 12th grade. Interview #20.*

> *I think that's kind of the critical point for developmentally appropriate-- developmentally. yeah, appropriate kids. Like sixth-- fifth, sixth grade like they are-- they're almost read- they can be ready to be independent. They can be independent, so that's kind of a critical moment as far as. Interview #13.*

School nurses described that sometimes middle schools or high schools did not have support systems for diabetic students. When a student became a middle schooler, they rotated classes as per their school schedule. Students did not have the same consistent supervision systems due to a rotating school schedule, so diabetic students were expected to take care of themselves or to master a certain skill:

> *I'll say in my practice I work with elementary students. So the transition from uh.. adolescence to adulthood, I don't work with that much. Mostly my- my working with children's independent skills are to- to build those independent skills at a level that is developmentally appropriate for the child. And I think that's true for the middle and the high school nurses too. We look at the developmental stage of the student and try to make them as independent as they can successfully be at that particular stage that they are in, so. Interview 9.*

Major theme 2: Care for changing management environments related to school/transferring from one school environment to another. Participating nurses described transitional care as the care for transferring from one setting (a school, home, or a hospital) to another school environment from the perspective of care continuity regarding changes in a new school environment (e.g. new school nurses, new schools, new school staff, changes in school after coming to school, or school schedules). The categories of changed environments consisted of the following: transferring from school to school, transitioning from a hospital to a school, and transitioning from home to school.

Transition from a hospital to a school. School nurses described transitional care as care for a student who has been newly diagnosed with diabetes and has come to a school. They expressed that a new diabetic student faced different situations:

> *I think the biggest transition, of course, is- is when a student is diagnosed in a hospital and then they go home and they're trying to wrap their heads around this new diagnosis. And then all of a sudden, they have to go back to school and everything's different. Interview #4.*

> *The only one would be from last year-- would be my- my student from last year, when he was diagnosed, I went up to the hospital, and I sat with him and his staff and kinda found out what they were expecting of him, and so that transition from the hospital into the school-- I was part of that. Interview #7.*

Nurses described that collaboration with school staff was important for providing proper environments for the student:

> *The nurse plays a key role in helping them adjust to their new diagnosis and how that's gonna fit in their school day. Interview #5.*

> *The nurse has the role of- of, you know, coordinating everything, but also being on top of how the child is managing. developmentally, you know, where they're at and how they're doing with learning how to manage it, and how much help they need, and making sure that information is relayed to the- the teacher or the next grade level, or the new school, working with the staff at the new school. Interview #16.*

Also, they provided support for students and their families in understanding the diabetes education they received at a hospital and to adjusting to a new situation relevant to diabetes. Nurses described that they would have a meeting with families or parents before a newly diagnosed student came to the school. Through the meeting, school nurses were able to determine needs or accommodations for the student and parents:

> *You know, and talking to the parents "I'm not going to contact you if we're doing normal everyday stuff. I will contact you if she's over this number or under this number just to let you know how it's going, you know. If we have any problems I will contact you. If I need any supplies I will contact you. Interview #8.*

School nurses faced parents' defensive behaviors, anger, or negative emotions caused by the new diagnosis, when their child was newly diagnosed with diabetes. Also, establishing a new therapeutic relationship with parents was encountered as a challenge:

> *Whenever I- whenever I work with parents when they're so angry I always try to just kind of take it very slow, always remember that anger is a secondary emotion. That anger is not the primary driver. There's something underneath that, whether it's fear or, you know, frustration, whatever is there, I always try to see what's- what's really driving that anger. And if you can speak to that frequently you can get a relationship with a parent. But boy there are just some parents you can never get there. Interview #1.*

Also, one nurse described returning to school after hospital visits/hospitalization as a transition:

> *I would try and reach out to the provider before their quarterly visit, and then sometimes there's only a few sentences, but sometimes there would be a couple paragraphs on how the student had been doing at school and some of the goals that we had been working on at school and how the goals were going. So instead of the provider setting new goals, they would be able to reassess the goals that we had set at school, and were-- and they could either change them or determine that they were not appropriate goals, think that they could use those in their-- in their care. So, and then they would generally reach out to me through email and let me know how the visit had gone. So, yeah, I would say that's a transition, even if it's only transition for one day while they go in for a quarterly visit or if they go in with. But we had a student go in with DKA (Diabetic Ketoacidosis) and then come back to school two days later, that's all transition to me. They're going from one setting to the other, and it's good for all different parties to know what's going on. Interview #2.*

Promotion from primary to intermediate to secondary education. Participants also described transitional care as care for transferring between schools, such as from elementary school to middle school.

> *So that would be supporting that bridge between elementary and middle school, which is the biggest jump. Interview #6.*

Transferring schools could occur within the same school district or not. When participants mentioned transferring between schools, they did not express explicitly whether a diabetic student transferred to a different level or to a different location at the same level.

For supporting advancement from one level to the next, nurses noted that they updated students' health plans when a student goes to from middle school to high school. Also, they used notes through software, if nurses worked in the same school district.

> *So through their health plan, so their transition would be from eighth grade to high school. And their health plan follows them or the 504 plan follows them. And it's updated annually, but that's pretty much how the transition of care goes. Interview #10.*

Transition from home to school. This category was related to another category, transition from a hospital to a school. Participants indicated this transition as a necessary step in figuring out healthcare providers' orders and the needs of a new diabetic student and family before returning to school from a hospital:

> *So hospital to here when we had the brand-new diabetic I did not allow her to come to school until we sat down with her parent or parents and discussed how it was going to look and how it would know what I would be involved with. Interview #8.*

During the interviews, nurses noted that a newly diagnosed student could not come back to school without submitting health care providers' orders and relative documents, such as 504 forms to schools.

Transferring from one kind of environment to another. Participants also described transitional care as transferring from one kind of environment to another. This category included transitioning to adulthood, moving from one grade to another, and transition to another healthcare provider:

> *They're transitioning into like the adult world. Interview #20.*

To manage these transitions, nurses described needing to communicate daily with parents and students while transitioning, to set a long-term goal for having a smooth transition.

> *So I, a lot of the goals that I have set were thinking long-term and thinking how can we create an individual that's able to be independent when the time is right which it's generally in the middle school age or it's the middle school student should be able to*

> *calculate their own insulin, inject their insulin, do their own carb counting and understand their diabetes and understand their own care. Interview #2.*

Major theme 3: Communication for maintaining constant diabetes management in school settings. Participating nurses also described transitional care as maintaining continuity of care for students with T1D in school settings based on communication with people who were involved in care. This major theme describes a purpose of care that nurses provided for a transition from one school to another. This theme consisted of five categories indicating communication with different groups of people.

Communication between school nurses for students' diabetes management in current schools. School nurses contacted nurses in other schools where their diabetic students would transfer and shared students' health information including students' goals, levels of diabetes management, and care plans:

> *If they're moving schools it's I'm on the phone and I'm faxing or emailing the- the documents over to the next nurse. And this is what we do. And this is, this is what we've had-- this is problems we've had. This is how we overcame it. So, you're talking to that nurse for a while to transition that kid to the next school. Interview #8.*

Some nurses stated that communication with another school nurse could be done by phone, fax, or email.

Communication with parents for students' diabetes management in current and new schools. Participants considered communication with parents for diabetes management in the current school and in the new school as transitional care. They advised parents to contact a nurse in a new school to set up a meeting or to complete necessary documents for the next school:

> *This is what you can expect next year. How can we try and put a-- you know, let's make a draft plan for next year in place. Let's call the nurse in and see if we can have a meeting before school starts about what this is gonna look like for you. Interview #6.*

Using notes about health concerns was also a means of communication with parents.

> *For instance, a kindergartner that might be going to daycare, that's not an option and so, we had a notebook that would go with the student at all times, and that could-- was a good vessel for me to make notes that would be able to go to either a daycare, to the family, or even to maybe grandma at home, and I could make notes on how the student had been doing that day. Interview #2.*

Communication with diabetic students for their disease management in current and new schools. Communicating with students regarding diabetes management was also frequently addressed by participants. In communication, nurses and diabetic students discussed upcoming changes in a new school or issues in managing diabetes:

> *And often it's the conversation with the students, "Okay, how are you feeling in- in doing everything? Are you feeling like you can get you're at a point where you don't need to come in every day and see us?". "Okay, great. If you do, you're doing pretty well in what I'm seeing here. That's a conversation you need to have with your parents and your doctor at your next endo visit." So, I would say that's how we kinda support that transition. Interview #12.*

Communicating and working with teachers or staff regarding students. This category described action that nurses took to share information about a new diabetic student with teachers or staff. This type of communication could enhance collaborative relationships between nurses and school staff in order to provide proper care in schools. One nurse described how she communicated with teachers:

> *I have to go and talk to all of the teachers too. You know, I created this care plan. The parents signed it. I email out. Please, you know, look through this and, you know, give me a call when you're done because I'm sure you'll have questions. Interview #8.*

Communication with mixed groups of people for students' management. This category described communication among people who were involved in care for a diabetic student in school. Nurses mentioned that communication was needed to prepare a smooth transition for a diabetic student. Targeted people for communication included students, parents, healthcare providers, nurses, teachers, and school staff:

> *..it's a team, including the provider, the parents, the nurse, the teachers and other staff in the building that might work with them, and every year all the staff gets annual training in diabetes, so I feel like the transition of care goes pretty smooth. Interview #18.*

Summary. In summary, school nurses described transitional care as support for enhancing students' autonomy in diabetes management based on continued care in school systems. This perception consisted of three major themes: care for moving to independent diabetes management, care for changing school environments, and maintaining continuity of diabetes management in school settings. School nurses perceived transitional care as a combination of developmental perspectives, environmental perspectives, and nursing care perspectives. Transitional care in schools focuses on providing secure care to promote independent diabetes management and assuring the same or similar levels of care as diabetic students move forward. School nurses viewed transitional care as a way to improve students' autonomy in diabetes care and to maintain the quality of diabetes care for students before graduating from schools.

Care Content Provided

To explore transitional care content provided, two descriptive questions from the survey and the interview data were analyzed, as previously described. Eighty-four of 114 school nurses (73.6%) responded to a descriptive question about provided care content. Three major themes were extracted from both the survey and interview data: communication with people involved in diabetes management in schools; transfer of one kind or another; and assisting students in attaining independent diabetes management.

Core construct: Preparing upcoming changes for a diabetic student's transfer from one environment to another related to a school. The core construct for transitional care content provided among school nurses was "preparing upcoming changes for a diabetic student's

transfer from one environment to another related to a school." School nurses' practice depended on their own experiences of caring for transitions that they dealt with students with T1D, families, and health care professionals in other schools. The core construct of care content provided was from both the survey and interview data: communication with people involved in diabetes management in schools; transfer of one kind or another; and assisting students in attaining independent diabetes management. The major themes were situation-specific in that these represented transitions related to diabetes management in school circumstances. The major themes and categories are presented in Appendix N.

Major theme 1: Communication with people involved in diabetes management in schools. From both the survey and interview data, the majority of participants described communication with people involved in students' diabetes management as a part of transitional care. In this theme, 'people' were described as those who were around a diabetic student in school, including school nurses, diabetic students, their parents and relevant school staff (teachers and school personnel). In this theme, communication referred to sharing health related information and having discussions related to diabetes management. The categories of communication with people were divided according to the types of people: communication with health care professionals, communication with students, communication with parents, and communication with school staff.

Communication with healthcare professionals. School nurses described that they communicated with other school nurses to share students' health information. Participants also described nurses in other schools as the major target population of communication:

> *Communication with the next school nurse (assigned to the school where the student is transferring). Study #3*
>
> *Talk with provider at next school about students who are transitioning. Study #7*

Communication usually occurred between a school nurse taking care of a diabetic student currently and a school nurse who would take care of the same student when they transferred to another school, when that diabetic student was in 5th grade, 8th grade, or 12th grade. Nurses reported that they communicated with a nurse who would take care of their diabetic student next year before that student graduated from the current school.

> *So I met with that nurse, and talked through the things with him. He was like-- I think he was in fifth grade the year that happened, so he was much more independent, but yeah, we talked. Interview #5.*

> *..with the eighth grader that went from eighth grade to high school last year, the nurse from his high school-- I mean, she/he would be coming. We contacted each other, and I told her all about the student and, like,.. how he cares for himself and what he's really good at and some of the things that are challenging and sent him- her the current care plan that we already had in place, sent her the orders that we already had. Of course, she would need to get updated orders and update the care plan, but just so she had a basis to work from; gave her all the parents' information. Interview #17.*

> *I currently have a high school student who will be transferring to a military school. I just called to speak with the nurse there to find out what kind of support the student would have in managing her diabetes – i.e.- carb counts for meals, managing hypoglycemia and exercise, etc. Study #119*

During communication, nurses shared diabetic students' health information and health care-related documents including health care providers' orders, current health care plans, 504 forms, levels of diabetes self-management, and information about students' families. Also, nurses updated diabetic students' health plans before communicating with a nurse in another school.

> *504 or Individualized Care Plan, HCP orders, copies of previous blood Glucose and Insulin Logs Study #33*

> *Just to make sure that the next school nurse gets their health plan and the 504 plan goes with the student. Interview #10*

> *When the girls graduate to the other school it was everything is going in the box. I made copies of the whole book and kept it here. But the whole book is going with them. So, it's*

> *a whole box, all of their stuff and off they go to the other school. You know, it's all of it. All of the medication, all of the food, all of the care plans, all of the everything has to go with them. Interview #8*
>
> *Updating the health plan and reviewing it with the new school nurse. Study #4.*

Communication between nurses was bidirectional, meaning that either nurses sending diabetic students to other schools or nurses receiving diabetic students from other schools initiated communication. Also, participants communicated with other school nurses via face-to-face meetings, phone calls, or emails. Phone calls were commonly used for communication with other professionals:

> *Also communicating via phone with school nurse in new school and answering any questions they may have regarding student's background and self-management/ family, etc. Study #42*
>
> *There should be a phone conversation between the nurses. Much like you would do a shift change report. I This would have multiple benefits. Study #69*
>
> *We didn't actually get to meet face to face. It was phone calls and some emails. Interview #1.*
>
> *We contacted each other, and I told her all about the student and, how he cares for himself and what he's really good at and some of the things that are challenging. Interview #17.*
>
> *We didn't actually get to meet face to face. It was phone calls and some emails. Interview #1.*

When a student was going to a school in another school district, they transferred health documents to a nurse in a new school through parents. Also, nurses noted that they sent out students' information upon parents' request as well:

> *Within the district I give a phone report and forward the student's Health Plan to the receiving nurse. If the student is going out of district I encourage the parent to give a copy of my health plan to the receiving nurse. Study #28.*

Communication with students. School nurses described how they communicated with their diabetic students with regards to discussing upcoming changes. These included different levels of care at new schools and a new therapeutic relationship with a new school nurse:

> *Communication with student just before promotion from middle to high school. Have disc (discussions about) change in possible care level and possible relationship with HS (high school) school nurse. Study #20*

> *I just tried, was telling him that "it's gonna-- should be the same as this next year. Make sure you check-in with the nurse. She'll check-in with you." Interview #13.*

Nurses stated that they informed students about expected changes in a new school environment and plans from health care providers. Nurses reported that they discussed with students what they needed to know about diabetes management:

> *So to be communicating to the student what the provider was intending. Interview #2..*

> *'cause I did have that eighth grader who was transitioning to ninth grade, and I just had met with-- I didn't do a lot with the student. I just tried-- you know, was telling him that "it's gonna, should be the same as this next year make sure you check-in with the nurse. She'll check-in with you." Interview #13.*

Nurses specifically communicated with diabetic students about a new school environment and management, when students were in 5th grade (sometimes 6th grade, depending on school systems), 8th grade, and 12th grade.

> *Teaching differences between student care with T1D in elementary versus the middle school environment--there is less oversight in middle schools when T1D students have multiple classes and teachers versus elementary where one teacher is familiar with the student. Students need to be progressing to more independent in their care and more self-advocating when problems or concerns arise--developmentally more peer influences of care management as T1D students enter middle school which adds an additional layer to how T1D view their disease. 7th graders sometimes need an adjustment year of care at school before going completely on their own depending on their level of independence/competence in elementary school. Study #114*

Communication with parents. Nurses described how they communicated with students and parents regarding potential changes in a new school (e.g. school routine, and care levels), relationships with new school nurses, home care, and plans for diabetes care.

> *Talked with parents and students regarding their health care needs at the next school, such as changes from elementary to middle school. Study #126.*

> *Communication with the parent about the challenges of middle school in care of diabetes, developmental needs of the student. Study #24.*

> *Assist parents with transition from elementary to middle school setting, arranging of class schedule, places for testing, treating low/high blood sugars, field trip and after school sports management/plans. Study #42*

> *Every year at the beginning of the school year we take the new plan and we talk about what's going on, and the parent and in middle school or high school, I think I would want to bring, if my child had diabetes, I'd want to bring them with me so they could be part of the plan. In grade school, that doesn't happen so much. But in middle school or high school, for sure, yeah. Interview#11*

Communication between school nurses and parents usually occurred before their child moved to another school. In addition, nurses described that they communicated with parents as well as students before starting a new academic year, so they had an opportunity to know each other and to get familiar with new school environments:

> *Meet with student and parent prior to starting school to introduce them to myself and other office staff. Orient student to supply storage, school routine and establish accommodations that may be needed for each student. Study #47.*

One participant reported that they communicated with health care providers and social workers for students with mental health issues.

> *Instructions to parents and communication with Health Care providers and social workers for student who was not mentally able to manage his own care. Study #106.*

Communication with school staff. Nurses described how they communicated with school staff including teachers or other staff regarding an incoming diabetic student. Through

communication, nurses shared information about the diabetic students with school staff. Communication occurred at a meeting (e.g. a parent and teacher meeting) and by email:

> *Send incoming teachers an email before start of school year about this student. Study #16.*
>
> *... meeting with the family and the teachers and make sure everybody is comfortable. Interview #19.*

Also, nurses noted that communication with school staff occurred while facilitating orientation for incoming students and their parents.

> *Whenever there is a transition for one grade level to the next or one building to another building, I set up a separate time where I can take the child and their family to meet new school staff personally and set up a meeting time where the diabetes plan can be discussed. Study #73.*

In major theme 1, communication with people involved in diabetes management in schools was described as part of transitional care provided for students with T1D. The purposes of communication apparently differed depending on the groups of people involved, although the ultimate purpose was to prepare people for a new school environment and work with a diabetic student. Four major groups of people were described by the interview participants: health care professionals, diabetic students, their parents, and school staff including teachers. The purpose of communication with health care professionals was to transfer health information about a diabetic student from a school nurse who is currently in charge of diabetes care for a diabetic student to another school nurse who is going to work with the diabetic student in a new school. Communication with students and parents aimed to prepare them for diabetes management in a new school environment. Students were expected to be more independent in their diabetes management through both education and supervision. Parents were encouraged to meet with a new school nurse in order to have a smooth transition to a new care circumstance.

Communication with school staff was intended to inform them about an incoming diabetic student. Therefore, school staff could prepare themselves for working with the diabetic student in their school such that school staff might have an opportunity to learn how to deal with a diabetic student and to be ready for working with the student. Mainly, communication occurred before a diabetic student moved to a higher educational institute.

Major theme 2: Transfer of one kind or another. While the previous theme involves communication with different groups of people who are involved in students' diabetes management in school as provided care content for transitional care, this major theme indicates specific situations in which nurses need to provide certain types of care related to a diabetic student's transitions. School nurses described how they provided diabetic students with care for students' transitioning from one area to another (e.g. transferring schools, and transferring grades). This theme was mainly described by the survey participants as a type of care they provided to diabetic students. This major theme includes several subcategories of care content: transferring schools (e.g. from elementary to middle school, middle to high school, and high school to higher education), promotion from one grade to another, developmental periods (e.g. childhood to adolescence, and adolescence to adulthood), change in treatment options (e.g. from pen to pump), and transferring from hospital to school.

Transferring schools. Nurses described transferring schools as care content provided for transitional care in schools. Transferring schools referred to a certain situation in which they needed to provide care plans and/or students' information to a school nurse in a new school, and inform students about possible changes in a new school regarding diabetes management:

> *Transferring schools, provided care plan and student specific information to the new school nurse. Study #33.*

> *Transition care for students has only involved transferring student info and report to the school nurse at the next school attending (i.e. moving from elementary to middle school). Study #115.*
>
> *I mean it's required. Yes. Interview #1.*
>
> *Basically, it's, you know, I'll show 'em the documentation that I have had. You know, and not that I pull out 300, you know, 180 pieces of paper and show it. Interview #18.*

Transferring grades. Nurses described transferring grades as transitional care content provided in schools. Transferring grades referred to a diabetic student being promoted from one grade to another. Nurses who completed the survey question described that they followed students closely and supported diabetes management when students moved from one grade to another in the same school. This theme demonstrates that nurses provide care to gradually increase students' independence in diabetes management.

> *Movement from elementary to middle school and grade to grade. Along with increased independence and being able to shift from nurse verification to the staff in the schools. Study #31.*
>
> *I manage students grades 7-9. Often during this period, students transition from daily care with me (RN) to independent management during the school day. Study #96.*
>
> *I have students 6-12 grades. I follow them through all of those grades. When they come to me in 6th grade, we (office staff and myself) follow them very closely and they check in at the office frequently. As they transition into high school, I gradually check them less and less, allowing them to become independent. Study #99.*
>
> *But moving to a different school typically you don't have a brand-new diabetic moving, you know, to another school. That- that would be- that would be pretty serious. But, on the phone, emails, faxing information, you know, getting everything over there. Interview #8.*

Transferring between developmental stages. Nurses described transferring between developmental stages as another care content area. Transferring between developmental stages referred to transferring from childhood to adolescence or from adolescence to adulthood, in terms of a process of gaining independent diabetes management:

Assistance psychosocially for parent & student from childhood to adolescence to promote gradual increase in independence of diabetes management. Senior student transitioning to college: Currently assisting student in anxiety management, transition to an insulin pump, nutrition and exercise relationship to blood sugar management, college resources for diabetes management etc. Study #108.

Transferring schools, (transferring from) childhood to adolescence. Study #5.

Dependent diabetic to independent diabetic. Transferring school districts childhood to adolescence nurse giving insulin shots to student doing it himself. Study #86.

Transition from one to another treatment/monitoring option. A few nurses described transferring treatment options as part of care content provided. This category had limited information about background or care content.

Transition from pen to pump therapy, initiation of CGM. Study #125.

Transition from pen to pump and from daily check in to more independent contract. Study #29.

Transitioning from a hospital to a school. Nurses also described transferring from a hospital to a school as care content provided for a student who was newly diagnosed with diabetes. A few nurses stated that they obtained necessary information about school diabetes management from students' health care providers and parents.

When they are transitioning out of the hospital home and then to me then I receive a care plan from XX Hospital, which looks just like all the other students that come here. It has the orders, and it gives me the baseline of where the student is with their educational needs, which is square one, and then, you know, I am providing full care, because the child's completely dependent at that point, and so I provide teaching from the very beginning. Interview #15.

I have also participated in meetings from hospital to school. Study #50.

Previous discussion of major theme 1 indicated communication as a way of providing nursing interventions for a diabetic student's transitions, but it did not fully describe care nurses provided for a diabetic student's transitions. This major theme 2 mainly focused on specific

situations in which school nurses provide appropriate nursing care to a diabetic student. The categories reflected a diabetic student's educational promotion and development, changing treatment options, and the timing of a student being diagnosed with diabetes. Concurrently with each category, school nurses seemed to educate diabetic students to promote their self-management skills under proper supervision.

Major theme 3: Assisting students in attaining independent diabetes management. Nurses reported that they assisted students in promoting independent diabetes management as part of care content provided. The categories consisted of the following: supporting students to be more independent in diabetes management based on their developmental status, and supervising students' management.

Supporting students to be more independent in diabetes management based on their developmental status. Nurses described how they assisted students in becoming more independent in diabetes management with regards to their developmental and educational levels. Nurses described their support for students in diabetes management from the perspectives of time, planning, and education. Nurses' support for independent diabetes management was ongoing, and this support was adjusted based on a student's developmental status (e.g. age, and achievement of developmental milestones), length of time having diabetes, and educational levels.

> *Going from Primary-Middle school transitioning to increasing independence. Going from Middle-High School increasing independence to become fully independent and signed off with parent involvement... Always keeping in mind, the stage of Development for the student. Study #100*

> *Moving from parental administration of insulin at school every day to independent insulin administration. Study #2.*

> *Progressive independence in management based on developmental milestones and age. Transition from total dependence to independence for new diagnose or younger students. Study #53.*

In addition, enhancing independent diabetes management was specifically emphasized before students were expected to be promoted from primary to intermediate or from intermediate to secondary education. Therefore, by the time of graduation, students could be more independent in diabetes management than they were before:

> *..My big transition is the transition from sixth to seventh grade, from elementary to middle. And I usually really start looking at those independent skills all the time. I'm looking at them all the time. But especially fifth and sixth grade. And it's-- 'cause I would-- I like my students to be able to be if they have or if they're able to get the pump and- and understand their- their pump, I think that that's super helpful for them. I don't have control over that, but if they're-- if they're able to get the pump, that's really helpful for them. If not, I want to make sure that they're able to, you know, give their own injections by the time they hit middle school and be able to give them rotating them and be able to give them. in a way that is socially appropriate so they don't have to go in the bathroom and pull their pants down. Interview #9.*

Nurses did not specify whether they set up a plan in advance for students' successful transition related to independent management. However, whenever nurses described their practices with diabetic students, they seemed to begin providing transitional care during the senior grade before a student's graduation in order to enhance self-management skills intensively. One nurse explicitly described her 6-month plan:

> *Well, like right now I have my student that's very new and so we're doing most of it for him. But like I said, this school year I will be transitioning him into being more independent and giving his own injections and things like that. … So I'll be doing that come in the beginning of January. Interview #3.*

Nurses' support referred to providing diabetes education to students with T1D, including learning management skills and self-advocacy. Regarding this management transition, some nurses also identified transitioning from elementary school to middle school, or transitioning

from middle school to high school as a turning point in more independent management was acquired by diabetic students.

> *Being more independent in their care as they transition to a higher-level education. Study #49.*
>
> *With the help of a full-time LPN that works directly with the diabetics routinely at the middle school, I help explain how middle school will look different for their management from the elementary school and together we assist them in becoming more independent as adolescents while maintaining safety in diabetes management. Study #96.*
>
> *Teaching differences between student care with T1D in elementary versus the middle school environment--there is less oversight in middle schools when T1D students have multiple classes and teachers versus elementary where one teacher is familiar with the student. Students need to be progressing to more independent in their care and more self-advocating when problems or concerns arise--developmentally more peer influences of care management as T1D students enter middle school which adds an additional layer to how T1D view their disease. 7th graders sometimes need an adjustment year of care at school before going completely on their own depending on their level of independence/competence in elementary school. Study #114*

Supervising students' management. Nurses described supervising students' management as transitional care that they provided. Nurses who participated in the interviews described two different approaches to supervision based on the level of a student's diabetes self-management. Nurses reported that they supervised students who were independent in diabetes management whenever they needed extra help for managing diabetic emergencies, such as hypoglycemic situations. Otherwise, nurses did not regularly supervise students managing diabetes independently. Instead, they expected students to come to the nurses' office as needed:

> *The one kid went completely independent this year. And I've seen her twice for high blood sugar episodes, which is not bad, twice is not bad. We know illness and all kinds of things affect it. So it just depends. Interview #20.*
>
> *Last year the student who was not independent, she came in every day at least once a day. We have quite a relationship with her. And this year she's declared independent, but she knows, 'cause we've maintained contact with her and we miss her and she misses us. she comes in every now and then just to check in or she'll come in any time she needs to uh. because she doesn't feel good and she needs to check her blood sugar. But I think that's a transition. So, she was excited about getting to be independent; we were excited*

> *about that for her, but let her know that there was still this safety net under her and that she can go on from there. Interview #14.*

In contrast, nurses provided constant supervision to students who were moving from dependent management to independent management. As a method of diabetes education, nurses demonstrated part of a skill and asked students to perform it:

> *We usually just cut out something I'm managing, and turn it over to them. … one student currently that I've been referencing, is managing himself, as long as he's within the- the ranges of 80 to 250. So his transition is I still need to have eyes on him coming every day to check in. "However, when you're within that range, you manage yourself. And if you're doing that well, we're going to progress to the end of the day management. But I still want you to be responsible for you when you're lower than 80, or higher than 250, or in a weird situation where you don't-- you know, you're unsure what's going on." so that's kind of-- it's just-- it's dependent upon those kids. the one kid went completely independent this year. And I've seen her twice. for high blood sugar episodes, which is not bad, twice is not bad. We know illness and all kinds of things affect it. so, it just depends. Sometimes you give that transition out in small pieces, and sometimes it's all. So. Interview #20.*

> *They would do their blood sugar. They would tell me how much carbs they were eating. They had already calculated, you know, added up the numbers. And then, they would just tell me how much insulin they're taking and I would check their number and write it down and they would show me their units and that they have a five pen here's five units, kind of thing. And they would take it. Interview #16.*

Summary. In summary, school nurses provided transitional care for preparing for upcoming changes while a diabetic student transferred from one school environment to another. Communication for continuing diabetes management in other schools, supporting students in moving to independent diabetes management, and supporting transitions from one setting to another were the content of transitional care that participants provided to students. Mostly, transitional care was provided before diabetic students graduated from their current schools or before they returned to school under special circumstances. The responses were varied in each major theme. This could be due to the wide ranges of situations with which nurses dealt.

Suggested care content

To explore what kinds of care school nurses suggested as transitional care for students with T1D in school settings, the survey data and the interview data were employed as previously described. Eighty-six out of 114 school nurses (75.4%) answered a descriptive question about suggested care content. Three major themes were extracted from the given texts: communication with people involved in students' diabetes care in schools; transferring students' health related documents to the next school; and promoting students' independent diabetes management. The results are presented in Appendix O.

Major theme 1: Coordinating care for students with T1D in schools. Nurses described coordinating care for students with T1D as suggested care content in schools. Coordinating care referred to the preparation of continuing diabetes care for students transferring from the current school environment to the new school environment. The categories of coordinating care for diabetic students consisted of the following: communication with people involved in students' diabetes care in schools; and facilitating a team meeting with nurses, students, parents, and/or school staff.

Communication with people involved in students' diabetes care in schools. School nurses described communication with people involved in students' diabetes care in school as suggested care content. In this category, people involved in students' diabetes care in schools referred to school nurses, diabetic students, parents, school staff, and students' health care providers. Through communication, people who were involved in students' diabetes care discussed students' current diabetes management status, accommodations, and tasks for smooth adjustment to a new school environment.

School nurses and health care providers. Nurses observed that communication with a nurse in a new school was crucial for successful transitions for diabetic students. This communication referred to verbal communication between a school nurse who was in charge of a diabetic student's care and a nurse who would take over the care responsibility for a diabetic student. In-person meetings and phone calls were suggested. Communication took place before a student moved to another school.

> *Talk with provider at next school about students who are transitioning. Study #7.*
>
> *When students move from elementary to middle or high school, there should be good communication between the nurses to make sure the new nurse assuming the care of that student has a good understanding of the student's level of comprehension and abilities. Study #29*
>
> *Also communicating via phone with school nurse in new school and answering any questions they may have regarding student's background and self-management/family, etc. Study #25.*
>
> *A face-to-face meeting between school nurses to review student's history and care plan. Study #102.*

Through communication, a new school nurse could have a better sense of an incoming diabetic student, so they could prepare a better care plan for the student. The suggested topics for communication between nurses included questions and answers regarding diabetic students' health information, including levels of diabetes management, students' characteristics, what had succeeded and what had failed in school, parental involvement, contact information, nursing FTE in a new school, and health room environment.

> *Contact with next nurse; discussion of middle school health room set up and care as well as nursing FTE at that school. Study #41.*
>
> *Past history, knowledge level, trends, socio-economic data about student/family. Study #40.*

> *Student's plan of care, what is working and what isn't, student's daily habits, parent/doctor participation, how student deals with hypo/hyperglycemia, student's goals, student's grades, any extracurricular activities student is involved in. Study #95.*

Communication with a diabetic student and family. Nurses described communication with a diabetic student and family as suggested content for care coordination. The aims of this communication were preparing diabetes management for a new school environment and discussing a student' concerns and goals for diabetes management in school. Nurses described that parental involvement in transition was essential.

> *Communication with student and parent. Study #20.*

> *…maybe letting them know something great about the new school they're going to or the new nurse that they'll be working with so they can feel more comfortable about it. Interview #17.*

> *Discussion with parent regarding changes in expectations depending on development of student, model of the school, nurse, PDA, school staff in health room. Study #24.*

> *Annual discussion with student regarding their concerns and/or goals for diabetes management in the school setting. Study #108.*

Nurses considered transferring from an elementary school to a middle school to be one of the biggest transitional events in schools, in addition to transferring from a middle school to a high school, and from a hospital to a school after being newly diagnosed with T1D. When students were going from the fifth or sixth grade to a middle school, school nurses discussed upcoming changes related to a new school setting (e.g. rotating classes, different nursing staff, and expectations of independent care) with students:

> *We need to prepare the child for like the change in nurse or school setting. Help them. The biggest transition that I see is like from especially elementary to middle school, because they've gone from one teacher, one PE, one daily, whatever. It's very set, not moving classrooms and that sort of thing. So, working with the student to help them know what it's gonna be like in middle school, and kinda giving them a chance to ask questions. Interview #5.*

> *I would say that especially if they're- if they're newly diagnosed- diagnosed that definitely that hospital-to-school moment, cause everyone's on edge, they don't know what to expect, parents don't sometimes want to release their kids to school in fear that the school doesn't do it right and so I think that's important. Interview #7.*

One nurse addressed facilitating interactions between students with different years of experience in managing diabetes, with parent consent, as part of ensuring a smooth transition:

> *In the elementary, I have had this happen, but giving students that are. have had diabetes longer, ask if they want to talk with the student that's younger. And if they say, "I would be happy to do that," and the parent says it's okay, and the younger student, we check with that parent and they say, 'We have a student that's older, had diabetes for a while, has been in the school setting. Would you like your child to talk with?' You know, so we've had that happen. Interview #5.*

> *Teaching students about transitioning to middle school where there is only a nurse once per week in the school. Study #71.*

Facilitating a team meeting with nurses, students, parents, and/or school staff. School nurses described facilitating relationships between diabetic students, parents, receiving nurses in other schools, and/or school staff as suggested care content. Nurses observed that having a team meeting with these people could be beneficial for exchanging information and concerns related to diabetes management for successful transition.

> *A meeting with both nurses, both counselors (from prior school and new school), parents, administrator at receiving school, and primary teacher if possible. Study #94.*

> *Transitional care should involve the nurse at each level meeting with the student and family in one team meeting. Study #50*

> *Team meeting with the staff regarding history, routine, and outcomes. Study #58*
> *Last year I went to 504 meetings with the school nurse from the middle school and sat down with the families and everybody to discuss her care that would be at the high school, so we do practice that when we know that there's a medical need. We definitely talk about the transition, how we're gonna get them from middle school to high school or from pre-K to kindergarten successfully and make sure that their health needs are covered, and so I definitely see that in our program. Interview #7.*

One nurse suggested having a conversation with a health care provider in a new place first, then having a meeting with students, parents, and the providers.

> *..then I'd want to talk with the providers at the next place they were going to find out if what I'm presenting is really true for the place they're going, and then, with the family and the providers and the student, try to have some sort of meeting before they have to transition. Interview #11.*

One interviewee noted that all stakeholders involved in diabetes management in schools needed to collaborate in developing a health care plan for diabetic students as a team through transparent communication:

> *I mean, it's all about making sure that you have all the players in the same room together and people are talking and people feel like they're making a safe plan. I think that's the number one. Everybody talks together, everybody makes a plan for safety, and then if you can-- depending on how willing all the people are to continue talking making sure that going forward things make sense, so, you know, are we being able to, you know, within the safety range make a range that supports long-term health. Interview #6.*

Major theme 2: Transferring students' health related documents to the next school.

School nurses described transferring health documents to other health care providers as suggested care content. Transferring health documents was distinguished from communication with the next nurse. This category focuses on transferring health related documents to the next nurse, excluding verbal communication between nurses.

> *Forwarding Dr's (doctor's) order (med authorization) and care plans and diabetic log from school system. Study #25.*

> *504 or Individualized Care Plan, HCP orders, copies of previous blood Glucose and Insulin Logs. Study #33.*

Students' health-related documents included individualized health plans, emergency care plans, logs, orders from students' health care providers, and other documentation related to diabetes management at schools, as well as students' histories and characteristics, information about family management, parents' contact information, and, information in PDAs.

> *Consistently documenting treatment of lows, or demonstrating correct carb/insulin counting etc. Study #108.*

Participants not only indicated sending or sharing students' information, but also suggested using students' previous plans for new health care plans, regardless of whether they were implemented successfully or not, in addition to updating students' health care plans and keeping documentation. In their descriptions of the major theme of students' information, participants did not identify with whom students' information would be shared. The target of sharing students' information most likely would be school nurses in the new school where students are transferring.

Major theme 3: Promoting students' independent diabetes management. Nurses described promoting diabetic students' independent diabetes management as suggested care content. This theme consists of two categories: supporting students in moving to independent diabetes management; and providing developmentally appropriate diabetes education.

Supporting students in moving to independent diabetes management. Nurses described supporting students in moving to independent diabetes management as part of suggested care content. Participants were eager to assist students in promoting independent diabetes management. Nurses' support included supervising students' management skills, assessing levels of self-management, encouraging students' self-advocacy, and providing safe environments from a developmental perspective.

> *Developmentally appropriate education on all aspects of diabetes management, empowerment, sharing how to access resources, counseling/stress management. Study #14.*
>
> *Supervision of independent carb counting, insulin administration, awareness of hypoglycemia and hyperglycemia. Study #2.*
>
> *They need to be monitored for their abilities to make good decisions as they gain more independence. They need to be monitored for their understanding level of carb counting. Study #91.*

> *...the most important person to helping you is you. And you need to advocate for yourself. And so when you have that substitute, that hasn't really paid attention to the sub notes and you really don't feel good and wanna go, you need to advocate. You need to stand up to that teacher, though she may be, in your words, mean, and say, "I'm diabetic and I don't feel right." Interview #18.*

> *Well, we go from giving them their injections, calculating out their insulin to calculating their carbs for them to the point where they're counting their own carbs, figuring out their own insulin, then being able to give their own shots. We do have a kindergartener this year or I think he's in first grade but he's been with us for several years since preschool. And so we started doing everything for him. Last year he transitioned to being able to give his own shots. And so he's even more independent this year. So that's where we come into the role of helping them transition into independence. Interview #3.*

> *I just work via motivational interviewing, pretty much all the time, to help students connect current decisions to future goals. Study #17.*

Nurses' supervision of students' diabetes management skills and students' accessibility to school nurses were also contributing factors to supporting independent management. One nurse suggested using worksheets containing information regarding demonstration of tasks and evaluation of whether diabetic students could acquire them to assist students' independent diabetes management.

> *I think that school nurses need to empower students to take as much responsibility as they can in managing their health needs. And that means something different to each student. So tailoring it. And like that-- are you familiar with that little book? The book has a list of things that has several kind of worksheets but one of them is …These are habits that they-- that somebody is doing for them. And then the next page asks them which of those they could take on themselves. Interview #16.*

During interviews, nurses described that moving up to a new school corresponded with their expectations of students' autonomy in diabetes management. They described elementary school students' dependence on parents' or nurses' management of diabetes. In addition, during transition from elementary to middle schools, school nurses began to scrutinize whether diabetic students were ready to perform independent diabetes management:

> *My big transition is the transition from sixth to seventh grade, from elementary to middle. I usually really start looking at those independent skills all the time. I'm looking at them all the time. Interview #9.*

Nurses also expressed that their expectation of students' independent management gradually increased as diabetic students became middle or high school students. However, there was a contradictory view expressed regarding the gradual increase in students' independent management along with their academic grades. One nurse insisted that diabetic students who are readily capable of performing diabetes self-management need to be allowed to do it regardless of their age, because the person thought early transition can allow students to adapt to the disease:

> *I think it's important that we allow students to transition as soon as they're ready. We don't wait till adolescence, because the sooner they transition, it's like they are not their diabetes anymore. It is just another part of their body. Just like long or short hair, or you know, wearing glasses or not. I think the literature needs to be revised. Interview #20.*

Providing developmentally appropriate diabetes education. Nurses described diabetes education as suggested care content. This category included direct educational topics delivered by school nurses. Nurses described diabetes education as a way of supporting independent management in students with T1D.

> *I think that's kinda where the education piece comes in as far as educating them on the different aspects of care so that they can become independent. Interview #13.*

They described that diabetic students needed to learn any necessary skills for managing their disease and fundamental knowledge about diabetes, such as hypoglycemia, hyperglycemia, nutrition, exercise, and development.

> *Physiological changes that affect BS, resources that are available (adulthood), ways to be independent and when to reach out. Study #13.*
> *Social changes, developmental/growth changes, puberty and hormone changes, stress.... burnout, denial, weight loss and tweaking numbers. Study #32.*

> *..to help them to consider what some of the differences may be in the setting they're in now and in the setting they're going to; to help them to recognize their own needs in terms of highs and lows and uhm.. exercise and nutrition; to help them to uhm.. recognize*

> *what resources are available to them in terms of people and clinical providers and all that; and if they can verbalize all that, then they're more likely to be able to take care of themselves independently. Interview #11.*

> *Education about how to handle extra physical activity, extra food, and other things that may affect blood sugar during the school day. Study #98.*

Nurses viewed providing diabetes education to promote students' critical thinking as crucial. In addition, one important aspect of diabetes education was helping students recognize their symptoms of hypo or hyperglycemic status, as well as the available human resources in schools for managing diabetes:

> *to help them to recognize their own needs in terms of highs and lows and exercise and nutrition; to help them to recognize what resources are available to them in terms of people and clinical providers and all that. Interview #11.*

One nurse noted that transitional care is heavily embedded in daily diabetes education in school and transitional care is a part of results of education:

> *Because the other part of it is just a piece that will come as a result of that. And then also provided their doctor's orders and parents, I'll follow on that, too. And often it's the conversation with the students, 'Okay, how are you feeling in- in doing everything? Are you feeling like you can get to-- you're at a point where you don't need to come in every day and see us?', 'Okay, great. If you're doing pretty well in what I'm seeing here. That's a conversation you need to have with your parents and your doctor at your next endo visit.' So, I would say that's how we kinda support that transition. Interview #12.*

Also, the importance of providing diabetes education to teachers and school staff who were around diabetic students was addressed.

> *...type 1 management, so that's where our expertise comes in, and we can kinda fill-in those gaps, but- but really you need-- in order for it to be successful into a higher-- you know, into middle school or high school because the student's gonna be more independent you need to educate educators in what they need to be thinking about and looking for and then helping make sure that the student's able to do those things. Interview #6.*

Summary. In summary, three major themes were extracted from the interviews for suggested transitional care content: communication with people involved in students' diabetes

care in schools, transferring students' health-related documents to the next school, and promoting students' independent diabetes management. The importance of communication in terms of care continuity for students with T1D was frequently emphasized by school nurses. Team meetings were suggested as a means of communication among people involved in students' diabetes care in schools. Also, transferring health-related documents to new schools or new providers was suggested. The expectation of performing self-management correspondingly increases as students progress through school. Therefore, preparation for meeting these expectations, along with environmental changes in a new school, was also frequently addressed. Diabetes education and developmentally appropriate support for students with diabetes were suggested in order to enhance students' successful management.

Summary of Aim 2

In summary, school nurses were eager to provide nursing care during transitions that diabetic students faced in schools. Nurses' perceptions of transitional care were divided into caring for students in their move to independent diabetes management, as they adjust to changing school environments, and their rights to constant diabetes care in schools. Providing transitional care in schools was affected by nurses attending diabetes training, having experience with diabetic students' health plans containing necessary interventions that accommodate the needs of students, and nurses' confidence in diabetes education. School nurses perceived transitional care as supporting diabetic students in promoting independent diabetes management in school systems. In other words, school nurses described transitional care as nursing care for students attaining diabetes self-management, regardless of changing environments related to promotion from primary to intermediate or intermediate to secondary education. School nurses provided nursing care for preparing students, families, health care professionals, and school staff for

upcoming changes in school systems with regards to students' specific situations and developmental status. Care content provided focused more on taking over processes for students' diabetes management in schools. Suggested care content was similar to care content provided. However, the fundamental purpose of nursing care during transitions was supporting students in achieving independent diabetes management, as students grow up.

Aim 3: Explore the interrelations between the levels of school nurses' educational preparation and their self-efficacy and attitudes related to delivering diabetes education and management to children with T1D

This aim includes two sub-aims exploring relationships between credentials, diabetes attitudes, self-efficacy in diabetes management, and education.

Sub-aim 1: Describe the relationship between the different credentials held by school nurses and their diabetes-related attitudes and self-efficacy diabetes management and diabetes education for children with T1D

To describe the relationships between the different credentials of school nurses, their diabetes-related attitudes, and self-efficacy in diabetes management and education for students with type 1 diabetes, multiple linear regressions were computed. The assumptions of regression models were tested prior to the analyses, and no violations of assumptions were present.

Credentials and Diabetes Attitudes

Three steps were performed to build regression models examining diabetes attitudes and nurses' credentials. First, univariate models between the five DAS-3 subscales and nurses' credentials were run. Second, backward-stepwise estimations with covariates were computed between the five DAS-3 subscales and nurses' credentials. After adjusting models, final models were selected for the results. The results are presented in Table 4.22.

Table 4.22
School Nurses' Credentials and Diabetes Attitudes

Dependent variable	1	2	3	4
Credential				
LPN vs RN	.37**	.45**	.70**	-.11**
LPN vs NP	.19	.57**	.11	-.04
H.A.N.D.S.				
Fulltime				
Elementary	.03			
Middle	-.17			
High	.12			
Constant	4.2**	3.86**	3.83	4.13**
R^2	.05	.02	.07	.001
F	27.48	84.47	150.04	4.07
p value	.00**	.00**	.00**	.02*

Note. 1=need for special training, 2= value of tight control, 3=psychosocial impact of diabetes, and 4=patient autonomy.
*p<.05. **p<.01

Nurses' credentials were a significant predictor of their attitudes towards the need for special training after controlling for types of schools worked in (p<.001). Adjusting for types of schools worked in, the difference in the mean score on the need for special training between nurses with RN credentials and those with LPN credentials remained significant (p<.001), indicating that RNs had higher scores in terms of the need for special training than did LPNs.

The univariate models were constructed after adjusting the stepwise regression models between nurses' credentials and their diabetes attitudes (value of tight control, psychosocial impact of diabetes, and patient autonomy). The final model for psychosocial impact of diabetes revealed that nurses with a RN had a higher mean score on value of tight control than did those with a LPN (p<.001). Also, RNs had a lower mean score on patient autonomy than did LPNs (p<.05).

In summary, nurses' credentials were a significant predictor of their diabetes attitudes. Compared to LPNs, RNs had significantly higher scores in terms of attitudes toward the need for

special training, the value of tight control, and the psychosocial impact of diabetes. For diabetes attitudes towards patient autonomy, RNs reported significantly lower scores than did LPNs. In comparisons between LPNs and NPs, NPs had significantly higher scores on the value of tight control than did LPNs. However, the models explained less than 5% of the variance of diabetes attitudes, so the results from each model may not be meaningful for actual practice. The number of nurses in each credential group was unequal because the majority of participants were RNs. Therefore, these results need to be investigated using larger sample sizes of groups with more varied credentials.

Credentials and Self-Efficacy in Diabetes Education and Management

The final model for nurses' self-efficacy in diabetes education was significant ($F(5, 105)=4.41$, $R^2=.11$). Nurses' credentials were a marginally significant predictor of their self-efficacy in diabetes education after controlling for their job status, and the types of schools in which they worked ($p=.06$). In other words, RNs had a higher mean score on self-efficacy in diabetes education than did non-RNs (LPN or NP) after controlling for their job status, and the types of schools worked in. In this model, nurses' job status was significantly positively related to their self-efficacy in diabetes education ($p=.01$).

The model for nurses' self-efficacy in diabetes management in overall managing of insulin pumps, glucagon, and carbohydrate count was significant ($F(5, 100)=3.19$, $R^2=.14$). Nurses' credentials were not a significant predictor of their self-efficacy in diabetes management after controlling for the number of diabetic students and the types of schools worked in ($p>.05$). However, in this model, the number of diabetic students and working in high schools were significant predictors of nurses' self-efficacy ($p<.05$). Also, multiple F-tests revealed that, after controlling for nurses' credentials, the number of diabetic students and the types of schools

worked in were significantly related to nurses' self-efficacy in diabetes management (p=.007). The model explained 14% of the variance of nurses' self-efficacy in diabetes management.

The model for nurses' self-efficacy in managing of insulin pumps was significant (F(5, 101)=5.44, R^2=.16). Nurses' credentials were not a significant predictor of their self-efficacy in managing insulin pumps after controlling for their job status, working in middle schools or high schools, or students' competence in knowledge about factors affecting correct insulin doses (p>.05). However, students' competence in knowledge about factors affecting correct insulin doses was a significant predictor of nurses' self-efficacy in managing of insulin pumps in this model (p=.001).

The multivariate model for nurses' self-efficacy in managing glucagon was significant (F(2, 105)=6.82, R^2=.105). Nurses' credentials were not a significant predictor of their self-efficacy in managing glucagon in hypoglycemic situations after controlling for the number of diabetic students (p>.05). The number of diabetic students cared for by nurses was a significant predictor of nurses' self-efficacy in managing glucagon in this model (p=.001), indicating that the number of diabetic students contributed to explaining nurses' self-efficacy in managing glucagon in hypoglycemic situations.

The model for nurses' self-efficacy in carbohydrate count was significant, F(5, 103)=4.82, R^2=.12. Nurses' credentials were not a significant predictor of their self-efficacy in carbohydrate counts after controlling for the number of diabetic students and the types of schools worked in (p>.05). The number of diabetic students and working in high schools were significant factors in this model (p<.05). In other words, nurses caring for six or more diabetic students were more likely to have a higher mean score on self-efficacy in carbohydrate count than those who cared for five or fewer diabetic students after controlling for nurses' credentials and the types of

schools worked in (p=.002). Nurses working in high schools were more likely to have lower mean scores on self-efficacy in carbohydrate count than those not in high schools after controlling for nurses' credentials, and working in elementary schools, as well as working in middle schools (p=.01). Also, multiple F-tests revealed that the types of schools worked in had a significant relationship with nurses' self-efficacy in carbohydrate count (p=.02).

In summary, nurses' credentials had a marginally significant relationship with their self-efficacy in diabetes education. However, nurses' credentials did not have significant relationships with their self-efficacy in diabetes management in managing insulin pumps, glucagon, and carbohydrate count. Results from these analyses must be interpreted with caution, however, due to the very small number of participants who had credentials other than RN.

National Certification of School Nurses and Diabetes Attitudes

Multiple regressions were later conducted to predict nurses' diabetes-related attitudes based on being a Nationally Certified School Nurse (NCSN), and potential covariates (years of working experience as a school nurse, job status, number of diabetic students cared for, the types of schools worked in, and students' competence in using pumps, math, and knowledge about adjusting correct doses). There were no significant regression models between being a NCSN and school nurses' attitudes towards need for special training and patient autonomy. However, two regression models were eligible to predict the effects of being a member of NCSN on the value of tight control and the psychosocial impact of diabetes (Table 4.23).

Being a NCSN was not a significant predictor of nurses' attitudes towards the value of tight control after controlling for nurses working in elementary schools and middle schools, and students' competence in using insulin pumps (p>.05). However, after controlling for being a NCSN, nurses' attitudes towards the value of tight control had a significant relationship with

working in elementary schools and middle schools and students' competence in using insulin pumps (p=.02). Similarly, being a NCSN was not a significant predictor of nurses' attitudes towards the psychosocial impact of diabetes after controlling for nurses' job status, the number of diabetic students, and students' competence in knowledge about factors affecting correct insulin doses (p>.05).

Table 4.23
Nationally Certified School Nurse and Diabetes Attitudes

Dependent variable	1	p	2	p
Credential				
NCSN	-.17	.11	.02	.09
Fulltime			.16	.07
Numbers of student				
6 or more			.19	.03*
Elementary	.16	.04*		
Middle	.08	.26		
Students' competence in using insulin pumps	.08	.02*		
knowledge			-.43	.21
Constant	4.22	.00**	4.41	.00**
R^2	.117		.094	
F	2.65		3.27	
p value	.04*		.02*	

Note. 1=value of tight control, and 2=psychosocial impact of diabetes.
*p<.05 **p<.01

In summary, being a NCSN had no significant relationships with nurses' diabetes-related attitudes. However, some of the nurses' demographic characteristics (job status, the number of diabetic students, and the types of schools worked in) and students' competence in using insulin pumps and cognitive knowledge about correct insulin doses were significant contributors to nurses' attitudes towards the value of tight control and the psychosocial impact of diabetes.

National Certification and Self-Efficacy in Diabetes Management and Education

As part of a consideration of credentials for school nurses, relationships between being a member of NCSN and nurses' self-efficacy in diabetes education and management were

examined using t-tests. There were no significant differences in the mean scores of self-efficacy in diabetes education and diabetes management on overall managing insulin pumps, glucagon, and carbohydrate count between NCSNs and those who were not NCSNs (p>.05). In detail, school nurses who were NCSN members and those who were not NCSN members did not differ significantly on self-efficacy in diabetes education, *t*(108)=1.68, p=.10 or self-efficacy in diabetes management, *t*(104)=.88, p=.38.

School nurses who were NCSNs did not differ significantly from non-NCSNs on self-efficacy in managing insulin pumps, *t*(107)=-.21, p=.83. Also, NCSNs and non-NCSNs did not differ significantly on self-efficacy in managing insulin pumps, *t*(106)=-.33, p=.74. However, NCSNs had significantly higher self-efficacy scores in counting carbohydrates (*M*=4.38, *S*=.72) than non-NCSNs (*M*=3.87, *SD*=.92), *t*(107)=2.07, p=.04.

The multivariate model for nurses' efficacy in diabetes education was significant (F(5, 103)=3.20, R^2=.15). Being a NCSN member was a significant predictor of nurses' self-efficacy levels in diabetes education after controlling for nurses' job status and the types of schools worked in (p=.01), indicating that NCSN members were more likely to have lower scores on self-efficacy in diabetes education after adjusting for their job status and the types of schools worked in. Also, nurses' job status and working in middle schools were significant factors in the model (p<.05).

The model for nurses' self-efficacy in diabetes management in overall managing of insulin pumps, glucagon, and carbohydrate count was significant(F(5, 98)=2.67, R^2=.13). Being a NCSN was not a significant predictor of nurses' self-efficacy levels in diabetes management after controlling for the number of diabetic students and the types of schools worked in (p=.45). However, in this model, the number of diabetic students was significantly related to nurses' self-

efficacy in diabetes management overall (p=.005), indicating that the number of diabetic students contributed to higher scores in self-efficacy in diabetes management. Also, working in high schools was a significant negative contributor to nurses' self-efficacy in diabetes management (p=.03).

For individual SEQ-IGC items, multiple regression models were constructed to examine relationships between being a NCSN and self-efficacy in diabetes management, in managing insulin pumps, glucagon in hypoglycemic situations, and carbohydrate counts. Being a NCSN was not a significant predictor of nurses' self-efficacy in managing insulin pumps after controlling for their job status and students' competence in knowledge about factors affecting correct insulin doses (p=.63), although the model was significant (F(3 101)=5.54, R^2=.14). In this model, students' knowledge was statistically significant (p<.001). In other words, students' knowledge about factors affecting correct insulin doses negatively predicted nurses' self-efficacy in managing insulin pumps.

The model for nurses' self-efficacy in managing glucagon in hypoglycemic situations was significant (F(5, 100)=2.50, R^2=.11). Being a NCSN was not a significant predictor of nurses' self-efficacy in managing glucagon in hypoglycemic situations after controlling for the number of diabetic students and the types of school worked in (p=.91). However, the number of diabetic students was a statistically significant contributor to nurses' self-efficacy in positively managing glucagon in hypoglycemic situations (p=.002), but the types of schools worked in did not have a significant relationship with nurses' self-efficacy in managing glucagon.

The model for nurses' self-efficacy in counting carbohydrates was significant (F(5, 101)=4.78, R^2=.16 Being a NCSN was a significant predictor of nurses' self-efficacy in carbohydrate count after controlling for the number of diabetic students and the types of schools

worked in (p=.01), indicating that NCSNs were more likely to have lower scores on self-efficacy in counting carbohydrates than did non- NCSNs. Also, working in high schools was a significant factor in the model (p=.01), with nurses working in high schools having lower self-efficacy scores in counting carbohydrates than those not working in high schools.

In summary, being a NCSN had a significant relationship with nurses' self-efficacy in diabetes education, and diabetes management in carbohydrate count. Being a NCSN was not significantly related to nurses' self-efficacy in diabetes management including insulin pumps, glucagon, and overall carbohydrate count, and managing insulin pumps and glucagon separately. However, nurses with six or more diabetic students were more likely to have higher scores on self-efficacy in managing insulin pumps, and glucagon than those with five or fewer diabetic students. Also, the study revealed negative relationships between students' competence in knowledge about factors affecting correct insulin doses and nurses' self-efficacy in managing pumps and between nurses' working in high schools and their self-efficacy in managing glucagon.

Sub-aim 2: Describe the relationship between number of school nurses attending any educational training for diabetes management and their self-efficacy and attitudes towards diabetes management education

Attending Diabetic Education Training

During the interviews, selected interview participants were asked about the number of educational trainings about diabetes management that they have attended in the past five years. The mean of the numbers of trainings participated in was 5.6 (SD=4.43). This indicates that the nurses interviewed attended some educational training about diabetes management an average of at least once a year. Nine interviewees (45%) attended diabetes education trainings five times or

more. One person reported 11 times, along with networking at monthly meetings. The majority of school nurses (95%) perceived that the training they received was helpful for management of diabetic students in school.

The number of nurses attending some educational training for diabetes management was not significantly different between nurses working ten years or less as a school nurse (M=4.69, SD=4.15) and those working more than ten years as a school nurse (M=7.29, SD=4.75), $t(18)=-1.27$, p=.22. The number of diabetes management educational trainings attended was not different between nurses caring for five or fewer diabetes diabetic students (M=6.31, SD=5.02) and those caring for six or more (M=4.29, SD=2.93). Also, t-tests revealed that the number of diabetes management educational trainings attended by school nurses in the past five years did not significantly differ by types of school they worked in (p>.05). However, school nurses working part-time reported attending statistically significantly more diabetes educational trainings (M=9.6, SD=5.81) than those working fulltime (M=4.43, SD=3.11), $t(17)=2.54$, p=.02. In addition, the number of nurses attending some educational training for diabetes management was significantly negatively correlated with students' competence in math in calculating correct insulin doses ($r=-.45$, p<.05) and knowledge about factors affecting correct doses ($r=-.49$, p<.05, Table 4.24).

Table 4.24
Correlation Matrix of the Number Diabetes Management Trainings Attended and Covariates of Students' Competence

	Number of trainings	Insulin pumps	Math	Knowledge
Number of trainings	1.00			
Insulin pumps	-.25	1.00		
Math	-.45*	.71***	1.00	
Knowledge	-.49*	.65**	.84***	1.00

Note. Insulin pumps= students' competence in using insulin pumps, Math= students' competence in math in calculating correct insulin doses, and Knowledge=students' competence in knowledge about affecting factors for determination of correct doses
*p<.05. **p<.01. ***p<.001.

The relationships between diabetes attitudes and the number of education trainings attended in the past five years were determined using Pearson's correlation coefficients. The results revealed that there were no statistically significant relationships between diabetes attitudes and the number of education trainings attended in the past five years ($p>.05$).

Similarly, to determine relationships between self-efficacy in diabetes management and education and the number of diabetes management educational trainings attended in the past five years, Pearson's correlation coefficients were computed. There was no evidence that the number of educational training for diabetes management school nurses attended in the past five years was significantly associated with participants' self-efficacy levels in diabetes management and education, including managing insulin pumps, glucagon, and carbohydrate count ($p>.05$).

In summary, the number of diabetes management educational trainings school nurses participated in was not significantly related to their diabetes attitudes or self-efficacy in diabetes education and management. However, it had a significant relationship with their job status such that part-time nurses attended more trainings about diabetes management than did full time nurses. Also, the number of trainings was negatively correlated with students' competence in math and knowledge related to correct insulin doses.

Relationships between School Nurses' Diabetes Attitudes, Self-Efficacy in Diabetes Management and Education, and Participation in the H.A.N.D.S. Training

To determine relationships between attending the H.A.N.D.S. educational training and diabetes attitudes, and between attending the H.A.N.D.S. educational training and self-efficacy in diabetes management and education, multiple regressions and t-tests were conducted. Multiple regressions were conducted with the data from the survey-only participants and t-tests were conducted with the data from the 20 interview participants.

Training and diabetes attitudes. The significant regression models examining relationships between participation in the H.A.N.D.S program and nurses' diabetes attitudes are presented in Table 25. Covariates were selected based on the literature, theoretical background, and correlation results from the current study: years of working experience, job status, number of diabetic students, working in elementary, middle, or high schools, and students' competence in using insulin pumps, math in calculating correct insulin doses, and knowledge about affecting factors for determining correct doses.

Taking the H.A.N.D.S. training was not a significant predictor of nurses' attitudes toward the value of tight control and the psychosocial impact of diabetes after controlling for covariates in each significant model ($p>.05$, Table 4.25). However, the other models for the need for special training, and patient autonomy were not significant ($p>.05$). Findings revealed no significant associations between school nurses' diabetes-related attitudes and their participation in the H.A.N.D.S. training ($p>.05$).

Table 4.25
Regression Model for the H.A.N.D.S. Training and Diabetes Attitudes

Dependent variables	Value of tight control	p	Psychosocial impact of diabetes	p
Independent variables				
H.A.N.D.S. Training	.10	.16	.03	.72
Fulltime			.16	.06
Numbers of student				
6 or more			.21	.01*
School type				
Elementary	.17	.02*		
Student' competence in				
Using insulin pumps	.09	.01*		
Knowledge	---	---	-.82	.23
Constant	3.84	.00**	4.43	.00**
R^2	.11		.10	
F	3.80		3.58	
p value	.01*		.01*	

Note. n=110 for the model of value of tight control, and n=109 for the model of psychosocial impact of diabetes.
*p<.05. **p<.01.

Training and self-efficacy. The regression models between participation in the H.A.N.D.S program and nurses' self-efficacy in diabetes education and management are presented in Table 4.26. Taking the H.A.N.D.S program was not a significant predictor of nurses' self-efficacy in diabetes education and diabetes management after controlling for the covariates in each model (p>.05). Although this regression model explains 14.7% of the variance of nurses' self-efficacy in diabetes management, the number of diabetic students contributes more to this explanation than does taking the H.A.N.D.S. training. This result indicates that school nurses who took care of six or more diabetic students were more likely to have higher self-efficacy in overall managing of pumps, glucagon, and carbohydrate count than did those who took care of up to five diabetic students.

Table 4.26
Regression Models for the H.A.N.D.S. Training, Self-Efficacy in Diabetes Education and Management

Dependent variables	SEDE	p	SEQ-IGC	p
Independent variables				
H.A.N.D.S. Training	1.33	.26	-.46	.32
Fulltime	3.34	.03*		
Numbers of student				
6 or more			1.33	.004**
School type				
Elementary			.92	.08
Middle	2.65	.03*	.51	.34
High			-1.00	.04*
Constant				
R^2	.09		.15	
F	3.23		3.14	
p value	.03*		.01*	

Note. SEDE= Self-Efficacy in Diabetes Education; SEQ-IGC= Self-Efficacy Questions for Insulin pumps, Glucagon, and Carbohydrate count; and H.A.N.D.S.= Helping Administer to the Need of the Student with Diabetes in Schools. n=108 for the model of SEDE, and n=105 for the model of SEQ-IGC.
*p<.05. **p<.01.

The relationships between individual SEQ-IGC items and nurses taking the H.A.N.D.S. training were examined using multivariate regression models as well (Table 4.27). The regression models revealed that taking the H.A.N.D.S. training was not a significant predictor of nurses' self-efficacy managing insulin pumps, glucagon, and carbohydrate count after controlling for covariates in each model (p>.05). After controlling for taking the H.A.N.D.S. training, nurses' self-efficacy in managing of insulin pumps had a significant relationship with nurses' job status and students' competence in using insulin pumps, math, and knowledge of correct doses (p=.001).

Table 4.27
Regression Models for the H.A.N.D.S. Training, Self-Efficacy in Diabetes Management

Dependent variables	Pumps	p	Glucagon		Carbohydrate count	p
Independent variables						
H.A.N.D.S. Training	-.18	.36	-.33	.14	-.01	.97
Fulltime	.47	.08				.
Numbers of student						
6 or more			.74	.001**	.51	.001**
Students' competence in						
Insulin pumps	.03	.80				
Math	-.11	.50				
Knowledge	-.22	.26				
School type						
Elementary					.17	.36
Middle					.39	.04*
High					-.45	.02*
Constant	3.55		2.90		3.68	
R^2	.145		.119		.12	
F	4.26		7.61		4.78	
p value	.002**		.001**		.001**	

Note. SEDE= Self-Efficacy in Diabetes Education; SEQ-IGC= Self-Efficacy Questions for Insulin pumps, Glucagon, and Carbohydrate count; and H.A.N.D.S.= Helping Administer to the Need of the Student with Diabetes in Schools. n=108 for the model of SEDE, and n=105 for the model of SEQ-IGC.
*p<.05. **p<.01.

The number of diabetic students was a significant predictor of nurses' self-efficacy in the regression model for nurses' self-efficacy in managing glucagon (p=.001). This model explains 11.9% of the variance of self-efficacy in managing glucagon. This suggests that nurses caring for six or more diabetic students were more likely to have higher self-efficacy in managing glucagon than those caring for five or fewer diabetic students (p=.001). The number of diabetic students contributes more to this explanation than taking the H.A.N.D.S. training in the model.

Similar to the previous model, the number of diabetic students was a significant predictor of nurses' self-efficacy in managing carbohydrate count (p=.001). These results indicate that

nurses taking care of six or more diabetic students had higher self-efficacy in managing carbohydrate count than did those taking care of five or fewer diabetic students (p=.001).

T-tests were run to examine differences between participation in the H.A.N.D.S program and nurses' self-efficacy in diabetes education and management among interview participants. Interview participants taking the H.A.N.D.S program (M=35.5, SD=1.56) and those not taking it (M=32.88, SD=7.06) did not differ significantly on the SEDE score measuring nurses' self-efficacy in diabetes education, $t(18)=-.943$, p=.37.

Interview participants taking the H.A.N.D.S program (M=8.55, SD=2.91) had significantly lower SEQ-IGC scores than those not taking it (M=11.29, SD=1.70), $t(16)=2.24$, p=.39. In addition, a series of t-tests were computed to identify relationships between taking the H.A.N.D.S. program and individual items from the SEG-IGC. Interviewed nurses taking the H.A.N.D.S program (M= 2.42, SD= .31) had significantly lower self-efficacy in managing insulin pumps than those not taking it (M= 3.57, SD= .30), $t(17)= 2.46$, p=.03. Also, interviewed nurses taking the H.A.N.D.S program (M=2.5, SD=.34) had significantly lower self-efficacy in injecting glucagon than those not taking it (M= 3.63, SD= .32), $t(18)=2.29$, p=.03. In addition, interviewees taking the H.A.N.D.S program (M= 3.73, SD=.33) had significantly lower self-efficacy in counting carbohydrates than those not taking it (M=4.00, SD=.19), $t(17)= .64$, p=.53.

In summary, taking the H.A.N.D.S. training was not significantly associated with nurses' diabetes-related attitudes and their self-efficacy in diabetes education among all participants. With regards to nurses' self-efficacy in diabetes management, the results of survey-only participants were different from both survey and interview participants. Among survey-only participants, taking the H.A.N.D.S. training was not significantly associated with their self-efficacy in diabetes education and diabetes management including insulin pumps, glucagon, and

carbohydrate count. The results reveal that the number of diabetic students a nurse was responsible for (five or fewer vs. six or more), and the populations they dealt with were significantly associated with their self-efficacy in managing glucagon and carbohydrate count.

Aim 4: Explore school nurses' attitudes about their actual and potential activities related to diabetes education

To explore school nurses' attitudes about their actual and potential activities related to diabetes education, the following two sub-aims were addressed: to explore reasons for initiating diabetes education; and to explore possible diabetes education formats. The interviews were conducted with 20 participants. The interview questions were the following:

1) What kinds of behavioral observations and evidence do you use to initiate diabetes education for children with diabetes?
2) Do you use any other observations/other evidence to initiate education?
3) What would be the best format for diabetes education in school in terms of improving diabetes self-management in children with T1D?

The interview questions are in Appendix L. Interview participant demographics are presented at the beginning of this chapter. The major themes are situational reasons for initiating diabetes education. The major themes and categories are described in each sub-aim.

Sub-aim 1: Explore potential cues for initiation of diabetes education in children with T1D

In this aim, in order to explain nurses' attitudes about diabetes education, the focus was on what made nurses initiate diabetes education for students with T1D. The 20 interview participants responded to the questions about the reasons or cues for initiating diabetes education for diabetic students. They elaborated on their answers with examples from their experiences with diabetic students in the present and/or in the past.

Core reason: Immediately responding to a diabetes-relevant situation. The core reason for initiating diabetes education in schools was 'responding to a diabetes-relevant situation immediately': this describes a situation requiring diabetes education and/or nursing interventions in order to resolve the situation a school nurse dealt with. Most nurses said that they initiated diabetes education when they faced a specific situation with a diabetic student, for example, a student reporting a symptom of hypo- or hyperglycemia. Also, nurses provided diabetes education to a student with T1D during an expected visit based on a school schedule, such as before lunch, a test, or a physical education (PE) class. Nurses often provided diabetes education and diabetes management simultaneously. The core reason consists of six domains: immediate situation-driven diabetes education, new information relevant to diabetes care for a student, a diabetic student's expression of need for support, students presenting incorrect performance of diabetes management, expected visits based on school schedule, and a diabetic student's developmental status. The major themes and categories are presented in Appendix N.

Major theme 1: Immediate situation-driven diabetes education. Participants described diabetic students' physical conditions that might indicate hypo/hyperglycemic situations requiring immediate attention as a reason for diabetes education. These condition changes were closely related to diabetes management by school nurses in the moment, so diabetes education could be provided to students simultaneously during necessary management to stabilize their conditions.

***When a diabetic student reports hypo/hyperglycemic symptoms*.** Diabetic students' physical conditions also created a teaching moment for not only diabetic students, but also teachers. One nurse described a situation they handled with a student and a teacher:

> *When they come to the health room, if they are low we let the teachers know that they've been low and, you know, obviously, we don't send them back until they've had. We've*

> *rechecked after fifteen minutes to make sure they're coming up and in good range. But we let them know so they know that the student has been off and wouldn't necessarily be able to [be] responsible for what they were taught or how they did on the test, if there was a test going on. Interview #5*

When diabetic students were in hypo or hyperglycemic situations, nurses were motivated to initiate situation-specific diabetes education for students, after identifying possible causes of the situations:

> *And then at the end of the day she came back but she was really high. So, in calculating out what she should have given for her insulin coverage she was about two units short than what she should have been. And so that prompted me to have a conversation with her and say, okay, remember, your orders are to cover this much per carbs and this much for over. And then we recalculated it out and I showed her how she should have had, you know, two more units than what she actually gave herself and so I said that might have been contributing to why you were high. It may not have been. But, you know, in the future we need to make sure you're correcting accurately. And so the next day then when she came in she said that she had used her phone calculator to calculate it out and did better that day. So those are the kind of educational things that I do. Interview 3.*

***Getting reports from staff/teachers/family*.** Sometimes staff, teachers, or family members could recognize changes in behaviors or appearance of a diabetic student, even though a diabetic student did not recognize their possibly changed conditions. When school staff and teachers noticed any unusual behaviors or appearance of a student, they contacted a school nurse immediately and sent the student to the nurse for further evaluation. Also, diabetic students' conditions were brought by students to nurses or reported by teachers, school staff, or family members as concerns. Nurses mentioned that getting reports from staff, teachers or families was a reason for initiating diabetes education. One nurse described how she got a report from a parent in a family that was experiencing dysfunction and this caused her to initiate diabetes education:

> *I had a student who was really severely learning disabled, was from a really, I mean, the- the mom was just sweet as could be, but horribly dysfunctional family. And so she didn't realize that-- well, I don't know how much she realized it or not, but it was not a healthy family either. But she just, she tried to do the best she could. And she gave me a call one time and she said, 'Well, you know--' the reason that her son had been out so much, he just wasn't feeling well. And he was now in Children's and he had recovered from his*

> *four-day coma and they had never recorded such a high blood glucose level. It was over 4,000. Interview #1.*

When diabetic students arrived at a nurse's office, a health room, or somewhere else in schools, their physical appearance, complaints of symptoms, and/or behavioral changes caused nurses to initiate proper nursing care as well as diabetes education.

Major theme 2: New information relevant to diabetes care for a student. This domain represents information that is new to a nurse or a student creating a reason for diabetes education. Participants reported several moments for initiating diabetes education: new disease situations that a student faced, new information, and starting a new relationship between a nurse and a student for diabetes management.

***When a diabetic student is newly diagnosed with diabetes*.** When a student came to a school nurse after being diagnosed with T1D, school nurses initiated diabetes education to help them adjust to their new disease and school environments. Participants said that, when a student was newly diagnosed with T1D, they worked closely with the student in terms of recognizing hypo/hyperglycemic symptoms and managing their equipment. One participant described how they helped a newly diagnosed student remember their symptoms related to their BG numbers:

> *I know it's-- this isn't really education but like when especially young students when they're first diagnosed like they don't know what it feels like to have a low blood sugar or a high blood sugar. So, I always try to just remind them if they are having one of those blood sugars to make sure well how are you feeling right now, like trying to remind them like remember what this feeling feels like so that you can kind of learn for your body just for next time as far as you can be like oh, I feel the same feeling, again. Maybe I should check my blood sugar because I might be low or whatever. So, I try to remind them about that. Interview #20.*

***When a nurse is new to a diabetic student or vice versa*.** When a nurse was new to a diabetic student or vice versa, and when they started establishing a new relationship, they had a

reason for initiating diabetes education as they learned something from each other. One participant shared their current experience with new students in a new school building:

> *Not right now, 'cause like I said, I only have the two, and they're both like complete opposite, so. I'm new to them and they're new to me, so we're still trying to learn that aspect of it. Interview #7.*

New information obtained by a nurse regarding diabetes management. When a nurse gained new information related to diabetes management or equipment, they preferred to share it with their diabetic students and families. Nurses even recommended that their diabetic students and families participate in training to learn new information. One participant said that they shared new information with parents of diabetic students:

> *…let the parents know "This is what has come up. You know, this is what I learned in this, and, you know, is this something that would be valuable to you and your student?" at the time, and, you know, "Here's more trainings" and that kinda thing. That, I mean, that's what I try to do. Interview #18.*

School nurses tended to closely educate students when the nurses got new information that could be valuable for them. In this way, students could be supported in a smooth transition when adapting to their disease, getting familiar with school environments as well as care environments, and independent management of their diabetes.

Major theme 3: A diabetic student's expression of need for support. Participants reported that they provided diabetes education when a diabetic student expressed need for support from a nurse.

***When a diabetic student actively expresses their willingness to learn*.** Participants said that students needed support in enhancing skills for self-management, and/or dealing with emotional frustration. One participant said that they directly heard from diabetic students that they were eager to learn how to manage diabetes in order to be independent:

> *'cause the comment I keep hearing is 'I want to learn. I want to do this on my own. I don't want anyone involved.' Well, okay. Show us that you can do it. Interview #7*

When a diabetic student expresses their diabetes-related frustration. Participants said that when a diabetic student expressed frustration to them, they provided necessary education and support based on the kinds of frustration and that this support included education to relieve the student's frustration as well as emotional support to reduce students' stress. Based on participants' reports, student frustration was caused by struggle with hypo/hyperglycemic status, feeling different from others, possible social stigma related to their disease, and family relations. One nurse shared her opinion related to students' negative feelings about social pressure:

> *I think maybe because diabetes is so much in the press and it's so such a negative connotation in the press. Maybe that's another reason that kids are a little bit nervous about it because then they're going to think people will judge them and think it's their fault or whatever. But I don't know. I don't think that it should be something that is-- that makes people feel self-- too self-conscious but, you know, but it does. So, we try to work with them education and whatever. I don't know. It's tricky. Interview #6.*

When a diabetic student came to a nurse with their worries related to their disease or disease management, school nurses used this as a teaching opportunity to relieve their stress at the moment.

Major theme 4: Students' incorrect performance of diabetes management.

Participants described that they initiated diabetes education whenever their diabetic students demonstrated incorrect diabetes management skills and knowledge, and whenever a diabetic student was non-adherent with diabetes management content.

Lack of knowledge about of diabetes management. When a diabetic student needed a reminder in terms of performing the next step in a diabetes management task, nurses prompted them to perform what they were supposed to do in that management task. One participant shared a case of a diabetic student who needed prompts:

> *...just needs a lot of reminders to do, 'Okay, now where's your kit? Let's wash your hands.' You know, step-by-step reminders, then I'm sure she's gonna be low. My other one that I have right now at the elementary she just gets moody. You know, it reminds me of a middle school moody girl. That's how she gets when she's low. Interview #5.*

When a diabetic student was not capable of performing diabetes management tasks independently, nurses started diabetes education based on predetermined education topics considering the student' level of performance. In these cases, participants initiated education that supported a student's improvement of critical thinking skills related to diabetes management and their practice of skills before moving to another task of diabetes management.

***Non-adherence to diabetes management routines*.** Participants also mentioned a diabetic student's non-adherence with diabetes management as a reason for diabetes education. When a diabetic student was found to manipulate reports of their BG levels in a way that could create a diabetic condition such as hypo- or hyperglycemia, nurses could intervene to provide education to correct treatment non-adherence. Moreover, participants gave accounts of situations wherein diabetic student's manipulation of their BG numbers caused them to take incorrect insulin doses, resulting in possible hypo/hyperglycemic situations as part of non-adherence to treatment. One participant shared their experience of dealing with a student who had issues in addition to manipulating his BG numbers:

> *One time I had a little boy who was in here, and he was very, very angry. There was stuff going on between his parents at home, and he was starting to feel different from the other kids in his class, and he just gave himself 10 units of insulin. He was fiddling with the pump and knew how to do that, and he knew that it would hurt him and that it would upset all the adults and so that was a teaching moment, because he got really low really fast. So that was one powerful teaching moment for me. Interview #15.*

Skipping a regular visit to a nurse was also a reason to start diabetes education. In this case, students were monitored regarding their nursing visits and nurses called them to the nurse's office for educational conversations during their visits.

Major theme 5: Expected visits based on school schedule. Participants described that moments for initiating diabetes education arose when their diabetic students made regular visits to the nurses' offices or health rooms based on their school schedules: lunch, tests, and/or PE classes. Major topics of education were food choices, counting carbohydrates, and interpreting BG levels during these scheduled visits.

Food choices or carb calculation before lunch, snacks, tests, or physical education classes. Participants provided diabetes education focusing on enhancing students' healthy food choices and skill in calculating carbohydrates in foods. Participants said that they taught their students to eat food with better nutrients as well as fewer carbohydrates:

> *We also educate when they're going to lunch, how to read labels. We make them read the labels to verify they're reading the right line. And we verify that, and they become aware of, 'Wow! Some of these things, the carb counts are huge!' You know, so that's kind of where we start. Interview #20.*

In addition, topics of diabetes education could be determined by these expected visits. Participants mostly reported that their diabetic students came to them before lunch, tests, and PE classes to get a blood glucose level checked. For lunch, students were guided to select their food from a school lunch menu or to calculate the amount of carbohydrate in food to estimate insulin doses. For tests and PE classes, students were guided as to whether they were eligible to take a test or to participate in PE class based on their BG test numbers. Therefore, diabetes education topics were focused on identifying eligibility for participation in class activities after checking and interpreting the results of BG tests.

Participants said that these expected visits could be adjusted when a school schedule was changed without advance notice. These situations often occurred at the beginning of school year

and when a teacher was newly assigned to a diabetic student. These situations created a discussion with teaching staff and additional education for them as well.

Major theme 6: A diabetic student's developmental status. Participants mentioned developmental status of a diabetic student as a reason for initiating diabetes education with prioritized topics. This domain represents how school nurses approached different age groups in order to convey diabetes education effectively.

Developmental status regarding diabetes management. Nurses' consideration of developmental status was based on a diabetic student's age and where the nurse worked (e.g. elementary or middle schools). For children with T1D in elementary schools, participants considered providing opportunities for practicing diabetes management skills along with recognizing and reporting hypo/hyperglycemic symptoms for further assistance as being more applicable to education in terms of their development. For adolescents in middle or high schools, participants suggested providing safety nets for managing their conditions independently under adequate supervision. One nurse shared her opinion about using a different approach for adolescents in diabetes education regardless of years since diagnosis:

> *But you can also think well they're going to be through-- and now they're going to hit puberty and that's going to change things and they might not have realized that. Or they're, developmentally, where are they? You know, where can we think that they might start having problems with- with their management. Just because they've had type 1 for eight years doesn't mean they necessarily know what all of the- the changes are that are coming up. Interview #6.*

Considering developmental status of a diabetic student constituted a reason for diabetes education requiring appropriate topics and approaches, in addition to levels of independent performance of diabetes management.

Summary. Participants shared their experiences and stories with diabetic students they have taken care of to identify reasons for initiating diabetes education for students with T1D. The

results indicated that school nurses used several different situations to initiate diabetes education in schools. These reasons were not only diabetic students' improper management skills in the moment, but also diabetic situations caused by hypo/hyperglycemic conditions in schools. In addition, nurses tended to respond to students' immediate management needs based on their assessment of students' developmental status and management levels, and when the students brought to them any issues related to diabetes management.

Sub-aim 2: Explore a possible format for diabetes education provided by school nurses in terms of improving diabetes self-management in children with T1D

The interview participants responded to a question asking about formats for diabetes education in schools in various ways. Most of the participants used their experiences with their diabetic students to respond and suggested some ideas for educational formats. Some of them also articulated the opinion that providing diabetes education in schools might be inappropriate because it could potentially interrupt students' learning. One participant was unable to answer the question during the interview because she expressed lack of knowledge of other educational formats.

Core idea: Using a proper approach with systemic preparation. The core idea of potential formats for diabetes education in schools was described as using a proper approach with systemic preparation. The interview data revealed that providing diabetes education in schools involved not only selecting an appropriate format for diabetes education to accommodate students' needs but having available systems that include fulltime nurses in schools and a standardized curriculum for school settings developed in collaboration with local hospitals. The following three major themes describe possible education formats for diabetic students and what

participants saw as currently lacking in terms of delivering diabetes education in school systems. The major themes and categories are presented in Appendix Q.

Major theme 1: Short, frequent, one-on-one education format during school hours. Participants said thinking about formats for diabetes education in schools compelled them to reflect on what they did with their diabetic students during school days. Participants highly recommended short, frequent one-on-one education with diabetic students while caring for students by providing individualized, tailored education.

Constant teaching in a limited time while dealing with students' diabetes management. Participants focused on repeated educational moments in each visit during the care they provided, and how these could minimize possible interruptions caused by pulling students out of class for a separate diabetes education session. However, participants did not specify the length of education during interviews. When they described "short education," this referred to part of the diabetes care they provided without an exact length of time. One nurse suggested 10 to 15 minutes of educational session and another nurse suggested a short time at lunchtime to minimize class interruption. Also, one nurse preferred to take every nursing opportunity as a teaching moment:

> *So, every opportunity, we in the health-based profession can have a teaching moment, is one we should seize upon. Interview #1*.

***One-on-one educational sessions using necessary educational aids*.** Participants considered one-on-one education to be more suitable for younger students or students with BG levels that were not well-controlled. One nurse expressed her opinion related to one-on-one education with elementary school students:

> *And I think it has to be one-on-one as you can, you know, while providing care. You can put that education in there because it has to be so tailored to that student and it has to be kind of this catch as catch can education portion. Interview #6*

Some participants mentioned several educational aids that could be used in educational conversation with students: a skill checklist; a log tracking BG levels, foods, signs and symptoms of hypo/hyperglycemic episodes; a chart with a facial scale for assessing students' feelings; and using equipment for demonstration of skills. The chart with the facial scale was used in one school district. The purpose of educational aids was to assess students' levels of management skills mastery and trends of changes in BG levels with or without hypo/hyperglycemic episodes. Participants also mentioned that allowing students to keep a log could provide another educational opportunity for looking at how they were doing.

Identifying students' management needs based on observation and conversation with parents. Participants also revealed the importance of identifying students' needs based on observation of their management behaviors as well as conversation with parents about management at home and school. They described that communicating with parents and observing students' management behaviors were essential to figuring out any need to adjust treatment plans through students' providers, to identifying educational needs, and to encouraging shared responsibilities between parents and students. One nurse described an example of the importance of observation and conversation processes enhancing students' self-management:

> *It was more of a conversation with the parent about that and getting the final word from them that, "Yes, I want her to be able to give her own injections at school. I'm comfortable with her doing it now?" Again, that was watching her. She'd always do it with me. Then after a certain point, conversation, watching, seeing how she was doing, talking with mom, saying, "Yeah, she seems to be doing it just fine every day," and then mom would say, "Okay, you don't need to be observing her anymore." Interview #5*

Reinforcing students' management skills. Participants also mentioned the importance of reinforcement whenever a diabetic student performed a skill correctly. Through positive reinforcement, participants could provide positive learning experiences for students regarding their improvement in management skills and decision making:

> *...it was also reinforcing you can do this yourself, you can do this yourself. This is amazing. You've learned so much. Interview #8.*

Major theme 2: Diabetic student groups for social-emotional support and diabetes management. While the previous theme focused on individualized educational interactions between nurses and diabetic students, the major theme of having student groups for social support, emotional support and diabetes management emphasized the importance of social networks and emotional support among diabetic students. As a part of diabetes education, participants considered providing social-emotional support important for promoting students' diabetes management behaviors.

***Groups of diabetic students for social support*.** Participants suggested that hosting group sessions for older students could provide students with a chance to communicate with other diabetic students and to meet someone that has the same experience with the disease. These group sessions needed to be held under nurses' supervision along with parents' consent. One nurse said:

> *I think for older kids having a group that meets that whether it's peer, peer led, supervised by the nurse that would be a great way to do it, if you could find a time. Right after school maybe where they could come meet, and have peer support. Interview #6*

Emotional support and social networks were not specifically mentioned in the previous theme, one-on-one education. While one-on-one education emphasizes improving students' performance levels in diabetes management, hosting a student group session can have the added advantage of general group activities and peer support. Participants specifically mentioned that student groups were more applicable to older students rather than younger students, because of there was an assumption that there would be different levels of management skills in these two groups. A criterion for categorizing these groups was not explicitly mentioned by the

participants, but, in the context, it could be elementary schoolers versus middle schoolers and high schoolers, or children versus adolescents.

***Parent-student support groups for sharing information and support*.** Parent-student support groups were also mentioned by one nurse as a means of sharing information related to diabetes management and school life and supporting each other as well. This type of support was an example of collaboration with nurses, parents, and students to create support for this vulnerable population in school communities:

> *I think a lot of it is creating support programs within the school for those students. Like for me I just have the two in my one building, so I don't know if I would quite make one for specifically my building but maybe we can include a couple buildings or maybe the whole district or something and have a parent-student support group of diabetics. I think being able to hear what's required of the nursing side of school districts and how do we keep them safe at school. I think that might help some of these parents and students to realize kinda what we're looking for. Interview #7*

***Support students in living a normal life*.** Participants also mentioned that diabetic students, particularly adolescents, felt different from other students because of their disease. Diabetic students made nursing visits for disease management during school hours and they might miss a test or a snack at a party due to their condition. Hosting student groups could benefit diabetic adolescents who might feel different from others or feel isolation:

> *I think pulling them out individually to educate them is not what our approach should be. I think if we're going to educate, we're going to educate like for any other things. And in the setting where all students learn about it. Interview #20.*

Major theme 3: Systemic readiness for providing proper diabetes education. Compared to the previous major themes, individual education and group education, participants suggested different approaches towards providing diabetes education successfully from two perspectives with respect to support systems: an educational curriculum for diabetes education and fulltime nurses in schools. Participants' answers revealed that developing an educational curriculum with

local hospitals and having fulltime nurses in school were necessary for providing a high quality of diabetes education in school, although these needs were not currently satisfied.

Standardized educational curriculum in conjunction with local hospitals where diabetic students receive care. Participants expressed a desire to have a standardized educational curriculum for diabetes education in schools. They also said that the curriculum needed to be developed in conjunction with local hospitals where a majority of diabetic students received diabetes care. In this way, the curriculum could correspond to the content that diabetic students learned at clinics or hospitals and it could also reflect the current evidence-based practice of the local hospitals in school settings. While participants did not say so explicitly, their responses suggested that a standardized educational curriculum was needed in order to provide well-organized diabetes education to diabetic students. In the context of the interviews, participants alluded to how a diabetes curriculum was unavailable in school settings, and one nurse said that she used resources from a well-known diabetes education book. However, one nurse spoke directly about a lack of a standardized curriculum in school nursing practice related diabetes education:

> *Every nurse has an independent practice, and so there isn't a formal educational tool that is used yet. That has yet to come about, so we have IHPs, which does design the care provided, but we don't have any sort of concrete outline of how to educate students. Each nurse does it differently. Interview #15.*

Fulltime school nurses available in schools related to diabetes management. Participants expressed the idea that having nurses in schools could benefit diabetes students with regard to diabetes management, safety, and consistency of care. They were concerned about the safety of diabetic students during school hours. Participants felt that having a nurse in a school could create a safe environment for diabetic students who might not be fully ready to manage themselves. As a means of assuring students' safety, a nurse could act as a care provider, a care

coordinator, and an educator. Also, participants expressed the idea that diabetic students could benefit from consistent daily care from a nurse in a school and that this could contribute to improving students' management skills as well:

> *I think just the consistency, so like either the mobile nurse or the nurse who sees them every day to kinda maybe have them. I mean, if you create the educational goals for the student and kinda plan out when to have that done or what to work on at specific times, like have that mobile nurse or the nurse who's doing the care kinda work on those incrementally every day, 'cause I think that also works with kids, just doing that consistency. Interview #5.*

Summary. In summary, three major themes were drawn from the interview for exploring possible forms of diabetes education in schools for improving diabetes self-management in students with T1D: short, frequent, one-on-one educational format during school hours; groups for students with diabetes that provide social-emotional support and diabetes management; and systemic readiness for providing proper diabetes education. The first two themes focused on supporting individual students in diabetes management and mental health. In contrast, the last theme focused on systemic preparation for diabetes education in schools with respect to developing an educational curriculum with local hospitals. School nurses reported that, in these ways, they could provide diabetes education to diabetic students more effectively to enhance students' diabetes self-management behaviors. These approaches were used selectively based on students' levels of diabetes management, or developmental status in a prepared school educational curriculum.

Chapter 5. Discussion

The present study was designed to assess school nurses' diabetes-related attitudes, along with self-efficacy in diabetes education and management, and currently implemented practices. This study is one of the first studies to explore school nurses' perceptions of transitional care for students with type 1 diabetes (T1D) in school settings. In this section, the study findings are summarized and discussed based on the theoretical framework, Transitional Theory (Meleis, 2000) which guided this study, and compared with results from previous studies. In the later sections, the contribution to nursing science, implications for nurses, limitations of the present study, and suggestions for further research are discussed.

Findings

The present study found that school nurses had a) positive attitudes toward diabetes-related issues (need for special training for diabetes management, value of tight blood glucose control, psychosocial impact of diabetes, and patient autonomy in diabetes management), b) a moderate level of confidence in diabetes education, c) moderate confidence in diabetes management including insulin pump operation, glucagon administration, and carbohydrate counting, d) moderate confidence in glucagon administration and carbohydrate counting, and e) a low level of confidence in insulin pump operation. School nurses' diabetes attitudes were not associated with their self-efficacy in providing diabetes education. However, nurses' attitudes towards the psychosocial impact of diabetes were significantly related to their self-efficacy in providing diabetes management (managing insulin pumps, administering glucagon, and counting carbohydrates), and the number of diabetic students they managed was a significant contributor to this relationship.

Holding a higher nursing credential was a significant predictor of nurses' positive diabetes attitudes. RNs and NPs had higher scores on the need for special training, the value of tight blood glucose control, the psychosocial impact of diabetes, and patient autonomy than did LPNs. However, holding higher nursing credentials was not significantly associated with nurses' self-efficacy in diabetes education and diabetes management. Because this result was based on a small percentage of the sample being LPNs or NPs, cautious interpretation of the result is needed.

Being a nationally certified school nurse was not related to nurses' diabetes-related attitudes, but was significantly related to their self-efficacy in diabetes education and diabetes management in carbohydrate counting. Participating in diabetes management educational training, including the H.A.N.D.S. training, was not associated with nurses' diabetes-related attitudes or with self-efficacy in diabetes education and management. Part-time nurses tended to attend more educational training than full-time nurses.

School nurses' self-efficacy in providing diabetes education had a significant relationship with their work status (full- vs. part-time) and the type of school they worked in. Their self-efficacy in diabetes management was associated with the number of diabetic students for whom they cared. Specifically, nurses taking care of six or more diabetic students were more likely to have higher self-efficacy in diabetes management with handling insulin pumps, administering glucagon, and counting carbohydrates.

School nurses' perceptions of transitional care included assisting students in enhancing independence in diabetes management, along with constant support in schools. They described transitional care for diabetic students as: 1) care for moving to independent diabetes management, 2) care for changing school environments, and 3) maintaining care continuity of

diabetes management in school. Most care for transitions occurred when a diabetic student was in 5th grade, 8th grade, or 12th grade. The major themes describing care content were: a) communication with people involved in diabetes management in schools, b) transfer of one kind or another; and c) assisting students in attaining independent diabetes management. Care content for transitions was categorized as a) coordinating care for students with T1D in schools, b) transferring students' health-related documents to the next school, and c) promoting students' independent diabetes management.

The reasons for providing diabetes education in school were described using six major themes: a) immediate situation-driven diabetes education, b) new information relevant to diabetes care for a student, c) a diabetic student's expression of need for support, d) students' incorrect behaviors in diabetes management, e) expected visits based on school schedule, and f) a diabetic student's developmental status. The findings indicate that school nurses seemed to provide diabetes education as immediate responses to students' diabetic needs in both management and their diabetic situations, such as hypoglycemic events in schools.

To promote students' diabetes self-management, possible forms of diabetes education in schools were described using the three major themes: a) short, frequent, one-on-one education format during school hours; b) diabetic student groups for social-emotional support and diabetes management; and c) systemic readiness for providing proper diabetes education. Both one-on-one education and holding a diabetic student group were considered appropriate formats in schools based on the students' developmental status, level of diabetes management, and school nurses' support in mental health. School nurses described the need to have a standardized curriculum for diabetes education in conjunction with local hospitals and clinics, where most of

their diabetic students received diabetes care, as well as needing full-time school-based nurses who could educate diabetic students in schools.

Comparison with Previous Findings

The study findings revealed that school nurses have positive attitudes toward the need for special training, the value of tight blood glucose control, the psychosocial impact of diabetes on patients, and patients' autonomy in diabetes management. School nurses had the highest attitude scores on the psychosocial impact of diabetes and the lowest scores on patient autonomy. These results are consistent with the findings from previous studies where researchers found that nurses tended to have higher scores on the psychosocial impact of diabetes on patients' lives than other health care professionals, and that low scores on patient autonomy were common among health care professionals (Anderson et al., 1998; Anderson et al., 1993; Siminerio et al., 2007; Williamson et al., 1996).

The present study found no relationship between nurses' diabetes attitudes and self-efficacy in diabetes education, but their attitudes were a significant predictor of self-efficacy in diabetes management. School nurses taking care of six or more diabetic students had higher confidence in their diabetes management. This finding is consistent with previous findings which reported that more hands-on practice contributed to higher confidence in diabetes management (Allen et al., 2011; Darby, 2006; Fisher, 2006). In particular, Fisher (2006) assumed that more experience caring for diabetic students may be a key factor influencing higher self-efficacy regarding diabetes management in school nurses. The present study provides evidence in support of that assumption.

Although nurses' self-efficacy in diabetes education and self-efficacy in diabetes management were positively correlated ($p<.05$), the study findings only indicated a relationship

between attitudes toward the psychosocial impact of diabetes and self-efficacy in managing insulin pumps, glucagon, and carbohydrate count, not including diabetes education. Therefore, further studies are needed to investigate relationships between school nurses' self-efficacy in diabetes education and their self-efficacy in diabetes management and to examine their relationship with diabetes-related attitudes.

It has been documented that adolescents and children tend to maintain blood glucose levels higher than their desired ranges (West & Holmes, 2014). School nurses somewhat agreed that tightly controlling blood glucose levels as close to a recommended range as possible contributed to optimal learning in schools (mean±SD= 3.41±0.99), although school nurses highly valued tight control of blood glucose levels (mean±SD= 4.31±0.385). This finding might indicate that there is a gap between nurses' diabetes-related attitudes regarding the value of tight control and their actual practices regarding the management of students' blood glucose levels as close as possible to the recommended range. This gap could be caused by concerns about safety issues related to unexpected hypo/hyperglycemic events in schools. Therefore, further studies might be needed to identify possible variables influencing this gap between the nurses' attitudes and their practice in managing students' blood glucose levels in school settings, so that nursing interventions in school can support students in maintaining blood glucose levels close to recommended ranges.

School nurses expressed positive attitudes about students' independence in diabetes management during the interviews, and their scores on patient autonomy provide possible evidence to support their tendency toward students' independent diabetes management. There is limited information about school nurses' diabetes-related attitudes, so it is not easy to compare this tendency in school nurses with results from previous studies. However, these school nurses

had more positive attitudes about students' autonomy in diabetes management than nurses taking care of adult patients in previous studies (Anderson et al., 1998; Anderson et al., 1993). This might be because adults are already assumed to have autonomy but school nurses must help children and adolescents achieve their developmental milestones until they become adults. These attitudes were also evident in the results of transitional care content indicating that nurses provided care for enhancing students' diabetes self-management during transitions. According to Transitional Theory, nurses' interventions are affected by students' transitions including their development, disease status, and types of transitions, as well as ecological factors facilitating conditions of transitions (Meleis, 2000). Therefore, as part of the school community, school nurses could be influenced by the nature of transitions to provide proper nursing interventions to students with T1D. For this reason, school nurses might have higher scores on patient autonomy.

Differences in diabetes-related attitudes among dissimilar health care professionals have been found (Anderson et al., 1998; Anderson et al., 1993; Williamson et al., 1996), but most studies do not report the results of diabetes-related attitudes among the same professionals with different credentials, like nurses. School nurses can have different credentials (LPN, RN, and ARNPs) with different privileges under each license. The present study findings are consistent with these studies indicating different diabetes-related attitudes among RNs, LNPs, and NPs. The findings revealed differences in diabetes-related attitudes among school nurses holding different nursing credentials: RNs scored higher than LPNs in attitudes towards the need for special training, the value of tight control, and the psychosocial impact of diabetes on diabetic patients. More investigation may be needed with a larger sample, because of limited representation of LPNs and NPs in this study.

The study findings revealed that school nurses' preferred modes for increasing preparedness were in-person (71.43%), followed by online (54.46%), online resources (37.5%), and on-site resources (19.64%). The findings were partially consistent with previous studies (Griffits et al., 2007; Ramos et al., 2014). School nurses and acute care nurses preferred in-person education for learning about diabetes management. However, it seems like school nurses favored online education and resources more than the acute care nurses in the previous study. One reason for this discrepancy is that more online CE programs have been developed and online resources have become easily accessible due to increasing the use of smartphones.

The study findings revealed that school nurses had broad perceptions regarding transitional care for diabetic students. In the diabetes literature, transitional care indicates care between emerging from childhood care to adulthood care from the perspective of transition of health care systems (Blum et al., 1993; Davis et al., 2014; Findley et al., 2015; Lotstein et al., 2013; Nakhla et al., 2009 Polfusset al., 2015; Van Staa et al., 2011). However, school nurses expressed a broader definition of what transitional care means that is based on diabetic students' development and related levels of performing diabetes self-management (NASN, 2014). The timeline of transitional care for youth with T1D who emerge from pediatric care to adult care is recommended to fall between the ages of 12 and 26 (Findley et al., 2015; Got Transition, 2014). Unlike this transitional care, school nurses' care for diabetic students' transitions was possibly initiated when a diabetic student was in kindergarten and their care could be ended when a diabetic student graduated from high school. Therefore, nurses take into account not only the level of diabetes self-management, but also the developmental transitions in students with T1D. In providing care, school nurses also considered a new school environment caused by diabetic students' transitions in the educational system and assured that diabetic students they currently

took care of could receive a similar level of care in a new school. During these transitions, school nurses communicated with providers to get information about medical plans and school accommodations from providers. Roles in diabetes care have included support, coordination, and facilitation to maintain diabetic students' safety in school systems (Boden et al., 2012; Green & Reffel, 2009; NASN, 2014). Moreover, students' health care providers played a major role in transitional care (Findley et al., 2015). Therefore, nurses' perceptions and care during transitions are affected and limited by students' transitions in school systems, based on a Transition Theory framework (Meleis, 2000). Nurses' perceptions and care content in this study are related to transitions that students face in the school system. School nurses meet daily with diabetic students who are not independent in diabetes management. Nurses provide care based on their assessment of students' levels of necessary skills mastery and developmental status and information about students' management levels from parents and health care providers. Therefore, as previously described, a Transition Theory framework can be applied when interpreting this comprehensive practice scope in school nurses. The content of transitional care contained similar approaches to transitional care in clinical settings. These included providing opportunities for practicing skills, encouraging parental involvement in a process, and open communication with providers, parents, and students (Bargeron et al., 2015; Bridgett et al., 2015; Cadario et al., 2009; De Beaufort et al., 2010; Findley et al., 2015; Got Transition, 2014; Kruger et al., 2009; NDEP , 2014). However, it is unclear whether school nurses provided this care content to students and families based on a systemic plan in schools. The current study interview participants did not specify any existing protocols in their systems. Having systematic transition planning is very important for guiding successful transitions (Cadario et al., 2009; Findley et al., 2015). Therefore, further studies are needed to investigate whether school districts have care

protocols or plans for transitional care in their nursing care systems, or whether protocols or plans need to be developed.

The findings revealed that the care content suggested by school nurses focused on two different issues: assuring care continuity in a new school and promoting diabetes self-management in students with T1D. Based on Transition Theory (Meleis, 2000), there can be a bidirectional influence between nursing interventions and school community and students' abilities in diabetes management. In a comparison with this theoretical framework, the study findings were consistent with the presumed relationships between nursing interventions and the school community and students' levels of diabetes management. However, it is unclear within this theoretical framework whether the suggested nursing content for diabetic students' transitions can influence society. Further studies are needed to investigate relationships between a school community and society after they are influenced by nursing interventions in transitions.

The findings concerning the reasons for initiating diabetes education in schools indicated that school nurses responded to students' immediate needs related to diabetes management and intervened in students' diabetes-related situations. During the interviews, school nurses did not provide details about whether educational activities were initiated based on a long-term plan of mastering diabetes self-management skills within a certain timeframe, or whether educational activities were provided based on a structured curriculum using educational aids for mastering management skills or supporting psychosocial issues. However, school nurses' education while responding to an immediate situation could assist students manage their conditions more independently. These findings were consistent with school nurses' roles suggested by NASN (2017), AAP (Magalnick, & Mazyck, 2008), and ADA (2014), in terms of supporting diabetic students' learning in schools. In addition, these nursing interventions could be explained within

the framework of Transitional Theory (Meleis, 2000). These could be an example of how nurses' interventions are affected by transitions, including the development of students' levels of management skills, changes in conditions, and changes in social-emotional states, where students' behaviors are considered part of transitions.

School nurses provided diabetes education to students to reinforce students' knowledge about diabetes and intervene in situations that threatened students' lives in school. These perspectives on diabetes education are consistent with suggestions from several professional organizations about school nurses' roles (NASN, 2015). In the present study, school nurses provided direct nursing care as designated health care professionals in school, which is consistent with other studies (Nguyen et al., 2008). However, the education they provided was not based on a long-term goal within a systematic educational curriculum. Rather, it was based on the immediate needs of students during a nurse visit for a diabetic situation. One difference from the findings in Fisher (2007) is current study participants' suggestion of collaboration with local hospitals and clinics for developing an educational curriculum and their emphasis on having full-time school nurses in place for diabetes education. Although NDEP recently updated their diabetes education guideline for school personnel, parents, and students and NASN recommended utilization of the guidelines in schools (NDEP, 2017), nurses who participated in the interviews wanted to have a locally developed educational curriculum containing educational content that diabetic students would learn from their health care providers. In addition, their suggestion about full-time school nurses could be interpreted as a reflection of the present shortage of school nurses (Marks et al., 2013). During the interviews, a few nurses mentioned that they had an experienced colleague who had worked with students having diabetes as a mentor in their districts. This idea is consistent with a previous study in Colorado school districts

(Bobo et al., 2011a). In this study, having a diabetes resource nurse in school districts/region produced positive outcomes in caring for diabetic students, supporting school nurses' practices, and providing resources and education at school. Further studies may be needed to identify the effectiveness of having a designated diabetes mentor in each district.

Receiving diabetes trainings was not significantly related to diabetes-related attitudes and self-efficacy in diabetes education and management. This result was inconsistent with previous studies (Bachman & Hsueh, 2008; Bobo et al., 2011; Breneman et al., 2015: Kaufman et al., 2012). One possible reason for this inconsistency is the difference in time between nurses receiving diabetes trainings and their evaluation of the effects of such trainings on diabetes attitudes and self-efficacy. Previous studies indicated effectiveness of diabetes trainings for nurses through post-tests after completing training programs, without examining long-term effects over one year (Bachman & Hsueh, 2008; Bobo et al., 2011; Breneman et al., 2015). However, in the present study, effects of nurses' diabetes trainings on diabetes-related attitudes and self-efficacy in diabetes education and management were not evaluated immediately after completing diabetes training. The study participants were asked about the number of diabetes trainings received in the past five years. By using a cross-sectional method, this study resulted in counting trainings at varying lengths of time from the time of the survey. Even though Kaufman et al. (2012) reported a positive effect for nurses' training in the past three years and their self-efficacy in chronic disease management, present study findings indicated that receiving diabetes trainings in the past five years was not significantly related to nurses' diabetes-related attitudes or self-efficacy in diabetes care. This inconsistency might also indicate a lack of retention of diabetes training content past three years. Therefore, continuing education might be necessary, perhaps annually, to maintain the educational effects on nurses' self-efficacy in diabetes care.

Three possible educational formats in schools were identified: short one-on-one education, group education, and systemic preparation within a standardized curriculum. These findings are consistent with previous studies (Edwards et al., 2014; Faro et al., 2005) in terms of formats, but the lack of a standardized curriculum for diabetes education in schools is newly identified. For close supervision of students' diabetes management skills, one-on-one education has been recommended. However, the findings also add new information about an expectation of time duration for diabetes education in schools. School nurses reported that they tried to minimize interruptions of academic learning in students with T1D. Most education was provided to students with T1D while they visited nurses. Nurses preferred not to have any extra hours with students purposely set aside for diabetes education during school hours. This finding reflects the fact that most school nurses might not have adequate time to provide diabetes education to students with T1D and all necessary care could be provided within a short nurse visit. Therefore, research might be needed to investigate how school nurses could manage nurse visit times more effectively to provide necessary diabetes management as well as education.

Contribution to Nursing Science

The study findings about diabetes-related attitudes and self-efficacy in diabetes management and education are important contributions to nursing science, especially school nursing. Relationships between diabetes-related attitudes and self-efficacy in diabetes management and diabetes education have not been explored previously with school nurses who take care of students with T1D. These findings provide evidence for how school nurses' diabetes management and education could be improved along with the individual attitudes of school nurses toward diabetes. For researchers, further exploration of these relationships can be used to

provide evidence for developing educational training for school nurses and a new school policy in order to serve students with T1D in a better nursing environment.

Also, the study findings about school nurses' roles in diabetes management reveal current school nurses' practices for caring for students with T1D in school and how most school nurses' practice followed NASN recommendations for daily diabetes management. In addition, the study findings about the computation of reliability of the SNR provide an estimation of psychometric properties of this measurement for the first time since it was developed. For researchers, further exploration about the psychometric properties of the measurement with a large number of school nurses can be used to provide evidence to revise the instrument based on current NASN recommendations for school nurses' roles in diabetes management, if needed.

The study findings about perceptions of transitional care and relevant care content make an important and unique contribution to nursing science. The results reveal a different perspective on transitional care from school nurses dealing with children and adolescents with T1D in school systems. Unlike pediatric care providers and adult care providers in clinical settings, school nurses' transitional care could be initiated earlier in schools, if necessary. School nurses focus more on promoting students' independent diabetes management and mastering management skills, which is essential for successful transitions, as well as assuring consistent nursing care in new school settings. For researchers, these different perceptions need further exploration before this knowledge can be used to develop relevant nursing protocols and interventions.

The present study adopts Transitional Theory (Meleis, 2000) as a theoretical framework to explore school nurses' roles in diabetes management and education for students with T1D in school settings. Findings reveal that the nature of diabetic students' transitions (e.g.

development, educational levels, diagnosis of T1D, discharge from hospital, and feeling different from other students) influenced school nurses' transitional care as understood within Transitional Theory (Meleis, 2000). The type of school (e.g. primary or secondary) to which students' transfer is also an influencing factor that can increase expectations of levels of diabetes management among students with T1D. For researchers, further exploration of these relationships can be used to establish more concrete evidence so that a middle-range theory can be developed to explain transitions of students with T1D specifically in school settings.

School nurses' diabetes education is characterized as situation-relevant education that occurs in reaction to encountering diabetic situations and the needs of students with T1D. For researchers, further exploration of situation-relevant diabetes education could identify reasons for these characteristics of diabetes education in schools in order to provide evidence for potential changes in school/district policies, and explore how school nurses can provide more structured, well-planned education for achieving a long-time goal of diabetes management in students with T1D.

The results of the present study suggest possible formats of diabetes education in schools (e.g. a short-duration of education format, and group sessions for students with T1D). For researchers, further exploration of possible formats of diabetes education can provide detailed information about the duration of diabetes education during a diabetic situation, proper educational aides or materials for diabetes education, and how to utilize a nurse visit efficiently for providing diabetes education in schools. Therefore, a school environment-specified, time-efficient diabetes education program, along with proper educational materials, can be developed for students with T1D.

The study findings provide information about relationships between school nurses' diabetes-related attitudes and their self-efficacy in diabetes education and management, as well as some inconsistent results indicating no associations between school nurses' diabetes-related attitudes and their confidence in diabetes education. For researchers, further exploration of these inconsistent relationships between school nurses' diabetes-related attitudes and their self-efficacy in diabetes education can be used to describe reasons for the gap between nurses' diabetes attitudes and their confidence in diabetes practices.

Findings identify a gap between the effects of numbers of diabetes trainings in the past five years on school nurses' self-efficacy in diabetes management and school nurses' perceived usefulness of participating in diabetes trainings. For researchers, further exploration of this gap in effectiveness of diabetes trainings for school nurses can provide evidence for recommending optimal intervals of diabetes trainings for school nurses to maintain the effects of diabetes trainings on their practices for students with T1D.

More than half of the study participants did not use any forms for evaluating their diabetes education for students with T1D. For researchers, further exploration of the reasons for not using any evaluation forms in school nursing can provide information about what school nurses need for evaluating the effectiveness of diabetes education for students with T1D. This information can be used to develop appropriate nursing tools for school nurses in order to provide evidence-based practice in school settings.

Nursing Implications

Six tentative nursing implications are suggested from the study results about school nurses' roles in diabetes management and education using diabetes-related attitudes, self-efficacy

in diabetes management and education, diabetes practice, nurses' perception of transitional care and nursing practice, and reasons for diabetes education.

First, having health care consolidated schools in each school district can be recommended as a means of providing more effective, high-quality nursing care to students with T1D. The findings reveal that the number of diabetic students school nurses take care of is significantly associated with school nurses' diabetes-related attitudes, and their self-efficacy in diabetes education and diabetes management. At a consolidated school, school nurses can take care of a higher number of diabetic students such that school nurses can increase their confidence in providing diabetes education, managing students' insulin pumps, administering glucagon, and counting carbohydrates in foods. In addition, school nurses can positively consider getting more trainings for diabetes management, managing diabetic students' blood glucose levels within the recommended ranges in schools, reflecting on the psychosocial effects of diabetes in students with T1D, and facilitating students' independent diabetes management. Therefore, students with T1D can receive better quality of nursing care by school nurses who are well-prepared for diabetes management.

Second, a standardized nursing protocol for students' transitions in school settings can be developed such as a transition plan template. This would allow each school nurse to transfer the same or similar information to the next school nurse, and care for diabetic students' transitions can be provided systematically. School nurses can benefit from a systemic approach to assessing and responding to the needs of students with T1D and their parents in order to facilitate successful transitions, especially transitions from one school to another. Each student has different needs with relation to diabetes management in schools, because of differences in levels of management skills, developmental status, and school environments, but a systematic approach

could facilitate care. If a diabetic student moves to a school in a different school district, a systemic approach can be help create an individualized and tailored plan for the transition.

Third, introducing the concept of transitional care to school nurses' diabetes trainings is recommended for facilitating a better understanding of what health care providers expect of transitional care. More school nurses might then expand their roles in transitions of care from schools to clinics and from one school to another.

Fourth, a standardized diabetes education plan and materials can be developed for situation-specific diabetes education in order to provide proper diabetes education to diabetic students that will help them to complete their school activities in a timely manner. The findings reveal that school nurses provide diabetes education in diabetic situations to meet students' diabetes management needs. A standardized diabetes education plan and materials can be helpful in meeting the needs of school nurses and diabetic students in creating collaborative, sufficient learning environments in a short period of time.

Fifth, developing a diabetes evaluation tool in order to evaluate the effects of school nurses' diabetes education on students with T1D is recommended. Over half of participated school nurses reported that they do not use a form to evaluate diabetic students' improvement after the provide diabetes education. A standardized evaluation form for diabetes education can be useful to provide evidence-based practice and individualized, tailored care to enhance students' levels of diabetes management skills.

Sixth, providing easily accessible diabetes trainings and resources to school nurses can increase their care confidence and feelings of preparedness to meet the needs of diabetic students in diabetes management. School nurses indicated that taking in-person/online trainings and getting on-call contact with diabetes specialists increased their preparedness to provide proper

care to students with T1D. Collaborating with local hospitals to provide diabetes trainings and resources to schools can promote communication between school nurses and local providers in terms of better care for students with T1D.

Future Research

If this present line of study continues in the future, the study measures employed (the SNR, the DETC, and the SEQ-IGC) will need to be revised and tested to establish a high level of reliability. There was already an attempt in the present study to establish reliability of the SNR. However, the attempt was not successfully accomplished due to a relatively small number of study participants, which did not permit factor analysis to identify its construct validity or computation of reliability coefficients. In addition, revising the DETC and SEQ-IGC and testing them with a larger number of school nurses will also be important. Although SEQ-IGC contains three different nursing care components, it would be beneficial to have more items addressing detailed nursing practices related to operating insulin pumps, administering glucagon, and counting carbohydrates. Likewise, the DETC could be revised to have more items addressing nursing practices for transitional care.

Further studies can be conducted to specify school nurses' perceptions of transitional care, relevant care content, and diabetes education for students with T1D based on nurses' workplaces. The study findings provided general views of transitional care content and diabetes education, but the results need to be examined based on students' primary or secondary education settings so that nursing protocols and interventions can be established in order to provide transitional care and diabetes education systematically in school settings.

Studies can be conducted with students with T1D and their families to explore perceptions of transitional care in school settings. The study findings provided perceptions of

transitional care and relative care content for students with T1D from school nurses' views, but the results need to be examined based on needs and perceptions of transitional care among students with T1D and families in order to provide a better understanding of transitional care in school settings.

Exploration of how school nurses collaborate with local health care providers to develop diabetes education curricula for diabetic students in school settings can also take place. Preliminary studies may be needed to identify local health care providers' expectations of diabetes education and management by school nurses as well as educational topics. Then, studies exploring effective collaboration between school nurses and local health care providers can be conducted. In addition, studies exploring how to measure student outcomes for the purposes of evaluating the effectiveness of a diabetes education curriculum and how school nurses improve diabetic students' outcomes will be useful. These studies may need to include local health care providers, parents, students with T1D, directors of the Student Health Services in each school district, and school nurses in the same regions.

Research studies can be conducted with students with T1D and parents to explore their expectations of school nurses' care for transitions and their perspectives on communication with school nurses and school staff for transitions in school systems. The study findings revealed the importance of communication with people who were involved in diabetes management during transitions. However, the results need to be examined with students with T1D and parents so that engagement with school nurses and school staff can be integrated for the purposes of developing a communication protocol that facilitates therapeutic interactions.

In addition, studies can be conducted with school nurses to explore proper timing and duration for diabetes education and educational aides in schools. The study findings reveal

frequent, one-on-one education as a proper format for diabetes education in schools. Therefore, how to use a limited time in each nurse visit, what kinds of educational aids can be utilized during education, and how to structure diabetes education can be identified to develop a diabetes education program for students with T1D regarding evidence-based practice in schools.

Research can also be conducted with students with T1D and parents to explore their expectations of school nurses' diabetes education and helpful educational formats and topics in schools. The study findings revealed reasons for initiating diabetes education and possible formats for that education from the perspectives of school nurses. Therefore, information from students with T1D and parents can contribute to a better understanding of school nurses' diabetes education and their needs in diabetes education in schools.

Further studies can be conducted with school nurses, students with T1D, and parents, to explore how school nurses can measure outcomes of diabetes education and management in school settings. The study findings revealed the possible formats of diabetes education in school depending on students' levels of diabetes self-management and education forms school nurses used for diabetes education. School nurses reported using logs for documenting students' blood glucose levels in schools and receiving health information from students' health care providers while they communicated with providers and parents. Therefore, information from these populations could provide information about what school nurses can use to measure outcomes of students with T1D after providing diabetes education and management.

Limitations

This study has several limitations. First, the study has a small number of school nurses from one state, so the generalizability of the findings is limited. The findings need to be replicated with a large number of school nurses. Second, the study has a highly homogeneous

sample of female, White, full-time school nurses with RN credentials. Although these characteristics of school nurses are consistent with the national demographics of school nurses in the U.S. (Maughan & Mangena, 2014), the small number of participants holding different credentials and a national certification limits some analyses of group effects. Third, some of the study measures did not demonstrate an acceptable level of reliability, (α>.80) although these measures have established content/face validity with experts in the field. These may limit confidence in the results. Additional studies are needed with a large number of school nurses and to test possible revised questions in the measures to establish reliability. Fourth, the interview participants were recruited using a convenience sample from the small number of school nurses completing the surveys in one state, so the findings about transitional care and diabetes education may not be replicable in other states. Fifth, the interview participants were a mixed group of school nurses working in elementary, middle, and/or high schools. Therefore, perceptions in transitional care and relevant care content contained school nurses' general ideas and care content for diabetic students in different age groups, not just adolescents with T1D who are going to become adults. If the interviews were only conducted with school nurses taking care of students with T1D in high schools, the findings would be focused on care for transitions in students with T1D who were emerging from high schools to colleges or other settings. Therefore, further studies need to specify care content for transitional care with school nurses working with high school students with T1D who are going to become adults. Sixth, there were no interview questions directly asking about policies or protocols related to transitional care and diabetes education in the school districts. For this reason, it is not easy to identify whether the differences in transitional care and diabetes education in the school districts were caused by individual school nurses' practices or each district's policies.

Conclusions

The present study explores the relationships between diabetes-related attitudes, self-efficacy in diabetes management and education, and current nursing practices among school nurses taking care of students with T1D, their perceptions of transitional care, and care provided during students' transitions in school systems. School nurses' diabetes-related attitudes were related to their self-efficacy in diabetes management including managing insulin pumps, administering glucagon, and counting carbohydrates in foods, not to self-efficacy in diabetes education for students with T1D. Also, school nurses' credentials were a significant predictor of their diabetes-related attitudes, but nurses' credentials were not associated with their self-efficacy in diabetes education and management. In contrast, holding a national certification of school nurse was not associated with nurses' diabetes-related attitudes, but it was associated with self-efficacy in diabetes education and diabetes management in carbohydrate counting. Attitudes of school nurses assisting students in diabetes management were significantly related to their experience of providing transitional care to students with T1D. Also, nurses' self-efficacy in diabetes education was significantly associated with their experiences providing transitional care. School nurses perceived transitional care as support for enhancing students' independence in diabetes management in schools and relevant care content focused on preparing students and families for new school environments and maintaining similar levels of diabetes care. School nurses' diabetes education was mainly initiated based on the immediate needs of students in diabetic situations. In addition, systemic approaches to diabetes education were identified as possible formats for diabetes education based on diabetic students' levels of self-management and developmental status. The new knowledge generated from the findings provides information about school nurses' practices for caring of students with T1D and relationships between their

diabetes-related attitudes and confidence in diabetes education and management, so current practices can be evolved to more effectively support diabetic students in schools. The new knowledge generated from this study helps school nurses understand the importance of transitional care and necessary nursing care in school systems for students with T1D. Future studies may benefit from studying a larger number of school nurses in other states, and in specific groups classified by the types of schools in which they work (e.g. elementary, middle, or high schools) to elaborate on differences in nursing practices for different student populations.

REFERENCES

Alexandropoulou, M. (2013). The health promoting school and the school nurse: a content analysis of school staff's views. *British Journal of School Nursing, 8*(3), 134–141.

Allen, K., Henselman, K., Laird, B., Quinones, A., & Reutzel, T. (2012). Potential life-threatening events in schools involving rescue inhalers, epinephrine autoinjectors, and glucagon delivery devices: Reports from school nurses. *The Journal of School Nursing, 28*(1), 47–55. doi:10.1177/1059840511420726

Altmann, T. K. (2008). Attitude: a concept analysis. In *Nursing Forum* (Vol. 43, pp. 144–150). Wiley Online Library. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1744-6198.2008.00106.x/full

American Academy of Pediatrics, American Academy of Family Physicians, and American College of Physicians, Transitions Clinical Report Authoring Group. (2011). Supporting the health care transition from adolescence to adulthood in the medical home. *Pediatrics, 128*(1), 182–200. https://doi.org/10.1542/peds.2011-0969

American Diabetes Association. (2014). Diabetes care in the school and day care setting. *Diabetes Care, 37*(Suppl 1), S91–6. doi:10.2337/dc14-S091

American Diabetes Association (2015). 11. Children and adolescents. *Diabetes Care, 38*(suppl.1), S70-S76.

Amillategui, B., Mora, E., Calle, J. R., & Giralt, P. (2009). Special needs of children with type 1 diabetes at primary school: perceptions from parents, children, and teachers. *Pediatric Diabetes, 10*(1), 67–73. doi:10.1111/j.1399-5448.2008.00457.x

Anderson, R. M., Fitzgerald, J. T., Funnell, M. M., Grupen, L. D. (1998). The third version of the diabetes attitude scale (DAS-3). *Diabetes Care, 21*(9):1403-1407, 1998.

Anderson, R. M., Fitzgerald, J. T., Gorenflo, D. W., & Oh, M. S. (1993). A comparison of the diabetes-related attitudes of health care professionals and patients. *Patient Education and Counseling*, *21*(1–2), 41–50.

Babler, E., & Strickland, C. J. (2015a). Normalizing: Adolescent experiences in living with type 1 diabetes. *Pediatric Diabetes*, *14*(1), 34–35. doi:10.1177/0145721715579108

Babler, E., & Strickland, C. J. (2015b). Moving the journey towards independence: Adolescents transitioning to successful diabetes self-management. *Journal of Pediatric Nursing*, *30*(5), 648–660. doi:10.1016/j.pedn.2015.06.005

Bachman, J. A., & Hsueh, K.-H. (2008). Evaluation of online education about diabetes management in the school setting. *The Journal of School Nursing*, *24*(3), 151–157. doi:10.1177/1059840533445566

Bandura, A. (1986). *Social foundation of thought & action: A social cognitive theory*. Upper Saddle River, NJ: Person Education Company.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: W.H. Freeman.

Bargeron, J., Contri, D., Gibbons, L. J., Ruch-Ross, H. S., & Sanabria, K. (2015). Transition planning for youth with special health care needs (YSHCN) in Illinois schools. *The Journal of School Nursing*, *31*(4), 253–260. https://doi.org/10.1177/1059840514542130

Benassi, K., Drobny, J., & Aye, T. (2013). Real-time continuous glucose monitoring systems in the classroom/school environment. Diabetes Technology & Therapeutics, 15(5), 409-412.

Bergren, M. D., & Monsalve, L. (2012). The 2011 NASN membership survey: Developing and providing leadership to advance school nursing practice. *NASN School Nurse, 27*(1), 36–41. https://doi.org/10.1177/1942602X11429829

Berk, L. E. (2006). *Child development* (7th Ed.). Boston, MA: Pearson/Allyn and Bacon.

Betz, C. L. (2007). Facilitating the transition of adolescents with developmental disabilities: Nursing practice issues and care. *Journal of Pediatric Nursing, 22*(2), 103–115. https://doi.org/10.1016/j.pedn.2006.07.006

Betz, C. L. (2017). SPN position statement: Transition of pediatric patients into adult care. *Journal of Pediatric Nursing*, *35*, 160–164. https://doi.org/10.1016/j.pedn.2017.05.003

Blum, R. W., Garell, D., Hodgman, C. H., Jorissen, T. W., Okinow, N. a., Orr, D. P., & Slap, G. B. (1993). Transition from child-centered to adult health-care systems for adolescents with chronic conditions. Journal of Adolescent Health, 14, 570–576. doi:10.1016/1054-139X(93)90143-D

Bobo, N., Kaup, T., McCarty, P., & Carlson, J. P. (2011). Diabetes management at school: application of the healthy learner model. *The Journal of School Nursing, 27*(3), 171–184. doi:10.1177/1059840510394190

Bobo, N., Wyckoff, L., Patrick, K., White, C., Glass, S., Carlson, J. P., & Perreault, C. (2011). A collaborative approach to diabetes management: The choice made for Colorado schools. *The Journal of School Nursing*, *27*(4), 269–281.

Boden, S., Ce, L., Gosden, C., Macdougall, C., Brown, N., The, M. K., … Macdougall, C. (2012). The concerns of school staff in caring for children with diabetes in primary school. *Pediatric Diabetes, 13*(6), e6-e13.

Breneman, C. B., Heidari, K., Butler, S., Porter, R. R., & Wang, X. (2015). Evaluation of the effectiveness of the H.A.N.D.S. [SM] program: A school nurse diabetes management education program. *The Journal of School Nursing*, *31*(6), 402–410. https://doi.org/10.1177/1059840514568895

Bridgett, M., Abrahamson, G., & Ho, J. (2015). Transition, It's More Than Just An Event: Supporting Young People With Type 1 Diabetes. *Journal of Pediatric Nursing*, *30*(5), e11–e14. https://doi.org/10.1016/j.pedn.2015.05.008

Brinkmann, S. (2014). Unstructured and semi-structured interviewing. In P. Leavy (Ed.), *The Oxford handbook of qualitative research* (pp. 277-299). New York: Oxford University Press.

Bullock, L. F. C., Libbus, M. K., Lewis, S., & Gayer, D. (2002). Continuing Education: Improving Perceived Competence in School Nurses. *The Journal of School Nursing*, *18*(6), 360–363. doi:10.1177/10598405020180060901

Cadario, F., Prodam, F., Bellone, S., Trada, M., Binotti, M., Trada, M., … Aimaretti, G. (2009). Transition process of patients with type 1 diabetes (T1DM) from paediatric to the adult health care service: a hospital-based approach. *Clinical Endocrinology*, *71*(3), 346–350. https://doi.org/10.1111/j.1365-2265.2008.03467.x

Carson, C. (2003) Adolescence to adulthood: how to keep adolescents in the system. *Journal of Diabetes Nursing*, **7**(1), 24–7

Centers for Disease Control and Prevention. (2015). *Diabetes Report Card 2014*. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services.

Centers for Disease Control and Prevention (2014). *National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States, 2014.* Atlanta, GA: US Department of Health and Human Services.

Chiang, J. L., Kirkman, M. S., Laffel, L. M. B., & Peters, A. L. (2014). Type 1 Diabetes Through the Life Span: A Position Statement of the American Diabetes Association. *Diabetes Care*, *37*(7), 2034–2054. https://doi.org/10.2337/dc14-1140

Chick, N, & Meleis, A. I. (1986). Transitions: A nursing concern. In P. L. Chinn (Ed.), *Nursing Research Methodology*, (pp. 237–257). Boulder, CO: Aspen Publication.

Churchill, J. N., Ruppe, R. L., & Smaldone, A. (2009). Use of Continuous Insulin Infusion Pumps in Young Children With Type 1 Diabetes : A Systematic Review. *Journal of Pediatric Health Care*, *23*(3), 173–179. doi:10.1016/j.pedhc.2008.07.002

Clarke, W. L. (2011). Behavioral challenges in the management of childhood diabetes. *Journal of Diabetes Science and Technology*, *5*(2), 225–8. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3125908&tool=pmcentrez&rendertype=abstract

Coffen, R. D. (2009). The 600 step program for type 1 diabetes self-management in youth. *Postgraduate Medicine, 121*(5), 119-139.

Council on School Health. (2016). Role of the School Nurse in Providing School Health Services. *Pediatrics*, *137*(6), e20160852–e20160852.

Dabelea, D., Mayer-Davis, E. J., Saydah, S., Imperatore, G., Linder, B., Divers, J., … Hamman, R. F. (2014). Prevalence of type 1 and type 2 diabetes among children and adolescents from 2001 to 2009. *JAMA : The Journal of the American Medical Association*, *311*(17), 1778–86. doi:10.1001/jama.2014.3201

Darby, W. (2006). The experiences of school nurses caring for students receiving continuous subcutaneous insulin infusion therapy. *The Journal of School Nursing, 22*(6), 336-344.

Dashiff, C., Hardeman, T., & McLain, R. (2008). Parent-adolescent communication and diabetes: an integrative review. *Journal of Advanced Nursing*, *62*(2), 140–62. doi:10.1111/j.1365-2648.2007.04549.x

Davis, A. M., Brown, R. F., Taylor, J. L., Epstein, R. A., & McPheeters, M., L. (2014). Transition care for children with special health needs. Pediatrics, 134(5), 900–908. doi:10.1542/peds.2014-1909

Day, E. (2006). Transitional care for young people with diabetes: When, where and how? *Journal of Diabetes Nursing*, *10*(4), 145.

de Beaufort, C., Jarosz-Chobot, P., Frank, M., de Bart, J., & Deja, G. (2010). Transition from pediatric to adult diabetes care: smooth or slippery? *Pediatric Diabetes*, *11*(1), 24–27. https://doi.org/10.1111/j.1399-5448.2009.00524.x

Duncan, D. F. (1989). Content analysis in health education research: an introduction to purposes and methods. *Health Education*, *20*(7), 27–31.

Eaton-Spiva, L., & Day, A. (2011). Effectiveness of a Computerized Educational Module on Nurses' Knowledge and Confidence Level Related to Diabetes. *Journal for Nurses in Staff Development (JNSD)*, *27*(6), 285–289. http://doi.org/10.1097/NND.0b013e3182371164

Edwards, D., Noyes, J., Lowes, L., Haf Spencer, L., & Gregory, J. W. (2014). An ongoing struggle: A mixed-method systematic review of interventions, barriers and facilitators to achieving optimal self-care by children and young people with Type 1 Diabetes in educational settings. *BMC Pediatrics, 14*(1), 228. doi:10.1186/1471-2431-14-228

El-Deirawi, K. M., & Zuraikat, N. (2001). Registered nurses' actual and perceived knowledge of diabetes mellitus. *Journal of Vascular Nursing, 19*(3), 95–100. http://doi.org/10.1067/mvn.2001.118311

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(Cole 1988), 107–115. doi:10.1111/j.1365-2648.2007.04569.x

Engelke, M. K., Guttu, M., Warren, M. B., & Swanson, M. (2008). School nurse case management for children with chronic illness: health, academic, and quality of life outcomes. *The Journal of School Nursing : The Official Publication of the National Association of School Nurses*, *24*(4), 205–214. doi:10.1177/1059840508319929

Engelke, M. K., Swanson, M., Guttu, M., Warren, M. B., & Lovern, S. (2012). School Nurses and Children With Diabetes :, *72*(5), 351–358.

Engvall, J. C., Padula, C., Krajewski, A., & Rourke, J. (2014). Empowering the Development of a Nurse-Driven Protocol. *MedSurg Nursing*, *23*(3), 149–154. Retrieved from http://go.galegroup.com/ps/i.do?id=GALE%7CA375581319&v=2.1&u=ubcolumbia&it=r&p=HRCA&sw=w&asid=7279dfbb0b20ea5a6d651ed6e5b71d6e

Faro, B., Ingersoll, G., Fiore, H., & Ippolito, K. S. (2005). Improving students' diabetes management through school-based diabetes care. *Journal of Pediatric Health Care : Official Publication of National Association of Pediatric Nurse Associates & Practitioners, 19*(5), 301–8. doi:10.1016/j.pedhc.2005.03.004

Findley, M. K., Cha, E., Wong, E., & Faulkner, M. S. (2015). A Systematic Review of Transitional Care for Emerging Adults with Diabetes. *Journal of Pediatric Nursing*. doi:10.1016/j.pedn.2015.05.019

Fisher, K. L. (2006). School nurses' perceptions of self-efficacy in providing diabetes care. The *Journal of School Nursing : The Official Publication of the National Association of School Nurses*, *22*(4), 223–8. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/16856777

Gagliardino, J. J., González, C., & Caporale, J. E. (2007). The diabetes-related attitudes of health care professionals and persons with diabetes in Argentina. *Revista Panamericana de Salud Pública*, *22*(5), 304–307.

Gallivan, J., & Greenberg, R. H. (2014). Diabetes and Youth Resources for School Nurses: An Update From the National Diabetes Education Program. *NASN School Nurse*, *29*(July), 170–171. doi:10.1177/1942602X14535268

Gan, M. J., Albanese-O'Neill, A., & Haller, M. J. (2012). Type 1 diabetes: current concepts in epidemiology, pathophysiology, clinical care, and research. *Current Problems in Pediatric and Adolescent Health Care*, *42*(10), 269–91. doi:10.1016/j.cppeds.2012.07.002

Got Transition. (2014). Six core elements of health care transition 2.0 (Side-by-side version). Retrieved from http://www.gottransition.org/resourceGet.cfm?id=206

Graneheim, U., & Lundman, B. (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, *24*(2), 105–112. https://doi.org/10.1016/j.nedt.2003.10.001

Grant, L., Lawton, J., Hopkins, D., Elliott, J., Lucas, S., Clark, M., … Cooke, D. (2013). Type 1 diabetes structured education: What are the core self-management behaviours? *Diabetic Medicine: A Journal of the British Diabetic Association*, *30*(6), 724–30. doi:10.1111/dme.12164

Green, R., & Reffel, J. (2009). Comparison of Administrators' and School Nurses' Perception of the School Nurse Role. *The Journal of School Nursing*, *25*(1), 62–71. doi:10.1177/1059840508324248

Gregory, J. M., Moore, D. J., & Simmons, J. H. (2013). Type 1 diabetes mellitus. *Pediatrics in Review*, *34*(5), 203–15. doi:10.1542/pir.34-5-203

Griffis, S., Morrison, N., Beauvais, C., & Bellefountaine, M., (2007). Identifying the continuing diabetes education needs of acute care nurses in northern Ontario. *Canadian Journal of Diabetes, 31*(4), 371-377.

Guo, J., Whittemore, R., & He, G.-P. (2011). The relationship between diabetes self-management and metabolic control in youth with type 1 diabetes: an integrative review. *Journal of Advanced Nursing*, *67*(11), 2294–310. doi:10.1111/j.1365-2648.2011.05697.x

Haas, L., Maryniuk, M., Beck, J., Cox, C. E., Duker, P., Edwards, L., … Youssef, G. (2014). National standards for diabetes self-management education and support. *Diabetes Care, 37*(Suppl 1), S144–53. doi:10.2337/dc14-S144

Hirsch, I. B. (2010). Insulin delivery devices--pumps and pens. *Diabetes Technology & Therapeutics*, *12 Suppl 1*, S115–6. doi:10.1089/dia.2010.0057

Hitchcock, J. (2011). School Nurses Lead the Team: Successful Relationships With Families of Children With Diabetes. *NASN School Nurse*, *26*(5), 294–295. https://doi.org/10.1177/1942602X11414915

Hsieh, H., & Shannon, S. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277–88. doi:10.1177/1049732305276687

Im. E. O. (2010). Transition theory. In Alligood, M. R. & Tomey, A. M. (7th ed.), *Nursing theories and their work* (pp. 418-433). Maryland Heights, MI: Mosby Elsevier.

Izquierdo, R., Morin, P. C., Bratt, K., Moreau, Z., Meyer, S., Ploutz-snyder, R., … Weinstock, R. S. (2009). School-Centered Telemedicine for Children with Type 1 Diabetes Mellitus. *The Journal of Pediatrics, 155*(3), 374–379. doi:10.1016/j.jpeds.2009.03.014

Jaacks, L. M., Bell, R. A., Dabelea, D., D'Agostino Jr., R. B., Dolan, L. M., Imperatore, G., … for the SEARCH for Diabetes in Youth Study Group. (2014). Diabetes self-management education patterns in a US population-based cohort of youth with type 1 diabetes. *Diabetes Educator 40*(1), 29–39. doi:10.1177/0145721713512156.Diabetes

Jackson, C. C., & Albanese-O'Neill, A. (2016). Supporting the Student's Graduated Independence in Diabetes Care. *NASN School Nurse, 31*(4), 202–204.

Jackson, C. C., Albanese-O'Neill, A., Butler, K. L., Chiang, J. L., Deeb, L. C., Hathaway, K., … Siminerio, L. M. (2015). Diabetes Care in the School Setting: A Position Statement of the American Diabetes Association. *Diabetes Care*, *38*(10), 1958–1963. https://doi.org/10.2337/dc15-1418

Jaser, S.S., Faulkner, M.S., Whittemore, R., Jeon, S., Delamater, A., & Grey, M. (2012). Coping, self-management, and adaptation in adolescents with type 1 diabetes. *Annals of Behavioral Medicine, 43*(3), 311-319.

Kawamura, T. (2007). The importance of carbohydrate counting in the treatment of children with diabetes. *Pediatric Diabetes, 8*(Suppl. 6), 57–62.

Kelo, M., Martikainen, M., & Eriksson, E. (2011). Self-care of school-age children with diabetes: an integrative review. Journal of Advanced Nursing, 67(10), 2096–108. doi:10.1111/j.1365-2648.2011.05682.x

Kliegman, R., Stanton, B., Schor, N., St. Geme III, J., & Behrman, R. (2011). *Nelson textbook of pediatrics* (19th ed.). Elsevier Health Sciences.

Knowles, J., Waller, H., Eiser, C., Heller, S., Roberts, J., Lewis, M., … Price, K. (2006). The development of an innovative education curriculum for 11-16 yr old children with type 1 diabetes mellitus (T1DM). *Pediatric Diabetes, 7*(6), 322–8. doi:10.1111/j.1399-5448.2006.00210.x

Kruger, B. J., Toker, K. H., Radjenovic, D., Comeaux, J. M., & Macha, K. (2009). School nursing for children with special needs: Does number of schools make a difference? *Journal of School Health*, *79*(8), 337–346.

Lange, K., Klotmann, S., Saßmann, H., Aschemeier, B., Wintergerst, E., Gerhardsson, P., … the SWEET group. (2012). A pediatric diabetes toolbox for creating centres of reference: A pediatric toolbox for COR. *Pediatric Diabetes, 13,* 49–61. https://doi.org/10.1111/j.1399-5448.2012.00913.x

Lange, K., Sassmann, H., von Schutz, W., Kordonouri, O., & Danne, T. (2007). Prerequisites for age-appropriate education in type 1 diabetes : a model programme for paediatric diabetes education in Germany. *Pediatric Diabetes, 8*(suppl 6), 63–71.

Lange, K., Swift, P., Pańkowska, E., & Danne, T. (2014). Diabetes education in children and adolescents. *Pediatric Diabetes, 15*(Suppl 2), 77–85. doi:10.1111/pedi.12187

Lewis, D. W., Powers, P. A, Goodenough, M. F., & Poth, M. A. (2003). Inadequacy of in-school support for diabetic children. *Diabetes Technology & Therapeutics, 5*(1), 45–56. doi:10.1089/152091503763816463

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Newbury Park, CA: Sage.

Lorig, K. R., & Holman, H. (2003). Self-management education: history, definition, outcomes, and mechanisms. *Annals of Behavioral Medicine : A Publication of the Society of Behavioral Medicine, 26*(1), 1–7.

Lotstein, D. S., Seid, M., Klingensmith, G., Case, D., Lawrence, J. M., Pihoker, C., … Waitzfelder, B. (2013). Transition from pediatric to adult care for youth diagnosed with type 1 diabetes in adolescence. *Pediatrics, 131*(4), e1062–70. doi:10.1542/peds.2012-1450

Mangena, A. S., & Maughan, E. (2015). The 2015 NASN school nurse survey: Developing and providing leadership to advance school nursing practice. *NASN School Nurse, 30*(6), 328-335.

Marks, A., Wilson, V., & Crisp, J. (2013). The management of type 1 diabetes in primary school: review of the literature. *Issues in Comprehensive Pediatric Nursing, 36*(1-2), 98–119. doi:10.3109/01460862.2013.782079

Marshall, M., Carter, B., Rose, K., & Brotherton, A. (2009). Living with type 1 diabetes: perceptions of children and their parents. *Journal of Clinical Nursing, 18,* 1703-1710.

Marshall, M., Gidman, W., & Callery, P. (2013). Research: Care Delivery Supporting the care of children with diabetes in school : a qualitative study of nurses in the UK. *Diabetic Medicine, 30*(7), 871–877. https://doi.org/10.1111/dme.12154

Martin, D., Lange, K., Sima, A., Kownatka, D., Skovlund, S., Danne, T., & Robert, J. J. (2012). Recommendations for age-appropriate education of children and adolescents with diabetes and their parents in the European Union. *Pediatric Diabetes, 13*(Suppl 1), 20–8. doi:10.1111/j.1399-5448.2012.00909.x

Mastrogiannis, D. Deltsidou A., Poulaka, M., Noula, M., Voltyraki, E. G., Fouka, G.,… Mantzorou, M. (2013). Exploring educationalists ’ views on the need for school nurses in secondary schools in Greece. *British Journal of School Nursing, 8*(6), 303–308.

Maughan, E., & Adams, R. (2011). Educators' and parents' perception of what school nurses do. *The Journal of School Nursing*, *27*(5), 355–363. doi:10.1177/1059840511416368

Maughan, E. D., Bobo, N., Butler, S., & Schantz, S. (2016). Framework for 21st Century School Nursing Practice. *NASN School Nurse*. Retrieved from https://schoolnursenet.nasn.org/blogs/nasn-profile/2017/03/13/diabetes-management-in-the-school-setting

Maughan, E., & Mangena, A. S. (2014). The 2013 NASN school nurse survey: Advancing school nursing practice. *NASN School Nurse*, *29*(2), 76–83.

Meleis, A. I. (2010). *Transitions Theory: Middle Range and Situation Specific Theories in Research and Practice.* New York, NY: Springer Publishing Company.

Meleis, A. I. (2012). *Theoretical nursing: Development & progress* (5th ed.). Philadelphia, PA: Wolters Kluwer Health | Lippincott Williams & Wilkins.

Meleis, A I., Sawyer, L. M., Im, E. O., Hilfinger Messias, D. K., & Schumacher, K. (2000). Experiencing transitions: an emerging middle-range theory. *ANS. Advances in Nursing Science*, *23*(1), 12–28. doi:10.1046/j.1440-1800.1999.00015.x

Meleis, A. I., & Trangenstein, P. A. (1994). Facilitating transitions: redefinition of the nursing mission. *Nursing Outlook*, *42*, 255–259. doi:10.1016/0029-6554(94)90045-0

Modi, A. C., Pai, A. L., Hommel, K. A., Hood, K. K., Cortina, S., Hilliard, M. E., … Drotar, D. (2012). Pediatric Self-management: A Framework for Research, Practice, and Policy. *Pediatrics*, *129*(2), e473–e485. doi:10.1542/peds.2011-1635

Nabors, L., Lehmkuhl, H., Christos, N., & Andreone, T. L. (2003). Children with diabetes: perceptions of supports for self-management at school. *The Journal of School Health, 73*(6), 216-221

Nabors, L., Troillett, A., Nash, T., & Masiulis, B. (2005). School nurse perceptions of barriers and supports for children with diabetes. *Journal of School Health, 75*(4), 119–124. doi:10.1111/j.1746-1561.2005.00008.x

Nakhla, M., Daneman, D., To, T., Paradis, G., & Guttmann, A. (2009). Transition to adult care for youths with diabetes mellitus: findings from a Universal Health Care System. *Pediatrics, 124*(6), e1134–e1141. doi:10.1542/peds.2009-0041

The National Alliance to Advance Adolescent Health. (2014–2017). What is health care transition? Retrieved from http://www.gottransition.org/providers/index.cfm.

National Association of State Boards of Education (2013, December 28). *Requirements for school nurses.* Retrieved from http://www.nasbe.org/healthy_schools/hs/bytopics.php?topicid=2130

National Association of School Nurses (2011). Role of the school nurse: Position statement. Retrieved from http://www.nasn.org/PolicyAdvocacy/PositionPapersandReports/NASNPositionStatementsFullView/tabid/462/ArticleId/87/Role-of-the-School-Nurse-Revised-2011

National Association of School Nurses. (2016). The role of the 21st century school nurse (Position Statement). Retrieved from https://schoolnursenet.nasn.org/blogs/nasn-profile/2017/03/13/the-role-of-the-21st-century-school-nurse

National Association of School Nurses (2017). Chronic health conditions (Students with): The role of the school nurse.
Retrieved from https://schoolnursenet.nasn.org/blogs/nasn-profile/2017/07/28/chronic-health-conditions-students-with-the-role-of-the-school-nurse

National Association of School Nurses. (2017). Diabetes management in the school setting: Position statement. Retrieved from https://schoolnursenet.nasn.org/blogs/nasn-profile/2017/03/13/diabetes-management-in-the-school-setting

National Association of School Nurses (2014). Transition planning for students with chronic health conditions. Retrieved from http://www.nasn.org/PolicyAdvocacy/PositionPapersandReports/NASNPositionStatementsFullView/tabid/462/ArticleId/644/Transition-Planning-for-Students-with-Chronic-Health-Conditions-Adopted-January-2014

National Association of School Nurses (2015). Transition Planning for Students with Chronic Health Conditions. *NASN School Nurse, 30*(2), 125-127.

National Association of School Nurses Board of Director. *(February, 2017). About. Retrieved from* https://www.nasn.org/nasn/about-nasn/about

National Diabetes Education Program (2010). Helping the student with diabetes succeed: A guide for school personnel (NIH Publication No. 03-5217, pp. 1-4). Washington, DC: U.S. Department of Health and Human Services.

National Diabetes Education Program (March, 2014). *Pediatric to adult diabetes care: transition planning checklist.* Retrieved from https://www.niddk.nih.gov/health-information/health-communication-programs/ndep/living-with-diabetes/youth-teens/transition-adult-health-care/planning-checklist/Pages/planningchecklist.aspx.

Nguyen, T.M., Mason, K.J., Sanders, C.G., Yazdani, P., & Heptulla, R.A. (2008). Targeting blood glucose management in school improves glycemic control in children with poorly controlled type 1 diabetes mellitus. *The Journal of Pediatrics, 153*(4), 575–578.

Nurrenbern, S. C. (2001). Piaget's theory of intellectual development revisited. *Journal of Chemical Education, 78*(8), 1107–1110.

Patrick, K., Mendonca, L. L., Maughan, E. D., Wolfe, L. C., Bergren, M. D., Johnson, K. H., … Cole, M. (2014). National Standardized Data Set for School Health Services: Step Up and Be Counted! *NASN School Nurse*, *29*(5), 236–240. http://doi.org/10.1177/1942602X14544448

Pettitt, D. J., Talton, J., Dabelea, D., Divers, J., Imperatore, G., Lawrence, J. M., … others. (2014). Prevalence of diabetes in US youth in 2009: the SEARCH for diabetes in youth study. *Diabetes Care*, *37*(2), 402–408.

Polfuss, M., Babler, E., Bush, L. L., & Sawin, K. (2015). Family Perspectives of Components of a Diabetes Transition Program. *Journal of Pediatric Nursing*, *30*(5), 748–756. doi:10.1016/j.pedn.2015.05.010

Ramos, M. M., Fullerton, L., Sapien, R., Greenberg, C., & Bauer-Creegan, J. (2014). Rural-urban disparities in school nursing: Implications for continuing education and rural school health. *Journal of Rural Health*, *30*, 265–274. doi:10.1111/jrh.12058

Robert, J, & Martin, D (2010). Recommendations on age- appropriate education for children and adolescents with diabetes in the EU. Retrieved from http://www.sweet-project.eu/relaunch/images/WP/WP3final.pdf

Schilling, L.S., Grey, M., and Knafl, K.A. (2002). The concept of self-management of type 1 diabetes in children and adolescents: an evolutionary concept analysis. *Journal of Advanced Nursing, 37*(1), 87-99.

Schilling, L. S., Knafl, K. A, & Grey, M. (2006). Changing patterns of self-management in youth with type I diabetes. *Journal of Pediatric Nursing, 21*(6), 412–24. doi:10.1016/j.pedn.2006.01.034

Schumacher, K. L., & Meleis, A. I. (1994). Transitions: A central concept in nursing. *Journal of Nursing Scholarship*. doi:10.1111/j.1547-5069.1994.tb00929.x

Scott, L. K. (2013). Developmental mastery of diabetes-related tasks in children. *The Nursing Clinics of North America. 48*(2), 329-342. doi:10.1016/j.cnur.2013.01.015

Selekman, J. (Ed.). (2013). *School nursing: A comprehensive text.* Philadelphia, PA: F. A. Davis.

Silverstein, J., Klingensmith, G., Copeland, K., Plotnick, L., Kaufman, F., Laffel, L., … Clark, N. (2005). Care of children and adolescents with type 1 diabetes: a statement of the American Diabetes Association. *Diabetes Care*, *28*(1), 186–212.

Siminerio, L. M. (2015). Diabetes Education and Support: A Must for Students With Diabetes. *NASN School Nurse*, *30*(6), 320–321.

Siminerio, L. M., Funnell, M. M., Peyrot, M., & Rubin, R. R. (2007). US Nurses' Perceptions of Their Role in Diabetes Care. *The Diabetes Educator*, *33*(1), 152–162. https://doi.org/10.1177/0145721706298194

Skyler, J. S. (2013). Primary and secondary prevention of Type 1 diabetes. *Diabetic Medicine, 30*, 161–169. doi:10.1111/dme.12100

Sonneveld, H. M., Strating, M. M. H., van Staa, A. L., & Nieboer, A. P. (2013). Gaps in transitional care: what are the perceptions of adolescents, parents and providers?: Transitional care - perceptions of adolescents, parents and providers. *Child: Care, Health and Development*, *39*(1), 69–80. https://doi.org/10.1111/j.1365-2214.2011.01354.x

Sperling, M. (2014). *Pediatric endocrinology* (14th ed.). Philadelphia, PA: Elsevier/Saunders.

Students with Diabetes in Colorado Schools Collaborative (October, 2006). Developmental stages and diabetes management. Retrieved from http://www.coloradokidswithdiabetes.org/wp-content/uploads/2013/07/728-Developmental-Stages-and-Diabetes.pdf

The Diabetes Control and Complications Trial Research Group. (1993). The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *New England Journal of Medicine, 329*(14), 997-986.

Tolbert, R. (2009). Managing type 1 diabetes at school: an integrative review. *The Journal of School Nursing, 25*(1), 55-61.

Van Staa, A. L., Jedeloo, S., van Meeteren, J., & Latour, J. M. (2011). Crossing the transition chasm: experiences and recommendations for improving transitional care of young adults, parents and providers. *Child: Care, Health and Development, 37*(6), 821–32. doi:10.1111/j.1365-2214.2011.01261.x

Wang, Y.-L., & Volker, D. L. (2012). Caring for students with type 1 diabetes: School nurses' experiences. *The Journal of School Nursing, 29*(1), 31–38. doi:10.1177/1059840512447123

West, E. & Holmes, J. (2014). The role of the school nurse in the management of diabetes: Assessing a position statement. *British Journal of School Nursing, 9*(1), 30–34.

Whittemore, R., Jaser, S., Guo, J., & Grey, M. (2010). A conceptual model of childhood adaptation to type 1 diabetes. *Nursing Outlook, 58*(5), 242–51.

Williamson, P., Shute, R., King, M., & Lehmann, J. (1996). Measuring diabetes-related attitudes: the use of a USA-developed instrument with Australian nurses. *Patient Education and Counseling*, *29*(1), 41–47.

Wilt, R. (2015). *The relationships among school nurse to student ratios, self-efficacy for type 1 diabetes management, and glycemic control in adolescents.* Retrieved from ProQuest Digital Dissertations. (AAT 3689135).

Wong, D. L., Hockenberry, M. J., & Wilson, D. (2007). *Wong's nursing care of infants and children.* St. Louis, MO: Mosby/Elsevier.

APPENDIX A

Recruitment Flyer

SCHOOL NURSES!!! Let's gather our voices for our children.

Are you a school nurse who takes care of children with type 1 diabetes?

http://kidshealth.org/kid/diabetes_basics/living-diabetes/school_diabetes.html

You are invited to participate in a research study through the University of Washington School of Nursing and the XXXXXXXXXXXXXX.

Purpose: to gain a broad understanding of school nurses' roles in diabetes education and management for children with T1D in school settings.

Eligibility: school nurses who have provided diabetes care to children with type 1 diabetes in the Seattle Public School District.

Study Requirements: to participate, you will be asked to complete a survey which will take approximately 20-25 minutes via online or mailed paper survey. Those who participate in the survey may be contacted for one follow-up interview, approximately 30-45 minutes, via phone or in-person.

As a thank-you for their time, participants will receive a **$20** gift card for the survey, and a **$30** gift care for the interview.

For more information please contact xxx@uw.edu*
(*Confidentiality of information sent by e-mail cannot be guaranteed)

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APPENDIX B

Information Statement

UNIVERSITY OF WASHINGTON
INFORMATION STATEMENT
School Nurses' Roles in Diabetes Education and Management for Children with Type 1 Diabetes in School Settings

Researchers:	**Faculty Sponsor:**
Mee Kyung Lee, PhD (c), RN	Elaine Walsh, PhD, RN, PMHCNS-BC
Doctoral Candidate	Associate Professor
School of Nursing	School of Nursing
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*Confidentiality of information sent by e-mail cannot be guaranteed

Researchers' statement

We are asking you to be in a research study. The purpose of this information statement is to give you the information you will need to help you decide whether to be in the study. Please read the form carefully. You may ask questions about the purpose of the research, what we would ask you to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions, you can decide if you want to be in the study. This process is called "informed consent." We will give you a copy of this form for your records.

PURPOSE OF THE STUDY

The purpose of this study is to gain a broad understanding of school nurses' roles in diabetes education and management for children with Type 1 Diabetes in school settings. First, you will be asked to complete online surveys with a total of 112 items. Later, you may be asked to participate in one 30-45 minute in-person or phone interview, as one of 20 potential interviewees. We are interested in learning about relationships between school nurses' attitudes, self-efficacy, and transitional care in diabetes education and management, and exploring school nurses' opinions about possible educational formats and transitional care in current practice.

STUDY PROCEDURES

I am asking school nurses to participate in online surveys and then 20 of the school nurses who participated in the survey will be asked to participate in interviews.

The surveys consist of questions that address demographics, school nurses' roles in diabetes care management for children with T1D, self-efficacy in diabetes care and education, attitudes towards diabetes care, and diabetes education and transitional care along with insulin pumps operation and Glucagon administration. Examples of survey items are rating what the levels of diabetes care practice implementation are in school settings, what the attitudes about diabetes care are, what the levels of diabetes care of education are, and what the current practice of diabetes education and transitional care are. All surveys will be online and individuals who agree to participate in the study will receive a link to access the surveys. However, if you prefer paper and pencil surveys, we will provide a paper version of the survey with a stamped envelope for your convenience. All surveys will take approximately 20-25 minutes to complete. You are free to skip any question(s) you do not want to answer. After the completion of the surveys, we may contact you via email as a potential interview participant. It means that you are randomly

selected based on the data analysis results. Interview questions are about current job description, school nurses' roles, diabetes education, transitional care, and developmental consideration. The interview will take approximately 30-45 minutes to complete. We will make audio recordings of the interview. At the beginning of the interview, your permission will be asked for audio recording of the interview.

RISKS, STRESS, OR DISCOMFORT

It is possible that you will experience stress or discomfort related to the topic of diabetes management and diabetes education in your practice. You may also experience stress providing real-time responses during an interview. Support resources for managing stress or discomfort will be provided if needed, and you may also contact the researcher or her faculty sponsor with any questions or concerns.

We will make audio recordings of the interview, and you will be given an opportunity to review the notes and the transcripts of the interview and delete any portions.

BENEFITS OF THE STUDY

There are no direct benefits to you for participating in this study. However, participation in this study may increase your knowledge and recognition of current practice for caring for children with T1D. Information provided may benefit school nurses' future practice by contributing to information about ways that school nurses manage T1D care.

SOURCE OF FUNDING

The researcher is receiving partial financial support from the Hester McLaws Nursing Dissertation Scholarship Fund at the University of Washington School of Nursing.

CONFIDENTIALITY OF RESEARCH INFORMATION

In order to link survey responses, you will be assigned a confidential code number. The list of participant names and code numbers will be kept in secure computer storage, and names and survey responses will never be kept together. The same code will also be used to link to the interview participant who participated in the surveys. The link between participants' identities and code numbers will be destroyed no later than December 2017. De-identified survey data and responses to the interview questions will be kept indefinitely and handled confidentially.

Participation in the study is confidential, and supervisors or other school personnel will not be informed about who did or did not participate in the surveys and the interviews. All surveys and interviews will be completed individually, so other school nurses will not know about who did or did not participate.

All of the information you provide will be confidential. However, if I am concerned about your safety or the safety of someone else, I will work with you to provide support and assistance. Mandatory reporting laws will be followed when appropriate.

Government or university staff members sometimes review studies such as this one to make sure they are being conducted safely and legally. If a review of this study takes place, your records may be examined. However, the reviewers will protect your privacy. The study records will not be used to put you at legal risk of harm.

OTHER INFORMATION

You may refuse to participate and you are free to withdraw from this study at any time without penalty or loss of benefits to which you are otherwise entitled. I want to thank participants for helping me explore school nurses' roles in diabetes care and education. In appreciation of your time, for completing the surveys, you will receive a $20 gift card. For those who participate in an interview, an additional $30 gift card will be provided.

Subject's statement

This study has been explained to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions later about the research, or if I have been harmed by participating in this study, I can contact the researcher listed on the first page of this consent form. If I have questions about my rights as a research subject, I can call the Human Subjects Division at (206) 543-0098. I will receive an electronic copy of this form.

APPENDIX C

Resources for Managing Potential Risks

Contact Information

Researcher:

Mee Kyung Lee, PhD (c), RN

xxxx@uw.edu

(xxx) xxxx-xxxx

Faculty Sponsor:

Elaine Walsh, PhD, RN, PMHCNS-BC

xxxxxxx@uw.edu

(xxx) xxx-xxxx

King County Crisis Clinic:

24-Hours Crisis Line: (866) 427-4747

WA Recovery Help Line: (866) 789-1511

King County 2-1-1: 2-1-1

(206) 461-3200

(800) 621-4636 (M-F 8am – 6pm)

APPENDIX D

Demographic Questions

1. What is your gender? Please specify.

2. What is your age?
   1) 18-24 years old
   2) 25-34 years old
   3) 35-44 years old
   4) 45-54 years old
   5) 55-64 years old
   6) 65-74 years old
   7) 75 years or older

3. What is your ethnicity?
   1) Hispanic or Latino
   2) Non-Hispanic or Latino

4. What is your race?
   1) White
   2) Black or African American
   3) Asian
   4) American Indian or Alaska Native
   5) Native Hawaiian or Other Pacific Islander
   6) Other

5. What is your highest nursing degree?
   1) Bachelor's
   2) Master's
   3) Doctor of Nursing Practice
   4) Doctor of Philosophy in Nursing
   5) Other (Please specify your degree)

6. What is your highest nursing credential?
   1) Registered Nurse
   2) Nurse Practitioner
   3) Other

   If you indicate other credential, please specify the title of your highest credential.

7. How long have you worked as a school nurse?
    1) Less than 1 year
    2) 1-5 years
    3) 6-10 years
    4) 11-15 years
    5) 16-20 years
    6) 21-25 years
    7) 26 years or longer

8. Are you working as a full-time school nurse?
    1) Yes
    2) No

9. How many schools are you currently covering per week?
    1) 1 school
    2) 2 schools
    3) 3 schools
    4) 4 schools
    5) 5 schools
    6) 6 schools or more

10. What is the size of the school or schools you are working in? Please select each school size that applies, if you cover multiple schools.
    1) 1-99 students /school
    2) 100-199 students /school
    3) 200-299 students /school
    4) 300-399 students /school
    5) 400-499 students /school
    6) 500-599 students /school
    7) 600-699 students /school
    8) 700-799 students /school
    9) 800-899 students /school
    10) 900-999 students /school
    11) 1000-1099 students /school
    12) 1100-1199 students /school
    13) 1200-1299 students /school
    14) 1300-1399 students /school
    15) 1400-1499 students /school
    16) 1500-1599 students /school
    17) 1600-1699 students /school
    18) 1700-1799 students /school
    19) More than 1800 students/school

APPENDIX E

School Nurse Role in Care and Management of the Child with Diabetes in the School Setting
West, E. & Homes, J.,2014

1. Please indicate below your work setting (Circle all that apply).
   A) Public School
   B) Private School
   C) Elementary School
   D) Middle School
   E) High School
   F) College/University

2. Please indicate your highest level of education.

   _____

3. Please indicate if you have an advanced degree or national certification.

   _____

4. I am currently employed:

   A) Full time
   B) Part time
   C) Unemployed
   D) Retired

5. I am employed:

   _____ (Please, indicate what state in the US, US territories or Country where you work)

6. My current job responsibilities include providing assistance and care to the student with diabetes.
   A) Yes
   B) No **(If no, please do not proceed)**

IF NO, YOU NEED NOT COMPLETE THE REST OF THE SURVEY, THANK YOU FOR YOUR TIME.

7. Students who lack diabetes management experience or cognitive and developmental skills have assistance with their diabetes management during the school day from a licensed registered nurse.
   A) Do Not Agree
   B) Slightly Agree
   C) Somewhat Agree
   D) Moderately Agree
   E) Strongly Agree

8. How many diabetic students do you care for?
   A) Less than 3
   B) 3 – 5
   C) 6 – 8
   D) More than 8

9. Most of the students with diabetes have access to blood glucose monitoring equipment.
   A) Do Not Agree
   B) Slightly Agree
   C) Somewhat Agree
   D) Moderately Agree
   E) Strongly Agree

10. Most of the students with diabetes have access to oral or injectable medication.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

11. Most of the students with diabetes have access to nutritional supplements such as snacks (or a fast-acting source of glucose).
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

12. Most of the students with diabetes are competent regarding equipment used in his/her diabetes management (ex. syringes, insulin pen, insulin pump).
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

13. Most of the students with diabetes have access to a documentation system for his/her blood glucose readings.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

14. Most of the students with diabetes have access to a documentation system for his/her insulin coverage.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

15. Most of the students with diabetes have access to a bathroom.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

16. For the majority of the students in your school(s) who are independently managing their diabetes, there is a protocol in place to document their ability to perform the self-management tasks independently.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

17. Most of the school personnel who surround the student with diabetes during the school day and for extracurricular activities are knowledgeable about that student's diabetes.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

18. Most of the school personnel who surround the student with diabetes during the school day and for extracurricular activities are knowledgeable about the student's Emergency Care Plan (ECP).
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

19. Most of the school personnel who surround the student with diabetes during the school day and for extracurricular activities are willing to learn and assist the student with his/her plan.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

20. Most of the students are in a safe environment with regard to the management of potential hypo or hyperglycemic episodes.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

21. If diabetes care is delegated to unlicensed staff, the school nurse is accessible (within 5 minutes via phone) to provide direction.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

22. Most of the students with type II diabetes who are overweight have a plan of care that addresses weight reduction.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

23. I feel adequately prepared to meet the needs of my students with diabetes.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

24. Have you participated in the NASN **H.A.N.D.S.SM** Diabetes education for nurses?
    A) Yes
    B) No

25. My school(s) has in place one or more of the following for our students with diabetes: an Individualized Health Plan IHP], a 504 Plan, an Emergency Care Plan [ECP] or an Individual Education Plan [IEP])
    A) Yes
    B) No (If NO, skip questions 26 – 37)

IF NO, PLEASE SKIP QUESTONS 26 - 37, THANK YOU FOR YOUR TIME.

26. All of the plans consider the knowledge base of the student.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

27. All of the plans consider the developmental level of the student.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

28. All of the plans consider the individual needs of the student.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

29. All of the plans describe the nursing interventions and school accommodations that the student needs during the school day.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

30. An RN is responsible for coordinating the implementation of the plan.
    A) Yes
    B) No

31. A School Administrator is responsible for coordinating the implementation of the plan.
    A) Yes
    B) No

32. The school nurse coordinated and implemented a plan of care for the student with diabetes that integrates management strategies preferred by the student and family.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

33. The plan of care coordinated with the student and family is a plan that the school nurse feels will adequately mange the student's diabetes.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

34. Most of the students with diabetes in your care have blood glucose levels as close to the desired range as possible for optimal learning and testing of academic skills.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

35. Most of the plans determine the nursing interventions and school accommodations needed for all school activities (ex. physical education, band, athletics) based on the developmental, cognitive, and physical status of the student.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

36. Most of the plans identify and coordinate the interventions for school activities (ex. physical education, band, athletics).
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

37. Most students with diabetes have a plan that assists the student in determining realistic and achievable personal goals for attaining self-care and independence in the management of her/his diabetes.
    A) Do Not Agree
    B) Slightly Agree
    C) Somewhat Agree
    D) Moderately Agree
    E) Strongly Agree

Supplemental Questions of School Nurse Role in Care and Management of the Child with Diabetes in the School Setting

8-1. Do you have an additional staff to help you, if your caseload is more than 4 T1D students?

1) Yes
2) No

8-2. What are the credentials of your additional staff?

1) Nursing assistant
2) Licensed practical nurse
3) Associate degree in nursing
4) Other

If you indicate other credential, please specify the title of the credentials.

12-1. How much nursing time do you spend with children who are competent in managing the equipment?

A) less than 5 min
B) 5-10min / visit
C) 10-15min/visit
D) 15-20min/visit
E) over 20 min/visit

12-2. Most of the students with diabetes are cognitively competent in math to calculate correct insulin doses?

A) Do Not Agree
B) Slightly Agree
C) Somewhat Agree
D) Moderately Agree
E) Strongly Agree

12-3. Most of the students with diabetes are cognitively competent in knowledge of the factors affecting determination of correct doses?

A) Do Not Agree
B) Slightly Agree
C) Somewhat Agree
D) Moderately Agree
E) Strongly Agree

17-1. Most school personnel receive diabetes care training by the school nurse.

A) Do Not Agree
B) Slightly Agree
C) Somewhat Agree
D) Moderately Agree
E) Strongly Agree

23-1. What would help you feel more prepared to meet the needs of students with diabetes? Please select all applicable choices.

A) Continuing Education (in-person)
B) Continuing Education (online)
C) On-site information resources
D) On-line information resources
E) Diabetes clinical specialist (on call)
F) Others
If you indicate others, please specify your opinion.

APPENDIX F

Diabetes Attitude Survey
Diabetes Research and Training Center © University of Michigan, 1998

Below are some statements about diabetes. Each numbered statement finishes the sentence "In general, I believe that..." You may believe that a statement is true for one person but not for another person or may be true one time but not be true another time. Mark the answer that you believe is true most of the time or is true for most people. Place a check mark in the box below the word or phrase that is closest to your opinion about each statement. It is important that you answer every statement.

Note: The term "health care professionals" in this survey refers to doctors, nurses, and dietitians.

In general, I believe that:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1. ...health care professionals who treat people with diabetes should be trained to communicate well with their patients.	☐	☐	☐	☐	☐
2. ...people who do not need to take insulin to treat their diabetes have a pretty mild disease.	☐	☐	☐	☐	☐
3. ...there is not much use in trying to have good blood sugar control because the complications of diabetes will happen anyway.	☐	☐	☐	☐	☐
4. ...diabetes affects almost every part of a diabetic person's life.	☐	☐	☐	☐	☐
5. ...the important decisions regarding daily diabetes care should be made by the person with diabetes.	☐	☐	☐	☐	☐
6. ...health care professionals should be taught how daily diabetes care affects patients' lives.	☐	☐	☐	☐	☐

In general, I believe that:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly**
7. ...older people with Type 2* diabetes do not usually get complications.	☐	☐	☐	☐	☐
8. ...keeping the blood sugar close to normal can help to prevent the complications of diabetes.	☐	☐	☐	☐	☐
9. ...health care professionals should help patients make informed choices about their care plans.	☐	☐	☐	☐	☐
10. ...it is important for the nurses and dietitians who teach people with diabetes to learn counseling skills.	☐	☐	☐	☐	☐
11. ...people whose diabetes is treated by just a diet do not have to worry about getting many long-term complications.	☐	☐	☐	☐	☐
12. ...almost everyone with diabetes should do whatever it takes to keep their blood sugar close to normal.	☐	☐	☐	☐	☐
13. ...the emotional effects of diabetes are pretty small.	☐	☐	☐	☐	☐

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
In general, I believe that:						
14.	...people with diabetes should have the final say in setting their blood glucose goals.	☐	☐	☐	☐	☐
15.	...blood sugar testing is not needed for people with Type 2* diabetes.	☐	☐	☐	☐	☐
16.	...low blood sugar reactions make tight control too risky for most people.	☐	☐	☐	☐	☐
17.	...health care professionals should learn how to set goals with patients, not just tell them what to do.	☐	☐	☐	☐	☐
18.	...diabetes is hard because you never get a break from it.	☐	☐	☐	☐	☐
19.	...the person with diabetes is the most important member of the diabetes care team.	☐	☐	☐	☐	☐
20.	...to do a good job, diabetes educators should learn a lot about being teachers	☐	☐	☐	☐	☐
21.	...Type 2* diabetes is a very serious disease.	☐	☐	☐	☐	☐
22.	...having diabetes changes a person’s outlook on life.	☐	☐	☐	☐	☐

In general, I believe that:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
23. ...people who have Type 2* diabetes will probably not get much payoff from tight control of their blood sugars.	☐	☐	☐	☐	☐
24. ...people with diabetes should learn a lot about the disease so that they can be in charge of their own diabetes care.	☐	☐	☐	☐	☐
25. ...Type 2* is as serious as Type 1† diabetes.	☐	☐	☐	☐	☐
26. ...tight control is too much work.	☐	☐	☐	☐	☐
27. ...what the patient does has more effect on the outcome of diabetes care than anything a health professional does.	☐	☐	☐	☐	☐
28. ...tight control of blood sugar makes sense only for people with Type 1† diabetes.	☐	☐	☐	☐	☐
29. ...it is frustrating for people with diabetes to take care of their disease.	☐	☐	☐	☐	☐
30. ...people with diabetes have a right to decide how hard they will work to control their blood sugar.	☐	☐	☐	☐	☐

In general, I believe that:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
31. ...people who take diabetes pills should be as concerned about their blood sugar as people who take insulin.	☐	☐	☐	☐	☐
32. ...people with diabetes have the right <u>not</u> to take good care of their diabetes.	☐	☐	☐	☐	☐
33. ...support from family and friends is important in dealing with diabetes.	☐	☐	☐	☐	☐

APPENDIX G

Self-Efficacy on Diabetes Education (SEDE)
Fisher, K. L., 2006

I feel confident providing diabetes education..

1. For individuals with type 1 diabetes.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

2. For individuals with type 2 diabetes.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

3. Without getting the feeling of anxiousness.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

4. Without it interfering in a daily school schedule.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

5. When I don't have access to meters.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

6. When I don't have access to resources.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

7. When teaching a group of students.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

8. When I have to do education in the office.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

9. When I have to teach one-on-one.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

10. When I have to instruct teachers on diabetes.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

11. When talking to parents regarding self-care plans for diabetic children.

1) Not at all confident
2) Slightly confident
3) Moderately confident
4) Very confident
5) Completely confident

APPENDIX H

Diabetes Education and Transitional Care Questions (DETC)

1. Have you provided any diabetes education for children with type 1 diabetes (T1D)?

    1) Yes
    2) No

2. What kinds of diabetes education have you provided for children with T1D? Please select all that apply.
    1) Physiological information of diabetes
    2) Medication
    3) Insulin delivery systems
    4) Nutrition (e.g. healthy eating, snacks, and food choices)
    5) Carbohydrate counting
    6) Exercise
    7) Emergency protocol
    8) Hypoglycemia management
    9) Hyperglycemia management
    10) Psychosocial management
    11) Developmental perspectives
    12) Others
        If you indicate “others”, please specify the contents you provided.

3. What are your first three educational priorities in school diabetes management for children with T1D? Please select three that apply.
    1) Physiological information of diabetes
    2) Medication
    3) Insulin delivery systems
    4) Nutrition (e.g. healthy eating, snacks, and food choices)
    5) Carbohydrate counting
    6) Exercise
    7) Emergency protocol
    8) Hypoglycemia management
    9) Hyperglycemia management
    10) Psychosocial management
    11) Developmental perspectives
    12) Other (Please specify)

4. Are you using any of these forms for diabetes education? Please select all that apply.
   1) Diabetes Self-Management Plan
   2) Individualized Health Plan
   3) 504 Form
   4) Others
      If you indicate “others”, please provide the name of the form you used in your practice.

5. What kinds of evaluation forms are you using whenever you provide diabetes education for children with T1D?
   1) Diabetes Self-Management Plan
   2) Individualized Health Plan
   3) Others
      If you indicate “others”, please provide the name of the form you used in your practice.

6. Have you communicated with a healthcare provider who is in charge of diabetes care for a child with T1D (e.g. getting further information or medical instructions)?
   1) Yes
   2) No

7. Have you provided transitional care (e.g. transferring schools, childhood to adolescence, and childhood care to adulthood care) for children with T1D as a part of diabetes education in school settings?
   1) Yes
   2) No

8. What kinds of transitional care have you provided for children with T1D? Please specify.

9. What should be included in transitional care in school settings for children with T1D?

APPENDIX I

Self-Efficacy Question for Insulin Pumps, Glucagon, and Carbohydrate Counting (SEQ-IGC)

1. I feel confident when I operate insulin pumps
   1) Not at all confident
   2) Slightly confident
   3) Moderately confident
   4) Very confident
   5) Completely confident

2. I feel confident when I use glucagon pens or injections for children in hypoglycemia
   1) Not at all confident
   2) Slightly confident
   3) Moderately confident
   4) Very confident
   5) Completely confident

3. I feel confident when I count carbohydrate amounts in food before insulin administration.
   1) Not at all confident
   2) Slightly confident
   3) Moderately confident
   4) Very confident
   5) Completely confident

APPENDIX J

Interview Questions

Intro

1. Before we get started, do you mind if I record this interview for my notes?
2. I am wondering if you have any questions for me before we get started.

Current Job description

3. Could you tell me a little bit about the role that you have, your job, and how you are related to the diabetes management for children with diabetes?

Current diabetes practice/Applicable diabetes educational formats in school

4. Who provides care for children with diabetes in schools?
5. How do you control diabetes and its related problems in children with diabetes?
   What kinds of behavioral observations and evidence do you use to initiate diabetes education for children with diabetes?
   OR What kinds of behavioral observations and evidence have you gathered that you can build upon diabetes education for children with diabetes?
   Do you use any other observations/other evidence to initiate education?
6. Have you set up an educational plan for children with diabetes? Who participated in developing the plan? How did it work for you and your student?
7. Are you using education plan involved in diabetes education/ how do you evaluate goal achievement?
   Are you using any specific tools for evaluation of diabetes education?
   What are the reasons for your selections of educational formats? What would be the best educational format in school settings?
   How did you evaluate goal achievement of diabetes management/education?

School nurses' roles

8. How do you see the school nurses' roles in diabetes education and diabetes management?
   Are there any differences between ARNPs and RNs when you work as a school nurse?
   What are the differences for RNs and ARNPs in diabetes education in school settings?
   What are the differences for RNs and ARNPs in diabetes management in school settings?

Diabetes education for nurses

9. Have you taken any educational programs, for example, the NASN H.A.N.D.S. continuing education, for providing diabetes education or diabetes care for children with diabetes?
   How does the education you took affect your diabetes education for children with diabetes?

Let them interpret transitional care prompted under 16, depending on the answer, can you describe transitional care (if they ask, provide the definition)

Transitional care

10. Have you provided any transitional care for children with diabetes?

11. What kind of transitional care do you provide for children with diabetes?
    What kind of transitional care do you suggest for children with diabetes?
12. What are your perceptions of transitional care for children with diabetes, as a school nurse?

Applied developmental perspectives

13. What kind of developmental considerations have you applied for children with diabetes? Could you give me the example of developmental considerations of developmental part?
14. Have you used any educational aids for diabetes education in terms of developmental stages of children with type 1 diabetes?

Barriers for diabetes education and management in schools

15. What are the barriers for providing diabetes education and management of children with diabetes in school?
16. How do you communicate with diabetes care providers of children with T1D? What tools are you using for the communication? Did you get information from the provider in a timely manner?
17. Have you worked with any mental health providers for children with T1D?

APPENDIX K

Supporting Students to Gain Autonomy in Diabetes Management Based on Continued Care in School Systems

Major theme 1: Care for moving toward independent diabetes management
1.1 Supporting students to be more independent in diabetes management
1.2 Managing diabetes independently based on types of schools where students transfer
Major theme 2: Care for changing management environments related to school/transferring from one school environment to another
2.1 Transition from a hospital to a school
2.2 Promotion from primary to intermediate to secondary education
2.3 Transition from home to school
2.4 Transferring from one kind of environment to another
Major theme 3: Communication for maintaining constant diabetes management in school settings
3.1 Communication between school nurses for students' diabetes management in current schools
3.2 Communication with parents for students' diabetes management in current and new schools
3.3 Communication with diabetic students for their disease management in current and new schools
3.4 Communicating and working with teachers or staff regarding students
3.5 Communication with mixed groups of people for students' management

APPENDIX L

Preparing upcoming changes for a diabetic student's transfer from one environment to another related to a school

Major theme 1: Communication with people involved in diabetes management in schools
1.1 Communication with healthcare professionals
1.2 Communication with students
1.3 Communication with parents
1.4 Communication with school staff
Major theme 2: Transfer of one kind or another
2.1 Transferring schools
2.2 Transferring grades
2.3 Transferring between developmental stages
2.4 Transition from one to another treatment/monitoring option
2.5 Transitioning from a hospital to a school
Major theme 3: Assisting students in attaining independent diabetes manage
3.1 Supporting students to be more independent in diabetes management based on their developmental status
3.2 Supervising students' management

APPENDIX M

Suggested Care Content for Transitional Care in School Settings

Major theme 1: Coordinating care for students with T1D in schools
1.1 Communication with people involved in students' diabetes care in schools
1.2 Facilitating a team meeting with nurses, students, parents, and/or school staff
Major theme 2: Transferring students' health related documents to the next school
2.1 Transferring health documents to other health care providers
Major theme 3: Promoting students' independent diabetes management
3.1 Supporting students in moving to independent diabetes management
3.2 Providing developmentally appropriate diabetes education

APPENDIX N

Immediately responding to a diabetes-relevant situation

Major theme 1: Immediate situation-driven diabetes education
1.1 When a diabetic student reports hypo/hyperglycemic symptoms
1.2 Getting reports from staff/teachers/family
Major theme 2: New information relevant to diabetes care for a student
2.1 When a diabetic student is newly diagnosed with diabetes
2.2 When a nurse is new to a diabetic student or vice versa
2.3 New information obtained by a nurse regarding diabetes management
Major theme 3: A diabetic student's expression of needs for support
3.1 When a diabetic student actively expresses their willingness to learn
3.2 When a diabetic student expresses their diabetes related frustration
Major theme 4: Students' incorrect performance of diabetes management
4.1 Lack of knowledge about diabetes management
4.2 Non-adherence to diabetes management routines
Major theme 5: Expected visits based on school schedule
5.1 Food choices or carb calculation before lunch, snacks, tests, or physical education classes
Major theme 6: A diabetic student's developmental status
6.1 Developmental status regarding diabetes management

APPENDIX O

Using a Proper Approach with Systemic Preparation

Major theme 1: Short, frequent, one-on-one education format during school hours
1.1 Constant teaching in a limited time while dealing with students' diabetes management
1.2 One-on-one educational sessions using necessary educational aids
1.3 Identifying students' management needs in based on observation and conversation with parents
1.4 Reinforcing students' management skills
Major theme 2: Diabetic student groups for social-emotional support and diabetes management
2.1 Groups of diabetic students for social support
2.2 Parent-student support groups for sharing information and support
2.3 Support students in living a normal life
Major theme 3: Systemic readiness for providing proper diabetes education
3.1 Standardized educational curriculum in conjunction with local hospitals where diabetic students receive care
3.2 Fulltime school nurses available in schools related to diabetes management

APPENDIX P

Permission from Authors of Measures

SNR

Date: April, 16, 2015

Hello Mee Kyung Lee,

You have my permission to use the tool. See attached.
Good luck with your research.
Sincerely,

Dr. Edie West, ACNS-BC, RN
Associate Professor of Nursing
Indiana University of Pennsylvania
Indiana, Pennsylvania

SEDE
Date: May 7, 2015

Hello Mee,

Yes, you have my permission to use the measurement tool. The items are in the article in a table and the scoring is described in the article as well.

I would love to read you finished study!

Best Regards,

Kelly L. Fisher, PhD, RN
Endicott College
Dean and Associate Professor
School of Nursing
376 Hale Street
Beverly, MA 01915
(978) 232-2328

DAS-3

Date: November, 23, 2015

Dear Dr. Lee,

Thank you for the inquiry. Please feel free to use our survey instrument. We just ask that you please cite our center as follows: the project described was supported by Grant Number P30DK092926 (MCDTR) from the National Institute of Diabetes and Digestive and Kidney Diseases.

Thank you,

Pam Campbell
Michigan Diabetes Research Center
Michigan Center for Diabetes Translational Research
University of Michigan Medical School
1000 Wall Street, RM# 6100
Brehm Tower
Ann Arbor, Michigan 48105
Tel: 734-763-5730
Fax: 734-647-2307

Remember to cite the Michigan Diabetes Research Center (MDRC) and/or the Michigan Center for Diabetes Translational Research (MCDTR) in publications:

"The project described was supported by Grant Number P30DK020572 (MDRC) from the National Institute of Diabetes and Digestive and Kidney Diseases" OR the project described was supported by Grant Number P30DK092926 (MCDTR) from the National Institute of Diabetes and Digestive and Kidney Diseases."