



Nurses Role in the Management of Diabetes Mellitus Type 1 in Children -
A Systematic Literature Review

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Degree Thesis in Health Care and Social Welfare

Education: Bachelor of Health Care, Nursing

Vaasa 2022

BACHELOR'S THESIS

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Degree Programme: Bachelor of Healthcare, Nursing

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Title: Nurses Role in the Management of Diabetes Mellitus Type 1 in Children: A Systematic Literature Review

Date: 24/11/2022 Number of pages: 1- 37 Appendices: 1

Abstract/Summary

Diabetes is a major health issues and one of the fastest growing global health condition and Type 1 Diabetes Mellitus (T1DM) accounts for over 90% of childhood and adolescent diabetes in most western countries (International Diabetes Federation, 2021). This is why the researcher set out to gain more knowledge and understanding about the role of nurses on self-care in the management of T1DM in children. Electronic databases MEDLINE; CINAHL; Library, Information Science & technology Abstract; and Academic Search Elite were searched for research articles between January 2010 - October 2022 and yielded 36,885 research articles. 20 research articles were shortlisted for this study out of which 7 were included for the study after review of the research articles. Content analysis of the included research articles revealed that the role of nurses has significant positive effect on the management of T1DM in children. In addition, nurses as educators and motivators were also effective in improving self-care in children with T1DM (Evcimen, Uncu, & Esen, 2021; Nobre, et al., 2019; Wilt, 2021). It further noted the positive impact of appropriate T1DM education to the child, family, parents and primary care givers (Emiliana, Agustini, Allenidekania, & Rustina , 2019; Nobre, et al., 2019; Wang & Volker, 2012; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013; Sparapani, Jacob, & Nascimento, 2015).

Language: English Key words: Nurses Role, Management of T1DM, Children, Content Analysis, Self-care, Self-Management,

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1 Introduction

This section introduces the systematic review of nursing role in the management of type 1 diabetes mellitus. It further explores the work of other researchers on the topic under study and the need for further research work.

The systemic review of literatures on the role of nurses in the management of type 1 diabetes mellitus goes back several decades ago. Researchers have analyzed the role and activities of nurses working with people with type 1 diabetes and examine the facilitators and barriers in caring for such people and educating them about diabetes. And have reveal three important roles of nurses including nurses as educators, nurses as advanced care givers and nurses as motivators which assure effective management of the type 1 diabetes (Nikitara, Constantinou, Andreou, & Diomidous, 2019; Olivera, et al., 2016).

Kongkaew et al. (2013) investigated influential targets most likely to improve adherence to diabetes treatment and glycemic control or depression and concluded that depression is moderately associated with non-adherence to treatment in diabetic children and adolescent. However, targeting behavior and social environment may provide cost effective health gains than targeting depression symptoms. In a similar study Wang et al. (2022) also evaluated the effect of different glucose monitoring methods on blood glucose control and the incidence of adverse effect among patients with T1DM. and revealed that continuous blood glucose monitoring (CGM) could significantly reduce HbA1c level of patients as compared with self-monitoring of blood glucose (SMBG) while the incidences of severe hyperglycemia in CBG were significantly decreased.

In another study, Rosnar & Roman-Urrestarazu (2019) investigated the association between Quality of Life (QoL) and T1DM treatment regimen including continuous subcutaneous insulin infusion (CSII) and multiple daily injection (MDI). Additionally, the study assessed differences in glycemic control and adverse event rates between groups. The results of this study showed significant differences in pediatric CSII and MDI users at follow-ups. Despite this the evidence further suggested no significant differences in adverse event incidence between groups over time, CSII proved to provide similar or slightly better outcome in all analyzed fields. In a related study, Coolen et al. (2021) also examined the relationship

between hypoglycemia and quality of life (QoL) and related outcomes among children and adolescents with T1DM through systematic review of literature and revealed that there are insufficient evidence on the relationship between hypoglycemia and domains of generic diabetic specific QoL for children and adolescents with T1DM. Additionally, there appears to be a correlation between severe hypoglycemia (SH) and greater worry about hypoglycemia.

In another systematic review research work, Marks et al. (2013) examined management of T1DM in the early primary school setting in terms of type, provision and location of treatment, the impact on the child and the role of the credentialed diabetic educator and identified majority of children as not receiving intensive diabetes treatment at school due to lack of appropriate school trained staff. It further stressed the need for diabetic educators to work in collaboration with children, parents, and school personnel to ensure diabetes care is fully integrated into the school day. In a similar study, Kennedy et al. (2013) reviewed evidence for a glycemic benefit of exercise in T1DM and showed a glycemic benefit of exercise in persons with T1DM.

In a separate study, Paoli & Rogers (2018) systematically evaluated insulin restriction and or omission as a disordered eating behavior in persons with T1DM or insulin dependent diabetes in order to develop verifiable maintenance approach of disordered eating through systematic review. The results demonstrated that disordered eating status could complicate insulin restriction and or omission. Diabetes specific circumstances including diagnosis, insulin management, insulin restriction, diabetes related complication could contribute to the maintenance of disordered eating cognition and behavior.

2 Background

This section looked at the background of the study including Diabetes Mellitus (DM), Type-1 Diabetes Mellitus (T1DM), causes and risk factors, signs and symptoms, diagnosis and treatment, complication, and nursing role.

In our present data driven world, nurses are expected to be capable of reflecting on, evaluating, and modifying their service delivery based on new knowledge. And nurses are also increasingly expected to generate such new knowledge themselves through nursing research (Polit & Beck, 2006). This has been a major motivation for many nursing researchers to investigate the effect of T1DM on various dependent variables (Olivera, et al., 2016; Nikitara, Constantinou, Andreou, & Diomidous, 2019; Kongkaew, Jampachaisri, Chaturonkul, & Scholfield, 2013; Wang, Zou, Na, Zeng, & Li, 2022; Rosnar & Roman-Urrestarazu, 2019; Coolen, et al., 2012; Zhao, Huang, & Zheng, 2021; Marks, Wilson, & Crisp, 2013; Kennedy , et al., 2013).

Now given the recognition that diabetes mellitus is a major cause of morbidity and mortality in Scotland and worldwide, with increasing prevalence (Scottish Intercollegiate Guidelines Network, 2017), it is safe to extrapolate same for the situation in Finland. Diabetes Mellitus has generally been considered as a chronic hyperglycemia that is associated with the body's inability to produce any or enough insulin or inability to use the insulin it produces. Diabetes is considered one of the fastest growing international health conditions in the 21st century with an estimated 537 million people having the disease. And this number is expected to reach 643 million people by 2030 (International Diabetes Federation, 2021). According to Reini (2013) diabetes affects about 10% of adult population in Finland. The International Diabetes Federation (IDF) Atlas 10th Edition estimates 6.7 million aged between 20-79 years to die from Diabetes related causes in 2021 while over 1.2 million children up to 19 years old have type 1 diabetes (T1DM). With the growing cost of managing health condition becoming a major concern for sustainable health expenditure, and the United States of America spending close to 17% of its income on healthcare while that of many European countries follow suit with 12.1% of GDP in Switzerland, 11.2% of GDP in Germany, and 11.1% of GDP in France (Colombier & Braendle, 2018), finding an effective and sustainable way of managing Type-1 Diabetes will go an long way to give citizens opportunity

for a better life and reduce their medical expenditure. This is why an evaluation of peer reviewed literatures on nursing roles in the management of T1DM will help improve the role of nurses in terms of education, health service delivery and motivation.

2.1 Diabetes

In 2021, the 10th Edition of International Diabetes Federation (IDF) affirms Diabetes as a major health issue and one of the fastest growing global health conditions. It is estimated that, about 537 million adults are living with the condition and the number is considered to rise to 643 million by 2030 (International Diabetes Federation, 2021). The question here is what is Diabetes? The group of heterogeneous disorders with common elements of high glucose level is considered diabetes (International Diabetes Federation, 2006). In 2019 the International Diabetes Federation (2019) went further to define “Diabetes as a serious long-term condition that occurs when the body cannot produce any or no insulin or cannot effectively use the insulin it produces” The International Diabetes Federation (2006) classified Diabetes into four categories: Type 1, Type 2, Gestational Diabetes Mellitus (GDM) and other specific types. It is evidently clear that, Diabetes as a chronic condition, affects millions of people in our present world. In the words of American Diabetes Association (2018), most patients with Diabetes presents Type 2 Diabetes, but an important minority also have Type 1 Diabetes.

2.2 Type 1 Diabetes Mellitus (T1DM)

According to Craig et al (2009), Type 1 Diabetes Mellitus (T1DM) accounts for over 90% of childhood and adolescent diabetes in most western countries. T1DM essentially develops when the body’s immune system attacks the insulin-producing beta cells of the pancreas causing the body to produce little or no insulin. Given the nature of T1DM, it is very prevalent in children but can also affect adults (International Diabetes Federation, 2019). In the works of American Diabetes Association (2018), T1DM is characterized by the situation where the immune system of a healthy individual attacks and destroys the insulin producing cells of the human body, β -cells located in the pancreas, disabling it from sensing rising glucose level in the blood and the corresponding releasing of appropriate insulin.

This results in the destruction of the body's insulin producing system leading to the rise of blood glucose.

People with T1DM requires regular insulin injections to maintain an appropriate blood glucose level without which they may not survive. This in essence requires regular blood glucose monitoring, education and support from qualified health professionals to assure healthy lives and prevent any possible complications associated with diabetes (International Diabetes Federation, 2021).

From the ongoing conversation it is evident that following such regular structured self-management plans is quite difficult for children and adolescent leading to serious disability and early death as a consequence of the building up of 'ketone' in the body (Diabetic Ketoacidosis, DKA) (International Diabetes Federation , 2019). This is why securing the support of effective nurses goes a long way to assure healthy happy lives.

2.3 Causes And Risk Factors

The etiology of T1DM is characterized by β -cells destruction usually leading to insulin deficiency, immune mediated condition where the body immune system attacks and destroys the β -cells and idiopathic etymology where the causes are unknown (Craig, Hattersley, & Donaghue, 2009). According to the American Diabetes Association (2018), the human glucose level before eating is between 70-100 mg/dl while after eating it goes above 140 mg/dl and the normal blood glucose should be 100 mg/dl. In the event that our glucose level falls too low, we may lose the ability to think and function properly while if it goes too high it could cause damage to the body over time.

T1DM is also generally a big risk factor for damaging the heart, kidney, blood vessels, eye, nerves and body leading to blindness, amputation, kidney problems and death (World Health Organization, 2016). Apart from the direct cost involving the prevention and treatment of diabetes with its complications for both people with diabetes and their families, there is also a huge economic burden on the healthcare system and the national economy (World Health Organization, 2016).

2.4 Signs and Symptoms

In a typical T1DM patient, signs and symptoms that can occur suddenly may include frequent urination (polyuria) or bedwetting, excessive thirst (polydipsia), lack of energy or fatigue, blurred vision, constant hunger, diabetic ketoacidosis and sudden weight loss (International Diabetes Federation, 2021).

In the opinion of Yale (2018) it is imperative to prevent hypoglycemia than to treat it after it occurs, therefore, diabetic people who are at high risk should be identified and educated on ways to prevent low blood glucose. Some signs and symptoms of hypoglycemia are weakness, dizziness, headache, drowsiness, difficulty in concentrating, difficulty speaking among others (Yale, 2018).

2.5 Diagnosis and Treatments

From the viewpoint of Wood and Peters (2018), people are diagnosed of being diabetic if their blood glucose level is ≥ 126 mg/dl where they are fasting, their blood glucose is ≥ 200 mg/dl and they have regular symptoms of diabetes and or their A1C results is $\geq 6.5\%$. Fasting here is considered failure to take in calories for ≥ 8 hours. In the case of oral glucose tolerance test where the blood glucose level is ≥ 200 mg/dl 2 hours after drinking water diagnoses of diabetes could be made.

Considering the fact that T1DM often presents signs and symptoms that prompt people to contact health service providers and improves the opportunity for diagnoses. Diabetes is determined by measuring the level of blood glucose in a blood sample taken while a suspected person is fasting or 2 hours after 75g of oral glucose have been taken. It can also be determine by measuring glycerated haemoglobin (HbA1C) even if the suspected person is not fasting (World Health Organization, 2016).

It is only natural for diagnoses to preceed treatment and the good news is that T1DM is treatable medical condition (Wood & Peters, 2018). Persons with T1DM will have to be placed on continuous, systematic and planned care provided by dedicated health care professionals in order to assure any possible improved outcome. Such intervention should include medication, health education, counselling and cossistent follow ups (World Health Organization, 2016). Here is

why understanding the role of nurses in the management of T1DM will go a long way to help nurses improve their systems and processes in management of Diabetes.

2.6 Nursing Role

Eriksson & Maclean (2019), seek to investigate how living with Type-1 diabetes mellitus may affect the patient's psychological health. The results of this research work showed that, living with T1DM affected the patient's psychosocial health, with women being more negatively impacted compared to men, emotions of guilt, control, fear and stress were associated with self-management of T1DM, especially during hypoglycemic episodes in public patients altered their behavior, diabetes distress related to their work are experienced by patients and we turn to see perceived stigmatization of the patients and T1DM. It also proved that, psychological support when living with T1DM is important as well as peer support within the community and psychosocial support from healthcare professionals.

In another study, Msekandiana et al. (2020) studied the complications and glycaemic control of Tyep 1 Diabetes Mellitus (T1DM) amongst children aged 5-19 years attending Diabetic Clinic at Kamuzu Central Hospital in Malawi. The results of the study found robust evidence of acute complications of T1DM amongst our patients and also observed that almost all patients had poorly controlled T1DM. Again, higher proportions of DKA and SH observed in this study showed a possibility for many children with T1DM to die at home even during their sleep. Thus, the study advocated training on management of T1DM amongst all clinicians, nurses, psychologists and nutritionists which is precedent to good diabetic education and improved home management of T1DM for our patients. In a related study, Sonya (2016) also explore the impact of parenting experience of 20 African American (AA) parent of children with T1DM affect the management and control of T1DM among AA youth age 5 to 17 years old. The results showed impact on the socialization for both the parent and the child, included family socialization, how others perceived T1DM and its management, education on diabetes management to others, and the parent's trust in other's ability to manage their child's diabetes. The findings of this study gives insight into population-based needs for successful diabetes management including how to make healthier cultural and ethnic meals

and the need for culturally-centered whole family diabetes education, to enhance family relationships and diabetes management.

The ongoing conversation gives great importance to the role of nurses as effective diabetic team member in promoting and providing education, training, medical intervention and a source of social support for persons with diabetes.

3 The aim and the research questions

The aim of this study is to gain more knowledge and understanding about the role of nurses on self care in the management T1DM in children.

The questions are :

- How does the roles of nurses' affect self care in the management of T1DM in children?
- How does self care impact the management of T1DM in children?

4 Theoretical Framework

While many nurses are indifferent towards the concept of nursing theory, the evolution of nursing theories has led to the creation of systems, theory analysis evaluation, the philosophy of science, and lack of clarity about the developmental strategies of theory and the choices of research methodologies (McEwen & Wills, 2014). This section reviewed Dorothea Orem Self-Care Deficit Nursing Theory (SCNDT), the key theory that underpins the study.

4.1 Dorothea Orem Self Care Deficit Nursing Theory

The etymology of Dorothea Orem's Self-Care Deficit Nursing Theory (SCDNT) is based on the idea that human beings have the innate ability, right, and responsibility to care for themselves. From the view of the theorist self-care involves the performance and or practice of activities that maintain life, health and wellbeing (McEwen & Wills, 2014). The ongoing conversation suggest that the theorist belief that people should be naturally inclined towards self-care as well as care of others and nurses are fundamentally required to promote that natural ability through their daily interactions.

SCDNT as a grand nursing theory entails three separate interrelated nursing theories: theory of self-care, the form of initiated activities imperative to human functioning and wellbeing; theory of self-care deficit, relating to the primary requirement for nursing; and theory of nursing systems, as the outcome of nursing (Renpenning & Taylor, 2003). The theory of nursing system is the bigger theory that surrounds the theory of self-care deficit while the theory of self-care is part of the theory of self-care deficit (McEwen & Wills, 2014).

4.1.1 The Theory of Self-Care

The theory of self-care suggests learned activities initiated and performed by the individual or another person such as family member on their own to promote life, health and wellbeing. In effect the individual executing self-care or dependent care have to determine and investigate the appropriate requirements in order to assure effective delivery (Naz, 2021). In addition, the ability to perform self-care is dependent on many social determinants and health conditions including self-care which entails human ability to initiate self-care which is generally guided by age, developmental stage, life experiences, socio-cultural orientation, health and resources; therapeutic self-care demands, which is the complete set of activities initiated and performed over a specific period with appropriate means of time to assure effective delivery; and self-care requisites, which involves universal, developmental, and health departure self-care requisites (Petiprin, 2020).

4.1.2 The Theory of Self-Care Deficit

Theory of self-care deficit on the other hand, incorporate the concept of self-care theory and describes when nursing is needed. Nursing is really needed when individuals are incapable of or limited in their ability to provide regular effective self-care. Five common approaches nurses could help individuals recover from self-care deficit include acting for or doing for other, guiding and directing, providing physical and psychological support, promoting an environment that supports personal development and teaching (Naz, 2021).

4.1.3 The Theory of Nursing Systems

The theory of nursing systems attempts to describe how the individual self-care needs will be attained by the nurse, the patient or both. Orem recognizes that, a

systematic process is developed to assure the desired result by following effective endeavor with or without the use of materials or instruments (Naz, 2021). The theory identifies three dimensions of nursing system to deliver the self-care needs of the individual: wholly compensatory system, partly compensatory system and supportive educative system. This approach provides a framework for identifying self-care deficit to facilitate the design of an effective approach towards achieving self-care demands. This nursing approach is considered in three parts: assessment, diagnosis and creation of nursing plan, and implementation and evaluation. This system truly commences the health care plan into implementation, assures effective delivery of patients and health care teams' goals, and provides a way to assess nursing care (Petiprin, 2020).

5 Methodology

This chapter looks at research strategy, systematic literature review, search strategy, data extraction, inclusion and exclusion criteria, content analysis and ethical consideration of the study.

5.1 Systematic Literature Review

Research is generally considered as a systematic process of investigating a peculiar phenomenon of interest to build and test explanatory concepts and theories (Bowling, 2014). Nursing research has also been considered by Polit & Beck (2017), as systematic approach tailored towards building knowledge about the nursing profession in terms of practice, education, administration and informatics. It is imperative for all researchers to follow an acceptable approach towards the generation of knowledge. Such general orientation to the conduct of research is considered research strategy (Bryman & Bell, 2011).

There generally two types of research strategy: quantitative and qualitative. Quantitative research has been regarded as the research strategy that promotes quantification in the collection and analysis of data and requires deductive approach towards investigating the correlation between theory and research. Qualitative research is the exact opposite of quantitative research. Its strategy emphasizes the evaluation of words in the collection and analysis of data, and predominantly follows inductive approach in investigating the correlation

between theory and research (Bryman & Bell, 2011). This research work will use qualitative approach to evaluate the research questions.

5.2 Qualitative Research

Crabtree and Miller (1999), identified three major analysis styles for qualitative research strategy including template analysis style, editing analysis style, and immersion/crystallization style. Template analysis style is where the researchers develop a template or analysis guide to which the empirical peer reviewed research articles are applied while editing analysis style involves the situation where the researchers using an editing style act as interpreters who read through the empirical peer reviewed articles in search of meaningful segments and units. Once segments are identified, reviewed, categorized and coded. And lastly, the immersion/crystallization style involves the analyst's total immersion in and reflection of the text materials, resulting in an intuitive crystallization of the data.

This research work shall use the template analysis style where the unit for the template shall be the research aims, research questions, inclusion criteria, methodology, discussions and evaluation of results. The process will involve data collection, coding into themes and categories and analyses and presentation of results (Bowling, 2014).

5.3 Research Design

It is a scientific investigation review of acquired data attempts to test a given hypothesis in order to analyze or synthesis it. It is in this same vein that a systemic literature review essentially identify, analyze and synthesis all the emprical evidence that meets pre-specified criteria to answer a given research question (Lame, 2019). The systematic literature review process must be recognise as a scientific process and all efforts must be made to ensure that the process is empirically appropriate, transparent, replicable and devoid of the possibility of bias. In the view of Lame (2019), affecting medical practices with scientific evidence required methods to review and synthesis existing data about peculiar questions of practical relevance to the medical profession.

The most appropriate sources to rely on are research articles found in trusted academic journals, books, governmental publications, and newspaper articles (Denney & Tewkbury, 2012). Some researchers have promulgated seven step model to systemic literature review including: exploring beliefs and topics, initiating search, storing and organizing information, selecting and deselecting information, expanding the search to include one or more modes, analyse and synthesis information, preparing the systematic literature review report (Onwuegbuzie & Frels, 2016). All these steps might have different components but are very much related to each other. To achieve effective outcome all this steps must be followed judiciously. Onwuegbuzie & Frels (2016) went further to categorise the seven step model into three phases: exploration phase, interpretation phase and communication phases. The exploration phase primarily deals with the processes involve in generating and gathering data while the interpretation phase involve synthesizing and analyzing the data and communication phase deals with reporting the outcome of the systemic literature review.

6 Data Collection

The study intends to access data from empirical peer reviewed medical articles from finna.com, trusted online journals, online magazine, google scholar, Microsoft Bing among others. Relevent databases were used for the selection of peer reviewed academic studies on the context of the role of nurses in the management of T1DM: a systematic literature review including Medical Literature Analysis and Retrieval System Online (Medline); Cummulative Index to Nursing Literature and Allied Health (CINAHL); Library, Information Science & technology Abstract; and Academic Search Elite. The research articles used were all conducted between January 2010 to October 2022.

Descriptor were employed to extract consistent analysis of the available research articles to obtain controlled wide literature search. In lieu of this, the following terms and phrases were used 'Diabetes Mellitus', 'Type 1 Diabestes Mellitus (T1DM)', 'Nursing role in the management of Type 1 Diabetes Mellitus in children', 'Systematic review of self care in Type 1 Diabetes', 'Nursing role in self care in the management of T1DM in children'.

In order to assure consistent extraction of the appropriate research work from the EBSCO HOST, the following search options were selected: Boolean/Phrase, Apply related words, Apply equivalent subjects, Full text, Peer reviewed, and PDF full text.

6.1 Inclusion And Exclusion Criteria

The inclusion criteria for the selected peer reviewed articles for this systematic literature review shall include: articles written in english, articles published between 2010 to August 2022, articles with a population of children, articles about type 1 diabetes mellitus, comparative outcomes of these articles, research design of these articles, articles that share the same or similar research question and objectives , and are significant to the research topic. While the exclusion criteria involved in this study will include: articles with a population of adults, Type 2 diabetes mellitus articles, book chapters, editorials, news paper reports, monographs, simple cases, articles that has to be bought online, articles that talks Type 1 Diabetes whose discussion does not affect this research work research questions and objectives, and articles not related to nursing.

6.2 Data Extraction

A standardized data extraction template was used to organize data from each research work which involves the following details: author, participants, inclusion and exclusion criteria, methodology, results, and discussion.

6.3 Data Analysis - Content Analysis

Data reduction is considered an important part of qualitative analysis which must be performed in a way that respect the quality of the qualitative data. However, many researchers are faced with the challenge of reducing large amount of written words into manageable and comprehension proportion in content analysis (Cohen, Manion, & Morrison, 2007). Research analyst pursuit of themes, regularities and patterns in data will probably encourage charting devices that assures sumarization of behaviours, events and processes (Polit & Beck, 2017). In its simplest form, content analysis involves coding, categorization, comparing and

concluding of words, text, phrases, sentences among others (Cohen, Manion, & Morrison, 2007).

Cohen et al. (2007), further identified three features of content analysis including breaking down words into units of analysis, undertaking statistical analysis of the units, and presenting the results in an economical form. This study intends to code, categorize, compare and evaluate peer reviewed research work based on the research questions, aims, themes, methodology and the inclusion criteria of the study.

6.4 Ethical Consideration

Research entails, the search for information obtained through systematic study and thinking, observation and experimentation (Finnish National Board on Research Integrity TENK, 2019). Ethical consideration in all research are critical to the validity and reliability of the research finding. The fact remains that, ethical issues cannot be ignored in any research work as they directly affects the integrity of not only a piece of research work but the disciplines involved (Bryman & Bell, 2011).

This research work will follow the guidelines on responsible conduct of research (RCR) drawn by TENK including the three general ethical principles: respect for the dignity and autonomy of human research participants as laid down in the Finnish constitution (1999/731, section 6-23); respect for material and immaterial cultural heritage and biodiversity in accordance with section 17 of the Finnish constitution; and conduct this research work in appropriate ways to forestall causation of significant risk, damage or harm to research participants, communities or other research subjects (Finnish National Board on Research Integrity TENK, 2019).

7 Results

Our search for research articles from Medical Literature Analysis and Retrieval System Online (Medline); Cumulative Index to Nursing Literature and Allied Health (CINAHL); Library, Information Science & technology Abstract; Academic Search Elite between January 201 - October 2022 yielded 36,885 research articles,

out of which the first 400 research articles were sampled for the study. Following this, the researcher reviewed all the titles and abstracts and identified 20 research articles for complete reading. Most of the research articles excluded at this phase have titles and abstracts that does not meet the inclusion criteria of this research work. In lieu of the ongoing, the researcher proceeded to have the first complete reading of the identified research articles and visualize their objectives, aims and methodologies used. On the second complete full reading, the researcher considered the recurring themes and categories of meanings being presented and included 8 research articles for this systemic literature review. Although the included research articles were initially 20, 13 research articles were excluded following complete full reading because some of them involves both children and adults, do not have any recognizable research methodology, were not written in English and involves both types of diabetes. In all the 7 research articles, we noted that three of them used qualitative research approach, one used survey technique, two used quasi-experimental approach, and one phenomenological approach. Major details of the included research articles have been shown in Table 1.1 labelled Overview of Research Articles in Appendix 1

7.1 Management of Type 1 Diabetes Mellitus (T1DM)

Given the case that, the occurrence of T1DM in children requires long term care including regular blood glucose monitoring, education and support from qualified health professionals to assure healthy lives and prevent any possible complications associated with diabetes without which children with T1DM may not survive (International Diabetes Federation , 2019). Content Analysis of these research articles revealed that the role of nurses has significant positive effect on management of T1DM in children (Emiliana, Agustini, Allenidekania, & Rustina , 2019; Nobre, et al., 2019; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013; Sparapani, Jacob, & Nascimento, 2015). The results from some studies showed improved compliance level and self- management after exposure to PRISMA educational intervention (Emiliana, Agustini, Allenidekania, & Rustina , 2019), while others studies showed that the nurses worked with families, children, and adolescents assured effective adaptation to healthy habits and a quality way of life, thereby reducing the risk of complications (Nobre, et al., 2019). Other studies recognize the challenges faced by nurses in the

management of T1DM, yet suggested that increasing school nurses' competences and developing effective strategies to overcome their challenges will be useful (Wang & Volker, 2012; Konradsdottir & Svavarsdottir, 2013). Since the practice of nursing is generally a human-to-human encounter, nursing has a great probability of coordinating and negotiating the systems and processes to overcome challenges associated with the management of T1DM including conflicting desires, insecurity, fear, pain, inadequate knowledge, concerns about long term effects among others; and assure effective management of the disease (Sparapani, Jacob, & Nascimento, 2015). Wilt (2021) identified higher school nurse to student ratio correlated with good glycemic control and old age. This reinforces the idea that nurses' role assures good glycemic level, thereby avoiding the occurrence of any possible diabetic complication.

7.2 Education

The nurse is the advocate for children with T1DM. This include: maintaining effective communication line between the children, parents, primary care givers among. The idea of maintaining such communication is to create the platform that could assure education. Education of Children with T1DM must happen in a continuum, beginning from diagnosis through the lifetime of the condition. The results from the content review of this research articles clearly shows the importance of impacting appropriate T1DM knowledge to the child, family, parents and primary care givers (Emiliana, Agustini, Allenidekania, & Rustina , 2019; Nobre, et al., 2019; Wang & Volker, 2012; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013; Sparapani, Jacob, & Nascimento, 2015). Studies by Emiliana et. al (2019), reported significant improvement in self-management ($p < 0.05$) and level of compliance ($p < 0.05$) among children with T1DM. This goes to prove that the use of educational tools in the form of animated videos could help improve self-management and compliance in the management of physical activity, stress management, blood glucose level and diet management. In a similar study, Nobre et. al (2019) also concluded that, the educational responsibilities of nurses for patients, families and care givers are essential in assuring effective strategies for adapting to healthy habits and quality of life for the child and adolescents with T1DM. Families rely heavily on knowledge gained from their interaction with nurses to devise strategies to enable strict

dietary control, application of insulin, monitoring, physical activity among others. In another studies, Wang & Volker (2012) showed that, even as school nurses are faced with some challenges as they follow their duty of caring for children with T1DM, most nurses considered it their responsibility to remain more educated on T1DM care issues in order to assure effective care for the children. It is evident from the ongoing that education on T1DM is not only the preserve of the patients, families, and care givers but that of the professional nurse. In a related studies, Evcimen, Uncu, & Esen (2021) demonstrated that by using MI-based DSME interviews nurses could transform negative health behaviours of adolescents with T1DM to healthy behaviours and increase self-efficacy and self-management of T1DM. In essence, these interviews were used as an educational tool to provide adolescents with more information on diabetes, increase their self-efficacy to assure sustainable behaviour change, increase the patients knowledge and appropriate behaviour in order to assure effective self-management.

7.3 Self-Care

Much like the ongoing conversation on the role of nurse on the education of children with T1DM above, the role of nurse is imperative to improving self-management in children and adolescents with T1DM (Emiliana, Agustini, Allenidekania, & Rustina, 2019; Nobre, et al., 2019; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013). Emiliana et. al (2019), reported significant improvement in self-management ($p < 0.05$) and level of compliance ($p < 0.05$) among children with T1DM. The study demonstrated that most participants had poor self-management (80.6%) and the compliance level was 64.5%, before the intervention, while after the intervention majority of the participants showed improved self-management (80.6%), and level of compliance of 74.2%. In a related studies, other researcher also concluded that nurses' work with families, children and adolescents help improved self-care by serving as the catalyst for motivation, reduction of fear and anxiety, reducing risk of T1DM complications through effective communication, interaction and education (Nobre, et al., 2019; Konradsdottir & Svavarsdottir, 2013). Wilt (2021) also revealed that higher school nurse to student ratio correlated with better glycemic control. This surely comes to improve self-care.

7.4 The Role of the Nurse

The occurrence of T1DM, places a lot of requirements on children, families and care givers for the management of this lifelong condition placing the need for them to rely heavily on the role of nurses. The role of nurses is imperative to the survival of children with T1DM (Dai, Chen, Huang, Wu, & Yang, 2022). The works of Wang & Volker (2012) revealed that, nurses face huge challenges in their effort to effectively manage T1DM for children, yet acknowledge the importance of school nurse workforce in assuring safe and effective T1DM management. In a related study, Wilt (2021) establish a decent correlation between school nurse ratio with glycemic control and older age. From the initial diagnosis of T1DM, nurses must constantly learn about current trends in diabetic management to assure optimal competencies with diabetic management; education of children, families and care givers; and effective cooperation with healthcare team members. In another studies, Konradsdottir & Svarvarsdottir (2013) revealed no major difference on perceived family support for parents of children and adolescents with T1DM after a brief FAM-TC intervention. Following further item by item analyzes of the perceived family support scale significant difference was identified for the mother after the brief FAM-TC intervention. APN can provide educational, psychosocial and emotional support to not only the child or adolescents but also to the families, portents and care givers in the management of T1DM (Konradsdottir & Svavarsdottir, 2013; Sparapani, Jacob, & Nascimento, 2015).

8 Discussion

This section seeks to review the summary of the main findings of this systematic literature and its implications. It further compares it with works of other previous systematic literature review works and show the degree to which it confirms our research aim or otherwise.

8.1 Results Discussion

The role of nurses in diagnosis, prompt initiation of treatment and the ongoing management of T1DM in children and their families are crucial to the survival of the child (Dai, Chen, Huang, Wu, & Yang, 2022). This systematic literature review

was design to gain more knowledge and understanding about the role of nurses on self-care in the management T1DM in children. The purpose of this systemic literature review was also to determine how the role of nurses' affect self-care in the management of T1DM in children and how self care impacts the management of T1DM in children. Our findings suggest that the role of nurses has significant positive effect on management of T1DM in children (Emiliana, Agustini, Allenidekania, & Rustina , 2019; Nobre, et al., 2019; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013; Sparapani, Jacob, & Nascimento, 2015). There were children who adapted well to healthy diets and foods, encourage coexistence and exchange of experience with others who have diabetes which came to improved self-care. Adolescents also develop a positive health behavior and increased self-efficacy in diabetes self-management which will consequently increase adaptation (Evcimen, Uncu, & Esen, 2021; Nobre, et al., 2019). However, there were some children who showed emotions and psychosocial factors that could interfere with T1DM management including conflicting desires, insecurity, fears, pain, inadequate knowledge, concern about long-term effect, prejudice, rejection and shame (Sparapani, Jacob, & Nascimento, 2015). This finding goes to suggest that during diagnosis and follow up clinics nurses who exercise daily interactions with these children must be mindful of their emotional and psychological needs and evolve strategies that will facilitate coping as children navigate the corridor of the management of T1DM. Two research articles using quasi-experimental intervention with one group pretest and posttest design showed improvement in self management and increased in mothers perception regarding family strenght after the intervention (Emiliana, Agustini, Allenidekania, & Rustina , 2019; Konradsdottir & Svavarsdottir, 2013). Given the outcome of the ongoing conversation, nurses should recognise the important role they play in offering children with T1DM educational and emotional support during the diagnosis and management of T1DM on a daily basis. This results goes to confirm Nikitara et (2019) and Olivera et al (2016) research works which revealed three important roles of nurses including nurses as educators, nurses as advanced care givers and nurses as motivators which assure effective management of the type 1 diabetes. Given the case that Konradsdottir & Svarvarsddottir (2013) initially found no major difference on perceived family support for parents of children and adolescents with T1DM after a brief FAM-TC intervention goes to support the studies conducted by Coolen et al. (2021) which revealed that, there

is insufficient evidence on the relationship between hypoglycemia and domains of generic diabetic specific QoL for children and adolescents with T1DM.

The role of nurse is also imperative to improving self-management in children and adolescents with T1DM (Emiliana, Agustini, Allenidekania, & Rustina, 2019; Nobre, et al., 2019; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013). Emiliana et. al (2019), revealed significant improvement in self-management after PRISMA education. Again, the studies also showed that higher SEDM scores correlated with old age, and females scored significantly higher (Wilt, 2021). However, school nurse to student ratios were not responsible for self-efficacy (Wilt, 2021). This goes to show that school nurses have a greater probability of affecting glycemic control in the management of T1DM. Studies from Mark et al. (2013) which examined management of T1DM in the early primary school setting in terms of type, provision and location of treatment, the impact on the child and the role of the credentialed diabetic educator and identified majority of children as not receiving intensive diabetes treatment at school due to lack of appropriate school trained staff; and Kennedy et al. (2013) who reviewed evidence for a glycemic benefits of exercise in T1DM and showed a glycemic benefit of exercise in persons with T1DM. This subsequently reveals the need for educators to work in collaboration with children, parents, and school personnel to ensure diabetes care is fully integrated into the school day. From the ongoing conversation, institutions are encouraged to continuously increase the level of knowledge about T1DM not only for children, adolescents, parents and care givers but also nurses in order to improve awareness, compliance and management of T1DM.

9 Conclusion

Given the case that, Diabetes Melitus is a major health issue and one of the fastest growing global health condition (International Diabetes Federation, 2021) and Type 1 Diabetes Mellitus (T1DM) in particular also accounts for over 90% of childhood and adolescent diabetes in most western countries (Craig, Hattersley, & Donaghue, 2009) while children with T1DM are faced the task of managing the challenges of living with T1DM including psychological health, acute health complications and socialization (Eriksson & Maclean, 2019; Msekandiana, et al.,

2020; Sonya , 2016) the role and activities of nurses are crucial to the survival of the T1DM child. Researchers having analyze the role and activities of nurses working with people with type 1 diabetes and examining the facilitators and barriers in caring for such people and educating them about diabetes identified three important roles of nurses including nurses as educators, nurses as advanced care givers and nurses as motivators which assure effective management of the type 1 diabetes (Nikitara, Constantinou, Andreou, & Diomidous, 2019; Olivera, et al., 2016).

The aim of this study is to gain more knowledge and understanding about the role of nurses on self-care in the management T1DM in children. The systematic literature review of various research articles revealed that the role of nurses had significant positive effect on management of T1DM in children (Emiliana, Agustini, Allenidekania, & Rustina , 2019; Nobre, et al., 2019; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013; Sparapani, Jacob, & Nascimento, 2015). In our present data driven world, nurses are expected to be capable of reflecting on, evaluating, and modifying their service delivery based on new knowledge. And nurses are also increasingly expected to generate such new knowledge themselves through nursing research (Polit & Beck, 2006). The results of this systematic literature review showed the importance of impacting appropriate knowledge on T1DM not only to the child, family, parents and primary care givers but to the nurses as well (Emiliana, Agustini, Allenidekania, & Rustina , 2019; Nobre, et al., 2019; Wang & Volker, 2012; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013; Sparapani, Jacob, & Nascimento, 2015). The outcome of this study also revealed that, the role of the nurse is imperative to improving self-management in children and adolescents with T1DM (Emiliana, Agustini, Allenidekania, & Rustina , 2019; Nobre, et al., 2019; Evcimen, Uncu, & Esen, 2021; Wilt, 2021; Konradsdottir & Svavarsdottir, 2013).

This study presented some limitation that needs to be addressed in future research. Lack of reporting on the socio-economic status of participants or respondents in the included articles makes assessment of representativeness and generalization very difficult. Again, the present approach in gathering data is limited as there were very little research articles on the role of nurses in the management of T1DM in children: a systematic literature review were limited. Research articles that came up upon search will involve either children and adults

or both T1DM and T2DM. Gaining more knowledge and understanding about the role of nurses on self-care in the management T1DM in children is in every way very important. However, determining the strategies that facilitate the implementation of these identified roles of nurses' in the management of T1DM in children is equally important. It is our candid opinion that further research will be required in this regard in order to assure effective management of T1DM in children.

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10 Appendix 1:

Table 1.1 Overview of Research Articles

No.	AUTHOR(S), YEAR & COUNTRY	RESEARCH DESIGN & SAMPLE SIZE	RESEARCH OBJECTIVE /AIMS	INCLUSION CRITERIA	RECURRING THEMES	METHODOLOGY	RESULTS
1	Emiliana Priska, Agustini Nur, Allenidekania, Rustina Yeni 2019 Indonesia	Quasi-experimental design with no control group. And the sample size is 31 children.	Determine the effect of PRISMA education on self-management and level of compliance in children with T1DM	Children aged between 6-18, not hospitalized, cooperative and understood the Indonesian language.	Education of patients and families Self-management	Pretest and Posttest Model. The effectiveness of the PRISMA education intervention was assessed by comparing the pretest and posttest scores. The research used data collection tools like demographic questionnaire and modified questionnaires	Majority of respondent have poor self-management (80.6%) with a compliance level of 64.5%, while after intervention self-management improved (80.6) with compliance level of 74.2%. There was also influence after intervention on self-management with p-value <0.001 (α =0.05) and level of compliance with p-value <0.005 (α =0.05).
2	Nobre et al 2019	Qualitative, exploratory	To assess the strategies used by families for	To be the main care giver of the child or	Education of family and social groups	Qualitative, exploratory and descriptive studies in	Children adapted well to diet schedules.

	Brazil	<p>and descriptive studies.</p> <p>And the sample size is 12 relatives of 6 children and 6 adolescents with T1DM.</p>	<p>the care of children and adolescent with T1DM.</p>	<p>adolescent with T1DM, to accompany him during consultation and to provide direct care.</p> <p>The child should be 5 years of age and adolescent up to 18 years</p>	<p>Management of care</p> <p>Self-care</p>	<p>a university hospital in the south of Brazil.</p> <p>Data was collected using semi structure interview subjecting them to content analysis.</p>	<p>Encouraged co-existence and exchange of experience of the children and adolescents with T1DM with other who have diabetes.</p> <p>Improved their self-care.</p>
3	<p>Wang & Volker 2012</p> <p>Taiwan</p>	<p>Husserlian Phenomenological approach was used.</p> <p>And with a sample size of 5.</p>	<p>To build an initial understanding about the essential structure of school nurses experience of caring for students with T1DM.</p>	<p>Experienced school nurses who worked in elementary or junior high schools.</p> <p>Participants ages ranges between 29-54 years.</p>	<p>Management of care in school setting</p> <p>Education</p> <p>The role of school nurse</p>	<p>Data was collected in a semi structured audiotaped indebt interview ranging from 45-91 minutes.</p> <p>Data was intuitively analyzed using modified approach to Colaizzi's (1978) method.</p>	<p>Having observed the needs and suffering that students with T1DM and their parents experienced they had more compassion for them and were motivated to dedicate themselves to improving the health and wellbeing of these students.</p>

				Participants Must be a full-time registered nurse of a sole school.			<p>Helping students with T1DM is challenging and revealed lack of adequate training and confidence in managing the disease which subsequently creates a sense of incompetence and anxiety.</p> <p>Participant recognize the importance of teamwork in achieving effective results.</p> <p>Caring for students with T1DM is a struggle with practical limitation.</p>
4	Evcimen et al 2021	Qualitative research.	Examine the effect of motivational interview based	Open to communication and collaboration.	Management of T1DM	Pre-test and Post-test interview method in a single group.	Adolescents develop a positive health behavior.

	Turkey	And the sample size is 66	<p>DSME on the development of self-efficacy, healthy lifestyle behavior and AIC in adolescents with T1DM.</p> <p>To investigate the effect of motional interviews (MI) based diabetic self-management education (DSME) interviews on self-efficacy, healthy lifestyle behavior development, and AIC in adolescent with T1DM</p>	Ability to read and understand verbally	<p>Self-Management</p> <p>Education</p>	<p>A total of six interviews were implemented to collect specific information which measured self-efficacy, healthy lifestyle development and A1c before and after the implementation of MI-based DSME.</p>	<p>Increased in self-efficacy in diabetes self-management among adolescents which will consequently increase adaptation.</p>
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5	Wilt Lori 2021 USA	Descriptive correlational design. And with a sample size of 89.	Examine the relationships among school nurse to student ration, self-efficacy for T1DM management, and glycemic control in adolescent.	Adolescent with T1DM between 10-16 years old, able to speak English, enrolled in public or private schools, able to read and understand grade level materials, and without comorbid disease or diagnosis that would result in increased interaction with the school nurse.	The role of the school nurse T1DM management Self-management Education	Self-Efficacy for Diabetes Management (SEDM)Likert style surveys Parent Questionnaires were used.	Higher nurse to student ratios correlated with better glycemic control and old age. Higher SEDM scores correlated with old age, and females scored significantly higher. No correlation between HbA1c levels and parental education.
6	Konradsdottir & Svarvarsdottir 2013 Iceland	Quasi-experimental intervention studies with one group pretest and	To evaluate the role of advanced nurse practitioner in offering brief therapeutic conversation interventions	Participants had to be able to read, speak and write Icelandic.	The role of Advance Practice Nurse Education, advocacy, and	The brief family therapeutic conversation (FAM-TC) intervention was based on Calgary Family Assessment and Intervention Models and consisted	For the parents results from the t-test indicated mothers of children with T1DM were not found to report significant higher family support after

		<p>posttest design.</p> <p>And with a sample size of 24</p>	<p>for families of children and adolescents dealing with T1DM on a daily basis.</p> <p>And also, to evaluated whether parents of children with diabetes perceived higher family support after two brief sessions of therapeutic conversation intervention offered by CNS based on the Calgary Family-Nursing Framework</p>		<p>coordination of care</p> <p>T1DM Management</p> <p>Self-care</p>	<p>of two sessions at the pediatric clinic.</p> <p>In the first Session parents were asked therapeutic questions and each concern of parents were explored.</p> <p>In the second session there was a revision of the first.</p>	<p>the brief FAM-TC intervention compared to before the intervention neither for the total scale.</p> <p>Using Wilcoxon test (Z Statistics Test) a significant difference was found on the mothers' perception regarding having experience the CNS to draw forth their family strength after the brief FAM-TC intervention compared to before the intervention.</p>
7	Sparapani et al 2015	Qualitative interviews.	To increase their understanding	Participant must be	Management of T1DM	Qualitative interviews facilitated by the use of puppets	Children showed conflicting desires,

	Brazil	And with a sample size of 19 children.	of what it's like to be child with T1DM from the younger child perspective and explore factors that interfere with the management of T1DM	between 7-12 years old. Must be of at least 1 year.	<p>Nurses role</p> <p>Education</p>	<p>in a stimulated environment to examine thoughts, feelings and how the young child manages T1DM.</p> <p>(1) Construction of scenarios</p> <p>(2) Construction of puppets</p> <p>(3) Interviews</p>	<p>insecurity, fear and pain.</p> <p>Inadequate knowledge of the disease.</p> <p>Prejudice, rejection and shame.</p>
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Education	Education
Self-Care	Self-Care
Management of T1DM	Management of T1DM
The Role of Nurses	The Role of Nurses

