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Nurses' Roles in Preventing the Complications of Type 1 Diabetes among Adults.

A Systematic Literature Review

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Abstract/Summary

Objective: The aim of this review was to thoroughly and critically evaluate evidence on the role of nurses in preventing complications of type 1 diabetes, with the goal of enhancing nurses' knowledge and improving outcomes for individuals with type 1 diabetes.

Method: This study was conducted using a qualitative systematic literature review method. Electronic databases were used to source for articles published between 2013-2023. The theoretical framework was based on Imogene Kings theory and Katie Erikssons theory.

Result: The 8 papers analysed for this research highlighted nurse's significance in preventing complications of type 1 diabetes. Most studies branded nurses as educators, supporters, collaborators while making pointers to their significance in insulin therapy and health promotion through attentive diet.

Conclusion: this study concludes that interpersonal relationship between the nurse and individuals with type 1 diabetes is a key component to improve patients' quality of life.

Language: English Keywords: diabetes type 1, non-insulin dependent diabetes mellitus, complications of dt1, preventive measurement for T1D, risks.

Table of Contents

1 Introduction 1
2 Background 3
2.1 Type 1 diabetes 3
2.2 Diagnosis of type 1 diabetes 4
2.3 Signs and symptoms of T1D 5
2.4 Complications of T1D 6
2.4.1 Diabetic retinopathy 6
2.4.2 Diabetic nephropathy 6
2.4.3 Cardiovascular disease 6
2.4.4 Foot ulcers 6
2.4.5 Neuropathy 7
2.4.6 Gastroparesis 7
2.5 Causes and risk factors for type 1 diabetes. 7
2.5.1 Genetics 8
2.5.2 Environmental factor 8
2.5.3 Viral infection 8
2.5.4 Autoimmune disorder 8
2.6 Prevention of type 1 diabetes complications 9
2.7 Management of type 1 diabetes 9
2.7.1 Early screening and detection. 9
2.7.2 Insulin Therapy 10
2.7.3 Continuous Glucose Monitoring (CGM) 10
2.7.4 Artificial Pancreas 10
3 Aim 12
3.1 Research questions 12
4 Theoretical Framework 13
4.1 Imogene king´s theory of goal attainment 13
4.2 Main concepts of Imogene king´s theory 14
4.3 Katie Eriksson theory of caritative care 15
5 Methodology 16
5.1 Qualitative study 16
5.2 Data collection 16
5.2.1 Inclusion and exclusion criteria. 18
5.3 Data analysis 19
6 Ethical consideration 21
7 Results 23
7.1 Measures to Manage Type 1 Diabetes 23
Table 2: Management strategies for Type 1 Diabetes 24

7.1.1 Consistent Glucose Monitoring 24
7.1.2 Insulin Therapy 25
7.1.3 Attentiveness to Diet and Physical Exercise 25
7.2 Role of nurses in the management of type 1 diabetes 26
7.2.1 Patient and Family Educator 27
7.2.2 Collaborative Role 29
7.2.3 Supportive Role 29
8 Discussion 31
8.1 Roles of nurses in enhancing the quality of life among persons suffering from T1D. 31
8.2 Measures for preventing complications of T1D. 32
9 Strengths and Limitations 35
10 Conclusion 36
References 37
Appendices 1
Appendix A. database search process. 1
Appendix B: PRISMA checklist 2
Appendix B: PRISMA checklist continuation 4

1 Introduction

Type 1 diabetes (T1D) is an autoimmune condition that is also known as insulin-dependent diabetes, it has led to the death of about 2.2 million individuals in 2012. There was a global estimation of 422 million people living with all types of diabetes in 2014. However, there is no global estimation distinguishing the number of T1D from type 2 diabetes mellitus because of the sophisticated laboratory tests usually required (World Health Organization WHO, 2016).

In the United States, 37 million people have been diagnosed with diabetes, and this is in fact the 7th leading cause of death in the United States. 90-95% of these diagnosed cases are type 2 diabetes, while T1D accounts for approximately 5-10% (Centres for Disease Control and Prevention CDC, 2022). Also, type 1 diabetes affects all people regardless of their ages, it is most prevalent in children and young adults. T1D is more common in developed countries, and the incidence of the disease is increasing globally (Abela & Fava, 2021).

Finland, like other countries is not left behind in this trend. Among the total population of 5.5milllion, a total estimation of 500,000 Finns have been diagnosed with diabetes. T1D accounts approximately 50,000 among the people suffering from diabetes (Finnish Diabetes Association FDA, 2017).

Despite the significant breakthrough and technological intervention in the treatment and control of T1D over the past few decades, complications from this disease continue to be the leading cause of disability and ultimately death. These complications are particularly classified as microvascular (neuropathy, retinopathy and nephropathy) or macrovascular (cardiovascular, cerebrovascular and peripheral vascular diseases) (Piona, 2021).

Since T1D is an autoimmune disease, i.e., the body´s immune system attacking and damaging the insulin-producing cells, this disease cannot be prevented. However, there are some measures that may be taken to lower the chance of developing complications from T1D, such as routinely checking blood sugar levels, adhering to a balanced diet and exercise routine, and closely managing the condition with medical professionals. There are also current clinical trials and research investigations aiming for a treatment for T1D with the aim of creating novel therapeutics, like immunotherapies and stem cell treatments,

which might potentially delay the onset of the disease, or perhaps reverse it (Gillespie, 2006).

Prevention of these complications is a critical aspect of the management of T1D (American Diabetes association ADA, 2020) a. While the goal is to cure the disease, current treatment options focus on controlling blood glucose levels and preventing long-term complications (Nathan, 2014). However, despite the availability of effective treatments, many individuals with type 1 diabetes still experience complications, leading to reduced quality of life and increased healthcare costs (Skyler, 2017).

While there is currently no cure for T1D, effective management of the disease can reduce the risk of complications (Nathan & DCCT/EDIC Research Group, 2014). Nurses who are the primary healthcare provider for these individuals, play a critical role in the prevention of these complications through patient education, monitoring, and collaboration with other healthcare professionals (Gonzalez, 2016). This paper would therefore explore the roles of nurses in preventing the complications of T1D, specifically among young adults.

2 Background

This chapter aimed at discussing various background information on this area of study which includes T1D, causes and risk factors of T1D, the diagnosis, signs and symptoms of T1DM, complications of T1D, as well as the prevention and managements of type 1 diabetes mellitus.

2.1 Type 1 diabetes

Type 1 diabetes (T1D), also termed as insulin-dependent diabetes or juvenile-onset diabetes, is a chronic autoimmune disorder characterized by the destruction of insulin-producing beta cells in the pancreas, leading to a deficiency of insulin. Insulin is a pancreas produced hormone that helps regulate blood sugar levels, so its deficiency leads to high levels of glucose in the bloodstream, which can cause a variety of health problems over time (ADA, 2021) b.

The exact cause of type 1 diabetes is not fully understood, but it is believed to involve a combination of genetic and environmental factors. In individuals with a genetic predisposition to the disease, certain environmental triggers, such as viral infections or exposure to toxins, can initiate an autoimmune response that leads to the destruction of the beta cells (ADA, 2021) d.

T1D, also known as insulin-dependent diabetes mellitus (IDDM), is a chronic autoimmune disease characterized by the destruction of pancreatic beta cells, leading to an absolute deficiency of insulin. Insulin is a hormone that regulates blood glucose levels, and its deficiency results in hyperglycaemia, which can cause a variety of acute and chronic complications (Atkinson, 2014).

Type 1 diabetes arises from a complex interplay between hereditary and environmental factors. The Human Leukocyte Antigen (HLA) class II genes, along with other genes, are involved in this illness and account for approximately 40% of the genetic vulnerability associated with type 1 diabetes. Environmental factors, such as viral infections and dietary factors, may trigger the autoimmune response that ultimately leads to beta cell destruction (Pociot & Larnmark, 2016).

The autoimmune mechanism in type 1 diabetes is characterized by the presence of autoantibodies against beta cell antigens, such as insulin, glutamic acid decarboxylase (GAD), and islet antigen 2 (IA-2). These autoantibodies can be detected in the blood years before clinical onset of the disease, and their presence is used as a diagnostic marker for the disease (Atkinson, 2014).

2.2 Diagnosis of type 1 diabetes

The diagnosis of type 1 diabetes is primarily based on clinical symptoms and laboratory tests that confirm the presence of autoantibodies against pancreatic beta cells (Centres for Disease Control and Prevention CDC 2023). These autoantibodies include islet cell antibodies (ICA), insulin autoantibodies (IAA), glutamic acid decarboxylase (GAD) antibodies, and others (Zhe, 2015). The presence of these autoantibodies indicates that the body's immune system is attacking and destroying insulin-producing beta cells in the pancreas. Other laboratory tests, such as measurement of blood glucose and glycated haemoglobin (HbA1c), are also important in the diagnosis and management of type 1 diabetes. In addition to these laboratory tests, an in-depth medical history and physical examination are necessary for ensuring a precise diagnosis of type 1 diabetes. (Zhuo, 2022). Furthermore, genetic testing may also be performed to identify any specific genetic factors associated with type 1 diabetes (César Ernesto, Álvaro, & Yayoi, 2020).

Type 1 diabetes is properly diagnosed by evaluating the individual's symptoms and risk factors in addition to laboratory tests. Frequent urination, increased thirst, unexplained weight loss, weariness, hazy eyesight, and slow-healing wounds are all common symptoms. Patients who exhibit these symptoms, particularly when combined with risk factors like as a family history of diabetes, are frequently submitted to further diagnostic examinations (WHO, 2021). Fasting plasma glucose (FPG), oral glucose tolerance test (OGTT), and haemoglobin A1c (HbA1c) tests are all recommended by the WHO to evaluate blood glucose levels (WHO, 2021). These tests provide diverse perspectives on a person's glucose metabolism throughout time, assisting in the proper diagnosis of diabetes. Fasting Plasma Glucose (FPG) Test: This test determines blood glucose levels after a fast of at least 12 hours. Before an individual takes any food or beverages, a blood sample is collected in the morning. Diabetes is indicated if the glucose level is above 126 milligrams per decilitre (mg/dL). The Oral Glucose Tolerance Test (OGTT) includes testing blood glucose levels after fasting and then drinking a glucose-rich beverage. Blood samples are

collected at regular intervals to evaluate how the body handles glucose. A two-hour blood glucose level of 200 mg/dL or greater indicates diabetes. The haemoglobin A1c (HbA1c) test measures the average blood glucose levels over the previous two to three months. Diabetes is diagnosed when the HbA1c level is 6.5% or greater.

2.3 Signs and symptoms of T1D

Frequent urination (polyuria) is one of the signs of type 1 diabetes. Individuals have an increased need to urinate, particularly at night. This symptom is caused by the kidneys' effort to excrete excess glucose from the blood via urine (WHO, 2021) b. Excessive thirst (polydipsia) results from the body's attempt to compensate for fluid loss and maintain proper hydration as a result of constant urination (ADA, 2022).

Furthermore, patients frequently complain with unexplained weight loss despite regular or increased food intake. This weight loss is caused by the body's inability to use glucose for energy due to a lack of insulin, which causes it to break down muscle and fat for energy (FDA, 2022). This causes intense hunger (polyphagia) since the body craves more energy despite the calorie shortfall, which contributes to weight loss (WHO, 2021) c.

Individuals with type 1 diabetes frequently suffer exhaustion and weakness as a result of their body's inability to adequately use glucose for energy production (ADA, 2022). In addition to these symptoms, changes in blood sugar levels can impact the eye lens, producing blurred vision or other visual impairments, prompting people to seek medical attention (Food and Drug Administration FDA, 2022).

Furthermore, type 1 diabetes can have an effect on an individual's temperament, causing irritation and mood swings. These mood fluctuations are frequently associated with variable blood sugar levels, which influence brain functionality and energy availability (WHO, 2021) c. Furthermore, the illness can cause slow-healing sores or wounds because elevated blood sugar levels impede the body's capacity to heal effectively, causing the recovery process to be prolonged (ADA, 2022).

These symptoms can develop quickly over a few weeks and be severe, especially when diabetic ketoacidosis (DKA) first appears. DKA is a potentially fatal illness defined by the buildup of ketones in the blood due to insulin deficiency (FDA, 2022).

2.4 Complications of T1D

Despite the best efforts of patients and healthcare professionals, complications of type 1 diabetes can still occur.

2.4.1 Diabetic retinopathy

One of the most significant complications of type 1 diabetes is diabetic retinopathy, which is damage or injury to the blood vessels in the retina of the eye. This condition can lead to vision loss or even blindness if left untreated. According to a study published in Diabetes Care, diabetic retinopathy is present in approximately 28% of patients with type 1 diabetes who have had the disease for 15 years or more (Klein, Knudtson, Lee, Gangnon, & Klein, 2008).

2.4.2 Diabetic nephropathy

Another complication of type 1 diabetes is diabetic nephropathy, which is damage to the kidneys' blood vessels. This condition can lead to kidney failure, requiring dialysis or a kidney transplant. A study published in Diabetes Care found that diabetic nephropathy develops in approximately 40% of patients with type 1 diabetes who have had the disease for 20 years or more (Orchard, Secrest, Miller, & Costacou, 2010).

2.4.3 Cardiovascular disease

Additionally, type 1 diabetes is associated with an increased and elevated risk of cardiovascular disease, including heart attacks and strokes. A study published in The New England Journal of Medicine found that patients with type 1 diabetes have a 10-fold higher risk of cardiovascular disease than the general population (Livingstone, Looker, & Hothersall, 2012). The high glucose level in the bloodstream can damage the blood vessels and therefore increasing the risks of atherosclerosis (Harding 2019).

2.4.4 Foot ulcers

Diabetic foot ulcers are one of the most prevalent complications of T1D. Prolonged high blood sugar levels can cause nerve damage (neuropathy) and poor blood circulation in the extremities, especially the feet. Individuals with T1D are more vulnerable to foot injuries and less able to heal properly as a result of this combination. A tiny cut or blister might go unnoticed and develop into a non-healing ulcer, which can lead to infection and even

amputation if left untreated (Pop-Busui, Boulton, Feldman, Bril, Freeman, Malik, & Vinik 2017).

2.4.5 Neuropathy

Another common complication of T1D is diabetic neuropathy. It is caused by nerve damage caused by constant high blood sugar levels. Neuropathy can affect any type of nerve in the body, causing symptoms such as tingling, numbness, burning sensations, and muscle weakness. Autonomic neuropathy can also have an effect on bodily activities such as digestion, heart rate, and blood pressure regulation (Pop-Busui. *et al*, 2017).

2.4.6 Gastroparesis

Gastroparesis is a condition characterized by delayed stomach emptying, which can cause nausea, vomiting, bloating, and a feeling of fullness. Because the rate of food absorption becomes unpredictable in people with T1D, gastroparesis can make blood sugar management difficult (Pop-Busui. *et al*, 2017).

Individuals diagnosed with diabetes may also experience acute or chronic neurocognitive changes, such as cognitive function deterioration that negatively impacts psychomotor speed, visual perception, cognitive flexibility, and attention. While the precise pathogenesis underlying neurocognitive changes remains elusive, their emergence has been associated with microvascular and macrovascular alterations, structural modifications in the brain, neuronal depletion, and cerebral atrophy (DiMeglio, Evans-Molina, & Oram 2018). These conditions can lead to significant disability and reduced quality of life for patients with type 1 diabetes.

2.5 Causes and risk factors for type 1 diabetes.

The exact cause of type 1 diabetes is not fully understood, but it is believed to be caused by a combination of genetic and environmental factors. Certain genes that regulate the immune system and the production of insulin have been identified as playing a role in the development of type 1 diabetes (Todd, 2010). Additionally, environmental factors such as viruses and other infections may trigger an immune response that attacks the beta cells in the pancreas (Wenzlau & Hutton, 2013). Since the exact cause of type 1 diabetes mellitus is still unclear, certain risk factors have been identified through research, some of which include.

2.5.1 Genetics

One of the most significant risk factors for type 1 diabetes is genetics. Studies have shown that the presence of a family history of the disease increases an individual's risk of developing type 1 diabetes. Moreover, certain genes have been identified that are associated with an increased susceptibility to type 1 diabetes. For example, variants of the Human Leukocyte Antigen (HLA) genes are strongly associated with an increased risk of type 1 diabetes (Noble, 2012).

2.5.2 Environmental factor

environmental factors, such as exposure to toxins or pollutants, may also contribute to the development of type 1 diabetes. For example, studies have shown that exposure to certain chemicals, such as nitrosamines and bisphenol A, may increase the risk of developing type 1 diabetes (Sipetic, Vlajinac, & Jarebinski , 2005).

2.5.3 Viral infection

Viral infections, particularly enterovirus and coxsackievirus, have also been linked to an increased risk of developing type 1 diabetes. Studies have shown that individuals who develop these viral infections have a higher risk of developing type 1 diabetes compared to individuals who do not (Stene & Rewers, 2012). The exact mechanisms by which viral infections contribute to the development of type 1 diabetes are not fully understood, but it is believed that the viruses may trigger an autoimmune response that attacks the insulin-producing cells in the pancreas.

2.5.4 Autoimmune disorder

Autoimmune disorders have also been associated with an increased risk of developing type 1 diabetes. For example, individuals with celiac disease (an autoimmune disease that affect the digestive system) or autoimmune thyroid disease have a higher risk of developing type 1 diabetes than the general population. This may be because these conditions share similar genetic and environmental risk factors with type 1 diabetes (Størdal, 2015).

It is important to note that while these risk factors have been identified, not all individuals with these risk factors will develop type 1 diabetes. Additionally, there may be other factors that contribute to the development of the disease that are not yet fully understood.

2.6 Prevention of type 1 diabetes complications

Several prevention strategies have been proposed to reduce the risk of developing type 1 diabetes. One approach is to identify individuals who are at high risk of developing the disease and to closely monitor them for the early signs of diabetes. This approach, known as "screening," involves testing for the presence of autoantibodies that target pancreatic beta cells. Individuals who test positive for these autoantibodies can be closely monitored and may benefit from early treatment (Ziegler, Rewers, & Simell , 2013).

Another approach is to intervene early in the disease process to prevent the destruction of pancreatic beta cells. One potential intervention is the use of immunosuppressive drugs, which can help to slow or halt the autoimmune attack on pancreatic beta cells (Pescovitz, Greenbaum, & Krause-Steinrauf, 2009). Another approach is the use of oral insulin, which has been shown to induce immune tolerance and prevent the onset of type 1 diabetes in animal models (Orban, Bundy, & Becker, 2011).

Just importantly, there is some evidence to suggest that dietary interventions may be effective in preventing the onset of type 1 diabetes. For example, a study conducted in Finland found that children who were given a diet high in omega-3 fatty acids had a reduced risk of developing type 1 diabetes (Niinistö, Takkinen, & Uusitalo, 2017). Similarly, another study found that children who were exposed to a diverse range of foods during the first year of life had a reduced risk of developing type 1 diabetes (Virtanen, *et al.*, 2012).

2.7 Management of type 1 diabetes

The management of T1D requires a lifelong commitment to blood glucose monitoring, insulin therapy, and lifestyle modifications. This subsection will review the current treatment options for T1D.

2.7.1 Early screening and detection.

Type 1 diabetes is a chronic illness that necessitates ongoing monitoring and care. While there is no treatment for T1D, the condition can be adequately managed, and the risk of complications reduced. Complication prevention is critical because T1D, if not controlled properly, can lead to a variety of issues affecting practically every system in the body. The prevention of complications in individuals at risk of or diagnosed with type 1 diabetes

(T1D) should commence prior to its onset by addressing risk factors. After a confirmed diagnosis, proactive interventions are necessary to avoid further harm to β-cells. These preventive measures can be implemented prior to the occurrence of T1D by addressing risk factors such as genetic predisposition, the presence of antibodies, and prediabetic conditions. Subsequently, interventions can be applied once a child is diagnosed with diabetes to mitigate further harm to β-cells. (Viswanathan, 2015).

2.7.2 Insulin Therapy

Insulin therapy is the fundamental pillar of T1D management. The goal of insulin therapy is to replace the insulin that the pancreas is no longer producing. Insulin can be administered via injections or an insulin pump. The choice of insulin regimen depends on various factors, such as age, weight, activity level, and lifestyle (ADA 2021) c. There are several types of insulin available, including rapid-acting, short-acting, intermediate-acting, and long-acting. The rapid-acting insulin analogs, namely, insulin lispro and insulin aspart, have a faster onset of action and a shorter duration of action than regular insulin. This makes them suitable and efficient for mealtime insulin coverage. The long-acting insulin analogues, such as insulin glargine and insulin detemir, have a more prolonged duration of action and provide basal insulin coverage (ADA 2021) c.

2.7.3 Continuous Glucose Monitoring (CGM)

CGM is a technology that measures glucose levels continuously through a sensor inserted under the skin. CGM provides real-time glucose data and can alert the patient to high or low glucose levels. CGM can help patients make informed decisions about insulin dosing, food intake, and physical activity. CGM has been shown to improve glycaemic control and reduce the risk of hypoglycaemia in patients with T1D (Beck, Riddlesworth, & Reudy, 2017).

2.7.4 Artificial Pancreas

The artificial pancreas is an emerging technology that involves the combination of insulin pumps, CGM, and a computer algorithm to automate insulin delivery. The system can adjust insulin delivery based on real-time glucose data, allowing for more precise insulin dosing. The artificial pancreas has been shown to improve glycaemic control and reduce

the risk of hypoglycaemia in patients with T1DM (Weisman, Bai, Cardinez, Kramer, & Perkins, 2017), (National Institute of Diabetes and Digestive of Kidney Diseases 2021).

3 Aim

The aim of this study is to enhance the knowledge of nurses and persons about the prevention of diabetes type 1 complication.

3.1 Research questions

Q1: what are the measures for preventing complications of type 1 diabetes mellitus?

Q2: what are the roles of the nurses in enhancing the quality of life among persons suffering from type 1 diabetes mellitus?

4 Theoretical Framework

A theoretical framework in nursing research refers to a set of concepts, theories, and assumptions that guide the study design and interpretation of findings. It serves as a foundation for understanding and explaining the phenomenon under investigation. A well-developed theoretical framework helps researchers organize their thoughts, identify variables or factors that may influence the outcomes, and establish logical relationships between these variables. Additionally, it enables researchers to generate hypotheses based on existing knowledge and test them empirically (Stommel, Given & Given 2004).

The theoretical framework of this study is based on two influential nursing theories that offer unique but complimentary perspectives on patient care. The theories of Imogene King's Theory of Goal Attainment and Katie Eriksson's Theory of Caritative Care provide comprehensive frameworks for understanding the complex aspects of nursing practice, patient relationships, and healthcare outcomes.

4.1 Imogene king´s theory of goal attainment

Imogene King's Theory of Goal Attainment is adopted for the purpose of this research, as it offers a comprehensive framework for examining the dynamics of self-care in nursing research. It provides a lens through which researchers can analyse the nurse-patient relationship, communication, goal setting, and factors influencing patients' ability to engage in effective self-care practices. Imogene King's Theory of Goal Attainment stands out as a comprehensive model that focuses on understanding the interactions between individuals, their environments, and their health-related goals (King 1981).

It’s been established that people suffering from type 1 diabetes are at risk of certain complications like Nephropathy. Proper goals related to preventing complications from this chronic disease must be established with a nurse-patient collaboration related to complication prevention, such as maintaining optimal blood glucose levels in diabetes or managing blood pressure in hypertension. And exploring the factors that motivate them to engage in selfcare practices. King´s theory principles of patient-centred care, communication, goal setting, and holistic understanding, contributes to effective strategies

for preventing complications and improving the overall health and well-being of individuals with type 1 diabetes.

This theory recognizes the importance of collaboration between nurses and patients in identifying and setting achievable goals. By understanding patients' roles, perceptions, and stressors, nurses can tailor interventions that address individual needs and challenges. For instance, a patient with diabetes aiming to prevent diabetic foot complications can collaborate with a nurse to set goals related to foot care practices and blood sugar management.

4.2 Main concepts of Imogene king´s theory

The Imogene King's Theory of Goal Attainment is constructed on numerous fundamental ideas that, when taken as a whole, offer a comprehensive comprehension of the dynamic interactions that take place between persons and the settings in which they find themselves (King, 1981). This theory acknowledges the uniqueness of an individual's experiences, connections, and societal influences by basing its basis on personal systems, interpersonal systems, and social systems (King, 1981). According to King (1981), the theory places an emphasis on the significance of perception, communication, and interaction as essential components that contribute to the accomplishment of health-related goals. The personal system, which refers to the individual with type 1 diabetes, the interpersonal system, which includes the healthcare provider or diabetes care team, and the social system, which encompasses the individual's broader social environment are the three interconnected systems that are described in King's model (Husband, A., 1988). According to King's definition from 1981, nursing care is a process of collaboration between the nurse and the patient in which the two parties create, negotiate, and ultimately achieve certain goals. The method places an emphasis on the requirement of interpersonal connections, communication, and mutual understanding in order to obtain the best possible outcomes in terms of health. King's theory offers an organized approach to nursing practice that is aligned with the larger healthcare system. This is accomplished through the theory's emphasis on goal formulation and achievement.

4.3 Katie Eriksson theory of caritative care

The caritative care theory developed by Katie Eriksson is a relational approach to the practice of nursing that places an emphasis on caring as the fundamental component of nursing.

According to Eriksson, caring is a complex and ever-changing activity that addresses all aspects of a person's life, including those of the person providing care as well as the person receiving care. This idea places an emphasis on the importance of having empathy, compassion, and love when providing nursing care, in addition to recognizing the intrinsic human dignity that exists in every person. It is possible for nurses and other healthcare personnel to develop a compassionate relationship with their patients by implementing Eriksson's concept of caritative care (Hemberg & Gustin 2020). This involves respecting and preserving the patient's dignity in spite of whatever suffering they may be experiencing.

5 Methodology

The term "methodology" refers to the process of systematically gathering and analyzing data in order to provide a response to a particular research question or hypothesis, and it is an essential part of every research project. It is the framework that directs the entirety of the research project, offering a clear and structured approach to the process of data collection and analysis. Because it enables researchers to collect accurate and reliable data, methodology is important because it helps researchers to draw valid conclusions and make decisions based on evidence (Creswell, 2014). Methodology is important because it enables researchers to acquire accurate and reliable data.

One can do a systematic literature review using a variety of methods, such as quantitative research, qualitative research, or mixed method research, which is a hybrid strategy that combines the qualitative and quantitative research approaches. The qualitative research method was determined to be the most suitable approach for this study, and as a result, it was utilized.

5.1 Qualitative study

According to Creswell (2013), qualitative research is characterized by its focus on exploring complex social phenomena, such as attitudes, beliefs, and experiences, through non-numerical data collection and analysis. Qualitative research seeks to uncover the underlying meanings, motivations, and contexts that shape human actions. By employing various data collection methods, analysis techniques, and interpretation strategies, qualitative research provides a window into the subjective world of individuals and groups. One of the key strengths of qualitative research is its ability to capture the richness and complexity of human experience (Braun & Clarke, 2019). By collecting data through techniques such as interviews and observations, qualitative researchers can gain insight into the social and cultural contexts in which phenomena occur.

5.2 Data collection

This study focuses on sourcing of data from previous peer-reviewed articles using online books, PubMed, Google scholar, while narrowing it down to publications that are considered relevant for the study.

The search wasn't made limited to certain geographical part of the world, but included research made all part of the globe, provided they are in English language and not any other language. Several searches were carried out primarily using electronic databases like CINAHL complete (2013-2023), EBSCO (2013-2023), PubMed (2013-2023) as they are rich in scientific publications.

The following keywords and phrases were utilized in the search to identify and extract relevant studies from the databases; Type 1 diabetes mellitus, **or** insulin-dependent diabetes, **or** T1D, **or** juvenile diabetes. Prevention of complications. Nurses' roles in managing type 1 diabetes. Management of type 1 diabetes.

Using these keywords, and the conjunctions **or**, relevant studies were retrieved and carefully assessed. The database search process, including the keywords search and hits are presented in the table below.

Relevant studies were chosen as follows, CINHAL complete (1), EBSCO Academic search elite (2), PubMed (4) Medline (1). Furthermore, these studies were conducted between year 2013-2023 and were chosen as follows: 2013 (1), 2014(1), 2015 (1), 2016 (1), 2021 (1), 2022 (2), 2023(1). Additionally, the selected studies were conducted in total of 7 countries which include United Kingdom (1), United States of America (2), Finland (1), Sweden (1), Canada (1), China (1), and New Zealand (1).

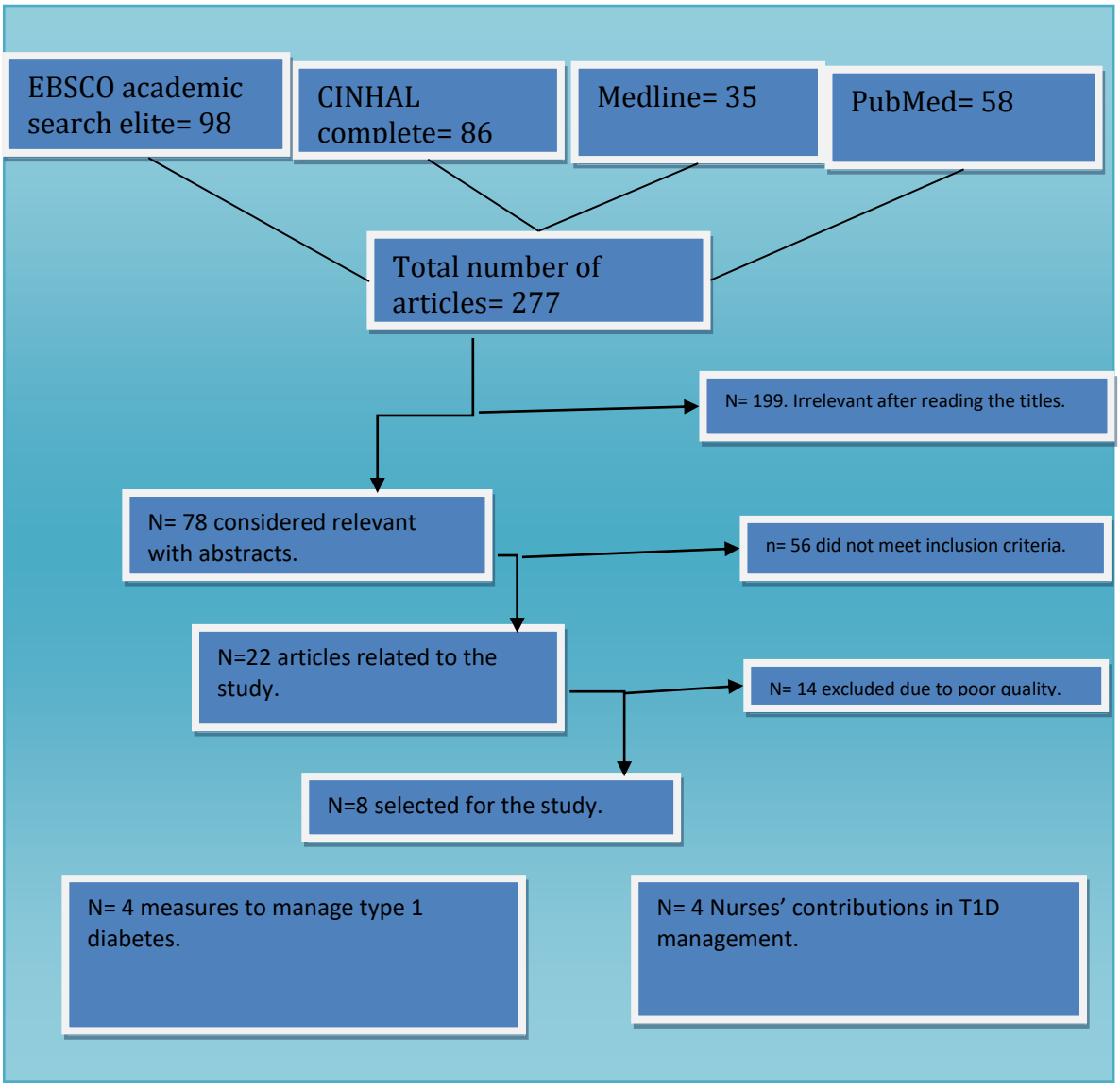


Table 1. Flow chart of selection of studies for this qualitative review.

5.2.1 Inclusion and exclusion criteria.

The inclusion and exclusion criteria of this paper was carefully considered as its going to play a crucial role in the scope of the research and determining which studies are relevant for the analysis. The following inclusion criteria were considered.

Year of publication: studies published between the year 2013 and 2023 were considered to ensure the relevance and recency of the research.

Study design: only peer-reviewed articles were considered to ensure the study had undergone rigorous review and validation by experts in the field.

Language: to avoid language barriers in understanding and analysing of the study, only studies published in English language were included.

Research focus: only studies related and relevant to the research studies and research question were included by specifying the key concepts to "nurses' role in preventing t1d diabetes complications", "management/intervention".

Furthermore, studies published before 2013 were excluded to maintain the recency of the study, any materials that are not peer-reviewed were excluded to ensure credibility and quality of the studies. To facilitate comprehension and maintain consistency, studies published in languages other than English language were excluded. Studies that do not directly address the research question were excluded, for example, studies on gestational of type 2 diabetes.

5.3 Data analysis

Data analysis is a process of making sense of research data through the identification of patterns, themes, and relationships (Lacey & Luff 2007). They described data analysis as a way of reducing the data into manageable units and transforming them into meaningful information and are grouped into three types namely, content analysis, thematic analysis and theoretical analysis. This study would however adopt the content analysis approach which is a widely used method for analysing qualitative data that involves systematically analysing and interpreting the content of textual, visual, or audio data (Krippendorff, 2019). This type of analysis allows researchers to systematically analyse large amounts of data, identify patterns and themes, and develop insights into the phenomenon being studied (Elo & Kyngäs, 2008).

Literature analysis is critical in qualitative research since it serves as the foundation for developing the context, theoretical framework, and study design. The first step in qualitative literature analysis is to discover relevant literature. This entails doing a systematic search of academic databases, journals, books, and other scholarly sources in order to find studies, theories, and concepts relevant to the research question. This preliminary stage establishes the groundwork for developing a strong theoretical framework and directing following research decisions. After identifying relevant literature,

the researcher analyses key concepts, theories, and models relevant to the study. This includes describing and critically evaluating existing theories, as well as explaining how they relate to the research question. The researcher establishes the theoretical basis of the study, clarifying the conceptual framework on which the research is developed (Creswell, 2013).

One of the primary goals of literature analysis is to synthesize the findings and essential ideas from prior qualitative studies that are relevant to the research topic. This synthesis provides a thorough review of what is known and unknown in the topic, providing the researcher with a solid foundation in existing knowledge. This synthesis may uncover common themes, concepts, or patterns that can be used to construct research questions or hypotheses (Denzin & Lincoln, 2017). Researchers use literature analysis to find recurring concepts, themes, or patterns in the literature that are relevant to their research. These repeating components are useful for establishing research questions and conceptual frameworks. They also influence the qualitative study's subsequent collection and analysis phases (Maxwell, 2013).

6 Ethical consideration

According to the National Institutes of Health (2018), ethical considerations are a set of ideas and norms that direct researchers and other professionals in how to carry out their work in a manner that is respectful of the rights and dignity of individuals and groups who are involved in the research or activity.

Ethical considerations in research include protecting the rights and welfare of study participants, ensuring that participants give informed consent to participate, maintaining confidentiality and privacy, minimizing the potential for harm and risks, and ensuring that the research is carried out in a fair and just manner (World Medical Association, 2013). In addition, ethical considerations are fundamental to the upkeep of the research process's credibility. Researchers are obligated to carry out research that is valid from a methodological standpoint, objective, and free from any kind of misconduct or fraud. When it comes to publishing the results of research, ethical guidelines, such as the ones offered by the International Council of Nurses (ICN, 2012), place a strong emphasis on the significance of being transparent and honest. The application of these principles guarantees that the findings of the research will be reliable and that they will be able to be utilized to inform evidence-based nursing practice.

In addition, adherence to ethical standards is an extremely important factor in maintaining the legitimacy of research investigations. Maintaining ethical standards helps prevent problems like as making up data, plagiarizing other people's work, and having competing interests. The American Nurses Association (ANA) Code of Ethics (ANA, 2015), which encourages honesty and responsibility, is one of the recognized codes of ethics that nursing researchers are obliged to adhere to. Researchers can increase the trustworthiness of their work and so make it possible for their results to contribute significantly to the nursing profession if they uphold rigorous ethical standards in their work.

Since this investigation was carried out utilizing the qualitative methodology, person participation was not required for its completion. Building upon the ideas presented in the prior paragraphs, the purpose of this thesis is to acknowledge and abide by significant ethical guidelines and standards. In order to avoid plagiarizing one's work, this verifies that none of the sources, including journals and articles, have been used as a replacement for

the original source. The author did not fabricate any information or embellish any data; rather, the author gave appropriate references whenever it was required to do so in order to boost the study's credibility.

In addition, the supervisor and the author were able to effectively communicate with one another to receive assistance regarding the appropriate structure for the research.

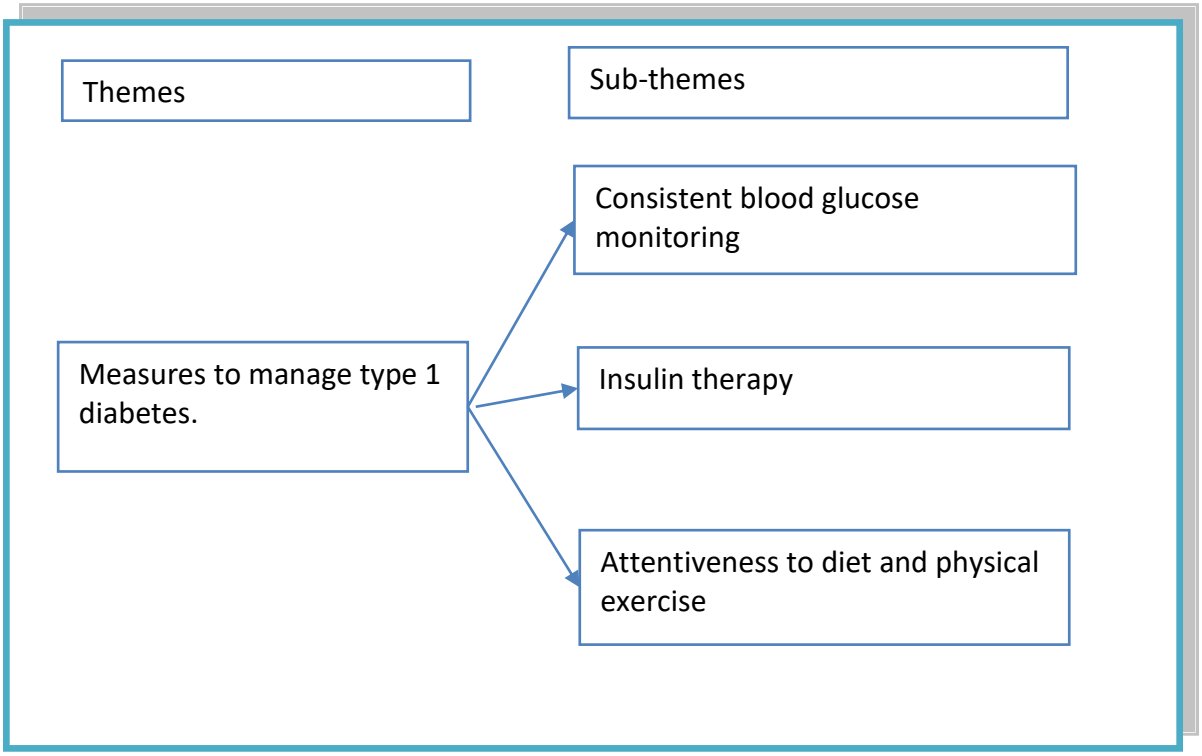
7 Results

This chapter will address the findings from the seven selected studies for this review. Their results will be categorized according to the research questions as shown in chapter 3. The first category will highlight the measures to take to manage and avoid type 1 diabetes complications. Whereas the second category will discuss the role of nurses in managing type 1 diabetes.

7.1 Measures to Manage Type 1 Diabetes

The sub-section will highlight measures that could be utilized by the type 1 diabetic patient to successfully manage the disease. The measures will be presented as identified in the reviewed literatures, they address measures such as early diagnoses, consistent glucose monitoring, insulin therapy, and attentiveness to diet and exercise, which will be presented in table 2 and further discussed in the subsequent sub-section. The four studies that address this issue are (Carlsund, & Söderberg, 2018; Lawrence, Cummings, Pacaud, Andrew Lynk, Metzger, 2015; Phiri, Mowat, & Cook, 2022; Sy, 2016).

Table 2: Management strategies for Type 1 Diabetes



7.1.1 Consistent Glucose Monitoring

Consistent monitoring of blood glucose monitoring is a good nursing intervention for controlling and management type 1 diabetes. Monitoring the blood sugar level of a diabetic patient is a good approach to avert type 1 diabetes complications. This measure should be taught to every nurse, who will then pass the knowledge on to the patients. Also, this method should be complemented with behavioural changes (diet and physical exercise) on blood sugar level. Evidence shows that the general state of insulin delivery and glucose monitoring devices has improved, which has helped people with type 1 diabetes control their diabetes (Phiri, Mowat, & Cook, 2022).

Furthermore, as earlier mentioned, type 1 diabetes blood sugar monitoring needs consistent and continuous approach compensated with good diet and exercise regimen. Blood glucose checks should be performed on children at least four times a day (before each meal and before bed), with more frequent testing being ideal for all and necessary for some (Lawrence, Cummings, Pacaud, Andrew Lynk, Metzger, 2015). More recently, there is innovative technology that enables this blood sugar level to be checked more frequently and reliably, this is called the continuous glucose monitoring systems or CGMs for short,

which helps to check the blood glucose level every 5 minutes (Lawrence, Cummings, Pacaud, Andrew Lynk, Metzger, 2015).

7.1.2 Insulin Therapy

Insulin therapy via insulin injection is a good approach to continuously manage type 1 diabetes. The reason for this therapy for type 1 diabetes is because pancreas produces very little or no insulin, this makes it very necessary for the patient to continuously take insulin doses every day. Nurses play crucial roles in this regard by ensuring that these patients are injected with the required doses of insulin either through hospital care or by empowering them to do at home. This is exactly where patients and family education are very important. Through this teaching, they are empowered to engage in self-care. Self-care education is an important tool because the consistency of insulin injection will become too cumbersome for the patients if they are to visit the hospital for this care. Patients benefit so much because this approach helps them to save cost, time, and energy while managing type 1 diabetes. For example, imagine a retired patient with little resources to travel to the hospital on daily basis for insulin injection, this approach will erode their little savings and could further impoverish them.

Interestingly, more recently, there is type 1 diabetes control improvement through multiple daily injections and is typically best achieved with an insulin pump or multiple daily injections (MDI) (Lawrence, Cummings, Pacaud, Metzger, 2015). This study further added that MDI entails administering injections of rapid-acting insulin in addition to a base dose of long-acting insulin with every meal or snack (four to six injections per day). Insulin pump users must administer an insulin bolus through their pump before eating. The pump is a continuous basal dosage insulin delivery system (Lawrence, Cummings, Pacaud, Metzger, 2015; Sy, 2016). Thus, the amount of insulin to be injected to the patient is calculated based on the amount of glucose in the bloodstream.

7.1.3 Attentiveness to Diet and Physical Exercise

Paying close attention to diet and physical activity is an important step towards managing type 1 diabetes and averting its complications. It is essential to pay close attention to what we eat, food too insulin in carbs is more likely to lead to frequent heights in blood sugar level among these patients. Like early mentioned, amount of insulin to be injected goes along with the calculated amount of glucose in the patient’s blood. Indicating that paying

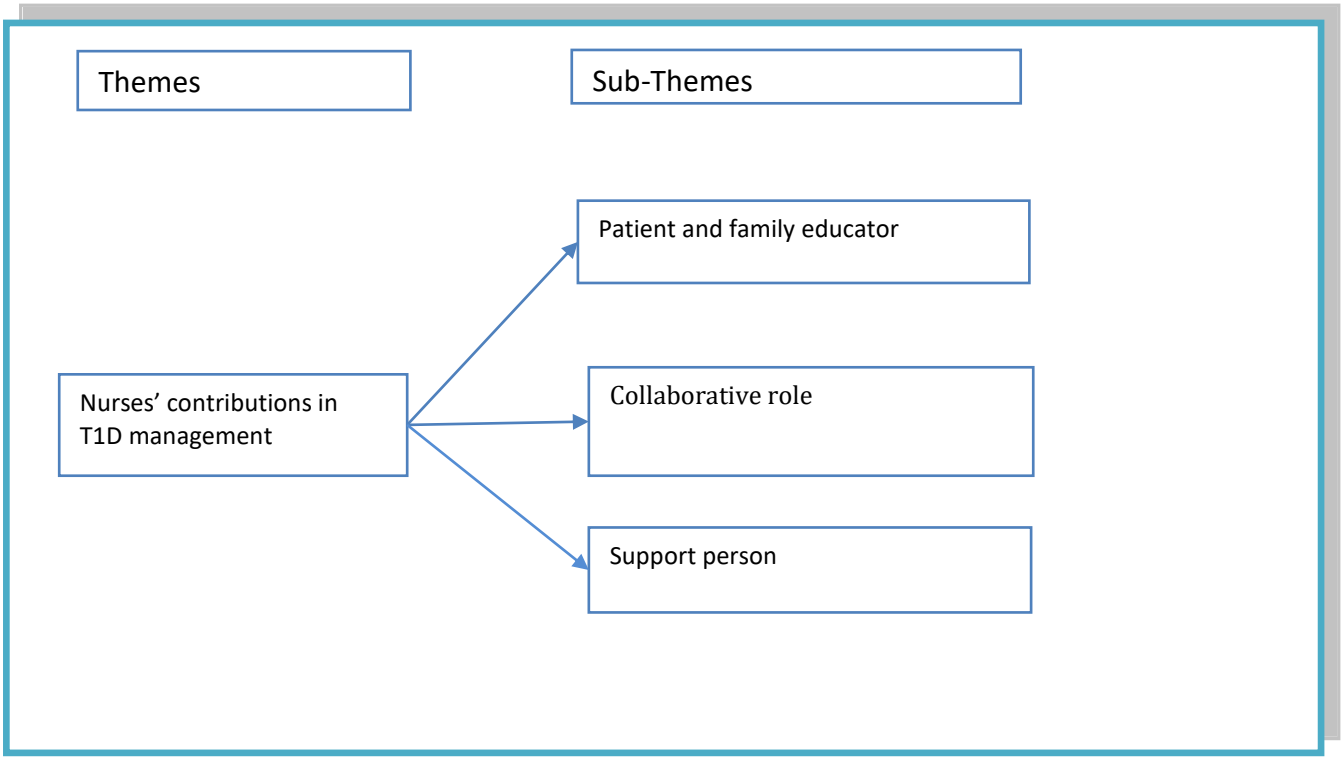
attention to what the patient eats is an important element in the manage of type 1 diabetes and its associated complications. Food rich in vitamins, proteins, with a little bit of carbohydrate should go a long way in helping patients to stay healthy. This involves collaboration with other healthcare professionals, particularly the dietician who recommends appropriate diabetic diets to the patient.

Physical activities on its part remains an undeletable approach to help type 1 diabetes to remain healthy. Physical exertion can result in hypoglycaemia because it increases the efficiency of glucose uptake into muscle and other tissues, therefore, youngsters with type 1 diabetes must be encouraged to engage in physical activity and all scheduled school activities (Lawrence, Cummings, Pacaud, Metzger, 2015; Carlsund, & Söderberg, 2018). Lawrence, Cummings, Pacaud, Metzger, 2015 revealed when it comes to physical activity, food consumption and blood glucose monitoring are even more crucial. To avoid sudden change s in hypoglycaemia or hyperglycaemia, parents must be informed of planned modifications to school activity schedules to modify the insulin dosage and lunch plan (Lawrence, Cummings, Pacaud, Metzger, 2015; Carlsund, & Söderberg, 2018). Thus, it is worthy to note that to avoid the incidence of low blood sugar level it is important to eat full meals or snacks in accordance with the person's physical activity.

7.2 Role of nurses in the management of type 1 diabetes

There are varieties of role a nurse can take in the management of type 1 diabetes. These roles will be presented as identified from the reviewed literatures. The roles that emerged are patient and family educator; inter-professional collaboration; and supportive care, see table 2 for the presentation of these themes and their corresponding sub-themes. The five studies that centred their discussion under this category are (Alshammari, Windle, Bowskill, & Adams, 2021; Kelo, Eriksson, & Eriksson, 2013; Sy, 2016; Dai, Chen, Huang, Wu, & Yang, 2022; Burke SD., Sherr D., & Lipman RD., 2014).

Table 3: Nurses contributions in Type 1 Diabetes Management



7.2.1 Patient and Family Educator

The primary role of a nurse is to serve as a caregiver for those that are ill, by ensuring their physical needs are met, helps in the management and prevention of ill-health. To accomplish this role, the nurse should be able to observe and monitor the patient's health condition and document the findings for further treatment and nursing care. In addition to this, the nurse steps in as a patient and family educator by empowering them with key information that would enable them to understand about the disease (Sy, 2016; Dai, Chen, Huang, Wu, & Yang, 2022).

These educators combine experience in biological and social sciences, communication, counselling, as well as deep knowledge of diabetes treatment. This understanding enables them to support people in identifying and accomplishing self-management objectives. These objectives frequently emphasize on behaviour change, which leads not only to improved clinical outcomes but also to enhance problem-solving abilities, general health perception, and quality of life (Burke SD., Sherr D., & Lipman RD., 2014).

Nurses play an important role in educating Type 1 Diabetes (T1D) patients as part of their overall care. Their duties as educators extends beyond simply giving knowledge but includes helping patients to effectively manage their illness. It is critical to help persons with diabetes get the knowledge, skills, and capacities needed for effective, long-term self-management of their illness (Burke, SD. *et al* 2014).

Patients are taught about the pathophysiology of the disease, and ways to manage it as there is no cure for it. At the same time, family members are involved in the teaching, so that they can learn the same information as the patient and serve as reinforcers and motivators for key practices at home. For example, imagine a 75-year-old type 1 diabetic patient with Alzheimer disease, at this point, family involvement in the teaching become a necessity because the family member will serve as key player in the reinforcement of the teaching skills to the patient.

This patient and family education has positive correlation with controlled type 1 diabetic complications. This is particularly true when this educational program is challenged in enhancing self-care behaviour among these patients. Diabetic care and management include patient empowerment and encouragement for self-management (Alshammari, Windle, Bowskill, & Adams, 2021).

A report from a participant in one of the selected studies revealed that,

"We ask the patients what they want to get out of the consultation and then I personally have a duty of care to make sure that they have the correct information. So, I will deliver education in a way that I feel is appropriate to the patient." (Alshammari, Windle, Bowskill, and Adams, p. 686, 2021).

The participants further revealed some of the challenges they encountered while trying to educate these patients. One of the challenges is the holistic demand from the patients about the entire information regarding type 1 diabetes. They pinpointed that these patients are concerned about getting detailed information about their condition, advancement, and treatments. Apart from this challenge, most nurses highlighted the issue of language barrier, saying that most the patients lack the ability to speak in an understandable English language, which to them, required additional resources in the form of hiring a language translator (Alshammari, Windle, Bowskill, and Adams, 2021).

Evidence from a participant reinforces this issue of language challenge, saying,

"The patient cannot speak or understand English very well. The nurse was trying to understand what he was saying and to make sure he understands what she is saying. Alternatively, she was drawing for him and writing to make sure he understood what she said. The consultation took more than 30 minutes, but the patient looked comfortable and appeared to indicate understanding of what the DN said" (Alshammari, Windle, Bowskill, and Adams, p. 686, 2021).

7.2.2 Collaborative Role

In nursing, collaboration with diverse personalities is possible. This makes possession of inter-personal skills, particularly inter-professional collaboration an essential part of nursing. Inter-professional collaboration occurs when two or more people from different professional backgrounds work together to achieve a common goal. For example, in the care of a type 1 diabetic patient, there is a high possibility that a nurse will encounter the service of other health care professionals such as diabetic health practitioner, social worker, dietician, physiotherapist, amongst others. (Alshammari, Windle, Bowskill, and Adams, 2021). Excellent inter-professional collaboration can lead to less hospitalization, avoidance of health complications, and medical errors.

However, despite the importance of collaboration in the treatment and care of these patients, nursing job face numerous challenges in actualizing this objective. One of such challenges is the shortage of nursing staff to take care of these patients. The few available nurses are put to pressure to deliver on the job. They are made to work more than their normal workload, leading to intense burn out and absence from work.

For example, in one of the selected studies, a participant reported that,

"We are expected to do more and more and see more and more people as there is a lack of staff. You know there are so many things to be done by one person and that makes us feel tired and exhausted." It is worthy to note that when a nurse is frustrated and exhausted, there is a high chance that the nurse will lose sense of care, leading to more medical errors (Alshammari, Windle, Bowskill, and Adams, p. 688, 2021).

7.2.3 Supportive Role

Supportive care is one of the nurses' roles in diabetes management. Nurses provide several kinds of supportive roles to their patients, by responding to their individual needs. They

respond to the patients' holistic and comprehensive needs that are directly connected to diabetic care. For example, in one of the selected studies a nurse described how her unit catered to the many needs of patients, such as foot care, physical and psychological care, cultural and economic concerns, and social support (Alshammari, Windle, Bowskill, and Adams, 2021).

Evidence from a participant in one of the studies revealed that,

"Our patients come with different needs and we make sure we cover these needs. Some of them [patients] have needs that are related to their cultural back grounds, others have financial problems and in that case, we try to provide some solutions, though this needs other interventions that are not under our scope of practice …" (Alshammari, Windle, Bowskill, and Adams, p. 687, 2021).

It has been found that giving T1D patients care that is tailored to their specific needs improves the quality of care they receive and is thought to improve patient outcomes including successful diabetes control and patient satisfaction with care (Alshammari, Windle, Bowskill, and Adams, 2021). The heart of playing this role is to tackle long terms issues the patient could face due to the present disease condition. Nurses help these patients to get connected to the social welfare system through the social worker so that their welfare needs are tackled. In addition, they can get connected to non-governmental organizations and other diabetic social clubs, to learn from similar people on strategies to cope with their health condition.

8 Discussion

This systematic literature review provides understanding of the multidimensional roles and responsibilities of nurses in caring for individuals with T1D with the goal of preventing complications from this disease. It's been established that Individuals diagnosed with type 1 diabetes are also susceptible to the development of additional autoimmune disorders, which can occur in combination with polyglandular autoimmune syndrome (DiMeglio, Evans-Molina, & Oram 2018).

The key findings of the selected studies will be discussed in relation with the research questions, namely: what are the roles of nurses in enhancing the quality of life among persons suffering from T1D? And, what are the measures to preventing complications of T1D?

8.1 Roles of nurses in enhancing the quality of life among persons suffering from T1D.

The investigation into the contributions of nurses in the management of Type 1 Diabetes (T1D) uncovers diverse aspects, which are categorized into specific themes and sub-themes. These are clarified in the research conducted by Alshammari et al. (2021), Kelo et al. (2013), Sy (2016), and Dai et al. (2022). All of these responsibilities—patient and family education, collaborative engagement, and supportive care—are critical in enhancing patient outcomes while minimizing complications associated with type 1 diabetes.

Patient and Family Education is recognized as a key component in the management of diabetes, with the dual purpose of educating patients and engaging their family members in the educational journey (Sy, 2016; Dai, Chen, Huang, Wu, & Yang, 2022). Particularly for patients with unique needs. However, there are certain obstacles that must be overcome, most notably the language barrier and the patients' demand for thorough information concerning their medical condition and treatment options (Alshammari, Windle, Bowskill, & Adams, 2021). The study findings indicate that in order to promote effective communication between nurses and patients, it is frequently necessary to utilize supplementary resources, such as language translators (Alshammari, Windle, Bowskill, & Adams, 2021).

The importance of nurses' collaborative function as members of the interdisciplinary healthcare team cannot be overstated in ensuring comprehensive patient care (Alshammari, Windle, Bowskill, & Adams, 2021). Nevertheless, the escalation of work demands and the potential for exhaustion and compromised patient care are consequences of the difficulties caused by nursing staff shortages (Alshammari, Windle, Bowskill, & Adams, 2021). This highlights the criticality of resolving staffing concerns in order to preserve the quality of care and prevent medical errors caused by healthcare providers who are overburdened.

The range of supportive care provided by nurses is extensive, comprising various aspects such as foot care, psychological assistance, cultural sensitivity, and social support (Alshammari, Windle, Bowskill, & Adams, 2021). Individualizing patient care substantially improves the standard of care and increases patient satisfaction. Establishing connections between patients and social welfare systems, non-governmental organizations, and diabetic support groups is crucial for facilitating the development of effective coping mechanisms and addressing long-term challenges associated with the disease (Alshammari, Windle, Bowskill, & Adams, 2021).

8.2 Measures for preventing complications of T1D.

Measures to control type 1 diabetes are essential in promoting the health of individuals. These measures include a range of care components, all designed to improve the overall health of patients and reduce the likelihood of complications related to the condition. The management of type 1 diabetes requires adherence to the four critical strategies detailed in this research result-early diagnosis, consistent glucose monitoring, insulin therapy, and vigilance regarding diet and exercise.

Regular monitoring of blood glucose levels is an essential component in the management of type 1 diabetes (Phiri et al., 2022). Consistent monitoring facilitates enhanced management and prevention of complications. The education of patients regarding the important role of regular monitoring of blood sugar levels is a critical responsibility of nurses (Lawrence et al., 2015). In addition, blood sugar level checks have been significantly transformed by technological advances, including continuous glucose monitoring systems (CGMs), which permit more frequent and reliable monitoring (Lawrence et al., 2015).

Due to insufficient insulin secretion by the pancreas, insulin therapy, which is administered via injections, continues to be a fundamental approach in the management of type 1

diabetes (Lawrence et al., 2015). By educating patients, nurses enable them to self-administer insulin, thereby fostering self-care and alleviating the need for frequent hospital visits for injections (Lawrence et al., 2015). The implementation of insulin pumps or multiple daily injections (MDI) has demonstrated potential in improving the regulation of blood glucose levels (Lawrence et al., 2015; Sy, 2016).

It is critical to prioritize diet and exercise when it comes to the management of type 1 diabetes (Carlsund & Soderberg, 2018; Lawrence et al., 2015). It is imperative for individuals with diabetes to adhere to a well-balanced diet, paying special attention to their consumption of carbohydrates in order to prevent abrupt increases in blood glucose levels (Lawrence et al., 2015). The involvement of dietitians in the process of formulating individualized dietary programs is beneficial. At the same time, promoting physical activity is crucial for the preservation of general health, nevertheless necessitating careful monitoring of blood glucose levels and modifications to one's diet (Carlsund & Söderberg, 2018).

Imogene king’s theory of goal attainment and Katie Eriksson’s caritative theory best elucidate the significant approaches for patient care in the result findings. King's Theory of Goal Attainment emphasizes the importance of mutual goal setting and understanding between the nurse and the patient. The theory is consistent with the patient and family education aspect as mentioned the previous paragraph. King's theory suggests that nurses strive to comprehend the requirements of their patients, impart knowledge to them, and engage in collaborative efforts to establish health-related goals. Given the circumstances, imparting knowledge to patients and their families regarding diabetes, its management, and the importance of self-care aligns with the objective-oriented component of King's theory.

Katie Eriksson's Caritative Theory places significant emphasis on the concept of caring moments and caritative factors, stressing the crucial importance of attending to the comprehensive requirements of the patient. The key findings of this review point out the responsibility of nurses to accommodate the diverse requirements of patients, taking into consideration cultural, economic, and psychological factors. Eriksson's theory places great importance on the value of human dignity, and this is evident in the nurse's attempts to deliver individualized, patient-centred care. For instance, in the context of language barriers encountered by patients, Eriksson's theory supports the notion that nurses should utilize supplementary modes of communication, such as writing or sketching, in order to guarantee comprehension for the patients. This is consistent with Eriksson's principle of

compassionately comprehending and attending to the patient's requirements, taking into account their vulnerabilities.

Furthermore, both theories align with the collaborative dimension of nursing, specifically in regard to inter-professional collaboration in the provision of diabetes care. The collaboration among healthcare personnel referred to in the study findings reflects King's theory, which emphasizes the significance of interpersonal relationships in attaining shared objectives. Furthermore, Eriksson's theory emphasizes the significance of collaboration by perceiving it as a method to provide comprehensive healthcare for individuals.

9 Strengths and Limitations

The most important advantage of this study is that the research issue is highly relevant in the field of healthcare due to the rising prevalence of diabetes, especially in Finland. Furthermore, the thesis has clear clinical implications, which may provide practical insights that healthcare organizations may use to improve the care delivery systems and nursing practices that they utilize in the management of diabetes.

One of the limitations of this thesis is scope and depth, diabetes care itself is multifaceted, and covering all aspects comprehensively within the constraints of a bachelor's degree thesis pose a challenge. also, there seemed to be substantial literature available on diabetes management and nursing roles which could have potentially provided a rich source of information and diverse perspectives to support the thesis, however, accessing specific articles on TYPE 1 diabetes and **not** other type of diabetes was another challenge faced by the author.

10 Conclusion

The management and prevention of complications associated with type 1 diabetes represent a challenge in the field of healthcare that calls for an approach that draws from a variety of disciplines. Throughout the entirety of this thesis, an investigation of the crucial part that nurses play in reducing the risk of these problems has been carried out. The comprehensive analysis of selected studies for this research sheds light on the numerous contributions made by nurses and reveals the significance of their responsibilities in patient education, collaborative care, and supportive activities in respect to preventing these complications.

However, issues such as a lack of staff, language barriers, and the fact that managing diabetes is becoming more difficult mean that nurses need to be empowered by continuous education, support, and adequate staffing.

The study has the potential to serve as an inspiration for continuous learning and progress in diabetes care. It has the potential to bridge the gap between theoretical knowledge and actual application, which can ultimately benefit both nurses and Type 1 diabetes patients in their attempts to prevent complications and improve quality of life.

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Appendices

Appendix A. database search process.

Database	Search terms	Hits	Abstract	Relevance to the research	No. of selected articles
CINHAL complete	Nursing interventions/management/treatment for T1D.	86	28	6	1
Medline	Nurses' role in management of T1D/ staff nurses as primary educators.	35	13	4	2
PubMed	Preventing complications of type 1 diabetes.	58	22	7	3
EBSCO academic search elite	Diabetes management/ roles of nurses.	98	15	5	2
Total		277	78	22	8

Appendix B: PRISMA checklist

		Burke et al, 2014 (Journal of Diabetes, Metabolic Syndrome and Obesity)	Alshammari et al, 2021 (journal of nursing)	Carslund & Söderberg 2018 (nursing)	Dai et al, 2022 (alternative therapies in health and medicine)
	TITLE & ABSTRACT				
1	If the titles and abstract were clearly stated	Y	Y	Y	Y
	INTRODUCTION & METHOD				
2	If the study's problem was clearly introduced.	Y	Y	Y	Y
3	Clear aim and research question.	Y	Y	Y	Y
4	Clear specification of the inclusion and exclusion criteria.	Y	Y	Y	Y
5	Were the search method explicitly stated?	Y	Y	Y	Y
6	Transparency in the data collection process?	Y	Y	Y	Y
7	Were the study findings clearly highlighted?	Y	Y	Y	Y
	RESULTS				
8	Flowchart utilization to show the selection process?	Y	Y	Y	Y
9	Presentation of the results in a thematic manner?	Y	Y	Y	Y
10	Identified biases in the study	Y	Y	Y	Y
11	Clear indication of certainty of evidence	Y	Y	Y	Y
	DISCUSSION				
12	Provided comprehensive	Y	Y	Y	Y

	analysis of results with existing evidence?				
	Other Information				
13	Study limitations were outlined?	Y	Y	Y	Y
14	The significance of the findings for practical application, policy-making, and further investigation was deliberated upon?	Y	Y	Y	Y
15	If the evidence limitations were discussed?	Y	Y	Y	Y
16	Provided financial or nonfinancial funding resources?	Y	Y	Y	Y
17	Were any conflicting interests reported?	Y	Y	Y	Y
18	Specified where study's protocol could be found?	Y	Y	Y	Y
19	The template, data extraction from included studies, data codes, and any other pertinent materials were specified?	Y	Y	Y	Y

Appendix B: PRISMA checklist continuation

		Phiri et al, 2022 (Nursing Praxis in Aotearoa)	Sarah et al, 2015 (Paediatrics & Child Health)	Sy Virginia, 2016 (paediatric nursing)	Kelo et al, 2013 (Journal of diabetes and metabolic disorders)
	TITLE & ABSTRACT				
1	If the titles and abstract were clearly stated	Y	Y	Y	Y
	INTRODUCTION & METHOD				
2	If the study's problem was clearly introduced.	Y	Y	Y	Y
3	Clear aim and research question.	Y	Y	Y	Y
4	Clear specification of the inclusion and exclusion criteria.	Y	Y	Y	Y
5	Were the search method explicitly stated?	Y	Y	Y	Y
6	Transparency in the data collection process?	Y	Y	Y	Y
7	Were the study findings clearly highlighted?	Y	Y	Y	Y
	RESULTS				
8	Flowchart utilization to show the selection process?	Y	Y	Y	Y
9	Presentation of the results in a thematic manner?	Y	Y	Y	Y
10	Identified biases in the study	Y	Y	Y	Y
11	Clear indication of certainty of evidence	Y	Y	Y	Y
	DISCUSSION				
12	Provided comprehensive analysis of results with existing evidence?	Y	Y	Y	Y
	Other Information				

13	Study limitations were outlined?	Y	Y	Y	Y
14	The significance of the findings for practical application, policy-making, and further investigation was deliberated upon?	Y	Y	Y	Y
15	If the evidence limitations were discussed?	Y	Y	Y	Y
16	Provided financial or nonfinancial funding resources?	Y	Y	Y	Y
17	Were any conflicting interests reported?	Y	Y	Y	Y
18	Specified where study's protocol could be found?	Y	Y	Y	Y
19	The template, data extraction from included studies, data codes, and any other pertinent materials were specified?	Y	Y	Y	Y

Keywords: Y= yes, N=No, NA= non-applicable, UN= unclear.

Appendix C: data extraction from chosen studies.

First author, year and journal.	Burke et al, 2014 (Journal of Diabetes, Metabolic Syndrome and Obesity)	Sy Virginia, 2016 (paediatric nursing)	Sarah et al, 2015 (Paediatrics & Child Health)	Kelo et al, 2013 (Journal of diabetes and metabolic disorders)
Topic	Partnering with diabetes educators to improve patient outcomes.	Empowering Staff Nurses as Primary Educators to Children with Type 1 Diabetes	What nursing interventions and healthcare practices facilitate type 1 diabetes self-management in young adults?	Pilot educational program to enhance empowering patient education of school-age children with diabetes.
Aim	The goal of this study is to explain the components of comprehensive and ongoing diabetes education and support, as well as to illustrate the efficacy of collaboration with a qualified diabetes educator.	The study aimed at empowering staff nurses to take on the role of primary educators for paediatric patients with type 1 diabetes.	The article aims to highlight the importance of consistent and comprehensive policy to manage type 1 diabetes in Canadian schools.	It aimed at improving nurses' skill and study their perceptions of empowering techniques through an educational program for children with type 1 diabetes.

Country/ target population	Addresses patients with type 1 and 2 diabetes.	Paediatric patients diagnosed with type 1 diabetes and the nurses working in a 14-bed paediatric unit in USA.	Children and youth with type 1 diabetes attending schools in Canada.	8 of 10 nurses who provide diabetes care were interviewed.
Methodology	Qualitative research	Qualitative study	Integrative review	Qualitative research with a semi-structured interview.
Type of study	Care provider and patient perspective.	Providers and patient-based perspective study	Patient based.	Care provider perspective
Results	The findings highlight the significance of diabetes self-management education and the role of diabetes educators in improving glycaemic control, reducing complications, and improving the quality of life for people with diabetes.	The study´s findings include improved knowledge and confidence among staff nurses in caring for diabetic patients, reduced readmissions, and increased patient and caregiver satisfaction.	The article suggests establishing minimum supervision standards, providing diabetes education to school staff, developing individual care plans for students with diabetes, providing safe self-care areas, and integrating diabetes care into the school routine.	Successful management of empowering patient education process. However, there were difficulties in adopting improvements in nursing procedures.
Conclusion	Continuous education, personalized treatment, and the role of diabetes educators is important in achieving better outcomes for individuals managing diabetes.	Continuous education of nurses boosts their confidence and has a positive impact on patient outcome.	A standardized approach to diabetes management in schools is essential to ensure the safety, health, and academic performance of students with diabetes.	The study delivered an evidence-based patient education program focusing on diabetic empowerment approaches.

Appendix C: data extraction from chosen studies continuation.

First author, year and journal.	Phiri et al, 2022 (Nursing Praxis in Aotearoa)	Alshammari et al, 2021 (journal of nursing)	Carslund & Söderberg 2018 (nursing)	Dai et al, 2022 (alternative therapies in health and medicine)
Topic	What nursing interventions and healthcare practices facilitate type 1 diabetes self-management in young adults? An integrative review.	The role of nurses in diabetes care	Living with type 1 diabetes as experienced by young adults.	The Role of Nurses in Taking Care of Children with Type 1 Diabetes
Aim	Aimed to explore the best practices and strategies for young adults with Type 1 Diabetes (T1D) to improve	The aim of the study is to explore the role of nurses in diabetes care through a qualitative analysis.	The article aims to explore the experiences of young adults living with type 1 diabetes.	The purpose of this text is to investigate Type 1 Diabetes (T1D), with an emphasis on its autoimmune

	self-management.			nature, etiology, epidemiology, pathophysiology, diagnosis, and the role of nurses in its identification, diagnosis, and treatment.
Country/ target population	Young adults between 16-25 years old in New Zealand.	Nurses working in a unit specifically those that provide diabetes care.	Young adults living with type 1 diabetes in Finland.	Individuals affected or that are at risk of developing type 1 diabetes.
Methodology	Integrative review.	Qualitative approach using semi-structured interview to gather data.	Qualitative research.	Qualitative literature review.
Type of study	Patient perspective	Care provider and patient perspective.	Patient based.	Patient and care provider perspective.
Results	The study showed that technology, particularly mobile health apps, helps young adults with T1D manage their condition. Health providers must aggressively offer and educate on T1D management technology to ensure its use and efficacy.	The challenges, responsibilities, and experiences of nurses in diabetes care, as well as their adherence to guidelines and protocols were highlighted.	The results of the study revealed two main categories and five subcategories related to the experiences of young adults living with type 1 diabetes. The main categories are "handling the situation" and "managing daily life," and the subcategories include dealing with different opinions, emotional roller coaster and general attitudes, own views and apprehensions, ignorance, and lack of motivation	The article discussed the autoimmune nature of T1D, its etiology, which includes genetic predisposition as well as environmental factors, epidemiological trends, the pathophysiology of T1D development across three stages, symptoms, diagnostic criteria, and the critical role of nurses in diagnosis and management.
Conclusion	Proposed implementing technological solutions to improve individuals with type 1 diabetes daily lives.	Derived implications or recommendations for enhancing the role of nurses in diabetes care from the qualitative analysis of the perspectives and experiences of nurses.	young adults with type 1 diabetes face various challenges in managing their illness, including emotional and social aspects, and highlights the importance of providing support and education to improve their quality of life.	Emphasizes the vital role of nurses in the diagnosis, investigation, and treatment of paediatric diabetes.