

# **Nurse's role in diabetes management: Challenges and facilitators**

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<p>Abstract:</p> <p>The purpose of this study is to explore and discuss the role of nurses in diabetes management and patient education as well as it sheds light on the facilitators and the possible barriers that are perceived by both nurse-patient to achieve the optimal self- management of diabetes. The genre of this study is a literature review in which three main electronic database search engines are used to retrieve the data. EBSCO, PubMed and ScienceDirect. The study is designed with inductive content analysis in which 10 articles were selected to be the relevant for conducting this study. Pender's Health Promotion Model (1982-1996) and Orem's Self-care Deficit Theory (1953-2001) are used as theoretical framework for this study. The study accentuated the role of nurses in diabetes management a being educators, evaluators, supporters, advocates and policy makers. In additions to the role of nurses in diabetes management, the literature review also outlined various approaches that can be used to by nurses to empower diabetic patients and to deliver effective patient education such as continuous rehearsing about diabetes and about most updated knowledge. Also, the study revealed certain challenges that hamper patient education and self-care management due to the lack of skills and knowledge about diabetes. Overall, nurses play a significant role in providing diabetics with effective patient education about diabetes and empowering diabetics to carry out self-care.</p>	
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## **FOREWARD**

I am grateful to the God for the good health and wellbeing that were necessary to complete this thesis.

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Anouar Abou-hafs,

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# 1. INTRODUCTION

Diabetes mellitus is a type of carbohydrate metabolism disorder caused by a combination of hereditary and environmental factors and usually characterized by inadequate secretion or utilization of insulin, by excessive urination, by high blood sugar in blood and urine, and by thirst, hunger and loss of weight (Merriam-Webster 2018). 350 000 people in Finland of whom 50 000 have type 1 diabetes and 300 000 have type 2 diabetes. Around 4000 children under the age of 15 have diabetes. The number of undiagnosed cases of type 2 is estimated are 150 000 according to Finnish Diabetes Association (2018).

Globally speaking, WHO (2017) revealed that the number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014. The number of adults over 18 years has risen from 4.7% in 1980 to 8.5% in 2014. In the light of these numbers, diabetes is increasing rapidly throughout the world especially diabetes type 2.

Type 1 and type 2 diabetes have a different cause and different treatment, but they have common long-term complications. According to WHO (2017), diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. In 2015, an estimated 1.6 million deaths were directly caused by diabetes and 2.2 million deaths were related indirectly to high blood glucose. WHO states that almost half of all deaths are linked to high blood glucose occur before the age of 70 years, and by 2030 diabetes will be the seventh leading cause of death.

Due to this enormous numbers of morbidity and mortality that caused by diabetes, the role of patient education in diabetes management becomes more important than ever for national and international healthcare systems and organization to tackle pandemic of diabetes mellitus. The optimum goal of patient education is to enable patients to perform effective self-care and to have knowledge of the disease.

This alarming situation becomes a challenge to public health providers, as a future nurse, the decision was made to review the available researches done on nurse's role in diabetic management and patient education as well to find other available preventive mechanism that are used to encounter diabetes mellitus.

The aim of this study is to explore and discuss nurse's role in diabetes management and to shed light on any possible barriers and facilitators that are perceived by both nurse and patient.

## 2. BACKGROUND

### 2.1 Prevalence of diabetes

The prevalence of diabetes is increasing at a great rate around the world. According to International Diabetes Federation (2017), currently 1 in 11 people have diabetes (425), 1 in 2 adults with diabetes is undiagnosed (212 million), over 1 million children and adolescents have type 1 diabetes, three-quarters of people with diabetes are of working ages (327 million). China has the highest number of adults (age 20-79) with diabetes estimated around 114.3 million followed by India with 72.9 million adults with diabetes and United States with 30.1 million adults with diabetes (International Diabetes Federation 2017).

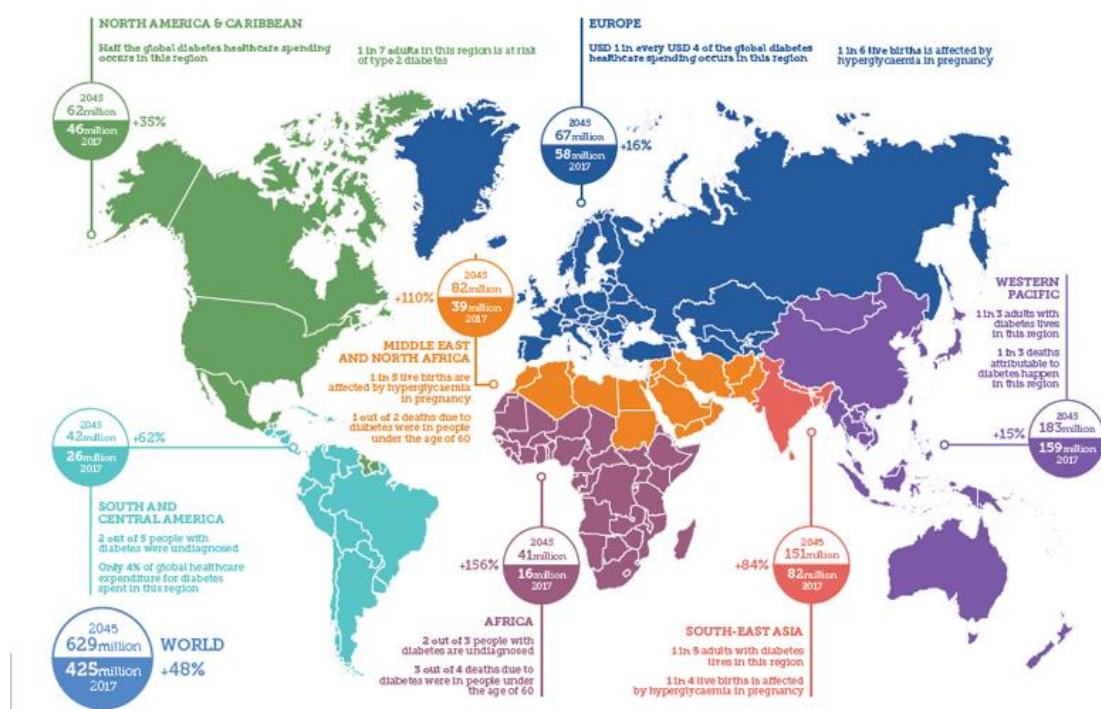


Figure 1. Map of global diabetes prevalence (International Diabetes Federation, 2017).

It is clear from the above data indicate that diabetes problem is now a truly global epidemic. The map (see fig 1.) demonstrates areas around the world that have a higher rate



of diabetes, for instance, North America and Asia countries. Rapid changes in lifestyle associated with modern life have led to sharp increase in the prevalence of diabetes in Asia. According to International Diabetes Federation (2018), China and India have an alarming rate of childhood obesity which is itself an accelerating factor in type 2 diabetes.

## **2.2 Economic burden of diabetes**

Besides the tremendous impact of diabetes and its complications as health burden on quality of life and morbidity and mortality, it also has enormous economic burden globally. The direct costs of medical care (\$851 billion per year), loss of work and wages considered as substantial effects of diabetes on patients and their families, on health systems and national economies (Zhang & Gregg 2017). Globally, around 327 million people with diabetes are of working age, 12% (\$727 billion) of global health expenditure is spent on diabetes (International Diabetes Federation 2018).

However, early detection of diabetes is very crucial in finding appropriate treatment and preventing the complications and the burden this puts on an individual's quality of life, morbidity and mortality (international Diabetes Federation 2018).

## **2.3 Etiology**

Diabetes mellitus (diabetes) occurs when the body's capacity to utilize glucose, fat and protein is disturbed due to insulin deficiency, insulin resistance or both. If enough insulin is not produced or insulin action is defective, fat and protein stores are mobilized and converted into glucose to supply energy (Dunning, 2012, p.2). Insulin is a hormone that controls the amount of glucose in the bloodstream; it is secreted by the pancreas. The pancreas is a compound organ, exocrine and endocrine glands, that secretes digestive enzyme into the duodenum via a pancreatic duct to break down carbohydrates and fats (exocrine function). And secretes directly insulin and glucagon hormones into the bloodstream (endocrine function). Insulin and glucagon are only the main inter-related pancreatic hormones which play a vital role in maintaining glucose homeostasis and in regulating nutrients storage (Britannica 2018).

Insulin and glucagon both react to blood glucose concentrations in opposite way. Insulin is secreted by pancreatic beta cells whenever the pancreas senses the blood sugar is high, it keeps being secreted constantly at low levels even though blood sugar is at a normal level. In opposite to insulin, glucagon is released by the pancreatic alpha cells whenever pancreas senses the blood glucose is at too low levels; for instance, during fasting, between meals or during exercising. Glucagon secretion is halted when blood sugar level is elevated (Diabetes Library 2018).

Diabetes leads to high blood sugar levels and if left untreated it can cause damage to the body's organs (eyes, kidneys, and heart), blood vessels and nerves (WHO 2018)

### **2.3.1 Types of Diabetes:**

There are many forms of diabetes mellitus, however, type 1 diabetes and type 2 diabetes are the major types of diabetes. Each of these types of diabetes has different underlying causes and varies in treatment as well.

#### ***2.3.1.1 Type 1 Diabetes***

Type 1 diabetes is the form of the disease occurs primarily due to Beta cell destruction. This causes complete deficiency of insulin. Individuals with type 1 diabetes are metabolically normal before the disease is clinically manifested, but the process of Beta cell destruction can be detected earlier by the presence of certain autoantibodies. Type 1 diabetes usually is characterized by the presence of anti-GAD, anti-islet cell, or anti-insulin antibodies, which reflect the autoimmune processes that have led to Beta cell destruction (Kahn 2007, p.333). To put it differently, Type 1 diabetes develops when the immune system wrongly attacks and kills the beta cells of the pancreas. Consequently, insufficient or no amount of insulin is released into the bloodstream which leads to cause the accumulation of glucose in the blood instead of being used or stored as energy (Diabetes teaching center 2018).

Historically, type 1 diabetes was largely considered a disorder in children and adolescents, however, this belief has changed recently, so the fact that the age is not anymore restrictedly consider as onset factor (Leslie, cited in Atkinson et al, 2014). Despite the fact that type 1 diabetes can occur at any age, it is still considered as one of the most common childhood diseases in developed nations. For instance, type 1 diabetes is the

most common in Finland (>60 cases per 100 000 people each year) and Sardinia (around 40 cases per 100 000 people each year). On the contrary, the disorder is uncommon in China, India, and Venezuela (around 0.1 cases per 100 000 people each year) (Atkinson et al 2014).

### *Risk factors*

Up-to-date the cause of type 1 diabetes is unknown as well it is not preventable with available knowledge; however, there is a strong family link stands as a risk factor. According to Fonseca (2010), classical features of Type 1 diabetes are the history of ketoacidosis, weight loss at diagnosis, full insulin dependency and if insulin is missed, ketosis occurs, excessive thirst, hunger and urination; additionally, the patient may have other autoimmune disorders such as hypothyroidism.

### **Treatment**

The treatment of Type 1 diabetes involves predominantly taking insulin on a regular basis. The purpose of insulin treatment for type 1 diabetes is to lower blood sugar levels to the normal range as shown below (*see table 1*) (Scobie & Samaras 2012). The insulin treatment is pharmacological treatment long side with other medications such as Metformin, helps the liver to process sugar and Pramlintide which acts as a hormone to help body control glycaemia. Besides pharmacologic therapy, self-monitoring blood glucose, calories counting, eating healthy food, exercising regularly and maintaining optimal body weight are all essential components of Type 1 diabetes (JDRF 2018).

*Table 1. Recommended target blood glucose level ranges by the global Diabetes Community 2018.*

<b>Target Levels</b>	<b>Upon waking</b>	<b>Before meals</b>	<b>At least 90 minutes after meals</b>
<b>Type 1 diabetes</b>	5 to 7 mmol/L	4 to 7 mmol/L	5 to 9 mmol/L
<b>Type 2 diabetes</b>		4 to 7 mmol/l	Under 8.5 mmol/L
<b>Children w/ type 1 Diabetes</b>	4 to 7 mmol/L	4 to 7 mmol/L	5 to 9 mmol/L
<b>Non-diabetic</b>		4.0 to 5.9 mmol/L	Under 7.8 mmol/L

### *2.3.1.2 Type 2 diabetes*

Type 2 diabetes is the most common form of diabetes and is characterized by insulin resistance and high blood sugar (American Diabetes Association 2018). According to Vivan Fonseca (2010), Type 2 diabetes is characterized by various metabolic disorders, mainly including insulin resistance which may be present for many years before the onset of diabetes mellitus and relatively lack of insulin secretion due to the slow response of Beta cells to glucose rise in the bloodstream. In addition to these main abnormalities, an excessive secretion of glucagon after a meal due to lack of suppression of glucagon after a meal; consequently, this leads to the increased production of glucose in the liver and hyperglycemic spikes. Patients who are diagnosed with Type 2 diabetes, they often do not need insulin as treatments to survive, nevertheless, many require controlling their blood sugar. However, insulin resistance may improve with weight reduction and pharmacologic treatment which result in stabilizing of glycaemia (Kahn 2007).

### *Gestational diabetes*

According to WHO classification of diabetes (2017), gestational diabetes (known as pregnancy diabetes) is considered as a subform of type 2 diabetes. Gestational diabetes mellitus is hyperglycemia related to carbohydrate intolerance occurs during pregnancy and characterized either by elevated or lower concentration of glucose in the bloodstream comparing to non-pregnant women during fasting (Kahn 2007). In addition, it can happen any time during pregnancy. The onset of Gestational diabetes occurs when there is not enough of insulin secretion that could meet extra needs in pregnancy (NHS 2016). Pregnant women who are high risk to develop gestational diabetes are those who are marked with obesity, previous history of gestational diabetes or strong link family history of diabetes (Kahn 2007).

## *The risk factors*

### Genetics

Type 2 diabetes generally considered as lifestyle disease; however, many studies reveal that type 2 diabetes is related strongly to the genetic background more than type 1 diabetes. Interestingly, genetic predisposition to type 2 diabetes has a hand in defect of Beta-cell which its function lies in insulin secretion (Scobie & Samaras 2012).

### Environment

Environment factors significantly play a major role in type 2 diabetes onset. World Health Organization (WHO 2018) states that the majority of people diagnosed with diabetes worldwide have type 2 diabetes and is caused mainly by the excess body weight and physical inactivity. Many studies show that obesity around abdominal area aggravates insulin resistance. The consumption of foods and drinks that are highly rich in carbohydrates and fat increases the chance to get obesity, thus it triggers insulin resistance. Indeed, obesity has an extremely strong effect on causing all forms of diabetes (Scobie & Samaras 2012). In addition to aforementioned factors, belonging to certain ethnic groups such as Native Americans, Afro-Americans, Polynesians or Micronesian, Asian Indian, Hispanic and Middle Eastern increases chance to develop Type 2 diabetes (Kahn 2007).

## **2.4 Diabetes Complications**

Any form of diabetes mellitus leads to complications that are classified either as acute, chronic, or both ones (World Health Organization 2017).

### *2.4.1 Acute Complications*

Acute complications occur as result of uncontrolled blood sugar caused either by that patient takes mismatching dosage of insulin, skipped or delayed meals. According to UCSF Medical centre (2018), the acute complications of diabetes mellitus include:

- *Hypoglycemia* is the state when blood sugar decreases severely under normal levels symptomatically causes shaking, sweating, sudden moodiness, headache, tachycardia, lack of coordination, seizures, confusion and loss of consciousness.

- *Hyperosmolar hyperglycemia* is the state when blood sugar is extremely high, and the body tried to discard the excess sugar in the urine concurrently leading to dehydration. Hyperglycemia is considered a serious medical emergency that can lead to death. The symptoms include excessive urination, thirst, confusion, fatigue, seizure and coma.
- *Diabetic ketoacidosis* is medical condition occurs when there is insufficient insulin to allow enough glucose to enter cells consequently making the body to burn fatty acids and cause acidic ketone bodies. Ketoacidosis is a typical type 1 diabetic complication. Symptoms include vomiting, dehydration, hyperventilation, fruity scented-breath, disorientation and coma.

#### 2.4.2 Chronic complications

The long-term complications of diabetes mellitus are categorized mainly into microvascular complications and macrovascular ones.

##### Microvascular complications

Microvascular complications of diabetes mellitus are specifically related to hyperglycemia. High blood sugar leads to various biochemical changes that cause tissue damage, in consequence, leading to organ failure in long-term (Fonseca2010).

- *Diabetic retinopathy*, known as diabetic eyes disease, is caused by the breakdown of blood vessels in retina gradually leading to blindness among adults aged from 20 to 74. In addition to this, other vision complications may occur also such as glaucoma, cataracts and other eye disorders (Fonseca2010). Between 80 to 90% of patients show some degree of retinopathy after 20 years of diabetes mellitus (Scobie& Samaras2012).
- *Diabetic nephropathy* is a condition caused by long-term elevated blood sugar in which blood vessels and glomeruli (filtering unit in kidney) are damaged. Symptoms include increased protein and microalbumin in the urine and high blood

pressure. Diabetic nephropathy is the leading cause of chronic renal failure in the West (Scobie& Samaras2012).

- *Diabetic neuropathy* (UCSF Medical Center2018), known as accumulated nerve damage, is caused when elevated levels of blood sugar damage the blood vessels that supplying the peripheral nerves. This simultaneously leads to damage of nerves in lower limbs especially. Amputation and foot ulceration are the most common consequences of diabetic neuropathy and major causes of morbidity and disability among diabetic people (Fonseca 2010).

### Macrovascular complications

Hyperglycemia is considered primarily as one of the major risk factors for developing cardiovascular diseases in people with diabetes. Cardiovascular disease is the major cause of mortality for diabetic patients, as well it is considered as a major contributor to morbidity and diabetic financial burden for people with diabetes (Fonseca 2010). According to WHO (2018), hyperglycemia gradually damaging blood vessel via clogging of arteries, known also as atherosclerosis. Narrowing of arteries leads to lessened blood flow to heart muscles, to the brain and to extremities. According to ADA (Diabetes Care Association 2018), uncontrolled diabetes, elevates low-density cholesterol (LDL)level in blood plasma, concurrently, decrease high-density cholesterol (HDL). This leads to the likelihood of plaque formation in arteries. In other studies, conducted by BPA (Blood Pressure Association UK 2008), states that about 25% of people with Type 1 diabetes and 80% of people with Type 2 diabetes have high blood pressure.

## 2.5 Treatment

The treatment of Type 2 diabetes is to some extent is not different from Type 1 diabetes. Except that Type 1 diabetes treatment depends greatly on insulin therapy. The primary goal of type 2 diabetes treatment to help control blood sugar levels and maintaining the ideal body weight. The treatment includes lifestyle adjustments, tablet medications, and

insulin injection (the global diabetes community, 2018). Diet is very important when it comes to type 2 diabetes management since obesity is linked particularly to type 2 diabetes development. Improving insulin sensitivity and making diabetes easier to manage depends highly on losing weight. Additionally, physical activities are also an effective method of controlling blood glucose levels in the way the body is eager to restore extra glucose from the bloodstream into muscle and liver. Furthermore, other lifestyle changes such as quitting smoking and reducing intake of alcohol will help diabetes management in particular and health in general (the global diabetes community 2018).

### **2.5.1 Diabetic Management and Patient Education**

The central concern for the most healthcare systems around the world is to meet and to control the demand for healthcare through empowering people's ability to self-manage of their health especially when it comes to non-communicable diseases such as diabetes. According to International Diabetes Federation (2018), 1 in 5 health care professionals do not have any postgraduate training in diabetes; less than 1 in 2 people with diabetes and 1 in 4 family members of people with diabetes have access to diabetes education programmes. Diabetes self-management can be challenging for both patients and health care providers. Because failing to support and empower self-care can lead to high dependency on health care professionals concurrently leading to increased health care costs (Wanless, cited in Coulter 2011). Coulter (2011) defines self- management as self-care activities that are carried out by most people with long-term chronic conditions. For people with chronic diseases to carry such self- care activities, they need health professionals' intervention in educating patients and supporting self-management (Mulligan et al, cited in Coulter 2011). According to Coulter (2011), the types of patient support and Education may include the following:

- Information: about disease, treatment or management options and prevention



- Education: about the effective self-care and behavior change
- Skills training: For instance, how to perform technical tasks such testing blood glucose levels, how to inject insulin etc
- Behavior change: adopting and adapting a certain healthy lifestyle
- Clearing misconceptions: changing patient's belief about the causes of certain illness and guide what patient needs to do about improving their conditions
- Emotional support: providing patients with coping mechanisms for dealing with the impact of their illness and its effect on their emotions such as dealing with depression and worry.

Fonseca (2010), in this regard, adds for achieving effective self-care, patient motivation also is the key concept in active self-management. Fonseca states to effectively enhance patient motivation for diabetes self-care, the health care providers must follow these steps:

- ✓ Engaging patient by helping them finding personal meaningful diabetes-related concern such as asking patient open-ended questions, e.g. what is the hardest thing for you right now about living with diabetes?
- ✓ Evaluating patient's knowledge, health literacy, self-care behavior, financial resources, and emotional aspect such as asking patient's "do you feel that you know enough to manage your diabetes effectively?"
- ✓ Explaining to patient self-care action plan such weekly schedule for exercising and dietary plan
- ✓ Encouraging patient's efforts to achieve self-goals such as focusing on what went right and maintaining positivity.

Effective management of diabetes plays an essential role in reducing short and long-term complications of diabetes (Hark et al, cited in Alotaibi et al 2017). Patient education is regarded as the cornerstone of self-diabetes management. Educating people with diabetes is an essential tool to help individuals to take an active role in their own management of diabetes. Diabetes requires day-to-day knowledge of dietary, glucose monitoring, exercise and medication (Joslin Diabetes Center 2018). Scobie and Samaras (2014) state that the role of education is not only to inform the individuals about complications and treatment of diabetes but also to empower them through interpretation of their behavior and helping them psychologically to have control over their diabetes.

Diabetes education and self-management involve different medical professionals' intervention. Nurses across the nursing spectrum including occupational health nurses, nurses in public health care, school nurses, and diabetes specialist nurses all of them play an essential role in diabetes care (Royal College of nursing 2018). Redman stated (Redman, cited in Mertig Girouard 2012, p.162):

The true overriding goal of patient education should be to support the patient's autonomous decision making, not (as it has been conceptualized) to get the patients to follow doctor's orders [...] True patient's autonomy requires creating new options to meet patient needs, not just as in now frequently the case, having the right to refuse a treatment option.

Understanding patient's autonomy enables healthcare professionals to deliver effective patient education, thus achieving full engagement of patient in the care plan and understanding the outcomes of treatment decision-making (Dunning 2012)

### **3 THEORETICAL FRAMEWORKS**

Pender's Health Promotion Model(1982-1996) and Orem's Self-Care Deficit Theory(1953-2001) are used as theoretical framework for this research., Pender's model focuses on empowering individuals to take action for their self-care by adjusting their behaviors and their attitudes against potential illness, while Orem's theory of self-care deficit focuses on the incapacity of individuals to meet the self-care requirements, the theory focuses on nursing role in patient's quality of life is deteriorated.

#### **3.1 Health Promotion Model**

Pender's health promotion model provides a holistic view towards all individuals by assessing individual's background and perceptions of self to predict health behaviors (Ripollone Jacqueline Mn.d). Pender defines her model of health promotion as "guide for exploration of complex biopsychosocial processes that motivate individuals to engage in behaviors directed toward the enhancement of health" (Pender, Cited in Ripollone Jacqueline M n.d). Pender's model is based on three major concepts (Petiprin 2016):

1. Individual characteristics and experiences, this applies to the individual's background and personal factors
2. Behavior specific cognitions and effect, this means the steps and measures that are taken into account to meet the goals that are planned.
3. Behavioral outcomes could be seen in the commitment to take actions, nursing empowerment, and preferences.

According to Pender (Petiprin 2016), these three conceptions are interrelated in nature. The model views each person has unique personal attributes and experiences that affect his/her actions. The actions are based on various behavioral factors, for instance, these factors can be created and motivated through nursing actions. As result, the health-promoting behavior is effectuated, meaning improved health and better quality of life.

The theoretical assumption of this model that is related to the study in the sense that the health care practitioners are part of the interpersonal environment and have a remarkable impact on individuals' life. Nurses play an essential role in empowering and educating the patients to manage their diabetes effectively targeting to achieve patient's self-care.

### **3.2 The Theory of Self-care Deficit**

Self-care nursing theory is considered as one the ideal self-care nursing theories that deliver an adequate theoretical guide to plan and implement good self-care among patients. It was developed by Dorothea Orem between 1959 and 2001 (Wayne 2014). Self-care theory is viewed as a grand theory which consists of three interrelated sub-theories: The self-care theory, the self-care deficit theory, and the nursing systems theory. The Orem's grand theory based on the following concepts (Renpenning & Taylor 2003):

1. Self-care: persons' activities towards maintaining self's functioning
2. Self-care agency: the ability of the person to give self-care
3. Self-care demands: the actions that are needed to maintain self-care, if those actions are not performed, the result would be death, injury, and self-deterioration
4. Nursing agency: The ability to plan, to implement and manage nursing activities with and for others in need
5. Self-care deficit: This concept focuses on the inability of the person (self-care agency) to meet self-care demand, here is when nurse's role is needed
6. Conditioning factors: Age, sex, health, socio-cultural attitudes, health care system, lifestyle, and resources.

In this regards, Orem (Orem, cited in Parker 1990, p.47-60) sees that the three interrelated sub-theories focus on the relation of persons to the aforementioned concepts. Each of the sub-theories defines person's relation. For instance, the theory of self-care focus-

es on the self or I (e.g. patients, adults, adolescent...); the theory of self-care deficit focuses on relation of the self towards the other, you and I (e.g. patient to nurse, patient to his/her own family), the theory of nursing systems focus the self as a social unit within the community and the environments.

Before talking about self-care deficit theory, it would be worth noting the Orem's definition of the concept of nursing which explains the role of the nurse. According to Orem (Cited in Renpenning & Taylor 2003, p.6), nursing is a practice and didactic art in which nurse delivers a specialized assistance to patients in order to meet their daily needs for self-care and clinical care as well to help patient's family and friends to contribute in enhancing the patient's well-being. Orem believes (Orem, cited in Renpenning & Taylor 2003, p.8) that the art of nursing is based on three forms: "caring for the patient, helping the patient to care for himself and instructing patient and/or another to acquire the knowledge and skills that are necessary to give the required care."

The self-care deficit theory views that the nurse's role is determined by patient's dependencies (Renpenning & Taylor 2003). In other words, Nursing is required when an individual is unable to or limited to meet the effective self-care. For instance, the patient with uncontrolled diabetes mellitus, having impaired circulatory lower extremities, is in need of nursing intervention. Orem identifies five methods of nursing's role in self-care deficit model (Current Nursing 2012):

- "Acting for and doing others
- Guiding others
- Supporting another
- Providing an environment promoting personal development in relation to future demands
- Teaching another"

### **3.3 The Relevance of Theory**

Diabetes mellitus is a chronic disease that has a negative impact on individual's health quality (American Diabetes Association 2010). As the author already mentioned about the complications of diabetes and deterioration that may cause to patient's wellbeing as whole. Due to high prevalence of diabetes mellitus especially its type 2 diabetes, 425 million people globally living with diabetes (International Diabetes Federation 2017), nurses need to have adequate knowledge and skills of patient education and special diabetic care. The chronicity of diabetes urges patients to be in need constantly for self-care management and empowerment and this can be only done by receiving effective education from diabetes-trained health care professional. Therefore, Pender's model of health promotion and Orem's theory of self-care deficit are used as a theoretical framework for this study to explore nurse's role in educating and empowering people with diabetes as well to deeply understand the concept of self-care in relation the to diabetes management from both patient and nurse's point of view.

## **4 AIM AND RESEARCH QUESTIONS**

The aim of this study is to explore and discuss the nurses' role in diabetes management, also to shed light on any possible barriers and facilitators that perceived by both nurse and patient in term of self-management of diabetes. Diabetes self-management is a challenge for both nurses and patients. This study is conducted on the purpose to shed light on the nurse's role in empowering and patient education as well to address the challenges that stand against achieving effective diabetes self-management.

### **1.1 The Research Questions:**

1. What is nurse's role in diabetes management?
2. Are there any possible barriers and facilitators perceived by both nurse and patient to achieve the optimal self- management of diabetes?

## 5 RESEARCH METHODOLOGY

The study is a literature review in nature conducted through a qualitative research method in which Induction approach is used. According to Aveyard (2010), a literature review is the comprehensive study and evaluation of the available literature that is related to a certain topic. Conducting a literature review goes across identifying research question(s) then answering the question(s) by searching for and analyzing relevant literature using a literature review approach. The author chose to conduct a literature review on the topic because it provides an overview of previous studies that investigated nursing roles and barriers that health care providers face in delivering patient education and diabetes management skills to people with diabetes. Since the research questions are qualitative, using the qualitative research method, content analysis, is the appropriate method to answer the questions. This qualitative method allows the author to have a close reading of the text, reflecting, and analyzing the themes that are related to answer the questions objectively. In this study, exploring and interpreting the role of nurses in diabetes management as well finding barriers that hinder to achieve effective diabetes management are the main themes that needed to be analyzed through close examination of the selected articles.

### 5.1 Data Collection

Three academic databases were used for retrieving the 10 relevant articles that answered the research questions were Academic Search Elite (EBSCO), PubMed, and ScienceDirect. The author methodically searched for the appropriate articles through taking into consideration various procedures in which inclusion and exclusion criteria were applied (*see fig 2.*). Only 10 years up to date articles that are related to the role of nurses in diabetes were included with no consideration to what type of diabetes, genders, age, or countries that are related. Exclusion included all articles that are not related to nurse's role in diabetes management specifically and generally all articles that are not academically written, older than 10 years, not freely accessed and not written in English. Data



collection was done according to measurements of data reliability and suitability of data to the aim the study, taking adequacy of data in consideration

*Table 2. Inclusion and exclusion criteria.*

Inclusion	Exclusion
<ul style="list-style-type: none"><li>• 10 years old articles</li><li>• written in English</li><li>• Nurse's role in diabetes management</li><li>• Applied to all genders</li><li>• All ages</li><li>• Nonspecific geographical area</li><li>• Nonspecific setting</li></ul>	<ul style="list-style-type: none"><li>• Nurse's role in other chronic disease care</li><li>• Nurse's non-led role in diabetes management.</li><li>• General diabetes management</li><li>• Not academically written</li><li>• Other chronic diseases</li></ul>

Data collection conducted systematically on three databases EBSCO, PubMed, and ScienceDirect. The data retrieving process is carried out through four phases which were applied similarly to the three databases and in which the same Boolean phrase “the role of nurse AND in diabetes management” was used accordingly. The selected articles for the study were based on the score indicated in the Table 4 which determined its quality in the study. Furthermore, the selection criteria were applied to ensure that credible sources that inform the study well were selected (*see table 2.*)

## EBSCO

The first search was carried out through EBSCO database on 4<sup>th</sup> March 2018, known as Academic Search Elite. The first phase of data retrieving was done by using the Boolean phrase “The role of nurse AND in diabetes management” and no specific search options were used. The number of hits was 76. Then, the second phase carried out via applying search option limitations: Free full text, peer-reviewed journals, publication date from 2008 to 2018 and English language; the hits were 13. The third phase was conducted through applying the search option limitations that were applied in the second phase; however, the criterion that was used specifically in this phase was reading through abstracts taking in consideration the strong relevance to answer the defined questions; the result was 6 articles. The fourth and the last phase based on screening whole text articles. In the end, 2 articles were selected from EBSCO searching.

## PubMed

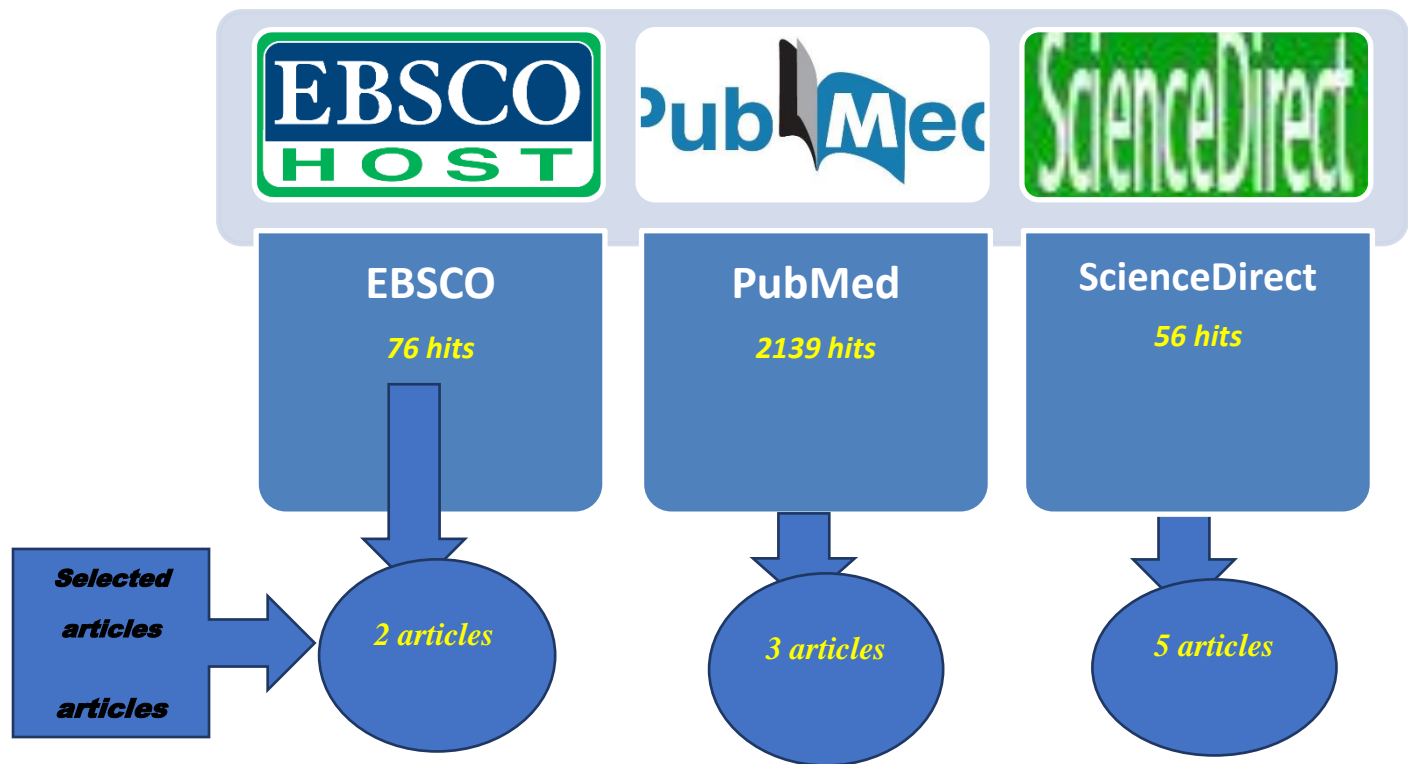
The first phase of data search without any specific search limitation resulted in 2139 hits. The second phase carried out via using search filters; namely, free full text, publication date between 2008 and 2018, and academically reviewed articles. The result was 25 hits. The third phases included reading through abstracts and relating the findings to the research questions; as a result, 10 articles were selected for the fourth phase. After reading through all the selected articles, 3 articles were selected.

## ScienceDirect

The first phase search for the relevant articles resulted in 56 hits. The second phase carried out through the same search filtrations were applied to the previously mentioned databases, resulting in 33 hits. 12 hits were the result of the third phase. After screening all the selected articles, 5 articles were selected for the study.

At the end of data retrieving, 10 articles were selected as the most relevant articles that were used to be examined and interpreted to explore the role of the nurse in diabetes

education; additionally, to find out of the possible barriers that prevent nurses to deliver effective diabetes management.



*The figure 2. The flowchart detailing data collection and selection of 10 articles.*

## 5.2 Data Analysis

The purpose of data analysis is an approach in which a researcher demonstrates and reveals to others what he/she discovered and observed through a variety of qualitative data analysis methods (Saldana et al. 2011). In this regard, the author used inductive content analysis to analyze the selected articles in this study. Qualitative content analysis can be used in either an inductive or a deductive way through main stages, preparation, organization, and reporting of results (Elo et al. 2014). Elo et al. (2014) added inductive content analysis is used more in nursing studies compared to deductive content analysis. Schreier (Schreier, cited in Elo et al 2014) argues that qualitative content analysis is one of the available qualitative approaches currently used for analyzing data and interpreting its meaning.

Content analysis is the exploration of articles, speech, media and, any form of material or culture, which helps in revealing the hidden meanings (Saldana et al. 2011). In this case, the inductive content analysis was used which entails a close reading of the articles, then creating open coding, categories and abstraction (Elo et al. 2014). Creating categories is meant to describe the phenomenon, to deepen the understanding and to formulate the knowledge (Cavanagh, cited in Elo et al. 2014).

First, the author prepared a coding schedule by creating a table where a row is a unit for which data was collected. Each theme was placed in its column of the research questions. The content analysis was therefore carried out by recording communication between the subjects and the researcher. The mode that was used in this case was the written documents for communication. The advantage of this method is that it offers a strict step by step analysis and methodological control of the material. In this regard, every data collected was grouped into different themes which were identified through secondary literature. The approach for analysis, therefore, followed eight steps which are: data preparation, defining the theme for analysis, coming up with the coding scheme, pre-testing coding scheme, coding of all texts, evaluating the method of coding used, coming up with inference based on themes and finally the presentation of results.

### **5.3 Ethical Aspects of the Research Study**

Ethics were taken into consideration while undertaking this study. This means that guidelines on ethics from the Finnish Advisory Board were considered in addition to Arcada's writing guidelines (2014). Some of the important aspects that were adhered while conducting this study including objectivity during analysis and interpretation of the data, avoidance of fabrication and misinterpretation, and maintaining the copyright and acknowledgments of previous studies (Finnish Advisory Board and Research integrity 2009). This allowed the acknowledge of other peoples' work and ensuring that the information and methodology used by the authors were not altered hence making the study credible.

### **5.4 Quality Assessment**

The quality assessment of the selected materials for this literature review applied the approach coined by Lorenc et al. (2014). In this regard, the use of this approach in determining the quality of the study materials was selected because it concentrates on the variety of the research issues which it must be taken into consideration when carrying out strength evaluation of the research. Furthermore, according to Booth (2017), the approach is more effective as it offers a great insight into beliefs, feelings as well as attitudes of the patient in a given research issue. The value of its focus on various aspects of the research articles makes it ideal to be employed in carrying out an evaluation of the quality of the materials used during secondary analysis.

*Table 4: shows the relevance of the chosen articles for this study.*

<b>Study material</b>	<b>Abstract</b>	<b>Introduction</b>	<b>Data collection</b>	<b>Sampling methods</b>	<b>Analysis of data</b>	<b>Ethics/bias</b>	<b>Results</b>	<b>Generability</b>
Lawton et al 2009	4	3	4	4	3	4	4	4
Sy Virginia 2016	4	3	3	2	3	3	3	3
Boström et al 2014	4	3	3	2	2	3	3	3
Moser et al 2008	4	3	3	2	3	3	3	3
Nicolucci et al 2013	4	4	3	3	3	3	3	3
Beth et al 2013	4	3	3	2	3	3	3	3
Ceriello et al 2012	4	4	4	4	3	4	4	4

Zgibor et al 2014	4	3	4	3	2	4	2	3	4
Alotaibi et al 2017	4	4	4	4	3	3	4	4	4
Daly, B, Tian, CJL & Scragg, RKR 2017	4	4	3	3	2	4	3	4	4

The assessment tool work by looking at the relevance of abstract, the introduction, sampling methods employed data analysis, ethics considered and bias in the study, the results and the study implications. (*see table 4.*) The relevance is arranged from 1 to 5 where 1 stands for greatly irrelevant, 2- irrelevant, 3-fairly relevant, 4-relevant while 5-greatly relevant. The points for each article used are obtained by adding all the points starting from the relevance of the abstract to implication. For this study, any material which had at least 30points was given a grade A and this is considered more relevant. On the other and, the articles which had points between 20-29 were considered of B category and they are relevant to the study. However, other articles that scored below 20 points were not considered in this study as they are considered fairly relevant but could not inform this study.

## **6 FINDINGS**

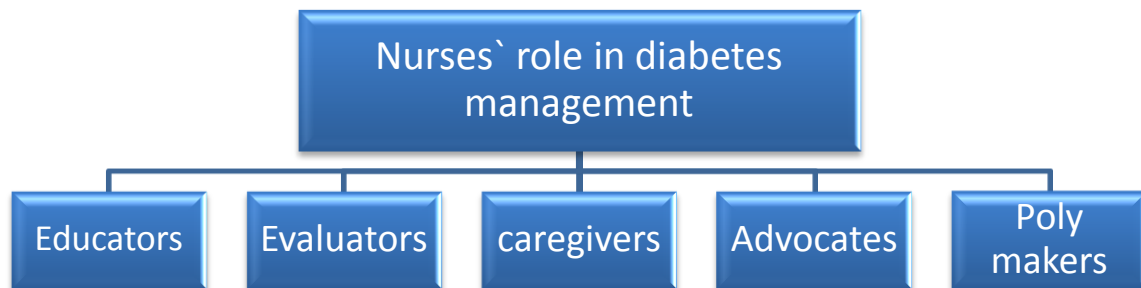
### **6.1 Description of the studies**

In this literature review, ten articles were used where all of them met the inclusion criteria indicated above. However, each article addressed the research questions in different perspectives. Some of the issues addressed include the role of nurses in self-management of type 2 diabetes Mellitus, examination of the actual knowledge of nurses working in the tertiary hospital and the impact of the randomized control trials led by the nurse among the diabetes patients. Nonetheless, the important issues that were addressed by the articles include approaches for the control of lipid control and blood pressure among the certified diabetes educators, management of diabetes unawareness, personalized approach of diabetes management as well as empowering nurses to be the primary educators to the children affected with the type 1 diabetes among other important issues. The articles, therefore, outlined various approaches that can be employed by the professional nurses to address diabetes among the population by applying various approaches which include education and establishment of good communication channels for effective feedback. The overall quality of the materials used for this study was medium quality having a mean grade of B.

### **6.2 Role of Nurses in Diabetes Management and the possible barriers- facilitators that are perceived by both nurse and patient.**

The figure (see Fig.3) below shows the relationship between the main theme and the sub-themes. From the literature review, the roles of the nurse as identified in the literature review include being educators, assessors, caregivers, advocates as well as policy-makers.





*Figure 3. The themes and subthemes of the study.*

### **Educators**

The role of the nurse as educators emerged during the literature review. This was the case with articles (1, 2,3, 5, 6, 8 and 9). The articles indicated that nurses play a significant role in educating the patients affected by diabetes in various ways which include the screening of diabetes, smooth transition from the hospital setting to home and the change of the lifestyle which can enhance the management of the condition. However, the articles (2,3,5,6 and 9) revealed the issue that stands against delivering proper patient education; many nurses doubt their ability to deliver sufficient education to their patients due to the lack of knowledge and skills about diabetes, lack of time, work overload and skepticism about teaching skills. Or due to the lack of communication as many nurses are skeptical to be involved in patient-centered care.

### **Evaluators or Assessors**

The role of a nurse as assessor or evaluator was identified during the literature review. This was highlighted by articles (1,3, 5, 9 and 10). From the findings, nurses were found to act as assessors of the diabetes condition among the patients and to give professional advices and recommendations which can be helpful in the treatment of diabetes. The article number 1 asserted that nurse are more approachable and give clear information to patients compared to doctors. From the articles, nurses were also found to

be keen in evaluating the culture of the patient and their background before giving some important information to help in self-management of diabetes among the patients. The article number 1 (Lawton et al. 2009) indicated that many patients who were participated in the study were keen about the role of nurse as evaluator due to the stereotype that nurses cannot replace physician's role.

### **Nurses act as caregivers**

From the literature review, the theme of nurse as caregiver or supporters was evident. This was demonstrated by articles (1, 2, 3, 4, 8 and 10). The article revealed that nurses in direct contact with patients, supporter and caregiver by demonstrating their soft skills and their compassion towards patient. Additionally, nurses work hand in hand with patient's family to help diabetics to accomplish the optimal self-management of the diabetes. For example, the use of the technology to access information of patients in remote areas which helped them properly manage their health condition. Nonetheless, nurses were found to be in close contact with the home caregivers who relied on the support from the nurses to help the patient in effective self-management of their diabetes. The findings also revealed that the support from the nurses helps in the management of the diabetes condition among the diabetes patients who will get motivated and dedicate their efforts and resources to manage the condition.

### **Nurses as Advocates**

From the literature review, articles (4, 5, 7, 8, and 10) demonstrated that nurses advocate for patients to change their life style and to avoid the risk factors which can predispose an individual to contract diabetes, hence empowering patients to be involved in the effective self-management. The review also demonstrated that the nurse advocates for constant communication from the caregivers to ensure effective management of the condition. Nurses also advocate for an increased level of awareness and the education among diabetics. Additionally, nurses address personal factors such as the cultural

values, beliefs, norms and practices which may interfere with the treatment of diabetes. These issues that normally affect diabetes patients include the underestimation of the risks associated with diabetes, low education attainment, self-stigmatization, and anxiety, loss of masculinity and embarrassment which hinders attainment of the effective care for the diabetes patients. However, the article number 3 revealed that lack of confidence and training may stand as an obstacle for nurses to be fully involved in patient empowerment.

### Policy Makers

Finally, from the literature review, nurses were found to be policymakers as demonstrated by articles (4, 7, 8 and 9). Nurses are policymakers in the sense that they participate in health organizations to coming up with the policies and decision-making concerning the treatment of diabetes based on the evidence-based practices which ensure that many people get screened on diabetes hence the condition can be contained during its early stages.

## 7 DISCUSSION

The aim of this study was to explore and review the role of nurse in diabetes management. From the literature review above, it is evident that nurses play significant roles in the management of diabetes. One of those roles is embodied in the support and empowerment that nurses offer to the diabetes patients since self-management is a complex process which requires professional input. According to Boström et al. (2014), the role of the professional nurse has been altered in order to offer a patient-centered care to the diabetes patients. It asserts that the role of the nurse has been subdivided into two main distinct categories which include ambivalence towards practicing patient-centered care and bolster relationships with the patient. Furthermore, the authors indicated that nurses enrich diabetes patients with the courage to openly discuss the adverse effects of diabetes and ensure that there is close engagement between the patient and the nurse on a daily basis. Boström et al. (2014) emphasize that patient-centered care should be based on mutual respect, maintaining patient's autonomy and support from nurse and patient's family to the extent desired by the patient. Also, Moser et al. (2008) assert that self-management among the diabetes patients is a dynamic and complex process that is highly dependent on the unique life situation of an individual. Therefore, in order to achieve a better health outcome among the diabetes patients, there is a significant need for the diabetes specialist nurses and patient's family involvement in self-managing diabetes condition. According to DAWN2 study (Nicolucci et al. 2013), the participants found their healthcare providers more supportive even though there is poor interaction from the latter about patient's psychological aspect. Besides this, Nicolucci et al. (2013) state that family involvement was higher with most participants in the study. As one of the participants in the Moser et al (2008)'s study stated about the role of family caregiver "my wife takes care of the cooking. I took course about the diet, and my wife knows how to cook for someone. She takes care of my meals and my eating pattern." This indicates the remarkable role of patient's family in diabetic care and self-management beside nurse's role. The involvement and empowerment that is provided by diabetes nurse specialist and patient's family help in attaining quality health outcome among the diabetes.

Nurses also play a critical role in educating the patients and other family members especially for the children with diabetes type 1. According to Lah, Modic & Siedlecki

(2013), patient and family education is significantly important part of diabetes management. Patient education is one the most ultimate role of nurses within healthcare spectrum. The authors assert that providing patient education is an integral part of nursing care. Their study showed that family and patient education in preparation of self-management played notable role in reducing hospitalization for type 1 diabetes children. In this regard, Moser et al. (2008) state that the involvement of nurse in patient education can be seen teaching, guiding and advising people diabetics about self-management issues. A participant in Moser et al. 's study said about the role of nurse in diabetes management "Now I know that I will see her regularly. If something is not right, she explains to me what went wrong and what I need to change. She monitors my health status. She advices me. I need to know something, I give her a call". However, many studies reveal that nurse do not have adequate knowledge about diabetes, hence cannot give a proper patient education concerning diabetes. Alotaibi et al. (2014) state that nursing staff lacking the knowledge about the disease and this may lead inadequate health care instruction by patients. Also nurses opt to act relaxed when dealing with practical skills than with theoretical aspect of diabetes (Alotaibi et al. 2014)

Children who are diagnosed with diabetes are hospitalized where the family members and the children will get initial diabetes education while in the hospital setting S. (2016). As cited by Sy (2016), Nettles (2005) indicated that when the blood glucose of the children have been stabilized and acidosis corrected, the patient can be allowed to go home specifically after three days. Due to the limited time between the nurse, the patient and the family members, it makes it hard to achieve the desired education that ensures effective self-management. The patient will, therefore, go home without adequate support hence making the transition to home difficult (Sy, 2016). Furthermore, according to Lawton (2009), it was not easy to achieve holistic care among the diabetes patients as they perceive nurses as not always present for other health illnesses. This makes the patient not to take much attention to the guidelines given by the nurses since the reassurance by the healthcare professional helps them believe that their condition is well controlled. Since the clinical nurse specialist is the only healthcare practitioner that is relied on for providing education to the patient and the family members, it makes it hard to achieve the specific health care goals which include adequate support and smooth transition to home. However, given the challenges that are faced by the patients

in transiting to home and inadequate support from the nurses, most of the nurses have been trained on multidisciplinary collaborations especially on the aspect of the protocol. The clinical nurse specialists, therefore, have come up with the diabetes resource cart that comprises all the necessary tools for diabetes education (Sy 2016). These materials are made available to the nurses and are outcome oriented. It is through this that nurse confidence in the treatment of diabetes will increase.

While it is hard for many people to achieve the treatment targets if diabetes which makes it at a higher risk of complications, there are various methods that can be applied by the nurses to address these challenges. Diabetes is one of the chronic diseases which requires the use of advanced therapy and effective communication and feedback to ensure successful self-management (Ceriello et al 2012). Furthermore, the authors indicated that nurses can use the individual profile to enhance adherence to therapy among the diabetes patients to improve outcomes of treatments. The suggested approaches include the use of the six-step cycle for the personalized self-management of diabetes as well as the collaborative use of the structured blood sugar data. Nonetheless, nurses can use the electronic health solutions which allow for effective communication between the nurse and the diabetes patients in the remote areas which cannot be reached easily. Also, other facilitators that help nurses attain self-management of diabetes include algorithms and support tools which help them in making informed decisions regarding the condition of the diabetes patient.

In as much as nurses play a significant role in various aspects regarding the diabetes care, there is a gap that exists in the inpatient diabetes. In this regard, there are no clear relationships between the clinical specialties, employment status, age, level of education and the knowledge score (Modic et al 2014). This means that nurses do not have confidence and are not fully prepared to make decisions regarding the patient care or even offer survival skills for those patients suffering from diabetes in the hospital. It is through this that will affect the self-management of the patients with diabetes in the sense that nurses are not fully prepared to address the challenges that face them. This results in low health outcome among the diabetes patients which makes it hard to manage. However, treatment of hypertension, hypercholesterolemia and hyperglycemia can help reduce the mortality and morbidity in the people affected by diabetes (Zgibor et al 2014). Moreover, the authors indicated that the certified diabetes educators can help in

offering a cost-effective strategy for managing diabetes. The tool, therefore, ensures timely diagnosis of type 2 diabetes which prompts the application of effective strategies which include education and support for the patient hence a better healthcare outcome.

The interventions applied by the nurses offer better improvements as compared to the normal care for the smoking cessation, serum triglyceride and HbA1c apart from enhancing the independent role of professional nurses in the management of diabetes (Daly, Tian & Scragg, 2017). In this case, nurses have played an important role in the management of diabetes which includes educating patients about the condition and lifestyle changes that they should take into consideration for effective management of the condition. Nonetheless, nurses also guide patients in the self-management of the condition to eliminate the risk factors which are associated with the diabetes complications (Daly, Tian & Scragg, 2017). Alotaibi et al (2017) indicated that an actual knowledge among the nurses helps in the management of diabetes as compared to the perceived knowledge. It is so because the indicators of high levels knowledge provide ways in which nurses can teach people how to manage diabetes.

Nurses help in empowering the diabetics. This is through the enhancement of glycemic control as well as the life of the diabetes patients which necessitates a mix of education and treatment methods that can help in the management of the disease (Peymani et al., 2008). Several studies (Peimani, Monjamed & Asgharpoor, 2006) indicates that the dimensions of life quality specifically the physical activity, as well as the feeling of well-being, is worse for the diabetics as compared to those that are healthy. Therefore, nurses require adequate knowledge to assist in providing adequate care for the diabetics or those that are at high risk of getting diabetic. Due to this, nurses play an important role in ensuring that diabetics are empowered to manage diabetes effectively by offering appropriate information to the patient and the family members through consultations (Fireman, Bartlett & Selby 2004). According to Khoshniat et al, offering proper education to the healthcare providers will not only enhance perfection and knowledge of the children about diabetes but instead, it enhances the quality of care provided at healthcare system (Khoshniat et al 2007). Finally, some studies have indicated that nurses are the major contributors to the enhanced quality of care accorded to the diabetics in the last two decades (Rafique & Shaikh 2006).

Given the important roles of the nurses in the self-management of diabetes among the patients, it is imperative to have a better understanding of the challenges that affect nurses in ensuring effective delivery of their services to the patients. To properly deliver quality care to the patients, there is a need for the nurses to be open minded so that issues such as cultural practices and beliefs do not adversely influence their role in the management of diabetes. Given the increased cases of the lifestyle diseases, there is need to empower nurses in various ways to enable them to educate and help patients with diabetes. By so doing, it will ensure a society that is free from diabetes and other lifestyle diseases which can be avoided by empowering nurses.

In the light of this literature review, there is strong connection between the theoretical framework themes of this study and the findings of reviewed articles. For instance, the study that is conducted by Moser et al (2008) correlates with one of the main components of Pender's model and Orem's self-care theory. The findings by Moser et al (2008) show that participants experience their autonomy, which is an essential component in both theories, through performing their diabetic self-management. Self-management is a set of activities that enables health care providers to understand and support patient's autonomy. Also, Moser et al (2008) stated that self-management is divided into three main categories accordingly to the findings. Daily self-management (daily routine of self-care) and Off-course self-management (actions in case of acute complication of diabetes) could fit under Orem's self-care theory because these actions enable patient to maintain their daily functioning and meet their self-care demands. However, the third category, Preventive self-management, embodies Pender's model of Health promotion which focuses on prevention of any complication by changing certain behaviors in favour of optimal outcomes and maintaining the commitment to take action against any decrease in person's life quality. All articles insisted on the importance of patient education in self-management of diabetes as well on necessity of implementing patient-centered care. In this regard also both theories put self-care and continuing patient education as an optimal mechanism to enhance individual's life quality.



## 8 CONCLUSION

Overall, nurses play a significant role in patient education, in ensuring and empowering patients to perform effective self-care. One of the most significant nurse's role in diabetes management is that nurse provides supporting mechanisms to the diabetic patients since self-management is a complex process which requires professional input. Also, they take part in providing holistic intervention in treatment of hypertension, hypercholesterolemia and hyperglycemia which significantly help reduce the mortality and morbidity in the people affected by diabetes. Nonetheless, nurses apply some interventions that offer better improvements as compared to the normal care for the smoking cessation, serum triglyceride and HbA1c apart from enhancing the independent role of professional nurses in the management of diabetes. Further, nurses help in educating patients about the condition and lifestyle changes that they should take into consideration for effective management of the condition which includes lifestyle changes and adhering to therapy. Finally, nurses help in empowering patients with diabetes through the enhancement of glycemic control as well as the life of the diabetes patients which necessitates a mix of education and treatment methods that can help in the management of the disease. Some of the facilitators of the nurse roles include the use of technology such as e-health which ensures effective management of patients in the remote areas through timely feedback. Further, nurses are facilitated through training which helps them update the caring skills especially regarding the management of diabetes. However, there are other challenges that hinder nurses from attaining their roles. They include inadequate knowledge, cultural barriers and unwillingness of people to be diagnosed. With the role of nurses known, their facilitators, and the challenges in the management of diabetes, it offers an opportunity for the healthcare professionals to improve the management of diabetes. Due to this, a better health outcome for the diabetics will be realized.

## **1.1 Strength**

The strengths of the study as it regards to ensuring effective self-management among the diabetes patients are embodied in the fact that the study gives an opportunity to identify the areas in which nurses can improve to enhance the management of diabetes. Aslo, the study identified some important technologies that can be applied by nurses to ensure effective management of diabetes such as e-health. In addition to this, the study identified the challenges that nurses face and hinder them from helping diabetes patients.

## **8.2Limitations**

- i. The study does not present statistic figures to show whether the nurse role has had a positive impact in helping patients with diabetes.
- ii. The study does not cover all the challenges that hinder nurses for helping patients with self-managing diabetes.
- iii. The study does not present how patient-centred care is understood and practised by the healthcare professionals that are specializing in diabetes management.

## **8.3Recommendations**

- i. Nurses should be trained well on the specific issues relating to diabetes to help patients effectively manage diabetes.
- ii. Nurses need to be trained on how to effectively communicate with patients of different cultural background to enable them to offer holistic care.
- iii. Nurses should learn how to use the technology to enable them to reach as many diabetes patients as possible especially in remote areas.

- iv. More research needs to be done to determine how nurses and the caregivers at home can collaborate to offer effective self-management education to the patient.
- v. Further research should be undertaken to determine how patient-centred care should be practised by the healthcare professionals who are specializing in the diabetes management to enable the caregivers to have evidence-based practice skills in the management of diabetes.

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## APPENDICES

### Appendix 1: The selected articles for the study

Article number	Author + Year	Name of article	Journal, Volume, and page	Findings
1-	Lawton et al 2009	Patient's perceptions and experiences of transitions in diabetes care: care longitudinal qualitative study	Health Expectations, vol.12, no.2, pp.138-148	The study found that the perspective of the patients regarding the present care on diabetes is seen as mixed blessings, some patients were satisfied with GP diagnosis and some were ambivalent about nurses' role in taking role of GP.
2-	Sy Virginia 2016	Empowering Staff Nurses As Primary Educators to Children With Type 1 Diabetes	Pediatric Nursing, vol.42, no.5, pp.247-251	The study found out that children suffering from diabetes get their initial education from the hospital setting by nurses. This helped to smoothen transition from hospital to home for effective diabetes management. The study shows that nurses feel uncomfortable about providing education to patients with type 1 diabetes due to lack of skills, time and knowledge.
3-	Boström et al 2014	Patient-centered care in type 2 diabetes- an altered professional role for diabetes specialist nurses	Scandinavian Journal of Caring Sciences, vol.28, no.4, pp.657-682	Nurses specializing in diabetes management doubt their ability in practising patient-centred care due to lack

				of support and extensive training to provide effective education. Also, their relationship with the patient was found to be an opportunity for them to improve their skill on patient-centered care in the management of diabetes type 2.
4-	Moser et al 2008	Self-management of type 2 diabetes mellitus: a qualitative investigation from the perspective of participants in a nurse-led, shared-care programme in the Netherlands	BMC Public Health, vol.8, pp.91	The study found out that self-management is a complex process which depends on the life of an individual where the support from the nurse and the patient's caregivers plays a significant role in self-management of diabetes.
5-	Nicolucci et al 2013	Diabetes Attitudes, Wishes and Needs second study (Dawn2 TM): cross-national benchmarking of diabetes-related psychosocial outcomes for people with diabetes	Diabetic Medicine, vol.30, no.7, pp.767-677	The study found out that a significant numbers of participants perceived their relatives with diabetes as a burden. Participants did not know how to deal with the diabetes patients and wanted to be involved in education. Those that were educated by nurses on diabetes management found it helpful.
6-	Beth et al 2013	Diabetes management unawareness: what do bedside nurses know?	Applied Nursing Research, vol.27, no.3, pp.157-161	There was no relationship between the knowledge scores and education, and employment ence. However, study

				revealed older nurses have more experience and knowledge on the management of diabetes. Also, study showed that nurses' knowledge of diabetes management principles of hospitalized patients was low.
7-	Ceriello et al 2012	Diabetes as a case study of chronic disease management with a personalized approach: the role of a structured feedback loop	Diabetes Research and Clinical Practice, vol.98, no.1, pp.5-10	The article found out that using 6-step cycle for diabetes self-management, and e-health solution can help in remote access and in enhancing efficacy of education, hence upgrading the role of nurse and educators in the care process. Also, decision support tools can help nurses in making a decision regarding the kind of care that is suitable for the diabetes patient.
8-	Zgibor et al 2014	Rationale, design, implementation of a cluster randomized trial using certified diabetes educators to intensify treatment of glycemia, blood pressure and lipid control: REMEDIES 4D	Contemporary Clinical Trials, vol.39, no.1, pp.124-131	The article found out that certified diabetes educators will help in offering a cost-effective approach to managing diabetes.
9-	Alotaibi et	Examining perceived and actual	Applied Nursing Research,	The study revealed that nurses had a positive

	al 2017	diabetes knowledge among nurses working in a tertiary hospital	vol.35, pp.24-29	view of their diabetes knowledge but agreed that the knowledge about diabetes varied based on the location. They are also competent about the current role of caring and educating diabetes patients.
<b>10-</b>	Daly, B, Tian, CJL & Scragg, RKR 2017	Effect of nurse-led randomized control trails on cardiovascular risk factors and HbA1c in diabetes patients: A meta-analysis	Diabetes Research and Clinical Practice, vol.131, pp.187-199	The article found that the nurse-led intervention in the management of the HbA1c produced a significant impact as compared to the usual care.