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NURSING SUPPORT IN THE PREVENTION OF DIABETIC NEPHROPATHY IN PEDIATRIC PATIENTS

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**NURSING SUPPORT IN THE PREVENTION OF DIABETIC NEPHROPATHY IN
PEDIATRIC PATIENTS**

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Abstract

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Diabetic nephropathy is a progressive life threatening microvascular complication from diabetes Type 1 and Type 2. It is the leading cause of end stage renal disease in western countries. Its earliest clinical manifestation is micro albuminuria. The occurrence of Diabetic Nephropathy can be highly influenced with proper and timely preventive measure. However, to achieve preventive goals, pediatric patients and their families need continuous support.

The purpose of this study was to describe the kind of nursing support that should be provided to pediatric patients in prevention of diabetic nephropathy. Its objective was to present updated knowledge of the kind of nursing support that should be provided to pediatric patients in prevention of Diabetic Nephropathy according to recent literature.

Systematic literature review method was used to conduct the study. The search was done through NELLI electronic library. CINALH EBSCO, OVID LAUREA JOURNALS, SAGE, and OVID MEDLINE databases were used; a manual search was also conducted. A total of 15 articles were identified. Inductive approach was used to analyze these articles in answering the research question.

The study resulted with four major kinds of nursing support that should be provided for this group of patients and their families; health education for patients and families, supporting patients in developing self- management skills, psychosocial support and continuous monitoring. This updated knowledge could be used by nurses working in this field. It can be especially helpful to the nurses who are new in this sector.

Key words: - Nursing support, Pediatric patients, Prevention, Diabetic nephropathy

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1. INTRODUCTION

Diabetic nephropathy is a progressive life threatening microvascular complication from diabetes Type 1 (T1D) and Type 2 (T2D). It is characterized by persistent albuminuria and serum creatinine concentration due to decrease in glomerular filtration rate GFR. It is a major cause of end stage renal disease (ESRD) in the Western World. A study from the National Public Health Institute Helsinki, Finland (2007) shows that 25- 40% of individuals with T1D are at risk of diabetic nephropathy (DM) after 6 - 15years of diabetes. The study also states that, in Finland, the incidence of T1D among children aged 14 years or under is the highest in the world. The increase in incidence has been approximately 2.4% per year. According to the Finnish Diabetes Association (2011), there are about 40 000 people with type 1 diabetes and about 250 000 people with type 2 diabetes in Finland. About 4 000 children under the age of 15 have diabetes. The number of undiagnosed cases of type 2 diabetes is estimated at 200 000. In the U.S. annually, 15,600 youths are newly diagnosed with T1DM, and 3,600 with T2DM (American Diabetes Association, 2013).

With this kind of high incidence of diabetes in the population and especially in children, the great necessity in prevention of long term complications cannot be over emphasized. DN being a diabetic complication is the leading cause of dialysis and kidney transplant in developed countries. Its costs including loss of lives, cost of treatment, decreased productivity and the emotional burden placed on the sick, their family and community in general. However, with early diagnosis and proper interventions, DN can be prevented, postponed or its progression can be retarded (WHO 2011; WHO 2014).

DN prevention requires a comprehensive, coordinated, patient-centered approach on the part of the health care system (WHO 2014). Nurses play a big role in coordinating patient care and continuously providing the needed support for patient and family (Sego 2007). This is especially so when it involves pediatric patients. Patients need psychosocial support, and guidance in developing self-management skill. Continuous health education for patients and families concerning all aspects of the disease is an important component in empowering them in life time decision making (Hicks 2010). Nursing support is also needed in constant monitoring of hyperglycemia, hypertension, hyperlipidemia, screening for micro-albuminuria, medication adherence and life style change in prevention of DN in pediatric patients (Willoughby & Burriss 2005).

2. THE PURPOSE STATEMENT AND RESEARCH QUESTIONS

The Purpose statement

The purpose of this thesis is to describe the kind of nursing support that should be provided to pediatric patients (PP) in prevention of diabetic nephropathy. The objective is to present updated knowledge of the kind of nursing support that should be provided to pediatric patients in prevention of DN according to recent literature.

Research questions

What kind of nursing support should be provided to pediatric patients in prevention of diabetic nephropathy?

3. KEY CONCEPTS` DEFINITIONS

A concept is a term that abstractly describes and names an object, idea, or phenomenon, thus providing it with a separate identity or meaning (Burns et al. 2011). The following section provides definition of the major concepts. Defining concepts allows consistency in the way the term is used (Burns et al. 2011).

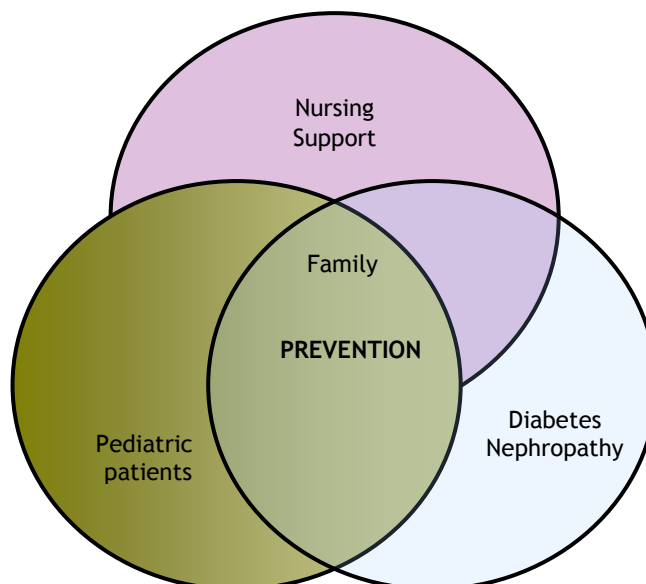


Figure 1: Key concepts

3.1. Nursing Support

The purpose of nursing is to promote health, healing, growth and development, and to prevent disease, illness, injury, and disability (Royal College of Nursing, 2003) . Health care professionals use clinical judgement in the provision of care to individuals of all ages, families and communities, throughout the entire life span. Nurses play a fundamental role in the provision of holistic nursing support to the patients and family. Nurses must work in partnership with the multi-disciplinary team and in collaboration with patients, their relatives and other carers in the identification of patient´s needs. It is thus important to understand the various aspects that affect a family for nursing support to be provided.

The concept of nursing support has always been considered important in nursing . It involves patient assessment, empowerment, family education and a therapeutic interaction. These elements provides a good base to health care professionals in the provision of a family centred- care. To understand the developmental needs of patient education, an understanding of how nurses provide their patient education in practice is important (Kelo, Martikainen, & Eriksson, 2013). Key elements of empowering education emphasize the whole person and personal strengths, learning needs of the

patient, shared goals, patient-driven decision-making, and promotion of participation. Without these elements, education is provided traditionally, with the focus on the physical illness, the educator's role as an authority based on expertise, and the patient viewed as a passive recipient compliant with recommendations (Kelo et al, 2013).

Educating patients' is a vital component of the nursing process. In the supportive - educative nursing system, the nurses' actions are to help clients develop their own self-care abilities through knowledge, support and encouragement (Roy & Andrews 1991). With chronic disease management being very complex, patient's treatment outcome is improved when they are provided with solid knowledge based on their disease process and treatment. In order to promote learning the nurse needs to implement strategies that promote patient's trust and participation.

3.2. Pediatric Patients

Pediatric nursing care is offered to infants, children, and adolescents up to the age of 18. Pediatric physicians and certified nurse practitioners are obligated to provide to the pediatric patient a family centred care. The core concepts of patient family centred care involves dignity and respect, information sharing, involvement, support and collaboration. The incidence of diabetes and diabetic nephropathy in pediatric age is on the rise. The complexity of the disease presents complex clinical challenges to nurses in inpatient and outpatient settings (Miller & MacDonald, 2006). Nurses providing care to pediatric patients are expected to be knowledgeable in implementing strategies in the lifelong management of DN.

3.3. Prevention

Disease prevention covers measures that prevent the occurrence of disease, such as risk factor reduction, as well as those that arrest its progression and reduce its consequences once established (WHO, Geneva, 1989). Approach in disease prevention is comprehensive, it encompass primary, secondary and tertiary levels of prevention. Primary prevention is done before the onset of disease; it includes health promotion and protection. It refers to actions that prevent disease from occurring and those that reduce its incidence e.g., smoking cessation, regular physical activity and good nutrition. Secondary prevention involves interruption of disease progression through early detection thereby preventing irreversible damage e.g. blood pressure check-ups and screenings. Secondary prevention of one disease can be primary prevention of another. Tertiary prevention refers to the control of a disease that has already developed. It is aimed at slowing disease progression and reducing the resultant disability. It may include both drug treatments and actions identical to primary prevention (Community Health Nurses of Canada 2012).

In this thesis, the actions that are aimed in addressing all three levels of disease prevention are involved. Most negative consequences of diabetes nephropathy are preventable. Early detection of persons at risk and implementing preventive and postponing measures is fundamental. When DN already exists, actions aimed at treating and preventing of progression are necessary (Sego 2007).

3.4. Diabetic nephropathy as a diabetic complication

Nephropathy also known as chronic kidney disease occurs due to changes and damage to the nephrons. The most common causes of chronic kidney disease are diabetic nephropathy and hypertensive nephropathy. In this thesis, the focus is on diabetic nephropathy (DN).

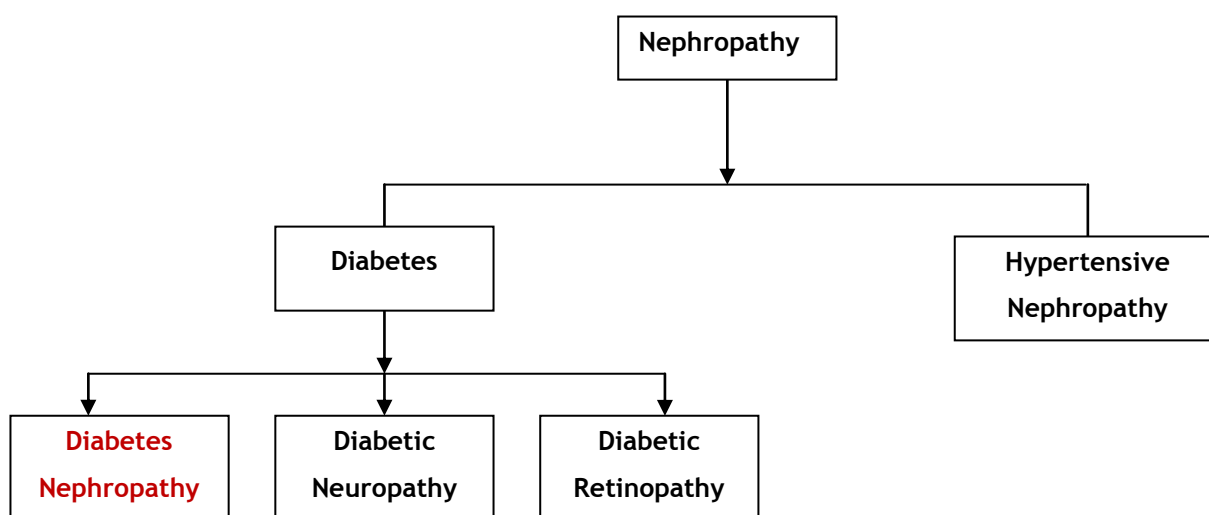


Figure 2: Diabetic nephropathy as a diabetic complication

Being one of the serious complications of diabetes, the pivotal element in diabetic nephropathy is the morphological changes in the extracellular matrix (ECM) of several of the components in the kidney (Kolset, Reinholt & Jenssen, 2012).

DN is a progressive and silent disease. In patients with type 1 diabetes, it usually takes about 5 to 10 years to develop. It may be present already when type 2 diabetes is diagnosed due to several years of unrecognized hyperglycaemia (Kolset, Reinholt & Jenssen, 2012). The development of the disease includes non-modifiable and modifiable risk factor such as puberty, duration of the disease, genetic factor, gender and glycaemic control, hypertension, hyperlipidaemia and diet. Diabetic nephropathy in both type 1 and 2 diabetes progresses in a relatively predictable manner through the stages of normal-albuminuria, micro-albuminuria and macro-albuminuria (Wright & Vardhan, 2008).

Recent publications showed diabetic nephropathy as the leading cause of End Stage Renal Failure (ESRF) necessitating renal replacement therapy worldwide. It affects up to 40% of people with type 1 diabetes and up to 25% of those with type 2 diabetes (Hardy, Furlong, Hulme & O'Brien, 2007). Both the CDC and the National Kidney Foundation have identified CKD as a public health problem that needs to be addressed. According to the CDC, 10% of the population (almost 20 million people) in the United States over the age of 20 has chronic kidney disease, (Saccomano & DeLuca, 2012) with an incidence of 155 diabetic patients developing ESRF per million each year (Kolset, Reinholt & Jenssen, 2012) .

Early recognition and early intervention can reduce the risks associated with DN. (Saccomano and DeLuca, 2012).When DN progresses to the end-stage; patients will require dialysis and renal replacement therapy. Caring for pediatric or adolescent patients with chronic renal insufficiency and those on dialysis, presents unique and varied challenges for the entire healthcare team (Terrill, 2007).

A slight decrease has been noted in the number of patients with type 2 diabetes who develop ESRD both in the United States and Europe (Kolse et al. 2012). Although modern treatment of diabetes to some degree has stabilized the occurrence of DN, the condition is still a leading cause of dialysis and kidney transplant in the Western world (Kolse et al. 2012).

4. METHODOLOGY

A systematic literature review is the qualitative research method that was used in collecting data. This is a summary of data that focuses on a single question. It is conducted in a way that tries to identify, select, appraise and synthesize all high quality research evidence relevant to that question (Saltikov 2012). As stated by Burns et al. 2007, qualitative research involves perceptually putting pieces together to make wholes and from this process, meaning is produced.

In this study, a systematic literature review method was chosen due to the fact that, it directs the planning and execution of the study (Burns et al. 2011). Secondly, it is an assistive tool in producing relevant and evidence-based information from publications using the inclusion and exclusion criteria. Thirdly, it provides a wide range of published articles related to the research questions. Literature reviews are used to describe and explain current knowledge which guides current professional practice (Fink 2010). As noted by the Reviews and Dissemination 2008, (University of York) the best available research evidence should be used for healthcare decisions to ensure knowledge of the latest research and information about best practice. Therefore a well conducted

literature review is a tool that provides current evidence-based knowledge and makes it available for use in decision making in professional practice.

4.1. Data Search

A review of literature provides the current theoretical and scientific knowledge about a particular problem, enabling the reader to synthesize what is known and not known (Burns et al. 2011). For reliability and authenticity of data source, Nelly Porter was sort to identify the relevant articles needed to answer our research questions. Books were also loaned from the library and a manual search was conducted.

Seven databases were initially identified. These databases included, Cinalh Ebsco, Ovid Laurea Journals, Sage, Ovid Med-line, Melinda, Helka and Medic. Different combination of the key words was used to form search words. The search words were "Diabetic Nephropathy" AND "Prevention" AND "Child", "Nurse" AND "Support" AND "Nephropathy", "Diabetic Nephropathy" AND "Nursing Prevention". The search was limited from the years 2006 to 2013. Each of the search words was used on each of the selected databases. However Melinda, Helka and Medic were later dropped because of the fact that the first two produced no hits and Medic had only one hit from all the searches and it was in Finnish. One of the exclusion criteria was studies not conducted in English.

The search result windows were saved for future reference, this search widows had all the details about the conducted search, unfortunately not all computers from the libraries used were able to save this search windows so a few of them were written manually. The results from the searches were as follows;

Table 3: Keywords used to retrieve relevant articles.

Search words	CINAL EBSCO	OVID LAUREA JOURNALS	SAGE	OVID MEDLINE
Diabetic Nephropathy AND prevention AND child	1	3	93	30
Nurse AND support AND Nephropathy	0	60	149	104
Diabetic Nephropathy AND nursing prevention	35	0	0	0
Total each source	36	63	242	134

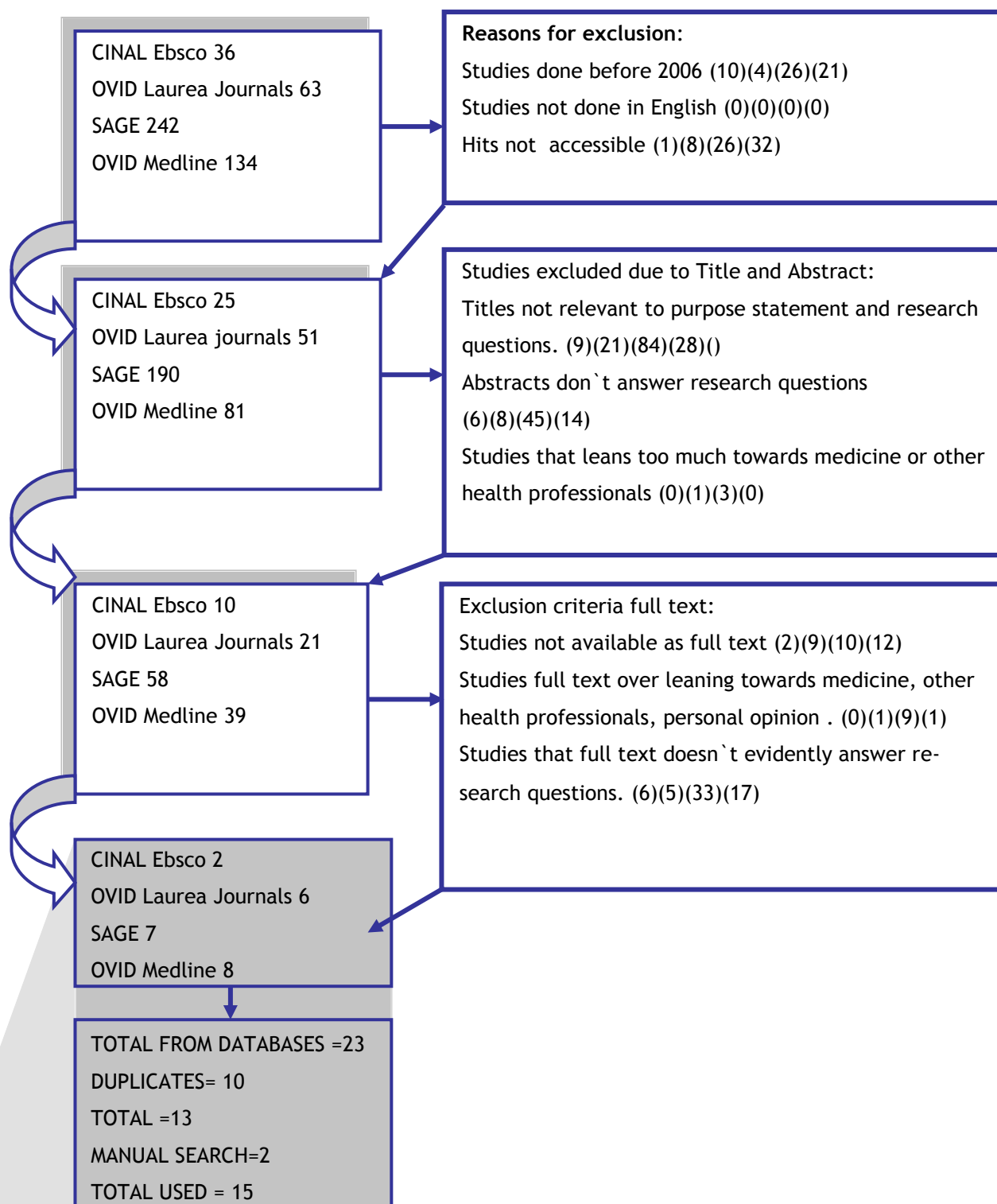
4.2. Data Screening

According to Cochrane, to avoid bias it is important to establish and document the methods to be used in advance. (<http://handbook.cochrane.org/>)

A research protocol was set beforehand; an inclusion and exclusion criterion for the studies to be included was established. After the two researchers together searched data from the databases and manual search, selection of studies to be used was done by the two researchers independently. The selection was based on the set protocol. After independent selection, they compared their results. Their differences in choice of studies were resolved through discussion and use of pre-set research protocol. A consensus between the two was reached on all the studies before they were included. The chosen studies were then saved in a different folder.

In Figure 1 (inclusion and exclusion criteria), the boxes to the left include the names of the databases searched while the boxes to the right includes the inclusion and exclusion criteria. The numbers beside the data source name indicates the number of studies that have not yet been eliminated. The numbers in the brackets on the right boxes follows the order of the list of database sources i.e. CINAL Ebsco in the first bracket and Ovid Medline in the last bracket. The numbers in the brackets indicate the number of studies eliminated due to the named criteria.

Figure 4: Inclusion and Exclusion criteria



4.3. Data Extraction and Analysis

Inductive approach of data analysis was used in the research. This is an approach that condenses extensive and varied raw data into a summary format. It clearly links the research objectives and the summary findings derived from the raw data. Inductive approach allows research findings to emerge from the significant themes inherent in raw data, without the restraints imposed by structured methodologies. It ensures transparency and defensibility of findings from the raw data in a demonstrable manner in answering the research question. (T, David. 2003)

After the 15 studies that met the inclusion criteria were identified, the researchers thoroughly read and reread the studies. Colour coding system was used for data with similar meaning. The segments of text with similar meaning were grouped together to form sub-categories. The sub-categories were given titles that best described them. The sub-categories were then conceptualised into four broader main categories. (T, David. 2003)

4.4. Data screening and analysis

The Figures 5-8 illustrate the data screening and analysis process. The boxes on the left side of each figure shows the raw data extracted from the 15 chosen studies. The middle boxes of each figure shows the sub-categories that emerged after grouping raw data of similar content together. The boxes on the right side indicate the main categories that emerged after linking sub-categories. Figure 5 illustrates data analysis for providing health education for patient and family, Figure 6 for support in development of self-management skills, Figure 7 for psychosocial support and Figure 8 for support in routine monitoring.

Figure 5: Data analysis for providing health education for patient and family.

Data extracted	Subcategories	Main categories
<ul style="list-style-type: none"> • Nurse will be responsible for providing on-going patient and family education. • Health literacy and education are critical in patient empowerment. • Counselling patients about available options and helping them make well informed decisions through a client centred approach. 	<ul style="list-style-type: none"> • Empowering by providing information 	
<ul style="list-style-type: none"> • Nurses have ethical duty to share health information with patients in a way they can understand. • Simple language for both verbal and written information. • The nurse can help establish patients' knowledge and understanding by making sure that the patient has clear and adequate information • Any instruction to the patient should be reviewed orally and reinforced in writing. • Use of pictures, tapes etc • Instructions should be at patient's level of understanding. 	<ul style="list-style-type: none"> • Considering patient's level of understanding 	<p>PROVIDING HEALTH EDUCATION FOR PATIENT AND FAMILY</p>
<ul style="list-style-type: none"> • Personalizing health information • Making information culturally appropriate is important. • Connecting patients value to disease management • Image on material appropriate for target group 	<ul style="list-style-type: none"> • Giving culturally appropriate education 	
<ul style="list-style-type: none"> • Educate family about importance of complying with prescribed medication and frequent physician/hospital visits. • Patients should be aware of consequences of poor disease management. 	<ul style="list-style-type: none"> • Adherence to treatment 	

Figure 6: Data analysis for support in development of self-management skills.

Data extracted	Subcategories	Main categories
<ul style="list-style-type: none"> • Nurses need to equip the families for challenges of managing the child long-term care • Teaching of skills such as problem solving, goal setting • When a patient repeat a single skill until success is attained, confidence about performing next step increase. • Can reduce risks by learning and practicing the skills necessary. 	<ul style="list-style-type: none"> • Guidance in learning skills 	
<ul style="list-style-type: none"> • No matter what lifestyle improvements are made or how slowly they are implemented, patients should be encouraged to continue towards improvement. • Encourage the patient to understand and accept the need for lifestyle modification and how to implement them • Celebrate small successes. 	<ul style="list-style-type: none"> • Lifestyle changes 	<p>SUPPORT IN DEVELOPING SELF MANAGEMENT SKILLS</p>
<ul style="list-style-type: none"> • Patient and health care provider work together to set goals • Set dates for attaining goals • Collaborative goal setting between nurse and patient facilitate feelings of ownership. 	<ul style="list-style-type: none"> • Setting goals together 	
<ul style="list-style-type: none"> • Help individual become confident in self- administration of Insulin, other medication, adjusting doses, take care of own nutrition. • Improve individual coping strategies. • Nurses can move patients towards the point of readiness to assume responsibility for management of their disease 	<ul style="list-style-type: none"> • Help to assume responsibility 	

Figure 7: Data analysis for psychosocial support in the prevention of DN in PP.

Data extracted	Subcategories	Main categories
<ul style="list-style-type: none"> • Patient nurse relationship is even more critical to enhance adherence. • Should make explicit provision for psychological support. • Patients look to the nurse for support and encouragement • Nurses should establish therapeutic contact with patients. • Enabling the patient consistently meet with same healthcare provider. 	<ul style="list-style-type: none"> • Professional psychologist and nurse support 	
<ul style="list-style-type: none"> • Social support has been shown to have positive effect on patient's care • Social support can be provided by family, friends- • Practitioner to identify patient's support system • Relatives or carers play an important role in disease management 	<ul style="list-style-type: none"> • Identify patient social support 	PSYCHOSOCIAL SUPPORT
<ul style="list-style-type: none"> • Arrange for them to participate in support groups • Ask successful patient to act as mentor to struggling patients. 	<ul style="list-style-type: none"> • Organize support groups 	

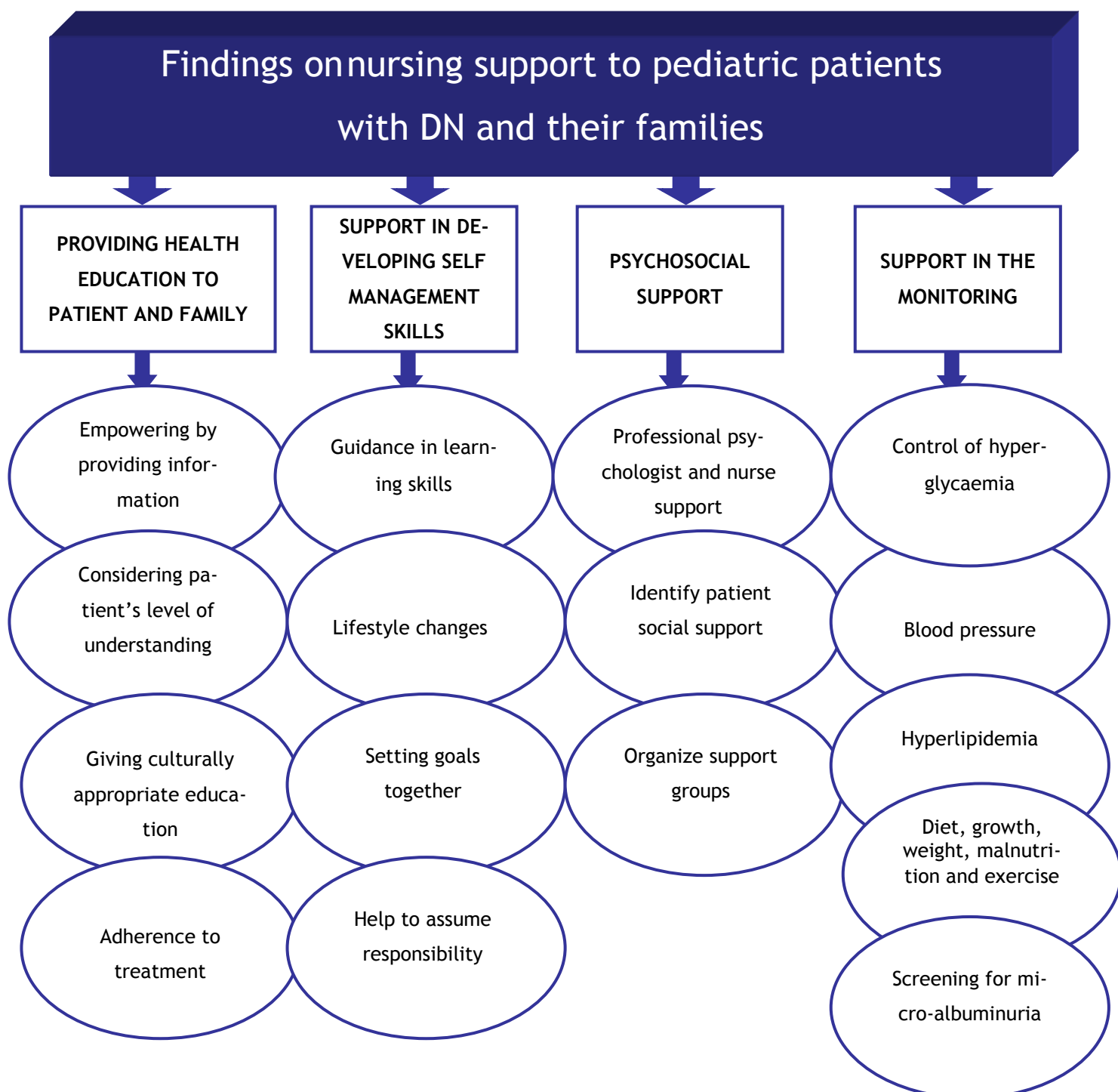
Figure 8: Data analysis for support in routine monitoring.

Data extracted	Subcategories	Main categories
<ul style="list-style-type: none"> • Diet and weight loss are key components in management • Protein-energy malnutrition is common in children with DN • Growth impairments should be monitored. • An individualized nutritional assessment will allow the plan of care to be tailored for each patient • Using patients data to appropriately develop or modify nutritional plan 	Diet, growth, weight, malnutrition and exercise	
<ul style="list-style-type: none"> • Identification of subjects at risk and screening for subclinical signs of complications is essential. • Annual screening for micro-albuminuria in patients with diabetes to detect early diabetic nephropathy. 	Screening for micro-albuminuria	SUPPORT IN THE MONITORING
<ul style="list-style-type: none"> • Early detection of persons at risk both before and after diabetes onset, aggressive glycaemic control and close monitoring can largely avert kidney failure due to DN. • Implementation of appropriate care strategies such as regular monitoring. • There is evidence linking smoking and insulin resistance. • 	Control of hyperglycaemia	
<ul style="list-style-type: none"> • Long term follow up with regular reinforcement • Preventive and treatment strategies: optimize glycaemic control, control BP, control lipid levels, and avoid smoking. 	Hyperlipidemia Blood pressure	

5. FINDINGS

Upon completion of the data analysis process, findings from the data were closely checked to make sure it answers the purpose statement and research question of this thesis. Four main themes emerged from the analysis, they include; providing health education to patient and family, Support in developing self-management skills, psychosocial support and Support in monitoring. Figure 9 shows a summary data analysis.

Figure 9: Summary of data analysis



5.1. PROVIDING HEALTH EDUCATION FOR PATIENT AND FAMILY

Health education is of paramount importance in patients' empowerment. The Institute of Medicine 2004 in the US defined health literacy as the degree to which individuals has the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions (Institute of Medicine 2004). Studies have shown that well educated patients frequently do research before their appointments. These empowers the patient to ask questions, ask for clarification and are more likely able to negotiate for time and better treatment with the healthcare professional. On the other hand, patients with less health education are usually more submissive, and complained of being rushed and treated rudely by healthcare provider. Therefore barriers caused by low health literacy should be addressed (Stiles 2011).

5.1.1. Empowering through information

To adapt an active, informed and involved approach in their care, patients need to be well informed. Nurses with collaboration with other health care professionals can empower patients and family through provision of on-going health care education. The patient and family should have clear and adequate information about the disease condition, possible complications, risk factors, preventive measures, treatment options including their advantages and disadvantages and the follow-ups needed (Miller & MacDonald 2006).

Knowledge and information is an important tool in decision making. It enables a patient to make well informed decision through a client centred approach. Making decisions such as lifestyle changes, lifelong adherence to treatment and regular health check-ups are essential in prevention or/and postponing of diabetic nephropathy. Education empowers patient to take charge of their condition, and to make appropriate and timely therapeutic decisions necessary for their condition (Hicks, 2010).

5.1.2. Patient's Adherence to Treatment

Patients with diabetes as a chronic illness may not be motivated to treatment adherence because consequences such as DN are not immediate. It is therefore the duty of the nurse and other health care professionals to help the patient understand the benefits of adherence to treatment and the long term consequences of non-adherence. Patients are more likely to adhere to treatment if they believe the healthcare professional is correct about treatment recommendations and that the treatment is beneficial (Willoughby 2005).

5.1.3. Considering patient's level of comprehension

Nurses have an ethical duty to share health information with patients within patients' level of comprehension. Use of simple language has been recommended in both verbal and written information. These could mean avoiding use of medical unfamiliar terms with patients. Information given to patients should be well organised, in manageable units and clear. The information and instructions should be in the format that the patients' best understands e.g. reading, watching video, pictures, tape-recorders etc. Telephone support should also be available to patients whenever they needed clarification (Stiles 2011).

5.1.4. Considering Patients' Cultural Aspect

The information and educational material should be culturally and religiously appropriate to the patient and family. Studies have shown that adapting culturally appropriate approach in nursing when giving health and lifestyle advice produces positive outcome. According to Stiles, the rates of people from south Asian origin developing T2DM in the UK could possibly have been reduced if the nurses had adopted culturally appropriate strategies in giving health and lifestyle advice. This is especially so when giving dietary advice, giving examples of food that the patient is accustomed to makes it easier to adapt the dietary advice (Stiles 2011).

5.2. SUPPORT IN DEVELOPING SELF MANAGEMENT SKILLS

Self-management is the individual's ability to manage the symptoms, treatment, physical and psychological consequences and lifestyle changes inherent in living with a chronic conditions. It entails the ability to monitor individual's condition and to affect the cognitive, behavioural and emotional responses necessary to maintain a satisfactory quality of life (Hicks 2010).

To prevent DN, the patients need adherence to treatment, behavioural and lifestyle changes, acquisition of coping strategies and ability make decision on daily basis. Therefore, patient and family need continued support and appropriate education in developing self-management skills to facilitate the ability to take charge of their condition. Nurses and other health care professionals have an important role in giving continuous education, support and encouragement to patients as they strive to develop self-management skills (Hicks 2010).

5.2.1. Assuming Responsibility

It is important to establish that the patient/family understands clearly what self-management means and what it entails. In order to assume responsibility, the patient/family needs to understand the disease condition, complications possibilities, different treatment regimens and preventive measures. The nurse and other health care professionals need to help the patients understand different responsibilities that are involved in self-management. The information should be clear and addressed according to the age and abilities of the patient. Instructions given orally should always be reinforced in writing. Assessment of the patient's/family level of readiness in self-management should be done and any uncertainties should be addressed. The patient should be aware of where to seek professional advice when needed (Willoughby & Burriss 2005).

5.2.2. Setting of Goals

Setting of goals is important in self-management. Research has shown there is a positive relationship between patient involvement in goal setting and successful disease management. The nurse and the patient/family should collaborate in setting specific goals. They should together assign responsibilities in achieving the goals; set dates of attaining them and should have a clear idea of how to achieve them. Setting goals together facilitates patient/family feeling of ownership of the process which results to more commitment and adherence. Feeling of ownership is especially important in achieving long term goals (Willoughby & Burriss, 2005).

5.2.3. Lifestyle Changes

The patient need help to understand the importance of lifestyle change in prevention of DN and how to implement them. Patient's motivation and continuous support is fundamental in lifestyle changing. The nurse and other health care professionals should assist the patient in dietary recommendations, exercise and weight reduction plan, smoking cessation and guidance on alcohol intake. Continuous counselling and encouragement are needed in achieving this long term lifestyle changes (Saccomano, & Deluca 2012).

5.2.4. Guidance in Learning Skills-

Prevention of DN requires skills. The skills involve, testing blood glucose, keeping records, counting carbohydrates, calculating dosages, monitoring blood pressure, monitoring diet, understanding laboratory values etc. (Stiles, 2011). These skills might initially seem overwhelming and challenging. Helping the patient/family to break the challenges in attainable components could be required. The nurse should then guide the patient and family in learning the skills. The skill should be

repeated until success is attained, this increases the patient's confidence in performing the skill and in learning more skill (Willoughby & Burriss 2005).

However, studies have shown that information and knowledge does not always result to appropriate behaviour changes. Different psychosocial theory models have been used to help patients develop self-management interventions. Nurses and other healthcare professionals should evaluate which best fits a particular patient and tailor it according patients' needs and abilities (Miller & MacDonald 2006).

5.3. PSYCHOSOCIAL SUPPORT

More than 40% people with diabetes suffer from reduced self-worth and/ or anxiety (Hicks 2010). A minimum, 15% of people with diabetes suffer from depression, a rate three times higher than general population (Willoughby & Burriss 2005). Different patients/families have different feelings after diagnosis; they could be feeling of guilt, shock, shame, worries and uncertainty about the future. Some patients/families feel relieved that they have a diagnosis of their problem. School aged children with chronic kidney disease such as DN commonly display deficit in verbal abstract reasoning and visual motor skills, and may demonstrate delayed social maturity (Hicks 2010).

5.3.1. Health Professional Support

Psychosocial provision for patients having chronic diseases is recommended. A mental health specialist is recommended as a part of the multi-professional team. Nurses being primary care providers should be keen to notice when the patient needs professional psychosocial support and intervene for the patient in organizing for a consultation (Hicks 2010; Sego 2007).

It is recommended that nurses be assigned to work with same patients on regular basis. This enables the patient/family to establish good relationship and trust. A therapeutic relationship facilitates good communication which is important when giving psychosocial support (Willoughby & Burriss 2005). According to Jones et al, no single factor is capable of influencing patients' decision as a trusting relationship with a health care provider, in this case the nurse (Sego 2007).

5.3.2. Identifying Patients Social Support

Social support has been shown to have a big impact on patient treatment adherence. Support could be provided by family, friends, schoolmates, neighbours, or school nurse. The nurse should identify patient's immediate social support system and with patient's consent involve them in the

care. The social support system could be source of patient's encouragement in achieving goals and overcoming setbacks. It is especially important in achieving long term goals such as lifestyle changes (Willoughby & Burriss 2005).

5.3.3. Support Groups

Nurses and other health care professionals should introduce patients to support group of people facing a similar problem or trying to achieve the similar goals. Support groups are important in giving the patient and family a sense of belonging and in preventing the feeling of isolation. Patients see that there are other people who are dealing with the similar problems. If needed, a successful patient could be assigned as a mentor to assist a struggling patient (Willoughby & Burriss, 2005).

5.4. SUPPORT IN THE MONITORING

5.4.1. Hyperglycaemia

In prevention of DN, the patient should try to achieve glycaemic level that is as near to the normal as possible. This is because there is no clear threshold for HbA1c levels, below which complications are completely prevented. In puberty, achieving good glycaemic control is challenging due to psychological issues, physiological insulin resistance and other changes in the hormonal milieu. Compliance in intensive insulin treatment in adolescence could also be compromised due to fear of weight gain and risk of hypoglycaemia (Marcovecchio, Tossavainen & Dunger 2010).

The nurse in collaboration with family members of the patient should institute an early and tight glycaemic control in order to effectively postpone, prevent or halt the progression of DN. The patients' glycaemic control records should be reviewed regularly, the nurse should give recommendations accordingly and when needed should refer the patient to other health care professionals. Diabetic Nephropathy is significantly influenced by interventions aiming at improving hyperglycaemia. Research has shown that, in patients with T1DN, tight glycaemic control achieved through multiple daily insulin injections was associated with a 40%-50% decrease in the incidence of proteinuria (Russell, 2006).

5.4.2. Blood Pressure Monitoring

Higher than normal systolic and diastolic BP contribute to the development of micro-vascular complications. Increases in BP have been found to precede or occur in concomitant with the appearance of MA in adolescents with T1D. Research has shown that BP is an independent risk factor

in the development of MA. (Marcovecchio, Tossavainen & Dunger 2010). In type 2 diabetes hypertension usually reflects a metabolic syndrome of which both glucose intolerance and hypertension are integral parts. Hypertension tends to worsen once nephropathy occurs in T2DM (Bogdanovic 2007).

The nurse in collaboration with the family should develop a proper blood pressure monitoring system which should include BP recording at home. These records should be evaluated and reviewed at every follow-up session with the nurse. A proper course of action should be taken in collaboration with other health care professionals. Studies have shown that a close correlation exists between the onset and degree of micro-albuminuria and the onset and degree of hypertension (Russell, 2006).

5.4.3. Hyperlipidaemia

Lipid abnormalities have been linked to the development and progression of DN and other diabetic complications. Elevated serum cholesterol acts as an independent progression promoter in DN, it has emerged as a strong predictor of persistent MA or overt DN in T1DM patients after follow-up of 6 or 12 years. Low levels of both cholesterol and triglycerides were associated with regression of MA of short duration (Bogdanovic 2008).

Regular monitoring of hyperlipidaemia is important in implementing appropriate care strategies. Review of care should then be done and recommendations given by the nurse in collaboration with other health care professionals. Recommendations could include medication changes, lifestyle changes, diet etc. (Miller & Macdold, 2006).

5.4.4. Diet, Growth, Weight, Malnutrition and exercise

In adults with T1D, low protein diet has been shown to reduce the increase in AER and the decline in glomerular filtration rate. Studies investigating the effect of protein intake have shown that a diet restriction to 0.5-0.8 g/kg/day reduces the risk of progression of nephropathy. However, it has not been properly evaluated the effects of such strict protein restriction on AER in children and adolescents with T1D especially during pubertal growth (Marcovecchio, Tossavainen & Dunger 2010). In T2DM, dietary changes are of fundamental importance due to its relationship with obesity and dyslipidaemia. Obesity in children and adolescents has been associated with insulin resistance and Higher Albumin Excretion Rate (Bogdanovic 2008).

An individualised nutritional assessment should be done, this allows for nutritional guidance tailored for each patient needs drawn together with a dietician. A strict and client -specific approach in the management of dietary intake in preventing obesity and malnutrition should be

implemented. Sample diets should be provided to the patient for an effective start-off (Russell, 2006). The pediatric nurse should encourage the patient to keep a food diary that should be evaluated when the patient returns to the clinic for routine check-up to determine adherence in prescribed dietary regime. Growth impairment and malnutrition should be closely monitored. Comparison of the patient's height and weight with normalized values for children of comparable age should be done during follow-ups. Diet review should then be done according to the patient's current status of health. Exercise should be recommended according to patient's health status. Professional consultation should be sought before starting the practice regime (Miller et. al. 2008).

5.4.5. Screening for Micro-Albuminuria

The nature of DN necessitates identifying people of high risk for early intervention. This is because; the early stages of diabetic nephropathy are asymptomatic. The pathological changes secondary to diabetes are clinically evident 5-10 years after onset of diabetes Type 1. However, in susceptible patients, pathological changes in the kidney almost certainly begin soon after onset of diabetes. This therefore calls for early proper management of diabetes so as to prevent/postpone DN and other diabetic complications (Marcovecchio, Tossavainen & Dunger 2010).

Screening for micro-albuminuria is recommended for all at-risk individuals. Micro-albuminuria is low levels of albumin in urine. It is the earliest clinical evidence of DN. In children and adolescents, MA is defined as AER (albumin excretion ratio) between 30-300 mg in 24 hours urine collection. A routine urinalysis to rule proteinuria is recommended for patients with T2DM on diagnosis. In pediatrics patients with T1DM, screening is recommended from early adolescence. It should be done from age 11 in those with 2 years of diabetes duration and from 9 years from patients with 5 years of diabetes duration. Nurses play a vital role in initiating screening process as they usually do routine follow-ups of diabetic patients (Marcovecchio, Tossavainen & Dunger 2010).

Depending on the screening results, the recommendation could be either for preventive purposes or initiating a treatment regime. For patients who test positive, other causes for micro-albuminuria should be ruled out and results confirmed. Confirmation of MA diagnosis is done when at least two of three urine samples taken over a period of 3 to 6 months have shown elevated protein levels. Once micro-albuminuria is diagnosed, treatment should be considered. Nurses in collaboration with the multi-professional team schedule for annual screening and preventive regime for the normal-albuminuria patients and treatment and follow-up for patients who test positive of micro-albuminuria during the initial screening (Willoughby & Burriss 2005).

6. DISCUSSION

This study was done using a qualitative method of systematic literature review. 15 studies were identified from reliable data bases and manual searches. A pre-determined protocol was set to help the researches choose the studies that clearly answered the research questions. An inductive approach was used to analyse data in answering the research question. The study tried to identify the kind of support the nurses should provide in the prevention of pediatric DN.

From the studies, it was clear that a diabetes milieu is important in the development of DN. According to statistics, pediatric diabetes is on the increase i.e. T1DM and T2DM. T2DM is on the increase due to childhood obesity which is associated with insulin resistance. Finland and Sardinia are the leading countries in T1DM despite slight decline in incidences in Finland. Clinical symptoms due to DN are evident after 5 - 10 years after the onset of the disease. However, in susceptible patients, kidney damages start with onset of diabetes and may accelerate during adolescent (Marcovecchio, Tossavainen & Dunger 2010).

Through the review, it was identified that DN in pediatrics can largely be prevented or postponed through early identification of persons at risk and use of proper and timely preventive measures. Pediatric health care practitioners are encouraged to collaborate in putting more emphasis on the preventive measures rather than complex and costly treatment measures (Bogdanovic 2008). Patients and families need continuous support from the nurses and other health care professionals in implementing the preventive measures in prevention of DN (Marcovecchio, Tossavainen & Dunger 2010).

Patients and family education and nursing support in patient's development of self-management skill proved to be fundamental in preventing DN. This equips the patient and empowers them to take charge of their life. Building a therapeutic relationship with patient and family creates a good environment for providing this patients care. It is especially important in the follow-up of long term goals. According to Sego, no single factor can influence patient's decision and compliance as a trusting relationship with a health care provider, in this case a nurse (Sego 2007; Hicks 2010; Stiles 2011).

Nurses' support in monitoring of DN was also revealed to be an area of importance. Due to the nature of the disease, psychosocial support, screening for micro-albuminuria, monitoring of blood sugar, blood pressure, hyperlipidaemia etc. is necessary. Nurses play a major role in monitoring of these values through follow-ups and regular reinforcement of patients and families in management of DN. (Sego 2007).

7. Ethical Considerations and Trustworthiness

Ethical behaviour is defined as “being in accordance with rules or standards for right conduct or practice” (Levy, Y. and Ellis, T. 2006). The researchers followed the guidelines of conducting a systematic literature review. Raw data for the review was collected from credible data sources through Nelly porter which is a reliable electronic library provision of Laurea University of Applied sciences. A research protocol for conducting the review was put in place before the research was conducted which acted as guide throughout the research process (Saltikov 2012). Proper referencing of the data used was done using Laureas` thesis guidelines ensuring that due credits were given to authorships.

Researchers are encouraged to admit shortcomings and limitation within their research process (O`Leary 2004). Ethical issues and limitations faced during the review process were duly documented.

7.1. Ethical Issues

On the onset, one of the elimination criteria was studies done before year 2006. However, one study that was published in 2005 was used. The nurses` role was a major part of the review. This study addressed this area in a way that felt that leaving it out would have deprived the review of important information. The researchers however wondered whether by including this study they had compromised research ethics by not following fully the predetermined review protocol.

7.2. Limitations of the study

One of the inclusion criteria was studies in English language. This limited any information that could have been found in studies conducted in other languages. It is difficult to tell how much this affected the results of their review. However, English was the language that both researchers had good command of and time constraints and resources did not allow for interpretation of studies in other languages.

There was also the question of the studies that were not accessible thus unattainable for data analysis. It is impossible to tell what information was contained in them and whether it could have in any way influenced the result of the review findings.

8. Implications for Practice

According to the findings of the literature review, occurrence of Diabetic Nephropathy in pediatrics as a diabetic complication can be influenced to a big degree. With early implementation of preventive and therapeutic strategies, particularly in high-risk individuals, most of the adverse complications as a result of diabetes could be prevented, delayed or reduced (Marcovecchio, Tossavainen & Dunger 2010). This calls for pediatric health care professionals to understand and put more emphasis on identifying the risk factors for DN, strategy for prevention, and early screening to identify earliest manifestations of renal injury rather than interventions available for advanced complications (Bogdanovicl 2008).

Effective nurses' health counselling skills also emerged as important factor in prevention of diabetic nephropathy. It was portrayed as a critical component in meeting the educational needs of patients and families in order to provide expert coaching and guidance in prevention of DN. The nurses' role in counselling includes skills such as effectively providing information about disease condition, preventive measures, importance of lifestyle changes, medication adherence etc. This empowers the patient to make well-informed decisions through a client-centred approach which in turn improves the probability of patients' adherence to treatment. It is therefore essential for nurses to develop these counselling skills, they are an important asset in proving patients education effectively (Willoughby & Burriss, 2005).

A positive interaction between the nurse and the patient/patients family is important in providing psychosocial support. It is also important in achieving long term goals such as life style changes in prevention or postponing of diabetic nephropathy. A positive interaction enables the patient to reveal their areas of weakness freely which gives a chance to address them. This interaction can be enhanced by the ability of the nurse to show sensitivity to the patient/family by being empathetic and understanding of the patient's/families feelings (Willoughby & Burriss, 2005).

Mentioned below are some other aspects that emerged from recent studies that could positively improve the quality of care provided to PP with microalbuminuria and DN. These suggestions included the development of a local guidelines and standards for the management of patients with microalbuminuria and DN and the establishment of an outpatient "DN clinic" with frequent clinic visits as part of routine care in monitoring pediatric patients with microalbuminuria and DN. (Kolset, Reinholt & Jenssen, 2012). Such will be helpful in providing continuity and consistency in care thereby improving patient's quality of life.

9. Implications for research

Although a lot of research has been done on diabetes, it was surprising to realize how much research is lacking in pediatrics diabetic nephropathy which is a complication of diabetes. Most of the recommendations on preventive measures were either based on adults' research or lacked proper evidence.

In adults with T1D, low protein diet has been shown to reduce the increase in AER and the decline in glomerular filtration rate. However, it has not been properly evaluated the effects of such strict protein restriction on AER in children and adolescents with T1D especially during puberty (Marcovecchio, Tossavainen & Dunger 2010). More research needs to be done to give proper protein dietary recommendation for this group of pediatric patients.

Negative effects have been associated with lack of proper nursing support in prevention of DN. (Stiles 2011). Most of the research during the study addressed general prevention, very few were on nursing support. More research should be done on this aspect in order to equip the nurses with the needed information. Education programmes should be organized for the nurses to help them cope with challenges such as dealing with patients from different cultural and religious background and when helping patients with different abilities to learn self-management skills.

Physiological, psychological and hormonal issues during adolescence present a challenge for patients and families in preventing diabetic nephropathy. Research dealing with this age group should be done addressing the unique kind of nursing support that should be provided for these patients and their families (Bogdanovic 2008).

10. CONCLUSION

Prevention of diabetic Nephropathy is complex, life-long and involves all aspects of patient's life. It is even more complex when pediatrics patients are concerned. Progression of DN can largely be influenced through early detection of risk factors and early implementation of intervention strategies. Continuous nursing support is needed for both the patients and their families.

Health education about the disease condition and its preventive measures empower the patient and family to make timely and therapeutic decision which is important in DN prevention. Patients who had health education were found to be able to negotiate for better health care than those who didn't. Giving education on the level and form that patients understand, evaluating the cultural and religious appropriateness of the education and educational material is essential. These factors affect patient and family level of benefiting from the education. However nurses were found to be

lacking in this area. According to Stiles, the rates of people from south Asian origin developing T2DM in the UK could possibly have been reduced if the nurses had adopted these strategies in giving health and lifestyle advice (Stiles 2011).

Supporting patients in developing self-management skills is essential. Prevention of DN requires skills such as blood glucose and blood pressure monitoring, medication administration and adjustment, decision making etc. Continuous encouragement and nursing guidance should be given to help the patient learn these essential skills which empowers the patient to take charge of their condition. Psychosocial support both professional and from patients social support system play a big part in patients development of self-management skills (Hicks 2010). Constant follow-up is needed to asses' patients' current situation, adherence to treatment regime and lifestyle, screening for micro-albuminuria, reviewing self-management skills etc.

Pediatric nurses have a duty to give substantial support to pediatric patients and families in prevention of DN. It is therefore important to equip the nurses for this duty. However, the nursing support part in prevention of diabetic nephropathy was very minimal. Most researches dwelt on general prevention and medical prevention (Bogdanovic 2008). More research on this area could be beneficial. Special education should be provided to the nurses dealing with this group of patients. The education should include how to assist patient to learn self-management skills, how to tailor education according to patient's age, needs and abilities and how to deal with patients from different cultural and religious backgrounds.

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1 Appendices

Author and the year of publication	Title	Kind of Publication	Purpose of the study	Method of data collection	findings relevant to this study
Miller, D., & MacDonald, D. 2006	Management of pediatric patients with chronic kidney disease.	Pediatric Nursing	Discuss pertinent issues of chronic kidney disease in the context of a case study to promote better understanding of real world nursing	Case study	Importance of nurses implementing preventive care strategies and facilitating coordination of care. The role of nurse in patient and family education and decisions about care plan.
Saccomano,S.J., and DeLuca,D.A. 2012	Living with chronic kidney disease: Related issues and treatment	The Nurse Practitioner	Help practitioners understand and utilize the proper treatment and health promotion activities to identify, prevent, and reverse the serious implications of chronic kidney disease.		Lifestyle modification education and monitoring should be the focus of healthcare provider. High risk patients should be screened regularly

Author and the year of publication	Title	Kind of Publication	Purpose of the study	Method of data collection	findings relevant to this study
y, K.J, Fur-N.J, Hul-A.,and en,S.V. 2007.	Delivering improved management and outcomes in diabetic kidney disease in routine clinical care.	British Journal of Diabetes & Vascular Disease.	Examines the Impact of service re-design on management and outcomes in type 2 diabetic patients with microalbuminuria and diabetic nephropathy	Case study	Service re-design in the management of type 2 diabetic kidney disease can deliver improved care and outcomes comparable with landmark trials in a routine clinical care setting.
Bogdanovic, R. 2008	Diabetic nephropathy in children and adolescents.	Pediatr Nephrol	This review considers each form of diabetes separately, including natural history, risk factors of development, screening for early manifestation, and strategy recommended for prevention and treatment of DN in children and adolescents.	Review based on lectures	Assessment of kidney function and screening for the earliest manifestation of renal injury. Pediatric health care professional need to understand risk factors, prevention strategies, screening and treatment of early DN

Author and the year of publication	Title	Kind of Publication	Purpose of the study	Method of data collection	findings relevant to this study
Marcovecchio,M.L., Tossavainen,P. and D. B. Dunger.D.B. 2010	Prevention and treatment of micro vascular disease in childhood type 1 diabetes.	British Medical Bulletin	Help to understand the increasing incidence of childhood T1D and its implications on prevention and treatment of micro vascular complications in childhood type 1 diabetes	Literature review	Early identification of persons at risk and early implementation of preventive measures and therapeutic strategies is essential in reducing the burden related to diabetic micro vascular complications. Good glycaemic control the fundamental in preventing and treating DN.
Sego,S. 2007.	Pathophysiology of Diabetic Nephropathy	Nephrology Nursing Journal	To help the health care professional Understand the mechanism of T2D and the implication for prevention.	Literature review	Patients look to the nurse for information, support and encouragement. A clear understanding of medication, diet, laboratory values and basic anatomy and physiology equip the patients to deal with their disease effectively.

Author and the year of publication	Title	Kind of Publication	Purpose of the study	Method of data collection	findings relevant to this study
Willoughby, D., Dye, C., Burriss, P. and Carr,R. 2005..	Protecting the Kidneys of Patients with Diabetes	Clinical Nurse Specialist.	To describe current screening and intervention guidelines for renal complication in patients with diabetes and to provide clinical nurse specialist with tools to facilitate education and expert guidance needed by patients with diabetes to preserve their kidney function.	Literature review	Diabetes is the most common cause of ESRD in the US. High BP, high cholesterol levels and smoking increase the risk of renal failure. Nurses must recognise the factors that impact patient's adherence such health beliefs and attitudes, social support, practitioner-patient relationship, patient's knowledge and understanding.
Hicks ,D .2010.	Self-management skills for people with type 2 diabetes	Nursing Standards	The article discuss type 2 diabetes , including underlying causes and treatment algorithm needed to manage this condition. It also explores the educational opportunities available to encourage self-management of this chronic lifelong condition.	Literature review	Diabetes services should make provision for psychosocial support. Developing of self-management interventions through teaching of skills, goal setting and problem solving. Nurses should be able to inform patients and refer them to appropriate services and support groups.

Author and the year of publication	Title	Kind of Publication	Purpose of the study	Method of data collection	findings relevant to this study
Willoughby, D., Dye, C., Burriss, P. and Carr,R. 2005..	Protecting the Kidneys of Patients with Diabetes	Clinical Nurse Specialist.	To describe current screening and intervention guidelines for renal complication in patients with diabetes and to provide clinical nurse specialist with tools to facilitate education and expert guidance needed by patients with diabetes to preserve their kidney function.	Literature review	Diabetes is the most common cause of ESRD in the US. High BP, high cholesterol levels and smoking increase the risk of renal failure. Nurses must recognise the factors that impact patient's adherence such health beliefs and attitudes, social support, practitioner-patient relationship, patient's knowledge and understanding.
Kelo,M., Martikainen, M. and Elina Eriksson,E. 2013	Patient Education of Children and Their Families:	Continuing Nursing Education	Describe significant patient education sessions, and to explore nurses' empowering and traditional behavior in the patient education process of children and their families	Qualitative research method	More training for nurses are needed in hospitals to enhance the empowering education of children and their families.

Author and the year of publication	Title	Kind of Publication	Purpose of the study	Method of data collection	findings relevant to this study
Stiles, E. 2011.	Promoting Health Literacy in patients with diabetes	Nursing Standard	The article suggests how nurses can help people with diabetes improve their health literacy.	Literature review	Health literacy and education is critical to patient empowerment. Effective communication skills are needed for nurses to develop and maintain therapeutic relationship. Nurses should share health information with patients in a way they can understand. Information should culturally appropriate
Terrill, C. J. 2007	Issues in Renal Nutrition and the Pediatric Patient with CKD.	Nephrology Nursing Journal	The review focused on nutritional requirements of Ped.nephrology patients to promote appropriate growth and development	literature review	Stipulated that, pediatric patient with DN requires the cooperation and coordination of the entire health care team, including nurses, social workers, dietitians, physicians, technicians, and the patient and family. It also emphasised on the importance of diet modification.

Author and the year of publication	Title	Kind of Publication	Purpose of the study	Method of data collection	findings relevant to this study
Wright,J. and Vardhan,A. 2008.	The problem of diabetic nephropathy and practical prevention of its progression	British Journal of Diabetes & Vascular Disease	Gives practical advice on the management of patients with diabetic nephropathy	literature review	Suggested that early detection and treatment of diabetic nephropathy must be sought and a systematic approach employed which includes patient and healthcare staff education
Walker, J.D, 2010	An update on diabetic renal disease	British Journal of Diabetes & Vascular Disease	Describe different intervention approaches that can limit the progression of DN in those with type 2 diabetes and micro albuminuria		Health care professionals should strive to help the person with diabetes achieve good glycaemic control as possible. Screening for diabetic renal disease should occur at least annually. Referral to a nephrology clinic should be considered in those with an eGFR under 30 ml/min and those with high level proteinuria
Russell, T.A. 2006	Diabetic nephropathy in patients with type 1 diabetes mellitus.	Nephropathy Nursing Journal	Illustrates the care of patients with diabetic nephropathy in type 1 diabetes mellitus.	Case study approach	Many of the complications of diabetes could be minimized if patients received a comprehensive health maintenance program. Hyperglycemia and blood pressure are the most important things to control

Author and the year of publication	Title	Kind of Publication	Purpose of the study	Method of data collection	findings relevant to this study
Balakumar, P., Chakkarwar, V.A., Kumar, V., Jain,A., Reddy, J. and Singh, M. 2008	Experimental models for nephropathy.	Journal of Renin-Angiotensin-Aldosterone System	This review discusses various models for nephropathy, which may open vistas for developing new drugs to treat nephropathy.	Case study	Hyperglycaemia, hyperlipidaemia and hypertension are considered to be the major risk factors implicated in the progression of nephropathy. Nurses should provide support to patients reduce the risks factors.
Kolset, . S. O., Reinholt, F. P., Jenssen, T. and Cytochem, J.H. 2012	Diabetic Nephropathy and Extracellular Matrix	Journal of Histochemistry & Cytochemistry.	Discuss the typical morphological changes that results in changes in the extracellular matrix (ECM)		Provision of nursing support should be made available to patients since all DN progression can be modified through tight blood glucose regulation