



Kamuzu College of Nursing

**Management of Diabetes and Self-Care Practices Among Older
Adolescents with Type 1 Diabetes at Two Central Hospitals**

By

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Declaration

I, Etta Chimbe, declare that this dissertation on “management of diabetes and self-care practices amongst older adolescents with type 1 diabetes” is entirely my own work. This thesis has not been presented for any award at any University within or outside Africa. All the sources of information that have been used or quoted have been acknowledged and added to the list of references

Etta Chimbe

Signature

A handwritten signature in black ink, appearing to read 'Etta Chimbe', written in a cursive style.

Date: 4th November, 2015

Certificate of approval

The undersigned approve that this dissertation represents the students' own work and has not been presented anywhere else in or outside Africa.

Signature _____

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Date _____

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Dedication

This thesis is dedicated to my parents Mr. & Mrs. J.R. Chimbe Mwale, my sister and brothers for their love, encouragement and support that has helped me throughout my study period.

Special thanks to my husband Patrick Duncan Phiri for the support during the whole study period.

God bless you all.

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Abstract

The study aimed at assessing knowledge levels and practices on management of type 1 diabetes among adolescents at Queen Elizabeth and Kamuzu Central Hospital. It was a quantitative research that used a descriptive cross sectional design. The participants were recruited using convenience sampling method, with a total of 46 adolescents. Data was collected using a structured questionnaire on various aspects of diabetes that included knowledge on management, self care practices, type of support and challenges faced in managing the condition. The data was analyzed using two statistical packages; IBM SPSS Statistics version 20, to enter and summarize data and R version 3.1 to analyze statistical relationships between variables of interest. Relationship between demographic variables and knowledge of diabetes was established using spearman correlation for continuous variables and for categorical variables, Chi-square test was used. A total of 63% (n=29) of the respondents knew the cause of type 1 diabetes and 58% (n=42) had inadequate knowledge on managing hyperglycemia. There was a significant association between age and number of admissions ($P=0.022$) and no link between knowledge and self care practices ($P>0.05$). Majority (64%, n=28) of the adolescents were injecting themselves with insulin. Sixty four percent (n=39) of the adolescents were inappropriately doing the self monitoring of blood glucose. Majority of the adolescents (70%, n=32) knew why changing insulin injection site is important and 78% (n=36) of them were not counseled on diet plan. Psychological support was the least provided by family (11%, n=13) and health care providers (9%, n=11). Lack of blood glucose monitoring equipment and erratic insulin supply were mentioned as some barriers affecting management and self care practices.

Knowledge, ability to perform self care practices and support, affects diabetes management behaviors among adolescents. Findings from the study revealed inadequate knowledge amongst the adolescent's on diabetes and diabetes self care practices. Therefore, there is need to train health care providers on diabetes and develop health education materials for adolescents with type 1 diabetes.

Acronyms

COMREC: College of Medicine Research and Ethics Committee

DAM: Diabetes Association of Malawi

DKA: Diabetes Keto-Acidosis

DM: Diabetes Mellitus

ISA: Insulin Self Administration

KCH: Kamuzu Central Hospital

KCN: Kamuzu College of Nursing

MOH: Ministry of Health

NCD: Non-Communicable Diseases

NYCOM: National Youth

QECH: Queen Elizabeth Central Hospital

RPC: Research and Publications Committee

SBGM: Self Blood Glucose Monitoring

SPSS: Statistical Package for the Social Sciences

T1DM: Type 1 Diabetes Mellitus

WHO: World Health Organization

Definition of terms

- *Adolescents*: Adolescents are individuals in the age of 10 – 19 years (MOH, 2009). But for this study subjects will be old adolescents.
- *Older adolescents*: WHO (2003) defines old adolescents as those aged 15-19 years.
- *Adolescence*: A stage of life during which individuals reach sexual maturity; it is the period of transition period from childhood to adulthood (NYCOM, 2001).
- *Diabetes mellitus*: Diabetes mellitus is a disorder characterized by chronic hyperglycaemia due to defective insulin secretion, action or both (Glasper, McElwing and Richardson, 2007, p634). For the study it will refer to type 1 diabetes and the patient should be on insulin treatment.
- *Self-care*: Self-care is "the ability of individuals, families and communities to promote health, prevent disease, and maintain health and to cope with illness and disability with or without the support of a healthcare provider." (Baumann and Dang, 2012).
- *Self-care management*: Self-management is the process by which a person develops the skills to manage their condition (Diabetes UK, 2009). Support for self-management and self-care is the responsibility of health workers and family members.
- *Diabetic ketoacidosis (DKA)*: a potentially life threatening condition caused by insulin deficiency leading to high blood glucose, hyperglycemia, and common in patients with type 1 diabetes (Glasper, McElwing and Richardson, 2007, p638).
- *Hypoglycemia*: Condition in which the plasma glucose concentration falls below 4.0 mmol/L-80mg/dl (Delaune and Ladner, 2002). This means the sugar level circulating in the blood plasma is low.

- *Hyperglycemia*: Condition in which the plasma glucose concentration exceeds 10mmol/L (180mg/dl-) (Delaune and Ladner, 2002). This means the sugar level circulating in the blood plasma is very high.
- *Health care provider*: A health care provider is defined as people whose job it is to protect and improve the health of their communities. In this study it will refer to a nurse, clinician or medical doctor who manages these patients at the diabetes clinic
- *Self monitoring of blood glucose (SMBG)*: An important component which involve self monitoring of the blood glucose to manage and prevent long term complications (Diabetes UK, 2009).

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Chapter 1

Introduction and Background

1.1 Introduction

Diabetes mellitus is one of the most common chronic non-communicable diseases (NCD) globally. In type 1 diabetes mellitus (T1DM), the production of insulin is reduced or completely absent. Without insulin, the body is unable to metabolize glucose, resulting in hyperglycemia (Monohan, Sands, Neighbors, Marek and Green, 2007). Hyperglycemia usually accounts for only a minority (10%) of the total burden of diabetes and a predominant form in younger age groups (Shaw, Sicree & Zimmet, 2010). The peak onset of T1DM is between 10-15 years (Hockenberry and Wilson, 2011) though it can even be diagnosed at less than two years (Lombardo, Salzano, Messina & De Luca, 2005). It is a challenging disease to manage successfully and a debilitating disease that requires life-long treatment with insulin injections. If untreated, complications occur, which include disorders like coronary artery disease, cerebrovascular and peripheral vascular disease, nephropathy, lower-extremity amputations, infection and ketoacidosis. (Allen, Cohen, Robling, Hood & Atwell et al., 2010). The goals for the management of T1DM in adolescents are to prevent Diabetes Ketoacidosis (DKA), prevent severe hyper/hypoglycemia, maintain normal growth and development and prevent long-term diabetic complications (Hoffman, 2004). This is done by following self care practices which include regular exercise, taking recommended diet, proper intake of prescribed medications and blood glucose monitoring (Sigurdardottor, 2005).

While the care regimen is complex, patients with good diabetes self-care knowledge and behaviors can attain excellent glycemic control (Delamater, 2006). For this to be done, patients

need to have adequate knowledge on self care practices despite the fact that literature concludes limited knowledge about diabetes among patients (Kiawi, Edwards, Shu, Unwin & Kamadjeu, et al., 2006). With the ever decreasing health care resources especially in developing countries including Malawi, the need for self-care management becomes paramount (Mufunda, Wikby, Björn & Hjelm, 2012). With adolescents, knowledge on self care practices is very important as it can be particularly challenging for adolescents to manage the diabetes (Halvorson, Yasuda, Carpenter & Kaiserman, 2005). This is so, as during this stage, physical, mental and emotional developments coincide with their battle against a chronic disease (Adeyemi, Rascati, Lawson & Strassels, 2012). There is a scarcity of studies investigating knowledge of diabetes and knowledge gaps among adolescents, children or adults with diabetes have been found in Malawi hence need for the study.

1.2 Background

In 2011, there were 366 million people worldwide with diabetes, and 551.8 million are expected by 2030 (International Diabetes Federation, 2012). The number of deaths attributed to diabetes has long been considerably underestimated (Elrayah-Eliadarous, 2007). Diabetes caused 4.6 million deaths in 2011 (International Diabetes Federation, 2012) with more than 80% of these deaths occurring in low and middle-income countries (WHO, 2013). However, 183 million people (50%) with diabetes are undiagnosed. WHO projects that diabetes will be the 7th leading cause of death worldwide by 2030 with a global prevalence estimated to be 9% among adults aged 18+ years (WHO, 2014). Soltesz, Patterson and Dahlquist (2009) estimated that annually, there are approximately 76,000 children less than 15 years who develop type 1 diabetes worldwide portraying the magnitude of the problem among children and adolescents.

Gulabani, John and Isaac (2008) in their study done in India, found that patients' knowledge regarding the treatment and complications of diabetes showed serious deficiencies, more so among women, even though most had been diabetic for years. The study confirmed that patient knowledge about the treatment and complications of diabetes is limited, especially with regard to preventive aspects. In another study done in Amman, Jordan, findings showed that diabetic patients had diabetes knowledge deficit about their disease (Al-Sarihin, Bani-Khaled, Haddad & Althwabia, 2012).

In sub-Saharan Africa, diabetes mellitus was once considered a rare disease, but in 2010, over 12 million people were estimated to have diabetes with 330,000 people dying from diabetes-related conditions (Motala & Ramayira, 2010). Over the next 20 years, it is predicted that Sub-Saharan Africa will have the highest prevalence of people with diabetes than any region in the world, with 80% of all new cases occurring in developing countries (International Diabetes Federation, 2012). In 2010, it was estimated that 37,500 children under 14 years of age in Africa had type 1 diabetes and 6,100 new cases will be diagnosed (Motala & Ramayira, 2010). However, these estimates might not reflect the real problem on the ground due to limited data available in most countries. Literature indicates few studies have been found exploring knowledge of diabetes and gaps in African populations which have concluded limited knowledge about diabetes, the management and patient self-care (Mufunda, Wikby, Björn, Hjelm & Edwards (2012).

In Malawi, non-communicable diseases (NCDs) account for approximately 12% of the Total Disability Adjusted Life Years (DALYs) which is fourth behind HIV/AIDS, other infections, parasitic and respiratory diseases (Health Sector Strategic Plan, 2011). The WHO STEPS-survey estimated the prevalence of diabetes among adults to be at 5.6% (Msyamboza,

Ngwira, Dzowela, Mvula & Kathyola et al., 2011). However, the Diabetic Association of Malawi (DAM) put it at around 15% of the adult population (Mtambalika, 2012). There are no dependable figures on how many children, adolescents and adults are diagnosed and treated countrywide due to lack of data in many health facilities. This makes it difficult to estimate the prevalence and incidence of diabetes among children and adolescents. Despite this fact, Queen Elizabeth Central Hospital (QECH) pediatric clinic has 49 children below 15 years with type 1 diabetes registered at the clinic and Mzuzu Central Hospital has 10 patients aged between 10-19 years.

Studies have shown that increasing patient knowledge regarding disease and its complications has significant benefits with regard to patient compliance to treatment and to decreasing complications associated with the disease (Gulabani, John & Isaac, 2008). Adolescents with diabetes have been overlooked despite the unique challenges their care presents (Halvorson, Yasuda, Carpenter & Kaiserman, 2005). The complex regimen like monitoring of blood glucose, insulin injections and dietary restraint becomes overwhelming and time-consuming for them (Wysocki, Lochrie, Antal & Buckloth, 2011).

Adolescents prefer to live a normal life like their friends affecting their compliance. In addition, incomplete knowledge and understanding of treatment regimens and premature shift in responsibility for management from parents to adolescents all affects practices in diabetes management (Borus & Laffel, 2010). This put them at a high risk of developing complications. Furthermore, the challenges to the health care system like drug shortage, lack of diagnostic equipment and life saving machines in most health facilities reducing the life expectancy. Motala and Ramayira (2010) stated that a child diagnosed with T1DM in sub-Saharan Africa has a life expectancy that varies between 7 months and 7 years compared to 60 years in Western Europe.

Also, there are a low number of health care providers with requisite knowledge, expertise and experience in the care of children with diabetes (Majaliwa, Alusiyan, Adesiyun, Laigong & Adeniran et al., 2008). Few studies have been done in Malawi on diabetes, with no published study focusing on children or adolescents with type 1 diabetes. It is against this background that this study was set to describe the level of knowledge on diabetes and its self care practices among adolescents with type 1 diabetes.

1.3 Problem Statement

In Malawi, little is known about adolescent patient's knowledge regarding T1DM and its management. Adolescence is the transitional period whereby the adolescent is moving from parental care to self care as an adult. This can be difficult for the young people and their families as the child is seeking to form a personal identity (Carroll, Downs & Marrero, 2007). Therefore, gathering information from adolescents with type 1 diabetes on how much they know about the condition and self care practices will help identify the gap on knowledge and self care practices. This is the first step in identifying strategies of managing these challenges.

1.4 Justification of the Study

Adolescents with type 1 diabetes face risks of long-term health complications (Buckloh, Lochrie, Antal, Milkes & Canas et al., 2008). This is due to teens having difficulty in achieving and maintaining target glycemic control (Allen, Cohen, Robling, Hood & Atwell et al., 2010). Other contributing factors include social factors, premature shift in responsibility for management from parents, incomplete knowledge and understanding of treatment regimens (Borus & Laffel, 2010). All these challenges affect the management of diabetes in adolescents.

The results of the study will help in development of educational materials for these patients and their families adapted to the local context to prevent development of complications. Understanding of such information will also help health workers to understand and focus on the patient's needs when communicating health information. The study findings will help generate information that may be utilized by health care managers in developing appropriate guidelines to ensure continuity of care and smooth transition process from the children's diabetic clinic to the adult clinic.

Therefore, this will improve on how patients in this age group are managed to ensure they have adequate information and have adopted behaviors that will promote self-care activities. This will eventually improve patient condition and prevent occurrence of complications. The findings will help in increasing the public awareness on diabetes among children, adolescents and considering diabetes as a serious condition that need attention at all levels of health care.

1.5 Aim of the study

- To assess the knowledge levels and practices on management of type 1 diabetes by adolescents at two referral hospitals in Malawi.

1.6 Specific Objectives

The specific objectives of the study were;

- To assess adolescents level of knowledge on management of type 1 diabetes.
- To assess adolescents self care practices in managing the diabetes.
- To assess type of support adolescents get when managing the condition.
- To determine the challenges faced by adolescents in managing the condition.

1.7 Outline of dissertation

This dissertation has five chapters. Chapter 1 provides the introductory information on type 1 diabetes, background information on knowledge on diabetes, management and the objectives of the study. Chapter 2 presents a review of related literature on knowledge, management of diabetes, self care practices, challenges in managing diabetes and support. Chapter 3 describes the methodology of this research in detail. The research findings are presented in chapter 4 and chapter 5 includes a discussion of the results, recommendations and conclusion.

Chapter 2

Literature review

2.1 Introduction

Literature review is a critical summary of research on a topic of interest (Polit & Beck, 2010) and aims at generating an understanding of what is known on a particular situation (Burns & Grove, 2009). This Chapter reviews the literature related to the management of diabetes and self-care practices among older adolescents with type 1 diabetes.

An integrative literature review approach was used to find pertinent articles to the management of diabetes and self-care practices among older adolescents with type 1 diabetes. Integrative literature review identifies, analyses, and synthesizes research findings from independent studies to determine the current knowledge (what is known and not known) in the particular area (Burns & Grove, 2011). The terms used during the search were as follows: adolescents' AND type 1 diabetes; Africa AND type 1 diabetes; Africa AND adolescents with type 1 diabetes; adolescents AND knowledge on diabetes; adolescents' AND knowledge on managing type 1 diabetes; adolescents' AND type 1 diabetes AND self care practices or adolescents with type 1 diabetes AND self care practices; adolescents with type 1 diabetes AND self care at home; type 1 diabetes AND support; adolescents with type diabetes AND available support, type 1 diabetes AND adolescents' perception of support, type 1 diabetes AND challenges OR problems; type 1 diabetes AND adolescents perception of care.

The terms were searched using a computer assisted literature search through various academic databases such as HINARI, Google scholar, PubMed, ScienceDirect.com; Open Access and Cumulative Index of Nursing and Allied Health Literature (CINAHL). World Health

Organization databases were also searched to review what is known on the topic of the study. Furthermore, textbooks and unpublished documents from what other researchers did were also accessed and reviewed from Kamuzu College of Nursing library. The search for articles was limited to articles published in English and publications from 2000 to 2014, except for one article which was published in 1997 and two in 1998. Bibliography of the retrieved articles also served as a source for identifying some articles.

The literature review contains a review of studies which were conducted on aspects of diabetes patient's knowledge on the condition, adolescent patients knowledge on diabetes management and self care practices of type 1 diabetes, support adolescents get when managing the condition and challenges faced by adolescents with type 1 diabetes. The articles reviewed were from both developing and developed countries.

2.2 Diabetes Knowledge

Diabetes self-management is demanding and requires much effort, discipline, skill and knowledge (Amer, 2005). Poor knowledge of diabetes is associated with increased rate of hospitalization for unstable diabetes as it is considered to hinder appropriate self-care management, hence speeding up complications. Recent advances in the management of diabetes have considerably improved the outcome, but this is dependent on patient's awareness about the disease and their efforts to achieve the target goals (Sircar, Sircar, Sircar & Misrab, 2010). See Wei Ooi (2008) noted that there is a poor understanding of diabetes among the general population, diabetes patients and disturbingly, health workers. Successful self-management requires knowledge about the condition, how it needs to be treated and what needs to be done (Diabetes UK, 2009). Patient education is the major principle of diabetes management and a

continuous process that needs to be repeated for it to be effective (Glasper, McElwing & Richardson, 2007). Patient adherence to treatment largely depends on how much information is given to them and their families (Ellms, 2006) and the health education should be personalized to the needs of the child and family and paced to accommodate individual needs (Silverstein, Klingensmith, Copeland, Plotnick & Kaufman, et al., 2005). Several studies have documented on this lack of knowledge among diabetes patients on the disease, complications and self care practices (Al-Sarihin, Bani-Khaled, Haddad & Althwabia, 2012; Miyar, Zanetti & Ogrizio, 2008). These studies show how important education is in the management of diabetes for proper glycemic control. They outline the most important area of health care providers lacking information on diabetes which can greatly affect the patient outcome. Most of these studies also assessed patients with type two diabetes the majority of whom were more than 40 years. They missed out the adolescents and young adults who are usually at the peak of their lives with high risk of developing complications.

A study in Abia State, Nigeria on assessing knowledge of diabetes management and control by diabetic patients at Federal Medical Center Umuahia, 96 patients were included in the study. The study findings showed that only 14.6% of the patients had knowledge of the main cause of diabetes- lack of insulin, 39.7% received information on nature, signs and symptoms of the disease, 35.3%, on diet for diabetes, 14.7%, on self-care/prevention of complications while 10.3% on the importance of exercise in diabetes. This was despite 79% of respondents being literate and working most as civil servants (Okolie, Ehiemere, Iheanacho & Kalu-Igwe, 2009). The study findings indicate how little information health workers give during counselling sessions to patients. This is supported by another study done in Blantyre Malawi, looking at management, control, and complications of diabetes mellitus in patients attending a diabetes

clinic. The findings showed the clinic had no diabetic nurses and doctors gave patient education during the consultation. Protocols or guidelines were not used during the consultation resulting in poor management and poor complication screening. All this resulted in poor information given shown by poor knowledge and understanding about diabetes, incorrect injection technique and a large proportion of patients not complying with diabetic diet (Cohen, Allain, Glover, Chimbayo & Dзамalala et al., 2010). Education is not a one-time event that occurs at diagnosis, it should be on going. Families and young patients need ongoing education regarding their condition, prevention and screening of complications, diet and treatment. In addition, knowledge and skills like monitoring blood glucose and insulin administration should be evaluated regularly by the nurses and clinicians involved in diabetes education (Silverstein, Klingensmith, Copeland, Plotnick & Kaufman, et al., 2005). Both the patient and caretakers need to understand why blood glucose monitoring is important, why and how insulin is given and diet change emphasized.

In her report, Austin (2005) highlighted that the unique and valued outcome of diabetes education is behavior change that leads to improved health status. The period from adolescence to young adulthood is a time when people are establishing their identity, assuming independence and taking responsibility of managing their condition. The suboptimal glycaemic control established during the early adolescence may be very difficult to change even with best behavioral intervention (Rausch, 2012). Therefore, knowledge of their chronic diseases is very important to help them change their behaviours thus promoting self care habits. However work overload, attitude of health care providers and knowledge among them have been identified to be contributing to this low knowledge. As observed in most studies (Cohen, Allain, Glover, Chimbayo & Dзамalala et. al 2010; Lushen & Rambiritch, 2007; Rafique & Shaikh, 2006) most patients identify their doctors as the primary source of diabetes information. However,

considering the large number of patients, it is unlikely that they provide all the necessary information. In an ethnographic study of the nature of communication between children and health professionals in a child hospital setting, health professionals positioned children as either passive bystanders or active participants in the communication process. These two positions signified the extent of children's inclusion or exclusion in the communication process and the degree to which children's communication needs were met or not (Lambert, Glacken & McCarron, 2011). This affects the knowledge children have on their chronic illnesses which affects self care management as they grow. Michaud, Suris and Viner (2004) in their qualitative research observed that in most cases, diagnosis and treatment information is directed to the parents. Health care workers interact more with parents than the young patient. Adolescents need to have the necessary knowledge, skills and practices to manage their condition and prevent complications. However, this can also be due to the role parents assume of caretakers that information is directed to them than the young patients.

Etzwiler (1967) also noted deficits in the knowledge of diabetes care among medical personnel (as cited in Thomas, 2004, p.28). This inadequate knowledge among health workers affects the information given to patients. A study by Fourie (2006) looking at registered nurses' knowledge related to the management of patients with diabetic keto-acidosis (DKA), revealed that the majority of the participants had inadequate knowledge regarding the diagnostic parameters that reflect DKA and its management. Chan and Zang (2006) in their study on nurses' perceived and actual level of diabetes mellitus knowledge concluded that nurses have the responsibility to educate patients with correct and updated information therefore knowledge among them needs to be maintained to a certain standard. The inadequate knowledge has been

found in both developed and developing world. This means more attention has to be put on diabetes without considering the part of the world the patients are treated.

2.3 Self-care practices and management

Self-care and management has emerged as an approach to enhance quality of care for patients suffering from long term conditions, and to control costs of health services (Diabetes UK, 2009). For teenagers, the daily medical care; glycemic control, insulin injections, diet, and exercise patterns, is a challenging experience and makes them feel burdened (Austin, Sénécal, Guay & Nouwen, 2011; Dwiardiani, 2009). A Report from the Juvenile Diabetes and Dietary Study in Canada, only 49% reported they had followed their dietary recommendations usually or always, with 51% indicating they had sometimes or never during the previous week. This was a 3-year longitudinal study of dietary self-care in families of adolescents with type 1 diabetes where 289 adolescent patients aged 11 to 17 years were recruited in the study (Austin, Sénécal, Guay & Nouwen, 2011). Literature indicates that metabolic control in adolescents is regularly unsatisfactory, with the majority having blood glucose levels higher than the required range (King and Butler, et. al 2011).

In a cross sectional study in Northwest of Iran assessing factors influencing self-care practice of patients, 400 diabetic patients were randomly selected from eight healthcare centers. Findings showed that patient's self-care practice was good in 15.1%, moderate in 58.7%, and poor in 26.2%. There was a significant association between education, duration of disease, treatment intensity and self-care practice of patients. However, they identified limited information available on the self-care practices of individuals who are recognized as diabetic patient through screening (Yekta, Pourali, Aghassi, Ashragh & Ravanyar, et al., 2011). In

agreement is a study in Harari, Eastern Ethiopia aiming at identifying predictors of self care behaviors among patients with diabetes. In this quantitative cross sectional study, 222 participants with type 2 diabetes from three different hospitals were included. Out of the 222 study participants, (93.7%, n=208) had general knowledge about diabetes and (93.2%, n=207) had specific knowledge about diabetes self care. This finding was different from other studies that had indicated low knowledge. Yet, only (39.2%, n=87) followed the recommended self care practices on diabetes (Ayele, Tesfa & Abebe, 2012). The challenge for patients is how to obtain the necessary skills to effectively manage their diabetes (Collins, Bradley, O'Sullivan & Perry, 2009). Therefore, for proper self-care practices, patients need continuous education as patients with less frequent information are less likely to take on diabetes self care activities.

Adolescents have the fine motor control to competently perform most self-management activities. It is therefore tempting for parents to turn over total diabetes management to the teenager. While adolescents can perform the tasks of diabetes management, they still need help with decision-making about insulin adjustments (Silverstein, Klingensmith, Copeland, Plotnick & Kaufman, et al., 2005). The development of self-management practices for adolescents with chronic illness requires active engagement of both young people and their parents, with attention to the psychosocial world of the young person (Sawyer & Aroni, 2005). Psychological component is very important although it is a neglected part.

2.4 Self care activities

A number of self care practices, such as home blood glucose monitoring, insulin administration, diet and physical activity, are critical in the successful management of diabetes (Ahola, 2012). This can be difficult to maintain through the developmental stages of early

adulthood (Pacaud & Yale, 2005). Treatment for type 1 diabetes is a lifelong commitment and many factors affect how well diabetes is controlled. Many of these factors are controlled by the person with diabetes, including how much and what is eaten, how frequently the blood sugar is monitored, physical activity levels, and accuracy and consistency of medication dosing. Even small changes in diet can affect blood sugar control.

Schmidt (2007) in her qualitative study solicited information regarding self-care practices, independence in management, parental involvement, dietary adherence, precision in skills, attitude about diabetes, and ability to manage abnormal blood glucose levels. Forty-six boys and 42 girls aged 6 to 18 years were represented by the 88 mothers, who believed, however, that older children had more negative attitudes about diabetes than did younger children. Yet, the children demonstrated higher levels of self-care abilities, independence, precision, and ability to manage blood glucose levels as they aged.

2.4.1 Diet

Diet is a cornerstone of type 1 diabetes treatment, and poor diet quality may affect glycemic control and other health outcomes. Yet diet quality in children and adolescents with type 1 diabetes remains understudied (Nansel, Haynie, Lipsky, Laffel & Mehta, 2012). Diet change is the most challenging thing in diabetes patients and much more difficult for young patients. Insulin and diet must be modified according to activity and blood glucose levels. Finding the right balance between the right foods, how much food and how much insulin is essential. In a cross-sectional study to examine associations of disordered eating behaviors with diet quality, diet-related attitudes, and diabetes management in adolescents with type 1 diabetes, 151 participants were included in the study. Youth with lower self-efficacy, greater barriers and

more negative outcome expectations were at more risk of poorer dietary intake (Tse, Nansel, Haynie, Mehta & Laffel, 2012).

In another study in KwaZulu-Natal South Africa, a cross-sectional observational study was carried out to assess the dietary intake and metabolic control of children with type 1 diabetes. A total of 30 subjects whose ages ranged from six to ten years were included in the study. The results showed that the dietary intake of the children was generally adequate, though there was a possibility that the caregivers did not report the dietary intake accurately or honestly (Pillay, Maunder & Naidoo, 2009). Nansel, Haynie, Lipsky, Laffel and Mehta, (2012), in their sectional study where participants completed 3 day diet records, data demonstrated poor diet quality and participants revealed low adherence to dietary guidelines. The findings reveal how difficult it is for them to adhere to the diet plan. Therefore, there is need for close monitoring of diet plan adherence amongst the patients.

2.4.2 Glucose self monitoring

Glucose monitoring is an essential part of DM management and can be done through urine or blood testing. Self- blood glucose monitoring (SBGM) is essential in the management of childhood and adolescent diabetes (Glasper, McElwing & Richardson, 2007). Patients and family members need proper information on how to monitor, how often, when to do it and how to interpret the results. Self-monitoring of blood glucose allows patients to evaluate their response to therapy with the obtained information subsequently used to modify the insulin regimen to maintain the glucose level in normal range 80 to 120 mg/dl (4-6 mmol/L) (Ahola, 2012).

Helgeson, Honcharuk, Becker, Escobar and Siminerio (2011) in their study where 132 adolescents with type 1 participated, they found relationship between frequent blood glucose

monitoring and better glycemic control. However, adolescents with good glycemic control were younger, from higher social status families, on insulin pumps, and had higher self-efficacy. Age-related declines in blood glucose monitoring occurred among adolescents with low self-esteem, high stressful life events, and lower parental support. Although adolescence period has been marked with deterioration in metabolic control, support for these patients is very important.

In another qualitative study by Carroll, Downs and Marrero (2007), ten focus groups were conducted with a total of 59 participants from a diabetes clinic in Indianapolis. The aim of the study was to learn from adolescents with diabetes and their parents whether mobile monitoring technology could help to reduce hassles associated with testing, improve compliance, and ease adolescent-parent conflict about testing behavior. The findings revealed that self glucose monitoring was viewed by many of the teens as the most inconvenient, disruptive, and least favorite aspect of having diabetes. Some stated social discomfort in testing in front of friends. Parents in all groups noted that as their children hit adolescence, it became more difficult to control their children's blood glucose monitoring.

2.4.3 Complication assessment

Literature has shown that the incidence rates of acute complications of T1DM like severe hyperglycemia and DKA are particularly higher in adolescent adults (Allen, Cohen & Robling, 2010). Long-term complications of type 1 diabetes develop gradually, over years. Complications associated with diabetes include retinopathy, which can result in blindness; nephropathy, which can result in kidney failure; neuropathy, which can result in lower limb amputation; macro-vascular complications, which can result in heart disease and strokes; peripheral vascular disease and infections (Allen, Cohen & Robling, 2010). This causes severe disabilities requiring chronic

care. With poor glycemic control, vascular changes can appear as early as 2-3 years, however, with good glycemic control this can be delayed to 20 years or more (Hockenbery & Wilson, 2011). There is an increased risk for mortality as the degree of each complication worsens and amputation is the strongest predictor for mortality in patients with type 1 diabetes (Cusick, Meleth, Agron, Fisher & Reed, et al., 2005). Eppens, Craig, Cusumano, Hing and Chan et al (2006) in their study found that retinopathy, that causes blindness, was significantly more common in patients with type 1 diabetes.

Another cross-sectional study, knowledge of major complications (nephropathy, retinopathy, neuropathy, and cardiovascular disease) was ascertained by structured interview of 151 youths (8- to 18-years) with T1DM and their parents. The findings showed that greater youth major complications knowledge predicted better treatment adherence. Despite this, both parents and youth scored quite low on a structured interview (KADFH) that was carefully designed to reveal their levels of major complications knowledge without exposing them to information that they did not already possess (Wysocki, Lochrie, Antal & Buckcloth, 2011).

2.4.4 Insulin administration

Patients with T1DM are required to be taking insulin for the rest of their life. It is the cornerstone of T1DM management (Hockenbery & Wilson, 2011). The main method of administration is through subcutaneous injection. It is important to understand how the medication you are taking works, how to properly take the medication and what side effects it may have. Depending on type of insulin therapy, the patient may need to check and record blood sugar at least three times a day, which requires frequent finger sticks. It is such type of activities that often result in poor adherence. In a study by Ekim and Pek (2010) 45 children with type 1

diabetes between 7 and 18 years of age were included in the study. The aim was to assess children's insulin administration skills according to their age and determine mistakes made. The findings showed that insulin administration skills and individual correctness was between 16.7% and 83.3% for children aged 7–9 years; between 5.9% and 94.1% for those aged 10–12 years; and between 13.6% and 100.0% in those aged 13–18 years. The results indicate that as children age, their ability to administer insulin improves. Therefore, it is necessary for children with diabetes to have enough knowledge and capability to take responsibility for their own insulin treatment. However, parental guidance is still needed even if the child masters all the self care skills.

2.5 Support for managing diabetes at home

Supporting people with diabetes to understand their condition is an important part of the disease management. Structured education programs, access to specialist diabetes advice, care planning discussions and annual checks are opportunities to identify necessary changes to treatment regimes and refer to specialist services (National Health Service, 2013). Lack of support is one of the factors that affect patients' ability to adhere properly to treatment regimen. Support of diabetes patients from the family, community and health care providers in performing self care activities is very crucial in achieving glycemic control.

2.5.1 Parental support

Involvement of parents in managing type 1 diabetes is very important since most patients are diagnosed whilst young. Social support from family provides patients with practical help and can buffer the stresses of living with illness (Miller & DiMatteo, 2013). Palmer, Berg, Butler, Fortenberry and Murray et al (2008) observed that parents might adjust responsibility as the child

grows and becomes independent, but still, parental responsibility should be maintained for best metabolic control and prevention of complications. Although some adolescents are excellent at managing their condition with little parental involvement, parental care and responsibility over their child's illness is very important. While parental participation is useful for diabetes management, sometimes it can have negative effects in cases where these patients feel their parents are taking too much control of their lives.

As the child grows, the challenge is to find the degree of parental involvement that is comfortable for all involved, without risking deterioration in glycemic control from over or under involvement (Klingensmith, Copeland, Plotnick & Kaufman, et al., 2005). For parents, sometimes it becomes difficult for them to offer the necessary support to these youth with diabetes because they do not understand the type of support they require or how to behave in a supportive way (Marshall, Carter & Rose, 2006). This is agreed by Carroll, Downs and Marrero (2007), where parents noted that it was difficult to determine when to step in versus when to give up control of the management of diabetes to their children. Parents stated that as the adolescents neared adulthood, they felt the need to give up some control of managing the diabetes to their children. At the same time, adolescents felt their parents' "nagging" behaviors because of being worried about irreversible complications, was annoying and stressful. Despite this, in other studies adolescents have reported that parents provide more support for diabetes management tasks than do friends (Hanna & Guthrie, 2003).

For this reason, parents may need assistance in learning how to let go and facilitate independence of actions for the patient while still maintaining some degree of responsibility. Wiebe, Berg, Korbel, Palmer and Beveridge (2005) suggested in their study findings, that better adherence is seen across age when mothers are viewed as collaborating with, as opposed to

controlling, their child when dealing with diabetes problems. Ekim and Pek (2010) in their study conclude that during childhood it is important for the family to take responsibility and gradually make their child to be responsible as his or her age increases while their role as a supervisor continues. The family and health care providers should understand the growth and developmental period of the adolescent, be sensitive of their developmental issues. Providing support to adolescents is one way that parents can be involved while still promoting their adolescents' development of diabetes management competence and responsibility (Hanna & Guthrie, 2003).

2.5.2 Health care provider support

Excellent diabetes management has been shown to reduce the risk of developing complications, enhance quality of life and reduce hospital admissions. Successful self-management requires knowledge about the condition, how it needs to be treated and what needs to be done. This might also include behaviour changes and learning problem-solving skills and how to cope when things go wrong or become more difficult (Diabetes UK, 2009). Therefore, for this to be done, patients need support from health care providers on information and training of the self-management. Health care providers teach on self blood glucose monitoring, managing complications and care at home. They also support with transition from paediatric to adult clinic, as this is a very crucial stage. In their report Allen, Cohen, Robling, Hood and Atwell, et al. (2010), identified a marked decline in clinic attendance around the time of transition, however, for others they had no problems. They observed dissatisfaction for both young people who transferred directly from a paediatric to an adult clinic and those who transferred to a young adult clinic. They concluded that the mode of transfer is more important than the age at which it

occurs. This shows a need for support during transition. However, the health care provider support is affected by their knowledge on diabetes. In many developing countries, there is little physician experience or post-graduate training specific to diabetes and endocrinology (Grant, 2013).

2.6 Challenges in managing diabetes

2.6.1 Poor Socio-economic Status

Even when health care services are available, and people are willing to use them, the cost of seeking care may delay or prevent households from accessing them (WHO, 2002). In Malawi, most people are poor especially those in rural areas with 39% of the population living below one dollar (US\$1) per person per day (MDG report, 2010).

Socio-economic status (SES) and its constituent elements are accepted as being determinants of health and a significant contributor to health disparities (Onwudiwe, Mullins, Winston, Shaya & Pradel et al., 2011). Low income appears to be associated with an increased rate of hospitalization for acute diabetes related complications (Rabi, Edwards, Southern, Svenson & Sargious et al., 2006). Al-Adsani, Moussa and AL-Jasem (2009) in their study found that knowledge deficit on diabetes among the patients were related to low literacy rates and low family income.

2.6.2 Social factors

Family relationships and support plays a significant position in diabetes management (Clarke, 2011). Rafique and Shaikh, (2006) in their qualitative exploratory study, participants mentioned family members as a source of support with adherence to diet, medication and mental support. This was also observed by Wekesa (2007) that adults and children with good social

support from their families have excellent adherence behaviour. In contrast, for adolescents, their peers become more important, spending more time together than with their family (Maylani & Wahyu, 2012). These peers influence their attitudes and behavior, making treatment compliance difficult. This alters their perceived seriousness of the disease, vulnerability to complications, and the usefulness of treatment. For this reason, there is need to balance between attaining independence and maintaining self-care practices. For this to be performed well, these patients need support from peers and family members. Heisler, 2007, (as cited in Maylani & Wahyu, 2012, p.38) showed that high social support from peers, especially support to comply with the pattern of their diet, exercise, and treatment, is associated with good self-management in adolescents with diabetes.

In developed countries, young patients with social problems at home are followed up to ensure there is treatment compliance through social workers. For some, they are placed in institutional homes for support until they are able to manage their condition on their own. In Malawi, we do not have these social workers and institutional homes hence health workers are responsible for offering such additional support. In order to do this, health care providers need to develop the ability to identify psychological and social problems in their patients (Delamater, 2006). This can only be done if the health care providers have time to talk and discuss issues with the patients and families.

2.6.3 Inadequate Insulin distribution

In their study Lufesi, Andrew and Aursnes (2007) reported long procurement processes and insufficient drug deliveries from the regional medical stores as a contributing factor to shortage of drugs and medical supplies in many health facilities. This erratic drug supply from the medical stores has resulted in continuous drug stock-outs hence causing a challenge in

managing diabetes. From observation, in most health centres, insulin has been unavailable resulting in patients going home without the medication and for some, travelling long distances to access the treatment in central hospitals. Due to frustrations and travelling costs, even when medications are available, these patients do not come for the re-supply of medication. In addition, diabetes is not under the conditions in the essential health package (EHP). As a result, it does not receive much attention like malaria and HIV and AIDS.

2.7 Summary of literature review

This chapter has covered a review of previous research studies related to knowledge, self care practices, parental involvement and transitional period for adolescent with type 1 diabetes. The review indicates that adolescents with type I diabetes have problems in controlling their blood glucose levels and the study helped to identify the factors contributing to this for the adolescents patients in Malawi. Knowledge on the disease, complications and self care activities can affect patient's attitude which then affects how patients carry out the self care practices. The literature review identified knowledge gaps mostly on adults with diabetes hence the current study itype 1 diabetes are lacking knowledge. The study also identified the challenges the adolescents encounter in managing the condition which development of effective strategies for improving management of diabetes in adolescents.

Chapter 3

Research design and methodology

3.1 Introduction

This chapter describes in detail the methods that were employed to investigate the knowledge levels among adolescents with type 1 diabetes. A descriptive, cross-sectional study was considered appropriate for the purpose of describing what exist regarding knowledge levels and self care practices among adolescents with type 1 diabetes (Burns & Grove, 2005). Data was collected over a three month period in two selected central hospitals.

3.2 Research design

A research design is an overall plan for the study in addressing research questions and strategies for enhancing integrity (Polit & Beck, 2008). Nargundkar (2003) add that it provides the framework to be used as a guide in collecting and analyzing data. The study used a descriptive cross sectional design that utilized a quantitative approach. The design enabled the investigator to gather information on the variables of interest in persons with diabetes mellitus and to make inference about possible relationships between diabetes knowledge and the variables (Creswell, 2009).

A descriptive study is designed to gain more information about characteristics within a particular field of study and its purpose is to provide a picture of a situation as it naturally happens (Burns & Grove, 2005). Bowling (2009) state that descriptive studies describe what exists at the time and then go on to try and uncover new facts and meanings. Burns and Grove (2005) also recommend the use of descriptive methods to observe, describe and document aspects of a situation as it occurs. It provides an accurate portrayal or account of characteristics

of a particular individual, situation or group that can be behaviour, attitude, beliefs, skills and knowledge. Therefore, the design was considered suitable for this study because it aimed at describing the knowledge adolescents diagnosed with type 1 diabetes had on the condition, on self care practices and also the support they get and challenges they encounter in managing the condition.

Quantitative research is the study of the phenomena that lend themselves to precise measurements and quantification (Polit & Beck, 2004). Burns and Grove (2005), state that it is used to examine relationships among variables and to determine cause-and-effect interactions between variables.

3.3 Research Setting

The study was conducted at two referral hospitals namely Queen Elizabeth Central Hospital (QECH) in the Southern region, Blantyre district and Kamuzu Central Hospital (KCH) in the central region, Lilongwe district. The two hospitals were purposively selected because they provide diabetic specialist care to adolescents with diabetes. In addition, QECH and KCH are referral hospitals for southern and central regions respectively. As such it was envisaged that an adequate number of participants would be recruited from these settings as type 1 diabetes is a rare disease in adolescents.

3.4 Study population

Target population is referred to as the entire population in which a researcher is interested and to which the researcher would generalise the results (Polit & Beck, 2010). The study population was drawn from adolescents with type 1 diabetes from 15 and 19 years presenting at KCH and QECH paediatric and adult diabetes clinic. This age group was chosen because during

this developmental stage, adolescents are striving for independence while learning to be responsible and accountable for their self care activities. The other reason is that when children have special health care needs, parents assume the roles of health care provider (Kratz, Uding, Trahms, Villareale & Kieckhefer, 2009) hence they are the focus of the health education. As the child grows and reaches adolescence, they are expected to be taking responsibility of their care while the parents assume the supervisor role. Therefore, with little knowledge on the disease and self care practices, they often face challenges when managing the condition.

3.5 Recruitment strategy

At each facility, potential respondents were approached and sought their consent to participate in the study. Those who accepted were given the questionnaire and asked to return it at the end of the clinic. A structured interview was done for those who had problems with reading (especially for those in primary school). They were also given a chance to return the questionnaire on the next clinic but they all preferred to respond after the clinic.

3.5.1 Inclusion and exclusion criteria

The inclusion criteria was adolescents 15-19 years, with T1DM diagnosed 6 months and more to ensure that the adolescents had been given health information concerning their illness on numerous times. Participants aged 18-19 years who were mentally stable to give consent and participate in the study. For the minors, aged 15-17 years, informed consent was sought from the caregiver escorting them. Those who came alone, the informed consent were sought from the doctors and clinical officers conducting the clinic.

The exclusion criteria was patients less than 15 years and more than 19 years, those with type 2 diabetes and diagnosis of type 1 diabetes less than 6 months.

3.6 Sampling

Two central hospitals were conveniently selected. Using expected frequency rate of 95% confidence interval a sample of 46 calculated after Lemeshow, Hosmer and Klar et al., (1990). In these facilities the estimated number of adolescents with type 1 diabetes was 25 (0.8%) from the 3321 diabetes patients for KCH and 34 (1.1%) from the 3500 for QECH. However, due to poor record keeping in these facilities, the figures given might not reflect the true picture on the total number of patients in these facilities. Since there are not many adolescents with type 1 diabetes, to achieve the targeted study sample, convenience sampling method which entails using the most conveniently available people as participants was used (Polit & Becker, 2010).

Calculating sample size

$n = [Z^2 * (P) * (1-P)] / e^2$ where; n is the sample size

Z is value of a standard normally distributed variate which for a 95% confidence interval takes the value of 1.96

e is the allowable error which for this study has been set at 0.05

P is the estimated proportion of adolescents with correct or acceptable knowledge levels of type 1 diabetes management. The proportion of older adolescents between 15-19 years out of total patients with the condition is 1.3% [0.013] and 1.7% [0.017] at KCH and QECH respectively.

Therefore, based on the proportions of diabetic adolescents, the sample sizes have been determined as follows;

Kamuzu Central Hospital;

$$n = \frac{1.96 \times 1.96 \times (0.013) \times (1-0.013)}{0.05 \times 0.05}$$

$$0.05 \times 0.05$$

$$n = \frac{3.8416 \times 0.013 \times 0.987}{0.0025}$$

$$0.0025$$

$$n=19.7166$$

For KCH, n=20

Queen Elizabeth Central Hospital;

$$n = \frac{1.96 \times 1.96 \times (0.017) \times (1-0.017)}{0.05 \times 0.05}$$

$$0.05 \times 0.05$$

$$n = \frac{3.8416 \times 0.017 \times 0.983}{0.0025}$$

$$0.0025$$

$$n=25.6787$$

For QECH, n= 26

Total sample: 20 + 26 = 46. Therefore, the sample size was 46.

3.7 Data collection**3.7.1 Development of the questionnaire**

Data were collected using the developed four part structured questionnaire. A questionnaire is a preferred method of data collection because it is an efficient and cost effective means of collecting data from a large number of respondents and can be anonymously completed (Burns & Grove, 2005). The questionnaire was developed by the researcher based on review of literature, adaptation of some questions from Michigan Diabetes Knowledge Test (MDKT) from the Michigan Diabetes Research and Training Centre and issues identified at QECH paediatric diabetes clinic.

The Michigan Diabetes Research and Training Center developed a series of valid and reliable knowledge tests that could be used in research and practice for knowledge assessment, one of which is the Michigan Diabetes Knowledge Tool (Fitzgerald, Funnel, Hess, Barr &

Anderson, et al., 1998). The items on the test should be used when it is certain that there is a good item to program content match (University of Michigan Health System, 2015). Therefore, only those questions that applied to the two study settings were used as the Michigan University clearly stated. The DKT consists of 23 questions testing the patients' general understanding of diabetes with respect to diet, blood glucose monitoring, foot care, diabetes complications, proper insulin usage, adverse effects of insulin and factors that influence blood glucose levels (Fitzgerald, Funnel, Hess, Barr & Anderson, et al., 1998). The MDKT has been used in several studies to assess diabetes knowledge in different background settings both in developing and developed world, in Zimbabwe (Mufunda, Wikby, Björn & Hjelm, 2012) in Kuwait (Al-Adsani, Moussa & Al-Jasem, et al., 2009) and in Nigeria (Jasper, Opara, Pyiki & Akinrolie, 2014). From an extensive literature review, questions on the MDKT appeared to be valid, reliable and easy to apply hence some of them were adapted for the assessment of knowledge in adolescents with diabetes in Malawi.

The questionnaire was provided in English (Appendix 7) and Chichewa (Appendix 8). The 31 item questionnaire comprised of closed ended questions because of the quantitative nature of the study. The questionnaire consisted of 4 sections as follows: demographic information of the adolescents, knowledge on type 1, management and self care practices and support and challenges. The first part of the questionnaire covered the respondent's demographic information which included: age, sex, level of education, period lived with diabetes, number of hospitalizations due to diabetes and reason for admission. This was important because age, education level can influence uptake of information (Schmidt, 2007). The second section covered knowledge about diabetes, based on their understanding of the condition after the health education they had received at the health facilities and had 7 questions. Knowledge on causes,

signs and symptoms, complications of diabetes was assessed. The third section of the questionnaire assessed adolescents' knowledge on management of diabetes and self care practices at home since this is the core of diabetes management. This section had 15 questions on managing hyperglycemia and hypoglycemia, insulin, foot care, diet, self monitoring of blood glucose. The fourth section had 2 questions and type of support the adolescents get from family members, friends and health care providers and the challenges they encounter when managing the condition were assessed.

The original questionnaire in English was translated into Chichewa by a nurse working at the diabetes clinic at QECH then it was translated back into English by a Clinical Officer working at the diabetes clinic at KCH. The two versions were compared for content and meaning and then a final questionnaire was agreed upon by the principal investigator and the co-authors. The questionnaire was then pre-tested.

3.7.2 Reliability and validity

Validity refers to the degree to which an instrument is capable of giving the “truth”, while reliability refers to the ability of the instrument to being consistent in giving results when applied (Burns & Grove, 2005). To check content validity, the questionnaire was sent to the head of department at QECH and a Clinical Officer at the diabetes clinic, KCH to comment on whether the questions addressed the aims and objectives of the study. Adjustments to the questionnaire were made as suggested. The suggested changes included addition of the following questions; if they knew how much insulin they were on, importance of changing injection sites and storage of insulin at home, rephrasing some questions and adding optional answers for the structured

questions. To test for the reliability of the instrument, a pre-test of the data collecting instrument was conducted at Kamuzu Central Hospital.

3.7.3 Pre testing the questionnaire

The questionnaire was pre tested with a group of five adolescents with type 1 diabetes at Kamuzu Central Hospital, a representative of the population. The pre-testing was to help identify problems with the data collection instrument, clarity, sequence and flow of the questionnaire and to check whether it was useful in generating the desired information. The pilot respondents were asked to review the questionnaire for clarity; note the time it took to complete the questionnaire and to suggest any modifications where necessary. The suggested changes included rephrasing some questions, adding optional answers for the structured questions and clarifying the instructions to questions. After including the changes, the questionnaire was again tested on three adolescents with type 1 diabetes who met the set inclusion criteria. These were not included in the final sample.

3.7.4 Data collection process

Permission to collect data at the two identified central hospitals was granted during the proposal development phase as a requirement for the obtaining of ethical approval with College of Medicine Research and Ethics Committee (COMREC). A copy of the proposal was sent to each of these facilities and the head of each facility approved the proposal and granted the permission for data collection at the institutions (Appendices 9, 10 and 11). Upon obtaining ethical approval from the COMREC (Appendix 12) and completing the pilot study, the researcher contacted the nurse managers for the data collection sites to get access to the clinics.

Upon reaching the clinics, permission was also obtained from doctors and clinical officers conducting the clinics.

At QECH, a nurse midwife technician who was on leave was approached by the researcher and requested to be a research assistant who would help with the data collection process. She was chosen because she had previous experience in data collection and was on holiday hence it did not disturb their working duty rosters. She was individually informed of the aims of the study and the procedure for data collection. After the clinic, the researcher contacted the research assistant to assess progress and the researcher travelled to QECH twice a month during the data collection period (October, 2013 to January, 2014) to collect the completed questionnaires. At KCH, the researcher collected the data.

Eligible participants were approached in person and once consent was obtained a structured interview was done. All the participants were also given a chance to complete the questionnaires at home and return then on their next scheduled follow up but they all preferred to have the interviews.

3.8 Data analysis process

The data were analyzed using two statistical packages, IBM SPSS Statistics version 20, to enter and summarize data and R version 3.1 to analyze statistical relationships between variables of interest. Before analysis, a spreadsheet to capture data were prepared using SPSS version 20. Relationship between demographic variables and knowledge of diabetes was established using spearman correlation for continuous variables. Analysis of Variance (ANOVA) and Chi-square tests were used to examine the relation between period lived with diabetes and the number of admissions, type of facility and knowledge on importance of dietary change,

knowledge on signs and symptoms of hypoglycemia and hyperglycemia. Linear regression was performed to model the effect of age on number of admissions. To ascertain whether the mean number of previous admissions was the same for both genders as well as for both health facilities, independent-samples t-tests was applied. The data analysis was performed at 5% significant level. Where variables were suspected to relate, cross-tabulations were done and tests for significance of the relationship were applied. The study topic is not a common condition. Considering the sample size of 46, the assumptions of the statistical tests used in the study have not been fully met. The analyzed data were presented in frequency distribution tables, relative frequency distribution tables and as graphs in the next chapter (Chapter 4).

3.9 Ethical considerations

To protect participants and the researcher as well, the proposal was submitted to College of Medicine Research and Ethics Committee (COMREC) for ethical review before data collection. Approval from the hospital director of KCH (Appendix 11) and QECH (Appendices 9 and 10) to conduct the study in these facilities was also obtained. To ensure autonomy, the adolescent participants were not forced or persuaded to take part in the study. The participants were allowed to make a decision to either decline, participate or withdraw from a study and they gave both verbal and written consents (Appendix 3). The informed consent was also made available in local language of Chichewa (Appendix 4). Participants 15-17 years, they signed the assent form (Appendix 5-English and 6-Chichewa) and consent was obtained from the caregiver escorting them. For those 18-19 years, they gave their own consent to participate in the study. An informed consent simply means a written agreement signed by a study participant and a researcher concerning the terms and conditions of voluntary participation in the study (Polit &

Beck, 2011). To avoid violating autonomy for participants with little or no educational background, information on study purpose, benefits, confidentiality was simplified in a language they understood.

The names of participants were not used on the questionnaires only code numbers were used to ensure anonymity and confidentiality (Burns & Grove, 2005). Accessibility of collected data was restricted to the researcher and the research assistant who assisted with data collection. After data collection, the completed questionnaires were kept in safe storage which only the researcher could access. While there was no direct benefit to participation in the study, the study results have produced information which may be utilised in policy making and clinical care improvement to manage adolescents with type 1 diabetes.

3.10 Summary

A descriptive cross sectional study was found appropriate for this study. Two facilities were the setting for the study, comprising of two central hospitals. Ethical approval for the conduct of this study was obtained from the College of Medicine Research and Ethics Committee (COMREC). Data were collected using a structured self-administered questionnaire. The questionnaire was piloted to test its validity and reliability before data was collected. The collected data was entered and in SPSS statistical package version 20 and was analyzed by the same package. The next Chapter 4 presents the study findings.

Chapter 4

Presentation of results

4.1 Introduction

This chapter presents findings of the study. The results are presented in four sections namely demographic characteristics of participants, knowledge of participants on diabetes, self-care practices and challenges and finally support they get in managing the condition. The data were analyzed using two statistical packages, IBM SPSS Statistics version 20, to enter and summarize data and R version 3.1 to analyze statistical relationships between variables of interest. Descriptive statistics such as frequencies, percentages, mean, standard deviation have been used to present the results in tables, pie charts and graphs. A discussion of the results and recommendations are presented in Chapter five.

4.2 Demographic characteristics of participants

Forty six (46) adolescents participated in the study, 20 from KCH and 26 from QECH. Sixty three percent (n=29) were males and 37% (n=17) were females. The mean age of the participants was about 17 years. The study was conducted at the adult clinics and pediatric clinics with the former registering more participants, (65%, n=30) and the latter (35%, n=16). In terms of education, 46% of the participants (n=21) were secondary in school, 35% (n=16) in primary school and only 19% (n=9) in college. Table 4.1 provides the characteristics of the participants.

Table 1: Demographic characteristics of participants

Characteristics	Frequency (n= 46)			Percentage (%)
Sex				
Male	29			63
Female	17			37
Education level	Male	Female	(n=46)	Percentage (%)
Never went to school	0	0	0	0
Secondary school	11	10	21	46
Primary school	11	5	16	35
Tertiary	6	3	9	19
Place of interview				
Adult clinic			30	65
Paedriatic clinic			16	35
Facility				
KCH	12	8	20	37
QECH	17	9	26	63

The results showed a statistically significant difference ($P < 0.05$) in the sex of the participants. This could mean that more males are affected with diabetes than females. At KCH, all the participants were interviewed at the adult clinic because they do not have a specific clinic for children.

4.2.1 Period of having diabetes

The adolescents were also asked to indicate the period they had lived with the diabetes. This was aimed at finding diabetes management experience amongst the adolescents. Fifty four percent (n=25) of the participants have had the diabetes for a period ranging from 2 to 5 years, 22% (n=10) for a period ranging from 6 to 10 years, 15% (n=7) for 6 months to 1 year and only a few 9% (n=4) had the diabetes for more than 10 years. Figure 1 show the period the adolescents had lived with the diabetes.

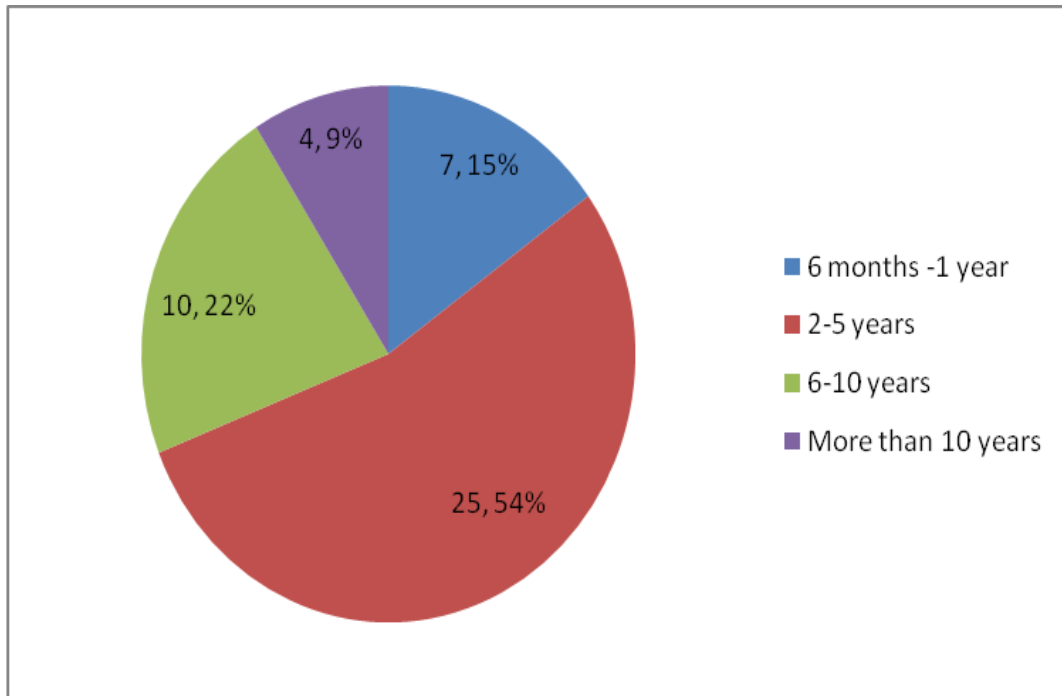


Figure 1: Pie Chart showing period of having diabetes

4.2.2 Number of admissions and reasons for admission

All participants (100%, n=46) had previously been admitted due to hyperglycemia, 10% (n=8) due to hypoglycemia, 9% (n=7) due to abdominal pain and only 23% (n=18) were admitted due to other complications.

Comparing the facilities, KCH had a few participants, 30% (n=6) being due to other complications than QECH who had double 46% (n=12). On number of adolescents being admitted due to hypoglycemia, QECH had a few (8%, n=2) and KCH (30%, n=6).

The frequency of admissions due to diabetes was assessed by asking the adolescents if they have ever been admitted due to diabetes complications. This was to determine the quality of self care practices. Twenty eight percent (28%) of the participants had been admitted 1-2

times, 44% (n=20) 3-4 times, 17% (n=8) 5-6 times and 11% (n=5) 7 times and more. Figure 2 show the results.

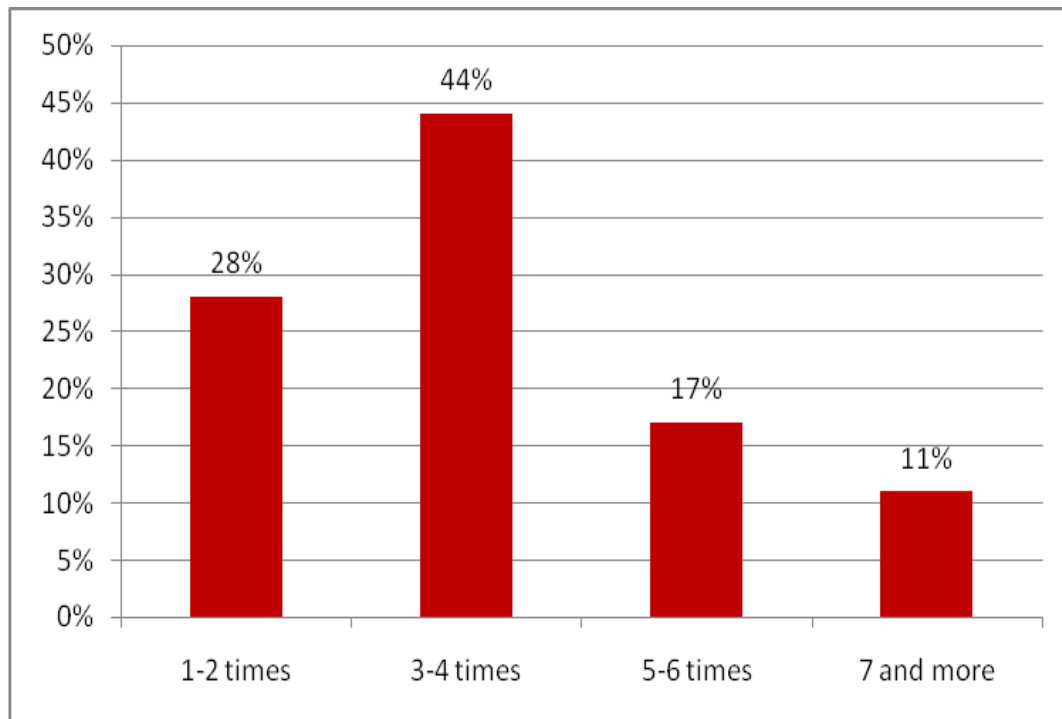


Figure 2: Bar Graph showing distribution of participants based on number of admissions

The results indicated that a lot of the participants had been admitted 3-4 times. Linear regression was performed to model the effect of age on the number of admissions which yielded a $P=0.022$. This means that as age increases, so does the number of admissions. Further results showed no significant difference in the mean number of admissions between male and female participants ($df = 38.105$, p value = 0.2983) and also between QECH and KCH participants ($df = 32.677$, p value = 0.4242). There was no any relationship between the education level and number of admissions. Figure 3 provides the visual comparison.

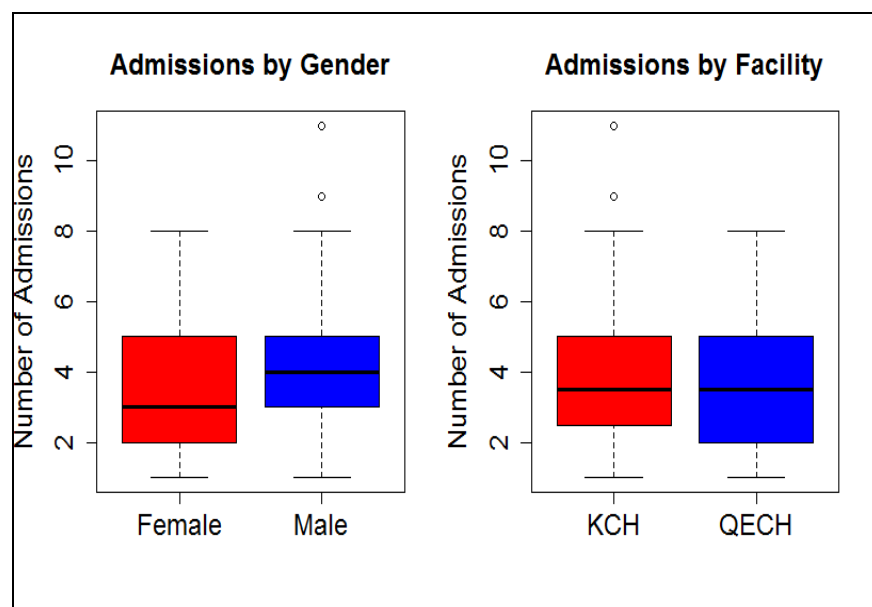


Figure 3: Box plot illustrating the mean number of admissions for participants based on gender and facility

This summarily shows that the participant's level of education had no influence on the number of admissions. Those with higher education had the same chance of developing diabetes complications and being admitted.

4.3 Knowledge on diabetes mellitus

To test the knowledge which the participants had on diabetes, they were asked a number of questions including selecting the causes of type 1 diabetes which they know, common signs, complications of type 1 diabetes, managing hyperglycemia and hypoglycemia. The questions were designed for multiple responses implying that a participant could give more than one responses to each question.

4.3.1 Causes, signs and complications of diabetes

Participants were asked on the causes, signs and complications of diabetes to establish the basic knowledge they had on diabetes. Results showed that 63% (n=29) knew the cause, failure of the body to use the insulin, whilst 37% (n=17) associated type 1 diabetes with eating a lot of sugar foods. On signs and symptoms excessive thirst and frequent urination were the commonest signs mentioned by 24% (n=45). Apart from hyperglycemia and hypoglycemia, ulcers on the feet was the commonest other complication mentioned by 33% (n=42) and abdominal pain with the least with 9% (n=12). Table 2 summarizes the results.

Table 2: Causes, signs and complications of diabetes

		Responses	
		n	Responses
Signs of type 1 diabetes	Excessive thirst	45	24
	Feeling tired/weak	34	18
	Frequent urination	45	24
	Loss of weight	32	17
	Excessive hunger	35	18
	Total	191	100
Complications of diabetes	Abdominal pain	12	9
	Eye damage	38	30
	Ulcers on the feet	42	33
	Kidney damage	17	13
	Nerve damage	18	14
	Total	127	100

The results showed good knowledge on the cause, signs and symptoms of type 1 diabetes and fair knowledge on the complications.

The results also showed that 85% (n=39) of the participants were not doing self assessment for the complications and only 22% (n=10) participants at QECH reported being

assessed for diabetes complications during clinic follow up visits and none at KCH. The results showed that assessment for complications in the adolescents both at home and clinic was not being done comprehensively.

4.3.2 Causes of hyperglycemia and hypoglycemia

On causes of hyperglycemia, most participants 29.6% (n=34) mentioned injecting too little insulin as the cause, forgetting to inject insulin was mentioned by 20.2% (n=24), not following diet plan by 21% (n=25), little physical exercise by 19.3% (n=23) and being sick by 10.9% (n=13).

On hypoglycemia, 22.5% (n=25) named too much physical activity as the cause, omitting carbohydrates was named by 21.6% (n=24), injecting too much insulin by 19.8% (n=22), skipping meals by 16.2% (n=18) and being sick by 19.8% (n=22). Figure 4 shows the results.

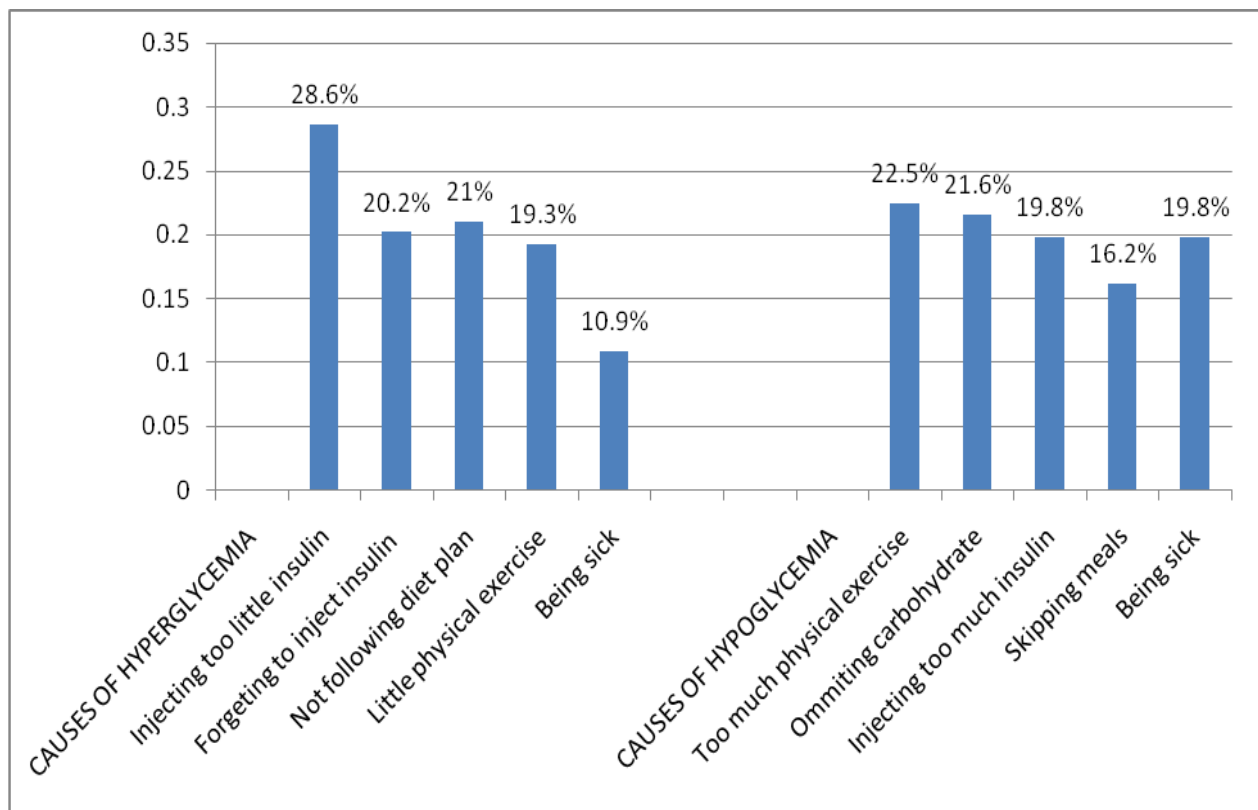


Figure 4: Bar graph showing causes of hyperglycemia and hypoglycemia

The results revealed almost equal levels of knowledge on the causes of hyperglycemia and hypoglycemia. Being sick was mentioned by a fair number of participants as both a cause of hyperglycemia and hypoglycemia.

4.3.3 Signs and symptoms of hyperglycemia and hypoglycemia

Knowledge on the ability to identify signs and symptoms of hyperglycaemia and hypoglycaemia was also assessed. The commonest sign for hyperglycemia identified by 25% (n=33) was frequent urination, followed by excessive thirst 23% (n=33), with the least named being blurred vision with 14% (n=19). The commonest sign for hypoglycemia identified by 28% (n=28) was feeling hungry followed by feeling dizzy with 24% (n=24) and the least mentioned

was headache by 9% (n=9). The findings revealed that the adolescents were a little more familiar with the signs and symptoms of hyperglycemia than hypoglycemia. Table 3 summarizes the findings.

Table 3: Common signs of hyperglycemia and hypoglycemia

		Responses	
		n	Percent
Common signs of hyperglycemia	Frequent urination	33	25
	Feeling tired and weak	29	22
	Headache	21	16
	Excessive thirst	31	24
	Blurred vision	19	14
	Total	133	100
Common signs of low sugar levels	Feeling hungry	28	28
	Feeling tired and weak	21	21
	Dizziness	24	24
	Headache	9	9
	Trembling	19	19
	Total	101	100

The results further revealed that 52% (n=24) of the participants were able to differentiate what they felt as signs of hyperglycemia from hypoglycemia while 48% (n=22) were having problems to differentiate the signs and symptoms. Pearson chi-square test was performed to find out if type of facility has an effect on whether the adolescents tell signs of hyperglycemia and hypoglycemia. There were no significant relationship ($p=0.80$).

4.3.4 Managing hyperglycaemia and hypoglycaemia

The participants were also asked on how they managed hyperglycemia and hypoglycemia at home. Eating sweets was mentioned by 61% (n=46), 17.3% (n=13) mentioned drinking a half cup of squash and sugar solution and 4% (n=3) eating a fruit. In managing hyperglycemia 36% (n=26) said when they felt their sugar levels were high, they drunk a lot of water, 6% (n=4) added they also injected another dose of insulin and 58% (n=42) said they go to hospital. The table below summarizes the findings. When asked on the challenges they meet when managing the condition, 14% (n=20) mentioned lack of adequate information to control the diabetes. Table 4 summarizes the findings.

Table 4: Management of hyperglycemia and hypoglycemia

		Responses	
		N	Percent
Response to low blood sugar levels	Drink a cup of squash	13	17
	Eat sweets	46	61
	Eat Fruits	3	4
	Drink sugar solution	13	17
	Total	75	100
Response to high blood sugar levels	Drink a lot of water	26	36
	Inject another dose of insulin	4	6
	Go to hospital	42	58
	Total	72	100

The results showed despite the participants being familiar with the signs and symptoms of hyperglycemia, there were not conversant with the management.

4.4 Self care practices and challenges

This section presents results following an investigation on how the survey participants managed their diabetes on daily basis including details on the practices they are aware of. To begin with, it was found that all participants were aware that type 1 diabetes patients required insulin injections on daily basis.

4.4.1 Insulin administration

Only 30% (n=12) of the participants gave the valid response of insulin helping the body turn the blood sugar into energy. Regarding knowledge on amount of insulin they were on, 80.4% (n=37) reported knowing the amount (dosage) of insulin they were on but only 26% (n=12) mentioned correct dosages of both long acting and short acting insulin. Fifty four percent (n=25) mentioned low doses than what was prescribed. The participants at QECH (n=9) mentioned the correct doses than at KCH (n=3). There was no significant statistical relationship between mentioning correct dosage of insulin and education level ($p=0.06$).

More than half of the participants 64% (n=39) said they injected themselves the insulin and 18% (n=11) family members helped them. The thigh was the commonest site for insulin injection mentioned by 32% (n=46) and the least site was the buttock with 13% (n=18). Seventy percent (n=32) of the participants gave the correct answer that changing insulin injection site helps to prevent skin damage. The findings are summarized in Table 5

Table 5: Knowledge on insulin injection

Description		Responses	
		n	Percent
Who injects the insulin at home	Myself	39	64
	Parents	11	18
	Brother/Sister	11	18
	Total	61	100
Areas of injecting insulin	Buttock	18	13
	Thigh	46	32
	Abdomen	42	29
	Arm	37	26
	Total	143	100

4.4.2 Monitoring blood glucose

The participants were also asked on the statement “monitoring blood glucose is important in managing diabetes”. Eighty seven participants (n=40) agreed to the statement and 13% (n=6) did not agree with the statement. Sixty four (n=28) of the participants said they monitored their blood glucose levels using symptoms of high and low blood sugar levels, 16% (n=7) said they use urine strips (dextrostix) and 20% (n=9) reported using blood glucose machine to monitor their blood sugar levels. Lack of monitoring equipment was the main challenge hindering the self monitoring of blood glucose at home by 22% (n=48) of the participants. Figure 5 summarizes the findings.

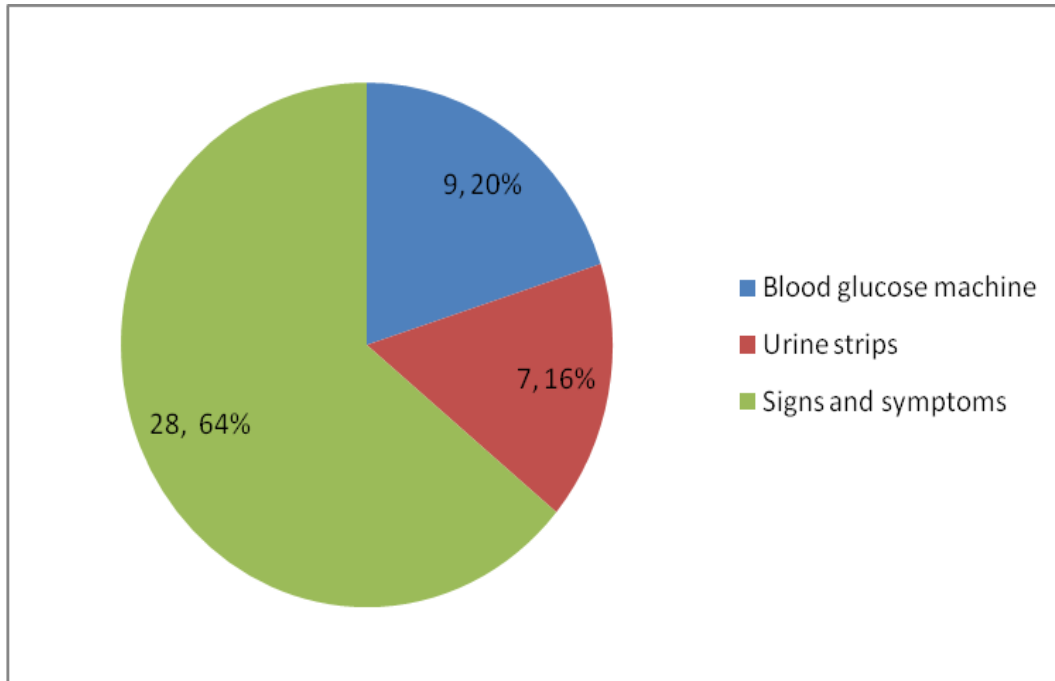


Figure 5: Methods of monitoring blood glucose levels at home

4.4.3 Storage of insulin

Slightly above half 52% (n=24) of the participants stored their insulin in a clay pot and 41% (n=19) in a refrigerator. The remaining 7% (n=3) said they stored their insulin in a cupboard. The results further showed for those who stored in a refrigerator, only 10% (n=5) the family owned the refrigerator, the rest they used their neighbors. For those who used the clay pot, 53% (n=14) reported not being sure if they were doing it right. On the challenge, erratic supply of insulin was mentioned by 32% (n=46) participants. Figure 6 illustrates the findings.

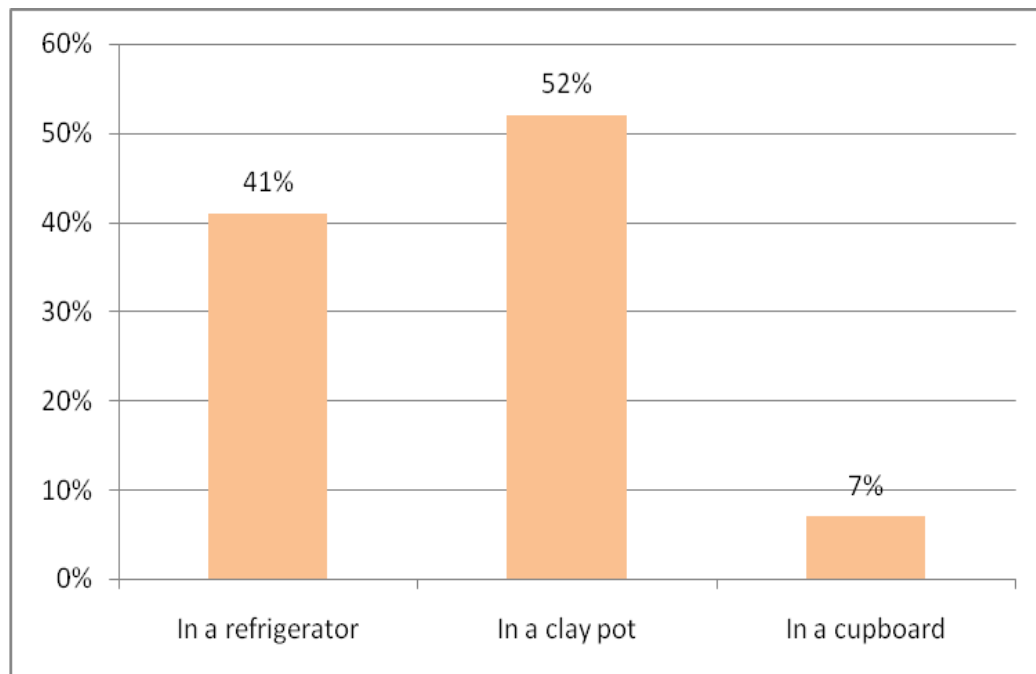


Figure 6: Insulin storage methods at home

4.4.4 Care of the feet

On care of the feet, 41% (n=26) of the participants responded correctly saying feet should be checked daily for sores and cuts and be washed and dried thoroughly daily 37% (n=23). While 18% (n=11) added they put on large shoes and 5% (n=3) said feet should be soaked in water for 1 hour.

4.4.5 Diet

The participants were asked if diet is important in managing diabetes, and 15% (n=6) said yes whilst a large number 85% (n=34) said no. Seventy eight percent (n=36) of the participants indicated that they were not counseled on diet plan, 22% (n=10) reported they were counseled. At QECH, (n=21) were not counseled and at KCH (n=15). Only 48% (n=22) of participants reported that they had snacks in between meals and majority, 52% (n=24) said that they did not.

Twenty one percent (n=30) of the participants mentioned failure to manage the diet plan as a challenge they face in managing the diabetes. Figure 7 show the findings.

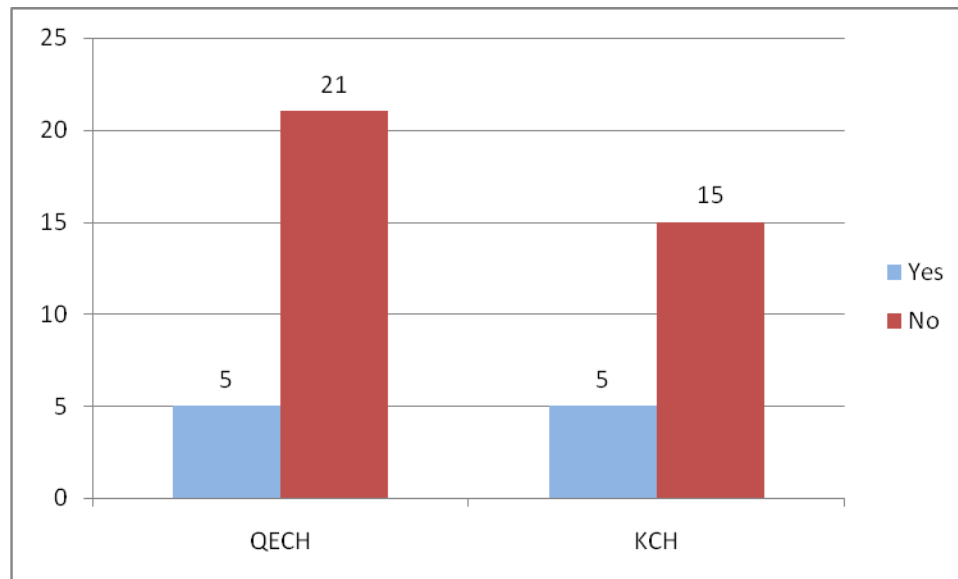


Figure 7: Counselling on diet plan per facility

The results show most of the participants were not counselled on diet plan and were having challenges to follow the recommended diet plan. Pearson chi-square test was performed to find effect of type of facility on knowledge on importance of diet in controlling blood glucose levels. The results indicate a significant relationship between necessity of dietary change and type of facility in controlling blood sugar levels ($p=0.01$).

4.5 Support

Part four of the questionnaire sought to elicit participants' support system. Thirty percent, (n=36) mentioned that family members helped them with managing high and low blood sugar levels, 29% (n=35) with administering insulin, and 11% (n=13) with psychological support. The participants were also asked on the type of support they got from their friends. Only 48% (n=10) said their friends helped them with treatment adherence and monitoring of blood sugar levels and

52% (n=11) with psychological support. On the health care provider support, 20% (n=24) said they helped them with monitoring sugar levels and 9% (n=11) with psychological support. Table 6 below summarizes the findings.

Table 6: Support in managing diabetes

		Responses	
		n	Percent
Support from family	Managing hyper/hypoglycemia	36	30
	Administering insulin & monitoring sugar levels	35	29
	Financial support	37	31
	Psychological support	13	11
	Total	121	100
Support from friends	Treatment adherence	10	48
	Psychological support	11	52
	Total	21	100
Support from health care providers	Identify hyper/hypoglycemia	31	26
	Managing hyper/hypoglycemia	31	26
	Administering insulin	22	19
	Monitoring sugar levels	24	20
	Psychological support	11	9
	Total	119	100

The results showed that friends provided much of the psychological support than health care providers and family members.

4.6 Conclusion

The results revealed that knowledge gaps amongst the adolescents with diabetes exist. The knowledge gaps varied significantly across the areas that were assessed. They had inappropriate self-care practice especially in self monitoring of blood glucose which had a

critical role in controlling diabetes, insufficient knowledge in managing hyperglycemia, differentiating the signs and symptoms of hypoglycemia and hyperglycemia. Insulin administration and psychological support was less provided and financial limitations were identified as the main obstacle hindering the adolescents from achieving self care practices at home. Age and period of having diabetes was found to have an impact on the number of admissions. The next Chapter discusses the findings of the study, the implications for practice, management, research, education and recommendations based on the conclusions made.

Chapter 5

Discussion

5.1 Introduction

This chapter discusses the results presented in Chapter 4, and presents recommendations for policy makers, clinical practice and research. It also presents implications of the study as well as limitations of the study. The themes included in the discussion are knowledge on diabetes amongst the adolescents, illness patterns among the adolescents and self care practices, challenges and support amongst adolescents,

5.2 Knowledge on diabetes among diabetes adolescents

The study explored knowledge on diabetes on the the cause, signs and symptoms, and complications of diabetes. The study findings revealed that the participants knew the cause, signs and complications of diabetes. About 63% (n=29) mentioned of failure of the body to use the insulin as the cause and 24% (n=45) mentioned excessive thirst and frequent urination and 18.3% (n=35) excessive hunger as the signs of diabetes. Majority of the participant's 45.7% (n=21) were in secondary school and this could have had an influence on the high knowledge levels. The results are comparable to Hoque¹, Islam, Khan and Ahasan (2005) who, in their study, found that higher education level was significantly associated with greater knowledge of diabetic symptoms, risk factors, complications and management. Contrary to this were results found in Jedda City where 18.5% of the children associated sweets with diabetes and 28% did not even know the cause of diabetes (Amer, 2005). This might be so as Amer's study participants were aged 10 years to 15 years and most of them were still in primary school hence retention of information might have been difficult. For patients with diabetes, knowledge on the disease is

important as it may strengthen the performance of self care practices as day-to-day care in diabetes is handled by patients or families at home. Continuous health education on the condition and performance of safe care activities should hence be reinforced. In agreement to this are Shrivastava, Shrivastava and Ramasamy (2008), who stated that it is expected that those with the greatest knowledge will have a better understanding of the disease and have a better impact on the progression of the disease and complications.

The study also explored knowledge on causes, signs and symptoms and management of hyperglycemia and hypoglycemia. Results showed that all the participants had basic knowledge on causes, signs and symptoms of hypoglycemia and hyperglycemia. However, the results showed a difference in knowledge on their management. All participants, 100% (n=46) knew the management of hypoglycemia at home and eating sweets was commonly mentioned. The good knowledge on management and easy availability and affordability of sweets could have influenced the participants fewer admissions due to hypoglycemia. About 58% (n=42) of the participants reported going to hospital when they felt their blood glucose level was high indicating the lack of knowledge in managing hyperglycemia at home. The adolescent patients need adequate information to manage their diabetes at home. In addition, the results showed that about 48% (n=22) of the participants had problems in clearly differentiating if what they were feeling were the signs of hyperglycemia or hypoglycemia. Although identifying a symptom for hyperglycemia or hypoglycemia can be deemed easy owing to the fact that they feel them whenever fluctuation of their blood glucose level occurs (Amer, 2005), they need to develop the skill to achieve this. Hence to develop this, the integrated support is then needed. Focus group discussions, visit to schools and multidisciplinary management at health facility level may help the adolescent patients to achieve the required skills to identify and manage hyperglycemia.

Fowler (2008) stated that the direct and indirect effects of hyperglycemia are the major source of morbidity and mortality in diabetes.

The hyperglycemia could have been caused by knowledge gaps on the dosages of insulin they were on. Only 26% (n=12) of the participants mentioned correct doses, many 54% (n=25) mentioned low dosages than what was in the health passport booklet. These could have resulted in the adolescents injecting low dosages of insulin than the prescribed amount ending in hyperglycemia. Knowing insulin dosage is very fundamental, as insulin dose depends on basal needs, food intake, amount of physical activity and is continuously adjusted (Loghmani, 2007). Therefore there is need for frequent knowledge assessment at the clinic for the dosage and type of insulin the patients are receiving.

The inadequate knowledge on diet plan by 85% (n=34) of the participants could have contributed to consumption of unrecommended meals leading to failure in controlling the blood glucose levels. About 21% (n=30) of the participants mentioned failure to manage the diet plan as a challenge they face in managing the diabetes. This could have contributed to the high number of admissions, 11% (n=5) of the participants being admitted 7 and more times 11 times. Dietary recommendations for type 1 diabetes advocate consumption of a healthy diet and maintenance of a balance between carbohydrate intake and insulin levels to achieve near-normal blood glucose levels (Bantle, Wylie-Rosett & Albright, et al., 2008). The lack of knowledge on diet could also be due to 78% (n=36) of the participants not being counseled on recommended diabetes diet plan. During data collection, it was observed that in both central hospitals, the patients were being counseled by the nurses, clinicians and doctors at the clinic, there were no dietitians to counsel them on their meal plan. The insufficient diet counseling could have resulted in diet in compliance contributing to the high number of admissions due to

hyperglycemia, 58.2% (n=100). Abioye-Kuteyi, Ojofeitimi, Ijadumola and Fasanu (2005) in their study concluded that in settings where dieticians are scarce, physicians managing diabetic patients must be skilled in the dietary management of the condition and show commitment to it. Since in Malawi physicians only make up a smaller percentage of health care providers, an average of one physician for every 50,000 persons, most health education services being provided by nurses which have a nurse-patient ratio of 36.8 nurses per 100,000 populations (WHO, 2011; Hoffman, Mofolo, Salima, Hoffman & Zadrozny et al., 2012). Therefore, nurses and other care providers, clinical technicians, officers and medical assistants, need to be properly trained in diabetes management as these are the backbone of health care service delivery in Malawi.

The insufficient knowledge on diet plan amongst the participants could also affect adherence with diet recommendations. Literature has shown that despite the availability of effective therapies, adolescents with type 1 diabetes demonstrate poorer adherence to treatment regimens compared with other pediatric age groups (Borus & Laffel, 2012). This was also found in a cross sectional study by Nansel, Haynie and Lipsky et al., (2012) where participants aged 8-18 years demonstrated low adherence to dietary guidelines. All this shows how difficult it is for the adolescents to follow the diet plan and with no information on meal planning; it can only make the situation worse. Therefore, continued supervision, education, support both psychological and financial is very imperative to achieve dietary compliance and good glycemic control. Development of teaching aids is also needed to provide the adolescent patients a reference when managing their condition at home.

Literature has also shown that lack of knowledge in chronic illnesses among children and adolescents depends on the way health care providers give information to young patients. Often, most health care providers focus on the parents/guardians when giving information concerning a child's illness, the young patient is often excluded (Borus & Laffel, 2012). Michaud, Suris and Viner (2004) concur in their article which states that research evidence indicates that in most cases, diagnosis and treatment information is directed to the parents. Though, another ethnographic survey showed health professionals positioning children as either passive bystanders or active participants in the communication process (Lambert, Glacken & McCarron, 2011). This could also apply to young patients with diabetes. If the children are positioned as inactive and information is directed to caregivers, they have no or too little knowledge on their condition and self care practices. Therefore, children with a chronic illness should be given as much information as possible for them to be able to perform self care practices. If they lack information, they will fail to properly care for themselves as they grow and attain responsibility of their own care.

5.3 Illness pattern among the adolescents

This section discusses the illness pattern amongst the participants relating age, gender and period of having the diabetes to number of admissions. Majority of the adolescents 54% (n=25) had lived with the diabetes for 2 to 5 years with 44%, (n=20) of them being admitted 3-4 times. The results revealed significant relationship ($P<0.05$) between period of having the diabetes and the number of admissions. This means that the longer the participant had the diabetes, the higher the number of admissions. Therefore, regardless of period of having diabetes health education, monitoring of self care practices and maintenance of normal blood glucose

levels should be emphasized. The findings further showed male and females had an equal chance of developing complications and being admitted $df = 38.105$, p value = 0.2983). Therefore, health education should focus on and target both sexes even though naturally females tend to take care of themselves better than males.

The study results revealed that the least reason for admission was abdominal pain mentioned by 9% ($n=7$) and it was also the least identified as a complication of type 1 diabetes by 9% ($n=12$) of the participants. Kitabchi, Umpierrez, Miles and Fisher (2009) stated that abdominal pain is a common presentation in patients developing or who have developed diabetes ketoacidosis (DKA). The low knowledge of DKA as a complication of type 1 diabetes could have negatively influenced the results, and putting this into consideration, the number of admissions due to DKA might have been higher. DKA is a serious complication in patients with type 1 diabetes and accounts for around half of all diabetes-related hospital admissions in people with type 1 diabetes (NHS Choices, 2012). Regardless of this, frequency of DKA in established diabetes can be decreased with education, behavioral intervention and family support (Ellis, Naar-King & Templin, 2008). Therefore, education, behavioral change interventions and provision of support should be emphasized to maintain good glycemic control and reduce both the onset and progression of diabetes-related complications. Results also revealed that QECH had a lot of adolescents being admitted due to other complications 46% ($n=12$). QECH has a well established and organized paediatric diabetes clinic presenting them with the capability to identify complications in the young patients. However, whether a well established clinic or not, care must not be compromised. Early identification of complications in diabetes is needed for management and to prevent progression.

There was also a significant statistical difference on effect of age on the number of admissions ($P=0.022$). This might be so diabetes as the onset of the disease can be as early as five years (Hockenbery & Wilson, 2011). As the child grows, understands the problem better and learns to perform self care activities the shift of responsibility often occurs affecting practice and self care (Borus & Laffel, 2010). Despite this, continuous support and supervision is still recommended as the child assumes self care responsibility. This is so as when adhering to self-care activities patients are sometimes expected to make what would in many cases be a medical decision and many patients are not comfortable or able to make such complex assessments (Shrivastava, Shrivastava & Ramasamy, 2008). Thus, without support this cannot be accomplished. Adeyemi, Rascati, Lawson and Strassels (2012) stated that age can affect treatment compliance and adolescence period is a challenging stage to manage diabetes as during this time, physical, mental and emotional developments coincide with their battle against a chronic disease. This means these young patients need close supervision as they are still dependent on their parents or guardians for care. Even if they grow up, they still need supervision as they master the skills of self care. In addition, adolescents also usually prefer to live a normal life like their friends which affects their compliance to treatment hence the need for close supervision.

5.4 Self care practices amongst adolescents and challenges

This section discusses self care amongst the participants and the challenges they encounter when managing the condition. A number of self care practices, such as home blood glucose monitoring, diet, insulin administration and care of feet, are critical in the successful management of diabetes (Ahola, 2012). The results revealed that although the participants were aware of the self care activities to be performed, self care practices performed were inadequate.

Self-monitoring of blood glucose is a cornerstone of diabetes care that can ensure patient participation in achieving and maintaining specific glycemic targets (Shrivastava, Shrivastava & Ramasamy, 2008). The study results revealed that 87% (n=40) of the participants agreed that monitoring blood glucose is important in managing diabetes. Research articles reviewed by Clarke and Foster (2012) showed that for accurate results, electrochemical glucose meter systems (glucometers) are recommended for monitoring blood glucose. Some of the participants 16% (n=7) were using dextrostix where colours are prone to fade and have a highly significant visual variation in the assessment of colours across the range of glucose concentrations. For the 64% (n=28) who did not have the glucometer or urine strips, they relied on signs and symptoms of hyperglycemia and hypoglycemia creating room for error. The study findings showed that only 20% (n=9) of the participants were using glucometers to do self monitoring of blood glucose at home. Lack of monitoring equipment was mentioned by 22% (n=48) of the participants as a challenge restraining them to do self monitoring. Lack of monitoring equipment could be due to poverty as most families could not afford them as glucometer machines range from K35, 000 to K40, 000 in most private pharmacies. The study results are similar to the study done in Urmia, Iran where they found that only two percent of the participants had weekly self monitoring and financial barrier played an important role (Yekta, 2011). In Malawi, 39% of the populations live below one dollar per person per day thus mobilization of resources is very crucial to provide these adolescents with glucometers to aid in performing the self monitoring of blood glucose. Self-monitoring of blood glucose provides information about current glycemic status, allowing for assessment of therapy response and guiding adjustments in diet, exercise and medication in order to achieve optimal glycemic control (Ahola, 2012).

Study results revealed that the participants knew the complications of diabetes, the commonest mentioned were ulcers on the feet by 33% (n=42) and eye damage by 30% (n=38). However, 85% (n=39) of the participants were not doing self assessment for the complications and only 22% (n=10) reported being assessed for diabetes complications during clinic follow up visits. Long-term complications of type 1 diabetes develop gradually, over years and retinopathy, that causes blindness, being significantly more common in patients with type 1 diabetes Eppens, Craig, Cusumano, Hing and Chan et. al (2006). With poor glycemic control, vascular changes can appear as early as 2-3 years, however, with good glycemic control this can be delayed to 20 years or more (Hockenbery & Wilson, 2011). So assessment for the complications should be done at each follow up visit for early identification and treatment to prevent progression of these complications. For this to be done there is need to improve the setup of the clinics and provision of necessary equipment to monitor the patients. Health education on diabetes complications should also be emphasized as knowledge on the complications predicts a better treatment adherence (Wysocki, Lochrie, Antal & Buckloth, 2011).

A good number of the participants 22% (n=10) reported using only two sites for insulin injection for fear of pain while 17% (n=8) said they use four sites. These findings are in agreement to the study by Patton, Eder, Schwab and Sisson (2010), where fear of pain was the reason mentioned for using one injection site by 22% (n=10) of the participants. Rotating the insulin injection site is necessary to prevent skin damage that can affect absorption, resulting in hyperglycemia. Alemzadeh, Loppnow, Parton and Kirby (2003) agrees that lipohypertrophy caused by injecting insulin on the same area has been linked to poorer glycemic control and may reduce absorption by as much as 25%. For this reason, regular assessment on injection sites and counseling regarding adequate site rotation should be emphasized at each clinic visit. Results

also indicated that the buttock was the least site mentioned by 13% (n=18) of the participants. Although this might not seem significant, it might show the early shift of self care responsibility. In addition, during data collection it was observed that many of the participants aged 15 and 16 were coming alone to the clinic further implying the immature shift of responsibility although financial constraints can also be argued as a cause.

The clay pot was the storage method used by 52% (n=24) of the participants to store insulin at home and 7% (n=3) were just storing the insulin in a cupboard. This can have an effect on the biological activity of the insulin, affecting its potency. In normal cases, insulin has to be stored in temperatures between 2°C and 8°C (Zuijdwijk, Ahmet & MacKenzie, 2011). Most areas in Malawi, whether formal or informal settlement areas, lack electricity supply, making the clay pot the best insulin storage method. Results also showed that amongst the participants using the clay pot (53%, n=14) were not sure if they were using the clay pot the correct way. Thus, health care providers need to be taught on how to prepare the clay pot and understand how it works, for them to teach the patients properly to ensure insulin potency is maintained.

Erratic supply of insulin was also mentioned by 32% (n=46) as a challenge in managing the condition that forced the participants to travel long distances for the resupply. The shortage of insulin in most district hospitals has resulted in increased number of patients at central hospitals. Yudkin (2000) also noted that the supply of insulin in Sub-Saharan Africa is erratic, even in big hospitals, and the prospects for people with type 1 diabetes are poor. The International Diabetes Federation Task Force on Insulin Survey also reported that no country in Africa had 100 percent accessibility to insulin (International Diabetes Federation, 2003). This challenge is even agreed by the Ministry of Health who in the Health Sector Strategic Plan 2011-2016 (2011) recognized limited resources including some essential medical supplies in most

facilities affecting the quality of health care services provided. However Lufesi, Andrew and Aursnes (2007) identified insufficient deliveries from the regional medical stores and long procurement policies as some factors contributing to shortage of drugs and medical supplies in hospitals in Malawi. Even with such challenges there is need for government to recognise diabetes as one disease that needs attention. Measures should be put in place to ensure that there is continuous supply of insulin and other medical supplies for managing diabetes at all levels of health care delivery.

Another important self care aspect for patients with type 1 diabetes is foot care which is necessary to prevent occurrence of foot complications. Results showed that 41% (n=26) of the participants knew the importance of checking the feet daily for sores and cuts. In patients with type 1, diabetes is the strongest predictor for mortality (Cusick, Meleth, Agron, Fisher & Reed, et al., 2005). Rasli and Zacharin (2008) in their study assessing foot problems in children and adolescents with diabetes mellitus found that 68.8% of the participants had modifiable skin and nail disorders and 31.2% musculoskeletal disorders. After giving their parents oral and written advice, there was a significant reduction of the disorders at follow up visits. This clearly shows how important the health education talks given to the patients and their families on self care are. The challenge on health education during data collection was absence of guardians. Most of the adolescents were coming to the clinic alone. Even though financial constraints were a challenge from the results, family members should be encouraged to accompany the young patients to the clinics.

For the adolescents to manage the diabetes and have good glycemic control, they need support. The study results showed that the type of support the adolescents received from parents, health care providers and friends included financial, psychological and support with self care

activities. About 48% (n=10) of the participants received treatment adherence support from friends and 52% (n=11) psychological support from friends. This shows that friends play a crucial role in diabetes management during the adolescent period that can be affect care positively or negatively. This is agreed by (Bearman & La Greca, 2002) who found that peer influence has a positive impact on behaviors such as increased blood sugar monitoring and dietary adherence. But literature review by Borus and Laffel (2010) found some studies showed no impact of peer influence on adherence. Considering the negative and positive of peers on self care, interventions like focus group discussions where peers/friends to the adolescents can be incorporated into the patient care system can be beneficial to help the affected adolescents manage their condition.

The family and health care providers provided much of the financial support, managing hyperglycemia, hypoglycemia and glucose monitoring. Only 11% (n=13) of the participants received psychological support from family members and 9% (n=11) from health care providers. Peers provided much of the needed psychological support 52% (n=11). Psychological support has been identified to directly affect performance of diabetes self-care behaviors and indirectly affects their glycemic control (Osborn & Egede, 2010). The inadequate support could be from lack of knowledge by family members and health care providers to help them provide the necessary support. This is also stated by Marshall, Carter and Rose (2006) who highlighted that sometimes it becomes difficult for parents to offer the necessary support to these adolescents with diabetes because they do not understand the type of support they require or how to behave in a supportive way. To deal with this, the best way would start with understanding the developmental stage at which these patients are. Adolescent stage is a period when they are discovering themselves and trying to be independent hence may come in conflict with managing

the condition. During this stage, they usually prefer to live a normal life like their friends affecting their compliance to treatment (Dashiff, McCaleb & Cull, 2006). This might explain the study results which showed no link between knowledge and self care practices ($P>0.05$). Wolpert and Anderson (2001) however identified this stage as a window of opportunity for the clinician to shape the behavior that will help to determine the future health of young adults with diabetes. Therefore, this developmental stage does not only offer challenges but also opportunities to emphasize self care practices. Palmer, Butler, Berg, Fortenberry and Murray, et al., (2008) insisted that for best metabolic control and prevention of developing complications, parental responsibility should be maintained despite factors like puberty as the child grows and becomes independent.

Another way is to provide family members and the community with information. A cross sectional study in Kenya found a serious deficiency in knowledge of diabetes among community members (Kiberenge, Ndegwa, Njenga & Mucheni, 2010). To improve the situation, they recommended a need for a comprehensive nationwide diabetes education programme and the country to design and develop a comprehensive health promotion strategy for diabetes mellitus and its related risk factors. Hence, the same recommendations can be applied to Malawi. We need health promotion strategies on type 1 diabetes and advance availability of diabetes care resources in the health facilities.

5.5 Summary

An integrated and multidisciplinary approach is required to manage and promote self-care practices among diabetic patients to avert any long-term complications. Despite that many factors in diabetes management are controlled by the person with diabetes, including how much and what is eaten, how frequently the blood sugar is monitored and accuracy and consistency of

medication dosing, supervision is still necessary to ensure optimal glycemic control. Training of health care providers in diabetes management is one area which needs to be considered as well.

5.6 Study Strengths

Literature search did not yield much relevant information about diabetes among adolescents in Malawi. Therefore, it is apparent that this emerges to be the first study to be conducted in a Malawian setting. This will help provide a basis for future research regarding diabetes among adolescents in Malawi.

5.7 Study Limitations

The study was conducted at QECH and KCH and involved the use of a small sample which limits generalization of the findings of the study. Larger sample is needed in future research as the sample used in the study may not truly be a representative of the over-all general diabetic adolescent's population. However, the findings are significant and provide the whole valuable insight into issues affecting adolescents with diabetes in Malawi as it was restricted to diabetes clinic only at two central hospitals. It was difficult to find relevant related literature on diabetes knowledge and self care practices among adolescent's in Africa because most studies had concentrated on diabetes knowledge among adults.

5.8 Conclusion

The findings of this study are consistent with research conducted in various countries in the Europe, Middle East, Asia and east Africa identifying limited knowledge among adolescents on diabetes and self care practices. The current study identified inadequate knowledge on diabetes complications, management of hyperglycaemia, inappropriate self monitoring of blood

glucose, challenges in differentiating signs and symptoms of hyperglycaemia from those of hypoglycaemia and provision of too little psychological support neglecting the emotional needs of these adolescents.

The period from adolescence to young adulthood is a time when people are establishing their identity, assuming independence and taking responsibility of managing their condition. Therefore, knowledge of their chronic diseases at this stage is very important to help them change their behaviours thus promoting self care habits. Thus, education should be a continuous process to achieve targeted behavior change that leads to improved health status. The education should also be individualized to meet the needs of each adolescent with type 1 diabetes.

In addition, all providers caring for children with diabetes should understand the normal stages of development and how the adolescent period affects diabetes management to provide quality care. For this to be done there is need for special diabetes training for the health care providers working in the clinics. Family participation and support is another essential item for the success of diabetes care at home by the adolescents, hence community education on diabetes is very crucial.

5.9 Recommendations

In the light of the findings of this study, the following recommendations are vital to address issues identified to achieve quality care in managing diabetes among adolescents.

5.9.1 Recommendation for clinical management

The QECH and KCH management need to do on job training for the health care providers manning the diabetes clinics. This will help them provide necessary care and education

to patients. The trainings can be done on job, like managing diabetes, insulin injection technique, counseling diabetes patients, giving health education to diabetes patients.

There is need to develop educational materials on type 1 diabetes like leaflets, posters to improve knowledge among patients, their families and the community. This could be in the form of a booklet with pictorial illustrations containing signs of hyperglycemia and hypoglycemia and management, sites of insulin injections and techniques of insulin administration, types of insulin, how to check blood glucose levels and complications of insulin and its management.

It was observed that at KCH, both adults and some children were attending the same clinic. At the children's ward, during the Wednesday clinic, they see children with different conditions the same day. This is a challenge as there is no proper education given and concentration by the health care providers attending to the children. Therefore, KCH need to separate these clinics.

During clinic days, individual patient assessments on self care practices should be thoroughly done to identify challenges in care for proper intervention.

There is need to purchase the machine to measure the glycated haemoglobin (HbA1c). Major studies have recommended the need to maintain near-normal blood glucose concentrations and to measure HbA1c levels every four months to reduce the occurrence and severity of serious secondary clinical conditions, most notably micro-vascular, macro-vascular and neuropathic complications.

Psychological support was another challenge identified. Guardians need to be properly educated on the condition for them to be able to provide the necessary support. Peers were found to be providing much support, therefore peers can be targeted for support programs.

5.9.2 Recommendation for patients

There is need for these adolescent patients to record the insulin administered, the number of times they experienced hyperglycaemia and hypoglycaemia in a booklet to be carried to the clinic. It is difficult for the adolescents to remember everything during clinic days to aid in evaluation of treatment effectiveness.

The adolescents should have identification bands. Currently, these are sold to patients and those who cannot afford to buy are disadvantaged. If these can be made available to patients free for easy identification. The ID provides critical information about the person's health status in times of emergencies.

5.9.3 Recommendation for Diabetic Association of Malawi (DAM)

DAM to incorporate childhood diabetes as much of their focus is on adult diabetes. DAM to work in collaboration with the Ministry of Health and other donor funding organizations for the production of the educational leaflets and posters' on childhood diabetes.

6.0 Areas for Further Studies

The study identified some gaps that need to be addressed through further studies as follows:

- a) Nurses and Clinical officers perceived and actual level of diabetes mellitus knowledge.

- b) An observational study to assess skills of insulin administration among adolescents with type 1 diabetes mellitus.
- c) A cross-sectional study on knowledge, attitude, and practices related to diabetes among community members.
- d) Knowledge, Attitude and Practices (KAP) study on community, teachers and students awareness on diabetes (in schools where these patients are schooling).
- e) A physical observational study of nurses/clinicians/doctors counseling diabetic patients.
This will highlight the potential barriers to patient counseling and also measure the effectiveness of counseling in terms of proper language and methods with different patient groups.
- f) There is need for more research with a larger sample and more health facilities to examine the management and self care practices among adolescents with type 1 diabetes. Studies which incorporate qualitative data would provide in-depth understanding of some of the issues raised in this study.

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Appendices

Appendix I: Client information sheet

Please read the information below and sign the form next page if you are taking part in this study

I am Etta Chimbe, currently a student at Kamuzu College of Nursing, pursuing Masters Degree in Child Health Nursing. I am conducting a research study on knowledge and practices on management of diabetes by adolescents diagnosed with type 1 diabetes and their families. The purpose of the study is to assess level of understanding of adolescents with type 1 diabetes on the condition and identify their self management practices.

You are being invited to take part in research study on knowledge and practices on management of diabetes by adolescents diagnosed with type 1 diabetes and their families. Before deciding to participate, it is important for you to understand why the research is being conducted. Participation is voluntary and if you need more clarification, please ask.

What is the purpose of the study?

The purpose of this study is to assess the knowledge levels and practices on management of type 1 diabetes by adolescents. The major part of diabetes management involves self care at home. For this to be done properly, patients and their families require information on the disease. Previous studies have indicated low knowledge among diabetes patients which affects their self care management at home. This study aims at finding the level of knowledge among adolescents as they are at high risk of developing complications. It will help to identify the knowledge gap and needs of these adolescent patients and help to find ways of improving the care.

Do I have to take part?

You are free to take part in the study or withdraw at any time you feel like. Your refusal to take part in the study will not affect you in any way, you will still access the service. If you agree to take part you will be asked to sign a consent form. Information about you will be confidential and no one will identify who answered which question as no names will be written on the questionnaires. Code numbers will be used instead. The questionnaire and responses will be destroyed at the end of the study.

If I take part what will happen to me?

You will be asked some questions about type 1 and its management. Where necessary, you will be asked to give in explanations. You will be required to answer the questions truthfully and the interview will take about 45 minutes.

What are the possible risks for taking part?

There are no known risks associated with the study. But it may involve giving out sensitive information on a personal situation.

What are the possible benefits of taking part?

The findings of the study will assist in identifying strategies to promote self management among adolescents at home hence preventing diabetes complications.

If something goes wrong, what will happen?

Complaints concerning how you have been treated during the course of the study can be forwarded to the Chairperson, College of Medicine Research Ethics Committee, P/Bag 360. telephone number 0111 871911

Contact for further information: If you need further information concerning the study, please contact Miss Etta Chimbe (Cell number 0999947828).

Appendix 2: Kalata yolongosola za kafukufuku wofuna kudziwa momwe achinyamata omwe ali ndi matenda a shuga amazisamalira kunyumba ndi zomwe iwo akudziwapo zokhudza nthenda yawo

Chonde werengani kalatayi ndi kusayinira pa tsamba lakuseli ngati mukulowa nawo mukafukufuku ameneyu.

Nfundo zofunika kwa olowa nawo mukafukufuku

Ine ndi Etta Chimbe, wophunzira pa sukulu ya ukachenjede ya Kamuzu College of Nursing. Muli kupephedwakutenga nawo mbali pa kafufuku wofuna kudziwa momwe achinyamata omwe ali ndi matenda a shuga amazisamalira kunyumba ndi zomwe iwo akudziwapo zokhudza matenda awo. Mukuyenera kumvetsetsa cholinga cha kafukufukuyu musanapange chisakho cholowanawo. Kutenga nawo mbali pa kafukufuku ameneyu ndi kosaumiriza ayi ndipo ngati chilipo china chomwe simunamvetse chokhudzana ndi kafukufuku ameneyu, mutha kufunsa.

Kodi cholinga cha kafukufukuyu nchiani?

Cholinga chakafukufukuyu ndikufuna kudziwa momwe achinyamata omwe ali ndi matenda a shuga amazisamalira kunyumba ndi zomwe iwo akudziwapo zokhudza matenda awo. Anthu amene amadwala matenda a shuga chisamaliro chachikulu amazipangira okha kunyumba. Ndiye kuti odwalawo athe kuzisamalira bwino, amayenera kudziwa bwinobwino za matenda a shagawo ndi momwe angazisamalire. Kafufuku kumaiko ena anasonyeza kuti anthu odwala matenda a shuga sadziwa zambiri za nthenda yawo zomwe zimapangitsa kuti athe kuzisamalira bwinobwino. Chifukwa cha chimenechi, kufukufuku akupangidwayu akufuna kuthandiza kudziwa zomwe achinyamata amene amadwala matenda a shuga akudziwapo zokhudzana ndi matenda awowo. Achinyamata omwe akudwala matenda a shuga amakhala pa chiopyezo chachikulu kotero ndikoyenera kufufuza kuti amadziwapo chain pa zathenda yawo ndiponso

zomwe sakudziwa ndi ziti. Izi ndizothandiza kupeza njira yabwino yowaphunzitsira zokhudzana ndi nthenda yawo kuti athe kuimvetsa bwinobwino.

Kodi ndingatenge nawo mbali pakafukufuku uyu?

Ndikufuna kwanu kusankha kutenga nawo mbali mukafukufukuyu kapena ayi. Muli ndi ufulu kufuna kusiya nthawi imene mukufuna ndipo izi sizizaletsa ine kulandira thandizo lomwe mwabwelera. Mayankho anu azasungidwa mwachimsinsi ndipo dzina lanu silizalembedwa penapaliponse chifukwa tizagwiritsa ntchito ma nambala. Mapepala onse azaotchedwa pomaliza pakafukufuku ameneyu.

Kodi chidzachitike ndi chiyani ngati nditenge nawo mbali?

Mukavomereza kutenga nawo mbali mukafukufukuyu mudzafunsidwa mafunso okhuzana ndi nthenda ya shuga komanso momwe mumazisamalira kunyumba. Kufunsa mafunsoku kudzatha pafupifupi mphindi makumi atatu kapena anayi. Palibe zovuta zodziwika mukatenga nawo mbali mukafukufukuyu. Palibe phindu lapadera mukatenga nawo mbali ngati ndalama.

Zotsatira za kafukufuku ameneyu zizathandiza kupeza njira zolimbikitsira achinyamata kuzisamalira kunyumba. Komanso zizathandiza kupanga timabuku tomwe odwala matenda a shuga azizapatsidwa towerenga kunyumba.

Patapezeka zovuta zokhuzana ndi kafukufukuyu chingachitike ndi chiyani?

Ngati pangapezeke zovuta kapena nkhwana ina ili yonse yokhuzana ndi kafukufukuyu, khalani omasuka popereka madandaulo anu kwa wamkulu wa College of Medicine Research Ethics Committee, Private bag 360, Blantyre, Malawi. Nambala ya lamy: 0111 871911

Appendix 3: Consent form

Make sure you have read the above information before signing below if you are taking part in this study

1. I have read and (or have had another person read to me) the attached information sheet for this study and have understood the purpose of the study and the problems involved.
2. I agree for my child to voluntarily participate in the study, be questioned and provide answers to the best of my knowledge. I understand that the child is free to withdraw from the study any time and this will not influence anything.
3. I know that the child is not to suffer any injury or harm during the research process. The information that I will give to the researcher should not be used against me in future.
4. I understand that the information my child gives will be kept confidentially and will only be accessed by the researcher or those people directly concerned with this study.
5. I understand that th child will not benefit financially.
6. I know how to contact the researcher if I need to.

Caregiver Signature/Thumb print

Date

.....

Name of interviewer

Signature

Date

.....

THANK YOU FOR TAKING PART IN THIS STUDY

Appendix 4: Kalata ya chivomerezo yolowela mu kafukufuku: Zaka 18 mpaka 19

Onetsetsani kuti mwawerenga ndi kumvetsetsa zakafukufuku ameneyu musanasayinire

1. Ndawerenga (kapena wina wandiwerengera) kalata yolongosola za kafukufuku ali pamwambayu ndipo ndamvetsa cholinga cha kafukufukuyu ndizovuta zake.
2. Ndavomereza kuti mwana wanga atha kutengapo mbali pa kafukufukuyu mosaumirizidwa ndi kufunsidwa mafunso okhudzana ndi thenda ya shuga. Ndamvetsa kuti mwanayu ali ufulu kusiya nthawi ina ili yonse.
3. Ndikumvetsa kuti zonse zomwe mwana ayankhule kapena kupereka mukafukufukuyu zidasungidwa mwachimsinsi ndikugwiritsidwa ntchito ndiopanga kafukufukuyi kapena okhuzidwa mwachinduinj ndi kafukufukuyi.
4. Ndamvetsetsa kuti palibepo phindu la ndalama potenga nawo mbali mukafukufuku ameneyu.
5. Ndikudziwa mmene ndikapezere opanga kafukufukuyu ngati ndikofunika kutero

Chitsindikizo cha kholo

Tsiku

.....

Dzina la opanga kafukufuku

Chitsindikizo

Tsiku

.....

ZIKOMO POTENGA NAWO MBALI PA KAFUKUFUKU AMENEYU

Appendix 5: Child assent form for those less than 18 years

I am Etta Chimbe, currently a student at Kamuzu College of Nursing, pursuing Masters Degree in Child Health Nursing. I am conducting a research study on knowledge and practices on management of diabetes by adolescents diagnosed with type 1 diabetes and their families. You are being invited to take part in research study to find out how much information adolescents with type 1 diabetes know about their condition.

If you agree to be in our study, you will be asked some questions about diabetes. For example, you will be asked on what is diabetes, the signs and symptoms, complications and on insulin. You can ask questions about this study at any time. If you decide at any time not to finish, you can ask us to stop. This is not a test, so there is no right or wrong answer and the questions we will ask are only about what you know about diabetes.

It is up to you to be in the study, no one will force you. If you sign the paper, it means you have agreed to voluntarily participate in the study and you are free to withdraw any time. If you don't want to be in the study, don't sign this paper. There are no financial benefits in participating in the study.

Your signature: _____ Date _____

Printed name of person obtaining consent: _____ Date _____

Signature of person obtaining consent: _____ Date _____

THANK YOU FOR TAKING PART IN THIS STUDY

Appendix 6: Kalata ya chivomerezo yolowela mu kafukufuku: Zaka zochepera 18

Ine ndi Etta Chimbe, wophunzira pa sukulu ya ukachenjede ya Kamuzu College of Nursing. Muli kupephedwakutenga nawo mbali pa kafufuku wofuna kudziwa momwe achinyamata omwe ali ndi matenda a shuga amazisamalira kunyumba ndi zomwe iwo akudziwapo zokhudza matenda awo. Cholinga chakafukufukuyu ndikufuna kudziwa momwe achinyamata omwe ali ndi matenda a shuga amazisamalira kunyumba ndi zomwe iwo akudziwapo zokhudza matenda awo. Choncho mukupephedwa kutenga nawo mbali mukafukufuku ameneyu.

Ngati mwavomera kutenga nawo mbali, mufunsidwa mafunso okhudzana ndi matenda a shuga. Muli ndi ufulu kufunsa mafunso okhudzana ndi kafukufukuyu nthawi iliyonse. Awa simayeso ayi kotero muyenera kuyankha mafunso ndi mayankho omwe inu mukudziwa.

Mukasayina kalatayi ndiye chisonyezo kuti inu mwavomera kutenga nawo mbali. Ngakhale mwavomera kutenga nawo mbali, muli ndi ufulu osiya nthawi iliyonse yomwe inu mwafuna. Ngati simukufuna kutenga nawo mbali, musasayine kalatayi. Palibe phindu lirilonse la ndalama potenga nawo mbali mukafukufuku ameneyi.

Chitsindikizo chanu

Tsiku

.....

Dzina la opanga kafukufuku

Chitsindikizo

Tsiku

.....

ZIKOMO POTENGA NAWO MBALI MUKAFUKUFUKU AMENEYU

Appendix 7: Interview guide on management of diabetes and self care practices among older adolescents with type 1 diabetes

Participants code number.....Date of interview.....

Facility (***please tick***) Kamuzu Central Hospital [☐] Queen Elizabeth Central Hospital [☐]

Place of interview (***please tick***) Adult clinic [☐] Pediatric clinic [☐]

SECTION A: DEMOGRAPHIC DATA

Instruction: ***please tick the applicable answer***

1A. Gender status

- a) Male [☐].....1 b) Female [☐].....2

2A. How old are you? (***Write your age in the space provided***) _____

3A. What is your highest education level?

- a) Primary [☐].....1
b) Secondary [☐].....2
c) College [☐].....3
d) None [☐].....4

4A. For how long have you had the diabetes?

- a) 6 months to 1year [☐].....1
b) 2-5 years [☐].....2
c) 5-10 years [☐].....3
d) More than 10 years [☐].....4

5A. How many times have you been admitted/hospitalized due to doabetes?

- a) 1-2 times [☐].....1
b) 3-4 times [☐].....2
c) 5-6 times [☐].....3
d) 7 and more [☐].....4

7A. What were the reasons for admission? (***Tick all applicable answers***)

- a) My sugar was very high [☐].....1
b) My sugar was very low [☐].....2
c) I fainted (DKA) [☐].....3

- d) I had other complications [].....4

SECTION B: KNOWLEDGE ON DIABETES

1B. From your knowledge, what causes type 1 diabetes? (*Tick all applicable answers*)

- a) The body produce too much glucose [].....1
b) Failure of the body to produce insulin [].....2
c) Eating a lot of sugar foods [].....3

2B. What common signs of type 1 diabetes do you know? (*Tick all applicable answers*)

- a) Excessive thirst causing a person to drink a lot of water [].....1
b) Excessive hunger causing a person to eat a lot [].....2
c) Frequent urination [].....3
d) Loss of weight due to the body's failure to use blood sugar [].....4
e) Feeling tired/weak because of the body's failure to use the sugar [].....5

3B. What are other complications of diabetes that you know? (*Tick all applicable answers*)

- a) Kidney damage [].....1
b) Eye damage [].....2
c) Ulcers on the feet [].....3
d) Nerve damage [].....4
e) Others (specify).....5

4B. What can cause your blood sugar levels to be high? (*Tick all applicable answers*)

- a) Injecting too little insulin [].....1
b) Forgetting to inject insulin [].....2
c) Not following diet plan [].....3
d) Little physical exercise [].....4
e) Being sick [].....5
f) Others (specify).....6

5B. What are the common signs of high sugar levels in the blood? (*Tick all applicable answers*)

- a) Feeling tired or sleepy [].....1
b) Frequent urination [].....2
c) Feeling very thirsty [].....3
d) Headache [].....4
e) Blurred vision [].....5
f) Others (specify).....6

6B. What can cause your blood sugar levels to be low? (*Tick all applicable answers*)

- a) Too much physical activity [].....1
b) Omitting carbohydrate-containing meals in diet [].....2
c) Injecting too much insulin [].....3

- d) Skipping meals (skipping breakfast, lunch, supper) [].....4
- e) Being sick [].....5
- f) Other (specify).....6

7 B. What are the common signs of low blood sugar levels? (*Tick all applicable answers*)

- a) Feeling hungry [].....1
- b) Sweating [].....2
- c) Feeling tired and weak [].....3
- d) Dizziness [].....4
- e) Headache [].....5
- f) Trembling [].....6
- g) Others (specify).....7

SECTION C: MANAGEMENT OF DIABETES AND SELF-CARE PRACTICES

1 C. In type 1 diabetes, the patient needs insulin injections every day?

- a) Yes [].....1
- b) No [].....2
- c) Don't know [].....3

2 C. How does insulin work in the body?

- a) Helps the body to use the sugar in the blood [].....1
- b) Helps the body to grow insulin cells [].....2
- c) Don't know [].....3

3 C. Do you know how much insulin you are on?

- a) Yes [].....1
- b) No [].....2

4 C. Who injects you the insulin at home?

- a) Myself [].....1
- b) Parents [].....2
- c) Brother/sister [].....3

5 C. Where do you inject the insulin

- a) Buttock [].....1
- b) Thigh [].....2
- c) Abdomen [].....3
- d) Arm [].....4

6 C. Why is it important to change the injection site?

- a) Helps to prevent skin damage [].....1
- b) Helps to prevent pain [].....2
- c) Don't know [].....3

7 C. How do you store insulin at home? (**Tick all applicable answers**)

- a) In a refrigerator [].....1
- b) In a clay pot [].....2
- c) In a cupboard [].....3
- d) Other (specify) [].....4

8 C. Monitoring blood glucose important in managing diabetes?

- a) Yes [].....1
- b) No [].....2
- c) Don't know [].....3

9 C. How do you monitor blood sugar levels at home? (**Tick all applicable answers**)

- a) Using the machine to check blood sugar levels [].....1
- b) Using urine strips to check sugar levels in the urine [].....2
- c) Using symptoms of high and low blood sugar levels [].....3
- d) Other (specify).....4

10 C. When your sugar level is low, what do you do? (**Tick all applicable answers**)

- a) Drink ½ cup sobo [].....1
- b) Eat sweets [].....2
- c) Drink ½ sugar solution [].....3
- d) Other (Specify).....4

11 C. When your sugar level is high, what do you do? (**Tick all applicable answers**)

- a) Drink a lot of water [].....1
- b) Inject another dose of insulin [].....2
- c) Go to hospital [].....3
- d) Other (Specify).....4

12 C. How do you care for the feet at home? (**Tick all applicable answers**)

- a) Check them daily for sores and cuts [].....1
- b) Wash & thoroughly dry them daily [].....2
- c) Soak them in water for 1 hour [].....3
- d) Put on large shoes [].....4

13 C. Do you think dietary change is necessary in controlling blood glucose levels?

- a) Yes [].....1
- b) No [].....2
- c) Don't know [].....3

14 C. Were you counselled on diet plan at the hospital?

- a) Yes [].....1
b) No [].....2

SECTION D: CHALLENGES AND SUPPORT

1 D. What are some of the challenges you face while managing diabetes?

(Tick all applicable answers)

- a) Lack of adequate information to control the diabetes [].....1
b) Lack of support from family & friend [].....2
c) Lack of support from the hospital [].....3
d) Lack of monitoring equipment [].....4
e) Erratic supply of insulin and needles [].....5
f) Failure to manage the diet plan [].....6

2D. What type of support do you get from;

i. Family members **(Tick all applicable answers)**

- a) Assist with self care activities; diet, monitoring sugar levels etc [].....1
b) Managing high and low blood sugar levels [].....2
c) Help with administering insulin [].....3
d) Financial support; follow up care, monitoring equipment [].....4
e) Psychological support [].....5
f) Other (specify).....6

ii. Friends **(Tick all applicable answers)**

- a) Help with treatment adherence i.e diet, self monitoring [].....1
b) Psychological support [].....2
c) Other (specify).....3

iii. Health care providers? **(Tick all applicable answers)**

- a) Identifying signs of high and low blood sugar levels [].....1
b) Managing high and low blood sugar levels [].....2
c) Administering insulin [].....3
d) Monitoring sugar levels [].....4
e) Psychological support [].....5
f) Other (specify).....6

THANK YOU FOR TAKING PART IN THE STUDY

Appendix 8: Mafunso a mukafukufuku ofuna kudziwa zomwe achinyamata amene ali ndi matenda a shuga amadziwa pa za thendayi

Nambala ya otenga mbali.....Tsiku:.....

Chipatala (*chonjani poyenera*) KCH [] QECH []

Malo a kafukufuku (*chonjani poyenera*) Kiliniki ya akulu [] Kiliniki ya ana []

GAWO A: MAFUNSO A OTENGA MBALI

Zoyenera kuchita: Chongani yankho loyenera

1 A. Tchulani, ndinu mnyamata kapena mtsikana

a) Mnyamata [].....1

b) Mtsikana [].....2

2 A. Muli ndi zaka zingati? (*lembani pa mzere uli kutsolowu*)_____

3 A. Sukulu munalekezela pati?

a) Pulaimale [].....1

b) Sekondale [].....2

c) Koleji [].....3

d) Palibe [].....4

4 A. Matenda a shuga mwadwala kwa nthawi yaitali bwanji?

a) Kwa miyezi 6 kufikira chaka chimodzi [].....1

b) Kwa zaka ziwiri kufikira zaka zisanu [].....2

c) Kwa zaka zisanu kufikira zaka khumi [].....3

d) Kupitilira zaka khumi [].....4

5A. Munagonekedwapo kangati mchipatala chifukwa cha nthenda ya shuga?

a) Kamodzi, kawiri [].....1

b) Katatu, kanayi [].....2

c) Kasanu, kasanu ndi kamodzi [].....3

d) Kasanu ndi kawiri ndi kupitilira [].....4

7A. Anakugonekani mchipatala chifukwa cha vuto lanji? (*Chongani mayankho olondola*)

a) Shuga anakwera kwambiri [].....1

b) Shuga anatsika kwambiri [].....2

c) Ndinakomoka [].....3

- d) Ndinali ndi vuto lina lokhudza shuga [].....4

GAWO B: ZOMWE MUKUDZIWA PA NTHENDA YA SHUGA

Zoyenera kuchita: Chonjani yankho loyenera

1B. Ndi chani chimene chimayambitsa nthenda a shuga? (*Chonjani yankho olondola*)

- a) Thupi limapanga insulin ochepa [].....1
- b) Thupi limasiya kupanga insulin [].....2
- c) Kudya zakudya za shuga wambiri [].....3
- d) Sindikudziwa [].....4

2B. Zizindikiro za matenda a shuga zomwe mumadziwa ndi ziti? (*Chongani zomwe mukudziwa*)

- a) Kumva ludzu kwambiri zomwe zimapangitsa kumwa madzi pafupipafupi [].....1
- b) Kumva njala kwambiri zomwe zimapangitsa kudya kwambiri [].....2
- c) Kukodza pafupipafupi [].....3
- d) Kuonda chifukwa cholephera kugwiritsa bwino shuga wamthupi [].....4
- e) Kumva kutopa [].....5
- f) Zina chulani).....6

3B. Ndi zoopsya zina ziti zomwe matenda a shuga amatha kuyambitsa mthupi la odwala? (*Chongani mayankho omwe mukudziwa*)

- a) Matenda a ipso [].....3
- b) Khungu (kusiya kuona) [].....4
- c) Zilonda m'mapazi/mmiyendo [].....5
- d) Vuto la mtima [].....6
- e) Zina (tchulani).....7

4B. Ndi zinthu ziti zomwe zimapangitsa kuti shuga akwere kwambiri mmthupi? (*Chongani mayankho omwe mukudziwa*)

- a) Kuzibaya insulin osakwanira [].....1
- b) Kuiwala kuzibaya insulin [].....2
- c) Kudya mosalondola ndondomeko yamadyedwe [].....3
- d) Kusachita masewero olimbitsa thupi [].....4
- e) Kudwala [].....5
- f) Zina (tchulani).....6

5B. Ndi zizindikiro ziti zomwe zimaonetsa kuti shuga wakwera mthupi? (*Chongani mayankho omwe mukudziwa*)

- a) Kumva kutopa [].....1
- b) Kukodza pafupipafupi [].....2
- c) Kumva ludzu kwambiri [].....3
- d) Mutu kuwawa [].....4
- e) Kumva chizungulire [].....5
- f) Zina (tchulani).....6

6B. Ndi zinthu ziti zomwe zimapangitsa kuti shuga atsike kwambiri mmthupi?

(Chongani mayankho omwe mukudziwa)

- a) Kugwira ntchito kwambiri [].....1
- b) Kusiya kudyachakudya chokhutitsa [].....2
- c) Kuzibaya insulin wambiri [].....3
- d) Kuduphita zakudya (osadya chakudya mmawa, masana, madzulo) [].....4
- e) Kudwala [].....5
- f) Zina (tchulani).....6

7B. Ndi zizindikiro ziti zomwe zimaonetsa kuti shuga watsika mthupi

(Chongani mayankho omwe mukudziwa)

- a) Kumva njala [].....1
- b) Kumva kutopa [].....3
- c) Kupanga chizungulire [].....4
- d) Mutu kuwawa [].....5
- e) Kunjenjemera [].....6
- f) Zina (tchulani).....7

GAWO LACHITATU: KASAMALIDWE

1 C. Matenda a shuga omwe mumadwala, mumayenera kuzibaya insulin tsiku lililonse?

- a) Eya [].....1
- b) Ayi [].....2
- c) Sindikudziwa [].....3

2 C. Kodi insulin amagwira bwanji ntchito mthupi?

- a) Amathandiza kukonza ndulu yowonongeka kuti iyambe kugwira ntchito [].....1
- b) Amathandiza shuga mthupi kugwira ntchito yake moyenera [].....2
- c) Sindikudziwa [].....3

3 C. Mukudziwa mlingo wa insulin omwe mumalandira

- a) Eya [].....1
- b) Ayi [].....2
- c) Sindikudziwa [].....3

4 C. Amakubayani insulin ndi ndani kunyumba?

- a) Ndekha [].....1
- b) Makolo anga [].....2
- c) Mchiwene/mchemwali wanga [].....3

5 C. Ndi malo ati omwe mumazibaya insulin? **(Chongani mayankho olondola)**

- a) Mmatako [].....1
- b) Patchaffu [].....2
- c) Pamimba [].....3
- d) pamkono [].....4

6 C. Ndi chifukwa chani muyenera kusintha malo ozibaya insulin?

- a) Zimathandiza kuti malo ozibaya asanongeke [].....1
- b) Zimathandiza kuchepetsa ululu pozibaya [].....2
- c) Sindikudziwa [].....3

7 C. Insulin mumasunga bwanji kunyumba (**Chongani mayankho olondola**)

- a) Pomuyika mu filiji [].....1
- b) Pomuyika mu mtsuko [].....2
- c) Pomuyika mu kabati [].....3
- d) Zina (Tchulani).....4

8 C. Kodi ndi kofunika kuyeza mlingo wa shuga kunyumba?

- a) Eya [].....1
- b) Ayi [].....2

9 C. Mumayeza bwanji mlingo wa shuga ku nyumba? (**Chongani zomwe inu mumachita**)

- a) Kuzibaya pachala ndi kuyeza magazi ndichoyezela shuga [].....1
- b) Kuyeza mkodzo pogwiritsa ntchito toyezera mkodzo [].....2
- c) Kugwiritsa ntchito zizindikiro zakuchepa/kuchuluka kwa shuga mnthupi [].....3
- d) Zina (tchulani).....4

10 C. Mukamva zizindikiro zoti shuga watsika kwambiri mthupi mumatani? (**Chongani zomwe mumachita**)

- a) Kumwa ½ kapu ya sobo [].....1
- b) Kudya ma siwiti [].....2
- c) Kumwa madzi a shuga [].....3
- d) Zina (tchulani).....4

11 C. Mukamva zizindikiro zoti shuga wakwera kwambiri mthupi mumatani? (**Chongani mayankho olondola**)

- a) Ndimamwa madzi ambiri [].....1
- b) Ndimazibayanso insulin wina [].....2
- c) Ndimapita ku chipatala [].....3
- d) Zina (tchulani).....4

12 C. Mumasala bwanji mapazi anu kunyumba? (**Chongani mayankho olondola**)

- a) Kuwaona tsiku lirilonse ngati muli zilonda [].....1
- b) Kusamba ndi kuwapuputa asakhale onyowa [].....2
- c) Kuwanyika mmadzi kwa ola limodzi [].....3
- d) Kuvala nsapato zazikulu [].....4

13 C. Kutsata ndondomeko yamadyedwe ndiyofunika kuti shuga azikhala mlingo oyenera?

- a) Eya [].....1
- b) Ayi [].....2
- c) Sindikudziwa [].....3

14 C. Ku chipatala anakuphunzitsani zamadyedwe kuti shuga wanu azikhala mlingo woyenera?

- a) Eya [].....1
- b) Ayi [].....2

15 C. Mumadya zakudya zina mukadya chakudya cha mmawamukudikira cha masana ndi pamenenso mukudikira cha madzulo?

- a) Eya [].....1
- b) Ayi [].....2

SECTION D: ZOVUTA POZISAMALIRA

1 D. Ndi zovuta ziti zomwe mumakumana nazoachinyamata omwe akudwala matenda a shuga amakumana nazo?

(Chongani mayankho oyenera)

- a) Kusadziwa mfundo zoyenera zokhudzana ndi momwe angazisamalirile [].....1
- b) Kusowa chithandizo choyenera kuchokera kwa abale [].....2
- c) Kusowa chithandizo choyenera kuchokera kwa amzawo [].....3
- d) Kusowa chithandizo choyenera kuchokera ku chipatala [].....4
- e) Kusowa zipangizo zoyezera mlingo wa shuga mthupi [].....5
- f) Kusowa kwa makhwala (insulin) ndi zobayila makhwala [].....6
- g) Zina (tchulani).....7

2D. Ndi thandizo lotani lomwe mumalandira kuchokera kwa;

1. Abale anu? **(Chongani mayankho olondola)**

- a) Kuthandiza, kuonetseta ndi kukumbutsa kuyeza mlingo wa shuga, kuzabaya insulin ndi kutsatira ndondomeko ya zakudya [].....1
- b) Kuzindikira zizindikiro za kukwera/kuchepa kwambiri kwa shuga [].....2
- c) Kuwerengera mlingo wa insulin ndi kuzibaya [].....3
- d) Chithandizo cha ndalama; kubwera kuchipatala ndi kugula zoyezera [].....4
- e) Kupereka malangizo ozisamalirira [].....5
- f) Zina (tchulani).....6

2. Amzanu? (***Chongani mayankho olondola***)

- a) Kuonetseta and kukumbutsa kuyeza mlingo wa shuga, kuzabaya insulin ndi kutsatira ndondomeko ya zakudya [].....1
- b) Kukulimbikitsani popereka malangizo [].....2
- c) Zina (tchulani).....3

3. Achipatala? (***Tick all applicable answers***)

- a) Kuphunzitsa zizndikiro za kukwera ndi kutsika kwa shuga [].....1
- b) Kuphunzitsa mmene mungazisamalire shuga akakwera/kutsika kwambiri [].....2
- c) Kuphunzitsa kaperekedwe ndi kasingidwe ka insulin [].....3
- d) Kuphunzitsa momwe mungayezere mlingo wa shuga kunyumba [].....4
- e) Kupereka malangizo [].....5
- f) Zina (tchulani).....6

ZIKOMO POTENGA NAWO MBALI PA KAFUKUFUKU AMENEYU

Appendix 9: Approval letter from Queen Elizabeth Central Hospital

Telephone: (265) 01 874 333 / 677 333
Facsimile: (265) 01 876928
Email: queenshosp@globemw.net

All communications should be addressed to:
The Hospital Director



In reply please quote **No.**

QUEEN ELIZABETH CENTRAL HOSPITAL
P.O. BOX 95
BLANTYRE
MALAWI

Ref No. QE/10

6th June 2013

Etta Chitimbe
Kamuzu College of Nursing
P.O. Box 415
BLANTYRE

Dear Madam

PERMISSION TO CONDUCT A RESEARCH STUDY AT DIABETES CLINIC

This is to inform you that management has no objection for you to do your research study on **"Management of diabetes and self care practices among older adolescents with type 1 diabetes"**.

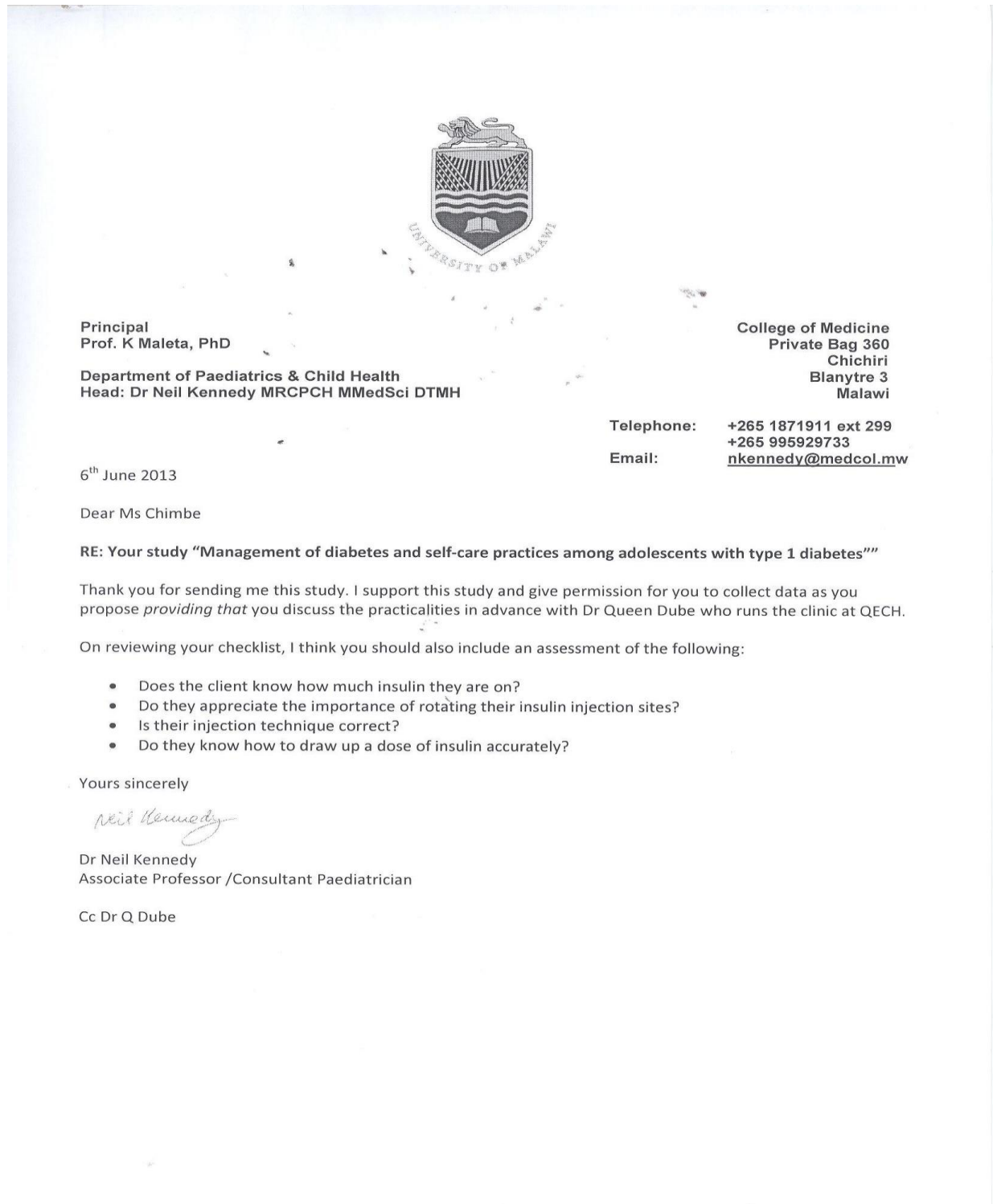
All the best in your studies.

Yours faithfully,

A handwritten signature in blue ink, appearing to be 'T.N. Soko'.

T.N. Soko (Mrs)
DEPUTY HOSPITAL DIRECTOR-NURSING
For: HOSPITAL DIRECTOR

Appendix 10: Approval letter from Queen Elizabeth Central Hospital paediatric department



Appendix 11: Approval letter from Kamuzu Central Hospital

REF. NO.
TELEPHONE NO: (265)1.753 555
TELE FAX NO. (265)1.756380



MINISTRY OF HEALTH
KAMUZU CENTRAL HOSPITAL
P.O BOX 149
LILONGWE
MALAWI

PLEASE ADDRESS ALL
COMMUNICATIONS TO:
THE HOSPITAL DIRECTOR

10th June 2013

Ettah Chimbe
Kamuzu College of Nursing
P.O Box 415
Blantyre

Dear Madam

**RE: PERMISSION TO CONDUCT A RESEARCH STUDY AT KAMUZU CENTRAL
HOSPITAL: CHILDRENS WARD AND DIABETES CLINIC**

This is to inform you that management has no objection for you to do your study at the facility titled 'Management of diabetes and self care practices among older adolescents with type 1 diabetes' as part of your academic research project.

All the best in your studies.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'N Alide'.

Dr N Alide

HOSPITAL DIRECTOR

Appendix 12: Certificate of approval from COMREC



CERTIFICATE OF ETHICS APPROVAL

This is to certify that the College of Medicine Research and Ethics Committee (COMREC) has reviewed and approved a study entitled:

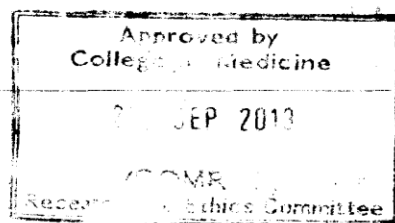
P.06/13/1408 – Management of diabetes and self-care practices among older adolescent's with type 1 diabetes at two central hospitals by Ettah Chimbe

On 23 September 2013

As you proceed with the implementation of your study, we would like you to adhere to international ethical guidelines, national guidelines and all requirements by COMREC as indicated on the next page

A handwritten signature in black ink, appearing to read 'F. Dzinzalamala'.

Dr. F. Dzinzalamala- Vice-Chairman (COMREC)



23rd Sept 2013
Date