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**COUNSELING DIABETIC PATIENTS IN PHYSICAL  
EXERCISE**

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## ABSTRACT

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<p>The goal of this study was to produce information to nurses about the benefits of diabeticsqphysical exercise. Furthermore, factors that influence adherence to regular exercise were reviewed. The purpose of this study was to discover the important aspects in counseling diabetic patients in physical exercise. Likewise, the positive aspects wrought from adhering to habitual exertion were displayed.</p> <p>This report is based on literature reviews. In this study the data was collected from Sage premier, Science direct and EBSCO. The selected reference material is published in the restricted time frame from 2006 to the current year of 2014. A deductive analysis method was utilized in this thesis.</p> <p>Nurses guidance has a major impact on diabeticsq ability to adhere to physical exercise. Besides, depreciating blood glucose and cholesterol levels, regular physical exercise is a means of preventing cardiovascular diseases. Moreover, if a nurse comprehends fundamental guidelines and promotes physical activities among diabetics, the process of adapting to a new lifestyle becomes more efficient.</p>		
<b>Keywords</b> adherence, counseling, diabetes, physical exercise, self-care		

## **ABBREVIATIONS**

EBSCO Elton Bryson Stephens Company

GLUT 4 Glucose transporter type 4

HDL High density lipoprotein

LDL Low density lipoprotein

T1DM Type 1 Diabetes Mellitus

T2DM Type 2 Diabetes Mellitus

WHO World Health Organization

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## 1 INTRODUCTION

Diabetes is an expanding global medical concern. In Finland, there are 500,000 diabetics. In the next ten years, the number of diabetics is predicted to double. Diabetes is an incurable chronic disease with multiple complication factors if not attended to. A diabetic is more susceptible to micro and macro vascular diseases especially cardiovascular disease. However, symptoms of diabetes may be substantially reduced by patient counseling, medical care and proper self-care. Physical activity reduces cholesterol and blood glucose levels. Physical activity is an important measure in weight management for type two diabetics.

A diabetic that receives sufficient and ongoing counseling from a trained nurse is more likely to adapt a healthy life style. Furthermore, adhering to the principals positively affects their condition and quality of life. Currently, these nurses are caring for an increasing amount of patients with diabetes. Therefore, nurses that care for diabetic patients need to be constantly learning and investigating the most current care methods and counseling. This maintains the best possible care and counseling for their patients. One of the major factors that influence the diabetics blood glucose levels is physical exercise.

This thesis is an academic, scientific research of compiled data from scientifically proven articles containing state-of-the-art information for nurses. Review of available literature is the method of research in this study. The goal of this study was to produce information to nurses about the benefits of diabetics physical exercise. Furthermore, factors that influence adherence to regular exercise were reviewed. The purpose of this study was to discover the important aspects in counseling diabetic patients in physical exercise. Hence, the nurse should be able to properly counsel their diabetic patients. Moreover, this thesis covers the advantages of various counseling techniques. The intended target group in this thesis was nurses.

The thesis also concentrated on diabetic adults. This thesis excludes children and adolescents although they also are diagnosed with type 1 diabetes. The researcher chose this topic because diabetes is an escalating health issue in Finland and other developed countries.

## 2 DIABETIC COUNSELING

The basis of this thesis covers nursing theory of adherence in self-care and influence of diabetic counseling. Various counseling methods will be portrayed in this thesis including methods of a nurse to motivate and guide a patient. Furthermore, the belief basis of that theory will be discussed as well as how it relates to this study.

The establishment of a relationship between a nurse and patient is crucial before counseling is attempted. The dialogue between a nurse and patient is to be interchangeable and both parties are included in the discussion. This promotes the patients trust in the nurse and the patient will speak without reserve. Hence, this enables accurate assessment of the patients current condition. Moreover, it is beneficial when setting goals with the patient. Patients who are counseled tend to be motivated in self-care. Furthermore, it is necessary for follow-up of the patients activities which provides an opportunity for the patient to discuss their thoughts and pose questions. Hence, oral literacy is a vital skill of a nurse, enabling patient comprehension and communication. (Roter 2011, 79-84.)

In Finland, there are physical exercise recommendations created for diabetic adults. The goals of these guidelines are meant to guide the diabetic in the optimal and safe self-care. The guidelines are created by a collection of societies and Institutes in Finland. Guidelines are products of evidence based on results developed by the Finnish Medical Society Duodecim. These guidelines are used in medical settings as well as by organizations. The aim of the society is to improve the care and diminish inconsistencies between treatment practices. Moreover, the society is the founder of the Guidelines International Network. The Society of Internal Medicine and the Finnish Diabetes Society are involved in creating the guidelines. (Finnish Medical Society Duodecim et al. 2013.) The UKK Institute located in Tampere, Finland also assists in creating national recommendations for physical exercise in Finland. The

institute handles various aspects of physical exercise including recommendations for diabetics. (UKK Institute 2013.)

The Finnish guidelines for diabetics varies depending on the person's age and health status. It is always important for a nurse to advise the patient to ask their doctor's advice before performing any type of exercise. However, the general guidelines for an adult age 18 through 64 is two and a half hours a week of a light impact aerobic exercise for instance, walking. If an intense impact aerobic exercise is performed such as jogging, the recommended minimal time is 75 minutes a week. Moreover, it is recommended that the patient participates in endurance exercise for instance, weight lifting two times a week. (Finnish Medical Society Duodecim et al. 2013.) Physical activity reduces cholesterol and blood glucose levels. Physical activity is an important measure in weight management for type two diabetics. (Finnish Diabetes Association 2013.)

## **2.1 Diabetic patients' characteristics**

Diabetes mellitus is an endocrine disease. The disease derives from the pancreas where insulin is produced. Insulin is a hormone and is produced in the islet of Langerhans cells located in the pancreas. There are three types of cells: the alpha, beta and delta cells that produce various secretions. The alpha cells secrete glucagon that raises blood glucose levels and is secreted if a lack of insulin in the blood is detected. This is accomplished by transforming glycogen to glucose in the liver. The delta cells produce somatostatin cells that exert a hormone that elevates the blood glucose level. These hormones are released from the pituitary gland. Beta cells produce insulin. (Smeltzer, Bare, Hinkle & Cheever 2008.)

The main purpose of insulin is to reduce blood glucose levels by releasing glucose into the cells in the liver, muscles and multiple other cells within the body. It is then saved as glycogen or utilized as energy. In the deficiency or absence of the production of insulin, the cells are unable to receive glucose and the glucose remains

in the blood stream. The body attempts to rid of extra glucose by releasing it through urination. The blood sugar level elevates causing disruption of homeostasis in the body. As a substitute for energy, fats and proteins are utilized causing reduced body mass. There are two types of diabetes mellitus that arise from two different causes. (Smeltzer et al. 2008.)

## **2.2 Type 1 diabetes mellitus**

Griffith (2012) defines Type 1 diabetes mellitus or also known as insulin dependent diabetes as:

A chronic metabolic disease that is characterized by the body's inability to produce enough insulin to process carbohydrates fat and protein efficiently. Treatment requires injections of insulin. Insulin dependent diabetes is often called ketosis-prone diabetes if it begins in adulthood and juvenile diabetes if it begins in childhood.

The onset of T1DM usually occurs before 30 years old. This onset is sudden and occurs as an autoimmune disease. The beta cells that produce insulin are damaged or destroyed by the body itself. Type 1 diabetics are at risk of ketoacidosis, which is a life threatening condition. This occurs due to excessive amounts of ketone bodies that are acids gathering in the body. Therefore, little or no insulin is produced. Genetics is the ruling factor as to the cause of T1DM. However, even though a type 1 diabetic is never able to be cured from their disease, they can influence their blood sugar level by choosing to live a healthy lifestyle. One of the major impacts is regular physical exercise in combination with appropriate medical treatment. (Smeltzer et al. 2008.)

## **2.3 Type 2 diabetes mellitus**

Diabetes mellitus Type 2 also known as non- insulin dependent diabetes is defined by Griffith et al. (2012.)

A metabolic disease characterized by the body's inability to produce enough insulin to process carbohydrates, fats and protein efficiently. Non-insulin dependent diabetes mellitus is most prevalent among obese adults.

Cells that are utilized for energy are equipped with receptors. These receptors match the receptors provided in insulin. Thus, they are a key of releasing glucose by providing energy to the cell. In T2DM the receptors become impaired and resistant to the insulin. The body detects the insulin resistance and in order to maintain a stable glucose level the pancreas produces an increasing amount of insulin. This elevates the blood glucose level. Fat stores are not used in type 2 diabetes that would result in reduction of body mass. However, other complications occur if the blood glucose level is not controlled. Obesity increases the risks of being diagnosed with T2DM. Therefore, reduction in weight and regular exercise controls the blood sugar level. Moreover, T2DM can be delayed or prevented by weight control and physical exercise. (Smeltzer et al. 2008.)

### **3 PHYSICAL EXERCISE OF A DIABETIC**

Exercise is physical activity that is planned, structured and repetitive for the purpose of conditioning any part of the body. Exercise is used to improve health, maintain fitness and is important as a means of physical rehabilitation. Moreover, exercise can be defined as performance of physical exertion for improvement of health or correction of physical deformity. (Medical dictionary 2014.)

According to Lumb and Gallen (2009), intermittent physical exercise for a Type 1 diabetic is the most effective method of reducing their blood glucose level. Medical professionals are increasingly aware of the benefits that physical exercise provide for diabetics. Hence, the patient is instructed to participate in high intensity physical regimes with intermittent rest. This tends to elevate the blood glucose level however it prevents post exercise hypoglycemia. Physical exercise provides multiple health benefits. Regular physical exercise creates muscle tissue and improves blood

circulation. Other benefits are the reduction of blood glucose levels and effects on psychological factors for instance reducing stress. Moreover, the probability of suffering from obesity and osteoporosis are substantially lowered. Studies have proven that physical exercise has been effective in preventing or aiding chronic illness for instance cardiovascular disease and diabetes.

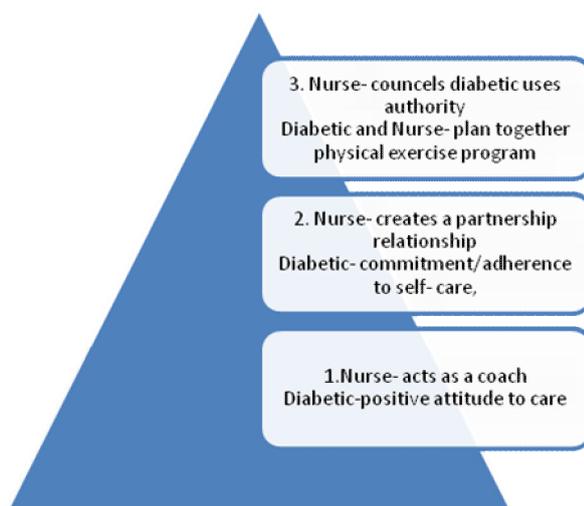
## **4 ADHERENCE**

Adherence is defined as steady devotion, support, allegiance or attachment. (Abate, 2013, 504.) A nurse's responsibility includes counseling the diabetic and encouraging them to adhere to their own self-care. Adherence commonly involves a change of lifestyle. There are multiple factors that affect a diabetic's adherence to physical exercise. These include internal and external factors. The influence of a nurse has a major impact of the likelihood that a diabetic adheres to a regular exercise regime. Therefore, a nurse is to be knowledgeable in factors affecting the success of their patient's adherence. In the following chapter is the discussion of methods a nurse can use to encourage a diabetic in adhering to physical exercise. (Ahonen, Blek-Vehkaluoto, Ekola, Partamies, Sulosaari & Uski-Tallqvist 2012.)

### **4.1 Internal and external factors**

Internal factors are addressed to a diabetic's response to their own self care. In addition, various components also affect the effectiveness of their treatment plan. The diabetic's cognitive skills and their ability to understand the guidance that they receive is vital. Furthermore, the diabetic's age, personality, ambition, self confidence and depression are factors that may affect their physical exercise habits. External factors of adherence are addressed as the relevant issues. For instance, knowledge and skill of a nurse is an affective factor. Furthermore, the diabetic is more likely to exercise if there are physical activity services available. Likewise, the cost of services as well as support from their friends or family has an impact. (Ahonen et al. 2012.)

The graph below is created by the author depicts the steps to be taken in adherence to self care. The nurses role is clarified as well as that of the diabetics.



GRAPH 1. Process in which adherence to regular physical exercise is accomplished.

## 4.2 Self-care

Self-care includes a broad spectrum. According to World Health Organisation (WHO) (2013), the definition is as follow:

Self-Care in health refers to the activities individuals, families and communities undertake with the intention of enhancing health, preventing disease, limiting illness, and restoring health. These activities are derived from knowledge and skills from the pool of both professional and lay experience. They are undertaken by lay people on their own behalf, either separately or in participative collaboration with professionals.

Self-care is vital among diabetic patients. The nurses responsibility is to counsel the diabetic in attempt to maintain a stable blood glucose level. However, the diabetic is to adhere to the health plan if optimal health is to be achieved. Thus, self-care is important to achieve optimal health. (Potter & Perry 2007.)

It has been proven that self-care has a positive effect on diabetics. Hence, self-care is to be routine in order to reap the optimal level of benefits. The diabetic that adheres to the importance of their own self care is less likely to suffer complications. Diabetic counseling guides the patient not only in self-care but also self-management. (Song, Ratcliffe, Tkacs & Riegel 2012, 309-324.) A form of counseling that nurses may provide to patient to increase the chance of adherence to physical exercise, may be by utilizing social support groups. These patients are able to relate learned concepts and experiences which may benefit other members in their own self-care. Diabetics that have support and contact with others experiencing similar experiences may be more likely to adhere to a new and unfamiliar lifestyle. (Mullin 2012, 555-557).

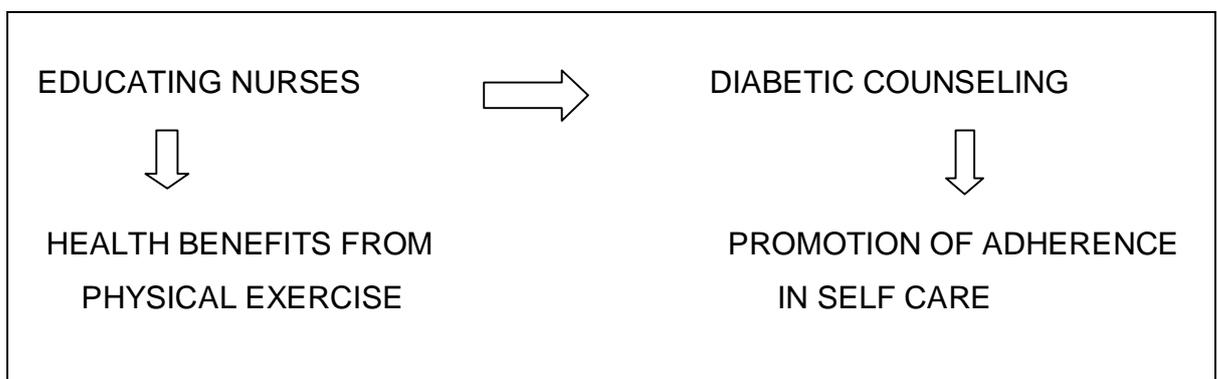
Regular physical exercise is essential in the management of diabetes. Diabetics are two times more likely to suffer from depression. This may be due to biological or psychosocial mediators. Physical exercise also has been proven to relieve depression among diabetics. This is possible when there is a regular patient counseling. Research has found that regular physical exercise provides benefits along with antidepressants and cognitive behavioral therapy. (Penckofen, S., Doyle, T., Byrn, M. & Lustman 2014, 1158-1182.)

### **4.3 Empowerment**

A challenging duty required of a nurse is to empower diabetic patients to adhere to regular physical exercise. Adult diabetics tend to be well educated and knowledgeable about diabetes. Similar to other diseases the effects of diabetes is very individual. Hence, this creates a unique relationship between the nurse and diabetic. The nurse is to tailor a patient centered approach. This is accomplished by assisting the diabetic in discovering and creating a capacity of self-care. The benefits of physical exercise are to be taught. (Grund & Stromberg 2012, 230-234.)

A nurse is to discuss with their patient the implementation of physical exercise into their daily lives, this serves as a key factor in empowering the patient. Follow up visits or support groups are important for the diabetic to remain empowered. The ability to empower a diabetic is impacted by the diabetic and nurses perspective. If both parties are open and have a commitment to the issue, the likelihood of succeeding is greater. An empowered diabetic tends to achieve self-care and is able to manage their disease. A nurse is to encourage the patient to make decisions about their own care and eventually promote self evaluation and ownership, this empowers a patient. (Grund & Stromberg 2012, 230-234.)

The content of the research is displayed in the graph below. This thesis focuses on the health benefits that a diabetic experiences due to physical exercise. Furthermore, this thesis provides with nurses with information about factors that affect a diabetic's adherence to physical exercise.



GRAPH 2. Content of the thesis.

## 5 PURPOSE AND RESEARCH QUESTIONS

This chapter contains an overview of the prominent questions that have been posed before starting this thesis. This chapter also reviews the main goals and purpose of this thesis as well as issues the author considered and discussion. The original questions posited the creation of the study and sought to summarize answers from the view point of multiple professionals that are in contact with diabetic patients. The questions contained vital factors that are to be considered.

The goal of this study was to produce information to nurses about the benefits of diabetics physical exercise. Furthermore, factors that influence adherence to regular exercise were reviewed. The purpose of this study was to discover the important aspects in counseling diabetic patients in physical exercise. The author chose this topic because it is currently an increasing medical concern. This especially pertains to the elevation in T2DM due to obesity. A nursing view point was considered from a multidimensional and holistic point of view in this thesis. Moreover, patients that suffer from T1DM are also able to benefit from this thesis. The following questions are:

1. What are the important aspects that a nurse should highlight when counseling a diabetic in physical exercise?
2. How can a nurse promote a diabetic to adhere to physical exercise?

## **6 METHODOLOGY**

The following chapter reveals the type of methodology used in this thesis and reasons of the methods being chosen for this particular thesis. The presumed target group was also discussed in this thesis. Data collection in this study is also revealed in this chapter.

### **6.1 Literature review**

This literature review is a summary of an extensive array of material that has been previously studied of specific phenomena. The data is collected from scientific journals that contained the most recent information about the topic. Studies by The Diabetic Association in Finland are included in this thesis. A literature review is research that broadly covers the length of a specific topic. Therefore, a wide span of content of can be presented that has been gathered from various sources. This is beneficial for the reliability of the study. The author of this study chose this type of study plan because the nature of the topic was suitable for this type of study. Furthermore, a literature review is defined by Gerrish & Lacey (2006) as follow:

A review of the evidence on a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant primary research and to extract and analyze data from the studies that are included in the review.

A literature review is to reflect the pertinent data and answers to the posed research questions. After the crucial content is extracted and collected, the author summarizes the results or discoveries. The conclusion confirms these statements. Graneheim & Lundman (2009), explained the process in this manner,

In the literature, shortening the text includes the concepts of reduction, distillation, and condensation. Reduction refers to decreasing the size but it

indicates nothing about the quality of what remains. Distillation deals with the abstracted quality of a text, which we see as a further step in the analysis process. We prefer condensation, as it refers to a process of shortening while preserving the core.

## **6.2 Reliability and validity**

Reliability is the result of a study by achieving the same outcome even if the studies were to be performed repeatedly. (Hart 2011.) Furthermore, validity is a precision of how closely the study questions related to the phenomena. The validity of the study was upheld by posing the most pertinent questions possible related to the subject. The researcher is to question if the study questions are logical and if they capture the total concept. Moreover, the author considered if the concept of the questions agreed with external studies. Finally, the author considered if the questions operated a similar concept and supported each other. (Polit & Beck 2008.)

## **6.3 Data collection**

A deductive method was chosen when developing this research. The theory of the topic was drawn from reliable sources enabling a common concept to be formed. Hence, a deductive style research is a broad search when beginning the search. However, eventually it becomes more specific. (Hart 2011.) The creation of a study with a deductive method data analysis follows a certain pattern. The data collection includes the collecting, organizing, managing and evaluation of available material. Hence, the research questions are answered. (Holloway 2008, 46-50.)

The chosen reference material in this thesis was published in the restricted time zone from 2006 to the current year of 2014. Therefore, the material provided the latest scientific information. Furthermore, sources of material were obtained from data bases for instance Sage premier, Elton Bryson Stephens Company (EBSCO) and

Science Direct. The author of the thesis was responsible for all costs that arose in this study for instance, library fees and purchasing nursing articles.

The original material collected for this thesis was from 30 scientific articles. The author reviewed the available material excluding 15 sources of the original search material that did not directly pertain to this study. The excluded material was too broad and although they were related to the topic of diabetes they were not based on counseling and exercise for a diabetic. The process of elimination continued and an additional three sources were disregarded because they did not directly answer to the research questions. The remaining sources were saved and optimal data was collected. The final report was derived from 12 articles. (Gerrish & Lacey 2006.)

The keywords utilized in this thesis were processed and analyzed. These included adherence, counseling, diabetes, physical exercise and self-care. These words proved reliable and enabled the author to research the topic precisely. Hence, multi-dimensional view points of the topic were compiled into a complete wholeness. The process of content analyzing was extensive and time consuming. However, it allowed the subject to be analyzed thoroughly and compiled properly. The main target group of this thesis was nurses. This thesis provided essential information on various ways to guide the diabetic patient about the importance of physical exercise.

There was an array of reliable scientific material of the subject. A foundation of the thesis is created which results in a thesis plan. A collection of science based material is to be gathered from reliable sources. The task of collecting pertinent material in scientific articles resulted in massive amounts of data. The data in scientific articles was screened. The included and excluded criteria are shown in Table 1. The screening allows the author to deduct all impertinent data. For instance, data may have been collected in a language that the author is not fluent in. However, the to be author was careful in the process of deduction of impertinent material in order to avoid unnecessary discarding of pertinent material. (Polit & Beck 2008.)

TABLE 1. Included and excluded material based on these guidelines.

<b>EXCLUDED</b>	<b>INCLUDED</b>
Non scientific material	Scientifically proven material
Material was not direct results of the reports keywords	Material search were direct results of the reports key words
The material was published before 2006	The material was published 2006 and thereafter except the
The material was broad and did not directly relate to the	The material was specifically pertained to the subject
The material did not directly give answers to the research	The material directly answered the research questions

#### **6.4 Content analysis**

It was important to be aware of the goals in this study in order to achieve them when completing the content analysis. The research question that the researcher attempts to answer derives from a research problem. Research questions always contain a concept. For instance, this may be an observed behavior. (Polit 2010.) The author of this study clearly understood the phenomenon of the process before creating a content analysis. Clearly, the desired subject of thesis was to be well defined. It was important that an overview was created so that the available material was organized systematically. Moreover, the overview provided the advantage of viewing the material in a focused manner. In the process of categorizing the material, the author had the opportunity to begin with the process of excluding the data that does not provide the answers to the posed research questions directly. (Graneheim & Lundman 2009.)

Content analysis is a process through which data is extracted, coded, categorized and condensed. (Elo & Kyngäs 2007, 107-155.) In this report, data was read twice. The author proceeded to analyze the data and identify the most important aspects that answered according to the research questions. Foremost, the consideration was

concentrated on; does this data specifically answer to the thesis questions? Furthermore, the main concepts of the data were detected and how various data was related to a certain concept. The information was recorded and the key ideas of the information were underlined or bolded. According to which question the data was required to answer, the data was highlighted for question number one and bolded for question number two.

The author proceeded by placing the data on a chart with headings of the two research questions in this study. This process was repeated on subsequent data that pertained to the same topic. Sufficient data and resources were collected and recorded. The data was simplified by extracting the key words of the contexts. The author proceeded to consolidate the data. The data was merged, excluding the non-critical information while the important aspects of the data remained. The data was reworded and interpreted into the author own words. This created a reliable basis for the creation of the subject. Furthermore, the interpretive data was added into the thesis. (Elo & Kyngäs 2007, 107-155.)

## 7 RESULTS

Promotion of physical exercise is a vital factor for a nurse to highlight while educating a diabetic patient. The diabetic is able to influence their own health. There are numerous physiological and psychological benefits. Moreover, a person that adheres to regular physical exercise reduces the risk of multiple diseases. The subjects of the scientific data that the author discovered while researching this thesis were extensive and are displayed in the table below. The researched topics were distributed in groups according to other related data. After adequate data was collected, the group topic was summarized as to the common factor that connected them.

TABLE 3. Research topics and the process of grouping.

Discovered issues while researching	Grouping	Group titles
Hypoglycemia	How the body and brain reacts to physical exercise	Physiological and psychological deviations as a result of exercise
glucose		
Circulation		
Blood pressure		
Heart rate		
Metabolic		
Depression		
Anxiety		
Well being		
Epinephrine and norepinephrine		
Prevention	How the heart and coronary arteries are affected by physical exercise	Cardiovascular system and physical exercise
Low density lipo-protein (LDL)		
High density lipo-protein (HDL)		
Circulation		
Cardiovascular disease		
Metabolic syndrome		
Stamina	Improves strength and endurance and assists in maintaining independence	Strength and endurance
Balance		
Endurance		
Bone density		
Tones muscle		
Posture		
Energy		
Bone density		
Sleep quality		
Cancer risks		

## 7.1. Physiological and psychological deviations as a result of physical exercise

Physical exercise is crucial for a diabetic. Physiological changes occur in the body during physical exercise. There are hormonal, metabolic and cardiovascular deviations that occur while exerting the body. As a person exercises, the heart rate increases, blood pressure rises and blood flow increases to provide oxygen to the muscles. This builds endurance and increases the diabetic's energy. The hormones epinephrine and norepinephrine are released in response to exercise stress. These hormones also maintain blood glucose levels. Carbohydrates are stored in the muscles as glycogen. Fat is stored in fat tissue as triglycerides, as a person exercises these substances become activated and provide energy for the duration of the workout. Carbohydrates are also stored as glycogen in the liver. While exercising, the liver is activated and the stored glycogen is transformed into glucose and becomes the main source of energy. Furthermore, the pancreatic production of insulin reduces facilitation of the production of glucose in the liver. Consequently, the work load of the pancreas is reduced. (Votion 2014, 747.)

Insulin enables glucose to enter a cell. The moment insulin comes in contact with a suitable cell receptor the cell becomes activated. On the cells surface near the cell receptor harbors Glucose Transporter Type 4 (GLUT 4). GLUT 4 is a protein carrier that assists in the transportation of glucose into the cell. When a person exercises, the contraction of muscle causes more GLUT4 to be available. Thus, a larger amount of glucose is able to enter and be used for energy in the cell. (Govers 2014, 173-240.)

Physical exercise maintains glycemic homeostasis. Muscles continue to utilize glucose for up to twenty-four hours after completing the exercise session. This promotes low levels of blood glucose. This reduces the need for large doses of injected insulin or pills. A diabetic is to be advised to check their blood glucose levels regularly after physical exercise in order to avoid hypoglycemia. (Nie, Kong, Baker, Tong, Lei & Shi 2012, 97-100.) Physical exercise produces positive psychological

benefits for a diabetic. The overall mental wellbeing improves as a diabetic exerts his or her body. Studies have proven that diabetics who exercise regularly were less likely to suffer from depression and anxiety. Moreover, a person is more likely to hold social integration. Therefore, the sense of wellbeing is promoted. (Kopp, Steinlechner, Ruedl, Ledochowski, Rumphold & Taylor 2012, 25-29.)

## **7.2 Cardiovascular system and physical exercise**

Regular physical exercise is a means of prevention for the cardiovascular system. There are several organs that reap benefits which include the heart, lungs and blood vessels. Physical exercise promotes the blood to flow undisturbed through the arteries. This affects cholesterol levels. Low Density Lipo-Protein Cholesterol (LDL) collects in the arteries and causes (build up) atherosclerosis. This may lead to a myocardial infarction. There is an elevated risk of heart disease and circulatory complications for a diabetic. High Density Lipo-Protein (HDL) is considered beneficial cholesterol. HDL gathers harmful cholesterol and transports it to the liver reducing the risk of atherosclerosis. Regular physical exercise increases HDL and decreases LDL cholesterol levels. Furthermore, routine physical exertion improves circulation, lowering blood pressure which reduces the risk of suffering from a stroke. (Gallagher, White, Armari & Hollams 2013, 320-329.)

Habitual physical exercise improves the management of a pre-diabetic or diabetics weight. Calories and fat stores are activated and continue to be exhausted for twenty-four hours after the exercise session finishes. Regular physical exercise may reduce a persons chance of being diagnosed with T2DM. A person that has been diagnosed with metabolic syndrome may be able to delay the onset of T2DM. Moderate weight loss (5-10%) in conjunction with habitual exertion substantially reduces a diabetics risk of cardiovascular disease. Fat that gathers around the abdomen creates an elevated risk of metabolic syndrome. (Gallagher et al. 2013, 320-329.)

### **7.3 Strength and endurance**

According to, Morrison, Colberg, Parson & Vinik (2014, 716-722), physical exercise strengthens and tones muscle. Furthermore, physical exercise improves posture and balance. Bone density increases reducing the diabetics risk of a bone fracture or osteoporosis. While exercising the heart beats faster, this increases the respiratory rate. A diabetic that adheres to a regular routine of exercise tends to have more energy and stamina. Diabetics that exercises regularly tend to sleep better. (Chennaoui, Arnal, Sauvet & Leger 2014, 1016.) They also reduce their risk of colon cancer and remain healthier. Furthermore, a diabetic is more likely to live independently if they exercise on a regular basis. (Coups, Hay & Ford 2008, 246-251.)

## 7.4 Promotion of adherence

The table below provides information to a nurse of factors that promote a diabetic to adhere to physical exercise.

TABLE 3. Research topics and the process of grouping.

Discovered issues while researching	Grouping	Group titles
Type of exercise	The goals and aims of an habitual exercise plan	Creating an exercise plan
Goals		
Time		
Duration		
Aerobic		
Strength training		
Flexibility		
Progress		
Recording		
Rewards		
Plan		
Adherence	How a nurse is to communicate with a client and motivate them	Empowering the client
Psychological process		
Empathy		
Trust		
Communication		
Dialogue		
Relationship		
Empowerment		
Discussion		
Scientifically proven material		
Agreement	Methods a nurse is able to use while counseling clients	Group verses individual counseling
Group meetings		
Individual appointments		
Advantages		
Disadvantages		

## 7.5 Creating an exercise plan

Studies have shown that special education of diabetes and exercise increases a nurse's confidence when counseling patients. According to Shields, Fowles, Dunbar,

Barren, Mcquaid & Fieldman (2013), a study by utilizing a tool kit was completed. The study utilized a tool kit to educate nurses in a systematic manner. The study suggested that there was a 20% increase in the confidence and attitude of the nurse. It is suggested that a tool kit is used in increasing nurses' efficiency of teaching their patients. Hence, if the diabetic is receiving adequate information, the individual is more likely to perform physical exercises.

A nurse is to assist a diabetic in creating an exercising plan. The plan is to state the types of physical exercise they wish to do. A diabetic is to choose types of exercise that they prefer and that they find enjoyable. Weekly goals are to be planned including the number of minutes and at which time of the day. If possible, a combination of aerobic, strength and flexibility activities are to be included. Realistic goals are to be set and maintaining records of progress and allowing small rewards increases motivation. Days of rest are necessary as a part of an exercise plan. If a session is missed it is to be rescheduled as soon as possible. For instance, if a diabetic is not in optimal physical condition, it is advisable that the exercise sessions to begin slowly. Furthermore, weight can be increased if strength activities are involved. (Shields et al. 2013, 381-387.)

## **7.6 Empowering the patient**

As discussed in the theory, empowerment is a key factor in the success of a patient adhering to physical exercise. As opposed to the patient's beliefs in myths, education derived from scientifically proven information is vital. In order for a nurse to be successful in empowering the diabetic an understanding of the psychological process of the patient is to be comprehended. Foremost, a nurse is to portray empathy to the diabetic. The nurse is to gain the patient's trust which promotes the patient communication. The dialogue between the patient and nurse is to be open dialogue. The nurse is to encourage the diabetic to discuss their own thoughts and ideas. Hence, this encourages the patient to think critically and obtain ownership of their own care. (Anderson & Funnell 2010, 277-282.)

Diabetic patients that have a sense of trust for a nurse are more likely to adhere to a physical exercise regimen. They also, tend to have more confidence in administering their own medication and are less likely to be anxious of insulin and its side effects. Therefore, it is important that a nurse uses cognitive techniques when counseling diabetic patients. For instance, a nurse can point out another area in a diabetic's life where they have been successful. A comparison of can be done between that positive factor and adherence to physical exercise. A nurse is to boost a diabetic's confidence and confirm that they have the ability to have a positive impact on their own lives. (Gherman, Schnur, Montgomery, Sassu, Veresiu & David 2011,392.)

### **7.7 Group verses individual Counseling**

There are two methods by which a nurse can educate diabetic patients on the importance of physical exercise. A nurse may choose to counsel the diabetic in an individual meeting. Hence, only the patient is present. Group counseling is another option of educating the patient. The meetings occur with multiple diabetics present. According to Ooi, Rodrigo, Cheong, Mehta, Bowman and Shearman (2007, 28-33), group counseling is beneficial for diabetics. A study was completed portraying the benefits of group counseling. The researchers discovered that the participants received optimal knowledge. Moreover, the group size impacted the information that was acquired.

## **8 DISCUSSIONS**

In this chapter, the author reflects on the importance of physical exercise for diabetic. The relevancy of the research is discussed in this chapter. Moreover, the methodology and the ethics that the thesis was based on are discussed in this chapter. Publicationsq examples of various authors whom have completed similar studies are researched in this thesis. Although the conclusions of various reports may contradict with each other, the author attempted to display various views and opinions surrounding the topic. The relevancy of the subject is argued and the aim was the recipientsqof this report will understand the important of the subject. Overall, an understanding of wholeness about diabetes and exercise is strived to be displayed in this thesis. The author reflected the benefit of this thesis and suggestions for further research.

### **8.1 Methodological process and considerations**

A review of literature was chosen as a study methodology in this report. This proved to be a suitable type of study method for collecting and presenting data. Hence, it enabled the researcher to search current and vital information. The research consumed a measurable amount of time while constructing the report. The material was reduced by elimination process of collecting essential data. Research material of this topic was available from worldwide sources. However, the researcher attempted to highlight the Finnish sources. Therefore, the information in this report is intended to educate Finnish nurses.

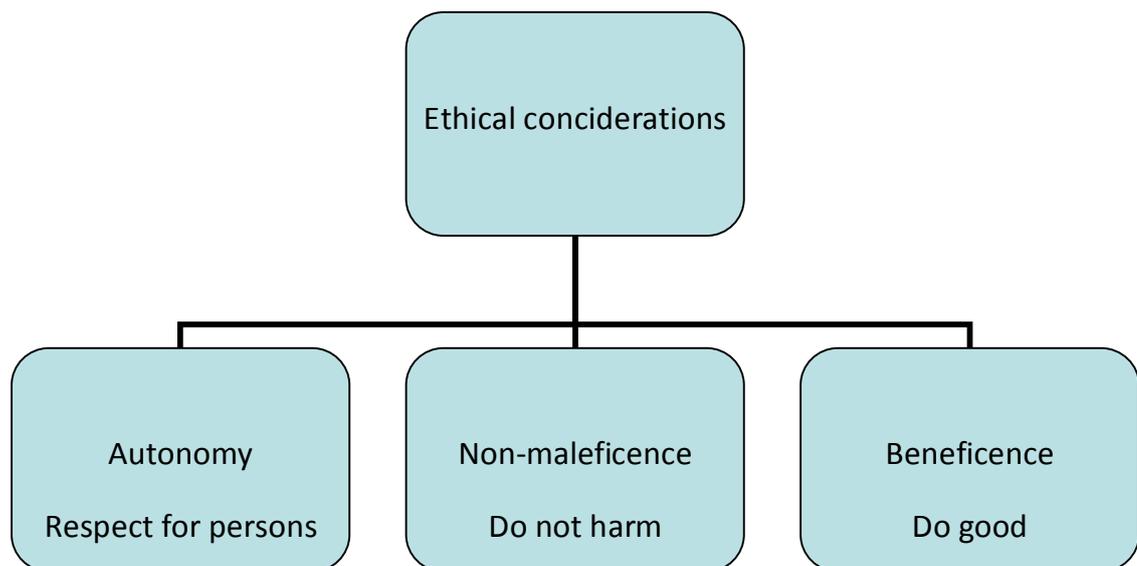
### **8.2 Methodological limitations**

Originally, the researcher considered a general study of diabetes research. This subject proved too be broad and possibly would have resulted in a poor quality of

research. Therefore, the subject was then focused on the impact of physical exercise among diabetics. However, the author accessed scientific journals from related and available databases.

### 8.3 Ethics

The topic of ethics is an essential part of this study. Moreover, the validity and reliability of this study were retained. The topic of plagiarism was also considered. Ethics are to be maintained in reliable scientific studies. Therefore, plagiarism is not acceptable. The definition of plagiarism is: an act of fraud, involving both stealing someone else's work and lying about it afterwards. Moreover, acts of forgery, misinterpretations and dishonest manipulations are to be avoided. (Gimenez 2011.)



GRAPH 3. Intentions and ethical considerations of this report.

The respect of persons was considered and the author avoided including personal names in the report. Moreover, this report is intended to be beneficial for nursesq  
The author of this study avoided unethical practices. The references were utilized

and summarized in the author's own words in order to avoid plagiarism and scientific misconduct.

#### **8.4 Discussions of the results**

The diagnoses of diabetes mellitus are steadily increasing. T2DM is becoming increasingly prevalent not only in Finland but also globally. A diabetic is to be encouraged and counseled in lifestyle interventions. The therapeutic strategy of the nurse and diabetic alike is insight of the importance of physical exercise. Hence, physical exercise is a vital factor in the overall care of a diabetic. The results of this research provide important factors that a nurse is to have knowledge of while counseling a diabetic. A nurse is to be knowledgeable and continue learning the most current information about diabetes and physical exercise. Scientific database of journals provide the latest research. It is beneficial for a nurse to motivate herself/himself to continue learning. This reflects in the quality of a nurse's work. The patient benefits from the nurse's knowledge by receiving quality care. Moreover, this thesis is also beneficial for nursing schools as well as diabetic centers.

The results of this thesis provided information of the important factors physical exercise provides for a diabetic. The results also displayed the factors in how a nurse is able to promote their diabetic patients to physical exercise. While researching this topic, the author researched many other topics related to this topic. However, the topic of the Psychological affects that physical exercise provides for a diabetic is a recommended topic for further research. The research of this particular study would concentrate solely on the how physical exercise affects the psychological well-being of a diabetic. The results also have a direct correlation with the theory of this thesis. For instance, it is a nurse's duty to counsel, empower and guide a patient. In the results this concept is supported in creating an exercise plan with the patient.

While researching this thesis the author discovered that various researchers published material that provided the same opinion. For instance, a following example

is displayed. According to Sato, Nagasaki, Kubota, Uno & Nakai (2007), physical exercise increases the action of blood glucose. Hence, this reduces blood glucose level of a diabetic. Habitual exercise such as jogging promotes the utilization of insulin. Furthermore, the number of steps taken daily has a direct correlation with glucose sensitivity. The study suggested that a diabetic is to exercise for duration of ten to thirty minutes and the exercises are to be performed three to five days a week. Hamdy (2014), also revealed similarities that physical exercise promotes the effectiveness of insulin partly due to the promotion of the GLUT 4 protein.

The author of the thesis also discovered differences in opinion when comparing the studies. For instance, the recommended duration of the exercise session can vary between various studies. As previously mentioned by Sato et al. (2007), an exercise session is to last for a duration of 10-30 minutes. However, according to Weil (2013), a session is to last for a duration of 15-40 minutes. Hence, there are variances in the recommendations of a single exercise duration in a session. However, it is recommended in all studies that a diabetic begins with short durations for instance, ten minutes if they have not previously adhered to a regular exercise program.

An adult diabetic may view physical exercise negatively. Likewise, they may view exercise as a daunting challenge. A study of adult diabetic reported that adults that in the study and exercised regularly were able to influence and even change their opinions about exercising. Therefore, it is important for a nurse to encourage the diabetic to exercise and if they have negative attitude, they are to be reminded that it may change if they are persistent. (Tessier, Menard, Fulop Ardilouze, Roy, Dubuc, Dubois & Gauthier 2006, 121-132.) Nurses who are knowledgeable of the factors that are able to influence a diabetic are more likely to be successful in empowering their patients. This thesis is a tool to be used by a nurse when counseling a diabetic about physical exercise.

While completing this research the author gained knowledge of how to academically write, construct and also the systematic process that the author must fulfill when

creating a literature review. As mentioned in the methodology section a literature review is a collection of data from scientifically proved articles on a specific topic. When creating the learning questions and throughout the entire creation of the thesis the author considered reliability and validity. While collecting data the author's foremost consideration was that the data answered the learning questions. Hence, the purpose and goal of the study were achieved. Content analysis included the coding and grouping of the data. Besides becoming knowledgeable in these matters the author also learned more about the physiological and psychological changes that occur in a diabetic's body while exercising. Moreover, the factors of how a nurse is able to impact a diabetic's adherence to physical exercise.

## 9 CONCLUSION

### 9.1 Purpose and goal

The purpose of this study was to discover the important aspects in counseling diabetic patients in physical exercise. Likewise, the positive aspects wrought from adhering to habitual exertion were displayed in this thesis. There are numerous beneficial factors that the diabetic reaps from exercising regularly. Improvement of the efficiency in the cardiovascular system may possibly enable the diabetic to avoid complications such as a myocardial infarction. Physiological deviations of the manner in which the body utilizes insulin during and after physical exercise aids in reducing blood glucose levels. Subsequent benefits for instance, the increased ability for glucose to enter a cell with GLUT 4. Increased strength and endurance are important factors in the daily living of a diabetic. Regular physical exercise benefits the diabetic's psychological wellbeing. There are numerous other benefits to habitual exerting of the body.

The goal of this study was to produce information to nurses about the benefits of diabetics' physical exercise. Furthermore, factors that influence adherence to regular exercise were reviewed in this thesis. The ability of a nurse to empower a diabetic is vital. Likewise, the nurse is to note that there are internal and external factors that could affect the diabetic's adherence to physical exercise. The discovered research material indicates that physical exercise is crucial for the health and wellbeing of a diabetic.

There is a correlation between the purpose and question number one of the study. As mentioned previously, the purpose of this study was to discover the important aspects in counseling diabetic patients in physical exercise. The positive aspects wrought from adhering to habitual exertion are displayed. Question number one was;

what are the important aspects that a nurse should highlight when counseling a diabetic in physical exercise? There is a correlation between the goal of the study and question number two. The goal of this study was to produce information to nurses about the benefits of diabeticsqphysical exercise. Furthermore, factors that influence adherence to regular exercise were reviewed. Question number two was as follow; how can a nurse promote a diabetic to adhere to physical exercise?

The results in the study posed an answer to the questions and also fulfilled the purpose and goal. Table 5 depicts the results in relationship. In the results there were three aspects that provided answers to the question as well as the purpose and goal.

TABLE 4. Conclusions and answers as well as the goal and purpose.

<b>CONCLUSION AND ANSWERS TO THE PURPOSE AND QUESTION # 1</b>	<b>CONCLUSION AND ANSWERS TO THE GOAL AND QUESTION # 2</b>
Physiological and psychological deviations as a result of physical exercise	Creating an exercise plan
Cardiovascular system and physical exercise	Empowering the patient
Strength and endurance	Group verses individual counselling

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**APPENDIX 1/4**

<b>Author, year, article, journal</b>	<b>Purpose of study</b>	<b>Sample (quantitative)/literature (qualitative)</b>	<b>Main results of the study</b>
Votion, D. 2014. Metabolic responses to exercise and training. <i>Equine sports medicine and surgery</i> 2, 747	Investigated metabolic responses to exercise and effects of training adaption	Adult study	Hormones epinephrine and norepinephrine stimulate cardiovascular system during physical exercise
Govers, R. 2014. Cellular regulation of glucose uptake by glucose transporters GLUT 4. <i>Advances in clinical chemistry</i> 66,173-240	Investigated current knowledge regarding the processes that govern GLUT4 physiology is discussed	Adult study	Insulin stimulation GLUT4 relocates to the cell surface where it transports glucose into the cell
Nie, J., Kong, Z., Baker, J., Tong, K., Lei, S. & Shi, Q. 2012. Acute changes in glycemic homeostasis in response to brief high-intensity intermittent exercise in obese adults. <i>Journal of exercise science and fitness</i> 10, 97-100	Investigated the acute changes in glycemic homeostasis in response to brief, high-intensity, intermittent exercise in obese adults	10 obese adults	This study demonstrated the improvement in glycemic homeostasis in obese adults immediately after brief, high-intensity, intermittent exercise. These effects were maintained for at least 24 hours post exercise

**APPENDIX 2/4**

<p>Kopp, M., Steinlechner, M., Ruedl, G., Ledochowski, L., Rumphold, G. &amp; Taylor, A. 2012. Acute effects of brisk walking on affect and psychological well-being in individuals with type 2 diabetes. <i>Diabetes research and clinical practice</i> 95, 25-29</p>	<p>To investigate the effects of an acute exercise bout on affect and psychological well-being in individuals with type 2 diabetes</p>	<p>16 Diabetic patients</p>	<p>This study demonstrated that an acute exercise bout has positive influences on affect and psychological well-being</p>
<p>Gallagher, R., Armari, E., White, &amp; Hollams, D. 2013. Multicomponent weight-loss interventions for people with type 2 diabetes mellitus. <i>European journal of cardiovascular nursing</i> 12, 320-329</p>	<p>Determine whether weight loss interventions, which combine dietary, exercise and behaviour change strategies, result in reduced weight, body mass index (BMI) and waist circumference in people with T2DM</p>	<p>1428 Obese diabetics</p>	<p>Weight loss interventions that combine exercise, diet and behavior change strategies result in weight loss in people with T2DM</p>
<p>Morrison, S., Colberg, S., Parson, H. &amp; Vinik, A. 2014. Exercise improves gait, reaction time and postural stability in older adults with type 2 diabetes and neuropathy. <i>Journal of diabetes and its complications</i> 28, 715-722</p>	<p>This study investigated the effects of 12 weeks of aerobic exercise training on walking, balance, reaction time and falls risk metrics in older T2DM individuals with/without peripheral neuropathy</p>	<p>21 Adults with T2DM and 16 with neuropathy</p>	<p>Aerobic exercise of varying intensities is beneficial for improving dynamic postural control in older T2DM adults</p>

APPENDIX 3/4

<p>Chennaoui, M., Arnal, P., Sauvet, F. &amp; Leger, D. 2014. Sleep and exercise: A reciprocal issue? Sleep medicine reviews 10, 1016</p>	<p>Describe the reciprocal fundamental physiological effects linking sleep and exercise</p>	<p>Adults</p>	<p>Physical activity is considered as beneficial in aiding sleep</p>
<p>Coups, E., Hay, J. &amp; Ford, J. 2008. Awareness of the role of physical activity in colon cancer prevention. Patient education and counseling 72, 246-251</p>	<p>This study examined the prevalence and correlates of adults awareness of the role that physical activity plays in preventing colon cancer</p>	<p>1932 Respondents to the Health Information National Trends Survey</p>	<p>There is poor awareness among adults of the role that physical activity plays in preventing colon cancer</p>
<p>Shields, C., Fowles, J., Dunbar, P., Barren, B., Mcquaid, S. &amp; Dillman, C. 2013. Increasing Diabetes Educators' Confidence in Physical Activity and Exercise Counselling: The Effectiveness of the Physical Activity and Exercise Toolkit+Training Intervention. Canadian Journal of Diabetes 37, 381-387</p>	<p>Examine the effectiveness of a comprehensive intervention (the toolkit) in improving diabetes educators' (DEs') perceptions of their abilities and their patients' abilities related to physical activity as part of regular diabetes self-management</p>	<p>Two separate studies were conducted. Participants completed measures assessing confidence, attitudes and perceived difficulty. In study 1, a quasi-experimental design was used to examine the impact of the training intervention at 6 months</p>	<p>Findings suggest that the toolkit is an effective resource to improve nurses confidence in the area of physical activity counseling</p>

**APPENDIX 4/4**

<p>Anderson, R. &amp; Funnell, M. 2010. Patient empowerment myths and misconceptions. Patient Education and Counseling 79, 277-282</p>	<p>Clarify the concept of empowerment and to correct common misconceptions about its use in diabetes care and education</p>	<p>Diabetic patients</p>	<p>Empowerment is not something one does to patients. Empowerment begins when nurses acknowledge that patients are in control of their daily diabetes care</p>
<p>Ooi, G., Rodrigo, W., Cheong, R., Mehta, G., Bower, C. &amp; Shearman, P. 2007. An evaluation of the value of group education in recently diagnosed diabetes mellitus. The international journal of lower extremity wounds 6, 28-33</p>	<p>Assess the effectiveness of group education in improving patient awareness of foot care</p>	<p>Fifty-nine patients recently diagnosed with diabetes mellitus were recruited for 7 sessions</p>	<p>Data show the benefit of group education about foot care for patients with diabetes</p>
<p>Gherman, A., Schnur, J., Montgomery, G., Sassu, R., Veresiu, I. &amp; David, D. 2011. How are adherent people more likely to think? Meta-analysis of health beliefs and diabetes self-care. Diabetes self-care 37, 392</p>	<p>Investigate the association between beliefs related to diabetics and adherence to diabetes regimens</p>	<p>48 Diabetic adults</p>	<p>Positive relations to nurse promoted adherence</p>