Guideline for Nurses Performance for Patients with Diabetes Mellitus on Insulin Therapy

Thesis

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(**Medical–Surgical Nursing)**

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دليل إرشادي لأداء الممرضات اللاتي يقدمن الرعاية لمرضي البول السكري تحت العلاج بالأنسولين

رسالة مقدمة
للحصول على درجة الماجستير
في علوم التمريض
(تمريض باطنـي – جراحـي)

مقدمة من
هنــد شافعـي إمام سيـد
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INTRODUCTION

Diabetes mellitus (DM) is a major health problem worldwide, which needs more attention as a way for applying basis of proper interventions, thus prevention of early or late complications. It is becoming actually fourth leading cause of global death by disease ***(Shaltout, 2010; & World Health Organization [WHO], 2008).***

The incidence of the disease is high worldwide and varies between populations because of differences in genetic susceptibility and other modifiable risk factors such as; unhealthy diet, sedentary life style. The WHO reported that; the prevalence of DM is continued to increase. In 2003, an estimated 180 million people with diabetes globally. Today, there are at least 194 million patients with diabetes and that this number is expected to rise to 366 million by the year 2030 ***(WHO, 2009; International Diabetes Federation [IDF], 2008***; & ***El Gamal, 2000).***

Recently, data shows that two people develop diabetes every ten seconds. In the United States, one in three Americans born today will develop type 2 diabetes from 11 to 14% in 2025 in their lifetime. At least, 50% of all people with diabetes are unaware of their condition. The highest rate of diabetes prevalence is in North America (9.2%) followed by Europe (8.4%) ***(Shaltout, 2010***; & ***IDF, 2008).***

Egypt is one of the countries which significantly suffer from DM in which is considering a major emerging clinical and public health problem among the Egyptian population. The International Union for Diabetes Development, Egypt was the top ten of the world in terms of developing diabetes ***(National Institution for Diabetes Egypt [NIDE], 2008; and Radwan, & Gadalah, 2005).***

In addition, Egypt is one of the countries having the highest diabetes prevalence belongs to the Arabic world. Recent statistical studies estimated that the total number of people with diagnosed and undiagnosed diabetes (pre diabetes) in Egypt was 3.80 million in 2000 and expected to become 8.80 million by the year 2025 ***(National Information Center for Health, 2010).***

This high and serious indicator for that Egyptian people are facing a major problem, which is that this ratio continues to increase, unless faced with a national issue of all those involved in health matters and preventive in the society. Each year, diabetes affects more people and causes more deaths than breast cancer and AIDS combined. Every ten seconds a person dies from diabetes related causes. Each year diabetes accounts for 3.8 million deaths. An even greater number die from cardiovascular diseases made worse by diabetes related lipid disorders and hypertension ***(Workman, 2010; & WHO, 2009).***

Diabetes is responsible for approximately 6% of total global mortality. Recently data reported that the world spent at least US$ 232 billion to treat and prevent diabetes and its complications. Overall, direct heath care costs of diabetes range from 2.5 to 15% of annual care budgets, depending on local diabetes prevalence and the sophistication treatment available. DM is a metabolic disease, characterized by hyperglycemia (increase concentration of blood glucose) and disturbance of glucose metabolism as result of reduced secretion or insulin resistance or both ***(IDF, 2008).***

Diabetes and its prevention treatment is a national issue that there had to identify the extent of development in the mass treatment of diabetes first. Diabetes is divided into two main types: type I diabetes: Insulin Dependent Diabetes Mellitus (IDDM), usually affects children and adults, but may also affect the elderly ***(Ackely, Ladwing, Swan, & Tuker, 2008).***

Type II diabetes: Non Insulin Dependent Diabetes Mellitus (NIDDM) usually affects elderly and rarely to affect on adults. Clients with type I DM don't produce enough insulin to sustain life. They depend on exogenous insulin administration on a daily basis. In contrast, clients with type II DM aren't dependent on exogenous insulin for survival. However, clients with type II DM may need to take insulin for adequate glucose control, especially in times for stress or illness ***(Nazario, 2011).***

Insulin is made chemically by recombinant Deoxyribonucleic Acid (DNA) technology (human insulin) with different duration of action (rapid-short-intermediate, and long acting). Insulin works to lower blood glucose level by promoting the transport of glucose into cells, and by inhibiting the conversion of glycogen and amino acids to glucose ***(Ministry of Health and Population [MOHP], 2007).***

Nurse's role must consider both the client's requirements and the client's response to insulin. Nurses help client learn how to adjust daily doses of insulin injection, self administration of insulin injection, Self Monitoring of Blood Glucose (SMBG) levels, food intake, and exercise ***(Nettina, 2010***; ***& Carpenito- Moyet, 2009).***

Guidelines are written strategies or protocol for health care delivery that are developed to facilitate clinical decision making and provide health care team as nurses and physicians with critical information concerning the different treatment options for patients with DM on insulin therapy available to heath care team. The practice guidelines are appropriate management for patient with DM on insulin therapy for their clinical problems based on patient's needs and health outcomes ***(National Diabetes Education Program, 2007).***

Significant of the Study:

Diabetes mellitus is one of the major causes of morbidity and mortality. Since the numbers of patients with DM had increased in Egypt and all around the world, those patients are in need to the highest quality of care. The incidence and prevalence of DM are increasing in epidemic proportions. So, the increasing morbidity and mortality in this population and complexity of diabetes treatment include dietary restrictions, use of medication (insulin) and associated chronic complications.

Diabetes Mellitus is as a chronic disease of the individuals and continues with them throughout life. Diabetes needs to continuity of treatment and medical follow up. Diabetes disease isn't like other diseases, the usual, it doesn't affect a member or only part of the body but affects and impacts negatively on all parts of the body beginning from the skin and end of bone, through all the tissues and organs as heart, blood vessels, vision, nerves, muscles and kidneys.

As a result, the nurse has critical role of care for patients with DM on insulin therapy either prevention or delay of complications of DM through instructions or guidelines provided for them. Furthermore, the nurse's role is to meet patients' needs for health instructions about diabetes knowledge and practice as hemogluco test, insulin injection, and foot care. However, the nurse will acquire the necessary knowledge and skills required to improve their performance and to be professional nurse in this respect. Thus, nurses will be professional caregivers.

Furthermore, nurse's performance will impact positively on patient's life style pattern, health effective and best quality of life as much as possible.

Aim of the Study:

This study aims to develop a guideline for nurse's performance for patients with diabetes mellitus through:

1- Assessing the nurse's performance for patients with diabetes mellitus on insulin therapy.

2- Recommending the guideline of the nurse's performance based on needs of patients with diabetes mellitus on insulin therapy.

Research questions:

This study will answer the following questions:

1- What is the nurse's performance for patients with diabetes mellitus on insulin therapy?

2- To what extend the nurses need for guideline in caring for patients with diabetes mellitus on insulin therapy?

Operational definition:

For the purpose of this study the following operational definition will be used:

Nurses performance: In this study refers to the nurse's knowledge and practice regarding DM, knowledge of DM such as definition, causes, risk factor, signs and symptoms, complications, insulin therapy, nursing care of complications, diet, exercise, follow up, and nursing activities done in the diabetic unit, which are based on nurses' knowledge and practice regarding blood glucose test (hemogluco test) and insulin administration are linked with each other.

REVIEW OF LITERATURE

Part I: Diabetes Mellitus

Anatomy and Physiology of the Pancreas:

The pancreas is a long, triangular organ. It is described as consisting of a head, body, and tail. It is situated in the upper part of one's abdomen. It is about 15 cm long and 2.5 cm wide. It has a flattened bulbous head that is surrounded by part of the intestine called duodenum, a narrow body that lies behind the stomach and tail that rests on the front of the left kidney. Pancreas is mixed gland contains both exocrine and endocrine functions. Exocrine cells within the pancreas secrete digestive enzymes into the duodenum ***(Sherwood, 2007; and Thibodeau & Patton, 2000).***

Exocrine function secretes an alkaline juice with enzymes such as amylase and lipase, which help digest the fat, protein as well as carbohydrates from the food that person eats. The alkaline juice helps to neutralize the acid secretions of the stomach. It secretes about 1.5 liters of these juices in a day. The enzymes are conveyed to the upper part of the small intestine called duodenum via a tube called the pancreatic duct. The pancreas also contains endocrine cells that secrete hormones directly into the bloodstream. The endocrine tissue is less than 5% of the total volume of the pancreas ***(Anderson, 2004).***

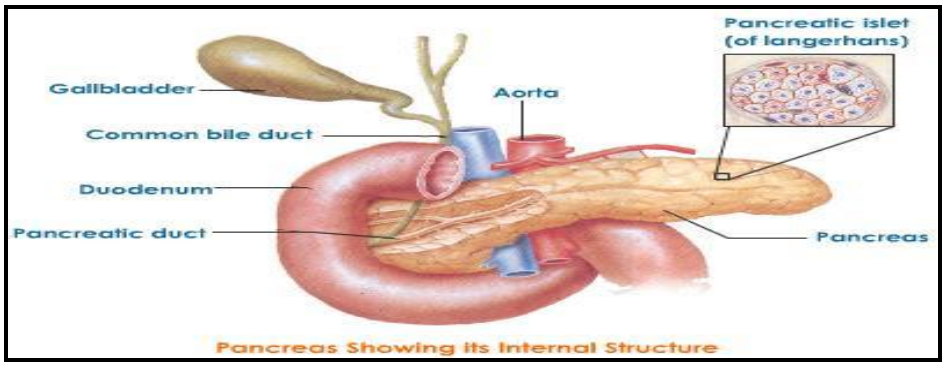

Fig. (1): Pancreas & its internal structure , Modified from Sherwood, L. (2007): Human physiology from cells to systems, 6th ed., Library of congress, U.S.A., P: 604.

Pancreas is composed of clusters of cells scattered among the exocrine acini cells accomplish pancreatic islets of the endocrine functions of the pancreas. These "islands" are known as the islets of Langerhans, and are composed of four distinct cell types. The cells are known as *alpha*, *beta*, *delta*, and *PP* (pancreatic polypeptide hormone) cells. Alpha cells secrete glucagon, beta cells secrete insulin, delta cells secrete somatostatin, and PP cells secrete pancreatic polypeptide hormone. Glucagon, insulin, somatostatin, and polypeptide hormones are released into the surrounding capillaries to empty into the portal vein in the liver ***(Sherwood, 2007).***

There are two types of cells are important to control glucose: alpha cells produce glucagon (hormone that acts opposite of insulin, and causes release of glucose from cell storage), and beta cells produce insulin (it allows body cells to use and store carbohydrate and protein) ***(Porth, 2002).***

Pancreas secretes 40-50 units of insulin daily as following: Secreted at low levels during fasting insulin secretion, increased levels after eating (post prandial), an early burst of insulin occurs within minutes of eating. Then it proceeds with increasing release long as hyperglycemia is present ***(Herlihy & Maebius, 2003)***.

Diabetes mellitus is a universal problem affecting human societies at all the stages of development. ADA defines "diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both". Diabetes mellitus is a metabolic syndrome, characterized by chronic hyperglycemia. Diabetes arises from impaired carbohydrate metabolism, and glucose intolerance ***(American Diabetes Associations (ADA),* 2003*, & Lewis, Heitkemper, & Dirksen, 2004).***

Classification of Diabetes Mellitus:

In recent years, there are several different types of DM; they may differ in cause, clinical course, and treatment ***(ADA, 2003). ADA*** classified diabetes mellitus as the following:

Type1diabetes (Insulin–Dependent Diabetes Mellitus [IDDM], or juvenile –onset diabetes mellitus). It affects about 5% to 10% of diagnosed cases of diabetes mellitus in the United States. It is characterized by no insulin production by the beta cells in the islets of Langerhans of the pancreas ***(ADA, 2003).***

Type 2 diabetes (Insulin–Dependent Diabetes Mellitus [IDDM] or adult- onset. It affects about 85% to 90% of diagnosed cases. It is characterized by insulin resistance or insufficient insulin production**. Gestational diabetes mellitus** is during pregnancy, usually in the second or third trimester. It occurs in about 2% to5% of all pregnancies. **Diabetes mellitus associated with other conditions** as genetic defects of beta-cell function, pancreatic disease, and medications as corticosteroids. **Prediabetes** is a new category adopted by *ADA* in 1997 redefined in 2003.It is an abnormality in glucose values intermediate between normal and overt diabetes ***(Zhang, & Wang, 2007; and Ghareeb, 2000).***

Pre-Diabetes is generally a silent condition, meaning that it has no overt physical symptoms, though patients are at higher risk if there is a family history of diabetes or if patients suffer from insulin resistance and obesity ***(Dirksen, 2000)*.**

Etiology of each type of diabetes mellitus is still unfolding. In type I DM is characterized by destruction of pancreatic beta cells, leading to absolute insulin deficiency. Type I DM is one of the most common childhood diseases. High risk individual are with first degree relatives of people with type I DM. Type II DM is a disorder involving both genetic and environmental factors, obese adults and certain ethnic population 90% concordance in identical twins. The risk in the general population ranges from 1 in 400 to1 in 1000, the child of a person with diabetes has a 1in 20 to 1in 50 risk ***(ADA, 2006).***

Risk factors are less well-defined for type I DM than for type II DM. Type I DM is inherited as autoimmune disorder is considered about 90% of the cases are immune mediated. Genetic predisposition plays a role in the development of type I DM. Identical twins have a risk 25% to 50% of inheriting disease ***(LeMone & Burke, 2008).***

Environmental factors are viruses such as (mumps, rubella or a chemical toxin such as those found in smoked and cured meats) appear to trigger an autoimmune process that destroys beta cells. Islet cell antibodies (ICAs) then appear to increase in amount over months to years as beta cells are destroyed ***(LeMone & Burke, 2008).***

Normal Insulin Metabolism:

Insulin is a hormone produced by ß cells in islets of Langerhans of pancreas. Under normal conditions, insulin is continuously released into the blood stream in small (a basal rate), with increased release (bolus) when food is ingested. The activity of released insulin lowers blood glucose and facilitates a stable or normal glucose range of approximately 70 to 120 mg/dl ***(WHO, 2005).***

Other hormones (glucagon, epinephrine, growth hormone, and cortical) work to oppose the effects of insulin and are often referred to as counter regulatory hormones. These hormones work to increase blood glucose levels by stimulating

glucose production and output by the liver and by decreasing the movement of glucose into the cells. Insulin and these counter regulatory hormones provide a sustained but regulated release of glucose for energy during food intake within normal range ***(Porth, 2002).***

An abnormal production of any or all of these hormones may be present in diabetes. Insulin promotes glucose transport from the bloodstream across the cell membrane to the cytoplasm of the cell. The rise in plasma insulin after a meal stimulates storage of glucose as glycogen in liver and muscle, inhibits glucogenesis, enhances fat deposition in adipose tissue, and increases protein synthesis. The fall in insulin level during normal overnight fasting facilitates the release of stored glucose from the liver, protein from muscle, and fat from adipose tissue. For this reason, insulin is known as the anabolic or storage hormone ***(Porth, 2002, and Lewis et al., 2004).***

Skeletal muscles and adipose tissue have specific receptors for insulin and are considered insulin-dependent tissues. Other tissues (e.g., brain, liver, blood cells) don't directly depend on insulin for glucose transport but require an adequate glucose supply for normal function. Although liver cells aren't considered insulin-dependent tissue, insulin receptors sites on the liver facilitate the hepatic uptake of glucose and its conversion to glycogen ***(Dirksen, 2000).***

Blood Glucose Homeostasis:

All body tissues and organs require a constant supply of glucose, however, not all tissues require insulin for glucose up take. The brain, liver, intestines, and renal tubules don't require insulin to transfer glucose into their cells. Skeletal muscle, cardiac muscle, and adipose tissue do require insulin for glucose movement into the cells ***(Ignatavicius & Workman, 2010).***

Normal blood glucose is maintained in healthy people primarily through the actions of insulin and glucagon. Increased blood glucose levels, amino acids, and fatty acids stimulate pancreatic beta cells to produce insulin. As cells of skeletal muscle, cardiac muscle, and adipose tissue take up glucose, plasma levels of nutrients decrease, suppressing the stimulus to produce insulin ***(Tracy, Ambrose, Goldbery, Howard, & Mayer, 2004).***

If blood glucose falls, glucagon is released to raise hepatic glucose output, raising glucose levels. Epinephrine, growth hormone, and glucocorticoids (often referred to as glucose counterregulatory hormones) also stimulate an increase in glucose in times of hypoglycemia, stress, growth, or increased metabolic demand ***(LeMone & Burke, 2008).***