

Nutritional Requirements and Nursing Care Management for Diabetes Mellitus

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Abstract

Diabetes is a chronic disease that involves some variation of insulin secretion and insulin resistance problems. Thus, an understanding of the pathophysiology and nutritional requirements for those diagnosed with diabetes mellitus is vital for both the patient and the health-care provider. Nutritional modifications involving carbohydrate intake and portion size are at the center of diabetes management. The theoretical framework of Dorothea Orem's self-care model is applied to patient teaching and empowerment. Various tools recommended by the American Diabetes Association can increase patient adherence to an individualized nutrition plan.

Introduction

Diabetes mellitus is a disease that affects 29.1 million Americans and is the seventh leading cause of death in the United States (American Diabetes Association (ADA), 2016). There are 1.4 million Americans diagnosed with diabetes each year, and another 8.1 million who go undiagnosed (ADA, 2016). Diabetes is defined as a disease affecting the metabolic processes of blood glucose within the body (Pellico, 2013). Diabetes mellitus is divided into four categories: type 1, type 2, gestational, and a category of other that is comprised of glucose intolerances that share etiological similarities with diabetes. Diagnosis of types 1 and 2 is dependent on the pathophysiology and risk factors associated with each.

Diabetes is a debilitating disease that, if left untreated, can lead to secondary complications, comorbidities and death. Diabetes management includes an individualized diet that focuses on carbohydrate intake, coupled with insulin and/or oral medications (Lutz, Mauzur & Litch, 2015). Nurses play a key role the education and teaching of newly diagnosed diabetes patients. Applying Dorothea Orem's model of self-care to patient education will ensure that patients are capable of self-care with regard to the patient's medication regime, diet and exercise. With an understanding of the pathophysiology and nutritional requirements of individuals diagnosed with type 1 and 2 diabetes, and mindful of Orem's model, nurses and other health-care providers can intervene to facilitate patient adherence to meal plans.

Application of Theoretical Framework

Dorothea Orem's self-care and self-deficit theory as it relates to diabetes management relies on the assumption that people have the ability to care for themselves and the principle that nurses are responsible for identifying the deficient areas (O'Shaughnessy, 2014). Patients are recognized as distinct individuals who must be held accountable with respect to self-care. Nurses must first recognize whether a patient has the ability to provide self-care and then follow up with an assessment of the patient's readiness to learn and barriers to learning. The nurse is responsible for providing self-care measures when the patient is incapable of self-care (Felicilda, 2011). Dorothea Orem's theory recognizes the importance of educating patients on the complications and comorbidities associated with non-compliance with their diabetes management plans. Explanation of the physiology behind nutrition, specifically carbohydrates, increases patients' knowledge for self-care. Patients who remain non-compliant to self-care must be reassessed, and other methods of education and motivation should be applied.

Pathophysiology of Diabetes Mellitus

Diabetes is a chronic disease resulting from deficiencies in the secretion and/or action of insulin. Insulin is a hormone secreted by the beta cells of the pancreas, also referred to as the Islets of Langerhans. The pancreas manages blood glucose levels through the secretion of several hormones, including insulin, glucagon, somatostatin and pancreatic polypeptide (Pellico, 2013). Insulin transports blood glucose into various cells of the body, which can then metabolize the glucose and use it for energy (Pellico, 2013). Type 1 and type 2 diabetes have similar treatment methods; however, it is crucial for nurses as well as patients to understand the physiological differences between the two classifications of diabetes.

Type 1 diabetes is a chronic autoimmune disease that targets the beta cells of the pancreas (Ozougwi, Obimbo, Belonwu & Unakalamba, 2013, p. 48). It affects roughly 1.25 million Americans (ADA, 2016). The onset occurs early in life, and the disease is one of the most prevalent chronic diseases affecting children; however, cases have been reported later in life (Atkinson, Eisenbarth & Michaels, 2014). The exact cause is unknown, although researchers believe genetic predispositions, and immunologic and environmental factors play a role in the destruction of beta cells (Atkinson et al., 2014).

The destruction of pancreatic beta cells by autoantibodies contributes to a lack of insulin secretion, resulting in a state of hyperglycemia. Insulin is also responsible for inhibiting glycogenesis and gluconeogenesis, which, if left unchecked, can also contribute to hyperglycemia (Pellico, 2013). The absence of insulin in the bloodstream inhibits cellular uptake of glucose, resulting in the breakdown of adipose tissue for energy. The breakdown of fat and proteins results in a byproduct of ketones, which can eventually lead to a state of metabolic acidosis in the patient, also known as ketoacidosis, that may result in coma or death if not treated (Pellico, 2013). Diabetic ketoacidosis is a serious risk factor for type 1 diabetics due to the body's inability to produce insulin; it is rare in type 2 diabetics due to their ability to secrete minimal amounts of insulin (Pellico, 2013). The process of ketoacidosis can be avoided through proper nutritional education and medication adherence. Type 2 diabetes can present similar clinical scenarios; however, the

disease process differs from type 1 as it relates to patient comorbidities associated with the disease.

Type 2 diabetes affects 90% to 95% of the individuals diagnosed with diabetes (Pellico, 2013). Type 2 diabetes is primarily associated with the obese and aging populations; however, since the 1980s the obesity rate among United States children has tripled, leading to diagnosis of type 2 diabetes at an earlier age (Imperatore et al., 2012). The disease process results in decreased secretion of insulin by pancreatic beta cells, and cellular insulin resistance. This results in reduced cellular uptake of glucose from the bloodstream, coupled with ineffective glucose regulation by the liver (Pellico, 2013). Excessive glucose in the bloodstream leads to a state of hyperglycemia; however, there is still a small amount of insulin production, preventing or reducing the risk for diabetic ketoacidosis (Pellico, 2013). Type 2 diabetes can go undetected in patients and is usually diagnosed upon routine laboratory screenings. Although the pathophysiology differs between type 1 and type 2 diabetes, nursing care and patient education encompass the same nutritional education.

Nutritional Requirements for Diabetes Mellitus

Dietary requirements for a patient with diabetes mellitus are not unlike routine United States Department of Agriculture (USDA) recommendations. However, poor nutritional choices coupled with obesity are factors that contribute to type 2 diabetes. The amount of carbohydrate, fat, and proteins may be adjusted based on metabolic goals and individual preferences of the patient with diabetes (ADA, 2013). Nutritional changes are some of the most difficult to adopt, and some patients may never agree to make healthier food choices. The health-care provider can apply Dorothea Orem's self-care and self-deficit theory to determine a patient's ability to provide self-care.



Which Foods Can Help Control Blood Sugar Levels?, n.d., *Healthy Dining Finder*. <https://www.healthydiningfinder.com/getattachment/9aed58d5-7c0c-4676-8b7d/3bbd7f96187c/Which-Foods-Can-Help-Control-Blood-Sugar-Levels.aspx>

Nutritional management of diabetes focuses on the patient's food choices, portion sizes, and consumption of carbohydrates. The most effective tools used to facilitate patient education include MyPlate for Diabetes, Dietary Guidelines for Americans, and the USDA Food Guide (Lutz et al., 2015). The ADA recommends that patients use the USDA's Food Exchange List in conjunction with MyPlate for Diabetes to facilitate meal planning. (See Appendix A for examples of each food group.) The USDA's Food Exchange List is a tool that is comprised of six food groups broken down by nutrients and serving size (Lutz et al., 2015).

Patients with diabetes benefit from choosing a variety of foods high in fiber, such as fruits, whole grains and vegetables. These foods provide vitamins, minerals, and complex carbohydrates that do not lead to a spike in blood glucose (Lutz et al., 2015). Nutritional goals and lifestyle modifications for patients with diabetes include attaining and maintaining blood glucose levels within normal limits through the adequate intake of food, endogenous and exogenous insulin, and physical activity (Lutz et al., 2015). Meal planning should be individualized to each patient and include healthy foods choices the patient is willing to eat.

Meal Plan

Nurses and health-care professionals can apply Orem's theory of self-care to diabetic nutritional teaching. The patients are at the center of their own care and must take responsibility for the management of their disease. The nurse can educate the patient on healthy food choices and portions using the ADA guidelines. Applying Orem's theoretical framework to the teaching, the patient can then give the nurse an example of a meal plan for one day that he or she can adhere to, and that also falls under the recommended guidelines set forth by the ADA. (See Appendix B for an example of a diabetic meal plan.) Research suggests that collaborating with the patient to strengthen motivation and movement toward therapeutic goals increases the success rate of healthy diabetes management (Sherman, 2016).

Conclusion

Diabetes is a chronic debilitating disease that, if left untreated, can lead to secondary complications including death. Application of Dorothea Orem's self-care and self-deficit theory places the patient at the center of his or her own treatment plan, not the health-care provider. Treatment of diabetes begins with proper education in regard to nutrition and medication regimes. The management of diabetes centers on the patient as his or her own change agent. Patients must have a willingness to learn and change unhealthy behaviors regarding food choices in order for management to be successful. Health-care providers should educate patients on the different types of diabetes and which type they are diagnosed with, as the pathophysiology of type 1 diabetes differs from that of type 2 diabetes in regard to insulin secretion and resistance. Understanding how the disease process affects the body helps patients understand why food choices are important to diabetes management. Tools like MyPlate for Diabetes, the Food Exchange List, and the USDA Food Guide can facilitate the transition to a more healthful diet.

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Appendix A. One Serving of Carbohydrates (CHO) by Food Group

| Food Group | Grams of CHO | Example of one serving |
|---|--------------|---|
| Starch | 15 grams | 1/3 cup cooked pasta or rice |
| Non-starchy vegetables | 5 grams | 1 cup raw vegetables (broccoli) |
| Fruits | 15 grams | 1 small fresh fruit (apple) |
| Free foods (<3 servings) | 0 grams | Condiments (1tbsp catsup) |
| >3 servings | 5 grams | |
| Protein | 0 grams | 1 oz. cooked beef, chicken |
| Sweets, Desserts, and other carbohydrates | 15 grams | Desserts, sweets (1 tbsp. regular syrup, 2 small cookies) |
| Fats | 0 grams | 1 tsp. margarine, butter |
| Milk and Milk substitutes | 12 grams | 1 cup fat free (skim) milk or low-fat (1%) milk |
| Combination foods and fast foods | 15 grams | 1 cup of tomato soup |

Appendix B. Sample Meal Plan for a Diabetic Patient Maintaining Weight

| Breakfast | Snack | Lunch | Dinner | Snack |
|--|--|---|---|--|
| 2 hard-boiled eggs 1 slice whole wheat toast 1/4 avocado 1/2 cup 100% fruit juice (unsweetened) | 1/2 cup cooked carrots 1 small apple 1 oz. string cheese | Large green salad with chicken (11.5 oz.). 2 tbsp. fat free dressing 1 small roll | 6 oz. pork tenderloin 1 cup cooked brown rice 1/2 cup cooked broccoli | 1/4 cup cottage cheese 1 1/4 cup strawberries 1/2 banana |
| 30g CHO | 20g CHO | 30g CHO | 30g CHO | 25g CHO |