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Nutrition Management of Diabetes in Acute Care

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ABSTRACT

Nutrition therapy in hospital includes the integration of diabetes into the care plan for the presenting condition, basic self-management education and care coordination to promote optimal glycemic control in hospital and an appropriate plan for discharge. Estimated nutrient requirements for people with diabetes are the same as those for the general population, and diets should be designed based on individual metabolic needs. Distribution of meals and snacks should employ a consistent carbohydrate meal-planning approach for both patient safety and management of glycemia. Referral to a registered dietitian for a full assessment is warranted for those at higher risk for hyperglycemia, including those on insulin or nutrition support. Consideration may be given to the use of lower carbohydrate oral nutrition supplements. A team approach should be employed to ensure there is coordination among blood glucose testing, insulin administration and meal timing. Self-management education should focus on patient safety, and an appropriate plan for discharge should be created to manage the ongoing needs of patients with this chronic disease.

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R É S U M É

La thérapie nutritionnelle à l'hôpital comprend l'intégration du diabète au plan de soins qui tient compte de l'état de santé, de l'enseignement de base sur la prise en charge autonome et de la coordination des soins pour promouvoir une régulation glycémique optimale à l'hôpital et un plan approprié au moment du congé. Les besoins estimés en substances nutritives des personnes ayant le diabète sont les mêmes que ceux de la population générale, et les régimes devraient être élaborés selon les besoins métaboliques individuels. La distribution des repas et des collations devrait utiliser une approche cohérente de planification des repas axée sur les glucides pour la sécurité du patient et la prise en charge de la glycémie. La consultation d'un diététiste pour obtenir une évaluation complète est justifiée pour ceux qui sont exposés à un risque élevé d'hyperglycémie, dont ceux recevant de l'insuline ou un soutien nutritionnel. L'utilisation de compléments nutritionnels oraux plus faibles en glucides peut être envisagée. Une approche d'équipe devrait être utilisée pour assurer la coordination des analyses de la glycémie, de l'administration d'insuline et de l'heure des repas. L'enseignement sur la prise en charge autonome devrait mettre l'accent sur la sécurité du patient, et un plan approprié au moment du congé devrait être élaboré pour prendre en charge les besoins des patients atteints de cette maladie chronique.

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Introduction

People with diabetes are more likely to be hospitalized and have longer lengths of stay than those without diabetes (1). One survey estimated that 22% of all hospital inpatient days in the United States involved individuals with diabetes (2), and diabetes is known to account for up to 25% of intensive care admissions (3). Older adults, particularly those with complicated socioeconomic conditions, are at risk for both malnutrition (3) and readmission to

hospital (4), highlighting the importance of developing coordinated diabetes care plans upon discharge. A recent report suggests that among medical and surgical units within Canadian hospitals, malnutrition rates are as high as 45% (5). Malnutrition may lead to decreased tolerance of treatment, poor prognosis, increased rates of hospital-acquired infections, poor wound healing and longer lengths of stay (6). Optimizing nutritional status in hospital, therefore, is an essential component of any nutrition care plan. However, the provision of extra foods, snacks or supplements commonly used to treat malnutrition can complicate the management of hyperglycemia in hospital. Additionally, poor intake in hospital may predispose patients to hypoglycemia. This article reviews issues affecting glycemic control while in hospital and

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notes some nutrition strategies to manage inpatients with diabetes.

Nutrition Care of Patients with Diabetes While in Hospital

In addition to managing nutritional status, the goal of nutrition therapy in acute care is to treat illness. Nutrition recommendations from the Canadian Diabetes Association emphasize foods low in energy density and high in volume so as to optimize satiety. Although this may be appropriate in the ambulatory setting, it may not be a priority within the nutrition management of acute illness. In hospital, therapeutic diets should be evidenced based yet maintain enough flexibility to accommodate changes in eating while in hospital and deviations from guidelines, dietary reference intakes or the principles of Canada's Food Guide may be necessary to meet short-term nutrition requirements.

Comprehensive nutrition care plans must consider that the management of diabetes is not a solitary goal, but rather an essential component of the optimization of nutritional status and the management of acute conditions.

In general, energy requirements in individuals with diabetes are not different from those without the disease. A recent study concluded that the Harris-Benedict equation accurately predicts resting energy expenditure in patients with diabetes when compared to indirect calorimetry (7). The American Diabetes Association guidelines indicate that the metabolic needs of most patients with diabetes in hospital range between 25 and 35 kcal/kg per day (8). Despite an adequate provision of calories in hospital, patients often take in an insufficient amount of both carbohydrates and calories, leading to an increased risk for hypoglycemia (9). One study, designed to examine the estimated requirements, the average daily meal consumption and the factors affecting intake in hospitalized patients with diabetes, provided some concerning data. First, the metabolic requirements of 434 patients (mean age 65.9 years; body mass index 31.4 kg/m²) were estimated to be approximately 2100 kcals, based on the Mifflin-St. Jeor equation. Second, the intake by study participants was very poor. Over 3 days, the average caloric intake was no more than 828 kcals (9), and subjects consumed less than half of the carbohydrate provided (mean intake 107 to 117 g/day). Additionally, between 18% and 34% of the subjects consumed no food at all (some of them had a nil per os [NPO] order), and breakfast was the meal most commonly cited for no intake. Only 25% consumed all of their meals at the start of the 4-day test period. Patient interviews were conducted to determine the reasons for the inadequate meal consumption. Patient-related issues, such as loss of appetite and dislike of the foods offered, accounted for 42.2% of the factors leading to inadequate intake. Treatment issues (32.6%) included NPO orders or interruptions of mealtimes. Illness-related issues (15.1%) included nausea and vomiting, fatigue and pain. Finally, system issues, including the need for assistance in eating or the inaccessibility of the meal tray, were cited as factors in 1.9% of subjects. This study highlights the increased risk for hypoglycemia in hospital. In addition to the intake issues listed above, ensuring that a sufficient amount of carbohydrate is provided and adequately distributed is of additional importance for optimal glucose control.

Nutrition recommendations for the proportion of carbohydrates, protein and fat in the diet are the same for people with diabetes as for those without diabetes. A range of macronutrient content is recommended to allow for flexibility and to suit the needs and preferences of the individual. Therapeutic diets planned for use in patients with diabetes should fit within the acceptable macronutrient distribution ranges of between 45% and 60% for carbohydrates, between 15% and 35% for protein and between 30% and 45% for fat (10). No single meal plan or "diabetic diet" is defined in the management of diabetes. To prevent hyperglycemia and its

associated complications, energy intake should be adjusted to patients' requirements, avoiding over-nutrition and excessive glucose intake. Protein intake should be adjusted to the degree of metabolic stress. Overly restrictive diets should not be used in a short duration of stay and may actually contribute to poor nutrition intake (8).

Both the Canadian Diabetes Association and the American Diabetes Association recommend that organizations implement a consistent carbohydrate diabetes meal-planning system (8,11). Especially for patients taking insulin, consistency in both timing and carbohydrate amount is essential to limit hyper- and hypoglycemia. In most situations, diets that limit sources of concentrated sweets or sugar are no longer appropriate because they unnecessarily restrict sucrose without consideration of the overall carbohydrate content of the meals (12).

Consistent carbohydrate-based diabetes diets

A consistent carbohydrate diet is considered the most appropriate in hospital, both because carbohydrate has the greatest effect on blood glucose and also because a consistent provision of carbohydrate is ideal for patient safety (8,11). These plans provide the needed consistency in day-to-day meals and snacks but without the structure of having to ensure that the carbohydrate is distributed among starch, fruit and milk as would be seen in the exchange-based diets. A greater variety of food can be selected and more or less protein and fat can be allowed as per preference and appetite.

For individuals who practise carbohydrate counting and those with poor appetites, nausea, vomiting or the inability to consume the whole meal, the carbohydrate amounts listed on the menus can assist patients and providers to estimate intake more accurately and, subsequently, the appropriate amount of insulin required for the meal. Carbohydrate lists can be created for the food items seen in the menu rotation at the hospital and can be made available by the food-service department. Patients and families should also be encouraged to disclose any additional foods consumed so as to assist healthcare practitioners in determining appropriate insulin doses.

Patterned and exchange-based diabetes diets

Traditionally used for many years, exchange-based diets provide fixed calorie levels with explicit distribution of carbohydrate, protein and fat. Exchange diets are designed with set amounts of food groups (starches and grains, meats and alternatives, fruit, vegetables, milk products and fat) at each meal in order to provide a consistent calorie level and a balanced intake each day. Carbohydrate choices are distributed throughout 3 meals and, depending on the calorie levels, the addition of morning, afternoon and bedtime snacks. As a benefit, these diets provide consistency in carbohydrate and also in the provision of food groups high in protein, which may be beneficial in situations of metabolic stress. As a limitation, these patterns limit individuals' abilities to select more or less of certain foods or food groups that might be preferable and would ultimately improve overall intake in hospital.

Based on the work processes within most hospitals, meals are generally provided within relatively short time intervals. In general, no more than 5 to 6 hours separate meal times, which creates a situation in which the overnight time frame is quite long, and a bedtime snack may be required to prevent hypoglycemia. It also creates an issue in which daytime snacks may not be required and may lead to hyperglycemia. Consideration of meal times is essential when creating an appropriate medication regimen and in managing patients on existing insulin regimens.

Regardless of the method of delivery, the primary goals of nutrition therapy in hospital are to manage glycemic control so as

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