Medical nutrition therapy (MNT) is an integral component in maintaining glycemic control for hospitalized patients with diabetes and must address special challenges related to illness, changes in medications, and erratic meal schedules. A team approach is required to ensure that patients' nutrition care plans work with their medical plan, not against it. This article reviews MNT goals for hospitalized patients, the need for screening and referral of inpatients for MNT services, and the process of providing MNT in the hospital.

In Brief

Medical nutrition therapy (MNT) is an integral component of clinical care for people with diabetes. It includes an assessment of nutritional status and the provision of diet modification, counseling, or specialized nutrition therapy.

Implementing MNT can be a challenge for healthy people with diabetes, but it poses an even greater challenge for people who are hospitalized. Many factors, such as illness, changes in medications, and erratic schedules for diagnostic tests or treatment procedures can make glycemic control seem unattainable. Yet the importance and benefits of achieving glycemic control during illness cannot be overemphasized. Individualization of MNT during hospitalization, along with tighter medical management, is required to help individuals with diabetes achieve blood glucose targets.

Nutrition Care for Hospitalized Individuals With Diabetes

Carrie S. Swift, MS, RD, BC-ADM, CDE, and Jackie L. Boucher, MS, RD, BC-ADM, CDE

MNT Goals for Hospitalized Individuals With Diabetes

Recently, the following upper limits for blood glucose targets were established for hospitalized patients:

- Preprandial: < 110 mg/dl
- Peak postprandial: < 180 mg/dl
- Critically ill surgical patients (i.e., intensive care unit): < 110 mg/dl

While glucose control is the first priority of MNT, other goals are outlined in Table 1.

Clear guidelines and recommendations exist regarding MNT for people with diabetes at home. How to implement those recommendations in the hospital poses unique challenges. Nutrient intake can often be inconsistent during hospitalization. As a result, supplementation and/or nutrition support may be required to meet an individual's dietary needs. To overcome these challenges, a team approach is required to ensure that the nutrition care plan works with the medical treatment plan, not against it. A registered dietitian (RD) knowledgeable in diabetes care is a crucial team member with the unique qualifications to integrate nutritional status measures with metabolic control to achieve optimal health outcomes.

Nutrition Screening and Referral System

The first step in providing nutrition care to patients with diabetes is to identify who they are. When individuals are admitted to the hospital, a screening is conducted, typically by a nurse, to identify patients who may benefit from further assessment and nutrition intervention. In a survey of clinical dietitians employed in acute care hospitals, 59.8% responded that nutrition screening is always or frequently completed by nursing staff, with patients determined to be at high nutritional risk referred to an RD.
Once individuals with diabetes are identified, the next step is to prioritize who will receive a more comprehensive assessment. With fewer resources available to clinical dietetics professionals in hospitals, patients at mild to moderate nutritional risk may not receive an appropriate intervention. Most screening processes focus on identifying individuals at high risk by reviewing lists of patients for indicators such as taking certain medications (e.g., insulin), receiving modified diets, NPO (nothing by mouth) status, or specific admitting diagnoses. People newly diagnosed with diabetes or admitted with diabetic ketoacidosis would be considered at higher risk and requiring further assessment. However, because current recommendations for inpatient glycemic management require tighter control, all individuals with diabetes should be considered at high nutritional risk. Blood glucose results should be included in the criteria that determine the need for further assessment and nutrition care.

Individuals who are deemed to need a more comprehensive assessment should receive a referral to nutrition services to ensure that they are further evaluated by an RD.

The remainder of this article will focus on two of the four steps—nutrition assessment and nutrition intervention—and how they apply to hospitalized patients with diabetes. Although the NCP is intended primarily for dietetics professionals, other health care professionals may find the process useful in providing quality care.

Nutrition Assessment
In nutritionally at-risk individuals, more thorough assessment is required to identify nutrition-related problems (e.g., inadequate calorie intake or dehydration). Table 2 lists the components that are examined as part of a comprehensive nutrition assessment.

Although these assessment considerations are central to anyone with diabetes, regardless of whether they are hospitalized, the treatment plan may differ when individuals are hospitalized. For example, a person may take an oral glucose-lowering medication at home but may be on insulin while in the hospital. Because the individual is now on insulin, he or she may be uncertain about what and how much to eat as a result of the change in medication.

Table 1. Goals of MNT for Hospitalized Individuals With Diabetes

- Achieve and maintain optimal control of blood glucose, lipids, and blood pressure to enhance recovery from illness and disease.
- Incorporate nutrition therapies to treat the complications of diabetes, including hypertension, cardiovascular disease, dyslipidemia, and nephropathy.
- Provide adequate calories for illness and recovery.
- Improve health through use of nutritious foods.
- Address individual needs based on personal, cultural, religious, and ethnic food preferences.
- Provide a plan for continuing self-management education and follow-up care.

Table 2. Nutrition Assessment Components

- Pertinent diagnoses and medications
- Laboratory measures, including blood glucose values and anthropometrics (e.g., height, weight, BMI)
- Nutritional adequacy of dietary intake
- Nutrition-related consequences of disease
- Psychosocial, functional, and behavioral factors related to food and nutrition intake
- Diabetes knowledge and self-management skills
- Readiness to learn and potential for behavior change
- Lifestyle/cultural influences and literacy skills
- Support systems
- Assessment of mobility, vision, hearing, and dexterity
- Previous education and future educational needs for discharge planning.

Medication therapy may not be the only change when a patient is hospitalized. In the hospital, it is often difficult to follow a normal food plan and, in many cases, difficult to eat at all. Some patients may have no appetite, some may have a medical condition that causes the inability to eat, and some may be placed on NPO status in preparation for a procedure or treatment. Barriers that may affect an individual’s ability to maintain an adequate nutrition status can include increased nutrient and calorie needs resulting from catabolic stress, changes in medications, the need for enteral or parenteral nutrition, and the limited ability of hospitals to individualize meal plans. As a result, supplements to regular food may be required to meet patients’ nutritional needs. Caloric needs for most hospitalized patients are ~ 25–35 kcal/kg body weight. Individuals with normal hepatic and renal function require ~ 1–1.5 g of protein/kg body weight, depending on the degree of catabolic stress. Enteral or parenteral feedings should only be considered when an individual is unable to get enough nutrients because of inadequate intake or a medical condition that contraindicates oral intake.

Nutrition Intervention
Once a comprehensive assessment is completed, a course of action can be determined. Nutrition intervention can include diet modification, implementing specialized nutrition therapies, and counseling. Although counseling is an important intervention, the focus here is on clinical nutrition interventions. However, educational needs should be addressed as part of any treatment plan (e.g., teaching “survival skills” while hospitalized and referring to

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programs and resources following discharge). The following nutrition interventions, common in hospital settings, will be briefly reviewed here: consistent carbohydrate meal plan, progression diets, and nutrition support (i.e., enteral or parenteral feedings). Sample meals for consistent carbohydrate meal plans and progression diets can be found in Table 3.

Consistent carbohydrate meal plan
Traditionally, providers have ordered diets for hospitalized individuals with diabetes by writing a specified calorie count followed by “ADA diet” (e.g., “1800-calorie ADA diet”). For more than a decade, however, the American Diabetes Association (ADA) has not endorsed any single meal plan or set macronutrient pattern. Yet the practice of ordering an “ADA diet” remains.

The consistent carbohydrate meal plan is beginning to gain acceptance in hospitals. This meal plan is defined as offering comparable carbohydrate content from day to day at breakfast, lunch, and dinner, as well as in snacks. The plan is not based on a set number of calories and is designed to contain appropriate fat content for patients with diabetes. Its intent is to meet individuals’ nutritional needs and facilitate improved metabolic control.

To maximize effectiveness of the consistent carbohydrate meal plan for individuals who take insulin, providers need to recognize the functions of insulin. For patients who are eating, insulin should be prescribed for basal, prandial, and correction or supplemental needs. To provide more flexibility and to accommodate individual food preferences, some facilities allow individuals with diabetes to select from menus with a specified number of carbohydrate choices per meal. Generally, foods that contain sucrose are included in the total daily carbohydrate count, although the majority of carbohydrate food choices are whole grains, fruits, vegetables, and low-fat milk.

Although the consistent carbohydrate meal plan is gaining acceptance, provider-ordered diets with set calorie counts based on the exchange system are still the standard. Use of meal plans that stipulate no concentrated sweets, no added sugar, or low sugar are no longer appropriate. These diets unnecessarily restrict sucrose and do not reflect current evidence-based nutrition recommendations.

Facilities have implemented the consistent carbohydrate meal plan in various ways. In some hospitals, providers can still write orders for an “ADA diet,” and a consistent carbohydrate meal plan will be sent by default. To gain acceptance and understanding for transitioning to a consistent carbohydrate system, extensive education is required for staff and health care providers, as well as for patients.

Differing philosophies exist about including snacks in the consistent carbohydrate meal plan. In an informal survey of members (n = 15) of the Diabetes Care and Education (DCE) Practice Group of the American Dietetic Association, 73% of respondents indicated that hospitals where they are employed include at least one snack as part of a “diabetic diet.” With appropriate insulin or oral diabetes medication therapy, snacks should not be a requirement but instead should be given as an option to meet patient preferences or additional caloric needs.

<table>
<thead>
<tr>
<th>Diet Order</th>
<th>Sample Menu</th>
<th>Serving Size</th>
<th>Carbohydrate Content (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear liquid (consistent carbohydrate)</td>
<td>Regular gelatin</td>
<td>4 oz</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Apple juice</td>
<td>4 oz</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Supplemental clear liquid</td>
<td>8 oz</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>beverage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chicken broth</td>
<td>6 oz</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Coffee or tea</td>
<td>6 oz</td>
<td>0</td>
</tr>
<tr>
<td>Full liquid (consistent carbohydrate)</td>
<td>Chocolate pudding</td>
<td>4 oz</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Supplemental beverage</td>
<td>8 oz</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>for diabetes patients*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apple juice</td>
<td>4 oz</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Tomato soup</td>
<td>6 oz</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Coffee or tea</td>
<td>6 oz</td>
<td>0</td>
</tr>
<tr>
<td>Mechanical soft diet (consistent carbohydrate)</td>
<td>Ground roast turkey</td>
<td>3 oz</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Mashed potatoes</td>
<td>1/2 cup</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Gravy</td>
<td>2 oz</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Steamed carrots</td>
<td>1/2 cup</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Finely minced lettuce</td>
<td>1/2 cup</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Blue cheese salad dressing</td>
<td>1 oz</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Canned pear halves</td>
<td>2 each</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Margarine</td>
<td>1 pat</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Whole wheat bread</td>
<td>1 slice</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Coffee or tea</td>
<td>6 oz</td>
<td>0</td>
</tr>
<tr>
<td>Regular diet (consistent carbohydrate)</td>
<td>Roast turkey</td>
<td>3 oz</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sage dressing</td>
<td>1/2 cup</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Gravy</td>
<td>2 oz</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Broccoli spears</td>
<td>2 each</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Tossed salad</td>
<td>1/2 cup</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Blue cheese salad dressing</td>
<td>1 oz</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Oatmeal raisin cookies</td>
<td>2 small</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Margarine</td>
<td>1 pat</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Whole wheat bread</td>
<td>1 slice</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Coffee or tea</td>
<td>6 oz</td>
<td>0</td>
</tr>
</tbody>
</table>

*Regular supplemental beverages or supplemental beverages designed for diabetes patients (i.e., having lower carbohydrate content and/or higher fiber content) may be utilized. The key is counting total carbohydrates.
Progression diets
Noncaloric (sugar-free) liquid diets are not appropriate for individuals with diabetes. Individuals on clear- or full-liquid diets should receive ~ 200 g of carbohydrate throughout the day, divided in equal amounts at meals and snack times. Advancing from clear liquids to full liquids to solid foods should be done as soon as a patient can tolerate the progression. See sample menus in Table 3.

Nutrition support
If an individual does not tolerate advancement of the diet, enteral and parenteral nutrition may be required. Parenteral nutrition is often necessary with certain medical conditions. Continuous scheduled insulin coverage is generally needed to maintain adequate blood glucose control for an individual receiving parenteral nutrition.

Enteral nutrition is the preferred route for nutrition supplementation when possible. The advantages include a more physiological route, avoidance of central catheter–related complications, the trophic effect on gastrointestinal cells, and reduced cost. Sudden interruption of either parenteral or enteral nutrition may lead to hypoglycemia. Frequent blood glucose monitoring, with adjustments to insulin or oral diabetes medications relative to change in nutrition support or oral intake, is essential in preventing hypoglycemic events.

The Team Approach to Achieving Glycemic Goals
The care of hospitalized diabetic patients is similar to their care in the outpatient setting, in that care is “most effective when delivered by a multidisciplinary team with a comprehensive plan of care.” Given new treatment targets for glycemic control, patients and members of the health care team need to work together to attain common goals to achieve positive health outcomes. However, to do this, the medical treatment plan needs to be effectively communicated and agreed on. For example, clinical hospital staff should understand the definition of different diet orders and what foods are provided. Hypoglycemia treatment protocols and insulin protocols should be implemented to standardize care. Philosophies regarding whether to provide snacks should be known to both staff and volunteers working in the hospital. All team members need to be educated to provide the best care to individuals with diabetes. Table 4 provides some common nutrition-related issues that may make

### Table 4. Key Messages for Nutrition-Related Issues That May Affect Glycemic Control During Hospitalization

<table>
<thead>
<tr>
<th>Common Issues</th>
<th>Key Messages for Professionals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delayed meals/inconsistent meal timing</td>
<td>- Meal insulin may need to be withheld until after tests or procedures; however, basal insulin may still be required.</td>
</tr>
<tr>
<td>Inconsistent carbohydrate intake</td>
<td>- Inconsistent carbohydrate intake can contribute to either hypo- or hyperglycemia. Individuals who are eating may need snacks, depending on their medication therapy. Individuals with poor intake may require changes to glucose-lowering medications based on the amount of carbohydrate they are eating.</td>
</tr>
<tr>
<td>Decreased activity level</td>
<td>- Glucose-lowering medications may need to be adjusted as the activity level increases or decreases.</td>
</tr>
<tr>
<td>Inconsistent blood glucose monitoring</td>
<td>- When individuals are eating, check blood glucose pre-meal and at bedtime.</td>
</tr>
</tbody>
</table>

* This list is not intended to cover all issues related to medical conditions and treatment therapies that may affect glycemic control during hospitalization. It is intended to focus on nutritional issues that may affect glycemic control, causing either hyper- or hypoglycemia.
achieving optimal glycemic control difficult while in the hospital. Key messages for educating health professionals are provided.

Diabetes education needs for clinical hospital staff should be identified annually, either through a survey or based on performance measures monitored as part of continuous quality improvement efforts. Once needs are identified, a plan should be established to educate staff through inservice training, grand rounds, continuing education seminars, self-learning modules, orientations, or one-to-one performance reviews or mentoring sessions.

When all staff understand the rationale for treatments, protocols, and policies, they are more likely to support and implement them. The end result will be the provision of appropriate, high-quality care for patients with diabetes.

Summary
MNT provided by an RD is an integral component in maintaining glycemic control for hospitalized patients with diabetes. However, a team approach is required to ensure that patients’ nutrition care plans work with their medical treatment plan, not against it. The expertise of dietetics professionals, nurses, physicians, and other health care providers is needed to develop and implement treatment plans that allow individuals with diabetes to achieve the best metabolic control.

Acknowledgments
The authors wish to thank the members of the American Dietetic Association Diabetes Care and Education Practice Group, who contributed to the article by completing a survey on hospital nutrition care distributed through an electronic mailing list.

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