Medical nutrition therapy (MNT) is an integral component of clinical care for people with diabetes.\(^1\) It includes an assessment of nutritional status and the provision of diet modification, counseling, or specialized nutrition therapy.\(^2\)

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.\(^3,4\) Individualization of MNT during hospitalization, along with tighter medical management, is required to help individuals with diabetes achieve blood glucose targets.

MNT Goals for Hospitalized Individuals With Diabetes

Recently,\(^5\) 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.\(^5\) 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.\(^1\)

Nutrition Screening and Referral System

The first step in providing nutrition care to patients with diabetes is to identify who they are.\(^2\) 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.\(^6\)
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 nutrition 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 1 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.

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

### 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

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programs and resources following dis-
charge).3

The following nutrition interven-
tions, common in hospital settings,
will be briefly reviewed here: consist-
ent carbohydrate meal plan, progres-
sion 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
derned any single meal plan or set
macronutrient pattern. Yet the prac-
tice of ordering an “ADA diet”
remains.5,9,10

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.9 The plan is not based on a set
number of calories and is designed to
contain appropriate fat content for
patients with diabetes.9 Its intent is to
meet individuals’ nutritional needs and
facilitate improved metabolic control.3

To maximize effectiveness of the
consistent carbohydrate meal plan for
individuals who take insulin,
providers need to recognize the func-
tions of insulin. For patients who are
eating, insulin should be prescribed
for basal, prandial, and correction or
supplemental needs.3,11 To provide
more flexibility and to accommodate
individual food preferences, some
facilities allow individuals with dia-
betes 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.5

Although the consistent carbohy-
drate meal plan is gaining accep-
tance, provider-ordered diets with
set calorie counts based on the
exchange system are still the stan-
dard. Use of meal plans that stipu-
late 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.5,9

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 carbo-
hydrate 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 carbo-
hydrate 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 respon-
dents indicated that hospitals where
they are employed include at least one
snack as part of a “diabetic diet.”
With appropriate insulin or oral dia-
betes medication therapy, snacks
should not be a requirement but
instead should be given as an option
to meet patient preferences or addi-
tional caloric needs.
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 make

| Table 4. Key Messages for Nutrition-Related Issues That May Affect Glycemic Control During Hospitalization |
|---|---|
| **Common Issues** | **Key Messages for Professionals** |
| Decreased appetite or no oral intake | • Consistent carbohydrate intake is the goal whether the individual is eating regular food or is on a progression diet. |
| | • The amount, not the source, of carbohydrate is most important. Allow patients to make substitu-tions of carbohydrate-containing foods with like carbohydrate content to maintain consistent intake. |
| | • Snacks or supplements may be needed to ensure adequate calorie and protein intake. Snacks should not be forced. |
| | • Insulin dose requirements should be based on “basal” and “nutritional” needs. The “nutritional insulin requirement” is the amount of insulin necessary to cover enteral or parenteral nutrition, intravenous dextrose, meals, snacks, or supple-ments. Combination insulin therapy may be appropri-ate to cover basal needs and match intermittent nutritional intake. |
| | • For individuals on insulin, it may be appropriate to inject rapid-acting insulin immediately following a meal so that carbohydrate intake and appropriate insulin dose may be more accurately matched. |
| Delayed meals/ inconsistent meal timing | • Meal insulin may need to be withheld until after tests or procedures; however, basal insulin may still be required. |
| | • For individuals taking oral diabetes medications that may cause hypoglycemia, it may be appropri-ate to provide a snack if a meal delay is anticipated. |
| Inconsistent carbohydrate intake | • Inconsistent carbohydrate intake can contribute to either hypo- or hyperglycemia. Individuals who are eating may need snacks, depending on their medica-tion therapy. Individuals with poor intake may require changes to glucose-lowering medications based on the amount of carbohydrate they are eating. |
| | • Patients, along with family and hospital volunteers, may need to be educated on the carbohydrate con-tent of foods and to notify hospital staff when food supplemental to the hospital diet is consumed. |
| | • Meal coverage insulin should not be withheld for “normal” pre-meal blood glucose levels. It is necessary to cover the carbohydrate load in the meal. |
| Decreased activity level | • Glucose-lowering medications may need to be adjusted as the activity level increases or decreases. |
| Inconsistent blood glucose monitoring | • When individuals are eating, check blood glucose pre-meal and at bedtime. |
| | • When individuals are NPO, check blood glucose levels every 4–6 hours. |

* 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.

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