Nutrition practice guidelines for diabetes provide direction to professionals on the best way to practice clinical care and achieve improved blood glucose control. Nutrition practice guidelines have been available since 1995 for type 2 diabetes and since 1996 for type 1 diabetes.

Medical nutrition therapy (MNT) for diabetes has been proven to lower HbA1c concentrations ~1–2% and is crucial to effective care. MNT is recommended for the management of gestational diabetes mellitus (GDM), and it is often the only diabetes treatment offered to women with this condition.

Unfortunately, few research studies have been devoted to the nutrition issues involved in the care of GDM. Without adequate research data, there has been no consensus on the nature and definition of MNT for patients with GDM. This has resulted in:

- inconsistent or nonexistent nutrition care for women with GDM,
- a lack of knowledge relating to the costs and potential benefits of nutrition care for GDM,
- unnecessary complications for women with GDM, and
- an absence of a clear message about the importance of nutrition to other professionals and organizations who deal with GDM.

These concerns led the Diabetes Care and Education and the Women and Reproductive Nutrition practice groups of the American Dietetic Association to collaborate on the development of practice guidelines for GDM. These guidelines seek to define the level and nature of MNT that has been shown to promote normoglycemia, provide optimum nutrition, and reduce complications in GDM.

Those developing the guidelines agreed on the following assumptions:

- MNT is essential to achieving glycemic control for women with GDM.
- Intensive treatment of hyperglycemia can reduce the fetal risk of excessive size for gestational age.
- Registered dietitians are the health care providers best prepared to provide MNT. Dietitians should work in collaboration with other health care providers and maintain appropriate communications.
- The guidelines will be implemented in a variety of settings, such as public health clinics, perinatal centers, diabetes specialty centers, hospitals, and physicians’ and nurse midwives’ offices.

The three key components of the GDM nutrition practice guidelines are:

1. integration of self-monitoring of blood glucose (SMBG) with MNT,
2. adjustment of carbohydrate (CHO) intake, and
3. timing of nutrition office visits.

**SMBG**

SMBG provides valuable information about the impact of food on blood glucose levels. Dietitians design a food plan, with input from patients, to achieve patients’ clinical outcomes (Table 2). Without patients’ SMBG records, dietitians have little information to assess the effectiveness of the food plans they develop. Food records and SMBG records guide nutrition therapy and alterations to food plans. They are also used to assess outcomes.

When SMBG records are reviewed along with patients’ food behaviors, much can be accomplished in assessing and recommending changes that result in improved blood glucose control. This requires time and follow-up, especially when pregnancy hormones challenge blood glucose control as the pregnancy progresses. SMBG records help to determine what changes may be needed in the macronutrient levels and distribution in patients’ food plans.

Initially, the minimal daily testing schedule is four times a day (fasting and 1 or 2 h after each meal). Blood glucose goals during pregnancy are fasting <95 mg/dl, 1-h postprandial 140 mg/dl, and 2-h postprandial <120 mg/dl. The frequency of SMBG may be decreased once blood glucose control is established. However, some monitoring should continue throughout pregnancy. The number of checks performed daily depends on patients’ SMBG results and their willingness to do the monitoring. SMBG results are recorded in a logbook along with food records and are brought to each visit.

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### Table 1. GDM Nutrition Practice Guidelines Development Committee

<table>
<thead>
<tr>
<th>Chairperson</th>
<th>Diane Reader, RD, CDE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Development committee</strong></td>
<td>Susan Biastre, RD, CDE</td>
</tr>
<tr>
<td></td>
<td>Mary Davis, MS, RD</td>
</tr>
<tr>
<td></td>
<td>Cathy Fagen, MA, RD</td>
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<td></td>
<td>Sheila Lenox, MS, RD, CDE</td>
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<td></td>
<td>Maggie Powers, MS, RD, CDE</td>
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<td></td>
<td>Melanie Sipe, RD, CDE</td>
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<tr>
<td></td>
<td>Alyce Thomas, RD</td>
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<tr>
<td><strong>Steering Committee</strong></td>
<td>Don Coustan, MD</td>
</tr>
<tr>
<td></td>
<td>Erica Gunderson, PhD, RD</td>
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<td></td>
<td>Donna Jornsay, NP, RN</td>
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<td></td>
<td>Lois Jovanovic, MD</td>
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<tr>
<td></td>
<td>Jack Kitzmiller, MD</td>
</tr>
<tr>
<td></td>
<td>Carolyn Leontos, MS, RD, CDE</td>
</tr>
<tr>
<td></td>
<td>Pat Splett, PhD, RD</td>
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</tbody>
</table>
The combination of food records, SMBG records, and weight changes determines if insulin therapy should be initiated. Patients’ primary care providers should be contacted if blood glucose levels exceed target goals on two or more occasions in a 1- to 2-week period without some obvious explanation from food records or if blood glucose levels are consistently elevated because of patients’ dietary indiscretions after MNT intervention. Ketone testing may be useful in determining whether patients are undereating to keep blood glucose levels within target range or to avoid insulin therapy. The monitoring and frequency of ketone testing is not standardized and may vary anywhere from daily home testing to periodic tests at clinic visits. The ketone testing schedule should be based on patients’ weight changes, illness, or stress.

**CHO Recommendations**

MNT for GDM primarily involves the development of a CHO-controlled, consistent meal plan that promotes adequate nutrition, appropriate weight gain, and normoglycemia and prevents ketones. CHO is the primary nutrient affecting postprandial blood glucose levels. The ideal amount of CHO is unknown. Generally, 40–45% of total calories come from CHO. However, this must be individualized based on patients’ needs and preferences. The amount, type, and distribution of CHO throughout the day affects blood glucose control. Because the size and timing of meals and snacks can affect nausea, heartburn, postprandial blood glucose levels, and ketones, women with GDM should be advised to have smaller and more frequent meals: three small meals with two to four snacks each day. The amount and distribution of CHO are based on clinical outcome measures such as blood glucose, weight, appetite, and ketones. Higher levels of CHO may increase hyperglycemia and result in the need for insulin therapy. CHO is generally not as well tolerated at breakfast as it is at other meals. During pregnancy, increased levels of cortisol and growth hormone appear to contribute to morning glucose intolerance. To compensate for this, the initial meal plan may have ≤45 g of CHO at breakfast. To satisfy hunger, patients can add protein foods to breakfast in place of foods containing CHO. Protein does not contribute significantly to postprandial blood glucose elevations. After evaluating postprandial blood glucose levels, patients who maintain their blood glucose goals and who so desire can add more CHO back into their morning meal. If postprandial blood glucose levels are elevated, the amount of CHO should be lowered further or a post-meal walk can be added to the regimen.

Again, continued SMBG is important throughout pregnancy to determine the best distribution of CHO throughout the day to achieve desired outcomes and to avoid unnecessary dietary restrictions.

**Calories and Weight Gain**

Dietitians working with women who have GDM must seek to achieve a balance of adequate calories, CHO, and other nutrients that will prevent hyperglycemia from overeating, ketosis from undereating, and weight loss or inadequate weight gain. Caloric recommendations are based on careful monitoring of weight-gain patterns, appetite assessments, and review of ketone testing results and food records. Specific caloric levels should be individualized and should take into consideration patients’ prepregnancy weight, physical activity level, and pregnancy weight gain to date.

Calorie restrictions must be viewed with caution. A minimum of 1,700–1,800 kcal/day of carefully selected food choices has been shown to prevent ketosis. Intakes below this level are generally not advised. Weight gain goals are based on prepregnancy body mass index. Even if patients have gained a large amount of weight before the onset of GDM, weight gain should still occur throughout the rest of their pregnancy following the appropriate weight-gain grid. Dietitians should evaluate each case individually, adjust care plans, and provide patient education as needed to achieve weight goals.

**Dietitian Intervention and Contacts**

MNT intervention visits and evaluation are critical components of the GDM nutrition practice guidelines. MNT and self-management education referrals should occur within 48 h of GDM diagnosis. Within 1 week of referral, the initial visit should take place. At this visit, dietitians should perform a nutrition assessment to establish outcome goals concerning nutrient recommendations, blood glucose and weight gain goals, and ketone testing schedules.

At subsequent visits, dietitians should assess food and blood glucose records, weight changes, and patients’ ability to follow their treatment plans. Dietitians should determine whether patients are achieving desired outcomes and are able to use self-management techniques adequately. Dietitians should also address patient questions and concerns, continue patient education and review education topics, and provide ongoing support.

The time spent at each visit will vary depending on patients’ individual needs. Face-to-face visits are encouraged because they yield more precise and detailed information from patients. Table 3 summarizes the recommended MNT visit schedule.

If patients are not achieving their clinical outcomes, their dietitian should evaluate the causes, provide potential solutions, and adjust their food and exercise plans and/or refer them for insulin initiation or adjustment. If patients are not using self-

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**Table 2. GDM Clinical Outcomes for MNT**

- Achieve and maintain normoglycemia.
- Consume adequate calories to promote appropriate gestational weight gain and avoid maternal ketosis.
- Consume food providing nutrients necessary for maternal and fetal health.
- Decrease pregnancy-related discomforts, such as hypoglycemia, nausea, vomiting, constipation, and heartburn.
- Ensure that GDM pregnancies result in the delivery of healthy babies without complications.

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monitoring techniques correctly or are not implementing the management plan, their dietitian should determine the barriers to achieving outcomes and provide appropriate interventions. Dietitians should communicate information regarding their interventions, clinical findings, and impressions to patients’ primary care providers and other health care team members as appropriate.

**Postpartum Care**

Postpartum planning is part of GDM management and includes counseling about infant feeding, postpartum glucose testing, and diabetes prevention strategies. Breastfeeding for the first year is recommended for full-term infants. Women who had GDM should have a glucose tolerance test 6–12 weeks postpartum. Women with a history of GDM are at high risk to develop GDM in subsequent pregnancies and type 2 diabetes later in life. Lifestyle behaviors such as healthy eating, weight management, and regular physical activity should be recommended to reduce patients’ risk of developing type 2 diabetes in the future.

**Validation and Field Testing**

Rigorous field testing has set the diabetes nutrition practice guidelines apart from other guidelines and flow-sheets offering best nutrition care recommendations. The evidence-based research that has been an integral part of the development of diabetes nutrition practice guidelines demonstrates their role and value in achieving outcomes.

A field test study was conducted to determine whether use of the GDM guidelines in a variety of clinical settings results in improved maternal and infant outcomes and whether blood glucose control is more favorable with guideline-recommended care than with usual care for women with GDM. The field test posed the question: Does nutrition care delivered according to the GDM practice guidelines result in better pregnancy outcomes than usual nutrition care provided by registered dietitians?

Clinical sites were randomized to one of two treatment groups to evaluate the effect of treatment and type of site on HbA1c levels. Twenty-four clinical sites from 20 states across the country were randomized to provide either guideline-recommended care or usual care to women diagnosed with GDM between 14 and 32 weeks’ gestation. Sites were categorized into three types: diabetes specialty, prenatal care, and other provider. The numbers of each type of site were similar within the groups.

Study sites collected outcome data on 215 women with GDM. Enrollment for the guideline care and usual care groups was 130 and 85, respectively. HbA1c concentrations were measured at study entry and at near-delivery (36–38 weeks’ gestation). M any other clinical outcomes were also studied.

The resulting data suggest that implementation of guideline-recommended care at prenatal care sites and other provider sites results in improved glucose control in women with GDM (Gunderson EP, Reader D, Splett P, Gildengorin G, unpublished observations). Table 4 summarizes the findings of the field-test study.

The new GDM nutrition practice guidelines do not replace clinical judgment, but rather outline the process through which best nutrition care can be provided and offer specific recommendations for the care of women with GDM.

Nutrition practice guidelines for type 1 diabetes, type 2 diabetes, and GDM are available from the American Dietetic Association at www.eatright.org/qm.

**References**


**Acknowledgments**

The content and tables for this article have been modified from the Nutrition Practice Guidelines for GDM Field Test Copy. The final version of these guidelines were expected

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**Table 3. Recommended MNT Visit Schedule**

<table>
<thead>
<tr>
<th>Type of Visit</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral contact</td>
<td>Within 48 h of referral</td>
</tr>
<tr>
<td>First visit</td>
<td>Within 1 week of referral</td>
</tr>
<tr>
<td>Second visit</td>
<td>1 week after initial visit</td>
</tr>
<tr>
<td>Third visit</td>
<td>1–3 weeks after second visit</td>
</tr>
<tr>
<td>Follow-up visits</td>
<td>Every 2–3 weeks until delivery</td>
</tr>
<tr>
<td>Postpartum visits</td>
<td>6–12 weeks post-delivery</td>
</tr>
</tbody>
</table>

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**Table 4. Conclusions of the Field-Test Study for GDM Nutrition Practice Guidelines**

- Patients given practice-guideline care had a lower frequency of insulin use. Those receiving practice-guideline care had a lower frequency of abnormal HbA1c at follow-up.
- Among diabetes specialty sites, mean change in HbA1c did not differ by treatment group. Diabetes specialty sites appeared to have a level of usual care similar to that recommended by the guidelines.
- Change in HbA1c differed by type of site.
- There is a possible need for training about the nutrition practice guidelines for non-diabetes specialty sites.
to be available in September 2001 from the American Dietetic Association website www.eatright.org/qm.

The development of the GDM Nutrition Practice Guidelines was sponsored by the Diabetes Care and Education and the Women and Reproductive Nutrition practice groups of the American Dietetic Association and supported in part by an unrestricted educational grant from PACE, an organization involving Roche Diagnostics, Eli Lilly and Company, and Becton Dickinson and Company.

Diane Reader, RD, LD, CDE, is the manager of health professional education at the International Diabetes Center in Minneapolis, Minn. Melanie Sipe, RD, LD, CDE, is the diabetes dietitian at the Claremore Diabetes Program of the Indian Health Service in Claremore, Okla.