

# Special Concerns Through an Early Pregnancy Journey

**AQ1** David Glenn Weismiller, MD, ScM, FAAFP  
Kathryn M. Kolasa, PhD, RDN, LDN

Nutrition and supplementation in the woman of reproductive age can have profound and lasting effects on her child's health. Preconceptional planning for all women should include advice to begin folic acid supplementation at 400  $\mu\text{g}/\text{d}$  as a means to prevent neural tube defects. Under some circumstances, it is recommended that a woman take a higher dose. Lifestyle interventions include reaching a healthy body weight before conception. The focus of preconceptional weight loss should be on cutting empty-calorie foods and increasing nutrient-dense foods such as fruits and vegetables, whole grains, dairy and lean meats, poultry, and fish. Increasing physical activity before becoming pregnant will have benefits in helping cope with some of the unpleasant side effects associated with pregnancy. Some women require physician assessment to determine the appropriate program. One of the most common side effects of pregnancy is "morning sickness," with up to 80% of women experiencing nausea and vomiting at some point, usually beginning between the 4th and 7th weeks after their last menses and ending for most by the 20th week. For 10% of those women, it remains an ongoing battle throughout the pregnancy. Some women self-treat with herbs. Healthcare professionals should become skilled in patient activation and culturally appropriate counseling skills. We present a case from our Family Medicine practice to demonstrate an approach to the issues of prevention of neural tube defects and treatment of morning sickness in an overweight Hispanic woman living in a rural area of the United States. *Nutr Today*. 2016;00(0):00-00

every health domain, including pregnancy. The symbiotic relationship of pregnancy places a tremendous stress on maternal reserves. The developing embryo and later fetus is a "parasite" that has tremendous needs as it moves from 2 haploid cells to a rather complete human being. But of course, pregnancy begins in the preconceptional period. The Centers for Disease Control and Prevention (CDC) defines preconceptional care as a set of interventions aimed at modifying biomedical, behavioral, and social risks to a woman's health or pregnancy outcome through prevention and management.<sup>1</sup> The goal is to ensure that the woman is as healthy as possible before conception to promote her health and the health of her future children. Preconceptional care is more than a single clinical visit but should be incorporated into every medical decision and treatment recommendation for women. Chief among these recommendations are nutritional considerations, in particular folic acid, iron supplement, and weight management. Once they are pregnant, an early barrier for some women to consuming a healthy diet is a common discomfort of pregnancy known as morning sickness or nausea and vomiting. It can diminish a woman's quality of life and can significantly contribute to healthcare costs and time lost from work. Because morning sickness is common in early pregnancy, it may not come to the attention of healthcare providers or be minimized by them and go undertreated.<sup>2,3</sup>

*Because morning sickness is common in early pregnancy, it may not come to the attention of healthcare providers or be minimized by them and go undertreated.*

**AQ2** Women all say they know they should "eat right." Good nutrition and regular physical activity have been tied to positive outcomes in almost

David Glenn Weismiller, MD, ScM, FAAFP, is an attending physician with the Rural Health Group, Inc, of North Carolina. An active practicing clinician and educator, Dr Weismiller has been providing maternity care for more than 25 years.

Kathryn M. Kolasa, PhD, RDN, LDN, is professor emerita at the Departments of Family Medicine and Pediatrics, Brody School of Medicine, East Carolina University, Greenville, North Carolina, and a contributing author to *Nutrition Today*.

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Correspondence: Kathryn M. Kolasa, PhD, RDN, LDN, 3080 Dartmouth Drive, Greenville NC 27858 (kolasaka@ecu.edu).

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This article presents a case where healthcare providers worked together to optimize a woman's nutritional and weight status before and during pregnancy to decrease risk of poor perinatal outcomes. Some challenges in meeting the needs of the woman and her family are identified.

## CASE: WOMAN PRESENTING FOR WELL-WOMAN CARE AFTER A MISCARRIAGE

### Initial Patient Encounter

M.A. is a 23-year-old Hispanic woman who recently moved to the United States from Mexico. She says she can conduct

the visit in English and declines the offer of an interpreter. She is married and lives with her husband and sister in a rural area. She works with a team of women cleaning homes several days a week but does little other physical activity. On establishing care at the local clinic, she reports that she was pregnant about 6 months ago, but the pregnancy ended in a miscarriage at about 7 weeks estimated gestational age. She reports that the loss was a very sad event for her and her family. She also reports limited healthcare in the past and has no record of childhood immunization. She has never had a pap smear. She denies any known issues with her blood pressure and there is no history of venous thromboembolic events. She does have a diagnosis of epilepsy, with her last seizure being about 4 months ago when she ran out of her medication, valproic acid (Depakene, Abbie Vie Inc, Chicago, Illinois), 250 mg twice a day. Valproic acid is an anticonvulsant that works centrally in the brain tissue to stop seizures and is used with certain types of seizures. M.A. is currently taking her valproic acid and reports no other prescription or over-the-counter medications, dietary or herbal supplements, tobacco use, or alcohol consumption. Her 42-year-old mother was recently diagnosed with type 2 diabetes mellitus. On discussion of family planning, she reports that she wants to be pregnant and knows of no other adverse pregnancy outcomes in her family. She is 5 ft 2 in. tall and weighs 169 lb (body mass index [BMI], 30.9 kg/m<sup>2</sup>). Her waist circumference is 40 in. She reports a food and beverage intake that is a mixture of American fast-food and Mexican dishes prepared at home. For example, on the day before her visit, she consumed black beans and white rice with a cola for breakfast; chicken soup with vegetables and corn tortillas and a can of mango juice for lunch; 4 soft cookies and coffee with cream for a snack; and pork meat with green hot sauce, green beans, corn tortilla, watermelon, and Kool-Aid for supper. Her physician concludes that she is probably meeting her protein and calorie needs but is concerned that M.A. may have a low intake of vitamins, especially folic acid and vitamin D, and a low iron intake. A point-of-care finger stick blood test reveals her to be iron deficient, with a hemoglobin level of 10.5 g/dL. Her physical examination results were normal. She told the doctor she was eager to do whatever the doctor tells her to do in preparation for pregnancy. She and her husband are hopeful that she when she gets pregnant, she will not have another miscarriage. After her miscarriage, she got lots of advice from her sister and an herbalist, but her husband, who has been in the United States for several years, said her family has too many superstitions. She wonders about her weight. She asks if there is a way to avoid the morning sickness, perhaps with an herb or dietary supplement.

## BACKGROUND

### Impact of Folic Acid on Neural Tube Defect Prevalence

The past decade has seen significant reductions in the number of infants born with neural tube defects (NTDs), congenital structural abnormalities of the brain and vertebral column that occur either as an isolated malformation, along with other malformations, or as part of a genetic syndrome. Most importantly, NTDs are among the few birth defects for which primary prevention is possible; prenatal screening and diagnosis are widely available, and prenatal therapy is being investigated.<sup>4</sup>

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Mandatory folic acid fortification of cereal grain products labeled as enriched (140 µg folic acid/100 g grain in the United States beginning in 1998) contributed to a 36% reduction in NTDs from 1996 to 2006 and prevented an estimated 10 000 NTD-affected pregnancies in the past decade, resulting in decreased suffering and in a savings of \$4.7 billion in direct cost.<sup>5</sup> The standard US diet is estimated to have 50 to 500 µg of absorbable folic acid per day. Synthetic folic acid in fortificants and supplements is about twice as bioavailable as folic acid in food. The estimated increase in intake of folic acid by women with this fortification level ranges from 215 to 240 µg/d. Updated estimates of NTDs prevented by mandatory folic acid fortification demonstrate that the prevalence of NTDs has remained relatively stable since the initial reduction observed immediately after mandatory fortification,<sup>6</sup> suggesting that additional efforts may be needed. Using the observed prevalence estimates of NTDs during 1999 to 2011, with fortification alone, an updated estimate of the number of births occurring annually without NTDs that would otherwise have been affected is 1326. Thus, with reliance on fortification alone, many women are below the 1992 US Public Health Service recommendation that all women capable of becoming pregnant consume 400 µg/d of folic acid to prevent NTDs. The addition to the diet of a multiple vitamin mineral (MVM) supplement containing 400 µg of folic acid (fortification plus periconceptional efforts) has resulted in a 70% decrease in NTDs in 1992 before fortification.<sup>7</sup> Although a 70% decrease is remarkable, factors than folic acid,

including racial and ethnic or genetic factors and obesity, as a possible confounding factor may need to be considered in helping women reduce their risk of a poor outcome.

### Women With Lower Blood Folate Levels

Hispanic women have the highest rate among women having a child affected by NTDs. During October 1998 to 1999, the birth prevalence of 1 NTD, in particular spina bifida, in the United States decreased by 23% compared with 1995 to 1996; however, by 2003 to 2004, no further decrease had been observed. Notably, the prevalence of NTD-affected pregnancies remained higher among Hispanic women than among women in other racial/ethnic populations. A 2009 CDC report demonstrated that from the early postfortification period (1999–2000) to the most recent period of analysis (2003–2005), the prevalence of spina bifida declined by 6.9%, from 2.04 to 1.90 per 10 000 live births. Among infants of non-Hispanic black mothers, prevalence fell by 19.8%, from 2.17 to 1.74 per 10 000 live births, whereas prevalence among infants with non-Hispanic white and Hispanic mothers remained nearly constant.<sup>8</sup> Additional public health efforts targeting women with known risk factors such as obesity and certain genetic factors likely are needed to further reduce the prevalence of spina bifida in the United States.<sup>8</sup> It appears, then, that 3 factors may be involved. Genetically, Hispanic women may have lower blood folate levels, are less likely to consume foods fortified with folic acid, and are less likely to have heard how taking folic acid may prevent birth defects and the importance of taking vitamins containing folic acid before pregnancy.<sup>9,10</sup>

### Fortification of Corn Products

One important issue is fortification of corn masa flour with folic acid in the United States. Corn masa flour, used to make products such as corn tortillas, is a staple food for Hispanic populations residing in the United States, particularly among Mexican Americans and Central Americans. By Food and Drug Administration (FDA) regulation, the United States has added folic acid to enriched bread, flour, cornmeal, rice, pasta, and other grain products since 1998. However, corn flour was not common nor defined in a way to be included in the policy. The FDA announced in November 2015 that a petition filed in 2012 by several organizations to fortify with folic acid is now under review. If corn masa flour were fortified, folic acid intake could increase by 4% for all non-Hispanic whites, 21% for all Mexican-American women, and 43% for Mexican-American women who speak primarily Spanish and report getting folic acid exclusively from cereal grain products that have been enriched, such as bread, pasta, and corn grits, in other words, no consumption of folic acid-containing supplements or ready-to-eat cereals. If corn masa flour

were fortified, an estimated 40 cases of NTDs per year could be prevented among Hispanic women.<sup>11</sup>

### Overweight, Obesity, and Pregnancy Complications

When counseling obese women about potential pregnancy complications, it is important to inform them of the associated fetal risks, including prematurity, stillbirth, congenital anomalies, macrosomia, and childhood and adolescent obesity. Obese pregnant women are more likely to give birth to an infant with congenital anomalies and obesity also lowers detection rates of fetal anomalies during pregnancy ultrasonography.<sup>12</sup> Data establish that the risk of NTDs among obese pregnant women is double that of pregnant women of normal weight after correcting for diabetes as a potential confounding factor. The benefit of administration of folic acid doses higher than 400  $\mu\text{g}$  has not been studied in obese women without diabetes.<sup>4</sup> Overweight and obese pregnant women can effectively manage their weight and weight gain through supervised nutritional programs and physical activity.<sup>15</sup> And they can be encouraged to do so, since even small weight reduction before pregnancy may improve pregnancy outcomes.<sup>4</sup>

### Iron Deficiency Anemia

Based on older data, estimates of the prevalence of iron deficiency anemia (IDA) in pregnant women in the United States range from 2% to 27%, with higher rates in the first trimester and minority populations.<sup>14</sup> Several factors have been identified that may increase a pregnant woman's risk for IDA, including a diet lacking in iron-rich foods, gastrointestinal disease and/or medications (such as antacids, which can decrease iron absorption), and short interpregnancy interval. Non-Hispanic black and Mexican American women have higher prevalence rates of IDA than do white women or multigravias. There is limited evidence on the efficacy of risk prediction tools to identify pregnant women who are at increased risk for IDA. Many observational studies have explored the association between adverse maternal and infant outcomes and iron deficiency or IDA in pregnancy, but findings have been inconclusive.<sup>14</sup> The US Preventive Services Task Force published 2 recommendation statements in 2015 concluding that the current evidence is insufficient to assess the balance of benefits and harms of screening for IDA in pregnant women to prevent adverse maternal health and birth outcomes. It also concluded that evidence was insufficient for routine iron supplementation for pregnant women to prevent adverse maternal health and birth outcomes.<sup>15</sup> The summary statement stated that routine iron supplementation during pregnancy may improve maternal hematologic indices and reduce the incidence of iron deficiency and IDA in the short term. However, there is no clear or consistent

evidence that prenatal iron supplementation has a beneficial clinical impact on maternal or infant health. In addition, no trials are available on the effect of prenatal screening for IDA on clinical outcomes despite routine screening practices in many high-income countries. Rigorous studies are needed to full understand the short- and long-term effect of routine iron supplementation and screening during pregnancy on women and infants, including the effects on rates of cesarean delivery, small size for gestational age, and low birth weight. Until the evidence on routine iron supplementation and screening is available, recommendations for supplementation during prenatal care will remain unclear at best, and healthcare providers need to encourage consumption of iron-rich foods and beverages.

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### Epilepsy and Risks for NTDs

Women with a history of epilepsy present a unique challenge during pregnancy. Low serum folate levels in women with epilepsy are independently associated with an increased risk of major fetal malformations. It has not been conclusively determined if folic acid supplementation prevents NTDs in women receiving antiepileptic drugs (AEDs). A small number of women taking seizure medication such as diphenylhydantoin (Dilantin, Pfizer, New York City, New York), carbamazepine (Tigerton, Novartis, Whippany, New Jersey), or valproic acid may even have a lower serum drug level and women may experience an associated increase in seizure frequency while taking folic acid supplements. There is limited evidence to indicate that folic acid supplementation may not decrease the risk of NTDs in women who take valproic acid. First trimester valproic acid usually results in a 1% to 2% risk of having a fetus with spina bifida, but the mechanism may be different from that of other antiepileptic agents. Similarly, increased risk has been associated with carbamazepine. Extrapolating from the landmark Medical Research Council Vitamin Study, it is suggested by consensus that women with epilepsy on valproate or carbamazepine who are

planning to become pregnant should receive daily folic acid supplementation at 4 mg per day for 1 to 3 months before conception and throughout the first trimester to reduce the risk of NTDs.<sup>16</sup> During preconceptional counseling, a woman who has been seizure-free for 2 years may, with physician approval, attempt a trial off the medicine. Women who are taking other AEDs, which have not been associated with as high a risk of NTDs, and sexually active women of reproductive age who are not actively planning pregnancy should take the standard lower dose of folic acid (400-800 µg/d). Many experts recommend the 800 µg dose for women on AEDs, with the exceptions of valproate and carbamazepine, which require 4 mg. It takes about 3 months of folic acid supplementation to achieve steady state folic acid levels. Table 1 summarizes the preconception recommendations for folic acid.

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### Including a SMART Goal to Enhance Adherence

There are several other mnemonics used to help patients set goals, including "SMART." A SMART goal is a goal that is specific, measurable, achievable, and realistic and timely.<sup>17,18</sup> Setting a SMART goal and assessing the patient's confidence in meeting this goal may be an effective

Centers for Disease Control	
All women capable of becoming pregnant	400 µg daily
Previous pregnancy complicated by a fetal neural tube defect <sup>b</sup>	4 mg daily
Institute of Medicine	
All women capable of becoming pregnant >19 years of age	600 µg daily
All adolescents 14–18 years of age	800 µg daily
Epilepsy <sup>c</sup>	
Woman capable of becoming pregnant and on valproate or carbamazepine	4 mg daily
Woman capable of becoming pregnant and on any other antiepileptic drug	800 µg daily
<sup>a</sup> At a minimum, women who fail to meet the dietary folic acid requirement should begin folic acid supplementation between 4 and 8 weeks before conception. Importantly, 3 months of folic acid supplementation is required to achieve steady-state folic acid levels. <sup>b</sup> Begin a minimum of 3 months before conception and continue through first trimester. <sup>c</sup> Begin 1 to 3 months before conception and continue through first trimester.	

way to conclude a patient-centered visit. This mnemonic stands for S for specific, significant, stretching; M, measurable, meaningful, and motivational; A, agreed upon, attainable, achievable, acceptable, and action oriented; R, realistic, relevant, reasonable, rewarding, results oriented; and T, time based, timely, tangible, trackable. For example, a patient, after reviewing her dietary record and assessing the challenges she faces to following her weight management plan, agrees to add at least 1 serving of nonstarchy vegetables to her lunch on at least 5 days of the week to help improve satiety. The patient rates her confidence in her ability to meet this goal as a 9 on a scale of 1 to 10, scale with 10 being "extremely confident."

### INITIAL ENCOUNTER: CASE REVISITED

M.A. is seeking advice to prepare for pregnancy. Her physician discusses the results of the preconceptional assessment and counsels her about the maternal and fetal risks of obesity in pregnancy and encourages her to undertake a weight-reduction program. The provider also began the discussion of a healthy weight gain (Table 2) during the pregnancy.<sup>19</sup> The physician noted the importance of consuming sufficient folic acid, and because she has not had a seizure during the prescribed time, discussed the risks and benefits of discontinuing her AED medicine to reduce the risk for fetal malformation. However, there is a risk of recurrent seizure if she does discontinue the medication, she would be prescribed a higher dose of folic acid. M.A. was fearful of a seizure and elects to continue the AED. M.A. agrees immediately to take 4 mg of folic acid every day. M.A. does not think she can increase her dietary iron and agrees to take an iron containing MVM on an empty stomach with a source of vitamin C to maximize absorption. A typical MVM has 18 mg of elemental iron per tablet. She says she understands she can take 325 mg FeSO<sub>4</sub> instead if she prefers. The clinic registered dietitian nutritionist (RDN) was asked to see her briefly to discuss food sources of folic acid, iron,

and other nutrients and excess calories and answer any questions that M.A. might have about the folic acid and vitamin recommendations. The RDN tells M.A. that she agrees with the physician's assessment of her usual dietary intake. She asks for permission to discuss ways to get more folic acid and iron by making some substitutions for foods and beverages that also are high in calorie and affect her weight. They discuss the difference in cost, taste, and nutritional value of wheat and corn tortillas and the RDN encouraged M.A. to switch to wheat tortillas as well as to consume a highly fortified breakfast cereal that has 100% of the Daily Value of folic acid every day. They discuss the importance of taking the iron and folic acid every day and alerting the doctor or RDN if she stops for any reason. She was provided the clinic's patient education brochure from the electronic health record's patient education module that outlines strategies for managing the early discomforts of pregnancy. The RDN also tells M.A. that there is some evidence that taking a multivitamins for 3 months before conception may reduce the incidence and severity of nausea and vomiting of pregnancy.<sup>20,21</sup> M.A. is offered an appointment with the RDN to start a weight management program, but M.A. replies that her resources are limited and her insurance does not cover weight management. She states she will join a program for healthy eating and physical activity that her church is starting. She sets as her SMART goal to take the multiple vitamin with iron and the folic acid supplements every day as directed. During the team huddle at the end of the day, members of the team noted that the number of Hispanic pregnant women they care for is small but the population in the community is growing. The RDN noted that the handouts available in their electronic health record were only in English and did not reflect most of the foods being consumed by M.A. Although she helped M.A. set a SMART goal, she was not sure if this was an appropriate counseling strategy to use. The RDN said that M.A. easily agreed to everything suggested, which was not typical of her other patients. She felt that they needed to find strategies to

**TABLE 2 2009 IOM Weight Gain Recommendations**

Pregnancy Weight Category	Body Mass Index <sup>a</sup> (kg/m <sup>2</sup> )	Recommended Total Weight, lb	Rate—Second and Third Trimesters, lb/wk
Underweight	<18.5	28–40	1 (1–1.3)
Normal Weight	18.5–24.9	25–35	1 (0.8–1)
Overweight	25–29.9	15–25	0.6 (0.5–0.7)
Obese (all classes)	≥30	11–20	0.5 (0.4–0.6)

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Modified from Institute of Medicine (IOM).<sup>19</sup>

<sup>a</sup>Body mass index is calculated as weight in kilograms divided by height in meters squared or a weight in pounds multiplied by 703 divided by height in inches.

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<sup>b</sup>Calculations assume a weight gain of 1.1 to 4.4 lb in the first trimester.

implement shared decision making that are patient centered.<sup>22</sup> As part of meeting her continuing education credits, the RDN recently had attended a webinar on patient engagement. She suggested that the team might want to review their approaches to different patient populations. The RDN was recently asked to serve on their Health System's patient engagement committee. They haven't met yet but she was sent some information about a Patient

**AQ5** Activation Measures Survey.<sup>23</sup> M.A.'s healthcare team decided they needed to include a discussion of relevant papers in their journal club discussions and assess their own cultural competence to provide patient-centered care to Hispanic women seeking prenatal care.

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## **HISPANIC WOMAN IS NOW PREGNANT: FOLLOW-UP VISIT**

M.A. sees the physician 6 months after her initial visit and has a positive pregnancy test. She is consistently taking her valproic acid and reports no seizures since her last visit. On the basis of her last normal menstrual period, the physician estimated the gestational age of the embryo to be 8 weeks 2 days. She denies any vaginal bleeding or abdominal pain. She reports that she is having a difficult time keeping anything she eats or drinks down. Her vomiting is unpredictable, but several times per day. There is intermittent nausea, particularly when she gets out of bed in the morning but she reports it is not as bad as during her earlier pregnancy. Although she reports increasing her physical activity, she was only successful in losing 1 lb in the last 12 weeks, which is not surprising because it is very difficult to lose weight with physical activity alone.<sup>24</sup> The group classes at her church were cancelled because of lack of an instructor. She asks what she can do about the nausea and vomiting. When asked, she said she stopped taking her iron and folic acid supplements based on the advice of her sister. She is not sure if that helped or not. During the

**AQ6** first pregnancy that ended in a miscarriage, her obstetrics nurse practitioner recommended ginger. She thought the ginger might help, but her sister said it might have contributed to the miscarriage.

## **BACKGROUND**

### **Nausea and Vomiting of Pregnancy**

#### **Incidence**

Nausea and vomiting of pregnancy are common conditions, with prevalence rates for nausea of 50% to 80% and for vomiting and retching of 50%. It is not well established which women might be more prone to nausea and vomiting. One study suggests that non-Hispanic black and Hispanic were at a higher risk, as were women of advanced gestational age.<sup>25</sup> Although it is often referred to as a "minor discomfort of pregnancy," it affects the health of the pregnant woman and her fetus by altering food intake, diminishing the woman's quality of life, and significantly contributes to healthcare costs and time lost from work.<sup>3</sup> The woman's perception of the severity of the symptoms, her desire for treatment, and the potential effects of treatment on her fetus influence clinical decision making. Early treatment of nausea and vomiting of pregnancy is recommended to prevent progression to hyperemesis gravidarum. Hyperemesis appears to represent the extreme end of the spectrum of nausea and vomiting of pregnancy and is experienced in approximately 0.3% to 3.0% of pregnancies. There is no single accepted definition, but rather it is a clinical diagnosis of exclusion based on a typical presentation in the absence of other disease that could explain the findings. The most commonly cited criteria include persistent vomiting not related to other causes, a measure of acute starvation or "spilling of ketones," and some discrete measure of weight loss, most often at least 5% of pre-pregnancy weight.<sup>26</sup>

#### **Treatment of Nausea and Vomiting Begins With Prevention**

Researchers have found that women who were taking a multivitamin at the time of conception were less likely to need medical attention for vomiting.<sup>20,21</sup> The standard recommendation for all women of childbearing age to a multivitamin with iron daily for at least 3 months before conception may also result in a reduced incidence and severity of nausea and vomiting of pregnancy. It is important to understand the woman's perception of the severity of her symptoms and her desire for treatment. Both of these factors are influential in the clinical decision making.<sup>3</sup>

The nonpharmacologic recommendations commonly presented to alleviate the initial signs of nausea and vomiting of pregnancy include the following: get adequate rest; eat crackers in the morning before getting out of bed; avoid extreme sensory stimuli such as odors, heat, humidity, noise, and flickering lights; eat frequent (every 1-2 hours) small meals to avoid a full stomach, bland or dry foods, and high protein snacks; avoid spicy or fatty foods; and/or, if possible, eliminate pills with iron or try a different brand of iron.

However, there is little published evidence regarding the efficacy of dietary changes for prevention or treatment of nausea and vomiting in pregnancy. That said, clinicians believe that there is little to no harm represented by the changes listed above and some strategies may be quite helpful. It is plausible that the remedies could be culture specific. A bit more evidence exists for the use of ginger in treating nausea and vomiting of pregnancy. A recent systematic review and meta-analysis of randomized clinical trials showed improvement in nausea symptoms in pregnant women treated with ginger compared with placebo. However, ginger did not significantly reduce the episodes of vomiting.<sup>27</sup> Whereas the dose studied the most in meta-analyses was 1000 mg/d, a subgroup analysis suggested a dosage of less than 1500 mg/d had the most favorable outcomes.<sup>28</sup> No adverse events were reported, and additional study is needed before safety can be assured. There were no adverse events reported, and therefore, this is considered a safe treatment.

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Acupressure, acupuncture, or electrical nerve stimulation have been studied. Although early small studies reported that women found relief, a recent systematic review of P6

acupuncture and acupressure wristbands compared with placebo in the treatment of nausea and vomiting of pregnancy found no difference.<sup>29</sup>

### Pharmacological Treatment of Nausea and Vomiting

Effective pharmacotherapy is available (Table 3). Treatment of nausea and vomiting of pregnancy with vitamin B<sub>6</sub> (25 mg/d) or vitamin B<sub>6</sub> plus doxylamine (20 mg/d) appears to be safe and effective and has been recommended for many years as first-line pharmacotherapy.<sup>3</sup> Both of these agents are available over the counter separately at a cost of \$5 to \$10 each for 100 tablets. Note that a doxylamine-pyridoxine combination was previously sold in the United States under the brand name Bendectin between 1956 and 1983 until litigation about birth defects led to its withdrawal from the market. Ongoing research has shown that the concerns were unsupported. Diclegis (doxylamine succinate and pyridoxine hydrochloride; Duchesnay USA Inc, Rosemont, Pennsylvania) was approved by the FDA in 2013 in the United States for treatment of nausea and vomiting in women who do not respond to dietary and lifestyle changes.<sup>3</sup> This product is 5 to 10 times more expensive than the over-the-counter components of doxylamine succinate and pyridoxine hydrochloride. However, the manufacturer has a patient assistance program. The FDA recommends a starting dose every day at bedtime and on an empty stomach and can be boosted to a maximum of 4 doses per day—1 in the morning, 1 in midafternoon, and 2 at bedtime as needed. For those with refractory nausea and vomiting, intravenous hydration should be used for the patient who cannot tolerate oral liquids for a prolonged period or if clinical signs of dehydration are present. Correction of ketosis and

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**TABLE 3 Selected Pharmacologic Therapies for Treatment of Nausea and Vomiting of Pregnancy<sup>a</sup>**

Medication	Dose	Comments	Pregnancy Category
Prochlorperazine	Immediate release, 5–10 mg PO q 6–8 h, 25 mg PR q 12 h	Aggregate of studies attest to safety. Adverse effects: insomnia, restlessness, dizziness, headache	C
Promethazine	12.5–25 mg PO/PR q 4–6 h	Adverse effects: sedation, dry mouth, urinary retention	C
Trimethobenzamide	300 mg PO q 6–8 h	Adverse effects: sedation, dizziness, headache	C
Metoclopramide	10 mg PO q 6–8 h	Adverse effects: Extrapyramidal symptoms, sedation, restlessness, fatigue	B
Ondansetron	4–8 mg PO q 8 h; for hyperemesis gravidarum, 10 mg IV q 8–12 h	Some studies have shown an increased risk of birth defects with early use, other studies have not, and the absolute risk to a fetus is low. Adverse effects: headache, drowsiness, fatigue, constipation	B

Abbreviations: IV, intravenous; PO, per os (oral); PR, rectal administration.

<sup>a</sup>As with all medications in pregnancy, always use with caution if benefits outweigh risks.

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vitamin deficiency, which is usually assumed, should be strongly considered. Dextrose and vitamins should be included in the therapy when prolonged vomiting is present, and thiamine should be administered before dextrose infusion to prevent Wernicke encephalopathy. Enteral tube feeding (nasogastric or nasoduodenal) should be used only as a first-line treatment to provide nutritional support to the women with hyperemesis who are not responsive to medical therapy and cannot maintain weight. Peripherally inserted central catheters should not be routinely used in women with hyperemesis given the sufficient complications associated with this intervention. Peripherally inserted central catheters should be used only as a last resort in the management of women with hyperemesis gravidarum because of the potential of severe maternal morbidity.<sup>3</sup> These procedures may require hospitalization depending on the degree of dehydration.

### Weight Gain in Pregnancy

The Institute of Medicine's (IOM's) Guidelines<sup>19</sup> for weight gain during pregnancy include a recommendation that overweight women (BMI 25.0–29.9 kg/m<sup>2</sup>) gain between 15 and 25 pounds and that obese women (BMI > 30.0 kg/m<sup>2</sup>) limit their weight gain to 11 to 20 lb. A recent CDC analysis of 2013 birth data showed that only 32% of women who delivered full-term, singleton infants had an appropriate weight gain while pregnant. Among the other 68% of women, nearly half gained excessive weight during pregnancy.<sup>30</sup> In a 2013 American College of Obstetricians and Gynecologists (ACOG) statement, it was noted that gestational weight gain below the IOM recommendations among overweight pregnant women does not appear to have a negative effect on fetal growth or neonatal outcomes, and it was concluded that in the overweight pregnant woman who is gaining less than the recommended amount but has an appropriately growing fetus, no evidence exists that encouraging increased weight gain to conform with the current IOM guidelines will improve maternal or fetal outcomes.<sup>31</sup> The relationship between weight gain and outcomes for obese women is more complex, since the guidelines attempt to balance the risks of having large-for-gestational age infants, small-for-gestational-age infants, and per-term births and postpartum weight retention based on limited and mixed data. The ACOG states that it is important to discuss appropriate weight gain, diet, and exercise at the initial visit and periodically throughout the pregnancy. Individualized care and clinical judgment are necessary in the management of the overweight or obese woman who is gaining (or wishes to gain) less weight than recommended but has an appropriately growing fetus.<sup>31</sup> The IOM has a toolkit in English and Spanish language to aid in educating women about healthy weight gain.<sup>32</sup>

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*Gain below the IOM recommendations among overweight pregnant women does not appear to have a negative effect on fetal growth or neonatal outcomes.* AQ8

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### Weight Loss Trials

Long considered unsafe for women to lose weight during their pregnancy, there are now a few trials conducted in overweight/obese women to determine the risks and benefits. It is important for the providers to learn about the dietary behaviors of obese women in pregnancy and address those behaviors.<sup>33</sup> The LIMIT trial investigators noted that improved diet quality and physical activity do result from antenatal counseling of overweight/obese women.<sup>31</sup> Pregnancy may be a prime opportunity to address the issue of obesity from a wider family perspective formulating long-term strategies. It is critical to find appropriate and effective methods for empowering women to change their obesity promoting lifestyle.<sup>35</sup> AQ9

### Physical Activity and Exercise During Pregnancy

In a new ACOG Committee Opinion<sup>36</sup> intended to continue to fight the obesity epidemic, it notes that regular physical activity during pregnancy improves or maintains physical fitness, helps with weight management, reduces the risk of gestational diabetes in obese women, and enhances psychologic well-being. Although there are no physical activity restrictions due to epilepsy noted, there may be some modifications to exercise or work routines due to normal anatomic and physiologic changes and fetal requirements. Because patients and some obstetric care providers are concerned that physical activity during pregnancy may cause miscarriage, poor fetal growth, musculoskeletal injury, or premature delivery, the provider should carefully evaluate the woman and make recommendations. Table 4 includes recommendations for physical activity during pregnancy.<sup>36,37</sup> T4

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*Regular physical activity during pregnancy improves or maintains physical fitness, helps with weight management, reduces the risk of gestational diabetes in obese women, and enhances psychologic well-being.* AQ8

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**TABLE 4 Recommended Physical Activity Guidelines**

Recreational and competitive athletes with uncomplicated pregnancies can remain active during pregnancy and should modify their usual exercise routines as medically indicated.
Previously inactive women and those with medical or obstetric complications should be evaluated before recommendations for physical activity during pregnancy are made.
A physically active woman with a history of or risk for preterm labor or fetal growth restriction should be advised to reduce her activity in the second and third trimesters.
Weight-bearing and non-weight-bearing exercises are thought to be safe during pregnancy. Swimming and stationary cycling are excellent non-weight-bearing exercises and may be recommended. Walking, jogging, and low-impact aerobics programs are good choices when weight-bearing exercise is to be considered.
Heavy weightlifting or similar activities that require straining are to be discouraged.
Bicycle riding, especially during the second and third trimesters, should be avoided because of changes in balance and the risk of falling.
Exposure to the extremes of air pressure, such as in scuba diving and high-altitude exercise in nonacclimatized women, should be avoided.
Pregnancy is probably not a time for serious competition. For women who are continuing their regular exercise regimen during pregnancy, exercise intensity should not exceed pre-pregnancy levels. The intensity of exercise should be regulated by how hard a woman believes she is working. Moderate to hard is safe for a woman who is accustomed to this level of exercise.
Adapted from the Institute of Medicine, <sup>32</sup> Cochrane Database, <sup>33</sup> and Dodd. <sup>31</sup>

AQ10

## Culturally Competent Care

### Culturally Appropriate Patient Education for Lifestyle Change

Although the Latino population, which includes a diverse group of people with origins in Mexico, Central or South America, and Spanish-speaking Caribbean, is the United States' largest minority group, representing around 16% of the US population, in some areas of the country, the percentage is much smaller, and understanding of the cultural health practices during pregnancy are less known to providers. Resources to create environments that are welcoming to Hispanic patients to contribute to successful pregnancy outcomes are less available as well. Medical practices that serve Hispanic patients are encouraged to hire Latino staff and physicians and encourage existing staff to learn Spanish to create a culturally sensitive office environment.<sup>38</sup> Although the concurrent use of cultural

health practices and Western Medicine during pregnancy is relatively understudied, there is information about cultural health practices to guide healthcare providers. Work by Barragan and coworkers<sup>39</sup> creates a foundation for understanding how women of Mexican origin may regard their own role in providing a healthful pregnancy environment for their developing baby as well as the roles they ascribe to Western medicine, which may vary with acculturation. For example, they write that healthcare providers may need to more actively inquire about cultural health practices, as some may choose not to share concerns, worried that the provider will be dismissive and judgmental of their beliefs. Furthermore, they suggest that a potential barrier to accurately understanding the response of client of Mexican origin is *simpatico* or the practice of demonstrating respect to healthcare providers by not questioning them and giving the appearance of understanding and agreeing with the provided advice. They also note the need to consider if these patients prefer a healthcare provider who prescribes a specific course of action and holds the patient accountable rather than one who practices motivational interviewing and helps patients along the path of informed decision making in a nondirective manner. Wilson<sup>40</sup> discusses how culture influences birthing practices and the importance of being engaged in the ongoing process of being culturally competent. Although there are differences among the Latino cultures in the United States, generally, it has been found that women are primarily influenced by their husbands and, to a lesser degree, by their mother-in-law and the media on advice about their weight. Less acculturated women receive advice about weight gain in pregnancy from their families, and that family plays a key role in changing health behaviors.<sup>41</sup>

### Herbal Remedy Use

Many people in the United States, especially if they have limited access to care, use herbal remedies. Healthcare providers are encouraged to ask patients about dietary supplement and herbal use. This may be particularly important for pregnant and lactating women. In 1 survey of Hispanic women, most were knowledgeable about potential harm from using herbs during pregnancy or while breastfeeding. Even so, they reported their physicians may not have asked about herbs and they may not have reported all that they were taking.<sup>42</sup> Bercaw and coworkers<sup>45</sup> found that 19% of Mexican women in their study took herbs, with another 47% taking vitamin or mineral supplements different from pregnancy prenatal vitamins. Generally, these herbs were taken to augment health and not displace other medicines. However, at least one-third did not disclose their herbal and supplement use to their providers.<sup>42</sup> Rivera and coworkers documented 41 herbs used by Mexican Americans in a Texas town. Of

those, they listed 17 to be avoided during pregnancy and 11 with unknown safety profile during pregnancy.<sup>42-44</sup>

### Effects of Acculturation to US Diet

It has been observed that Mexican immigrants are disproportionately affected by diet-related risk of metabolic dysfunction and are at greater risk of overweight and obesity. Greater acculturation has been associated with change from a dietary pattern high in fruits, vegetables, and legumes to a more US diet low in fruits and vegetables and high in refined grains and added sugars. In a crossover feeding trial in first- and second-generation healthy women of Mexican descent, it was found that following a traditional Mexican diet improved insulin sensitivity, reduced circulating concentrations of insulin-like growth factor binding protein 3, and tended to reduce circulating concentrations of insulin-like growth factor 1 under conditions of weight stability.<sup>45</sup>

### FOLLOW UP: CASE REVISITED

#### Counsel M.A. to Prevent Nausea and Vomiting

Even though the physician told M.A. that ginger is safe and could reduce nausea symptoms, she is reluctant to take it. She asks for a new medicine for morning sickness that one of her employers mentioned. The physician explains to her that taking over-the-counter doxylamine (10 mg every 8 hours along with vitamin B<sub>6</sub>, 10–25 mg every 8 hours) is much less expensive and as effective as the prescription medicine. He reassures her that there is no adverse effect on her epilepsy medicine. Later in the visit, the RDN asked her if she had been taking the MVM with iron and her folic acid regularly. M.A. said she took it sometimes but thought it was just a suggestion and not a “prescription” from the physician. She acknowledges she now understands it is something she must do for herself and her baby. The RDN worked through the other suggestions (eg, avoiding strong odors, heat, humidity, noise, and eating every 1-2 hours) to help M.A. understand which strategies she can feasibly use.

#### Recommend Gentle Exercise

M.A. does little physical activity outside the house cleaning that she does several days a week. She is prescribed short, regular sessions of activity that may include stretching to warm-up and relax, walking, or using a home fitness program with her sister or friend or gardening. The provider reassured that these are safe for the baby and important for her weight management. She is told to avoid exercising directly after eating, remain hydrated, and avoid contact sports or house cleaning activities with a high risk of falling.

#### Referral for Weight Management

The provider and the RDN asked M.A. if they could find a student intern to provide a weight management class for the women at the church if the women would be willing

to participate. M.A. said she would come and recruit her friends. She gave them the name of her pastor to call and discuss the possibilities. In the meantime, she agreed to text the RDN her weekly weight on Friday afternoons. The provider asked M.A. if she would prefer an English or Spanish brochure on weight gain in pregnancy and gave her the handout from the IOM Toolkit.<sup>32</sup> They ended the session discussing the type and timing of follow-up and who might accompany her as a support person.

### SUMMARY

Nutrition and supplementation in the woman of reproductive age are cornerstones of preconceptional care. The case presented highlights the nuances focused on optimizing pregnancy outcome in an overweight Hispanic woman living in a rural area of the United States. The issues presented confront many of us in our daily practices regardless of our geographic location. Good nutrition, adequate supplementation, physical activity, and culturally appropriate patient education for lifestyle change all contribute to improved health outcomes for families. The partnerships of clinical providers with the patient support positive change, informed decisions, and care that best meets an individual's needs.

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