

safe; one study showed no increased risk of poor reading or writing skills in children ages eight to nine.¹⁰⁹ Use of office ultrasound has become increasingly common in the United States; it is important that physicians who use office ultrasound be aware of the ethical implications of self-referral. One study showed that physicians who performed their own office ultrasound examinations performed more examinations and charged more for each one than those who referred their patients to radiologists.¹¹⁰ In addition, it is important that physicians performing office ultrasound be well trained and that this experience become routine in residency training.¹¹¹

Discomforts Complicating Normal Pregnancy

Healthy pregnant women experience various symptoms due to physiologic pregnancy-related changes. Because these symptoms are so common, the physician should educate the expectant mother so that she will anticipate the symptoms and be prepared to deal with them. This physician counseling reassures patients who are experiencing these normal changes and prepares those who have not yet encountered such symptoms. The physician's role is to differentiate the physiologic changes of normal pregnancy from pathologic conditions and to develop management strategies for symptoms considered to be physiologic.

NAUSEA AND VOMITING

About 70 percent of pregnant women report nausea during the first 14 to 16 weeks of pregnancy, and 37 to 58 percent experience vomiting.¹ Altered senses of taste and smell also often accompany early pregnancy. The etiology of "morning sickness" is unclear. True hyperemesis gravidarum, with weight loss, electrolyte and acid-base disturbances and danger to the pregnancy, occurs in only 0.35 percent of pregnancies. Hyperemesis has been associated with higher maternal levels of estrogen; the prognosis for mothers and their infants is good.¹¹² The condition must be

differentiated from hyperthyroidism presenting during pregnancy, a distinction that can be difficult.¹¹³

Management includes reassurance that the condition is self-limited and, in fact, associated with a better pregnancy outcome.¹¹⁴ Practical measures include eating small frequent meals and dry foods and avoiding spicy or acidic foods and cooking smells. Fortunately, most women respond to conservative therapy. If weight loss, ketonuria and electrolyte imbalance develop, hospitalization is required. If a woman is losing weight and is at risk for nutritional deficiencies, use of anti-nauseants is appropriate; parenteral nutrition can be used in severe cases.¹¹⁵

Bendectin® (dicyclomine, doxylamine and pyridoxine) was withdrawn from the market in 1983 after use in over 30 million pregnancies because of the cost of litigation over claims that the drug caused birth defects. Epidemiologic studies provide strong evidence regarding the safety of Bendectin,¹ and the same formulation is still available in Canada under the tradename Diclectin®. With the withdrawal of Bendectin, nausea in pregnancy is being treated with antihistamines whose safety has not been as extensively studied. Drugs judged to probably be safe for use in pregnancy include dimenhydrinate, diphenhydramine (Benadryl®), meclizine (Antivert®) and cyclizine (Marezine®).¹¹⁶ Treatment with acupuncture is another unconventional but very safe alternative.¹¹⁷

HEARTBURN

Heartburn, which affects most pregnant women, is caused by decreased gastrointestinal motility and pressure from the enlarging gravid uterus. Small frequent meals and elevation of the head of the bed may help, but antacids are often required. Simple antacids with magnesium-containing substances appear to be safe for use in pregnant women.¹ Aluminum-containing preparations may aggravate constipation and interact with minerals.¹¹⁸

CONSTIPATION

Constipation is extremely common in pregnancy due to decreased motility of the gastrointestinal tract; in addition, it is exacerbated by iron supplementation. Physiologic approaches, such as increasing fiber, fluids and exercise, often provide relief. Occasionally, bulk-adding agents, such as methylcellulose or psyllium hydrophilic mucilloid, or stool softeners are required. These agents are considered safe for use in pregnancy.

HEMORRHOIDS

The development or aggravation of hemorrhoids during pregnancy is due to increased pressure in the hemorrhoidal veins caused by obstruction of venous return by the gravid uterus and the tendency to develop constipation. Treatment consists of stool softeners, sitz baths and, occasionally, topical agents. Thrombosed external hemorrhoids may require incision and evacuation. Further surgical treatment should not be undertaken until after delivery if problems persist.

SWELLING AND VARICOSITIES

Dependent edema is almost universal in late pregnancy due to occlusion of the pelvic veins and inferior vena cava resulting from pressure from the enlarged uterus. Treatment consists of avoidance of prolonged standing, elevation of the lower extremities and use of support hose, if desired.

Varicosities of the legs and vulva result from physiologic changes of pregnancy and, perhaps, a congenital predisposition toward the development of varicose veins. Treatment is the same as for dependent edema. Surgery, if indicated, should be postponed until after delivery, generally until the end of childbearing.

The discomfort of vulvar varicosities may be relieved by lying down with a covered bag of ice chips (or a small bag of frozen peas) against the perineum. During the day, the pressure of a sanitary napkin against the perineum may provide relief.

LEG CRAMPS

Painful muscle cramps of the legs occur in almost 50 percent of pregnant women.¹ Symptoms tend to occur at night and are often repetitive, protracted and very painful. The etiology is unknown. The simplest remedy is to gently stretch the calf and avoid hyperextension of the foot. Calcium salts are still widely prescribed despite little evidence of their benefit.

FATIGUE

Early in pregnancy, most women complain of excessive fatigue. This usually remits by the second trimester but can be extremely frustrating for a healthy active woman. Reassurance and "common-sense" adjustments to lifestyle are appropriate. Fatigue frequently recurs in the third trimester due to the sheer physical effort of carrying the increased weight of pregnancy.

URINARY SYMPTOMS

A pregnant woman experiences urinary frequency in the first trimester as the enlarging uterus exerts pressure on the bladder and in the third trimester near the end of pregnancy as the presenting part descends into the pelvis. Nocturnal frequency can be diminished if the woman consumes her daily liquid intake before the last three to four hours before retiring. A midstream urine sample for culture should be obtained if symptoms suggest urinary tract infection.

ACHES AND PAINS

The weight of the gravid uterus causes a compensatory lumbar lordosis during pregnancy. This displacement frequently causes back pain, which may be severe at times. Treatment consists of education, proper footwear, heat and rest in a firm bed. Although abdominal strengthening exercises are not easy to perform after the first trimester, gentle stretching and flexibility exercises may be beneficial. Occasionally, severe back pain requires analgesia.

The ligaments of the pubic symphysis and sacroiliac joints loosen during pregnancy. Although this change facilitates vaginal delivery, it frequently leads to pelvic discomfort and groin aches late in pregnancy. Cross-legged sitting or a supported squat may relieve some discomfort.

NUMBNESS

Nerve entrapment is a relatively common problem in pregnancy. Carpal tunnel syndrome is reported in 5 to 10 percent of pregnancies. The paresthesias and diminished fine motor function of the hand are usually worse at night or on awakening. Proper wrist and hand splints are usually helpful. Surgical management should be delayed until postpartum resolution has stabilized. Other nerve entrapments more commonly seen in pregnancy include Bell's palsy, meralgia paresthetica and abdominal wall nerve entrapment.¹¹⁹

DIZZINESS AND FAINTING

Many pregnant women experience dizziness or syncope, particularly when standing for prolonged periods or in warm weather. It is thought to be related to a decrease in cardiac output resulting from lowered venous return from the legs and dilation of peripheral vessels to dissipate body heat. Practical measures include avoiding prolonged standing and lying flat on the back. When faintness occurs, a pregnant woman should lie down on her left side.

SHORTNESS OF BREATH

Even early in pregnancy, as many as 60 to 70 percent of women experience an increased awareness of the desire to breathe. This increased respiratory effort is probably due to progesterone, reduced Pa_{CO_2} levels and an awareness of the increased tidal volume of pregnancy.¹²⁰

Later in pregnancy, as residual volume decreases and weight increases, women may have an even greater sensation of shortness of breath. Sitting up straight and sleeping

propped up on pillows may be helpful measures. These physiologic cardiorespiratory changes in pregnant women can make evaluation for the possibility of true cardiac disease difficult.¹²¹

RHINITIS

Nasal congestion is due to increased estrogen, which produces perivascular edema and enlargement of the nasal turbinates. Epistaxis may develop. Treatment consists of reassurance, standard treatment for epistaxis and avoidance of topical nasal decongestants. Symptoms disappear after delivery.

PIGMENTATION

Because estrogen and progesterone stimulate melanocytes, they may be responsible for the formation of linea nigra, darkening of the areolae and pigment changes of the face known as the "mask of pregnancy." Although these changes considerably improve after delivery, avoidance of excessive sunlight and use of a sun-blocking agent are recommended.

STRIAE GRAVIDARUM

About 65 percent of pregnant women develop striae gravidarum on their abdomen, buttocks, thighs or breasts.¹²⁰ Caused by rupture of the elastic fibers in the dermis, these reddish marks fade to silver after pregnancy but never disappear. Despite the claims of cosmetic companies, nothing can prevent stretch marks because they are solely caused by genetic predisposition. Avoidance of excessive weight gain is helpful.

BLEEDING GUMS

In pregnancy, estrogen causes the gums to become hyperemic and softened. Normal toothbrushing may produce bleeding that is not necessarily a sign of gum or dental disease. Women should continue regular dental care during pregnancy.¹²⁰ The epulis of pregnancy is a focal vascular swelling of the gums, which spontaneously regresses after delivery.

BREAST CHANGES

Tenderness and tingling of the breasts are among the first symptoms of pregnancy. After the second month, the breasts increase in size and nodularity due to estrogen, progesterone and prolactin. The nipples become darker, larger and more erectile, and colostrum may be expressed. A well-fitting support bra is recommended for comfort.

HEADACHE

Headache is a common complaint early in pregnancy. Usually, no demonstrable cause is found, and most headaches diminish or disappear by midpregnancy. Treatment should be symptomatic, with medication limited to acetaminophen if required. Later in pregnancy, headache may be a symptom of toxemia.

VAGINAL DISCHARGE

The increased vaginal discharge that most pregnant women describe is due to increased formation of mucus by the cervical glands due to estrogen. Monilia can be cultured from the vagina in about 25 percent of women approaching term, and *Trichomonas vaginalis* is found in up to 20 percent.¹²² If the patient is symptomatic, drugs of choice in pregnancy include clotrimazole (Gyne-Lotrimin[®], Mycelex-G[®]) for trichomoniasis and clotrimazole or miconazole (Monistat[®]) for moniliasis. Neither infection requires treatment if asymptomatic.

Impact of Pregnancy and Childbirth on the Family

The transition to parenthood is invariably accompanied by stress as the couple negotiates changing expectations, tasks and attitudes. With the birth of the first infant, the marital dyad changes to include the child, the couple takes on parenting roles, and relationships realign within the extended family. An increased incidence of depression, with decreased marital satisfaction, occurs after the birth of the first child.¹²³

The expectant mother may have concerns

about her changing body image, fears about labor and delivery and anxiety about the health of her unborn child. Acknowledging and normalizing these feelings is an important part of the physician's role. Close attention must be given to a woman who perceives that pregnancy greatly interferes with her lifestyle or self-image or a woman who has not resolved her ambivalent feelings toward the pregnancy by 20 weeks gestation. Other danger signals include inappropriately negative or unrealistically positive feelings about mothering.

The lack of family and extended support systems also places the pregnancy at social risk. Social support can moderate stress and facilitate coping and is a strong predictor of satisfaction with the parent role and infant care. In fact, satisfaction with an intimate relationship is the most important predictor of a positive maternal attitude.¹²³

Pregnancy is an important event and sometimes a crisis for a prospective father. The *couvade* syndrome consists of various symptoms, including dyspepsia, headache, mild hypertension and weight gain, that men may experience during their partner's pregnancy.¹²⁴ A father's perceptions of his role are influenced by his childhood role models, family expectations and societal norms. Men with poor confidence and nurturing skills tend to be ambivalent about the responsibility of a child.¹²⁵ These men may demonstrate transient emotional regression and childish behavior while they resolve this ambivalence over their new role.

It is vital that the father be actively involved in his partner's care. The family physician should provide psychosocial support to new fathers and encourage their involvement in prenatal visits, ultrasound examinations, delivery and well-baby visits.

Education and Counseling in Prenatal Care

Prenatal visits present ideal opportunities for patient education, particularly as receptivity is heightened in the third trimester.

Although patients often ask the following questions, the physician should also initiate discussion in these relevant areas:

1. What should I eat? Nutritional education in pregnancy can contribute to better maternal and fetal outcomes and provide a foundation for sound nutritional practices for children. A well-balanced sensible diet is the basic framework for food selection. The diet should include additional servings of nutritionally dense foods to meet the increased needs during pregnancy and lactation. In the first trimester, an additional 100 kcal per day is appropriate. In the second and third trimesters, an additional 300 kcal per day promotes gradual weight gain.^{118,126} Table 8 lists factors that identify a pregnancy at nutritional risk.

2. Do I have to take my vitamins? No clear evidence shows that routine administration of iron supplements to healthy well-nourished pregnant women improves maternal or infant outcome.^{1,118,127} However, many physicians routinely recommend iron supplementation during prenatal care.¹²⁸ Indications for prophylactic iron treatment are listed in Table 9. Opponents of routine iron supplementation argue that iron supplements frequently cause gastrointestinal side effects, risk diverting attention from the need for appropriate nutrition and are toxic if ingested in overdose.

Maternal folate requirements are increased during pregnancy.¹³⁰ Recently, several trials have shown fewer cases of NTDs among women who took folic acid starting one month before conception and continuing through the first trimester.¹²⁹ Thus, the Centers for Disease Control recommends that all women who are capable of becoming pregnant consume 0.4 mg of folate daily.¹²⁹ Risk factors that identify pregnant women in particular need of folate supplementation are listed in Table 10.¹³⁰

In pregnant women, the daily calcium requirement is 500 mg greater than that in nonpregnant women.¹¹⁸ Milk products are appropriate food sources.

TABLE 8.

Factors that Identify a Pregnancy at Nutritional Risk

Adolescence
Anemia
Abnormal prepregnant weight (high or low)
Fad diets
History of an eating disorder
Multiple gestation
Medical illness or medication that interferes with absorption
Cigarette smoking or significant alcohol use

TABLE 9.

Maternal Risk Factors for Iron Deficiency

Previous anemia
Dietary inadequacy (poverty, dietary fads, eating disorders)
Chronic blood loss
Borderline hemoglobin in the first trimester
Concomitant folic acid treatment (except iron-replete hemoglobinopathies)

TABLE 10.

Factors that Identify Pregnant Women in Particular Need of Folate Supplementation

Previous neural tube defect
Malabsorption syndrome
Hemoglobinopathy
Treatment with phenytoin
Multiple pregnancy
Adolescence

(From Hibbard BM. Iron and folate supplements during pregnancy: supplementation is valuable only in selected patients. *BMJ* 1988;297(6659):1324-6.)

3. How much weight should I gain? The issue of weight gain is controversial. For most healthy women, weight gain of 10 to 14 kg (22 to 31 lb) correlates with the lowest incidence of obstetric complications.¹¹⁸ The opti-

mal weight gain depends on the woman's prepregnancy weight for height. Some authorities think that the pattern of weight gain is more important than the absolute amount.¹³¹ A useful guide is to aim for a gain of 4 kg (9 lb) by the 20th week, with the remainder gained in a progressive manner during the rest of the pregnancy.

An underweight woman (weighing less than 47 kg [104 lb] or more than 20 percent below the standard for her height and age) should gain about 13 to 16 kg (29 to 35 lb). In an obese woman (weighing more than 20 percent over the standard for her height and age), a gain of 7 to 9 kg (15 to 20 lb) has been associated with an improved perinatal outcome.¹²⁷

4. Do I have to quit drinking? Chronic alcohol abuse is associated with fetal alcohol syndrome, a pattern of multiple congenital anomalies that includes microcephaly, micrognathia, microphthalmia, cardiac defects, intrauterine growth retardation and developmental delay. Although this syndrome is recognized as a consequence of excessive alcohol consumption, even small amounts of alcohol can temporarily alter fetal function. Adverse outcomes have not been found with daily consumption of less than two standard drinks.¹ It is perhaps best that patients abstain from alcohol throughout pregnancy, although the danger from light drinking should not be overstated, particularly to the distressed woman who had a few drinks before her pregnancy was diagnosed.

5. Do I have to quit smoking? Cigarette smoking is a major obstetric health hazard in North America. Up to 25 percent of all pregnant women smoke.¹³² Hazards associated with maternal smoking are listed in Table 11.¹³²

Smoking should be strongly discouraged. If abstinence is impossible, reduction should be encouraged, although the beneficial effect on birth weight is restricted to those who quit.¹³³ Passive smoking is also hazardous for the fetus; it is prudent to advise the patient about these additional risks.¹³⁸

Eighteen percent of smokers quit by the time of their first antenatal visit and deliver infants of equivalent weight to those of non-smokers.¹ Few smokers quit the habit later in pregnancy. Successful interventions emphasize how to quit smoking and include pregnancy-specific behavioral strategies.

6. Can I still drink coffee? About 95 percent of pregnant women in North America consume caffeine at least once daily.¹³⁴ No recognized adverse effects of moderate caffeine consumption (two cups of coffee daily) in pregnancy have been demonstrated.¹¹⁸ High doses (more than six to eight cups daily) have been associated with decreased fertility, spontaneous abortion and low birth weight, but no association between the use of caffeine in pregnancy and congenital malformations has been found in humans.¹³³

7. Can I still drink diet soda? Aspartame, the sweetener found in many diet soft drinks, is a dipeptide containing phenylalanine and aspartic acid. Ingestion of aspartame is contraindicated in patients with phenylketonuria. Moderate consumption of aspartame by pregnant women does not appear to pose a health hazard, but direct evidence of safety is unavailable. Because foods containing aspartame have little nutrient value, most authorities recommend avoidance or limited consumption.

8. Can I still exercise? Recent studies sug-

TABLE 11.

Hazards of Smoking During Pregnancy

Increased perinatal mortality
Lower birth weight and intrauterine growth retardation
Increased incidence of placenta previa, placental dysfunction and placental abruption
Increased perinatal morbidity due to prolonged infant growth retardation
Higher incidence of sudden infant death syndrome
Possible reduction in intellectual skill development and evidence of minimal brain dysfunction syndromes

(From SOGC. *The effects of smoking on the outcome of pregnancy*. SOGC Bulletin 1984;6(5):3-4.)

gest that well-controlled exercise programs have no detrimental effect on pregnant women who are at low risk. In fact, exercise can improve the patient's mental outlook and self-image.¹³⁵ A healthy pregnant woman

should not exceed her prepregnancy exercise level. She should avoid hyperthermia and reduce the percentage of maximum effort, particularly in the last trimester. She should also eliminate activities in which the risk of injury

TABLE 12.
Safety of Drugs in Pregnancy

Agent	Potential toxicity	Recommendation
Acetaminophen Aspirin	Nonteratogenic in low doses When taken in late pregnancy, may cause premature closure of fetal ductus arteriosus May cause increased risk of bleeding for mother and fetus Probably nonteratogenic By displacing bilirubin from albumin, may cause kernicterus in jaundiced infants	Probably safe Should be avoided in pregnancy, especially in the third trimester
Codeine	Not associated with increased malformations; near term, may cause a narcotic withdrawal syndrome in newborn	Not in third trimester
Antihistamines	Safety uncertain due to conflicting studies; some studies show increased risk of malformations	Avoid if possible
Pseudoephedrine	Use in first trimester associated with minor malformations, such as inguinal hernia and clubfoot	Avoid if possible
Allergy shots Antacids Diazepam	Do not consist of live infectious agents Nonteratogenic Some studies show a three- to fourfold increase in cleft lip/cleft palate with first-trimester exposure	Safe Probably safe Not in first trimester; single dose or repeated low dose may be used, if necessary, in second and third trimester with minimal risk Avoid if possible
Oral contraceptives	Regular use by mother in the last weeks of pregnancy may cause hypotonia and drowsiness in the infant for up to two weeks; drug detectable in the neonate for up to eight days after delivery; withdrawal symptoms may occur in infant If given shortly before delivery, can suppress fetal and neonatal respiration Risk of malformations, if any, very small; conflicting studies exist, but there may be a small risk of limb reduction defects, cardiovascular defects and vertebral, anal, tracheal and esophageal lesions	Avoid
Nystatin (topical) Amphetamine, cocaine, heroin	Nonteratogenic Difficult to determine because often used in combination with other drugs and poor prenatal care; major problem is withdrawal syndrome in newborn Prematurity and low birth weight common	Safe Avoid
Hashish and other 9-THC products	Nonteratogenic in large studies; occasional reports of central nervous system malformations	Avoid
Penicillins	None known for older types; limited experience with new agents	Probably safe
Cephalosporins	Same as for penicillins	Coprotected
Erythromycin estolate	Associated with cholestatic hepatitis in pregnant women	Probably safe
Other erythromycins		Contraindicated
Tetracyclines	Tooth discoloration and dysplasia; inhibition of bone growth in fetus; minimal risk of cataracts and congenital limb abnormalities	
Sulfonamides	Hemolysis in newborn with G6PD deficiency; risk of kernicterus at term	Contraindicated at term
Co-trimoxazole	Folate-antagonist; teratogenic in rats; same effect as sulfonamides	Use with caution for strong clinical indication in absence of suitable alternatives; contraindicated at term
Metronidazole	Carcinogenic in rats and mice	Use with caution for strong clinical indication in absence of suitable alternatives

is high and avoid sports in which balance is of major importance. A high-risk patient (e.g., one with cardiac disease or uteroplacental insufficiency) should not engage in strenuous exercise.¹³⁶

9. Can I still have sexual intercourse? Masters and Johnson found that most women report decreased sexual interest in the first trimester, an increase in eroticism in the second trimester and a significant reduction in coital activity in the third trimester. There are no contraindications to intercourse in a healthy low-risk pregnancy.¹ Intercourse should be restricted in those with a history of recurrent miscarriage, premature rupture of membranes, antepartum bleeding or preterm labor. Couples should be encouraged to engage in other forms of sexual expression, with the exception of vaginal insufflation, which has caused fatal cases of air embolism in pregnancy. After delivery, sexual intercourse may be resumed when lochia serosa ceases, the perineum has healed, and the woman is psychologically ready.

10. Should I continue to work? An occupational history should be taken at the first prenatal visit to assess potential work hazards.²⁰ Further information can be gathered from the employee health unit or union director. In general, there are few contraindications to working during pregnancy.

Physically demanding work may need to be modified. Preterm labor is associated with an index of occupational fatigue that includes measures of posture, machine work, physical effort, repetitive gestures and environmental components of the workplace.¹ Obviously, exposure to toxic and potentially teratogenic materials must be avoided. When there are complications of pregnancy, such as hypertension, intrauterine growth retardation, premature rupture of membranes or a history of preterm labor, work must be restricted.

11. Can I still use my computer? Video dis-

play terminals do not emit x-rays, microwaves or other radiation at harmful levels.¹³⁷

Current data indicate that video display terminals do not constitute an increased risk to the pregnant woman or the fetus.¹³³

12. Can I douche? Pregnant women should not douche. Hand-held bulb syringes are absolutely contraindicated because of the risk of death from air embolism.

13. Can I travel? No adverse effects are associated with air, sea or land travel during pregnancy. During long trips, the patient should walk every two to three hours to reduce the risk of stasis and thrombosis. Pregnant women should always wear three-point shoulder restraints in cars because the leading cause of fetal death in motor vehicle accidents is maternal death.

Airlines refuse to carry pregnant women at varying gestational ages depending on the length of the flight. In general, the possibility and risk associated with complications of pregnancy and even labor occurring en route or abroad must be balanced against the importance of the trip.

14. Can I dye my hair or have a "perm"? No studies of these substances have been performed in humans, but some of the compounds are considered potentially mutagenic and teratogenic. No systemic toxicity has been documented in animals, even after doses exceeding the human exposure by 100-fold.¹³³ Hair waving solutions have irritant properties but are not teratogenic.¹³³

15. What drugs are safe in pregnancy? Table 12 lists recommendations for a number of medications often used in pregnancy.¹³⁸⁻¹⁴²

Conclusion

Childbirth education classes are an integral part of perinatal care. Important topics include the physical and emotional changes in pregnancy, breast-feeding preparation, delivery and the postpartum period ■