Pregnancy at Risk: Preexisting Conditions

Learning Objectives

On completion of this chapter the reader will be able to:

• Differentiate the types of diabetes mellitus and their respective risk factors in pregnancy.
• Compare insulin requirements during pregnancy, the postpartum period, and lactation.
• Identify maternal and fetal risks or complications associated with diabetes in pregnancy.
• Develop a plan of care for the pregnant woman with pregestational or gestational diabetes.
• Compare the management of a pregnant woman with hyperthyroidism with one who has hypothyroidism.
• Differentiate the management of various cardiovascular disorders in pregnant women.
• Discuss the different types of anemia and their effects during pregnancy.
• Explain the care of pregnant women with pulmonary disorders.
• Describe the effect of gastrointestinal disorders on pregnancy.
• Review the effects of neurologic disorders on pregnancy.
• Review the care of pregnant women who use, abuse, or are dependent on alcohol or illicit or prescription drugs.

Electronic Resources

Additional information related to the content in Chapter 13 can be found on evolve the Companion Website at http://evolve.elsevier.com/Perry/maternal/

• NCLEX Review Questions
• Case Study—Pregestational Diabetes
• Case Study—Class III Cardiac Disorders
• Nursing Care Plan—Pregestational Diabetes
• Nursing Care Plan—Heart Disease

For most women pregnancy represents a normal part of life. However, for some women pregnancy presents a significant risk because it is superimposed on a chronic illness. With well-motivated patients who actively participate in the treatment plan and with careful management from a multidisciplinary health care team, positive pregnancy outcomes are often possible.

Providing safe and effective care for women experiencing high risk pregnancy and their fetuses is a challenge. Although unique maternal and fetal needs prompted by these conditions exist, these women also experience many of the same pregnancy-related feelings, needs, and concerns as their “normal” counterparts. The primary objective of nursing care must be to guide and support the woman and her family in achieving optimal outcomes for both the pregnant woman and the fetus.

This chapter focuses on metabolic disorders, including diabetes mellitus and thyroid disorders; cardiovascular disorders; selected disorders of the respiratory, gastrointestinal, integumentary, and central nervous systems; and autoimmune disorders. Substance abuse and human immunodeficiency virus (HIV) infection are also discussed.

Metabolic Disorders

Diabetes Mellitus

Despite advances in care, the woman whose pregnancy is complicated by diabetes may still have poor outcomes. Diabetes during pregnancy is most successfully managed with a multidisciplinary approach involving the obstetrician, internist or diabetologist, neonatologist, nurse, nutritionist, and
social worker. Favorable outcome of pregnancy requires commitment and active participation by the woman and her family. The woman must comply with a schedule of frequent prenatal visits, strict adherence to the dietary regimen, regular self-monitoring of blood glucose level, frequent laboratory evaluation, intensive fetal surveillance, and possible hospitalization.

The perinatal mortality rate for women with well-controlled diabetes, excluding major congenital malformations, is about the same as that for any other pregnancy (Landon, Catalano, & Gabbe, 2007). The incidence of major congenital malformations in infants born to women with diabetes has not changed significantly over time. Experts have concluded that the key to optimal pregnancy outcome is strict maternal glucose control before conception and throughout the pregnancy. Consequently much emphasis is placed on preconception counseling for women with diabetes.

Care of the pregnant woman who has diabetes requires that the nurse fully understand the normal physiologic responses to pregnancy, as well as the altered metabolism of diabetes. Furthermore, the nurse must understand the relationship between pregnancy and diabetes, including psychosocial implications, to accurately assess the woman, plan for her care, and intervene appropriately.

Pathogenesis
Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). Insulin, produced by \( \beta \)-cells in the islets of Langerhans of the pancreas, regulates blood glucose levels by enabling glucose to enter adipose and muscle cells, where it is used for energy. Insulin also stimulates protein synthesis and storage of free fatty acids. When insulin is insufficient or ineffective in promoting glucose uptake by the muscle and adipose cells, glucose accumulates in the bloodstream, resulting in hyperglycemia. Hyperglycemia causes hyperosmolarity of the blood, which attracts intracellular fluid into the vascular system, resulting in cellular dehydration and expanded blood volume. Consequently the kidneys function to excrete large volumes of urine (polyuria) in an attempt to regulate excess vascular volume and excrete the unused glucose (glycosuria). Polyuria and cellular dehydration cause excessive thirst (polydipsia).

The body compensates for its inability to convert carbohydrate (glucose) into energy by burning proteins (muscle) and fats. The end products of this metabolism are ketones and fatty acids, which in excess quantity produce ketoacidosis and acetonuria. Weight loss occurs because of the breakdown of fat and muscle tissue. This tissue breakdown causes a state of starvation that compels the individual to eat excessive amounts of food (polyphagia).

Over time diabetes causes significant changes in both the microvascular and macrovascular circulations. These structural changes affect a variety of organ systems, primarily the heart, eyes, kidneys, and nerves. Complications resulting from diabetes include premature atherosclerosis, retinopathy, nephropathy, and neuropathy.

Diabetes may be caused by either impaired insulin secretion when \( \beta \)-cells of the pancreas are destroyed by an autoimmune process or inadequate insulin action in target tissues at one or more points along the metabolic pathway. Both of these conditions are commonly present in the same person, and it is unclear which abnormality, if either, is the primary cause of the disease (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

Classification
The current classification system includes four groups: type 1 diabetes, type 2 diabetes, other specific types (e.g., diabetes caused by infection, drug-induced diabetes), and gestational diabetes mellitus (GDM). A major change proposed by the Expert Committee was a move away from a system that classified the disease by its pharmacologic management to one based on disease etiology (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

Type 1 diabetes includes cases that are primarily caused by pancreatic islet \( \beta \)-cell destruction and prone to ketoacidosis. People with type 1 diabetes usually have an absolute insulin deficiency. Type 1 diabetes includes cases currently thought to be caused by an autoimmune process, as well as those for which the cause is unknown (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

Type 2 diabetes is the most prevalent form of the disease and includes individuals who have insulin resistance and usually relative (rather than absolute) insulin deficiency. Specific etiologies for type 2 diabetes are unknown at this time. It often goes undiagnosed for years because hyperglycemia develops gradually and often is not severe enough for the person to recognize the classic signs of polyuria, polydipsia, and polyphagia. Many people who develop type 2 diabetes are obese or have an increased amount of body fat distributed primarily in the abdominal area. Other risk factors include aging, a sedentary lifestyle, hypertension, and prior gestational diabetes. Type 2 diabetes often has a strong genetic predisposition (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

Pregestational diabetes is the label sometimes given to type 1 or type 2 diabetes that existed before pregnancy. GDM is any degree of glucose intolerance with its onset or first recognition during pregnancy. This definition is appropriate whether or not insulin is used for treatment or whether the diabetes persists after pregnancy. It does not exclude the possibility that the glucose intolerance preceded the pregnancy. Women experiencing gestational diabetes should be reclassified 6 weeks or more after the pregnancy ends (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

An alternative classification used commonly in obstetrics is that of Priscilla White (Table 13-1). This classification is based on duration of disease and vascular damage to retinal, renal, and cardiovascular structures. The ADA classification is preferred today (Moore & Catalano, 2009).

Metabolic Changes Associated with Pregnancy
Normal pregnancy is characterized by complex alterations in maternal glucose metabolism, insulin production, and meta-
bolic homeostasis. During normal pregnancy adjustments in maternal metabolism allow for adequate nutrition for both the mother and the developing fetus. Glucose, the primary fuel used by the fetus, is transported across the placenta through the process of carrier-mediated facilitated diffusion. This means that the glucose levels in the fetus are directly proportional to maternal levels. Although glucose crosses the placenta, insulin does not. By the tenth week of gestation the embryo or fetus secretes its own insulin at levels adequate to use the glucose obtained from the mother. Thus, as maternal glucose levels rise, fetal glucose levels are increased, resulting in increased fetal insulin secretion.

During the first trimester of pregnancy the pregnant woman’s metabolic status is significantly influenced by the rising levels of estrogen and progesterone. These hormones stimulate the β-cells in the pancreas to increase insulin production, which promotes increased peripheral use of glucose and decreased blood glucose, with fasting levels being reduced by approximately 10% (Fig. 13-1, A). There is a concomitant increase in tissue glycogen stores and a decrease in hepatic glucose production, which further encourage lower fasting glucose levels. As a result of these normal metabolic changes of pregnancy, women with insulin-dependent diabetes are prone to hypoglycemia (low blood glucose) during the first trimester.

During the second and third trimesters pregnancy exerts a diabetogenic effect on the maternal metabolic status. Because of the major hormonal changes, there is decreased tolerance to glucose, increased insulin resistance, decreased hepatic glycogen stores, and increased hepatic production of glucose. Increasing levels of human chorionic somatomammotropin, estrogen, progesterone, prolactin, cortisol, and insulinase increase insulin resistance through their actions as insulin antagonists. Insulin resistance is a glucose-sparing mechanism that ensures an abundant supply of glucose for the fetus. Maternal insulin requirements gradually increase from about 18 to 24 weeks of gestation to about 36 weeks of gestation. At this time insulin requirements usually level off until labor begins (see Fig. 13-1, B and C).

At birth expulsion of the placenta prompts an abrupt decrease in levels of circulating placental hormones, cortisol, and insulinase (see Fig. 13-1, D). Maternal tissues quickly regain their prepregnancy sensitivity to insulin. For the non-breastfeeding mother, the prepregnancy insulin-carbohydrate

### Table 13-1 The White Classification of Diabetes in Pregnancy

<table>
<thead>
<tr>
<th>CLASS</th>
<th>AGE AT ONSET (yr)</th>
<th>DURATION (yr)</th>
<th>COMPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Any</td>
<td>Any</td>
<td>Diagnosed before pregnancy; no vascular disease</td>
</tr>
<tr>
<td>B</td>
<td>≥20 or &lt;10</td>
<td></td>
<td>No vascular disease</td>
</tr>
<tr>
<td>C</td>
<td>10-19 or 10-19</td>
<td></td>
<td>No vascular disease</td>
</tr>
<tr>
<td>D</td>
<td>&lt;10 or ≥20</td>
<td></td>
<td>Background retinopathy only or hypertension</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td>Calcification of pelvic arteries (no longer used)</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td>Nephropathy (&gt;500 mg of proteinuria per day)</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td>Arteriosclerotic heart disease</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td></td>
<td>Proliferative retinopathy or vitreous hemorrhage</td>
</tr>
<tr>
<td>T</td>
<td></td>
<td></td>
<td>After renal transplantation</td>
</tr>
</tbody>
</table>

balance usually returns in about 7 to 10 days (see Fig. 13-1, E). Lactation uses maternal glucose; thus the breastfeeding mother’s insulin requirements remain low as long as she is nursing (see Fig. 13-1, E). On completion of weaning the mother’s prepregnancy insulin requirement is reestablished (see Fig. 13-1, F).

Pregestational Diabetes Mellitus

Approximately 2 per 1000 pregnancies are complicated by preexisting diabetes. Women with pregestational diabetes may have either type 1 or type 2 diabetes, with type 1 now the more common diagnosis. As the incidence of type 2 diabetes increases in the general population, it may become the more prevalent form of the disease in childbearing-age women. Fetal risks for women with type 1 and type 2 diabetes are about the same. However, maternal risks tend to be greater in women with type 1 diabetes. Their blood sugar control is usually more erratic because of their absolute lack of insulin production. They also are more likely to have the vascular, retinal, or renal complications that often accompany the disease because their duration of illness is usually longer than that of women with type 2 diabetes. Almost all women with pregestational diabetes are insulin dependent during pregnancy.

Preconception Counseling

Preconception counseling, which is recommended by the American Diabetes Association (ADA) and the American College of Obstetricians and Gynecologists (ACOG) for all women of reproductive age with diabetes, is associated with improved pregnancy outcomes (ADA, 2008b; ACOG, 2005).

Under ideal circumstances the woman with pregestational diabetes is counseled before the time of conception to evaluate the mother’s health status, plan the optimal time for pregnancy, establish glycemic control before conception, and diagnose any vascular complications of diabetes (retinopathy, nephropathy, neuropathy, and cardiovascular disease). However, it is estimated that fewer than one third of women in the United States with diabetes plan their pregnancies and seek preconceptional counseling. Preconception counseling is particularly important because strict metabolic control before conception and in the early weeks of gestation during organogenesis is instrumental in decreasing the risk of congenital anomalies and spontaneous abortion (Box 13-1).

Preconception counseling should also include information regarding agents currently used for glycemic control. Because of insufficient data, the use of oral antidiabetes agents is currently not recommended by the ADA (2008b) or ACOG (2001a) for use during pregnancy. However, the use of these agents is a focus of continued research to determine the efficacy and safety before and during pregnancy. Some physicians may recommend that oral hypoglycemic agents be discontinued in the preconception period in women with type 2 diabetes. These women are started on insulin before pregnancy when the pregnancy is planned or as soon as the pregnancy is diagnosed when it is unplanned. (Cunningham et al, 2005)

The woman’s partner should be included in the counseling to assess the couple’s level of understanding related to the effects of pregnancy on the diabetic condition and the potential complications of pregnancy as a result of diabetes. The couple also should be informed of the anticipated alterations in management of diabetes during pregnancy and the need for a multidisciplinary team approach to health care. Financial implications of diabetic pregnancy and other demands related to frequent maternal and fetal surveillance should be discussed. Contraception is an important aspect of preconception counseling to assist the couple in planning effectively for pregnancy.

Maternal Risks and Complications

Although maternal morbidity and mortality rates have improved significantly, the pregnant woman with diabetes remains at risk for the development of significant complications during pregnancy. Risk assessment is best done by evaluating the woman’s blood glucose control, the length of time since diagnosis of the woman’s diabetes, and the presence of vascular disease. Women with poor glycemic control, longer durations of diabetes, and vascular disease have inferior pregnancy outcomes.

Women with pregestational diabetes who have poor glycemic control (defined as a glycosylated hemoglobin value greater than 6 standard deviations above the mean) around the time of conception and in the early weeks of pregnancy have a twofold increased incidence of early pregnancy loss (28%). Women with good glycemic control before conception and in the first trimester are no more likely to have a miscarriage than women without diabetes.

Poor glycemic control later in pregnancy increases the rate of fetal macrosomia (excessive growth; defined as a birth weight greater than 4000 to 4500 g). Macrosomia occurs in up to 50% in women with gestational diabetes and 40% of type 1 and type 2 diabetic pregnancies (Landon, Catalano, & Gabbe, 2007). These large infants tend to have a disproportionate increase in shoulder and trunk size; consequently the risk of shoulder dystocia is greater in these babies than in other macrosomic infants. Thus women with diabetes face an increased likelihood of cesarean birth (because of failure to progress or failure of descent) or operative vaginal birth (birth using episiotomy, forceps, or vacuum extraction).

Hypertensive disorders such as preeclampsia or eclampsia occur much more frequently in women with pregestational diabetes, particularly in those who already have renal dysfunction. Preterm labor/birth also is more likely to occur, especially with more severe diabetes, elevated glucose levels, and genital or urinary tract infections. The risk for induced preterm birth also is greater in women with pregestational diabetes (Landon, Catalano, & Gabbe, 2007).

Hydramnios (polyhydramnios; amniotic fluid in excess of 2000 ml) occurs about 10 times more often in diabetic pregnancies than in nondiabetic pregnancies. The etiology for hydramnios has been theorized as increased amniotic glucose
concentration or fetal hyperglycemia and polyuria; however, it is still unknown (Cunningham et al, 2005). Overdistention of the uterus caused by hydramnios increases the possibility of compression of maternal abdominal blood vessels (vena cava and aorta), causing supine hypotension. Premature rupture of the membranes, preterm labor, and postpartum hemorrhage are also associated with hydramnios.

Infections are more common and more serious in pregnant women with diabetes. Disorders of carbohydrate metabolism alter the body's normal resistance to infection. The inflammatory response, leukocyte function, and vaginal pH are all affected. Vaginal infections, particularly monilial vaginitis, are more common. Urinary tract infections also are more prevalent. Infection in the pregnant woman with diabetes may be critical, causing increased insulin resistance, which may result in ketoacidosis. Postpartum infection is also more common among women who are insulin dependent.

Ketoacidosis (accumulation of ketones in the blood resulting from hyperglycemia and leading to metabolic acidosis) occurs most often during the second and third trimesters when the diabetogenic effect of pregnancy is the greatest. When the maternal metabolism is stressed by illness or infection, the woman with diabetes is at increased risk for diabetic ketoacidosis (DKA). The use of tocolytic drugs such as terbutaline (Brethine) to treat premature labor may also contribute to the risk for hyperglycemia and subsequent DKA. DKA may also occur because of the woman's failure to take insulin appropriately. The onset of previously undiagnosed diabetes during pregnancy is another cause of DKA. It may occur with blood glucose levels barely exceeding 200 mg/dl compared with 300 to 350 mg/dl in the nonpregnant state. In response to stress factors such as infection or illness, hyperglycemia occurs as a result of increased hepatic glucose production and decreased peripheral glucose use. Stress hormones, which act to impair insulin action and further contribute to insulin deficiency, are released. Fatty acids are mobilized from fat stores into the circulation. As they are oxidized, ketone bodies are released into the peripheral circulation. The woman's buffering system is unable to compensate, and metabolic acidosis develops. The excessive blood glucose and ketone bodies result in osmotic diuresis, with subsequent loss of fluid and electrolytes, volume depletion, and cellular dehydration. Prompt treatment of DKA is necessary to avoid maternal coma or death. Ketoacidosis at any time during pregnancy can lead to intrauterine fetal death; it is also a cause of preterm labor. The fetal mortality rate is approximately 20% with maternal ketoacidosis (Cunningham et al, 2005).

The risk of hypoglycemia is also increased. Early in pregnancy, when hepatic production of glucose is diminished and peripheral use of glucose is enhanced, hypoglycemia occurs frequently, often during sleep. Later in pregnancy hypoglycemia may also result as insulin doses are adjusted to maintain euglycemia (a normal blood glucose level). Women with a prepregnancy history of severe hypoglycemia are at increased risk for severe hypoglycemia during gestation. Mild-to-moderate hypoglycemic episodes do not appear to have significant deleterious effects on fetal well-being. The long-term fetal effects of severe maternal hypoglycemia are as yet uncertain.

**Fetal and Neonatal Risks and Complications**

Despite the improvements in care of pregnant women with diabetes, sudden and unexplained stillbirth is still a significant risk (Landon, Catalano, & Gabbe, 2007). The other major cause of perinatal deaths in pregnancies complicated by diabetes is congenital anomalies. The incidence of congenital anomalies in infants born to women with diabetes is 6% to 10%, a twofold to fourfold increase over that of the general population (Reece & Homko, 2007). Central nervous system (CNS) defects (e.g., anencephaly, open spina bifida) are increased tenfold (Reece & Homko, 2007). Cardiac defects, especially ventricular septal defects (VSDs) and transposition of the great vessels, are increased fivefold (Landon, Catalano, & Gabbe, 2007). Caudal regression (also called caudal dysplasia or sacral agenesis) is a fetal anomaly found 200 to 400 times more often in pregnancies of mothers with diabetes (Landon, Catalano, & Gabbe, 2007).

Other problems that cause significant neonatal morbidity include macrosomia, hypoglycemia, respiratory distress syndrome, polycythemia, and hyperbilirubinemia (Cunningham et al, 2005; Landon, Catalano, & Gabbe, 2007). See Chapter 27 for further discussion of neonatal risks associated with maternal diabetes.

**Nursing Care Management**

Effective management of diabetic pregnancy depends on the woman's adherence to a plan of care (see Nursing Process box). For the woman to care for her diabetes on a daily basis, she must have an adequate understanding of her disease and the prescribed regimen. Thus with the initial prenatal visit the woman's knowledge regarding diabetes and pregnancy, potential maternal and fetal complications, and the plan of care are assessed. With subsequent visits follow-up assessments are completed. Data from these assessments are used to identify the woman's specific learning needs. The support person's knowledge of diabetes is also assessed, and teaching needs are identified.

**Assessment of Past Glycemic Control**

For the woman with pregestational type 1 or type 2 diabetes, the glycosylated hemoglobin $A_1c$ level may be measured. With prolonged hyperglycemia some of the hemoglobin remains saturated with glucose for the life of the red blood cell. Therefore a test for glycosylated hemoglobin provides a measurement of glycemic control over time, specifically over the previous 8 to 12 weeks. Regular measurements of glycosylated hemoglobin provide data for altering the treatment plan and lead to improvement of glycemic control. A hemoglobin $A_1c$ of 5% to 6% is the desired goal, which correlates to an average glucose of 90 to 120 mg/dl (Gabbe, Carpenter, & Garrison, 2007).

Fasting blood glucose and random (1 to 2 hours after eating) glucose levels may be assessed during antepartum visits (Fig. 13-2). Blood glucose self-monitoring records should also be reviewed.

**Antepartum**

Because of her high risk status, the woman with diabetes is monitored more frequently than low risk pregnant women. In the past routine hospitalization for management of diabetes...
### NURSING PROCESS: PREGESTATIONAL DIABETES

#### Assessment
When a pregnant woman with diabetes initiates prenatal care, a thorough evaluation of her health status is completed. The assessment includes:

**History**
- Routine prenatal history
- Onset and course of diabetes
- Degree of glycemic control before pregnancy

**Interview**
- Learning needs:
  - Diabetes and pregnancy
  - Potential fetal complications
  - Plan of care
- Emotional status:
  - Coping with pregnancy superimposed on preexisting diabetes
  - Dealing with “high risk” status
  - Fear of maternal and fetal complications

**Support system:*
- Identifying significant persons and their roles
- Assessing reactions to the pregnancy and the management plan
- Assessing involvement in the treatment regimen
- Reviewing socioeconomic factors

#### Physical Examination
Current health status
- Routine prenatal examination

**Effects of diabetes on pregnancy**
- Baseline electrocardiogram to assess cardiovascular status
- Evaluation for retinopathy with follow-up as needed by an ophthalmologist each trimester and more often if retinopathy is diagnosed
- Blood pressure: increased risk for preeclampsia
- Weight gain
- Fundal height: abnormal increase in size for dates may indicate hydramnios or fetal macrosomia

#### Laboratory Tests
- Glycosylated hemoglobin (glycemic control over time)
- Baseline renal function with a 24-hour urine collection for total protein excretion and creatinine clearance
- Urinalysis and culture: initial prenatal visit and throughout the pregnancy (urinary tract infections are common in diabetic pregnancy)
- Urine (ketones)
- Thyroid function tests may be performed (see later discussion of thyroid disorders)

#### Nursing Diagnoses
Nursing diagnoses for the woman with pregestational diabetes include the following:

**Deficient Knowledge Related to**
- diabetic pregnancy, management, and potential effects on pregnant woman and fetus

**Anxiety, Fear, Dysfunctional Grieving, Powerlessness, Disturbed Body Image, Situational Low Self-Esteem, Spiritual Distress, Ineffective Role Performance, Interrupted Family Processes Related to**
- stigma of being labeled diabetic
- effects of diabetes and its potential sequelae on the pregnant woman and the fetus

**Risk for Injury to Fetus Related to**
- uteroplacental insufficiency
- birth trauma

**Risk for Injury to Mother Related to**
- improper insulin administration
- hypoglycemia and hyperglycemia
- cesarean or operative vaginal birth
- postpartum infection

#### Plan of Care
A plan of care is developed with the woman in collaboration with the multidisciplinary care team.

#### Expected Outcomes
Expected outcomes of care for the pregnant woman with pregestational diabetes include that she will do the following:
- Demonstrate or verbalize understanding of diabetic pregnancy, the plan of care, and the importance of glycemic control
- Achieve and maintain glycemic control
- Demonstrate effective coping
- Experience no complications (maternal morbidity or mortality)
- Give birth to a healthy infant at term

#### Interventions

**Antepartum**
- Schedule routine prenatal visits every 1 to 2 weeks in first and second trimesters and one to two times per week in the third trimester.

**Education:**
- Home glucose monitoring
- Importance of a consistent daily schedule to maintain tight glucose control
- Importance of good foot care and general skin care
- Diet: Nutrition counseling by registered dietitian
- Insulin therapy

**Exercise as prescribed by the primary health care provider**

**Fetal surveillance**
- Sonograms (to determine gestational age and fetal growth; estimate fetal weight; detect hydramnios, macrosomia, and anomalies)
- Maternal serum alpha-fetoprotein (to detect neural tube defects)
- Fetal echocardiography (to detect cardiac anomalies)
- Doppler studies of the umbilical artery (to detect placental compromise)
- Kick counts
- Nonstress tests (to evaluate fetal well-being)

**Intrapartum**
- Monitor closely to prevent complications (dehydration, hypoglycemia, hyperglycemia).
- Determine blood glucose hourly.
- Monitor fetal heart rate continuously.
- Observe for fetal dystocia.
- Ensure that a neonatal care provider is present at birth.
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**NURSING PROCESS: PREGESTATIONAL DIABETES—cont’d**

**Postpartum**

- Monitor blood glucose levels and adjust insulin dosage as appropriate.
- Observe for complications (preeclampsia, hemorrhage, infection).
- Encourage breastfeeding.
- Provide family planning education.

**Evaluation**

Evaluation of the effectiveness of care of the pregnant woman with pregestational diabetes is based on the previously stated outcomes, which are closely associated with the degree of maternal metabolic control during pregnancy.

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**Table 13-2 Target Blood Glucose Levels During Pregnancy**

<table>
<thead>
<tr>
<th>TIME OF MEASUREMENT</th>
<th>TARGET GLUCOSE LEVEL (mg/dl)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>60-90</td>
</tr>
<tr>
<td>Premeal (lunch, dinner)</td>
<td>60-105</td>
</tr>
<tr>
<td>Bedtime</td>
<td>90-120</td>
</tr>
<tr>
<td>Postmeal</td>
<td></td>
</tr>
<tr>
<td>1 hr</td>
<td>100-120</td>
</tr>
<tr>
<td>2 hr</td>
<td>90-120</td>
</tr>
<tr>
<td>2 AM to 4 AM</td>
<td>60-120</td>
</tr>
</tbody>
</table>


*Add 15% if plasma values are used.

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such as insulin dose changes was common. With the availability of better home glucose monitoring and the growing reluctance of third-party payers to reimburse for hospitalization, pregnant women with diabetes are now generally managed as outpatients. Some patient and family education and maternal and fetal assessment may be done in the home, depending on the woman’s insurance coverage and care provider preference.

Achieving and maintaining euglycemia (normal blood glucose level; also called normoglycemia) with blood glucose levels in the range of 60 to 120 mg/dl (Table 13-2) is the primary goal of medical therapy for the pregnant woman with diabetes. Euglycemia is achieved through a combination of diet, insulin, exercise, and blood glucose determinations. Providing the woman with the knowledge, skill, and motivation she needs to achieve and maintain excellent blood glucose control is the primary nursing goal.

Achieving euglycemia requires commitment of the woman and her family to make the necessary lifestyle changes, which can sometimes seem overwhelming. Maintaining tight blood glucose control necessitates that the woman follow a consistent daily schedule. She must go to bed and get up, eat, exercise, and take insulin at the same time every day. Blood glucose is measured frequently to determine how well the major components of therapy (diet, insulin, and exercise) are working together to control blood glucose levels.

The woman should wear an identification bracelet at all times and carry insulin, syringes, and "glucose boosters" with her whenever she is away from home (see Community Focus box). She should be given written instructions for reporting the development of problems such as nausea, vomiting, and infections; and directions for reaching her health care provider by phone at night and on weekends and holidays (see Guidelines box).

Because the woman with diabetes is at risk for infections, eye problems, and neurologic changes, foot care and general skin care are important. A daily bath that includes good perineal and foot care is important. Lotions, creams, or oils can be applied to dry skin. Tight clothing should be avoided. Shoes or slippers that fit properly should be worn at all times and are best worn with socks or stockings. Feet should be inspected regularly, toenails should be cut straight across, and profes-
Dietary management during diabetic pregnancy must be tailored with a normal pregnancy, prevent ketoacidosis, and minimize wide fluctuations of blood glucose levels.

Energy needs are usually calculated on the basis of 30 to 35 calories per kilogram of ideal body weight, with the average diet including 2200 calories (first trimester) to 2500 calories (second and third trimesters). Total calories may be distributed among three meals and one evening snack or, more commonly, three meals and at least two snacks. Meals should be eaten on time and never skipped. Snacks must be carefully planned in accordance with insulin therapy to avoid fluctuations in blood glucose levels. A large bedtime snack of at least 25 g of carbohydrate with some protein is recommended to help prevent hypoglycemia and starvation ketosis during the night.

The ratio of carbohydrates, protein, and fat is important to meet the metabolic needs of the woman and the fetus. Approximately 40% to 50% of the total calories should be from carbohydrates, with a minimum of 250 g per day. Simple carbohydrates are limited; complex carbohydrates that are high in fiber content are recommended because the starch and protein in such foods help regulate the blood glucose level by more sustained glucose release. Protein intake should constitute 20% of the total kilocalories; 30% to 40% of the daily caloric intake should come from fat, with no more than 10% saturated fats (see Home Care box). Weight gain for most women should be about 12 kg during the pregnancy (Gilbert, 2007).

Exercise Although exercise enhances the utilization of glucose and decreases insulin need in nonpregnant women with diabetes, there are limited data regarding exercise during pregnancy. Any prescription of exercise during pregnancy for a woman with diabetes should be done by the primary health care provider and should be monitored closely to prevent complications. For women with vasculopathy only mild exercise is recommended because exercise causes a redistribution of blood flow, which increases the potential for ischemic injury to the placenta and already compromised organs. Women with vasculopathy typically depend completely on exogenous insulin and are at greater risk for wide fluctuations in blood glucose levels and ketoacidosis, which can be worsened by exercise.

When exercise is prescribed by the health care provider as part of the treatment plan, careful instructions are given. The exercise need not be vigorous to be beneficial: 15 to 30 minutes of walking four to six times a week is satisfactory for most pregnant women. Other exercises that may be recommended include non–weight-bearing activities such as arm ergometry or use of a recumbent bicycle. The best time for exercise is after meals when the blood glucose level is rising. To monitor the effect of insulin on blood glucose levels, the woman can measure blood glucose before, during, and after exercise (see also Home Care box: Exercise Tips for Pregnant Women in Chapter 11).

Insulin Therapy Adequate insulinization is the primary factor in the maintenance of euglycemia during pregnancy, thus ensuring proper glucose metabolism of the mother and fetus. Insulin requirements during pregnancy change dramatically as the pregnancy progresses, necessitating frequent adjustments in insulin dosage. In the first trimester, little or
HOMECARE

**Dietary Management of Diabetic Pregnancy**

- Follow the prescribed diet plan.
- Eat a well-balanced diet, including daily food requirements for a normal pregnancy.
- Divide daily food intake between three meals and two to four snacks, depending on individual needs.
- Eat a substantial bedtime snack to prevent a severe drop in blood glucose level during the night.
- Limit the intake of fats if weight gain occurs too rapidly.
- Take daily vitamins and iron as prescribed by the health care provider.
- Avoid foods high in refined sugar.
- Eat consistently each day; never skip meals or snacks.
- Reduce the intake of saturated fat and cholesterol.
- Eat foods high in dietary fiber.
- Avoid alcohol and caffeine.

no change occurs in prepregnancy insulin requirements; however, insulin dosage may need to be decreased because of hypoglycemia. During the second and third trimesters, because of insulin resistance, the dosage must be increased to maintain target glucose levels.

The goal of administration of exogenous insulin during pregnancy is to achieve diurnal glucose levels that are similar to those of a nondiabetic pregnant woman. The insulin regimen for a pregnant woman differs from that which is effective in the nonpregnant state in combinations and timing of insulin injections (Landon, Catalano, & Gabbe, 2007). Thus, for the woman with type 1 pregestational diabetes who has typically been accustomed to one injection per day of intermediate-acting insulin, multiple daily injections of mixed insulin are a new experience. The woman with type 2 diabetes previously treated with oral hypoglycemics is faced with the task of learning to self-administer injections of insulin. The nurse is instrumental in education and support with regard to insulin administration and the adjustment of insulin dosage to maintain euglycemia (see Patient Teaching box).

Many types of insulin are available today. Beef and pork insulin have largely been replaced by biosynthetic human insulin preparations (Humulin or Novolin), which are less likely to cause antibody formation. Patients with new onset of diabetes are almost always started on this type of insulin. Lispro (Humalog) is a rapid-acting insulin preparation that has an onset of action within 25 minutes of injection and peaks in 30 minutes to 1½ hours. Advantages of lispro include convenience; because it is injected immediately before mealtime, there is less hyperglycemia after meals and fewer hypoglycemic episodes. Lispro insulin has a total duration of action of 4 to 5 hours (Landon, Catalano, & Gabbe, 2007) (Table 13-3). Insulin-dependent diabetes is managed in most women with two to three injections per day. Usually two thirds of the daily insulin dose, with longer-acting (NPH) and short-acting (regular or Lispro) insulin combined in a 2 : 1 ratio, is given before breakfast. The remaining one third, again a combination of longer- and short-acting insulin, is administered in the evening before dinner. To reduce the risk of hypoglycemia during the night, separate injections often are administered, with short-acting insulin given before dinner, followed by longer-acting insulin at bedtime. An alternative insulin regimen that works well for some women is to administer short-acting insulin before each meal and longer-acting insulin at bedtime (Landon, Catalano, & Gabbe, 2007).

Although subcutaneous insulin injections are most commonly used, increasing numbers of pregnant women are using continuous insulin infusion systems. The insulin pump is designed to mimic more closely the function of the pancreas in secreting insulin (Fig. 13-3). This portable, battery-powered

### Procedure for Mixing Intermediate-Acting (NPH) and Short-Acting (Regular) Insulin

1. Wash hands thoroughly and gather supplies. Be sure that the insulin syringe corresponds to the concentration of insulin you are using.
2. Check insulin bottle to be certain that it is the appropriate type and check the expiration date.
3. Gently rotate (do not shake) the insulin vial to mix the insulin.
4. Wipe off rubber stopper of each vial with alcohol.
5. Draw into syringe the amount of air equal to total dose.
6. Inject air equal to NPH dose into NPH vial. Remove syringe from vial.
7. Inject air equal to regular insulin dose into regular insulin vial.
8. Invert regular insulin bottle and withdraw regular insulin dose.
9. Without adding more air to NPH vial, carefully withdraw NPH dose.

### Table 13-3  Insulin Administration During Pregnancy: Expected Time of Action

<table>
<thead>
<tr>
<th>TYPE OF INSULIN</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lispro (rapid acting)</td>
<td>Within 15 min</td>
<td>2-3 hr</td>
<td>3-4 hr</td>
</tr>
<tr>
<td>Regular (short acting)</td>
<td>30 min</td>
<td>3-4 hr</td>
<td>6-8 hr</td>
</tr>
<tr>
<td>Intermediate acting</td>
<td>2-4 hr</td>
<td>4-12 hr</td>
<td>12-24 hr</td>
</tr>
<tr>
<td>Long acting</td>
<td>3-4 hr</td>
<td>14-24 hr</td>
<td>24-36 hr</td>
</tr>
</tbody>
</table>

During the second and third trimesters, separate injections often are administered, with short-acting insulin given before dinner, followed by longer-acting insulin at bedtime. An alternative insulin regimen that works well for some women is to administer short-acting insulin before each meal and longer-acting insulin at bedtime (Landon, Catalano, & Gabbe, 2007).
device is worn like a pager during most daily activities. The pump infuses regular insulin at a set basal rate and has the capacity to deliver up to four different basal rates in 24 hours. It also delivers bolus doses of insulin before meals to control postprandial blood glucose levels. A fine-gauge plastic catheter is inserted into subcutaneous tissue, usually in the abdomen, and attached to the pump syringe by connecting tubing. The subcutaneous catheter and connecting tubing are changed every 2 to 3 days. Although the insulin pump is convenient and generally provides good glycemic control, complications such as DKA, infection, or hypoglycemic coma can still develop. Use of the insulin pump requires a knowledgeable, motivated patient; skilled health care providers; and 24-hour availability of emergency assistance (Landon, Catalano, & Gabbe, 2007).

**Monitoring Blood Glucose Levels** Blood glucose testing at home is the commonly accepted method for monitoring blood glucose levels. It is the most important tool available to the woman to assess her degree of glycemic control. In addition, this monitoring provides motivation to continue the prescribed treatment plan. The data obtained facilitate interaction with the health care team in maintaining glycemic control and minimizing fetal risk (see Home Care box).

Women with pregestational diabetes are often familiar with self-monitoring of blood glucose levels because it is typically included in the management plan for type 1 and some cases of type 2 diabetes. However, a thorough assessment of the woman's knowledge and skill related to blood glucose testing is essential to ensure accurate monitoring of glucose levels during pregnancy. The nurse observes the woman performing blood glucose monitoring to determine her accuracy and comfort with the system. The family is included in the assessment and in subsequent instruction.

Glucometers incorporate memory to store a large number of readings; however, the woman is still encouraged to keep written records of glucose levels. She should bring her written records, her meter containing stored test results, or both with her to each appointment. It is important that the monitoring equipment be checked for accuracy at intervals by comparing the woman’s results on her machine with the results of a laboratory test done at the same time on a capillary whole blood sample.

Blood glucose levels are routinely measured at various times throughout the day such as before breakfast, lunch, and dinner; 2 hours after meals; at bedtime; and in the middle of the night. The primary health care provider will determine for each individual woman the number and timing of routine blood glucose determinations. Because hyperglycemia is to be avoided, postprandial measurements are often performed.

**NURSING ALERT** Hyperglycemia will most likely be identified in the 2-hour postprandial values because blood glucose levels peak about 2 hours after a meal.

Special circumstances may necessitate more frequent testing. Women are instructed to check glucose levels at any sign of hypoglycemia or hyperglycemia. When there is any readjustment in insulin dosage or diet, more frequent measurement of blood glucose is warranted. If nausea, vomiting, or diarrhea occurs or if any infection is present, the woman will probably be asked to monitor her blood glucose levels more closely.

Target levels of blood glucose during pregnancy are lower than nonpregnant values. Acceptable fasting levels are generally between 60 and 90 mg/dl, and 2-hour postprandial levels should be less than 120 mg/dl (see Table 13-2) (ADA, 2008b). The woman should be told to report episodes of hypoglycemia (less than 60 mg/dl) and hyperglycemia (greater than 200 mg/dl) to her health care provider immediately so that adjustments in diet or insulin therapy can be made.

Pregnant women with diabetes are much more likely to develop hypoglycemia than hyperglycemia because the goal of therapy is to maintain the blood glucose in a narrow, low-normal range of 60 to 120 mg/dl. Although a blood glucose level greater than 120 mg/dl is considered too high for a pregnant woman, it will not produce the classic signs and symptoms of hyperglycemia. However, many women will have signs
and symptoms of hypoglycemia with blood glucose levels below 60 mg/dl. Most episodes of mild or moderate hypoglycemia can be treated with oral intake of 10 to 15 g of simple carbohydrates (see Guidelines box, p. ••). If severe hypoglycemia occurs in which the woman experiences a decrease in or loss of consciousness or an inability to swallow, she will require a parenteral injection of glucagon or intravenous (IV) glucose. Because hypoglycemia can develop rapidly and impaired judgment can be associated with even moderate episodes, it is vital that family members, friends, and work colleagues be able to recognize signs and symptoms quickly and initiate proper treatment if necessary.

Although hyperglycemia is less likely to occur, it is still a dangerous complication. Hyperglycemia can rapidly progress to DKA. Women and their family members should be alert for signs and symptoms of hyperglycemia, especially when infections or other illnesses occur (see Home Care box).

**HOME CARE**

**What to Do When Illness Occurs**

- Be sure to take insulin even though appetite and food intake may be less than normal. (Insulin needs are increased with illness or infection.)
- Call the health care provider and relay the following information:
  - Symptoms of illness (e.g., nausea, vomiting, diarrhea)
  - Fever
  - Most recent blood glucose level
  - Urine ketones
  - Time and amount of last insulin dose
- Increase oral intake of fluids to prevent dehydration.
- Rest as much as possible.
- If unable to reach health care provider and blood glucose exceeds 200 mg/dl with urine ketones present, seek emergency treatment at the nearest health care facility.
- Do not attempt to self-treat.

**Complications Requiring Hospitalization** Occasionally hospitalization may be required to regulate insulin dosage and stabilize glucose levels. Hospitalization offers a controlled situation to initiate and regulate insulin therapy while providing opportunity for intensive education in self-administration of insulin and regulation of blood glucose. Infection, which can lead to hyperglycemia and DKA, is an indication for hospitalization, regardless of gestational age. Hospitalization during the third trimester for closer maternal and fetal observation may be indicated for women whose diabetes is poorly controlled or who also have hypertension.

**Determination of Birth Date and Mode of Delivery** Today the majority of diabetic pregnancies are allowed to progress to term (38 to 40 weeks of gestation), as long as good metabolic control is maintained and all parameters of antepartum fetal surveillance remain within normal limits. Reasons to proceed with delivery before term include poor metabolic control, worsening hypertensive disorders, fetal macrosomia, prior stillbirth, or fetal growth restriction (Landon, Catalano, & Gabbe, 2007).

Many practitioners plan labor induction between 38 and 40 weeks provided maternal glucose levels are well controlled. To confirm fetal lung maturity before birth, an amniocentesis may be performed in pregnancies of less than 39 weeks. For the pregnancy complicated by diabetes, fetal lung maturation is better predicted by the amniotic fluid phosphatidylglycerol than by the lecithin/sphingomyelin (L/S) ratio. If the fetal lungs are still immature, birth should be postponed as long as the results of fetal assessment remain reassuring. Induced labor and birth despite poor fetal lung maturity may be essential when testing suggests fetal compromise or if preeclampsia, deteriorating vision resulting from proliferative retinopathy, or worsening renal function develops.

The mode of birth for women with pregestational diabetes is a subject of controversy among practitioners. The rate of cesarean births for these women is high, around 45%. Cesarean birth is often performed when antepartum testing suggests a compromised fetal status or if the estimated fetal weight is 4000 to 4500 g. When induction of labor is desired and the cervix fails to respond, cesarean birth often is necessary (Landon, Catalano, & Gabbe, 2007).

**Intrapartum**

During the intrapartum period the woman with pregestational diabetes must be monitored closely to prevent complications related to dehydration, hypoglycemia, and hyperglycemia. Most women use large amounts of energy (calories) to accomplish the work and manage the stress of labor and birth; however, this calorie expenditure varies with the individual. Blood glucose levels and hydration must be controlled carefully during labor. An IV line is inserted for infusion of a maintenance fluid such as lactated Ringer’s solution or 5% dextrose in lactated Ringer’s solution. Insulin may be administered by continuous infusion or intermittent subcutaneous injection.

Deteriorations of blood glucose are made every hour, and fluids and insulin are adjusted to maintain blood glucose levels between 70 and 90 mg/dl or capillary whole blood glucose levels at 60 to 90 mg/dl. It is essential that these target glucose levels be maintained because hyperglycemia during labor can precipitate metabolic problems in the neonate, particularly hypoglycemia.

During labor continuous fetal heart monitoring is necessary. The mother should assume an upright or side-lying position during bed rest in labor to prevent supine hypotension because of a large fetus or polyhydramnios. Labor is allowed to progress without intervention, provided normal rates of cervical dilation, fetal descent, and fetal well-being are maintained. Failure to progress may indicate a macrosomic infant and cephalopelvic disproportion, necessitating cesarean birth. The woman is observed and treated during labor for diabetic complications such as hyperglycemia, ketosis, ketoacidosis, and glycosuria. During second-stage labor the nurse should be alert for the possibility of shoulder dystocia if delivery of a macrosomic infant is attempted and be prepared to assist with maneuvers to free the fetal shoulder that is lodged behind the symphysis pubis (see Chapter 19). A neonatologist, pediatri-
B

The new mother needs information about family planning and contraception. Family planning is important for all women, but it is essential for the woman with diabetes to safeguard her own health and to promote optimal outcomes in future pregnancies. Because excellent glucose control at conception is crucial for all women with diabetes, the importance of conscientiously using a reliable contraceptive method until another pregnancy is desired should be stressed. No one best form of contraception exists for women with diabetes. Instead emphasis should be placed on consistent use of a reliable and effective birth control method. The risks and benefits of contraceptive methods should be discussed with the mother and her partner before discharge from the hospital.

The barrier methods are often recommended as safe, inexpensive options that have no inherent risks for women with diabetes (Landon, Catalano, & Gabbe, 2007). However, barrier methods are not as effective or convenient as some other forms of contraception.

Use of oral contraceptives is controversial because of the risk of thromboembolic events and myocardial infarction and the effect on carbohydrate metabolism. In women without vascular disease or other risk factors, combination low-dose oral contraceptives may be prescribed. Close monitoring of blood pressure and lipid levels is necessary to detect complications (Landon, Catalano, & Gabbe, 2007). Progestin-only oral contraceptives can be used because they minimally affect carbohydrate metabolism (Cunningham et al, 2005).

Some health care providers are reluctant to use intrauterine devices (IUDs) in women with diabetes because of concerns about infection. However, these women have used this method successfully.

Opinion is divided about the use of long-acting parenteral or implantable progestins such as Depo-Provera. Some authorities recommend their use, especially in women who may not be compliant with daily dosing of oral contraceptives or appropriate follow-up care. Others believe that these methods may adversely affect diabetic control (Landon, Catalano, & Gabbe, 2007).

The woman and her partner should be informed that the risks associated with pregnancy increase with the duration and severity of the diabetic condition and that pregnancy may contribute to vascular changes associated with diabetes. Therefore sterilization should be discussed with the woman who has completed her family or who has significant vasculopathy (see Nursing Care Plan).

Gestational Diabetes Mellitus

GDM complicates approximately 4% of all pregnancies in the United States and accounts for 90% of all cases of diabetic pregnancy (ADA, 2008a). Prevalence varies by race and ethnicity. GDM is more likely to occur among Hispanic, Native American, Asian, and African-American populations than in Caucasians (Centers for Disease Control and Prevention [CDC], 2007a; Landon, Catalano, & Gabbe, 2007). Women with GDM are at significant risk of developing glucose intolerance later in life; about 50% will be diagnosed as having diabetes within 5 to 10 years. This is especially true of women whose GDM is diagnosed early in pregnancy and who also are
Women with GDM have twice the risk of developing hyperglycemia. When the pancreas is unable to produce sufficient insulin or the insulin is not used effectively, GDM can result. Maternal and fetal risks include increased risk for maternal hypertension and preeclampsia, increased risk for diabetogenic complications such as macrosomia, hydramnios, unexplained stillbirth, miscarriage, or an infant with congenital anomalies. Other factors include hypertensive disorders, recurrent monilial vaginitis, and glucosuria on two consecutive visits to the clinic or office (ADA, 2008a).

The diagnosis of gestational diabetes is usually made during the second half of pregnancy. As fetal nutrient demands rise during the late second and third trimesters, maternal nutrient ingestion induces greater and more sustained levels of blood glucose. At the same time maternal insulin resistance is also increasing as a result of the insulin antagonistic effects of the placental hormones, cortisol and insulinase. Consequently maternal insulin demands rise as much as threefold. Most pregnant women are capable of increasing insulin production to compensate for the insulin resistance and maintain euglycemia. When the pancreas is unable to produce sufficient insulin or the insulin is not used effectively, GDM can result.

**Maternal and Fetal Risks**

Women with GDM have twice the risk of developing hypertensive disorders compared with normal pregnant women. They also have increased risk for fetal macrosomia, which can...
Unit 3  Pregnancy

lead to increased rates of perineal lacerations, episiotomy, and cesarean birth. In addition, fetal macrosomia may be associated with shoulder dystocia and birth trauma. GDM also places the neonate at increased risk for hypoglycemia, hypocalcemia, hyperbilirubinemia, thrombocytopenia, polycythemia, and respiratory distress syndrome.

The overall incidence of congenital anomalies among infants of women with GDM approaches that of the general population because GDM usually develops after week 20 of pregnancy—after the critical period of organogenesis (first trimester) has passed.

Screening for Gestational Diabetes Mellitus

Nurses involved in prenatal care delivery can be instrumental in the identification of women with GDM. Although protocols regarding which women will undergo screening and exactly how the screening will be done vary among care providers, nurses are often responsible for ensuring that the screen is performed on the identified group of women at the proper gestational age. Careful adherence to screening protocols is crucial to correctly identify women with GDM.

ACOG (2001a) recommends that all pregnant women be screened for GDM, either by history, clinical risk factors, or laboratory screening of blood glucose levels (Fig. 13-4). Based on history and clinical risk factors, some women are at such low risk for the development of GDM that glucose testing is neither necessary nor cost-effective (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). This group at low risk includes normal-weight women younger than 25 years who have no family history of diabetes, are not members of an ethnic or a racial group known to have a high prevalence of the disease, and have no previous history of abnormal glucose tolerance or adverse obstetric outcomes usually associated with GDM (ACOG, 2001a; Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). Women at high risk for developing GDM should be screened at the first prenatal visit and again at 24 to 28 weeks of gestation (ADA, 2008b).

Nursing diagnoses and expected outcomes of care for the woman with GDM are basically the same as those for women with pregestational diabetes; however, the time frame for planning may be shortened with GDM because the diagnosis is usually made later in pregnancy.

Interventions

Antepartum

When the diagnosis of gestational diabetes is made, treatment begins immediately, allowing little or no time for the woman and her family to adjust to the diagnosis before they are expected to participate in the treatment plan. This is in contrast to the woman with pregestational diabetes who may have had years to learn about the disease and adapt to dietary modifications, self-monitoring of glucose, and insulin administration. With each step of the treatment plan, the nurse and other health care providers should educate the woman and her family, providing detailed and comprehensive explanations to ensure understanding, participation, and adherence to the necessary interventions. Potential complications should be discussed, and the need for maintenance of euglycemia throughout the remainder of the pregnancy is reinforced. It may be reassuring for the woman and her family to know that GDM typically disappears when the pregnancy is over.

As with pregestational diabetes, the aim of therapy in women with GDM is meticulous blood glucose control. Fasting (preprandial) blood glucose levels should be less than or equal to 105 mg/dl; 1 hour after meals (postprandial) they should be less than or equal to 155; and 2-hour postprandial blood levels should be less than or equal to 145 mg/dl (ADA, 2008b).

Diet  Dietary modification is the mainstay of treatment for GDM. The woman with GDM is placed on a standard diabetic diet immediately on diagnosis. Some authorities recommend fewer calories for overweight or morbidly obese women, believing that such a diet will cause less hyperglycemia and reduce the need for insulin (Landon, Catalano, & Gabbe, 2007). Dietary counseling by a nutritionist is recommended.
Exercise  Exercise in women with GDM appears to be safe. It helps lower blood glucose levels and may be instrumental in eliminating the need for insulin.

Monitoring Blood Glucose Levels Regular blood glucose monitoring is necessary to determine if euglycemia can be maintained by diet and exercise. Women with GDM are encouraged to perform self-monitoring with reflectance meters to adjust the management plan to achieve near-normal glycemia. Testing may be done at fasting, preprandial, and postprandial times with values recorded in a log for review by the health care provider.

Insulin Therapy  Up to 20% of women with GDM require insulin during the pregnancy to maintain adequate blood glucose levels, despite compliance with the prescribed diet. The nurse should never assume that increased blood glucose levels in the woman with GDM have been caused by dietary indiscretion alone without first taking a thorough history.

Women who repeatedly exceed glucose thresholds for fasting and 2-hour postprandial values are usually started on insulin therapy. The woman and her family should be taught the necessary skills to manage insulin administration. The use of oral hypoglycemic agents, commonly used in the treatment of nonpregnant patients, is currently being studied to determine safety for use during pregnancy and the long-term effects of in utero exposure. However, glyburide, a second-generation oral hypoglycemic agent, has been shown not to pass through the placenta. Langer and colleagues (2000) compared the use of glyburide and insulin in women with GDM. They found similar improvement in maternal glucose levels in both groups. Furthermore, the incidence of fetal macrosomia and neonatal hypoglycemia in the two study groups also was similar. Even though oral hypoglycemic agents are becoming more widely used, more studies are recommended before their endorsement for general use in all women with GDM.

Fetal Surveillance  There is no standard recommendation for fetal surveillance in pregnancies complicated by GDM. Women whose blood glucose levels are well controlled by diet are at low risk for fetal death. Many practitioners do not routinely perform antepartum fetal testing on them as long as their fasting and 2-hour postprandial blood glucose levels remain within normal limits and they have no other risk factors. Usually these women are allowed to progress to term and spontaneous labor without intervention. Once the woman reaches 40 weeks of gestation, fetal surveillance once or twice weekly is usually instituted (ACOG, 2001a).

Women with GDM whose blood glucose levels are not well controlled or who require insulin therapy, have hypertension, or have a history of previous stillbirth generally receive more intensive fetal biophysical monitoring. There is no standard recommendation regarding initiation of testing. Nonstress tests and biophysical profiles are often performed weekly, beginning from 32 to 36 weeks of gestation (ACOG, 2001a).

Intrapartum  During labor and birth blood glucose levels are monitored at least every 1 to 2 hours to maintain levels less than 110 mg/dl (ACOG, 2005). Glucose levels within this range will decrease the severity of neonatal hypoglycemia. Women whose GDM has been managed on insulin can be controlled by an infusion of regular insulin during labor. Even though IV fluids containing glucose may be given as maintenance fluids during birth, they should not be given as a bolus to the woman who has GDM. Routine uterine activity and fetal heart rate assessments are done. Although GDM is not an indication for cesarean birth, it may be necessary in the presence of problems such as preeclampsia or macrosomia.

Postpartum  Most women with GDM return to normal glucose levels after childbirth. However, GDM is likely to recur in future pregnancies, and women with GDM are at significant risk of developing glucose intolerance later in life. Assessment for carbohydrate intolerance can be initiated 6 to 12 weeks postpartum or after breastfeeding has stopped and should be repeated at regular intervals throughout the woman’s life. Obesity is a major risk factor for the later development of diabetes. Thus women with a history of GDM, particularly those who are overweight, should be encouraged to make lifestyle changes that include weight loss and exercise to reduce this risk. Because offspring of women with GDM are at risk to develop obesity and diabetes in childhood or adolescence, regular health care for these children is essential.

Thyroid Disorders  Hyperthyroidism  Hyperthyroidism occurs in approximately 2 of every 1000 pregnancies (Mestman, 2007). In 90% to 95% of pregnant women it is caused by Graves’ disease. Other rare but possible causes include toxic nodular goiter and thyroiditis (Mestman, 2007). Clinical manifestations of hyperthyroidism usually begin between 4 to 8 weeks of gestation and involve severe nausea and vomiting. Hyperemesis gravidarum may be diagnosed and is often associated with elevated thyroid hormone levels. Other symptoms are associated with an increased basal metabolic rate and increased sympathetic nervous system activity. Typical symptoms include fatigue, heat intolerance, warm skin, diaphoresis, emotional lability, tremulousness, tachycardia, and a wide pulse pressure. Many of these symptoms also occur with pregnancy; thus the disorder can be difficult to diagnose. Signs that may help differentiate hyperthyroidism from normal pregnancy include unexplained weight loss, onycholysis (loose nails), and a pulse rate greater than 100 beats/min that does not decrease with the Valsalva maneuver. Laboratory findings include an elevated free thyroxine (T4) level and a suppressed serum thyroid-stimulating hormone (TSH) level. Hyperthyroidism is best treated before pregnancy. Moderate and severe hyperthyroidism must be treated during pregnancy; untreated or inadequately treated women may give birth to infants with low birth weight, intrauterine growth restriction (IUGR), hyperthyroidism, prematurity, stillbirth, and central hypothyroidism (Mestman, 2007). Women with hyperthyroidism are also at increased risk of developing severe preeclampsia, congestive heart failure, thyroid storm, miscarriage, placental abruption and infection (Mestman, 2007).

The primary treatment of hyperthyroidism during pregnancy is drug therapy; the medication of choice is propylthiouracil (PTU). Patients generally show clinical improvement within 2 to 6 weeks of beginning therapy, but the medication requires 6 to 8 weeks to reach full effectiveness. During therapy...
iodide, antipyretics, glucocorticoids, and are administered along with high doses of PTU. Potassium is necessary for the treatment of agranulocytosis, which is more common in women over 40 years of age and in those taking high doses of PTU. Symptoms of agranulocytosis are fever, malaise, gingivitis, and sore throat, which should be reported immediately to the health care provider; the woman should stop taking the PTU. Leukopenia of a transient and benign nature may occur as a result of PTU therapy. PTU readily crosses the placenta and may induce fetal hypothyroidism and goiter (Mestman, 2007; Nader, 2009).

β-Adrenergic blockers such as propranolol may be used in women with severe hyperthyroidism symptoms. Long-term use is not recommended because of the potential for IUGR and altered response to anoxic stress, postnatal bradycardia, and hypoglycemia.

Radioactive iodine must not be used in diagnosis or treatment of hyperthyroidism because it may compromise the fetal thyroid. If a mother taking hyperthyroid medication chooses to breastfeed, she needs to be aware that physiologically significant doses of the drug are passed to the infant through the breast milk. The infant’s thyroid status should be monitored periodically so hypothyroidism can be prevented.

In severe cases hyperthyroidism may be treated surgically with subtotal thyroidectomy during the second or third trimester. Because of the increased risk of miscarriage and preterm labor associated with major surgery, this treatment is usually reserved for women with severe disease, those for whom drug therapy proves toxic, and those who are unable to adhere to the prescribed medical regimen. Postoperative hypothyroidism is common, occurring in at least 20% of women with hyperthyroidism.

**NURSING ALERT** A serious but uncommon complication of undiagnosed or partially treated hyperthyroidism is thyroid storm, which may occur in response to stresses such as infection, birth, or surgery. A woman experiencing this emergent condition may have fever, restlessness, tachycardia, vomiting, hypotension, or stupor. Congestive heart failure occurs frequently. Prompt treatment is essential; IV fluids and oxygen are administered along with high doses of PTU. Potassium iodide, antipyretics, glucocorticoids, and β-adrenergic blockers may also be given; sedation may be necessary for extreme restlessness (Mestman, 2007; Nader, 2009).

**Hypothyroidism**

Hypothyroidism during pregnancy is rare because women with this condition are often infertile. Hypothyroidism is usually the result of Hashimoto’s disease (autoimmune thyroiditis), thyroid gland ablation by radiation, previous surgery, or antithyroid medications. Reduced thyroid function because of hypothalamic or pituitary failure is rare, with only a few reported cases. Iodine deficiency in the United States is also rare (Mestman, 2007; Nader, 2009).

Characteristic symptoms of hypothyroidism include fatigue, weight gain, cold intolerance, constipation, cool and dry skin, coarsened hair, and muscle weakness. Laboratory findings during pregnancy include low or low-normal T₄ and T₃ levels and elevated levels of TSH.

Pregnant women with untreated hypothyroidism are at risk for preeclampsia, placental abruption, and stillbirth. Infants born to mothers with hypothyroidism may be of low birth weight but for the most part are healthy, without evidence of thyroid dysfunction.

Thyroid hormone supplements are used to treat hypothyroidism. Levothyroxine (l-thyroxine [Synthroid]) is most often prescribed during pregnancy. As pregnancy progresses, the woman usually requires increased amounts of l-thyroxine. The aim of drug therapy is to maintain the woman’s TSH level within the normal range for pregnant women. Dosage adjustments are made as necessary by measuring TSH levels periodically. Each dosage change should be followed 4 to 6 weeks later by determining the TSH level.

**NURSING ALERT** Pregnant women should be told to take l-thyroxine 2 hours before or after iron tablets because ferrous sulfate lowers the effectiveness of the medication (Cooper et al, 2007).

The fetus depends on maternal thyroid hormones until 12 weeks of gestation, when fetal production begins. Thus maternal hypothyroidism does not cause fetal hypothyroidism. However, maternal treatment of hypothyroidism may result in increased fetal levels of thyroid hormones. Careful monitoring of the neonate’s thyroid status is important to detect any abnormalities.

**Nursing Care**

Education of the pregnant woman with thyroid dysfunction is essential to promote compliance with the plan of treatment. The woman is instructed regarding the disorder and its potential impact on herself and her fetus, the medication regimen and possible side effects, the need for continuing medical supervision, and the importance of compliance. The family is incorporated into the plan of care to foster mutuality and support among the members.

The woman often needs assistance from the nurse in coping with the discomforts and frustrations associated with symptoms of the disorder. For example, the woman with hyperthyroidism who has nervousness and hyperactivity concomitant with weakness and fatigue may benefit from suggestions to channel excess energies into quiet diversional activities such as reading or crafts. Discomfort associated with hypersensitivity to heat (hyperthyroidism) or cold intolerance (hypothyroidism) can be minimized by wearing appropriate clothing, regulating environmental temperatures, and avoiding temperature extremes when possible.

Nutrition counseling with a registered dietitian can provide guidance in selecting a well-balanced diet. The woman with hyperthyroidism who has increased appetite and poor weight gain and the hypothyroid woman who has anorexia and lethargy need counseling to ensure adequate intake of nutritionally sound foods to meet both maternal and fetal needs.
Maternal Phenylketonuria

Phenylketonuria (PKU), a recognized cause of mental retardation, is an inborn error of metabolism caused by an autosomal recessive trait that creates a deficiency in the enzyme phenylalanine hydrolase. Absence of this enzyme impairs the ability of the body to metabolize the amino acid phenylalanine found in all protein foods. Consequently there is toxic accumulation of phenylalanine in the blood, which interferes with brain development and function. PKU affects approximately 1 of every 15,000 infants in the United States (Mayo Clinic Staff, 2007).

All newborns are tested for this disorder soon after birth; prompt diagnosis and therapy with a phenylalanine-restricted diet significantly decreases the incidence of mental retardation. Diet therapy for PKU is recommended to continue throughout life (Mayo Clinic Staff, 2007). Subtle but detrimental effects of elevated levels of phenylalanine on neurologic, behavioral, and intellectual function have been found in women who discontinued treatment in childhood.

The key to prevention of fetal anomalies caused by PKU is the identification of women in their reproductive years who have the disorder. Screening programs during the school years and in the premarital period may help identify individuals with PKU so dietary therapy can be instituted before conception occurs. Before conception these women and their families should be educated about the potential risks to the fetus if phenylalanine levels are not controlled.

Screening for undiagnosed maternal PKU at the first prenatal visit may be warranted, especially in individuals with a family history of the disorder, with low intelligence of uncertain etiology, or who have given birth to microcephalic infants. Although it may be too late to improve the current pregnancy outcome through diet therapy, the woman and her family will be aware of the problem and the necessary treatment should future pregnancies occur.

Normal pregnancy weight gain reduces the incidence of microcephaly and should be encouraged. Adequate protein and vitamin intake early in pregnancy may prevent congenital heart disease even when the blood phenylalanine level is elevated.

Women with PKU have been discouraged from breastfeeding because their milk contains a high concentration of phenylalanine. Infants diagnosed with PKU can be safely breastfed if the amount of breast milk ingested is monitored so that phenylalanine levels do not get too high. Mothers who choose to breastfeed must supplement the infant’s diet with a special milk preparation that contains little or no phenylalanine.

Cardiovascular Disorders

During a normal pregnancy the maternal cardiovascular system undergoes many changes that put a physiologic strain on the heart. The major cardiovascular changes that occur during a normal pregnancy and affect the patient with cardiac disease are increased intravascular volume; decreased systemic vascular resistance; cardiac output changes occurring during pregnancy, labor, and birth; and the intravascular volume changes that occur just after childbirth. The strain is present during pregnancy and continues for a few weeks after birth. The normal heart can compensate for the increased workload; and pregnancy, labor, and birth are generally well tolerated; but the diseased heart is hemodynamically challenged.

If the cardiovascular changes are not well tolerated, cardiac failure can develop during pregnancy, labor, or the postpartum period. In addition, if myocardial disease develops, valvular disease exists, or a congenital heart defect is present, cardiac decompensation (inability of the heart to maintain a sufficient cardiac output) may occur.

From 0.4% to 4% of pregnancies are complicated by heart disease (Grewal, Biswas, & Perloff, 2003), the leading cause of nonobstetric maternal death. The two broad categories of cardiac disease are congenital and acquired. The incidence of acquired disease (e.g., rheumatic heart disease) is decreasing in developed countries. However, pregnancy in women with congenital cardiac disease is increasing because of advances in diagnosis, technology and treatment, which has improved survival rates in these women (Arafeh & Baird, 2006). Cardiac disease ranks fourth overall as a cause of maternal death. A maternal mortality rate of up to 50% is anticipated in women with persistent cardiac decompensation (Arafeh & Baird, 2006). Box 13-2 lists maternal cardiac disease risk groups.

The New York Heart Association (NYHA) classification of functional capacity of patients with heart disease, a widely accepted standard, is as follows (Criteria Committee of the New York Heart Association, 1994):

- **Class I**—Asymptomatic at normal levels of activity
- **Class II**—Symptomatic with ordinary activity
- **Class III**—Symptomatic with less than ordinary activity
- **Class IV**—Symptomatic at rest

**BOX 13-2 Maternal Cardiac Disease Risk Groups**

<table>
<thead>
<tr>
<th>Group I (Mortality Rate 1%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected tetralogy of Fallot</td>
</tr>
<tr>
<td>Pulmonic/tricuspid disease</td>
</tr>
<tr>
<td>Mitral stenosis (classes I and II)</td>
</tr>
<tr>
<td>Patent ductus arteriosus</td>
</tr>
<tr>
<td>Ventricular septal defect</td>
</tr>
<tr>
<td>Atrial septal defect</td>
</tr>
<tr>
<td>Porcine valve</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group II (Mortality Rate 5%-15%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitral stenosis with atrial fibrillation</td>
</tr>
<tr>
<td>Artificial heart valves</td>
</tr>
<tr>
<td>Mitral stenosis (classes III and IV)</td>
</tr>
<tr>
<td>Uncorrected tetralogy of Fallot</td>
</tr>
<tr>
<td>Aortic coarctation (uncomplicated)</td>
</tr>
<tr>
<td>Aortic stenosis</td>
</tr>
<tr>
<td>Marfan syndrome with normal aorta</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group III (Mortality Rate 25%-50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic coarctation (complicated)</td>
</tr>
<tr>
<td>Myocardial infarction (previous)</td>
</tr>
<tr>
<td>Marfan syndrome with aortic involvement</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
</tr>
</tbody>
</table>

No classification of heart disease can be considered rigid or absolute, but the NYHA classification offers a basic practical guide for treatment, assuming that frequent prenatal visits, good patient cooperation, and appropriate obstetric care occur. Medical therapy is conducted by a team approach that includes the cardiologist, obstetrician, anesthesia care providers, and nurses. The functional classification may change over the course of the pregnancy because of the hemodynamic changes that occur in the cardiovascular system. There is a 45% to 50% increase in cardiac output compared with nonpregnancy resting values, with the majority of the increase in the first trimester and the peaks around 25 to 32 weeks of gestation (Blanchard & Shabetai, 2009). The functional classification of the disease is determined at 3 months and again at 7 or 8 months of gestation. Pregnant women may progress from class I or II to III or IV during pregnancy. Women with cyanotic congenital heart disease do not fit into the NYHA classification because their exercise-induced symptoms have causes not related to heart failure. An ability index was developed for assessment of these patients (Gei & Hankins, 2001).

Contraindications to pregnancy in women with heart disease are listed in Box 13-3. The incidence of miscarriage is increased, and preterm labor and birth are more prevalent in the pregnant woman with cardiac problems. In addition, IUGR is common, which may be the result of low oxygen pressure (Po2) in the mother. The incidence of congenital heart lesions is increased in children of mothers with congenital heart disease; thus, preconception counseling is important.

A diagnosis of cardiac disease depends on the history, physical examination, chest film findings, and, if indicated, sonogram results. The differential diagnosis of heart disease also involves ruling out respiratory problems and other potential causes of chest pain.

General intrapartum management for cardiac disease focuses on preventing hypotension and maternal tachycardia (heart rate greater than 110 beats/min) and optimizing cardiac output with volume and maternal position (e.g., left or right side to increase cardiac output) (Arafeh & Baird, 2006). Pulmonary artery catheter and arterial line placement, epidural anesthesia, and scheduled induction of labor should be strongly considered for women with moderate-to-high risk lesions or with symptoms in NYHA classes III and IV. Second stage should be managed with “laboring down” technique, preventing Valsalva maneuver (forced expiration against a closed airway, which when released causes blood to rush to the heart and overload the cardiac system), open glottis pushing, and consideration for operative vaginal delivery.

Cesarean birth is recommended only for obstetric issues (e.g., cephalopelvic disproportion). Bacterial endocarditis prophylaxis should be in accordance with the American Heart Association recommendations. During the immediate postpartum period, diuretic therapy may be required.

**Peripartum Cardiomyopathy**

The criteria for the diagnosis of peripartum cardiomyopathy (PPCM) include development of congestive heart failure in the last month of pregnancy or within the first 5 postpartum months, lack of another cause for heart failure, and absence of heart disease before the last month of pregnancy (Easterling & Stout, 2007). Some data suggest that this definition be expanded because the diagnosis of PPCM has been made at other times during gestation. The etiology of the disease is unknown; theories suggest genetic predisposition, autoimmunity, and viral infections.

PPCM is more common in African-American women, twin pregnancies, and women with preeclampsia (Grewal, Biswas, & Perloff, 2003). In the United States the incidence is 1 in 3000 to 4000 live births. Maternal mortality rate has been estimated in the range of 25% to 50%, whereas infant mortality rate is approximately 10% (Ramsey, Ramin, & Ramin, 2001). Maternal death is usually caused by thromboembolism, arrhythmia, or progressive heart failure. Symptoms include breathlessness, dyspnea, cough, orthopnea, tachydysrhythmias, and edema, with radiologic findings of cardiomegaly. The prognosis is good if cardiomegaly does not persist after 6 months postpartum. Women whose hearts remain enlarged after 6 months postpartum will have PPCM in future pregnancies (Blanchard & Shabetai, 2009). Pregnancy is contraindicated for women with persistent cardiomegaly or cardiac dysfunction.

Medical management of cardiomyopathy during pregnancy includes a regimen used for congestive heart failure and the potential for thromboembolism: diuretics, sodium restriction, afterload-reducing agents, anticoagulants, and digoxin. Angiotensin-converting enzyme inhibitors can be used only in the postpartum period because they are teratogenic agents. The nursing care of women with PPCM is essentially the same as that for women with other types of cardiac problems.

**Rheumatic Heart Disease**

Rheumatic fever is increasingly uncommon in the United States. When it occurs, it usually develops suddenly, often several symptom-free weeks after an inadequately treated group A β-hemolytic streptococcal throat infection. Episodes of rheumatic fever create an autoimmune reaction in the heart tissue that leads to permanent damage of heart valves (usually the mitral valve) and the chorda tendineae cords. This damage is referred to as rheumatic heart disease (RHD). RHD may be evident during acute rheumatic fever or discovered years later. Recurrences of rheumatic fever are common; each has the potential to increase the severity of heart damage. The American Heart Association recommends prophylaxis to prevent infective endocarditis only in those patients who are at highest risk (Blanchard & Shabetai, 2009). Heart murmurs resulting from stenosis, valvular insufficiency, or thickening of the

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**Box 13-3 Contraindications to Pregnancy in a Woman with Heart Disease**

- Dilated cardiomyopathy
- Primary pulmonary hypertension
- Eisenmenger’s syndrome
- Marfan syndrome with aortic root dilatation

walls of the heart characterize RHD. Abnormal pulse rate and rhythm and congestive heart failure are common.

**Mitral and Aortic Valve Stenosis**

The concern regarding mitral and aortic valve lesions in the pregnant women is the need for cardiac output fluctuations during pregnancy, labor, and birth. With many of these lesions only allowing a “fixed” cardiac output, pregnant women and their fetuses may have hemodynamic decompensation if cardiac output cannot meet the needs for tissue perfusion and oxygen transport. Mitral valve stenosis (narrowing of the opening of the mitral valve caused by stiffening of valve leaflets, thereby obstructing blood flow from the atrium to the ventricles) is the characteristic lesion resulting from RHD. Even though a history of rheumatic fever may be absent, it remains the most likely cause of mitral stenosis. As the mitral valve narrows, cardiac output decreases, and dyspnea worsens, occurring first on exertion and eventually at rest. A tight stenosis plus the increase in blood volume and required cardiac output demands of normal pregnancy and birth may cause ventricular failure, pulmonary edema, and death (Blanchard & Shabetai, 2009).

Rheumatic fever can also affect the aortic valve. However, significant aortic stenosis in pregnant women is usually congenital. With this in mind, a fetal echocardiogram may be done. When the aortic valve orifice is less than one third of normal, limited cardiac output is possible, leading to increased left ventricular afterload, left ventricular hypertrophy, and failure. As with any left-sided heart lesion, the pregnant woman is very sensitive to changes in intravascular volume. Intravascular volume balance is essential to prevent hypotension caused by hypovolemia and pulmonary edema caused by hypervolemia (Easterling & Stout, 2007).

Antepartum care of the pregnant woman with mitral and/or aortic stenosis typically is managed by reducing her activity, restricting dietary sodium, diuretic therapy, β-blocking medications to lower heart rate, and increasing bed rest. She should be monitored frequently for clinical symptoms and with routine echocardiograms to monitor atrial and ventricular size and heart valve function. For patients with NYHA class III or IV symptoms, balloon valvuloplasty may be considered. This procedure should be considered only when symptoms cannot be controlled by standard medical treatments. Balloon valvuloplasty is optimally performed after 20 weeks of gestation to decrease radiation risks to the fetus.

**Mitral Valve Prolapse**

Mitral valve prolapse (MVP) is a common, usually benign, condition occurring in 1% of women (Blanchard & Shabetai, 2009). The mitral valve leaflets prolapse into the left atrium during ventricular systole, allowing some backflow of blood. Midsystolic click and late systolic murmur are hallmarks of this syndrome. Most cases are asymptomatic. A few women have atypical chest pain (sharp and located in the left side of the chest) that occurs at rest, is unrelated to exercise, and does not respond to nitrates. They may have anxiety, palpitations, dyspnea on exertion, and syncope. Specific treatment is usually not necessary except for symptomatic tachyarrhythmias. Pregnancy and its associated hemodynamic changes may change or alleviate the murmur and click of MVP, as well as its symptoms. Pregnancy is usually well tolerated; but, as with RHD, antibiotic prophylaxis may be given before invasive procedures for at-risk patients and for complicated vaginal births in patients with MVP.

**Eisenmenger’s Syndrome**

Eisenmenger’s syndrome is a right-to-left or bidirectional shunting that can be at the atrial or ventricular level and is combined with elevated pulmonary vascular resistance (Easterling & Stout, 2007). The syndrome is associated with a mortality rate of approximately 50% during pregnancy; thus pregnancy is contraindicated. If pregnancy occurs, termination may be recommended if the woman has significant pulmonary hypertension.

In women who continue pregnancy despite the risks, physical activity is strictly limited; prophylactic anticoagulation is considered (Easterling & Stout, 2007). Intensive care monitoring during labor and birth, guided by invasive hemodynamic parameters obtained with a pulmonary artery and arterial catheter, is essential to optimize outcomes for mother and fetus. A team approach involving a perinatologist, skilled critical care and obstetric nurses, and cardiology and anesthesia care providers is essential.

**Atrial and Ventricular Septal Defects**

Atrial septal defects (ASDs: an abnormal opening between the atria) and VSDs are causes of a left-to-right shunting that can lead to Eisenmenger’s syndrome. These defects may go undetected because the woman usually is asymptomatic until pregnancy hemodynamic changes occur. The pregnant woman with an ASD or VSD will most likely have an uncomplicated pregnancy unless the defect causes significant shunting and increased pulmonary vascular resistance. As a result of the increased plasma volume, some women may have right-sided heart failure or tachyarrhythmias as the pregnancy progresses.

**Tetralogy of Fallot**

Tetralogy of Fallot includes several abnormalities caused by maldevelopment of the truncus arteriosus. The cardiac abnormalities include a VSD, pulmonary stenosis, overriding aorta, and right ventricular hypertrophy, leading to a right-to-left shunt. Surgical correction of tetralogy of Fallot includes correction of the VSD and possibly the pulmonary stenosis. Women with corrected tetralogy of Fallot have a low mortality rate; however, women with uncorrected tetralogy of Fallot have a high maternal risk and high rate of fetal loss (Blanchard & Shabetai, 2009). Medical management for women with uncorrected tetralogy of Fallot includes anticoagulant therapy, high-concentration oxygen administration, and hemodynamic monitoring during labor and birth as well as prophylactic antibiotics.

**Marfan Syndrome**

Marfan syndrome is an autosomal dominant genetic disorder characterized by generalized weakness of the connective tissue, resulting in joint deformities, ocular lens dislocation, and weakness of the aortic wall and root (Arafeh & Baird, 2006). About 90% of individuals with this syndrome have
UNIT 3 • Pregnancy

MVP, and 25% have aortic insufficiency, with an increased risk of aortic dissection and rupture during pregnancy. Excruciating chest pain and sudden cardiac decompensation is the most common symptom of aortic dissection and rupture. Aortic dissection and/or rupture most often occurs in the third trimester or the postpartum period. Therapy includes limiting physical activity, preventing hypertensive or hypotensive complications, and administering β-blockers as needed. Aortic root measurements are taken early in pregnancy as a baseline and then at intervals to detect an increasing diameter. Preconception and genetic counseling are recommended to make women aware of the risks of pregnancy with this condition (i.e., a 50% risk of mortality and inheritance of the syndrome) (Easterling & Stout, 2007).

Heart Transplantation
Increasing numbers of heart recipients are successfully completing pregnancies but risk complications. Before conception the woman should be assessed for quality of ventricular function and potential rejection of the transplant. She should be stabilized on the immunosuppressant regimen. Conception should be postponed for at least 1 year after transplantation to avoid acute rejection episodes (Blanchard & Shabetai, 2009). Risks to the woman include hypertension, preeclampsia, preterm labor (50%), renal insufficiency, small-for-gestational-age (SGA) neonate, rejection, and infections. During labor β-blocking agents may be needed to prevent tachycardia caused by vagal denervation from the transplant surgery. Management of the intrapartal period requires the coordination of care among all health care providers involved in the care of the woman and her fetus.

After birth the neonate may exhibit immunosuppressive effects during the first week of life. Breastfeeding is not advised for infants of mothers taking cyclosporine.

Nursing Care Management
Nursing care of the woman with a cardiovascular disorder combines routine peripartum care with care specific for the cardiac diagnosis and function (see Nursing Process box). Care of these women at high risk requires a multidisciplinary approach. The multidisciplinary team includes a cardiologist who is familiar with expected cardiovascular changes in pregnancy; a perinatologist; an anesthesiologist; and nurses expert in labor, birth, and maternal hemodynamic monitoring.

Cardiac conditions vary in their impact on pregnancy because of acuteness or chronicity. The presence of cardiac disease makes the decision to become pregnant more difficult. Planned pregnancy requires that the woman understand the peripartum risks. If the pregnancy is unplanned, the nurse needs to explore the woman’s desire to continue the pregnancy. The nurse should review with the woman options for pregnancy termination if her cardiac status is tenuous and impairment, family expectations may be a cause of major stress if she is unable to bear the expected number of children or if it is unacceptable to receive help with domestic chores.

Table 13-4 Cardiovascular Signs and Symptoms During Pregnancy

<table>
<thead>
<tr>
<th>Signs</th>
<th>NORMAL</th>
<th>ABNORMAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>Symptoms at rest</td>
<td></td>
</tr>
<tr>
<td>Chest pain</td>
<td>Exertional chest pain</td>
<td></td>
</tr>
<tr>
<td>Dyspnea</td>
<td>Exertional, severe dyspnea</td>
<td></td>
</tr>
<tr>
<td>Orthopnea</td>
<td>Orthopnea (progressive)</td>
<td></td>
</tr>
<tr>
<td>Hyperpnea</td>
<td>Paroxysmal nocturnal dyspnea</td>
<td></td>
</tr>
<tr>
<td>Palpitations</td>
<td>Tachycardia (&gt;120 beats/min); dyshrhythmia</td>
<td></td>
</tr>
<tr>
<td>Syncope (vasovagal)</td>
<td>Exertional syncope</td>
<td></td>
</tr>
</tbody>
</table>


Symptoms of cardiac decompensation may appear abruptly or gradually. Medical intervention must be instituted immediately to maintain optimal cardiac status. Dyspnea, palpitations, syncope, and edema commonly occur in pregnant women and can mask the symptoms of a developing or worsening cardiovascular disorder. A woman’s sudden inability to perform activities she previously was comfortable doing may indicate cardiovascular decompensation (Box 13-4).

The woman’s cultural background may affect the amount of support that she is able to receive from significant others. Family size (number of children and extended family members in the home) and role expectations within the family may be dictated by cultural norms. For the woman with cardiac impairment, family expectations may be a cause of major stress if she is unable to bear the expected number of children or if it is unacceptable to receive help with domestic chores.

Plan of Care and Implementation
Therapy for the pregnant woman with heart disease is focused on minimizing stress on the heart. This stress is greatest between 28 and 32 weeks as the hemodynamic changes reach their maximum. The workload of the cardiovascular system is reduced by appropriate treatment of any coexisting emotional stress, hypertension, anemia, hyperthyroidism, or obesity.
# NURSING PROCESS: CARDIAC DISEASE

## Assessment

The pregnant woman with cardiac disease requires detailed assessment throughout the peripartum period to determine the potential for optimal maternal health, progression of symptoms and a viable fetus. If she chooses to continue the pregnancy, the high risk pregnant woman’s condition may be assessed as often as weekly.

### Interview

The nurse elicits the following information from the woman:

- Her personal medical history and that of her family
  - Diseases of cardiovascular significance, including congenital heart disease, streptococcal infections, rheumatic fever, valvular disease, endocarditis, congestive heart failure, angina, or myocardial infarction
- Factors that would increase stress on the heart (anemia, infection, and edema)
- How the woman is adapting to the physiologic changes of pregnancy
  - Review of the cardiovascular and pulmonary systems
  - Whether the woman has experienced chest pain at rest or on exertion
  - Edema of the face, hands, or feet; hypertension; heart murmurs; palpitations; paroxysmal nocturnal dyspnea; diaphoresis; and pallor or syncope.
- Pulmonary symptoms such as cough, hemoptysis, shortness of breath, and orthopnea

Document all medications taken by the woman. Assess for undue emotional stress that might further compromise cardiac status.

### Physical Examination

Monitor the following:

- Amount and pattern of edema
- Vital signs
- Discomforts of pregnancy
- Amount and pattern of weight gain

Observe for signs of cardiac decompensation:

- Progressive generalized edema
- Crackles at base of lungs
- Pulse irregularity

Review results of laboratory tests:

- Routine urinalysis and blood work (complete blood count and blood chemistry)
- Baseline 12-lead electrocardiogram (ECG) at the beginning of the pregnancy, if not before pregnancy (permits vital diagnostic comparisons with subsequent ECGs)
- Echocardiograms and pulse oximetry studies as indicated

Chest films may be necessary during late pregnancy; the abdomen must be carefully shielded.

- Fetal ultrasound, fetal movement studies, or fetal nonstress tests (to determine fetal well-being)

## Nursing Diagnoses

The following examples are some nursing diagnoses that may be formulated. As always, individualizing diagnoses is vital.

### Prenatal Period

#### Fear Related to
- increased peripartum risk

### Deficient Knowledge Related to
- cardiac condition
- pregnancy and how it affects cardiac condition
- requirements to alter self-management activities

### Activity Intolerance Related to
- cardiac condition

### Risk for Self-Care Deficit (Bathing, Grooming, and Dressing)

#### Related to
- fatigue or activity intolerance
- need for bed rest

### Impaired Home Maintenance Related to
- woman’s confinement to bed or limited activity level

### Postpartum Period

#### Anxiety Related to
- fear for infant’s safety

#### Fear of Dying Related to
- perceived physiologic inability to cope with stress of labor

#### Risk for Impaired Gas Exchange Related to
- cardiac condition

#### Risk for Excess Fluid Volume Related to
- extravascular fluid shifts

#### Ineffective Breastfeeding Related to
- fatigue from cardiac condition

### Plan of Care

Nursing care of the woman with a cardiovascular disorder combines routine peripartum care with care specific for the cardiac diagnosis and function. Care of these women at high risk requires a multidisciplinary approach.

### Expected Outcomes

Expected outcomes might include that the pregnant woman (and family, if appropriate) will do the following:

- Verbalize understanding of the disorder, management, and probable outcome
- Describe her role in management, including when and how to take medication, adjust diet, and prepare for and participate in treatment
- Cope with emotional reactions to pregnancy and an infant at risk
- Adapt to the physiologic stressors of pregnancy, labor, and birth
- Identify and use support systems
- Carry her fetus to viability or to term

### Interventions

Review signs and symptoms of cardiac decompensation with the pregnant woman and her family.

**The Woman with Class I or II Heart Disease**

Woman requires 8 to 10 hours of sleep every day and should take 30-minute naps after meals.

Restrict activities (limit housework, shopping, and exercise) to the amount recommended for the functional classification of her heart disease.
The Woman with Class II Cardiac Disease
Avoid heavy exertion; stop any activity that causes even minor signs and symptoms of cardiac decompensation.
She will be admitted to the hospital near term (or earlier if signs of cardiac overload or dysrhythmia develop) for evaluation and treatment.

The Pregnant Woman with Class III Cardiac Disease
Emphasize that bed rest for much of the day is necessary.
Treat infections promptly; administer prophylactic antibiotics against bacterial endocarditis as ordered.
Provide nutrition counseling. Refer to a registered dietitian as necessary.

Patent Teaching The Pregnant Woman at Risk for Cardiac Decompensation
- Assess lifestyle patterns, emotional status, and environment of woman.
- Arrange for consultations as needed (i.e., dietitian, home care, child care, social work).
- Determine woman’s and her family’s understanding of her heart disease and how the disease affects her pregnancy.
- Determine stressors in the woman’s life. Assist woman in identifying effective coping strategies.
- Instruct woman to report signs of cardiac decompensation or congestive heart failure: generalized edema, distention of neck veins, dyspnea, pulmonary crackles, cough, palpitations, sudden weight gain.
- Instruct woman to be watchful for signs of thromboembolism such as redness, tenderness, pain, or swelling of the legs. Instruct woman to seek medical help immediately if such symptoms occur.
- Instruct woman to avoid constipation and thus straining with bowel movements (Valsalva maneuver) by taking in adequate fluids and fiber. A stool softener may be ordered.
- Explore with woman ways to obtain the needed rest throughout the day. Depending on the level of her cardiac disease, she may need to sleep 10 hours per night and rest for 30 minutes after meals (class I or II) or for most of the day (class III or IV).
- Help woman make use of community resources, including support groups, as indicated.
- Emphasize the importance of keeping her prenatal visits.

If anticoagulant therapy is required during pregnancy for conditions such as recurrent venous thrombosis, pulmonary embolus, RHD, prosthetic valves, or cyanotic congenital heart defects, heparin may be used because this large-molecule drug does not cross the placenta (Blanchard & Shabetai, 2009). The nurse should closely monitor the woman’s blood work, including clotting factors. The woman may need to learn to self-administer heparin. She also requires specific nutrition education to avoid foods high in vitamin K such as raw, dark green leafy vegetables, which counteract the effects of the heparin. In addition, she will require a folic acid supplement.

Tests for fetal maturity and well-being and placental sufficiency may be necessary. Other therapy is directly related to the functional classification of heart disease. The nurse may need to reinforce the need for close medical supervision.

**LEGAL TIP Cardiac and Metabolic Emergencies** The management of emergencies such as maternal cardiopulmonary distress or arrest or maternal metabolic crisis should be documented in policies, procedures, and protocols. Any independent nursing actions appropriate to the emergency should be clearly identified.

**Heart Surgery During Pregnancy** Ideally a woman would have surgical correction of the cardiac lesion before pregnancy; however, cardiac disease may be diagnosed for the first time during pregnancy. When medical therapy for a pregnant woman fails, cardiac surgery may be performed. Early in the second trimester is the best time for surgery. The woman, fetus, and uterine activity must be monitored carefully during surgery. Closed cardiac surgery such as release of a stenotic mitral orifice can be accomplished with little risk to mother or fetus. Open heart surgery requires extracorporeal circulation, and under these circumstances hypoxia and fetal bradycardia may occur as a result of low blood-flow rates. Periods of hypoxemia for the fetus can lead to various kinds of neurologic insults. Increase in flow rates on cardiopulmonary bypass may correct fetal bradycardia. Uterine contractions also increase in frequency before and during cardiopulmonary bypass and can be alleviated by medication.

**Intrapartum** For all pregnant women the intrapartum period evokes the most apprehension in patients and caregivers. The woman with impaired cardiac function has additional reasons to be anxious because labor and giving birth place an additional burden on her already compromised cardiovascular system. Assessments include the routine assessments for all laboring women, as well as assessments for cardiac decompensation. In addition, arterial line placement and arterial blood gas evaluations may be needed to assess for adequate oxygenation. A pulmonary artery catheter (Swan-Ganz catheter) may be

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>SELECTED MATERNAL INDICATIONS</th>
<th>FDA PREGNANCY CATEGORY*</th>
<th>POSSIBLE ADVERSE FETAL EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Glycoside</td>
<td>Digoxin, digitoxin</td>
<td>Arrhythmia</td>
<td>C</td>
</tr>
<tr>
<td>Anticoagulants</td>
<td>Heparin</td>
<td>Thrombophlebitis Pulmonary hypertension</td>
<td>Does not cross the placenta</td>
</tr>
<tr>
<td>Warfarin</td>
<td>Same as heparin</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Furosemide Thiazides</td>
<td>Hypertension</td>
<td>C</td>
</tr>
<tr>
<td>β-Blockers</td>
<td>Propranolol Metoprolol</td>
<td>Angina, hypertension, mitral valve prolapse, arrhythmia</td>
<td>C</td>
</tr>
<tr>
<td>Vasodilators</td>
<td>Hydralazine</td>
<td>Severe hypertension, pulmonary hypertension</td>
<td>C</td>
</tr>
<tr>
<td>Calcium Channel Blockers</td>
<td>Nifedipine Verapamil</td>
<td>Angina, hypertension, arrhythmia (verapamil only)</td>
<td>C</td>
</tr>
<tr>
<td>Antiarrhythmias</td>
<td>Quinidine Procaainamide</td>
<td>Arrhythmia</td>
<td>C</td>
</tr>
</tbody>
</table>


*U.S. Food and Drug Administration (FDA) pregnancy categories: category A, controlled studies have not demonstrated a risk to the fetus; category C, animal studies have shown no adverse effects on the fetus, but there are no adequate studies in humans; potential benefits may be acceptable despite potential risks; category X, studies demonstrate fetal risk or abnormalities; risks outweigh potential benefits.
inserted to monitor hemodynamic status accurately during labor and birth. Electrocardiographic monitoring and continuous monitoring of blood pressure and pulse oximetry should be instituted for all women, and the fetus is continuously monitored electronically (Arafeh & Baird, 2006).

**NURSING ALERT** A pulse rate of 100 beats/min or greater or a respiratory rate of 25 breaths/min or greater is a concern. Respiratory status is checked frequently for developing dyspnea, coughing, or crackles at the base of the lungs. The color and temperature of the skin are noted. Pale, cool, clammy skin may indicate cardiac shock.

Nursing care during labor and birth focuses on the promotion of cardiac function. Anxiety is minimized by maintaining a calm atmosphere in the labor and birth rooms. The nurse provides anticipatory guidance by keeping the woman and her family informed of labor progress and events that will probably occur and answering any questions they have. The woman's childbirth preparation method should be supported to the degree it is feasible for her cardiac condition. Nursing techniques that promote comfort such as back massage are used.

Cardiac function is supported by keeping the woman's head and shoulders elevated and body parts resting on pillows. The side-lying position usually facilitates hemodynamics during labor. Discomfort is relieved with medication and supportive care. Epidural regional analgesia provides better pain relief than narcotics and causes fewer alterations in hemodynamics. Hypotension must be avoided.

The woman may require other types of medication (e.g., anticoagulants, prophylactic antibiotics). If evidence of cardiac decompensation appears, the physician may order deslanoside (Cedilanid-D) for rapid digitalization, furosemide (Lasix) for rapid diuresis, and oxygen by intermittent positive pressure to decrease the development of pulmonary edema.

β-Adrenergic agents (i.e., ritodrine and terbutaline) should not be used for tocolysis. These medications are associated with various cardiac side effects, including tachycardia and myocardial ischemia.

Labor and/or planned induction of labor is the preferred method of birth for women with cardiac disease. If there are no obstetric problems, vaginal birth can be accomplished with the woman in a side-lying position to facilitate uterine perfusion. To prevent compression of popliteal veins and an increase in blood volume in the chest and trunk as a result of the effects of gravity, stirrups are not used. The "laboring down" method or open-glotis pushing is recommended for the second stage of labor. Valsalva maneuver should be avoided during pushing in the second stage of labor because it reduces diastolic ventricular filling and obstructs left ventricular outflow. Supplemental oxygen is administered throughout labor to optimize maternal and fetal tissue perfusion.

Vacuum extraction or outlet forceps may be used to decrease the length and workload of the heart in second-stage labor. Cesarean birth is not routinely recommended for women who have cardiovascular disease because there is risk of dramatic fluid shifts, sustained hemodynamic changes, and increased blood loss.

Penicillin prophylaxis may be ordered for nonallergic pregnant women with class II or higher cardiac disease to protect against bacterial endocarditis in labor and during early puerperium. Dilute IV oxytocin immediately after birth may be used to prevent hemorrhage. Ergot products should not be used because they tend to increase blood pressure. Fluid balance should be maintained, and blood loss replaced. If tubal sterilization is desired, surgery is delayed at least several days to ensure homeostasis.

**Postpartum**

Monitoring for cardiac decompensation in the postpartum period is essential. The first 24 to 48 hours postpartum are the most hemodynamically difficult for the woman. Hemorrhage, infection, or both, may worsen the cardiac condition. The woman with a cardiac disorder may continue to require a pulmonary artery catheter and arterial catheter to monitor volume status, cardiac output, blood pressure, and arterial blood gases.

**NURSING ALERT** The immediate postbirth period is hazardous for a woman whose heart function is compromised. Cardiac output increases rapidly as extravascular fluid is remobilized into the vascular compartment. At the moment of birth intraabdominal pressure is reduced drastically; pressure on veins is removed, the splanchnic vessels engorge, and blood flow to the heart is increased. When blood flow increases to the heart, a reflex bradycardia may result.

Care in the postpartum period is tailored to the woman's functional capacity. Postpartum assessment of the woman with cardiac disease includes vital signs, oxygen saturation levels, lung and heart auscultation, edema, amount and character of bleeding, uterine tone and fundal height, urinary output, pain (especially chest pain), the activity-rest pattern, dietary intake, mother-infant interactions, and emotional state. The head of the bed is elevated, and the woman is encouraged to lie on her side. Bed rest may be ordered, with or without bathroom privileges. Progressive ambulation may be permitted as tolerated. The nurse may help the woman meet her grooming and hygiene needs and other activities. Bowel movements without stress or strain for the woman are promoted with stool softeners, diet, and fluids.

The woman may need a family member to help in the care of the infant. Breastfeeding is not contraindicated, but not all women with heart disease will be able to nurse their infants. The woman who chooses to breastfeed will need the support of her family and the nursing staff to be successful. She may need assistance in positioning herself or the infant for feeding.

To conserve the woman's energy, the infant may need to be brought to the mother and taken from her after the feeding. Women who breastfeed may need less medication, especially fewer diuretics, for their cardiac condition. Because diuretics can cause neonatal diuresis that can lead to dehydration, lactating women must be monitored closely to determine if medication doses can be reduced and still be effective.

If the woman is unable to breastfeed and her energies do not allow her to bottle-feed the infant, the baby can be kept at the bedside so she can look at and touch her baby to establish
an emotional bond with a low expenditure of energy. If the mother is unable to hold her infant, the nurse or a family member can hold the infant at the mother's eye level and close enough for her to touch.

Discharge is carefully planned with the woman and family. Provision of help for the woman in the home by relatives, friends, and others must be addressed. The family is referred to community resources (e.g., homemaking services) as appropriate. Rest and sleep periods, activity, and diet must be planned. The couple may need information about reestablishing sexual relations and contraception or sterilization. Potential hazards of a subsequent pregnancy need to be examined by the woman and her partner. If sterilization is selected as a method of contraception, the risks of surgery, especially for the woman with class III or IV heart disease, need to be explained. Oral contraceptives are often contraindicated because of the risk of thromboembolism. IUDs may put the woman at risk for infection, especially if she has a valve replacement. Injectable progestins are effective and safe (Easterling & Stout, 2007). Both the woman and her partner need to be involved in the decision-making process.

Monitoring for cardiac decompensation continues through the first few weeks after birth because of hormone shifts that affect hemodynamics. Maternal cardiac output is usually stabilized by 2 weeks postpartum (Easterling & Stout, 2007).

Cardiopulmonary Resuscitation of the Pregnant Woman

Cardiac arrest in a pregnant woman is most often related to events at the time of birth such as amniotic fluid embolism, eclampsia, and drug toxicity. It can also be related to congestive cardiomyopathy, aortic dissection, pulmonary embolism, or hemorrhage caused by a pregnancy-related pathologic condition. Other problems are motor vehicle accidents, falls, assault, suicide attempts, and trauma (stabbing, gunshot wounds) (American Heart Association [AHA], 2000). Preexisting disorders such as heart or pulmonary disease, hypertension, or autoimmune collagen vascular disease increase this risk.

Various protocols exist for cardiopulmonary resuscitation (CPR) during pregnancy. The most widely used guide is the AHA advanced cardiac life support (ACLS) protocol (AHA, 2005). This protocol recommends standard CPR with the uterus displaced laterally, fluid volume restoration, and defibrillation if indicated. The decision for cesarean birth should be made within 4 to 5 minutes of the mother’s cardiac arrest. No matter what protocol is used, nurses and other health care providers must be prepared if CPR is to be successful.

In the event of cardiac arrest, standard resuscitative efforts with a few modifications are implemented. To prevent supine hypotension, the woman is placed on a flat, firm surface with the uterus displaced laterally either manually or with a wedge or rolled towel under her right hip or on her side supported by angled thighs of several rescuers or angled backs of several chairs (AHA, 2005). If defibrillation is needed, the paddles must be placed one rib interspace higher than usual because the heart is slightly displaced by the enlarged uterus. If possible, the fetus should be monitored during the cardiac arrest (see Emergency box).

### Emergency

**Cardiopulmonary Resuscitation of the Pregnant Woman**

**Airway**

Determine unresponsiveness. Activate emergency medical system and get the automated external defibrillator (AED) if available. Position woman on flat, firm surface with uterus displaced laterally with a wedge (e.g., a rolled towel placed under her hip) or manually or place her in a lateral position. Open airway with head tilt-chin lift maneuver.

**Breathing**

Determine breathlessness (look, listen, feel). If the woman is not breathing, give two slow breaths; each breath over 1-second duration to make the chest rise. Rescue breathing without chest compressions should be given at a rate of 10 to 12 breaths/min.

**Circulation**

Determine pulselessness by feeling carotid pulse. If there is no pulse, begin chest compressions at rate of 100/min at a compression depth of 1½ to 2 inches. Allow the chest to completely recoil after compression. Chest compressions may be performed slightly higher on the sternum if the uterus is enlarged enough to displace the diaphragm into a higher position. After four cycles of 30 compressions and two breaths, check her pulse. If pulse is not present, continue cardiopulmonary resuscitation.

**Defibrillation**

Use an AED according to standard protocol to analyze heart rhythm and deliver shock if indicated.

**Delivery**

Consider perimortem cesarean delivery within 5 minutes if chest compressions are unsuccessful.

**Relief of Foreign-Body Airway Obstruction**

If the pregnant woman is unable to speak or cough, perform chest thrusts. Stand behind the woman and place your arms under her armpits to encircle her chest. Press backward with quick thrusts until the foreign body is expelled (see Fig. 13-5). If the woman becomes unresponsive, follow the steps for victims who become unresponsive, but use chest thrusts instead of abdominal thrusts.


Complications that may be associated with CPR of a pregnant woman include laceration of the liver, rupture of the uterus, hemothorax, and hemoperitoneum. Fetal complications that may occur include cardiac dysrhythmia or asystole related to maternal defibrillation and medications, CNS depression related to antidyssrhythmic drugs and inadequate uteroplacental perfusion, and onset of preterm labor.
If resuscitation is successful, the woman and her fetus must receive careful monitoring. The woman remains at increased risk for recurrent pulmonary arrest and dysrhythmias (ventricular tachycardia, supraventricular tachycardia, and bradycardia). Therefore her cardiovascular, pulmonary, and neurologic status should be assessed continuously. Uterine activity and resting tone must be monitored. Fetal status and gestational age should be determined and used in decision making regarding continuation of the pregnancy or the timing and route of birth.

Clearing an airway obstruction in a woman in the second or third trimester of pregnancy also requires a modification of the Heimlich maneuver (Fig. 13-5) (see Nursing Care Plan).

Anemia

Anemia is the most common medical disorder of pregnancy, affecting at least 20% of pregnant women. Anemia results in reduction of the oxygen-carrying capacity of the blood, and the heart tries to compensate by increasing the cardiac output. This effort increases the workload of the heart and stresses ventricular function. Therefore anemia that occurs with any other complication (e.g., preeclampsia) may result in congestive heart failure.

An indirect index of the oxygen-carrying capacity is the packed red blood cell volume, or hematocrit level. The normal hematocrit range in nonpregnant women is 37% to 47%. Normal values for pregnant women with adequate iron stores may be as low as 32%. This has been explained by the blood volume expansion by approximately 50% and total red blood cell mass expansion of approximately 25%. This hydremia (dilution of blood) is also called the physiologic anemia of pregnancy.

The CDC defines anemia in the pregnant woman as a hemoglobin level of less than 11 g/dl or a hematocrit of less than or equal to 32% (CDC, 1998). When a woman has anemia during pregnancy, the loss of blood at birth, even if minimal, is not well tolerated. She is at an increased risk for requiring blood transfusions. Women with anemia have a higher incidence of puerperal complications such as infection than do pregnant women with normal hematologic values (Box 13-5). Severe anemia, defined as a hemoglobin level of less than 6 g/dl, has been associated with decreased fetal oxygen levels that result in abnormal fetal heart rate patterns, decreased amniotic fluid volume, and fetal death.

Nursing care of the pregnant woman with anemia requires that the nurse be able to distinguish between the normal physiologic anemia of pregnancy and the disease states. About 90% of cases of anemia in pregnancy are of the iron deficiency type. The remaining 10% embrace a considerable variety of acquired and hereditary anemias, including folic acid deficiency, sickle cell anemia, and thalassemia.

During prenatal visits the nurse should take a diet history and provide dietary teaching as appropriate. Pregnancy may cause increased fatigue, stress, and financial difficulties for a

**Box 13-5 Restless Legs Syndrome**

Restless legs syndrome (RLS) is a sensorimotor disorder characterized by discomfort of the legs and an urge to move them, usually during rest or inactivity. The discomfort is relieved by movement. RLS occurs mostly in the evening. It is generally idiopathic but is associated with anemia and pregnancy. Pregnant women have two to three times the risk of having RLS than the general population. Preexisting RLS worsens during pregnancy, having the highest degree of severity in the third trimester, and disappears at the time of birth.

NURSING CARE PLAN  The Pregnant Woman with Heart Disease

**Nursing Diagnosis**
Activity intolerance related to effects of pregnancy on the patient with rheumatic heart disease with mitral valve stenosis

**Expected Outcome**
Woman will verbalize a plan to change her lifestyle throughout pregnancy to avoid risk of cardiac decompensation.

**Nursing Interventions/Rationales**
Assist woman to identify factors that decrease activity tolerance and explore extent of limitations to establish a baseline for evaluation.

Help woman to develop an individualized program of activity and rest, taking into account the living and working environment, as well as support of family and friends, to maintain sufficient cardiac output.

Teach woman to monitor physiologic response to activity (i.e., pulse rate, respiratory rate) and reduce activity that causes fatigue or pain to maintain sufficient cardiac output and prevent potential injury to fetus.

Enlist family and friends to assist woman in pacing activities and provide support in performing role functions and self-management activities that are too strenuous to increase chances of compliance with activity restrictions.

Suggest that woman maintain an activity log that records activities, time, duration, intensity, and physiologic response to evaluate effectiveness of and adherence to activity program.

Discuss various quiet diversional activities that could be done by the woman to decrease the potential for boredom during rest periods.

**Nursing Diagnosis**
Risk for ineffective therapeutic regimen management related to woman’s first pregnancy and perceived sense of wellness

**Expected Outcome**
Woman will participate in an effective therapeutic regimen for pregnancy complicated by heart disease.

**Nursing Interventions/Rationales**
Identify factors that could inhibit the woman from participating in a therapeutic regimen such as insufficient knowledge about the effect of cardiac disease on pregnancy to promote early interventions such as teaching about the importance of rest.

Teach woman and family about factors such as lack of rest or not taking prescribed medications that could adversely affect the pregnancy to provide information and promote empowerment over the situation.

Woman will exhibit signs of adequate cardiac output (i.e., pulse rate, respiratory rate) and reduce activity that causes fatigue or pain to maintain sufficient cardiac output and prevent potential injury to fetus.

Expected Outcomes
The woman will exhibit signs of adequate cardiac output (i.e., normal pulse and blood pressure; normal heart and breath sounds; normal skin color, tone, and turgor; normal capillary refill; normal urine output; and no evidence of edema).

**Nursing Interventions/Rationales**
Reinforce the importance of activity/rest cycles to prevent cardiac complications.

Plan with woman a frequent visit schedule to caregiver to provide adequate surveillance of high risk pregnancy.

Teach woman to lie in lateral position to increase uteroplacental blood flow and to elevate legs while sitting to promote venous return.

Monitor intake and output and check for edema to assess for renal complications or venous return problems.

Monitor fetal heart rate (FHR) and fetal activity and perform nonstress test (NST) as indicated to assess fetal status and detect uteroplacental insufficiency.

**Nursing Diagnosis**
Risk for ineffective tissue perfusion related to cardiac condition secondary to increased circulatory needs during pregnancy

**Expected Outcomes**
The woman will exhibit signs of hemodynamic stability (i.e., blood pressure, pulse, arterial blood gases [ABGs], and white blood cell [WBC] counts are within normal limits). The fetus will exhibit signs of well-being (i.e., fetal activity and FHR are within normal limits).

**Nursing Interventions/Rationales**
Monitor heart rate and rhythm, blood pressure, skin color and temperature, WBCs, hemoglobin and hematocrit, and ABGs to detect early signs of cardiac failure/hypoxia.

Monitor fetal activity and FHR and perform NST as indicated to assess fetal status and detect uteroplacental insufficiency.

Teach woman how to detect and report early signs of cardiac decompensation to prevent maternal/fetal complications.

Iron Deficiency Anemia
Pathologic anemia of pregnancy is mainly the result of iron deficiency. Without iron therapy even pregnant women who enjoy excellent nutrition conclude pregnancy with an iron deficit. Iron is actively transported across the placenta for fetal erythropoiesis. Ferritin levels are the primary screening tests to diagnose iron deficiency anemia. A ferritin level of less than 10 to 15 mcg/L confirms the diagnosis.

If iron deficiency anemia is diagnosed, increased iron dosages are recommended (elemental iron, 60 to 120 mg/day). Diet alone cannot replace gestational iron losses. Inadequate nutrition without therapy will certainly mean iron deficiency anemia during late pregnancy and the puerperium. It is important to teach the pregnant woman the significance of iron therapy (see Table 12-1). In addition, the woman should be instructed to decrease the gastrointestinal side effects of...
iron therapy through diet. Some pregnant women cannot tolerate the prescribed oral iron because of nausea and vomiting. In such cases they should receive parenteral iron such as an iron-dextran complex (Imferon). Blood transfusions should be considered for the woman with severe anemia to prevent fetal and maternal complications of decreased oxygen delivery.

Folic Acid Deficiency Anemia
Folic acid deficiency during conception and early pregnancy increases the incidence of neural tube defects, cleft lip, and cleft palate. Even in well-nourished women it is common to have a folate deficiency. Poor diet, cooking with large volumes of water, or home canning of food (especially vegetables) may lead to folate deficiency. Malabsorption may play a part in the development of anemia caused by a lack of folic acid. Folic acid deficiency is common in multiple gestations. During pregnancy the recommended daily intake is 600 mcg per day of folic acid, although women who have a deficiency may need 1 mg or more per day (see Box 12-1).

Since 1998 the U.S. Food and Drug Administration has required the addition of folic acid to cereals, pasta, breads, and other food that are labeled “enriched.” However, the amount added is small, and most pregnant women need a supplement.

Sickle Cell Hemoglobinopathy
Sickle cell hemoglobinopathy is a disease caused by the presence of abnormal hemoglobin in the blood. Sickle cell trait (SA hemoglobin pattern), sickling of the red blood cells but with a normal red blood cell life span, usually causes only mild clinical symptoms. Sickle cell anemia (sickle cell disease) is a recessive, hereditary, familial hemolytic anemia that affects those of African-American or Mediterranean ancestry. These individuals usually have abnormal hemoglobin types (SS or SC). People with sickle cell anemia have recurrent attacks (crises) of fever and pain in the abdomen or extremities. These attacks are attributed to vascular occlusion (from abnormal cells), tissue hypoxia, edema, and red blood cell destruction. Crises are associated with normochromic anemia, jaundice, reticulocytosis, a positive sickle cell test, and the demonstration of abnormal hemoglobin (usually SS or SC).

Almost 10% of African-Americans in North America have the sickle cell trait, but fewer than 1% have sickle cell anemia. The anemia often is complicated by iron and folic acid deficiency.

Women with sickle cell trait usually do well in pregnancy, although they are at increased risk for urinary tract infections and hematuria and may be deficient in iron (Kilpatrick, 2009). If the woman has sickle cell anemia, the anemia that occurs in normal pregnancies may aggravate the condition and bring on more crises. Fetal complications include being small for gestational age, IUGR, and skeletal changes. Pregnant women with sickle cell anemia are prone to pyelonephritis, leg ulcers, bone abnormalities, strokes, cardiopathy, congestive heart failure, and preeclampsia. An aplastic crisis may follow serious infection. Transfusions have been the usual treatment for symptomatic patients; however, partial exchange transfusions or prophylactic transfusions are common as well and significantly reduce the number of painful crises (Kilpatrick, 2009). Cesarean birth is warranted only for obstetric indications. Oral contraceptives are contraindicated.

Table 13-6 identifies some potential problems faced by the woman with sickle cell disease and some preventive and maintenance interventions.

Thalassemia
Thalassemia (Mediterranean or Cooley anemia) is a relatively common anemia in which an insufficient amount of globin is produced to fill the red blood cells. The condition eventually manifests itself in severe bone deformities caused by massive marrow tissue expansion. Thalassemia is a hereditary disorder that involves the abnormal synthesis of the alpha (α) or beta (β) chains of hemoglobin. β-Thalassemia is the more common variety in the United States and is more common in individuals of Mediterranean, Middle Eastern, and Asian descent (Kilpatrick, 2009). The unbalanced synthesis of hemoglobin leads to premature red blood cell death, resulting in severe anemia. Thalassemia major is the homozygous form of the disorder; thalassemia minor is the heterozygous form. Couples with the thalassemia trait should seek genetic counseling. Women with the thalassemia trait usually have an uncomplicated pregnancy.

Women with thalassemia major or minor have infertility problems; thus few pregnancies result. As many as 50% of these pregnancies have been complicated by stillbirth, IUGR, preeclampsia, and preterm birth. Medical management consists of ongoing monitoring and transfusion therapy.

Women with thalassemia minor have a mild, persistent anemia; but the red blood cell level may be normal or even elevated. However, no systemic problems are caused by the anemia. Thalassemia minor must be distinguished from iron deficiency anemia.

The anemia does not respond to iron therapy; and prolonged parenteral iron therapy can lead to harmful, excessive iron storage. People with thalassemia minor should have a normal life span despite a moderately reduced hemoglobin level.

Pulmonary Disorders
As pregnancy advances and the uterus impinges on the thoracic cavity, any pregnant woman may have increased respiratory difficulty. This difficulty is compounded by pulmonary disease.

A pregnant woman with a pulmonary disorder requires assessment, planning, and interventions specific to the disease process, in addition to the routine peripartum care. The nurse also must be alert to pulmonary complications precipitated by the pregnancy.

Asthma
Bronchial asthma is an acute respiratory illness caused by allergens, irritants, marked changes in ambient temperature, certain medications (e.g., aspirin and β-blockers) or exercise. In many cases the cause may be unknown. A history of positive allergen testing is common (75% to 85%) in people with asthma. In response to stimuli, there is widespread but revers-
Table 13-6  Sickle Cell Anemia: Potential Problems, Prevention, and Maintenance

<table>
<thead>
<tr>
<th>POTENTIAL PROBLEM</th>
<th>PREVENTION AND MAINTENANCE</th>
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| 1. Inadequate oxygen to meet needs of labor and prevent sickling | 1. a. Monitor Hb level and HCT to maintain Hb at ≥8 g and HCT at ≥20%.  
| | b. Have typed and crossmatched blood available.  
| | c. Assist with transfusions.  
| | d. Administer oxygen continuously during labor.  
| | e. Coach for relaxation and to lessen anxiety. |
| 2. Infection: UTI, pyelonephritis, pneumonia | 2. a. Continue actions as under No. 1.  
| | b. Maintain adequate hydration.  
| | c. Administer antibiotics as ordered.  
| | d. Maintain strict asepsis.  
| | e. Encourage frequent voiding to keep bladder empty. |
| 3. Sequestration crisis caused by need for and destruction of RBCs | 3. Administer folic acid supplement (1 mg/day) to decrease erythropoietic demands and reduce probability of capillary stasis. |
| | b. Avoid supine hypotension.  
| | c. Maintain adequate hydration.  
| | d. Maintain comfortable room temperature: use warm blankets or cool cloths as needed.  
| | e. Assist with analgesia and anesthesia. |
| 5. Hypertension, proteinuria, no large weight gain; often accompanying bone pain crisis | 5. a. If true preeclampsia occurs, care is the same as for preeclampsia.  
| | b. Monitor blood pressure and urine. |
| 6. Thromboembolism (from increased blood viscosity) | 6. a. Monitor for positive Homans’ sign.  
| | b. Initiate bed rest if Homans’ sign is positive or if reddened, warm areas or lump appears in calf.  
| | c. Maintain adequate hydration.  
| | d. Administer heparin as ordered.  
| | e. Apply warm compresses.  
| | f. Apply antiembolism stockings. |
| | b. Place in semirecumbent position; lateral position for labor.  
| | c. Auscultate frequently for crackles in the lungs.  
| | d. Administer oxygen and medications (e.g., digitalis, antibiotics, diuretics, analgesics).  
| | e. Regional analgesia for pain relief in labor. |
| 8. Pulmonary infarction (hemoptysis, cough, temperature to 38.9° C, friction rub) | 8. Assess for this possible complication to facilitate early diagnosis. |

Hb, Hemoglobin; HCT, hematocrit; RBC, red blood cell; UTI, urinary tract infection.

A life narrowing of the hyperreactive airways, making it difficult to breathe. The clinical manifestations are some or all of the following: expiratory wheezing, productive cough, thick sputum, and dyspnea. Approximately 4% to 8% of pregnant women have diagnosed asthma, making it the most common pulmonary disease in pregnancy (Whitty & Dombrowski, 2009). To classify the severity of asthma and determine management guidelines, the National Asthma Education and Prevention Program (NAEPP) Working Group on Asthma and Pregnancy published guidelines for classification. Pregnant women are classified as having mild intermittent, mild persistent, moderate persistent, and severe persistent asthma based on exacerbation of symptoms, peak expiratory flow rate (PEFR), and forced expiratory volume in 1 second (FEV₁) (NAEPP, 2004) (Table 13-7). The effect of pregnancy on asthma is unpredictable. Approximately 23% improve, and 30% worsen (Whitty & Dombrowski, 2009). Maternal morbidity is 2.3% with mild, 19.3% with moderate, and 26.9% with severe symptoms that required hospitalization (Whitty & Dombrowski, 2009). Physiologic alterations induced by pregnancy do not make the pregnant woman more prone to asthmatic attacks. Women often have few symptoms of asthma in the first trimester and the last weeks of pregnancy. The severity of symptoms usually peaks between 29 and 36 weeks of gestation (Burton & Reyes, 2001).

The ultimate goal of therapy for asthma is to prevent hypoxic episodes in the mother and fetus. The therapy has four objectives: (1) relieve the bronchospasm, (2) limit irritating stimuli, (3) decrease the pulmonary response to allergen exposure, and (4) limit the inflammatory response in the airways. These goals can be achieved in pregnancy by eliminating environmental triggers (e.g., dust mites, animal dander, pollen), drug therapy (e.g., bronchodilators and anti-inflammatory agents), and patient education. Respiratory infections should be treated, and mist or steam inhalation should be used to aid expectoration of mucus. Acute episodes may require albuterol, steroids, aminophylline, β-adrenergic agents, and oxygen. Pharmacotherapy to control symptoms and treat airway inflammation is safer than exacerbations of symptoms during pregnancy. Patients should determine their PEFR before taking medications (Whitty & Dombrowski, 2009).
Asthma attacks can occur in labor; thus medications for asthma are continued in labor and postpartum. Pulse oximetry should be instituted during labor. Epidural analgesia reduces oxygen consumption and minute ventilation during labor. Meperidine is a histamine-releasing narcotic but rarely causes bronchospasm (Whitty & Dombrowski, 2009).

During the postpartum period women who have asthma are at increased risk for hemorrhage. If excessive bleeding occurs, oxytocin is the recommended drug. Asthma medications are usually safe for administration during the postpartum period and lactation. The woman usually returns to her prepregnancy asthma status within 3 months after giving birth.

Cystic Fibrosis

Cystic fibrosis is a common autosomal recessive genetic disorder in which the exocrine glands produce excessive viscous secretions, causing problems with both respiratory and digestive functions. There is an increase in pulmonary capillary permeability, decrease of lung volume, and shunting, which results in arterial hypoxemia. Respiratory failure and early death (in the early twenties) may occur.

The gene for cystic fibrosis was identified in 1989. All infants born to mothers with cystic fibrosis are carriers of the gene. The disease occurs in 1 in 3300 Caucasian live births (Slack et al, 2006). Improvements in diagnosis and treatment have allowed an increasing number of women with cystic fibrosis to survive to adulthood. One of the genetic testing recommendations from ACOG is cystic fibrosis carrier screening to couples who are planning a pregnancy (ACOG, 2001b). Preconception counseling is essential for women with cystic fibrosis. Infertility appears to relate to changes in cervical mucus. As a result of the advances in diagnostic capabilities and treatment, the median survival has increased from 14 years of age to 30 to 35 years of age. The median age of survival for women with pancreatic insufficiency is 27 years (Whitty & Dombrowski, 2009).

In women with good nutritional status, mild obstructive lung disease, and minimal impairment of lung function, pregnancy is tolerated well. In those with severe disease the pregnancy is often complicated by chronic hypoxia and frequent pulmonary infections. Women with cystic fibrosis show a decrease in their residual lung volume during pregnancy, as do normal pregnant women, and are unable to maintain vital capacity. Presumably the pulmonary vasculature cannot accommodate the increased cardiac output of pregnancy. The results are decreased oxygen to the myocardium, decreased cardiac output, and increased hypoxia. A pregnant woman with less than 50% of expected vital capacity usually has a difficult pregnancy. Increased maternal and perinatal mortality rates are related to severe pulmonary infection. There is an increased incidence of preterm births, IUGR, and neonatal deaths in patients with cystic fibrosis. Predictors of adverse effects to the fetus and neonate are inadequate weight gain, dyspnea, and cyanosis.

In addition to the respiratory problems, pregnant women with cystic fibrosis have decreased insulin secretion and increased insulin resistance, resulting in a higher incidence for the development of GDM. Pancreatic insufficiency may also put the woman at risk for malnutrition because she cannot meet the increased nutrition requirements of pregnancy. Fat-soluble vitamins may not be utilized because of diminished absorption.

Weight and symptoms of malabsorption should be monitored at each prenatal visit, and pancreatic enzymes should be adjusted as necessary. Women with severe pancreatic insufficiency may require total parenteral nutrition. A glucose tolerance test should be done at 20 weeks of gestation. Routine
respiratory management is continued throughout the pregnancy. Hospitalization and antibiotic therapy are recommended when a pulmonary infection has been identified. Because cystic fibrosis places the pregnant woman at risk, nonstress testing should be initiated at 32 weeks.

During labor, monitoring for fluid and electrolyte balance is required. The amount of sodium lost through sweat can be significant, and hypovolemia can occur. Conversely, if the woman has any degree of cor pulmonale, fluid overload is a concern. Oxygen is given freely during labor, and monitoring by pulse oximetry is recommended. Epidural or local anesthesia is the preferred analgesic for birth. Vaginal birth is preferable; cesarean birth should be reserved for the usual obstetric indications.

Breastfeeding appears to be safe as long as the sodium content of the mother’s milk is not abnormal. The milk is pumped and discarded until the sodium content has been determined. Milk samples should be tested periodically for sodium, chloride, and total fat; and the infant’s growth pattern should be followed (Lawrence & Lawrence, 2005).

Gastrointestinal Disorders

Compromise of gastrointestinal function during pregnancy is a concern. Obvious physiologic alterations such as the greatly enlarged uterus and less apparent changes such as hormonal differences and hypochlorhydria (deficiency of hydrochloric acid in the stomach’s gastric juice) require understanding for proper diagnosis and treatment. Gallbladder disease and inflammatory bowel disease are two gastrointestinal disorders that may occur during pregnancy.

Cholelithiasis and Cholecystitis

Women are twice as likely to have cholelithiasis (presence of gallstones in the gallbladder) than are men, and pregnancy seems to make the woman more vulnerable to gallstone formation. Decreased muscle tone allows gallbladder distention and thickening of the bile and prolongs emptying time. Increased progesterone levels result in a slight hypercholesterolemia. Nutrition counseling is important (see Home Care box).

HOME CARE

Nutrition Counseling for the Pregnant Woman with Cholelithiasis or Cholecystitis

- Assess your diet for foods that cause discomfort and flatusence and omit foods that trigger episodes.
- Reduce dietary fat intake to 40 to 50 g/day.
- Limit protein to 10% to 12% of total calories.
- Choose foods so that most of the calories come from carbohydrates.
- Prepare food without adding fats or oils as much as possible.
- Avoid fried foods.

Cholecystitis (inflammation of the gallbladder) may also occur during pregnancy, probably because pressure of the enlarged uterus interferes with the normal circulation and drainage of the gallbladder. Acute cholecystitis occurs most often in older women who have been pregnant several times and who have a history of previous attacks.

Women with acute cholecystitis usually have fatty food intolerance along with colicky abdominal pain radiating to the back or shoulder, nausea, and vomiting. Fever and an increased leukocyte count may also be present. Ultrasound is often used to detect the presence of stones or dilation of the common bile duct.

Generally gallbladder surgery should be postponed until the puerperium. Usually the woman can be treated with medical therapy consisting of antibiotics, analgesics, IV fluids, bowel rest, and nasogastric suctioning. Total parenteral nutrition can be used in some cases as an alternative to surgery. Morphine should not be used as an analgesic because it may cause ductal spasm. The woman’s condition should improve significantly within 48 hours of beginning treatment. Surgery may be necessary if the woman has repeated attacks of biliary colic, acute cholecystitis, obstructive jaundice, peritonitis, or pancreatitis. Laparoscopic cholecystectomy performed in the second trimester poses minimal risk to both mother and fetus. Other procedures performed may be endoscopic retrograde cholangiopancreatography or open cholecystectomy (Williamson & Mackillop, 2009).

Inflammatory Bowel Disease

Treatment of inflammatory bowel disease is the same for the pregnant woman as it is for the nonpregnant woman. Medications include prednisone and sulfasalazine. Vitamin and folic acid supplementation is especially important because of problems with malabsorption. Effects of inflammatory bowel disease on pregnancy are usually minimal. If the woman is severely debilitated, miscarriage, preterm birth, or fetal death can occur.

Integumentary Disorders

The skin surface may exhibit many physiologic and pathologic conditions during pregnancy. Dermatologic disorders induced by pregnancy include melasma (chloasma), vascular “spiders,” palm erythema, and striae gravidarum. Skin problems generally aggravated by pregnancy are acne vulgaris (in the first trimester), erythema multiforme, herpetiform dermatitis (fever blisters and genital herpes), granuloma inguinale (Donovan bodies), condylomata acuminata (genital warts), neurofibromatosis (von Recklinghausen’s disease), and pemphigus. Dermatologic disorders usually improved by pregnancy include acne vulgaris (in the third trimester), seborrheic dermatitis (dandruff), and psoriasis. An unpredictable course during pregnancy may be expected in atopic dermatitis, lupus erythematosus, and herpes simplex. Disease processes during and soon after pregnancy may be extremely difficult to diagnose and treat.

NURSING ALERT Isotretinoin (Accutane), commonly prescribed for acne, is contraindicated in pregnancy because of its high teratogenicity. Fetuses exposed to this medication are at increased risk for craniofacial, cardiac, and CNS anomalies.
Pruritus is a common symptom in pregnancy-specific inflammatory skin diseases. The most common pregnancy-specific causes of pruritus are polymorphic eruption of pregnancy (also known as pruritic urticarial papules and plaques of pregnancy [PUPPP]), prurigo gestationis, and cholestasis of pregnancy. Symptoms usually appear in the third trimester and usually subside in the postpartum period. The abdomen is usually affected; but lesions can spread to the arms, thighs, back, and buttocks. Topical steroid therapy usually provides relief, but some women may require systemic steroid therapy for severe symptoms (Papoutsis & Kroumpouzos, 2007).

**Neurologic Disorders**

The pregnant woman with a neurologic disorder needs to deal with the potential teratogenic effects of prescribed medications, changes of mobility during pregnancy, and impaired ability to care for the baby. The nurse should be aware of all drugs the pregnant woman is taking and the associated potential for producing congenital anomalies. As the pregnancy progresses, the woman's center of gravity shifts and causes balance and gait changes. The woman should be advised of these expected changes and suggest safety measures as appropriate. Family and community resources should be assessed to provide child care for the neurologically impaired woman.

**Epilepsy**

Epilepsy is a disorder of the brain causing recurrent seizures; it is the most common neurologic disorder accompanying pregnancy. Epilepsy may result from developmental abnormalities or injury or have no identifiable cause. Convulsive seizures may be more frequent or severe during complications of pregnancy such as edema, alkalosis, fluid-electrolyte imbalance, cerebral hypoxia, hypoglycemia, and hypocalcemia. They also may be related to hormonal changes, fatigue, or sleep deprivation.

**NURSING ALERT** Anticonvulsants and oral contraceptive agents may have interactions that decrease the effectiveness of the contraceptive, leading to unplanned pregnancy.

The effects of pregnancy on epilepsy are unpredictable. Most women have no change in seizure activity during pregnancy; some have an increase, whereas others have a decrease in seizures.

The differential diagnosis between epilepsy and eclampsia may pose a problem. Epilepsy and eclampsia can coexist. However, a history of seizures, a normal plasma uric acid level, and the absence of hypertension and generalized edema or proteinuria point to epilepsy.

During pregnancy risk of vaginal bleeding is doubled, and there is a threefold risk of abruptio placentae. Abnormal presentations are more common in labor and delivery. There is an increased possibility that the fetus will experience seizures in utero.

Metabolic changes in pregnancy usually alter pharmacokinetics. In addition, nausea and vomiting may interfere with ingestion and absorption of medication.

Teratogenicity of antiepileptic drugs (AEDs) has been described thoroughly. However, failure to take medications is a common factor leading to worsening of seizure activity during pregnancy. Babies born to mothers exposed to AEDs are at increased risk of congenital malformations, cognitive impairment, and fetal death. Congenital anomalies associated with AEDs include cleft lip or palate, congenital heart disease, urogenital defects, and neural tube defects. AEDs should be monotherapy and used in the smallest therapeutic dose. Daily folic acid supplementation is essential because of the depletion that occurs when taking AEDs.

A small risk of seizure activity exists during labor. If the woman cannot take oral AEDs, phenytoin can be administered intravenously. Serum levels of AEDs should be checked within 48 hours and at 1 to 2 weeks after birth because levels can change quickly and toxicity can develop.

During the neonatal period infants can have a hemorrhagic disorder associated with AED-induced vitamin K deficiency. Prophylaxis consists of administering vitamin K, 20 mg orally, daily during the last month of pregnancy and 1 mg intramuscularly to the newborn at birth. Neonates also should be monitored for drug withdrawal. All of the most prescribed AEDs cross into breast milk; however, their use is not contraindicated with breastfeeding. Some AEDs may have a sedative effect and cause possible withdrawal symptoms in the newborn (e.g., phenobarbital, primidone, benzodiazepines). Newborn weight loss has been associated with the use of topiramate and may not be an option for the breastfeeding mother (Samuels & Niebyl, 2007).

**Multiple Sclerosis**

Multiple sclerosis (MS), a patchy demyelination of the spinal cord and CNS, may be a viral disorder. Women are affected twice as often as men, with the most common onset occurring during the childbearing years between ages 20 and 40. MS does not affect the normal course of pregnancy or birth (Aminoff, 2009).
Occasionally MS may complicate pregnancy, but exacerbations and remissions are unrelated to the pregnant state. Bed rest and steroids are commonly used to treat acute exacerbations. Nursing care of the pregnant woman with MS is similar to that of the pregnant woman with an uncomplicated pregnancy. Women with MS may have an almost painless labor, although the character of uterine contractions is unaffected by the disease.

**Bell’s Palsy**

An association between Bell’s palsy (idiopathic facial paralysis) and pregnancy was first cited by Bell in 1830. The incidence of Bell’s palsy in pregnancy is about 57 per 100,000 per year. The clinical manifestations include the sudden development of a unilateral facial weakness, often discovered first thing in the morning. In addition, taste on the anterior two thirds of the tongue may be lost, depending on the location of the lesion. Pain may occur in and around the ear. The incidence usually peaks during the third trimester and the puerperium. There is no relationship between the appearance of Bell’s palsy and any complications of pregnancy.

No effects of maternal Bell’s palsy have been observed in infants. Maternal outcome is generally good unless there is a complete block in nerve conduction. Steroids sometimes are prescribed for the condition, but they do not hasten recovery. In most affected women 90% or more of facial function can be expected to return. Supportive care includes prevention of injury to the exposed cornea, facial muscle massage, careful chewing and manual removal of food from inside the affected cheek, and reassurance that return of total neurologic function is likely.

**Autoimmune Disorders**

Autoimmune disorders make up a large group of diseases that disrupt the function of the immune system of the body. In these types of disorders the body develops antibodies that attack its normally present antigens, causing tissue damage. Autoimmune disorders have a predilection for women in their reproductive years; therefore associations with pregnancy are not uncommon. Pregnancy may affect the disease process. Some disorders adversely affect the course of pregnancy or are detrimental to the fetus. Autoimmune disorders of concern in pregnancy include systemic lupus erythematosus, myasthenia gravis, and rheumatoid arthritis.

**Systemic Lupus Erythematosus**

One of the most common serious disorders in women of childbearing age, systemic lupus erythematosus (SLE), is a chronic multisystem inflammatory disease characterized by autoimmune antibody production that affects skin, joints, kidneys, lungs, CNS, liver, and other body organs. The exact cause is unknown, but viral infection and hormonal and genetic factors may be related. SLE is four times more common in African-American than in Caucasian women.

Early symptoms such as fatigue, fever, skin rashes, weight loss, and arthralgias may be overlooked. Pericarditis is often the initial symptom. Eventually all organs become involved. The condition is characterized by a series of exacerbations and remissions. If the diagnosis has been established and the woman desires a child, she is advised to wait until she is in remission and cytotoxic drugs (e.g., azathioprine, methotrexate, cyclophosphamide) have been stopped (Holmgren & Branch, 2007). An exacerbation of SLE during pregnancy or postpartum occurs in 15% to 60% of women (Holmgren & Branch, 2007).

SLE during pregnancy is associated with increased rates of preterm deliveries, IUGR, stillbirth, postpartum hemorrhage, and perinatal death. Complications such as preeclampsia and HELLP syndrome are common.

Medical therapy is kept to a minimum in women who are in remission or who have a mild form of SLE. Antiinflammatory medications such as prednisone and aspirin may be used. Immunosuppressive medications are not recommended during pregnancy but may be used in some situations when there is more risk in not treating SLE. Nursing care focuses on early recognition of signs of SLE exacerbation and pregnancy complications, education and support of the woman and her family, and assessment of fetal well-being.

Vaginal birth is preferred, but cesarean birth is common because of maternal and fetal complications. During labor efforts are aimed at reducing the risk of infection, which is the leading cause of death in women with SLE.

During the postpartum period the mother should rest as much as possible to prevent an exacerbation of SLE. Breastfeeding is encouraged unless the mother is taking immunosuppressive agents. Women with SLE should limit their number of pregnancies because of increased adverse perinatal outcomes and the guarded maternal prognosis (Holmgren & Branch, 2007). Family planning is important. Oral contraceptives with synthetic estrogens should not be used in women with active lupus nephritis.

**Myasthenia Gravis**

Myasthenia gravis (MG), an autoimmune motor (muscle) end-plate disorder that involves acetylcholine use, affects the motor function at the myoneural junction. Muscle weakness results, particularly in the eyes, face, tongue, neck, limbs, and respiratory muscles. Symptoms include easy fatigability; intermittent double vision (diplopia); upper eyelid drooping; and difficulty speaking, swallowing, and clearing secretions. In more serious cases upper arm weakness and breathing difficulty are seen. The response of women with MG to pregnancy is unpredictable; remission, exacerbation, or remaining stable during pregnancy may occur.

**NURSING ALERT** If preterm labor occurs, magnesium sulfate, which interferes with neuromuscular transmission, is absolutely contraindicated.

Treatment is the same as that for a nonpregnant woman. Usual medications include immunosuppressive medications and acetylcholinesterase inhibitors. Monitoring blood glucose values is important because hyperglycemia may be the result of corticosteroid therapy. Thymectomy may result in remission of the disease but is best performed before or after preg-
nancy if at all possible. Plasmapheresis or IV immunoglobulin therapy may be needed for severe weakness.

Women with MG usually tolerate labor well, but vacuum or forceps assistance for birth may be required because of muscle weakness. Oxytocin may be given to stimulate contractions. Regional analgesia should be avoided because it may precipitate respiratory depression. Regional analgesia is preferred. After birth women must be carefully supervised because relapses often occur during the puerperium.

In approximately 10% to 15% of neonates neonatal myasthenia develops, with symptoms of feeble cry, respiratory distress, and weak suck. These neonates may require ventilatory support. With proper management, complete recovery of the neonate should occur within 6 weeks (Aminoff, 2009).

Human Immunodeficiency Virus and Acquired Immunodeficiency Syndrome

Infection with HIV and the resultant acquired immunodeficiency syndrome (AIDS) are increasingly occurring in women. Although HIV and AIDS have traditionally been associated with homosexual populations, women are now the fastest-growing population of individuals with HIV infection and AIDS. Women are more likely to have acquired the infection through heterosexual contact or IV drug use. Women of color are disproportionately affected; about 78% of HIV-infected women are African-American or Hispanic. This section addresses management of the pregnant woman who is HIV positive or who has developed full-blown AIDS. See Chapter 6 for more information about the diagnosis and management of nonpregnant women with HIV and Chapter 28 for a discussion of HIV/AIDS in infants.

Preconception Counseling

Pregnancy is discouraged in HIV-positive women; preconception counseling is recommended. Exposure to the virus has a significant impact on the pregnancy, the neonatal feeding method, and neonatal health status. HIV-positive women should be counseled extensively about the risk of perinatal transmission and possible obstetric complications. Pregnancy itself does not appear to significantly accelerate the progression of HIV infection. HIV-positive women should be encouraged to seek prenatal care immediately if they suspect pregnancy to maximize chances for a positive outcome.

Pregnancy Risks

Perinatal Transmission

Even though the number of AIDS cases from perinatal transmission has decreased dramatically, approximately 100 to 200 infants in the United States are still infected with HIV every year. Data show that almost all AIDS diagnoses in children are caused by mother-to-child transmission and were from minority races and ethnicities (CDC, 2007b). Perinatal transmission may occur to the fetus through the maternal circulation as early as the first trimester of pregnancy; to the infant during labor and birth by inoculation or ingestion of maternal blood and other infected fluids; or to the infant through breast milk. Factors that increase the likelihood of perinatal viral transmission are listed in Box 13-6.

Treatment of HIV-infected women with the antiviral drug zidovudine (AZT) during pregnancy and labor and birth and treatment of their infants for the first 6 weeks of life with zidovudine decreases the rate of viral transmission from 25.5% to 8.3%. In the United States 25% of women who do not undergo antiviral treatment will transmit the virus to their unborn child (CDC, 2007b). These women should also be given the option of having a scheduled cesarean birth at 38 weeks to decrease the risk of perinatal transmission. If a woman with HIV has a cesarean birth and receives antiviral treatment during pregnancy, labor, and birth and if her newborn is treated, the perinatal transmission rate is less than 2% (CDC, 2007b).

Obstetric Complications

It is difficult to determine obstetric risk in persons with HIV infection because so many confounding variables are often present. Many HIV-positive women also suffer from drug and alcohol addiction, poor nutrition, limited access to prenatal care, or concurrent sexually transmitted infections (STIs). HIV-positive women are probably at risk for preterm labor
**BOX 13-6 Factors That Increase the Risk of Perinatal Human Immunodeficiency Virus Transmission**

- Previous history of a child with HIV infection
- Acquired immunodeficiency syndrome
- Preterm birth
- Decreased maternal CD4 count
- High maternal viral load
- Firstborn twin
- Chorioamnionitis
- Intrapartum blood exposure
- Failure to treat mother and fetus with zidovudine during the perinatal period


The major side effect of these drugs is bone marrow suppression. Periodic hematocrit, white blood cell count, and platelet count assessments should be performed. Women with CD4 counts of less than 200 cells/mm³ should receive prophylactic treatment for *Pneumocystis carinii* pneumonia with daily trimethoprim-sulfamethoxazole. Any other opportunistic infections should be treated with medications specific for the infection; often dosages must be higher for women with HIV infection or AIDS. If women are treated with HAART and have an undetectable viral load, the risk of perinatal transmission is 1% to 2% (Bernstein, 2007).

To support any pregnant woman’s immune system, appropriate counseling is provided about optimal nutrition, sleep, rest, exercise, and stress reduction. The HIV-infected woman needs a greater amount of nutritional support and counseling about diet choices, food preparation, and food handling. Weight gain or maintenance in pregnancy is a challenge with the HIV-infected patient. The infected patient is counseled regarding risk reduction techniques. Use of condoms and a spermicide is encouraged to minimize further exposure to HIV if her partner is the source. Orogenital sex is discouraged.

The woman is referred for drug rehabilitation as necessary to discontinue substance abuse. Abuse of alcohol, methamphetamine (“speed,” “ice”), marijuana, cocaine, nitrites (“poppers,” “snappers”), or other drugs compromises the body’s immune system and increases the risks of AIDS and associated conditions. It also interferes with many medical and alternative therapies for AIDS. In addition, alcohol and other drugs affect the judgment of abusers, who may be more likely to engage in high risk activities that increase their exposure to HIV.

*IV* zidovudine is administered to the HIV-positive woman during the intrapartum period. A loading dose is initiated on her admission in labor, followed by a continuous maintenance dosage throughout labor.

Every effort should be made during the birthing process to decrease the neonate’s exposure to infected maternal blood and secretions if cesarean birth is not scheduled and the woman goes into labor. If feasible, the membranes should be left intact until the birth. Increased duration of ruptured amniotic membranes has been associated with increased perinatal transmission. However, research has not shown these data to be statistically significant (Bernstein, 2007). If rupture of membranes occurs before labor, induction of uterine contractions with oxytocin may be appropriate. Fetal scalp electrode and scalp pH sampling should be avoided because these procedures may result in inoculation of the virus into the fetus. Operative vaginal delivery (forceps and/or vacuum extractor) and episiotomy should also be avoided when possible (Bernstein, 2007).

The postpartum period for the woman infected with HIV may be notable for infection, hemorrhage, or both. Women without symptoms may have an unremarkable postpartum course; on the other hand, immunosuppressed women with symptoms may be at increased risk for postpartum urinary tract infections, vaginitis, postpartum endometritis, and poor wound healing. HIV-related thrombocytopenia may also increase the risk of hemorrhage.

Immediately after birth infants should be wiped free of all body fluids and then bathed as soon as they are in stable con-
dation. All staff working with the mother or infant must adhere strictly to infection control techniques and observe Standard Universal Precautions for blood and other body fluids. The cleansed neonate can be with the mother after birth, but breastfeeding is discouraged because of the risk of transmission through breast milk. Oral zidovudine treatment for the infant is initiated before discharge. After discharge the woman and her infant are referred to physicians who are experienced in the treatment of AIDS and associated conditions.

Substance Abuse

The damaging effects of alcohol and illicit drugs on pregnant women and their unborn babies are well documented (Wisner et al, 2007). Alcohol and other drugs easily pass from a mother to her baby through the placenta. Smoking during pregnancy has serious health risks, including bleeding complications, miscarriage, stillbirth, prematurity, placenta previa, placental abruption, low birth weight, and sudden infant death syndrome (Wisner et al, 2007). Congenital abnormalities have occurred in infants of mothers who have taken drugs. The safest pregnancy is one in which the mother is totally drug and alcohol free, with one exception: for pregnant women addicted to heroin, methadone maintenance is safer for the fetus than acute opiate detoxification.

Substance abuse refers to the continued use of substances despite related problems in physical, social, or interpersonal areas. Recurrent abuse results in failure to fulfill major role obligations, and there may be substance-related legal problems.

Barriers to Treatment

Pregnant women often do not seek help because of the fear of losing custody of the child or of criminal prosecution. Pregnant women who abuse substances commonly have little understanding of the ways in which these substances affect them, their pregnancies, and their babies. They often delay seeking prenatal care until labor begins. Stigma, shame, and guilt lead to a high denial of drinking or drug problems both by the woman herself and by family members and friends who conceal the abuse from outsiders to protect the abuser (Wisner et al, 2007). Traditionally substance abuse treatment programs have not addressed issues that affect pregnant women such as concurrent need for obstetric care and child care for other children. Long waiting lists and lack of health insurance present further barriers to treatment.

Legal Considerations

Because of the risks to the unborn children, pregnant women who abuse substances may face criminal charges under expanded interpretations of child abuse and drug-trafficking statutes. At least 35 states have proscribed pregnant women on a variety of charges for suspected harm to the fetus (Jos, Perlmutter, & Marshall, 2003). Some policymakers have proposed that pregnant women who abuse substances should be jailed, placed under house arrest, or committed to psychiatric hospitals for the remainder of their pregnancies. Nurses who screen for substance abuse in pregnancy and encourage prenatal care, counseling, and treatment will be of greater benefit to the mother and child than prosecution. A public health approach to substance abuse can inspire macrolevel policy that is designed to strengthen communities, as well as specific treatment and prevention programs embedded in the communities (Jos, Perlmutter, & Marshall, 2003).

LEGAL TIP Drug Testing During Pregnancy

There is no state requirement for a health care provider to test either the mother or the newborn for the presence of drugs. However, nurses need to know the practices of the states in which they are working. In some states a woman whose urine drug screen test is positive at the time of labor and birth must be referred to child protective services. If the mother is not in a drug treatment program or is judged unable to provide care, the infant may be placed in foster care. In all states the U.S. Supreme Court has ruled that it is unlawful to test for drug use without the pregnant woman’s permission (Harris & Paltrow, 2003).

Nursing Care Management

The care of the substance-dependent pregnant woman is based on historical data, symptoms, physical findings, and laboratory results. Screening questions for alcohol and drug abuse should be included in the overall assessment of the first prenatal visit of all women. Because women often deny or greatly underreport usage when asked directly about drug or alcohol consumption, it is crucial that the nurse display a nonjudgmental and matter-of-fact attitude while taking the history to gain the woman’s trust and elicit a reasonably accurate estimate. Information about drug use should be obtained by first asking about the woman’s intake of over-the-counter and prescribed medications. Next her use of “legal” drugs such as caffeine, nicotine, and alcohol should be ascertained. Finally, the woman should be questioned about her use of illicit drugs such as cocaine, heroin, and marijuana. The approximate frequency and amount should be documented for each drug used.

Alcohol screening questionnaires generally ask about consequences of heavy drinking, alcohol intake, or both. The Michigan Alcoholism Screening Test (MAST) and the CAGE test are two well-known screens that are used. The T-ACE (Hankin & Sokol, 1995) (Box 13-7) was developed to screen specifically for alcohol use during pregnancy. Urine screening is unreliable because alcohol is undetectable within a few hours after ingestion. Abnormal liver function studies can provide diagnostic data about the physical effects of alcohol abuse.

Urine toxicology testing is often performed to screen for illicit drug use. Drugs may be found in urine days to weeks after ingestion, depending on how quickly they are metabolized and excreted from the body. Meconium (from the neonate) and hair can also be analyzed to determine past drug use over a longer period of time. In addition to screening for alcohol and drug abuse, the nurse should also screen for physical and sexual abuse and history of psychiatric illness because these are risk factors in women who abuse substances.

Initial and serial ultrasound studies are usually performed to determine gestational age because the woman may have had...
amenorrhea as a result of her drug use or may not know when her last menstrual period occurred. Because of concerns about stillbirth, an increased frequency of the birth of SGA infants, and the potential for hypoxia, some experts recommend that nonstress testing be done in women who are known substance abusers.

Planning the care for a pregnant woman who is a substance abuser must take into consideration the woman’s lifestyle and habits. Although the ideal long-term outcome is total abstinence, it is not likely that the woman will either desire or be able to stop alcohol and drug use suddenly. Indeed, it may be harmful to the fetus for her to do so. A realistic goal may be to decrease substance use, and short-term outcomes will be necessary.

An interdisciplinary model is essential when planning the care for women who abuse substances. Major issues that must be addressed in treatment for women that generally are not part of treatment for men are low self-esteem, stigmatization, high probability of sexual abuse and physical abuse, lack of social support, need for social services and child care, need for women’s health services, and need for support and education in the mothering role. Drug-free public housing or residential communities may offer an ideal route to stabilization in a safe environment. Treatment must demonstrate cultural sensitivity and responsiveness to recognize ethnicity and culture as an important part of her identity. Other needs of many women include relationship counseling, coping skills training, and vocational and legal assistance (Jos, Perlmutter, & Marshall, 2003).

Intervention with the pregnant substance abuser begins with education about specific effects on pregnancy, the fetus, and the newborn for each drug used. Consequences of perinatal drug use should be clearly communicated, and abstinence recommended as the safest course of action. Women are often more receptive to making lifestyle changes during pregnancy than at any other time in their lives. The casual, experimental, or recreational drug user is often able to achieve and maintain sobriety when she receives education, support, and continued monitoring throughout pregnancy. Periodic screening during pregnancy of women who have admitted to drug use may help them continue abstinence. Pregnancy presents a window of opportunity for motivating women to stop their abuse of substances.

Treatment for substance abuse will be individualized for each woman, depending on the type of drug used and the frequency and amount of use. Detoxification, short-term inpatient or outpatient treatment, long-term residential treatment, aftercare services, and self-help support groups are all possible options. Neonatal outcomes are improved among infants whose mothers received an integration of substance abuse treatment with prenatal care.

Women for Sobriety may be a more helpful organization for women than Alcoholics Anonymous or Narcotics Anonymous, which are based on the 12-step program. The emphasis on powerlessness over addiction and avoidance of codependency found in 12-step programs may disempower and isolate women, particularly women of color. The confrontational techniques of the 12-step program, developed to break down denial in men, may be especially threatening to women, who often feel unworthy and full of shame and guilt.

In general, long-term treatment of any sort is becoming increasingly more difficult to obtain, particularly for women who lack insurance coverage. Although some programs allow a woman to keep her child with her at the treatment facility, far too few are available to meet the demand.

Methadone maintenance treatment for pregnant women dependent on opiates is the current standard (Wisner et al, 2007). Methadone therapy, along with behavioral counseling, has been shown to decrease the use of opiates and other drugs, reduce criminal activity, improve birth weight and decrease the rates of preeclampsia and HIV. Disadvantages of methadone therapy include fetal heart rate changes (e.g., fewer accelerations, decreased rate and variability), a decrease in fetal breathing episodes, and neonatal abstinence syndrome (Wisner et al, 2007).

Cocaine use during pregnancy has increased dramatically in the last few years. A number of maternal and fetal complications accompany cocaine use, including placental abruption and stillbirth, prematurity, and SGA infants. When it is determined that a pregnant woman is using cocaine, she should be advised to stop using immediately. She will need a great deal of assistance such as an alcohol and drug treatment program, individual or group counseling, and participation in self-help support groups to successfully accomplish this major lifestyle change.

Because of the lifestyle often associated with drug use, substance-abusing women are at risk for STIs, including HIV. Laboratory assessments will likely include screening for STIs such as gonorrhea and chlamydial infection and antibody determinations for hepatitis B and HIV. A chest x-ray film may be taken to assess for pulmonary problems such as hilar lymphadenopathy, pulmonary edema, bacterial pneumonia, and foreign-body emboli. A skin test to screen for tuberculosis may also be ordered.

Although substance abusers may be difficult to care for at any time, they are often particularly challenging during the intrapartum and postpartum periods because of manipulative and demanding behavior. Typically these women display poor control over their behavior and a low threshold for pain.

**BOX 13-7 T-ACE Test**

- How many drinks can you hold before getting sleepy or passing out? (TOLERANCE)
- Have people ANNOYED you by criticizing your drinking?
- Have you ever thought that you ought to CUT DOWN on your drinking?
- Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover? (EYE-OPENER)

**Scoring**: Two points are given for the TOLERANCE question for the ability to hold at least a six-pack of beer or a bottle of wine. A “yes” answer to any of the other questions receives one point. An overall score of ≥2 indicates a high probability that the woman is a risk drinker.

Increased dependency needs and poor parenting skills may also be apparent.

Nurses must understand that substance abuse is an illness and that these women deserve to be treated with patience, kindness, consistency, and firmness when necessary (Box 13-8). Even women who are actively abusing drugs experience pain during labor and after giving birth. Withholding analgesia or anesthesia in an attempt to “punish” them for prenatal substance abuse is not helpful and should be avoided. It is helpful to develop a standardized plan of care so that patients have limited opportunities to play staff members against each other. Mother-infant attachment should be promoted by identifying the woman’s strengths and reinforcing positive maternal feelings and behaviors. Staffing should be sufficient to ensure strict surveillance of visitors and prevent unsupervised drug use.

Advice regarding breastfeeding must be individualized. Although all abuse substances appear in breast milk, some in greater amounts than others, breastfeeding is definitely contraindicated in women who continue to use amphetamines, alcohol, cocaine, heroin, or marijuana. The baby’s nutrition and safety needs are of primary importance in this consideration. For some women a desire to breastfeed may provide strong motivation to achieve and maintain sobriety.

Before a known substance abuser is discharged with her baby, the home situation must be assessed to determine that the environment is safe and that someone will be available to meet the infant’s needs if the mother proves unable to do so. Usually the social services department of the hospital will be involved in interviewing the mother before discharge to ensure that the infant’s needs will be met. Sometimes family members or friends will be asked to become actively involved with the mother before discharge. A home care or public health nurse may be asked to make home visits to assess the mother’s ability to care for the baby and provide guidance and support. If serious questions about the infant’s well-being exist, the case can be referred to the state’s child protective services agency for further action.

**Key Points**

- Careful monitoring of blood glucose levels, insulin administration when necessary, and dietary counseling are used to create a normal intrauterine environment for fetal growth and development in the pregnancy complicated by diabetes mellitus.
- Poor maternal glycemic control before conception and in the first trimester of pregnancy may be responsible for fetal congenital malformations and maternal complications such as miscarriage, infection, preeclampsia, and dystocia (difficult labor) caused by macrosomia.
- Maternal insulin requirements increase as the pregnancy progresses and may quadruple by term as a result of insulin resistance created by placental hormones, insulinase, and cortisol.
- Thyroid dysfunction during pregnancy requires close monitoring of thyroid hormone levels to regulate therapy and prevent fetal insult.
- High levels of phenylalanine in the maternal bloodstream cross the placenta and are teratogenic to the fetus. Damage can be prevented or minimized by dietary restriction of phenylalanine.

**Audio Chapter Summaries**

- The stress of the normal maternal adaptations to pregnancy on a heart whose functions are already taxed may cause cardiac decompensation.
- In the case of cardiac arrest in a pregnant woman, the ACLS guidelines should be implemented without modification.
- Anemia, the most common medical disorder of pregnancy, affects at least 20% of pregnant women.
- Women in their reproductive years show a predilection for autoimmune disorders (e.g., systemic lupus erythematosus and myasthenia gravis); therefore they may occur during pregnancy.
- Perinatal administration of HAART is recommended to decrease transmission of HIV from mother to fetus.
- Support from a variety of sources—including family and friends, health care providers, and the recovery community—is needed to help perinatal substance abusers achieve and maintain sobriety.
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