LEARNING OBJECTIVES

- Differentiate the types of diabetes mellitus and their respective risk factors in pregnancy.
- Compare insulin requirements during pregnancy, postpartum, and with 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.
- Explain the effects of thyroid disorders on pregnancy.
- Differentiate the management for pregnant women with class I to class IV cardiac disease.
- Describe the different types of anemia and their effects during pregnancy.
- Explain the care of pregnant women with pulmonary disorders.
- Discuss the effects of gastrointestinal disorders on pregnancy.
- Describe the effects of neurologic disorders on pregnancy.
- Outline the care of women whose pregnancies are complicated by autoimmune disorders.
- Discuss the care of pregnant women who have human immunodeficiency virus (HIV) infection.
- Discuss the care of pregnant women who use, abuse, or are dependent on alcohol or illicit or prescription drugs.

KEY TERMS AND DEFINITIONS

autoimmune disorders  Group of diseases that disrupt the function of the immune system, causing the body to produce antibodies against itself, resulting in tissue damage

cardiac decompensation  Condition of heart failure in which the heart is unable to maintain a sufficient cardiac output

euglycemia  Pertaining to a normal blood glucose level; also called normoglycemia

gestational diabetes mellitus (GDM)  Glucose intolerance first recognized during pregnancy

glycosylated hemoglobin A1c  Glycohemoglobin, a minor hemoglobin with glucose attached; the glycosylated hemoglobin concentration represents the average blood glucose level over the previous several weeks and is a measurement of glycemic control in diabetic therapy

hydramnios (polyhydramnios)  Amniotic fluid in excess of 2000 ml

hyperglycemia  Excess glucose in the blood, usually caused by inadequate secretion of insulin by the islet cells of the pancreas or inadequate control of diabetes mellitus

hyperthyroidism  Excessive functional activity of the thyroid gland

hypoglycemia  Less than normal amount of glucose in the blood; usually caused by administration of too much insulin, excessive secretion of insulin by the islet cells of the pancreas, or dietary deficiency

hypothyroidism  Deficiency of thyroid gland activity with underproduction of thyroxine

ketoadidosis  The accumulation of ketone bodies in the blood as a consequence of hyperglycemia; leads to metabolic acidosis

macrosomia  Large body size as seen in neonates of mothers with pregestational or gestational diabetes

peripartum cardiomyopathy  Inability of the heart to maintain an adequate cardiac output; congestive heart failure occurring during the peripartum period in a woman who has or has had gestational diabetes mellitus

type 1 or type 2 that exists before pregnancy

reflex bradycardia  Slowing of the heart in response to a particular stimulus
For most women, pregnancy represents a normal part of life. This chapter discusses the care of women for whom pregnancy represents a significant risk because it is superimposed on a preexisting condition. However, with the active participation of well-motivated women in the treatment plan and 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 there are unique needs related to the preexisting conditions, these high risk women also experience the feelings, needs, and concerns associated with a normal pregnancy. The primary objective of nursing care is to achieve optimal outcomes for both the pregnant woman and the fetus.

This chapter focuses on diabetes mellitus and other metabolic disorders and cardiovascular disorders. Select disorders of the respiratory system, gastrointestinal system, integumentary system, and central nervous system (CNS); substance abuse; and human immunodeficiency virus (HIV) are also discussed.

**METABOLIC DISORDERS**

**Diabetes Mellitus**

The perinatal mortality rate for well-managed diabetic pregnancies, excluding major congenital malformations, is approximately the same as for any other pregnancy (Landon, Catalano, & Gabbe, 2002; Moore, 2004). The key to an optimal pregnancy outcome is strict maternal glucose control before conception, as well as throughout the gestational period. Consequently, much emphasis is placed on preconception counseling for women with diabetes.

Pregnancy complicated by diabetes is still considered high risk. It is most successfully managed by a multidisciplinary approach involving the obstetrician, perinatologist, internist or endocrinologist, ophthalmologist, nephrologist, neonatologist, nurse, nutritionist or dietitian, and social worker, as needed. A favorable outcome requires commitment and active participation by the pregnant woman and her family. It is preferable to plan the pregnancy, working with the woman and her family preconceptionally (Slocum et al., 2004).

**Pathogenesis**

*Diabetes mellitus* refers to 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 the beta cells in the islets of Langerhans in the pancreas, regulates blood glucose levels by enabling glucose to enter adipose and muscle cells, where it is used for energy. When insulin is insufficient or ineffective in promoting glucose uptake by the muscle and adipose cells, glucose accumulates in the bloodstream, and hyperglycemia results. 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 to excrete the unusable glucose (glycosuria). Polyuria, along with cellular dehydration, causes excessive thirst (polydipsia).

The body compensates for its inability to convert carbohydrate (glucose) into energy by burning proteins (muscle) and fats. However, the end products of this metabolism are ketones and fatty acids, which, in excess quantities, produce ketoacidosis and acetonuria. Weight loss occurs as a result 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, particularly 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 the beta cells of the pancreas are destroyed by an autoimmune process, or by 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, if either, abnormality is the primary cause of the disease (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

**Classification**

The current classification system for diabetes includes four groups: type 1 diabetes, type 2 diabetes, other specific types (e.g., diabetes caused by infection or induced by drugs), and gestational diabetes mellitus (GDM) (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). Approximately 8.7% of women greater than 20
years of age have diabetes mellitus (Bernasko, 2004), with approximately 4% to 7% of those women developing gestational diabetes or diabetes in pregnancy (ADA, 2004a; ADA, 2004b). Of the women with pregestational diabetes, the majority (65%) have type 2 diabetes (Chan & Johnson, 2006).

Type 1 diabetes includes those cases that are primarily caused by pancreatic islet beta cell destruction and that are 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 causes of type 2 diabetes are unknown at this time. Type 2 diabetes often goes undiagnosed for years because hyperglycemia develops gradually and often is not severe enough for the patient 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 for the development of type 2 diabetes 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 mellitus is the label sometimes given to type 1 or type 2 diabetes that existed before pregnancy. Gestational diabetes mellitus is any degree of glucose intolerance with the onset or first recognition occurring during pregnancy. This definition is appropriate whether or not insulin is used for treatment or 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).

Metabolic changes associated with pregnancy

Normal pregnancy is characterized by complex alterations in maternal glucose metabolism, insulin production, and metabolic 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. Around the tenth week of gestation the fetus begins to secrete its own insulin at levels adequate to use the glucose obtained from the mother. Therefore, 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 beta 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. 22-1, A). A concomitant increase in tissue glycogen stores and a decrease in hepatic glucose production occur, 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 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. Maternal insulin requirements may double or quadruple by the end of the pregnancy (Fig. 22-1, B and C).

At birth, expulsion of the placenta prompts an abrupt drop in levels of circulating placental hormones, cortisol, and insulinase (Fig. 22-1, D). Maternal tissues quickly regain their prepregnancy sensitivity to insulin. For the nonbreastfeeding mother the prepregnancy insulin-carbohydrate balance usually returns in approximately 7 to 10 days (Fig. 22-1, E). Lactation uses maternal glucose; therefore the breastfeeding mother’s insulin requirements will remain low during lactation. On completion of weaning, the mother’s prepregnancy insulin requirement is reestablished (Fig. 22-1, F).

Pregestational Diabetes Mellitus

Approximately two per 1000 pregnancies are complicated by preexisting diabetes. Women who have pregestational diabetes may have either type 1 or type 2 diabetes, which may or may not be complicated by vascular disease, retinopathy, nephropathy, or other diabetic sequelae. Type 1 diabetes is the more common diagnosis, but as the incidence of type 2 diabetes increases in the general population it may become the more prevalent diagnosis. Almost all women with pregestational diabetes are insulin dependent during pregnancy.

The diabetogenic state of pregnancy imposed on the compromised metabolic system of the woman with pregestational diabetes has significant implications. The normal hormonal adaptations of pregnancy affect glycemic control, and pregnancy may accelerate the progress of vascular complications.

During the first trimester, when maternal blood glucose levels are normally reduced and the insulin response to
Glucose is enhanced, glycemic control is improved. The insulin dosage for the woman with well-controlled diabetes may need to be reduced to avoid hypoglycemia. Nausea, vomiting, and cravings typical of early pregnancy result in dietary fluctuations that influence maternal glucose levels and may also necessitate a reduction in insulin dosage.

Because insulin requirements steadily increase after the first trimester, insulin dosage must be adjusted accordingly to prevent hyperglycemia. Insulin resistance begins as early as 14 to 16 weeks and continues to rise until it stabilizes during the last few weeks of pregnancy.

Diabetic nephropathy has more impact on perinatal outcome than any other vascular complication. Increased risks of preeclampsia, preterm labor, intrauterine growth restriction (IUGR), fetal distress, stillbirth, and neonatal death are associated with this condition (Moore, 2004).

**Preconception counseling**

Preconception counseling is recommended for all women of reproductive age who have diabetes because it is associated with an improved pregnancy outcome (Moore, 2004). Under ideal circumstances, women with pregestational diabetes are counseled before the time of conception to plan the optimal time for pregnancy, establish glycemic control before conception, and diagnose any vascular complications of diabetes. However, it has been estimated that fewer than 20% of women with diabetes in the United States participate in preconception counseling (Landon, Catalano, & Gabbe, 2002).

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 of the potential complications of pregnancy as a result of diabetes. The couple should also 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 another 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 complications during pregnancy. In women who have diabetes, poor glycemic control around the time of conception and in the early weeks of pregnancy is associated with an increased incidence of miscarriage. Women with good glycemic control before conception and in the first trimester are no more likely to miscarry than women who do not have diabetes (Moore, 2004).

Poor glycemic control later in pregnancy, particularly in women without vascular disease, increases the rate of fetal macrosomia. Macrosomia occurs in 20% to 25% of diabetic pregnancies. Macroscopic infants tend to have a disproportionate increase in shoulder and trunk size. Because of this, the risk of shoulder dystocia is greater in these babies than in other macroscopic infants. Women with diabetes therefore face an increased likelihood of cesarean birth because...
Critical Thinking Exercise

Diabetes Mellitus

Maria is a 28-year-old pregnant woman, G7P4-2-0-4 who is 30 weeks of gestation. She is 64 inches tall and weighs 277 lbs. Her fantasy blood sugar (FBS) is 173 and her HgbA₁c is 10.6. She had previously been on glucophage 500 mg bid and took it prior to pregnancy. This is her first visit. The provider prescribes Lantus insulin 37 units and regular insulin 5 units with meals. At her next prenatal visit, she is 32 weeks gestation and reports she is not taking her insulin, “because I can’t do that.” Her provider prescribes an oral hypoglycemic, glyburide. She asks if she can take this medicine while she is pregnant.

1. Is there sufficient evidence to draw conclusions about her diagnosis and preferred treatment?
2. What assumptions can be made about the following items?
   a. Possible diagnoses.
   b. Physical assessment, laboratory tests, and diagnostic procedures that will be done to make a diagnosis.
   c. Factors contributing to her elevated blood sugar.
   d. Factors contributing to the provider’s prescription of an oral hypoglycemic.
3. What implications and priorities for nursing care can be drawn at this time?
4. Does the evidence objectively support your conclusion?
5. Are there alternative perspectives to your conclusion?

of failure of fetal descent or labor progress, or of operative vaginal birth (birth involving the use of episiotomy, forceps, or vacuum extractor) (Moore, 2004).

The hypertensive disorder, preeclampsia or eclampsia, occurs more frequently during diabetic pregnancies (Moore, 2004). The highest incidence occurs in women with preexisting vascular changes related to diabetes (Moore, 2004).

**Hydramnios (polyhydramnios)** occurs approximately 10 times more often in diabetic than in nondiabetic pregnancies. Hydramnios (amniotic fluid in excess of 2000 ml) is associated with premature rupture of membranes (PROM), onset of preterm labor, and postpartum hemorrhage (Cunningham et al., 2005).

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 (UTIs) are also more prevalent. Infection is serious because it causes increased insulin resistance and may result in ketoacidosis. Postpartum infection is more common among women who are insulin dependent.

**Ketoacidosis** 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 is at increased risk for diabetic ketoacidosis (DKA). The use of tocolytic drugs such as terbutaline to arrest preterm labor may also contribute to the risk for hyperglycemia and subsequent DKA (Cunningham et al., 2005; Iams & Creasy, 2004). 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. DKA 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 to enter 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 occurring at any time during pregnancy can lead to intrauterine fetal death. It is also a cause of preterm labor. Fetal demise is approximately 10% with maternal ketoacidosis (Moore, 2004) (Table 22-1).

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 normoglycemia. 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. (see Table 22-1).

**Fetal and neonatal risks and complications**

From the moment of conception, the infant of a woman with diabetes faces an increased risk of complications that may occur during the antepartum, intrapartum, or neonatal periods. Infant morbidity and mortality rates associated with diabetic pregnancy are significantly reduced with strict control of maternal glucose levels before and during pregnancy.

Despite the improvements in care of pregnant women with diabetes, sudden and unexplained stillbirth is still a major concern. Typically, this is observed in pregnancies after 36 weeks in women with vascular disease or poor glycemic control. It may also be associated with DKA, preeclampsia, hydramnios, or macrosomia. Although the exact cause of stillbirth is unknown, it may be related to chronic intrauterine hypoxia.

The most important cause of perinatal loss in diabetic pregnancy is congenital malformations, accounting for up to 40% of all perinatal deaths. The incidence of congenital
malformations is related to the severity and duration of the diabetes. Anomalies commonly seen in infants primarily affect the cardiovascular system, CNS, and skeletal system (Cunningham et al., 2004; Moore, 2004) (see Chapter 27).

The fetal pancreas begins to secrete insulin at 10 to 14 weeks of gestation. The fetus responds to maternal hyperglycemia by secreting large amounts of insulin (hyperinsulinism). Insulin acts as a growth hormone, causing the fetus to produce excess stores of glycogen, protein, and adipose tissue, leading to increased fetal size, or macrosomia. Macrosomia is often defined as a weight of greater than 4500 g (American College of Obstetricians and Gynecologists [ACOG], 2000a). During birth the macrosomic infant is at risk for a fractured clavicle, liver or spleen laceration, brachial plexus injury, facial palsy, phrenic nerve injury, or subdural hemorrhage (Moore, 2004) (for further discussion, see Chapter 27).

**CARE MANAGEMENT**

**Assessment And Nursing Diagnoses**

**Interview**

When a pregnant woman with diabetes initiates prenatal care, a thorough evaluation of her health status is completed. In addition to the routine prenatal assessment, a detailed history regarding the onset and course of the diabetes and its

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**TABLE 22-1**

**Differentiation of Hypoglycemia (Insulin Shock) and Hyperglycemia (Diabetic Ketoacidosis)**

<table>
<thead>
<tr>
<th>CAUSES</th>
<th>ONSET</th>
<th>SYMPTOMS</th>
<th>INTERVENTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HYPOGLYCEMIA (INSULIN SHOCK)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess insulin</td>
<td>Rapid (regular insulin)</td>
<td>Irritability</td>
<td>Check blood glucose level when symptoms first appear</td>
</tr>
<tr>
<td>Insufficient food (delayed or missed meals)</td>
<td>Gradual (modified insulin or oral hypoglycemic agents)</td>
<td>Hunger</td>
<td>Eat or drink 10 to 15 grams simple carbohydrate immediately</td>
</tr>
<tr>
<td>Excessive exercise or work</td>
<td></td>
<td>Sweating</td>
<td>Recheck blood glucose level in 15 min and eat or drink another 10 to 15 grams simple carbohydrate if glucose remains low</td>
</tr>
<tr>
<td>Indigestion, diarrhea, vomiting</td>
<td></td>
<td>Weakness</td>
<td></td>
</tr>
<tr>
<td><strong>HYPERGLYCEMIA (DKA)</strong></td>
<td>Slow (hours to days)</td>
<td>Thirst</td>
<td>Notify primary health care provider if no change in glucose level</td>
</tr>
<tr>
<td>Insufficient insulin</td>
<td></td>
<td>Nausea or vomiting</td>
<td>If woman is unconscious, administer 50% dextrose IV push, 5% to 10% dextrose in water IV drip, or glucagon</td>
</tr>
<tr>
<td>Excess or wrong kind of food</td>
<td></td>
<td>Abdominal pain</td>
<td>Obtain blood and urine specimens for laboratory testing</td>
</tr>
<tr>
<td>Infection, injuries, illness</td>
<td></td>
<td>Constipation</td>
<td></td>
</tr>
<tr>
<td>Emotional stress</td>
<td></td>
<td>Drowsiness</td>
<td></td>
</tr>
<tr>
<td>Insufficient exercise</td>
<td></td>
<td>Increased urination</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Headache</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Headache</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pallor; clammy skin</td>
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<tr>
<td></td>
<td></td>
<td>Shallow respirations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rapid pulse</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laboratory values</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Urine: negative for sugar and acetone</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blood glucose: ≤60 mg/dl</td>
<td></td>
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</tbody>
</table>

DKA, Diabetic ketoacidosis; IV, intravenous.
management and the degree of glycemic control before pregnancy is obtained. Effective management of the diabetic pregnancy depends on the woman’s adherence to a plan of care. At the initial prenatal visit the woman’s knowledge regarding diabetes and pregnancy, potential maternal and fetal complications, and the plan of care are also assessed. With subsequent visits, follow-up assessments are completed. Data from these assessments are used to identify the woman’s specific learning needs.

The woman’s emotional status is assessed to determine how she is coping with pregnancy superimposed on preexisting diabetes. Although normal pregnancy typically evokes some degree of stress and anxiety, pregnancy designated as high risk serves to compound anxiety and stress levels. Fear of maternal and fetal complications is a major concern. Strict adherence to the plan of care may necessitate alterations in patterns of daily living and may be an additional source of stress.

The woman’s support system is assessed to identify those people significant to her and their roles in her life. It is important to assess reactions of the family or significant other to the pregnancy and to the strict management plan, and their involvement in the treatment regimen.

**Physical examination**

At the initial visit a thorough physical examination is performed to assess the woman’s current health status. In addition to the routine prenatal examination, specific efforts are made to assess the effects of the diabetes, specifically diabetic retinopathy, nephropathy, autonomic neuropathy, and coronary artery disease (ADA, 2003). A baseline electrocardiogram (ECG) may be done to assess cardiovascular status. Evaluation for retinopathy is done, with follow-up by an ophthalmologist each trimester and more frequently if retinopathy is diagnosed. Blood pressure is monitored carefully throughout pregnancy because of the increased risk for preclampsia. The woman’s weight gain is also monitored at each visit. Fundal height is measured, with note made of any abnormal increase in size for dates, which may indicate hydramnios or fetal macrosomia.

**Laboratory tests**

Routine prenatal laboratory examinations are performed. In addition, baseline renal function may be assessed with a 24-hour urine collection for total protein excretion and creatinine clearance. Urinalysis and culture are performed on the initial prenatal visit and as needed throughout the pregnancy to assess for the presence of UTI, which is common in diabetic pregnancy. At each visit urine is tested for the presence of glucose and ketones. Because of the risk of coexisting thyroid disease, thyroid function tests may also be performed (see later discussion of thyroid disorders).

For the woman with pregestational type 1 or type 2 diabetes, laboratory tests may be done to assess past glycemic control. At the initial prenatal visit, 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 (RBC). Therefore a test for glycosylated hemoglobin provides a measure of glycemic control over time, specifically over the previous 4 to 6 weeks. Regular measurements of glycosylated hemoglobin provide data for altering the treatment plan and lead to improvement of glycemic control. Values for the measurement of hemoglobin $A_{1c}$, the most commonly used index of glycosylated hemoglobin, are as follows (Pagana & Pagana, 2003):

- Adult or elderly without diabetes: 2.2% to 4.8%
- Good diabetic control: 2.5% to 5.9%
- Fair diabetic control: 6% to 8%
- Poor diabetic control: greater than 8%

Fasting blood glucose or random (1 to 2 hours after eating) glucose levels may be assessed during antepartum visits (Fig. 22-2). Blood glucose self-monitoring records may also be reviewed.

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
  - insulin administration and its effects
  - hypoglycemia and hyperglycemia
  - diabetic diet
- **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 noncompliance related to**
  - lack of understanding of diabetes and pregnancy and requirements of treatment plan
  - lack of financial resources to purchase blood glucose monitoring supplies or insulin and necessary supplies
  - insufficient funds or lack of transportation to grocery store to follow dietary regimen
- **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

**Expected Outcomes of Care**

Expected outcomes of management 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
• Give birth to a healthy infant at term

**Plan of Care and Interventions Antepartum**

Because of her high risk status, a woman with diabetes is monitored much more frequently and thoroughly than are other pregnant women. During the first and second trimesters of pregnancy, her routine prenatal care visits will be scheduled every 1 to 2 weeks. In the last trimester she will likely be seen one or two times each week. In the past, routine hospitalization for management of the diabetes, 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 constant euglycemia, with blood glucose levels in the range of 65 to 105 mg/dl preprandially (Table 22-2), is the primary goal of medical therapy (ACOG, 2004a; ACOG, 2004b; Moore, 2004). 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.

Euglycemia is achieved through a combination of diet, insulin, and exercise. The necessary lifestyle changes for some women and their families can sometimes seem overwhelming. Maintaining tight blood glucose control necessitates that the woman follow a consistent daily schedule. She must get up and go to bed, eat, exercise, and take insulin at the same time each day. Blood glucose measurements are done 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 when away from home.

Because the woman is at increased risk for infections, eye problems, and neurologic changes, foot care and general skin care are important. A daily bath that includes good perineal care and foot care is important. For dry skin, lotions, creams, or oils can be applied. 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 professional help should be sought for any foot problems. Extremes of temperature should be avoided.

**Diet.** The woman with pregestational diabetes has usually had nutritional counseling regarding management of her diabetes. However, pregnancy precipitates special nutritional concerns and needs and the woman must be educated to incorporate these changes into dietary planning. Therefore, for the woman who has “controlled” her diabetes for a number of years, the changes in her insulin and dietary needs mandated by pregnancy may be difficult. Nutritional counseling is usually provided by a registered dietitian.

Dietary management during diabetic pregnancy must be based on blood (not urine) glucose levels. The diet is indi-

<table>
<thead>
<tr>
<th>TIME OF DAY</th>
<th>TARGET PLASMA GLUCOSE LEVEL (MG/DL)</th>
</tr>
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<tbody>
<tr>
<td>Premeal/Fasting</td>
<td>&gt;65 but &lt;105</td>
</tr>
<tr>
<td>Postmeal (1 hr)</td>
<td>&lt;130–155</td>
</tr>
<tr>
<td>Postmeal (2 hr)</td>
<td>&lt;130</td>
</tr>
</tbody>
</table>

vidualized to allow for increased fetal and metabolic requirements, with consideration of such factors as prepregnancy weight and dietary habits, overall health, ethnic background, lifestyle, stage of pregnancy, knowledge of nutrition, and insulin therapy. The dietary goals are to provide weight gain consistent with a normal pregnancy, to prevent ketoadiposis, and to minimize wide fluctuation of blood glucose levels.

For nonobese women, dietary counseling based on preconceptional body mass index (BMI) is 30 kcal/kg/day (Cunningham et al., 2005). In contrast, for obese women with a BMI greater than 30, it is recommended that the caloric intake total 25 kcal/kg/day (Moore, 2004). The average diet includes 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 carbohydrate, protein, and fat or the carbohydrate-to-insulin ratio (C:I ratio) is important to meet the metabolic needs of the woman and the fetus (Bernasko, 2004). Approximately 40% to 50% of the total calories should be carbohydrates, with 30% to 40% fats and proteins providing the remainder of the caloric intake (ADA, 2004d; Bernasko, 2004) (Patient Instructions for Self-Care box below). 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. Weight gain for women with a normal BMI (19.8 to 26) should be approximately 12 kg during the pregnancy (Institute of Medicine [IOM, 1990]).

**Exercise.** Although it has been shown that exercise enhances the use of glucose and decreases insulin need in women without diabetes, there are limited data regarding exercise in women with pregestational diabetes. 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, especially for women with vasculopathy. Women with vasculopathy depend completely on exogenous insulin and are at greater risk for wide fluctuations in blood glucose levels and ketoadiposis, which can be made worse by exercise.

Careful instructions are given to the woman. 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 are non–weight-bearing activities such as arm exercises 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.

**NURSE ALERT** Uterine contractions may occur during exercise; the woman should stop exercising immediately if they are detected.

**Insulin therapy.** Adequate insulin is the primary factor in the maintenance of euglycemia during pregnancy, thus ensuring proper glucose metabolism of the woman and fetus. Insulin requirements during pregnancy change dramatically as the pregnancy progresses, necessitating frequent adjustments in insulin dosage. In the first trimester, from 3 to 7 weeks of gestation there is an increase in insulin requirements, followed by a decrease between 7 and 15 weeks of gestation. However, insulin dosage may need to be decreased because of hypoglycemia. The common prescribed insulin dosage is 0.7 units/kg in the first trimester for women with type 1 diabetes (Moore, 2004). During the second and third trimester, because of insulin resistance, dosage must be increased to maintain target glucose levels. As insulin needs rise, women with type 1 diabetes require a dosage increase to 0.8 units/kg during weeks of gestation 18 to 26, 0.9 units/kg during weeks of gestation 27 to 36, and 1 unit/kg from 37 weeks of gestation until labor (ADA, 2004c; Moore, 2004).

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 of pregestational diabetic women with regard to insulin administration and adjustment of insulin dosage to maintain euglycemia (Patient Instructions for Self-Care box on p. 682).

Many types of biosynthetic human insulin preparations (Humulin or Novolin) are available, including regular, NPH,
Lente, Semi-lente, and mixed. These insulins are less likely to cause antibody formation. Lispro (Humalog), a rapid-acting insulin with a shorter duration than regular insulin, is also available. Advantages of lispro include convenience, because it is injected immediately before mealtime; less hypoglycemia after meals; and fewer hypoglycemic episodes in some patients. Because its effects last 6 to 8 hours, most patients require a longer-acting insulin along with lispro to maintain optimal blood glucose levels (Landon, Catalano, & Gabbe, 2002; Moore, 2004; Weiner & Buhimschi, 2004). In addition, Lantus (insulin glargine) is being used more frequently by providers and is a long-acting insulin lasting approximately 16 to 24 hours in women who are pregnant. Lantus is categorized as a pregnancy category C drug by the U.S. Food and Drug Administration (FDA) (Aventis Pharmaceuticals, 2004). Small amounts of Lantus insulin are slowly released with no pronounced peak. This insulin preparation is most often used with women with insulin resistance diabetes (type 2) requiring high doses of long-acting insulin. Lantus is combined with a rapid-acting insulin to prevent hypoglycemia. Major concerns with Lantus include monitoring for nocturnal hypoglycemia (Moore, 2004) (Table 22-3) and not mixing with other insulins or solutions (Aventis Pharmaceuticals, 2004). It provides a more stable basal blood glucose with less risk of nocturnal hypoglycemia than NPH insulin (Cianni et al., 2005).

Most women with insulin-dependent diabetes are managed with two to three injections per day, also known as multiple injection therapy (MIT) (Bernasko, 2004). 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 (Moore, 2004).

**TABLE 22-3**

<table>
<thead>
<tr>
<th>Insulin Administration during Pregnancy: Expected Time of Action</th>
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<tbody>
<tr>
<td><strong>TYPE OF INSULIN</strong></td>
</tr>
<tr>
<td>Lispro (short acting)</td>
</tr>
<tr>
<td>Regular (short acting)</td>
</tr>
<tr>
<td>Intermediate acting</td>
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<tr>
<td>Long acting</td>
</tr>
<tr>
<td>Lantus (long acting)*</td>
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</tbody>
</table>

*Lantus is categorized as a category C drug. Category C drugs are drugs in animal studies that an adverse fetal effect has been noted but adequate research has not been conducted in humans (Nursing 2006, 2006). Reference: Facts and Comparisons. (2003). Drug Facts and Comparisons. St. Louis: Wolters Kluwer Co.*
Continuous subcutaneous insulin infusion (CSII) systems are increasingly used during pregnancy. The insulin pump is designed to mimic more closely the function of the pancreas in secreting insulin (Fig. 22-3). This portable, battery-powered 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. 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. It also delivers bolus doses of insulin before meals to control postmeal blood glucose levels. The infusion tubing from the insulin pump can be left in place for several weeks without local complications. Although the insulin pump is convenient and generally provides good glycemic control, complications such as DKA, infection, or hypoglycemic coma can still develop (Moore, 2004). Use of the insulin pump requires a knowledgeable, motivated patient, skilled health care providers, and an alternative mode of insulin delivery in case of pump failure (Bernasko, 2004; Moore, 2004).

**Monitoring blood glucose levels.** Blood glucose testing at home with a glucose reflectance meter or biosensor monitor is the commonly accepted method for monitoring blood glucose levels.

To perform blood glucose monitoring, an individual obtains a drop of blood by means of a finger stick and places it on a test strip. After a specified amount of time, the glucose level can be read by the meter (Patient Instructions for Self-Care box). Blood glucose levels are routinely measured at various times throughout the day, such as before breakfast, lunch, and dinner; 2 hours after each meal; at bedtime; and in the middle of the night. Hyperglycemia will most likely be identified in 2-hour postprandial values, because blood glucose levels peak approximately 2 hours after a meal. When there is any readjustment in insulin dosage or diet, more frequent measurement of blood glucose is warranted. If nausea, vomiting, or diarrhea occur; or if any infection is present, the woman will 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 65 and 105 mg/dl, and 1-hour postprandial levels should be less than 130 to 155 mg/dl (ADA, 2004b; Moore, 2004). The woman should be told to immediately report episodes of hypoglycemia (less than 60 mg/dl) and hyperglycemia (more than 200 mg/dl) to her health care provider so that adjustments in diet or insulin therapy can be made.

Pregnant women with diabetes are much more likely to develop hypoglycemia than hyperglycemia. Most episodes of mild or moderate hypoglycemia can be treated with oral intake of 10 to 15 grams of simple carbohydrate (Patient Instructions for Self-Care box, Treatment for Hypoglycemia, p. 684). 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 because impaired judgment can be associated with even moderate episodes, it is vital that family members, friends, and work colleagues be able to

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**NURSE ALERT** When instructing patients to take insulin before dinner, recognize that some people have eating patterns of breakfast, lunch, and dinner while others follow a pattern of breakfast, dinner, and supper. For some people, the biggest meal is at noon while for others, the biggest meal is the evening meal.

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**PATIENT INSTRUCTIONS FOR SELF-CARE**

**Self-Testing of Blood Glucose Level**

- Gather supplies, check expiration date, and read instructions on testing materials. Prepare glucose reflectance meter for use according to manufacturer’s directions.
- Wash hands in warm water (warmth increases circulation).
- Select site on side of any finger (all fingers should be used in rotation).
- Pierce site with lancet (may use automatic, spring-loaded, puncturing device). Cleaning the site with alcohol is not necessary.
- Drop hand down to side; with other hand gently squeeze finger from hand to fingertip.
- Allow blood to drop onto testing strip. Be sure to cover entire reagent area.
- Determine blood glucose value using the glucose reflectance meter, following manufacturer’s instructions.
- Record results.
- Repeat as instructed by health care provider and as needed for signs of hypoglycemia or hyperglycemia.

quickly recognize signs and symptoms and initiate proper treatment if necessary.

Hyperglycemia is less likely to occur, but it can rapidly progress to DKA, which is associated with an increased risk of fetal death (Cunningham et al., 2005; Moore, 2004). Maternal hyperglycemia is predictive of macrosomia (ADA, 2004). Women and family members should be particularly alert for signs and symptoms of hyperglycemia, especially when infections or other illnesses occur (Patient Instructions for Self-Care box, above right).

Urine testing. While urine testing for glucose is not beneficial during pregnancy, urine testing for ketones continues to have a place in diabetic management (ADA, 2004b). Monitoring for urine ketones may detect inadequate caloric or carbohydrate intake (ADA, 2004b). Women may be taught to perform urine testing daily with the first morning urine. Testing may also be done if a meal is missed or delayed, when illness occurs, or when the blood glucose level is greater than 200 mg/dL.

Complications requiring hospitalization. Occasionally, hospitalization is needed to regulate insulin therapy and stabilize glucose levels. 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 is recommended for women whose diabetes is poorly controlled. In addition, women with diabetes are 20% to 30% more likely to also have preexisting hypertension (Moore, 2004), and develop chronic hypertension, preeclampsia, or eclampsia, which may necessitate hospitalization.

*Fetal surveillance.* Diagnostic techniques for fetal surveillance are often performed to assess fetal growth and well-being. The goals of fetal surveillance are to detect fetal compromise as early as possible and to prevent intrauterine fetal death or unnecessary preterm birth.

Early in pregnancy, the estimated date of birth (EDB) is determined. A baseline sonogram is done during the first trimester to assess gestational age. Follow-up ultrasound examinations are usually performed during the pregnancy (as often as every 4 to 6 weeks) to monitor fetal growth; estimate fetal weight; and detect hydramnios, macrosomia, and congenital anomalies.

Because a fetus in a diabetic pregnancy is at greater risk for neural tube defects (e.g., spina bifida, anencephaly, microcephaly), measurement of maternal serum alpha-fetoprotein is performed between 16 to 20 weeks of gestation (Cunningham et al., 2005). This is often done in conjunction with a detailed ultrasound study to examine the fetus for neural tube defects.

Fetal echocardiography may be performed between 20 and 22 weeks of gestation to detect cardiac anomalies (Moore, 2004). Some practitioners repeat this fetal surveillance test at 34 weeks of gestation. Doppler studies of the umbilical artery may be performed in women with vascular disease to detect placental compromise.

The majority of fetal surveillance measures are concentrated in the third trimester, when the risk of fetal compromise is greatest. Pregnant women should be taught how to do daily fetal movement counts, beginning at 28 weeks of gestation (see Chapter 21) (Moore, 2004).

The nonstress test used to evaluate fetal well-being may be used weekly or more often (twice weekly), typically beginning around 28 weeks of gestation (Moore, 2004). For the woman with vascular disease, testing may begin earlier and
continue more frequently. In the presence of a nonreactive nonstress test, a contraction stress test or fetal biophysical profile may be used to evaluate fetal well-being (Landon, Catalano, & Gabbe, 2002; Moore, 2004).

**Determination of birth date and mode of birth.** Today, most diabetic pregnancies are allowed to progress to 38.5 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 birth before term include poor metabolic control, worsening hypertensive disorders, fetal macrosomia, or fetal growth restriction (Cunningham et al., 2005; Moore, 2004).

Many practitioners plan for elective labor induction between 38 and 40 weeks of gestation. To confirm fetal lung maturity before birth, an amnioncentesis should be performed in pregnancies between 37 and 38.5 weeks of gestation (Moore, 2004). For the pregnancy complicated by diabetes, fetal lung maturation is better predicted by the amniotic fluid phosphatidylglycerol (≥5%) (Moore, 2004) than by the lecithin/sphingomyelin ratio. If the fetal lungs are still immature, birth should be postponed as long as the results of fetal assessment remain reassuring. Amniocentesis may be repeated to monitor lung maturity (Landon, Catalano & Gabbe, 2002). Birth, despite poor fetal lung maturity, may be necessary when testing suggests fetal compromise, worsening maternal renal or visual function, or preeclampsia.

Although vaginal birth is expected for most women with pregestational diabetes, the cesarean rate for these women ranges from 30% to 80% (Cunningham et al., 2005; Moore, 2004). Cesarean birth is often performed when antepartum testing suggests fetal distress or the estimated fetal weight is greater than 4500 grams (Moore, 2004). Also, cesarean birth is necessary when the cervix fails to dilate completely during induction of labor (Moore, 2004).

**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 carefully controlled during labor. An IV line is inserted for infusion of a maintenance fluid, such as lactated Ringer’s solution, 5% dextrose in lactated Ringer’s solution, or 10% dextrose (ADA, 2004c). Most commonly, insulin is administered by continuous infusion. Only regular insulin may be administered intravenously. Determinations of blood glucose levels are made every hour, and fluids and insulin are adjusted to maintain blood glucose levels between 80 and 120 mg/dl (ADA, 2004c; Balsells et al., 2000; Bernasko, 2004). 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 woman 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 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 a cesarean birth. The woman is observed and treated during labor for diabetic complications such as hyperglycemia, ketosis, ketoacidosis, and glycosuria. During second-stage labor, shoulder dystocia may occur with birth of a macrosomic infant (see Chapter 24). A neonatologist, pediatrician, or neonatal nurse practitioner may be present at the birth to initiate assessment and neonatal care.

If a cesarean birth is planned, it should be scheduled in the early morning to facilitate glycemic control. Dependent upon the provider, no morning insulin may be given or the bedtime dose of NPH insulin may be given in the morning and every 8 hours until surgery (Chan & Johnson, 2006). The woman is given nothing by mouth. Epidural anesthesia is recommended because hypoglycemia can be detected earlier if the woman is awake. After surgery, glucose levels should be monitored at least every 2 hours if an IV solution containing 5% dextrose is being infused. Target plasma glucose levels are between 80 and 160 mg/dl (Moore, 2004).

**Postpartum**

In the immediate 24 hours postpartum, insulin requirements decrease substantially because the major source of insulin resistance, the placenta, has been removed. Women with type 1 diabetes may require only one fourth to one third of the prenatal insulin dose on the first postpartum day, provided that they are eating a full diet (Bernasko, 2004). In women giving birth by cesarean an intravenous infusion of glucose and insulin may be required for the first 2 to 3 days after birth for type 1 diabetics (Moore, 2004). It takes several days after birth to reestablish carbohydrate homeostasis (see Fig. 22-1, D and E). As insulin needs decrease significantly following birth some women may not require insulin for 24 to 72 hours postpartum (Chan & Johnson, 2006). Blood glucose levels are monitored in the postpartum period, and insulin dosage is adjusted using a sliding scale. The woman who has insulin-dependent diabetes must realize the importance of eating on time even if the baby needs feeding or other pressing demands exist. Women with type 2 diabetes often require only 40% to 50% of their pregnancy insulin dose in the postpartum period and are soon able to maintain euglycemia through diet alone or with oral hypoglycemics (Moore, 2004).

Possible postpartum complications include preeclampsia-eclampsia, hemorrhage, and infection. Hemorrhage is a possibility if the mother’s uterus was overdistended (hydramnios, macrosomic fetus) or overstimulated (oxytocin induction). Postpartum infections such as endometritis are more likely to occur in a woman with diabetes.
Mothers are encouraged to breastfeed. In addition to the advantages of maternal satisfaction and pleasure, breastfeeding has an antidiabeticogenic effect for the children of women with diabetes and for women with gestational diabetes (Moore, 2004). Insulin requirements may be half of prepregnancy levels because of the carbohydrate used in human milk production. Because glucose levels are lower, breastfeeding women are at increased risk for hypoglycemia, especially in the early postpartum period and after breastfeeding sessions, particularly after late night nursing (Moore, 2004). Breastfeeding mothers with diabetes may be at increased risk for mastitis and yeast infections of the breast. Insulin dosage, which is decreased during lactation, must be recalculated at weaning (Landon, Catalano, & Gabbe, 2002; Lawrence & Lawrence, 2005) (see Fig. 22-1, F).

The mother may have early breastfeeding difficulties. Poor metabolic control may delay lactogenesis and contribute to decreased milk production (Moore, 2004). Initial contact and opportunity to breastfeed the infant may be delayed for mothers who gave birth by cesarean or if infants are placed in neonatal intensive care units or special care nurseries for observation during the first few hours after birth. Support and assistance from nursing staff and lactation specialists can facilitate the mother’s early experience with breastfeeding and encourage her to continue.

The new mother needs information about family planning and contraception. Although family planning is important for all women, it is essential for the woman with diabetes to safeguard her own health and to promote optimal outcomes in future pregnancies. 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.

The risks and benefits of contraceptive methods should be discussed with the mother and her partner before discharge from the hospital.Barrier methods are often recommended as safe, inexpensive options that have no inherent risks for women with diabetes (Landon, Catalano, & Gabbe, 2002). However, barrier methods such as the diaphragm or condom and spermicide are not as effective as some other forms of contraception, and inconsistent use often leads to unplanned pregnancy (Landon, Catalano, & Gabbe, 2002).

Use of oral contraceptives by diabetic women is controversial because of the risk of thromboembolic and vascular complications and the effect on carbohydrate metabolism. In women without vascular disease or other risk factors, combination low-dose oral contraceptives may be prescribed. Progestin-only oral contraceptives also may be used (Cunningham et al., 2005; Landon, Catalano, & Gabbe, 2002). Close monitoring of blood pressure and lipid levels is necessary to detect complications (Landon, Catalano, & Gabbe, 2002). Some health care providers are reluctant to use intrauterine contraceptive devices (IUDs) in women with diabetes. However, this method has been successfully used with diabetic women though an increased incidence of pelvic infections has been reported in this population (Cunningham et al., 2005).

Opinion is divided about the use of long-acting parenteral progestins, such as Depo-Provera. Some health care providers recommend their use, particularly in women who are non-compliant with daily dosing oral contraceptives. In contrast, other health care providers believe this method may adversely affect diabetic control. Transdermal (patch) and transvaginal (vaginal ring) administration are newer contraceptive methods, particularly effective in women who prefer weekly or every-third-week dosing, respectively. For women weighing more than 90 kg there is a higher contraceptive failure rate with transdermal administration (Cunningham et al., 2005). Therefore, this method would be contraindicated in obese women with diabetes. Limited data are available regarding their use in women with diabetes.

The risks associated with pregnancy increase with duration and severity of diabetes, and vascular changes may worsen. This information needs to be thoroughly discussed with the woman and her partner. Therefore, sterilization should be discussed with the woman who has completed her family, who has poor metabolic control, or who has significant vascular problems.

**Evaluation**

Evaluation of the care of the pregnant woman with prepregnational diabetes is based on the previously stated expected outcomes of care and is closely associated with the degree of maternal metabolic control during pregnancy (Plan of Care).

**Gestational Diabetes Mellitus**

Gestational diabetes mellitus (GDM) complicates approximately 4% to 7% of all pregnancies in the United States (ADA, 2004a; ADA, 2004b) and accounts for greater than 75% of all cases of diabetic pregnancy (Chan & Johnson, 2006). Prevalence varies (1% - 14%) by racial and ethnic groups (ADA, 2004a). GDM is more likely to occur among Hispanic, Native American, Asian, and African-American populations than in Caucasians (ADA, 2004a; Moore, 2004). GDM is likely to recur in future pregnancies, and there is an increased risk for development of overt diabetes in later life (Moore, 2004). This is especially true of women whose GDM is diagnosed early in pregnancy or who are obese (Landon, Catalano, & Gabbe, 2002). Classic risk factors for GDM include maternal age over 25 years; obesity; family history of type 2 diabetes; and an obstetric history of an infant weighing more than 4500 g, hydramnios, unexplained stillbirth, miscarriage, or an infant with congenital anomalies (Moore, 2004). Women at high risk for GDM are often screened at their initial prenatal visit and then re-screened later (at 24 to 28 weeks of gestation) in pregnancy if the initial screen is negative.

The diagnosis of gestational diabetes is usually made during the second half of pregnancy. As fetal nutrient demands rise during the late second and the third trimesters, mater-
nal nutrient ingestion induces greater and more sustained levels of blood glucose. At the same time, maternal insulin resistance is also increasing because 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 insulin resistance and to maintain euglycemia. When the pancreas is unable to produce sufficient insulin or the insulin is not used effectively, gestational diabetes can result.

**Maternal-fetal risks**

Women with GDM have an increased risk (10% to 40%) of developing hypertensive disorders compared with normal pregnant women (ADA, 2004b; Moore, 2004). They also have increased risk for fetal macrosomia, which can lead to increased rates of perineal lacerations, episiotomy, and cesarean birth (ADA, 2004b). In addition, fetal macrosomia may be associated with shoulder dystocia and birth trauma. Diabetes in pregnancy also places the neonate at increased risk for hypoglycemia, hypocalcemia, hyperbilirubinemia, thrombocytopenia, polycythemia, and respiratory distress syndrome (Moore, 2004). The overall incidence of congenital anomalies among infants of women with gestational diabetes approaches that of the general population because gestational diabetes usually develops after the critical period of organogenesis (first trimester) has passed. However, Anderson and colleagues (2005) found that women who were obese preconceptionally (BMI > 30 kg/m²) and developed gestational diabetes were at greater risk to give birth to infants with CNS defects.

**Screening for gestational diabetes mellitus**

ACOG recommends that all pregnant women be screened for GDM, either by history, clinical risk factors, or laboratory screening of blood glucose levels (ACOG, 2001). Based on history and clinical risk factors, some women are at low risk for the development of GDM. Therefore, glucose testing for this low risk population is not cost effective (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). This group includes normal weight women younger than 25 years of age 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

### PLAN OF CARE

#### The Pregnant Woman with Pregestational Diabetes

**NURSING DIAGNOSIS** Deficient knowledge related to lack of recall of information as evidenced by woman’s questions and concerns  
**Expected Outcomes** Woman will be able to verbalize important information regarding diabetes, its management, and potential effects on the pregnancy and fetus.  
**Nursing Interventions/Rationales**
- Assess woman’s current knowledge base regarding disease process, management, effects on pregnancy and fetus, and potential complications to provide database for further teaching.  
- Review the pathophysiology of diabetes, effects on pregnancy and fetus, and potential complications to promote recall of information and compliance with treatment plan.  
- Review procedure for insulin administration, demonstrate procedure for blood glucose monitoring and insulin measurement and administration, and obtain return demonstration to establish patient comfort and competence with procedures.  
- Discuss diet and exercise as prescribed to promote self-care.  
- Review signs and symptoms of complications of hyperglycemia and hyperglycemia and appropriate interventions to promote prompt recognition of complications and self-care.  
- Provide contact numbers for health care team for prompt interventions and answers to questions on an ongoing basis to promote comfort.  
- Review information on diagnostic tests, schedule of visits to primary health care provider, and expected plan of care to alleviate anxiety and enlist cooperation of woman in her care.

**NURSING DIAGNOSIS** Risk for fetal injury related to elevated maternal glucose levels  
**Expected Outcomes** Fetus will remain free of injury and be born at term in a healthy state.  
**Nursing Interventions/Rationales**
- Assess woman’s current diabetic control to identify risk for fetal mortality and congenital anomalies.  
- Monitor fundal height during each prenatal visit to identify appropriate fetal growth.  
- Monitor for signs and symptoms of gestational hypertension to identify early manifestations because pregnant women with diabetes are at greater risk.  
- Assess fetal movement and heart rate during each prenatal visit and perform weekly nonstress tests during the last 4 weeks of pregnancy to assess fetal well-being.  
- Review procedure for blood glucose testing and insulin administration and fetal movement counts to promote self-care.

**NURSING DIAGNOSIS** Anxiety related to threat to maternal and fetal well-being as evidenced by woman verbal expressions of concern  
**Expected Outcomes** Woman will identify sources of anxiety and report feeling less anxious.  
**Nursing Interventions/Rationales**
- Through therapeutic communication, promote an open relationship with woman to promote trust.  
- Listen to patient’s feelings and concerns to assess for any misconception or misinformation that may be contributing to anxiety.  
- Review potential dangers by providing factual information to correct any misconceptions or misinformation.  
- Encourage woman to share concerns with her health care team to promote collaboration in her care.
glucose tolerance or adverse obstetric outcomes usually associated with GDM (ADA, 2004a; ADA 2004b; ACOG, 2001; Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). Women at high risk for developing GDM should be screened the first prenatal visit and again at 24 to 28 weeks of gestation (ADA, 2004a; ADA, 2004b). The screening test (Gluco screening) most often used consists of a 50-gram oral glucose load, followed by a plasma glucose determination 1 hour later. It is not necessary that the woman be fasting. A glucose value of 135 to 140 mg/dl is considered a positive screen and should be followed by a 2-hour (75-gram) or 3-hour (100-gram) oral glucose tolerance test (OGTT) (ADA, 2004a; ADA, 2004b; Cunningham et al., 2005; Moore, 2004). The OGTT is administered after an overnight fast and at least 3 days of unrestricted diet (at least 150 gram of carbohydrate) and physical activity. The woman is instructed to avoid caffeine because it will increase glucose levels and to abstain from smoking for 12 hours before the test. The 3-hour OGTT, the gold standard test, requires a fasting blood glucose level, which is drawn before giving a 100-gram glucose load. Blood glucose levels are then drawn 1, 2, and 3 hours later. The woman is diagnosed with gestational diabetes if two or more values are met or exceeded (ADA, 2004a; ADA, 2004b; Moore, 2004) (Fig. 22-4).

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

**Antepartum Care**

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. 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 gestational diabetes typically disappears when the pregnancy is over.

As with pregestational diabetes, the aim of therapy in women with GDM is strict blood glucose control. Fasting blood glucose levels should range from 65 to 105 mg/dl, and 1-hour postprandial blood levels should be less than 130 to 155 mg/dl (ADA, 2004b; Moore, 2004).

**Diet.** Dietary modification is the mainstay of treatment for GDM. The woman with GDM is placed on a standard diabetic diet. The usual prescription is 30 kcal/kg/day based on a normal BMI preconceptional weight. For obese women, the usual prescription is up to 25 kcal/kg/day, which translates into 1500 to 2000 kcal/day for most women (ADA, 2004b; Chan & Johnson, 2006). Carbohydrate intake is restricted to approximately 35% to 40% of caloric intake (ADA, 2004b). Dietary counseling by a nutritionist is recommended.

**Exercise.** Exercise in women with GDM helps lower blood glucose levels and may be instrumental in decreasing the need for insulin (ADA, 2004b). Women with GDM who already have an active lifestyle should be encouraged to continue an exercise program.

**Monitoring Blood Glucose Levels.** Blood glucose monitoring is necessary to determine whether euglycemia can be maintained by diet and exercise. Women are encouraged to monitor their blood sugar daily. However,
fasting and postprandial glucose levels should be monitored minimally at least weekly (ACOG, 2001). The optimal frequency and timing of blood glucose monitoring has not been established (ACOG, 2001). Women with GDM may perform self-monitoring at home, or monitoring may be done at the clinic or office visit.

**Insulin therapy.** Up to 20% of women with GDM will require insulin during the pregnancy to maintain adequate blood glucose levels, despite compliance with the prescribed diet. In contrast to women with insulin-dependent diabetes, women with gestational diabetes are initially managed with diet and exercise. If fasting glucose levels are greater than 105 mg/dl, then insulin therapy is begun (ADA, 2004b). Either lower or higher thresholds for initiating insulin may be used (Landon, Catalano, & Gabbe, 2002). One oral agent, glyburide, is being used experimentally during pregnancy to be used (Landon, Catalano, & Gabbe, 2002). One oral agent, glyburide, is being used experimentally during pregnancy with women with diabetes. Although limited data exist, minimal placental transfer occurs and maternal and fetal complications were comparable with those of maternal insulin administration (Cianni et al., 2005). Women with diabetes who are unable or unwilling to take insulin by injection or are cognitively impaired may be candidates for glyburide use.

**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 complications. Limited antepartum fetal testing is done in women with gestational diabetes as long as their fasting and 2-hour postprandial blood glucose levels remain within normal limits and they have no other risk factors. Daily fetal kick counts are done beginning at 28 weeks of gestation, and nonstress tests may be done twice weekly beginning at 36 weeks of gestation (Moore, 2004). Usually these women progress to term and spontaneous labor without intervention.

Women with GDM whose blood glucose levels are poorly controlled or who require insulin, have hypertension, or have a history of previous stillbirth generally receive more intensive fetal biophysical monitoring. Nonstress tests and biophysical profiles are often performed weekly, beginning at 28 to 36 weeks of gestation (Bernasko, 2004; Moore, 2004).

**Intrapartum care**

During the labor and birth process, blood glucose levels are monitored at least every 2 hours to maintain levels at 80 to 120 mg/dl (Bernasko, 2004; Moore, 2004). Glucose levels within this range will decrease the incidence of neonatal hypoglycemia. It may be necessary to infuse regular insulin intravenously during labor in order to maintain blood glucose levels within this range. IV fluids containing glucose are not commonly given during labor. Although gestational diabetes is not an indication for cesarean birth, it may be necessary in the presence of preeclampsia or macrosomia. Women with gestational diabetes are encouraged to breastfeed.

**Postpartum care**

Most women with GDM will return to normal glucose levels after childbirth. However, GDM is likely to recur in future pregnancies, and women with GDM are at significant risk for developing glucose intolerance later in life, so they should be screened with a 75 g oral glucose tolerance test at 6 to 12 weeks postpartum or after breastfeeding has stopped (ADA, 2004b). Obesity is a major risk factor for the later development of diabetes. Therefore 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 (ADA, 2004b). The risk of developing GDM in subsequent pregnancies is 50% or higher. Because infants born to women with GDM are at risk for developing obesity and diabetes in childhood or adolescence, regular health care for these children is essential (Moore, 2004).

**Thyroid Disorders**

**Hyperthyroidism** occurs in approximately 1 or 2 of every 1000 pregnancies. (Cunningham et al., 2005; Nader, 2004b) Graves’ disease is the most common cause of hyperthyroidism in 90% to 95% of pregnant women (Nader, 2004b). Clinical manifestations of hyperthyroidism include tachycardia, fatigue, heat intolerance, emotional lability, weight loss, and severe nausea and vomiting. Exophthalmos and enlargement of the thyroid gland (goiter) may also occur. Many of these symptoms also occur with pregnancy, so the disorder can be difficult to diagnose. Laboratory findings include elevated free thyroxine (T₄) and triiodothyronine (T₃) levels and suppressed thyroid-stimulating hormone (TSH) levels (Cunningham et al., 2005; Nader, 2004b). Moderate and severe hyperthyroidism must be treated during pregnancy; untreated or inadequately treated women have an increased risk of preterm birth, stillbirth, fetal goiter, and fetal hypothyroidism or hyperthyroidism (Cunningham et al., 2005). Women with hyperthyroidism are also at increased risk to develop severe preeclampsia (Nader, 2004b). Women with hyperemesis gravidarum often present with elevated thyroid hormone levels because of high levels of chorionic gonadotropin (Cunningham et al., 2005).

The primary treatment of hyperthyroidism during pregnancy is drug therapy; the medication of choice is propylthiouracil (PTU). The usual starting dose is 100 to 150 mg every 8 hours, with higher doses required for some women (Nader, 2004b). Women generally show clinical improvement within 2 weeks of beginning therapy, but the medication requires 6 to 8 weeks to reach full effectiveness. During therapy the woman’s free T₄ levels are measured monthly, and the results are used to taper the drug to the smallest effective dosage to prevent unnecessary fetal hypothyroidism (Nader, 2004b). PTU is well tolerated by most women. Maternal side effects include pruritus, skin rash, fever, a metallic taste, nausea, bronchospasm, oral ulcerations, hepatitis, and a lupus-like syndrome (Nader, 2004b;
Weiner & Buhimschi, 2004). The most severe side effect is agranulocytosis, which is more common in women over 40 years of age and in those taking high doses of PTU (Nader, 2004b). Symptoms of agranulocytosis are fever and sore throat; these symptoms should be reported immediately to the health care provider, and 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 to the placenta and may induce fetal hypothyroidism and goiter (Mestman, 2002; Nader, 2004b).

Beta-adrenergic blockers such as propranolol may be used in severe hyperthyroidism. 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 in pregnancy because it may compromise the fetal thyroid. Mothers choosing to breastfeed who are also taking hyperthyroid medication need to be instructed that small amounts are excreted in the breast milk, but PTU has not been found to adversely affect the neonate’s thyroid function (Weiner & Buhimschi, 2004).

In severe cases surgical treatment of hyperthyroidism, subtotal thyroidectomy, may be performed 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.

**NURSE ALERT** A serious but uncommon complication of undiagnosed or partially treated hyperthyroidism is thyroid storm, which may occur in response to stress such as infection, birth, or surgery. A woman with this emergency disorder may have fever, restlessness, tachycardia, vomiting, hypotension, or stupor. Prompt treatment is essential; IV fluids and oxygen are administered, along with high doses of PTU. After administration of PTU, iodide is given. Other medications include antipyretics, dexamethasone, and beta-blockers (Cunningham et al., 2005; Nader, 2004b).

**Hypothyroidism**

Hypothyroidism during pregnancy is less common (1.3 per 1000) than hyperthyroidism and is often associated with menstrual and fertility problems and an increased risk of miscarriage (Cunningham et al., 2005). Hypothyroidism is usually caused by glandular destruction by autoantibodies, most commonly because of Hashimoto’s thyroiditis. Characteristic symptoms of hypothyroidism include weight gain; fatigue; cold intolerance; constipation; cool, dry skin; coarsened hair; and muscle weakness. Laboratory values in pregnancy include low or low-normal T₃ and T₄ levels and elevated levels of TSH (Cunningham et al., 2005; Nader, 2004b).

Pregnant women with untreated hypothyroidism are at increased risk for preeclampsia, placental abruption, and stillbirth (Cunningham et al., 2005). Infants born to mothers with hypothyroidism may be of low birth weight, but for the most part if such women are treated preconceptionally or early in the pregnancy, the infants are healthy and without evidence of thyroid dysfunction (Nader, 2004b).

Thyroid hormone supplements are used to treat hypothyroidism. Levothyroxine (e.g., l-thyroxine [Synthroid]) is most often prescribed during pregnancy. The usual beginning dosage is 0.1 to 0.15 mg/day with adjustment by 25 to 50 mcg every 4 to 6 weeks as necessary based on the maternal TSH level (Nader, 2004b; Cunningham et al., 2005). The aim of drug therapy is to maintain the woman’s level at the lower end of the normal range for pregnant women. In contrast, women on thyroid replacement therapy prior to conception usually will have a dose increase of 25% to 50% during the pregnancy (DiPiro et al., 2005).

**NURSE ALERT** If taking iron supplementation, pregnant women should be told to take l-thyroxine 2 hours before or after iron tablets, because ferrous sulfate decreases absorption of T4 (Spratto & Woods, 2004).

The fetus depends on maternal thyroid hormones until 12 weeks of gestation, when fetal production begins (Blackburn, 2003). Decreased levels of T₄ in the second trimester have been associated with permanent neonatal neurologic deficits (Cunningham et al., 2005; Nader, 2004b). Careful monitoring of the neonate’s thyroid status to detect any abnormalities is important.

**Nursing Care**

Education of the pregnant woman with thyroid dysfunction is essential to promote compliance with the plan of treatment. It is important to discuss with the woman and her family the disorder and its potential impact on her, her family, 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 appropriate clothing and regulation of environmental temperatures, and by avoidance of temperature extremes.

Nutrition counseling with a registered dietitian may 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 body’s ability 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 1 in every 15,000 live births in the United States (Cunningham et al., 2005). All newborns are tested soon after birth for this disorder. Prompt diagnosis and therapy with a phenylalanine-restricted diet significantly decrease the incidence of mental retardation. It is recommended that dietary therapy for PKU be continued throughout life (Blackburn, 2003; Brown et al., 2002). Women who discontinue the phenylalanine-restricted diet may demonstrate a decline in intellectual function (Cunningham et al., 2005). Some people discontinue the restricted diet because of the difficulty in adhering to the specially prepared diet (Blackburn, 2003; Brown et al., 2002).

The keys to prevention of fetal anomalies caused by PKU are the identification of women in their reproductive years who have the disorder and dietary compliance for those women diagnosed. Screening for undiagnosed homozygous 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. Women with PKU should continue the low-protein diet during pregnancy. Nutritional phenylalanine intake and phenylalanine levels must be monitored. It is recommended that maternal phenylalanine levels range between 2 and 6 mg/dl. These levels are associated with a decrease in fetal sequelae (Cunningham et al., 2005). High maternal phenylalanine levels are associated with microcephaly with mental retardation and congenital heart defects (Landon, Catalan, & Gabbe, 2004; Cunningham et al., 2005). Ultrasound examinations are used for fetal surveillance beginning in the first trimester. A spontaneous vaginal birth is anticipated.

Women with PKU may breastfeed but their maternal blood levels are followed closely (Lawrence & Lawrence, 2005; Riordan, 2005) because their milk contains high levels of phenylalanine (Nader, 2004a). Mothers who choose to breastfeed must still supplement the infant’s diet with a special milk preparation, phenylalanine (PHE)-free formula that contains little or no phenylalanine (Riordan, 2005).

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 that affect the woman with cardiac disease are increased intravascular volume, decreased systemic vascular resistance, cardiac output changes occurring during 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, so that pregnancy, labor, and birth are generally well tolerated, but the diseased heart is challenged hemodynamically. 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, if valvular disease exists, or if a congenital heart defect is present, cardiac decompensation (decreased cardiac output) may occur.

From 1% to 4% of pregnancies are complicated by heart disease (Foley, 2004) the leading cause of nonobstetric maternal death. Rheumatic fever is responsible for about 50% of cardiac complications; congenital diseases and mitral valve disease are the next most common causes. 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. Box 22-1 lists maternal cardiac disease risk groups and their related mortality rates.

The degree of disability experienced by the woman with cardiac disease often is more important in the treatment and prognosis during pregnancy than is the diagnosis of the type of cardiovascular disease. The New York Heart Association’s (NYHA’s) functional classification of heart disease, a widely accepted standard, is as follows (AHA, 2000):

**NYHA Functional Classification of Heart Disease**

- **Class I:** asymptomatic without limitation of physical activity
- **Class II:** symptomatic with slight limitation of activity
- **Class III:** symptomatic with marked limitation of activity
- **Class IV:** symptomatic with inability to perform any activity

**Box 22-1**

### Maternal Cardiac Disease Risk Groups

**GROUP I (MORTALITY RATE 1%)**
- Corrected tetralogy of Fallot
- Pulmonic or tricuspid disease
- Mitral stenosis (classes I and II)
- Patent ductus
- Ventricular septal defect
- Atrial septal defect
- Porcine valve

**GROUP II (MORTALITY RATE 5%-15%)**
- Mitral stenosis with atrial fibrillation
- Artificial heart valves
- Mitral stenosis (classes III and IV)
- Uncorrected tetralogy
- Aortic coarctation (uncomplicated)
- Aortic stenosis

**GROUP III (MORTALITY RATE 25%-50%)**
- Aortic coarctation (complicated)
- Myocardial infarction
- Marfan syndrome
- True cardiomyopathy
- Pulmonary hypertension

Peripartum Cardiomyopathy

Peripartum cardiomyopathy is congestive heart failure with cardiomyopathy. Diagnostic criteria include development of cardiac failure in the last month of pregnancy or within the first 5 months postpartum, lack of another cause for heart failure, absence of heart disease before the last month of pregnancy, and a depressed ejection fraction (Blanchard & Shabetai, 2004; Cunningham et al., 2005). The etiology of the disease is unknown. Theories suggest genetic predisposition, autoimmunity, and viral infections. The incidence of this disease is 1 per 3000 to 4000 live births in the United States (Blanchard & Shabetai, 2004).

Peripartum cardiomyopathy is more common in African-Americans, in twin pregnancies, and in women with preeclampsia (Foley, 2004). The 5-year survival rate for women with peripartum cardiomyopathy is 50% or less, with a worsening prognosis if the cardiomegaly persists after 6 months postpartum (Blanchard & Shabetai, 2004). Symptoms may vary depending on the type of peripartum cardiomyopathy, but all relate to congestive heart failure. Pregnancy is contraindicated for women with persistent cardiomegaly or cardiac dysfunction.

Medical management of cardiomyopathy during pregnancy mimics the regimen used for congestive heart failure. Treatment includes beta-adrenergic blockers, diuretics, digoxin, anticoagulants, and sodium restriction. Angiotensin-converting enzyme (ACE) inhibitors are contraindicated in pregnancy because of their teratogenic potential but may be used postpartially. The nursing care of women with peripartum cardiomyopathy is essentially the same as for women with other cardiac problems.

Rheumatic Heart Disease

Rheumatic fever is increasingly uncommon in the United States but is more common in underdeveloped nations (Blanchard & Shabetai, 2004; Cunningham et al., 2005). 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, leading to permanent damage of heart valves (usually the mitral valve) and the chordae 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 with the potential to increase the severity of heart damage. If a woman has had rheumatic fever in the past, a recurrence can occur during pregnancy, most likely early in the pregnancy. The American Heart Association recommends lifelong prophylaxis with benzathine G penicillin, even during pregnancy. For those women with penicillin allergies, erythromycin is an acceptable alternative during pregnancy. Heart murmurs resulting from stenosis, valvular insufficiency, or thickening of the walls of the heart characterize RHD. Signs and symptoms include cardiac murmurs, congestive heart failure, and an enlarged heart (Blanchard & Shabetai, 2004; Cunningham et al., 2005). Treatment also includes limited physical activity, diuretics, sodium restriction, and medications such as digoxin, beta-blockers, and calcium channel blockers. It is recommended that affected women give birth vaginally, with use of an epidural anesthetic and strict monitoring of their fluid intake (Cunningham et al., 2005).

Mitral Valve Stenosis

Mitral valve stenosis is a narrowing of the opening of the mitral valve caused by stiffening of valve leaflets, which obstructs blood flow from the atrium to the ventricle and is the...
characteristic lesion resulting from RHD (Blanchard & Shabetai, 2004). Even though a history of rheumatic fever may be absent, it remains the most likely cause of mitral stenosis. As the mitral valve narrows, dyspnea worsens, occurring first on exertion and eventually at rest. A tight stenosis plus the increase in blood volume and therefore cardiac output of normal pregnancy may cause ventricular failure and pulmonary edema; hemoptysis may occur. About 25% of women with mitral valve stenosis may become symptomatic for the first time during pregnancy (Cunningham et al., 2005).

The care of the woman with mitral stenosis typically is managed by reducing her activity, restricting dietary sodium, and increasing bed rest. The pregnant woman with mitral stenosis should be followed clinically for symptoms and by echocardiograms to monitor the atrial and ventricular size, as well as heart valve function. Prophylaxis for intrapartum endocarditis and pulmonary infections may be provided for women at high risk (Easterling & Otto, 2002).

**Mitral Valve Prolapse**

Mitral valve prolapse (MVP) is a common, usually benign, condition occurring in 2% to 3% of women of reproductive age (Cunningham et al., 2005). 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 and does not respond to nitrates. They may also have anxiety, palpitations, dyspnea on exertion, and syncope. Specific treatment is usually not necessary except for symptomatic tachyarrhythmias and, rarely, heart failure (Cunningham et al., 2005). Patients usually are treated with beta-blockers such as propranolol (Inderal) or beta-adrenergic blockers such as atenolol (Tenormin). (Blanchard & Shabetai, 2004; Cunningham et al., 2005). Pregnancy and its associated hemodynamic changes may change or alleviate the murmur and click of MVP, as well as symptoms. As with RHD, antibiotic prophylaxis may be given before invasive procedures for woman with mitral regurgitation, thickened mitral valves and complicated vaginal births to prevent bacterial endocarditis (Blanchard & Shabetai, 2004; Cunningham et al., 2005).

**Infected Endocarditis**

Infective endocarditis, or inflammation of the innermost lining (endocardium) of the heart caused by invasion of microorganisms, is an uncommon disorder during pregnancy (Cunningham et al., 2005). It may be seen in women taking street drugs intravenously. Bacterial endocarditis, leading to incompetence of heart valves and thus congestive heart failure and cerebral emboli, can result in death. Treatment is with antibiotics.

**Eisenmenger Syndrome**

Eisenmenger 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 (Blanchard & Shabetai, 2004). The syndrome is associated with a maternal mortality rate of approximately 50%, but this is dependent on the severity of the pulmonary hypertension (Blanchard & Shabetai, 2004). Because of the poor pregnancy outcomes, pregnancy is contraindicated in women with Eisenmenger syndrome (Blanchard & Shabetai, 2004). Maternal morbidity is associated with right ventricular failure and associated cardiogenic shock (Cunningham et al., 2005). If pregnancy occurs, termination may be recommended if the woman has significant pulmonary hypertension.

In women who continue pregnancy, physical activity is strictly limited, and the supine position is avoided in the third trimester. Treatment includes diuretics, vasodilators, oxygen therapy, and skilled intensive nursing care. Maternal hypotension is not tolerated and should be avoided. Intensive monitoring of fluid status and cardiac function is vital (Blanchard & Shabetai, 2004).

**Atrial Septal Defect**

Atrial septal defect (ASD) is an abnormal opening between the atria. It is one of the causes of a left-to-right shunt and is the most common congenital defect seen during pregnancy. This defect may go undetected because the woman usually is asymptomatic. The pregnant woman with an ASD will most likely have an uncomplicated pregnancy, unless she has pulmonary hypertension (Blanchard & Shabetai, 2004; Cunningham et al., 2005). With complicated ASDs some women may have right-sided heart failure or arrhythmias as the pregnancy progresses, as a result of increased plasma volume.

**Tetralogy of Fallot**

Tetralogy of Fallot is the most common cyanotic heart disease present during pregnancy (Blanchard & Shabetai, 2004). Other cyanotic congenital heart diseases are rarely seen during pregnancy because women with these conditions rarely survive to adulthood. Components of tetralogy of Fallot include a ventricular septal defect (VSD), pulmonary stenosis, overriding aorta, and right ventricular hypertrophy, leading to a right-to-left shunt. Women with a corrected tetralogy of Fallot have a mortality rate of less than 1%; however women with uncorrected tetralogy of Fallot have a 10% to 15% mortality rate (Cunningham et al., 2005; Gie & Hankins, 2001). Medical management for women with uncorrected tetralogy of Fallot includes avoiding hypotensive episodes during labor and monitoring maternal hematocrits, anticoagulant therapy, high concentration oxygen administration, and hemodynamic monitoring during labor and birth. Complications include right-sided heart failure, dysrhythmias, and conduction defects, with the most dangerous time being the late third trimester and early postpartum period (Blanchard & Shabetai, 2004). Women with tetralogy of Fallot are counseled preconceptionally to have surgical repair.

**Marfan Syndrome**

Marfan syndrome is an autosomal dominant disorder characterized by generalized weakness of the connective tissue, resulting in joint deformities, ocular lens dislocation, and
dilation of the aortic root and progressive aortic valve insufficiency (Blackburn, 2003; Blanchard & Shabetai, 2004). Approximately 90% of individuals with this syndrome have MVP. Aortic insufficiency may result, with an increased risk of aortic dissection and rupture during pregnancy, particularly in the third trimester or postpartum. Excruating chest pain is the most common symptom of aortic dissection, along with dyspnea and an aortic diastolic murmur (Blanchard & Shabetai, 2004). Therapy includes limiting physical activity, preventing hypertensive complications, and administering beta-blockers. Preconception genetic counseling is recommended to make women aware of the risks of pregnancy with this disease, with a 50% risk of inheritance of the syndrome (Blanchard & Shabetai, 2004).

**Heart Transplantation**

Increasing numbers of heart recipients are successfully completing pregnancies. Before conception, the woman should be assessed for quality of ventricular function and potential rejection of the transplant. The woman should be stabilized on the immunosuppressant regimen with close monitoring of these medications during the pregnancy (Foley, 2004). Conception should be postponed for at least 1 year after transplantation to avoid acute rejection episodes (Blanchard & Shabetai, 2004). Risks to the woman include hypertension, preeclampsia, preterm labor, renal insufficiency, small-for-gestational-age neonate, and infections (Foley, 2004). During labor, beta-blocking agents may be needed to prevent tachycardia resulting from vagal denervation from the transplant surgery. Vaginal birth is desired, but transplant recipients have an increased rate of cesarean births. Management of the intrapartum 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. Though information is limited, breastfeeding infants of mothers who are taking cyclosporine absorb undetectable amounts (Weiner & Buhimschi, 2004).

**CARE MANAGEMENT**

**Assessment and Nursing Diagnoses**

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 after examining the risks in relation to the status of her cardiac condition. The woman’s partner and family should be included in the discussion. Women with cardiac disease with significant cardiac compromise may choose to terminate the pregnancy.

The pregnant woman with cardiac disease requires detailed assessment to determine the potential for optimal maternal health and a viable fetus throughout the peripartum period. If she chooses to continue the pregnancy, the high risk pregnant woman’s condition may be assessed as often as weekly. Multidisciplinary care will include a cardiologist, obstetrician, anesthesiologist, and nurses skilled in intensive obstetric care.

**Interview**

The nurse assesses for factors that would increase stress on the heart, such as anemia, infection, and edema, and how the woman is adapting to the physiologic changes of pregnancy. Special attention is given to the review of the cardiovascular and pulmonary systems. The nurse should determine 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; pallor; or syncope. Pulmonary signs and symptoms such as cough, hemoptyisis, shortness of breath, and orthopnea can indicate cardiac disease. Table 22-4 lists normal and abnormal cardiovascular signs and symptoms during pregnancy.

The nurse documents all medication taken by the woman—including over-the-counter (OTC) medications such as supplemental iron—and is alert to their potential side effects and interactions. The woman is also assessed for undue emotional stress that might further compromise her cardiac status. Examples are depression, anxiety about or fear of morbidity or mortality for herself and her fetus, financial concerns related to extended hospitalization, anger because of impaired social interaction, and feelings of inadequacy regarding her inability to meet family and household demands.

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), as well as role expectations within the family, may be dictated by cultural norms. For the woman with cardiac impairment, family expectations may prove to 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.

**Physical assessment**

Routine assessments continue during the prenatal period, including monitoring the amount and pattern of weight gain, edema, vital signs, and discomforts of pregnancy. In addition, the woman is observed for signs of cardiac decompensation, that is, progressive generalized edema, crackles at the base of the lungs, or pulse irregularity (Signs of Potential Complications box). 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 occur commonly in pregnant women and can mask the symptoms of a developing or worsening cardiovascular disorder. A woman’s sudden inability to perform activities that she previously was comfortable doing may indicate cardiac decompensation.

**Laboratory and diagnostic tests**

Routine urinalysis and blood work (complete blood cell count and blood chemistry) are done during the initial visit. The woman with cardiac impairment requires a baseline.
ECG at the beginning of her pregnancy, if not before pregnancy, which permits vital diagnostic comparisons of subsequent ECGs. Echocardiograms and pulse oximetry studies may be performed as indicated. Chest films may be necessary during late pregnancy, provided the abdomen is carefully shielded. In addition, fetal ultrasound, fetal movement studies, or fetal nonstress tests may be used to determine fetal well-being.

The following nursing diagnoses may be appropriate for the pregnant woman with cardiac disease:

- **Fear related to**
  - increased peripartum risk
- **Risk for ineffective coping related to**
  - the woman’s cardiac condition
  - changes in relationships
- **Risk for ineffective tissue perfusion related to**
  - hypotensive syndrome
- **Activity intolerance related to**
  - cardiac condition
- **Deficient knowledge related to**
  - cardiac condition
  - pregnancy and how it affects cardiac condition
  - requirements to alter self-care activities
- **Impaired home maintenance related to**
  - woman’s confinement to bed or limited activity level
- **Self-care deficit (bathing, grooming, dressing) related to**
  - fatigue or activity intolerance
  - need for bed rest

**Expected Outcomes of Care**

The pregnant woman with cardiovascular problems faces significant curtailment of her activities. These restrictions can have physical and emotional implications. The community health nurse, social worker, and physical or occupational therapist are some of the resource people whose services may need to be incorporated into the plan of care. Expected outcomes for the pregnant woman (and family, if appropriate) may include that she (they) 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

### TABLE 22-4

<table>
<thead>
<tr>
<th>CARDIOVASCULAR SIGNS AND SYMPTOMS DURING PREGNANCY</th>
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<tbody>
<tr>
<td><strong>NORMAL</strong></td>
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<tr>
<td>Neck vein pulsation</td>
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<tr>
<td>Diffuse or displaced apical pulse</td>
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<tr>
<td>Split S1, accentuated S2</td>
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<tr>
<td>Third heart sound - loud</td>
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<tr>
<td>Systolic murmur (1-2/6) (92%- 95%)</td>
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<td>Venous hum</td>
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<tr>
<td>Sinus dysrhythm</td>
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<tr>
<td>Peripheral edema, particularly lower extremities</td>
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<tr>
<td><strong>SYMPTOMS</strong></td>
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<tr>
<td>Fatigue</td>
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<tr>
<td>Chest pain</td>
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<td>Dyspnea</td>
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<td>Orthopnea</td>
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<tr>
<td>Hyperpnea</td>
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<tr>
<td>Palpitations</td>
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<td>Syncope (vasovagal)</td>
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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, as well as 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.

**Intrapartum**

For all pregnant women and caregivers the intrapartum period is the one that evokes the most apprehension. 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 blood gases (ABGs) may be needed to assess for adequate oxygenation. A Swan-Ganz catheter may be inserted to accurately monitor hemodynamic status during labor and birth. ECG monitoring and continuous monitoring of blood pressure and pulse oximetry are usually instituted for the woman, and the fetus is continuously monitored electronically.

**NURSE 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, as well as 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 anesthesia provides better pain relief than narcotics and causes fewer alterations in hemodynamics (Cunningham et al., 2005). Maternal 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.

**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.

Beta-adrenergic agents (e.g., ritodrine and terbutaline) should not be used for tocolysis in women with cardiac problems. These drugs are associated with various cardiac side effects, including tachycardia and myocardial ischemia. A synthetic oxytocin, Syntocinon, can be used for induction of labor. This drug does not appear to cause significant coronary artery constriction in doses prescribed for labor induction or control of postpartum uterine atony. Cervical ripening agents containing prostaglandin are not contraindicated, but reports of use in pregnant women with cardiac disease are not available.

If there are no obstetric problems, vaginal birth is recommended and may be accomplished with the woman in the side-lying position to facilitate uterine perfusion. If the supine position is used, a pad is positioned under the hip to displace the uterus laterally and minimize the danger of supine hypotension. The knees are flexed, and the feet are flat on the bed. 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. Open glottis pushing is recommended, and the Valsalva maneuver must be avoided when pushing because it reduces diastolic ventricular filling and obstructs left ventricular outflow. Mask oxygen is important. Episiotomy and vacuum extraction or outlet forceps may be used because these procedures decrease the length of the second stage of labor and decrease the 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 pregnant women with class II or higher cardiac disease to protect against bacterial endocarditis in labor and during the early puerperium. Dilute IV oxytocin immediately after birth may be employed to prevent hemorrhage. Ergot products should not be used because they 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 or infection, or both, may worsen the cardiac condition. The woman with a cardiac disorder may continue to require a Swan-Ganz catheter and ABG monitoring.

**NURSE ALERT** The immediate postbirth period is hazardous for a woman whose heart function is compromised. Cardiac output increases rapidly as extravascular...
Cardiopulmonary resuscitation of the pregnant woman

Cardiac arrest in a pregnant woman occurs in approximately 1 in 30,000 pregnancies (Hueppchen & Satin, 2004). It is most often related to events at the time of birth such as amniotic fluid embolism, eclampsia, stroke, hemorrhage, and acute respiratory failure. Some modifications of the procedure for cardiopulmonary resuscitation (CPR) (Emergency box) are needed during pregnancy.

Various protocols exist for CPR during pregnancy. The most widely used guide is the American Heart Association (AHA) Advanced Cardiac Life Support Protocol (AHA, 2000). This protocol recommends standard CPR with the uterus displaced laterally, fluid restoration, and defibrillation if indicated. The decision for cesarean birth must be made within 4 to 5 minutes of the mother’s cardiac arrest. The gestational age of the infant and the presence of skilled pediatric support personnel must be considered in the decision.

In the event of cardiac arrest, standard resuscitative efforts with a few modifications are implemented. To prevent supine hypotension, the pregnant woman is placed on a flat, firm surface with the uterus displaced laterally either manually or with a wedge or rolled blanket or towel under her right hip (AHA, 2000). If defibrillation is needed, the paddles need to be placed one rib interspace higher because the heart is displaced slightly by the enlarged uterus. If possible, the fetus should be monitored during the cardiac arrest.

Complications may be associated with CPR of a pregnant woman. These complications may include laceration of the cord, flex bradycardia, and reflex bradycardia may result.

Cardiopulmonary resuscitation for the Pregnant Woman

CARDIOPULMONARY RESUSCITATION (CPR)

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.

Circulation
- Determine pulselessness by feeling carotid pulse.
- If there is no pulse, begin chest compressions at rate of 100 per minute. 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 15 compressions and two breaths, check her pulse. If pulse is not present, continue CPR.

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

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 (Fig. 22-5). If the woman becomes unresponsive, follow the steps for victims who become unresponsive, but use chest thrusts instead of abdominal thrusts.

liver, rupture of the uterus, fractures of the ribs and sternum, hemothorax, or hemoperitoneum. Fetal complications, including cardiac arrhythmia or asystole related to maternal defibrillation and medications, CNS depression related to antiarrhythmic drugs and inadequate uteroplacental perfusion, and onset of preterm labor, may also occur (Hueppchen & Satin, 2004).

If resuscitation is successful, the woman and her fetus must receive careful monitoring. The woman remains at increased risk for recurrent pulmonary arrest and arrhythmias (ventricular tachycardia, supraventricular tachycardia, 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 the continuation of the pregnancy or the timing and route of birth.

**Evaluation**

The nurse uses the previously stated expected outcomes as criteria to evaluate the care of the woman with cardiac disease (Plan of Care).

**ANEMIA**

Anemia is the most common medical disorder of pregnancy, affecting from 20% to 60% of pregnant women (Kilpatrick & Laros, 2004). Anemia results in reduction of the oxygen-carrying capacity of the blood. Because the oxygen-carrying capacity of the blood is decreased, 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 RBC volume, or hematocrit level. The normal hematocrit range in nonpregnant women is 37% to 47%. However, normal values for pregnant women with adequate iron stores may be as low as 33%. As defined by the CDC, anemia in pregnancy is defined as below 11 g/dl in the first and third trimesters and less than 10.5 g/dl in the second trimester (IOM, 1990). This has been explained by hydremia (dilution of blood), also called the physiologic anemia of pregnancy.

At or near sea level, the pregnant woman is anemic when her hemoglobin level is less than 11 g/dl or hematocrit is less than 33%. In areas of high altitude, much higher values indicate anemia; for example, at 1500 m (5000 feet) above sea level, a hemoglobin level less than 14 g/dl indicates anemia (Pagana & Pagana, 2003).

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.

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

Iron Deficiency Anemia
Iron deficiency anemia is the most common anemia of pregnancy (Kilpatrick & Laros, 2004). Because of the increased iron needs necessitated for fetal development and maternal stores, pregnant women who ingest a balanced diet are encouraged to take multivitamins with iron (Blackburn, 2003). Pregnant women with anemia despite iron supplementation need to be questioned regarding the practice of pica, the ingestion of nonfood substances (e.g., clay, cornstarch, freezer frost). If iron deficiency anemia is diagnosed, increased iron dosages are recommended (elemental iron, 60 to 120 mg/day). It is important to teach the pregnant woman the significance of the iron therapy. In addition, the pregnant woman should be instructed about which foods are high in iron and which are high in ascorbic acid, which facilitates iron absorption from the gastrointestinal tract. In addition, women need to be instructed regarding strategies to decrease the gastrointestinal side effects of iron therapy. Some pregnant women cannot tolerate the prescribed oral iron because of the nausea and vomiting associated with the pregnancy and as a side effect of iron therapy. Therefore, some practitioners may recommend the use of chewable children’s vitamins with iron, 2 tablets/day. For women with anemia refractory to oral iron therapy, with a hemoglobin less than 8.5 g/dl, the health care provider may order parenteral iron such as iron dextran (Kilpatrick & Laros, 2004).

Folate Deficiency
Even in well-nourished women, it is common to have a folate deficiency. Poor diet and increased alcohol use may contribute to folate deficiency. Malabsorption may play a part in the development of anemia caused by a lack of folic acid.
Women with megaloblastic anemia caused by folic acid deficiency have the usual presenting symptoms and signs of anemia: pallor, fatigue, and lethargy as well as glossitis and skin roughness, which are associated specifically with megaloblastic anemia (Kilpatrick & Laros, 2004). Folic acid deficiency anemia is common in multiple gestations. Folate deficiency during conception has been associated with increases in the incidence of neural tube defects, cleft lip, and cleft palate. During pregnancy the recommended daily intake is 400 mcg of folic acid per day. Women are instructed to consume foods high in folic acid (fresh, green leafy vegetables and legumes) and encouraged to take a daily prenatal multivitamin.

**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) is sickling of the RBCs but with a normal RBC life span. It 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 (Moore & Martin, 2004). These individuals usually have abnormal hemoglobin types (SS or SC). Beginning in childhood, persons 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 RBC 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 UTIs and may be deficient in iron (Kilpatrick & Laros, 2004). 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 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 RBC destruction. Crises are associated with normochromic anemia, jaundice, reticulocytosis, a positive sickle cell test, and the demonstration of abnormal hemoglobin (usually SS or SC).

**Thalassemia**

Thalassemia (Mediterranean or Cooley’s anemia) is a relatively common anemia in which there is ineffective erythropoiesis and varying degrees of anemia (Cunningham et al., 2005). Thalassemia is a hereditary disorder that involves the abnormal synthesis of the alpha or beta chains of hemoglobin. Beta thalassemia is the more common variety in the United States and often is diagnosed in persons of Mediterranean, North African, African-American, Middle Eastern, or Asian descent (Kilpatrick & Laros, 2004). The unbalanced synthesis of hemoglobin leads to premature RBC death, resulting in severe anemia. There are two major types, classified according to the missing globin peptide chain (Cunningham et al., 2005). Beta thalassemia major (Cooley’s anemia), is the homozygous form of this disorder, and alpha thalassemia minor is the heterozygous form. Thalassemia major is the more severe of the two, and females with beta thalassemia who survive childhood are most often sterile (Cunningham et al., 2005). Couples with the thalassemia trait should seek genetic counseling. Thalassemia must be differentiated from iron deficiency anemia.

Women with thalassemia major have problems conceiving. During pregnancy, women with thalassemia minor may demonstrate a mild persistent anemia, but the RBC level may be normal or even elevated. Supplemental iron and folic acid should be administered (Cunningham et al., 2005).

**PULMONARY DISORDERS**

As pregnancy advances and the uterus impinges on the thoracic cavity, any pregnant woman may experience increased respiratory difficulty. This difficulty will be compounded by pulmonary disease.

**Asthma**

Bronchial asthma is an acute respiratory illness characterized by periods of exacerbations and remissions. Exacerbations are triggered by allergens, marked change in ambient temperature, or emotional tension. In many cases the actual cause may be unknown, although a family history of allergy is common. In response to stimuli, there is widespread but reversible narrowing of the hyperreactive airways, making it difficult to breathe. The clinical manifestations are expiratory wheezing, productive cough, thick sputum, and dyspnea.

Prevalence rates for women pregnant with asthma range from 3.7% to 8.4% (Kwon, Belanger, & Bracken, 2004). The physiologic changes associated with pregnancy do not contribute to a worsening of asthma (Whitty & Dombrowski, 2004). The effect of pregnancy on asthma is unpredictable, though women of African-American ethnicity with asthma have an increased morbidity and mortality. Asthma has been associated with IUGR and preterm birth (Whitty & Dombrowski, 2004). Women often experience few symptoms of asthma in the first trimester and in the last weeks of pregnancy. The severity of symptoms usually peaks between 29 and 36 weeks of gestation (Burton & Reyes, 2001).
Therapy for asthma has three objectives: (1) relief of the acute attack, (2) prevention or limitation of later attacks, and (3) adequate maternal and fetal oxygenation (Barth & Stewart, 2004). These goals can be achieved in pregnancy by eliminating environmental triggers (e.g., dust mites, animal dander, pollen), drug therapy (e.g., inhaled beta-agonists, inhaled cromolyn, corticosteroids, antiinflammatory agents), and patient education. Respiratory infections should be treated, and mist or steam inhalation employed to aid expectoration of mucus. Acute episodes may require albuterol, steroids, aminophylline, beta-adrenergic agents, and oxygen. Almost all asthma medications are considered safe in pregnancy (Burton & Reyes, 2001; Gluck & Gluck, 2005).

Asthma attacks can occur in labor; therefore medications for asthma are continued in labor and postpartum. Pulse oximetry should be instituted during labor. Epidural anesthesia reduces oxygen consumption and is recommended for pain relief. Fentanyl, a non–histamine-releasing narcotic may be used also for pain control and is not associated with bronchospasm (Cunningham et al., 2005). During postpartum, women in whom excessive bleeding occurs will receive prostaglandin E2. 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 (1 in 3000 live Caucasian births) in which the exocrine glands produce excessive viscous secretions, causing problems with both respiratory and digestive functions (Whitty & Dombrowski, 2004). There is an increase in pulmonary capillary permeability, decrease in lung volume, and shunting, which results in arterial hypoxemia. Respiratory failure and early death (early twenties) may occur. Genetic counseling is encouraged to identify carriers of the disease. In women with good nutrition, mild obstructive lung disease, and minimal lung impairment, pregnancy is tolerated well (Cunningham et al., 2005; Whitty & Dombrowski, 2004). 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 residual 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 is related to severe pulmonary infection.

Maternal weight and symptoms of malabsorption should be monitored at each prenatal visit, and pancreatic enzymes should be adjusted as necessary. A glucose tolerance test should be done at 20 weeks of gestation. Routine respiratory management is continued through the pregnancy. Nonstress tests should be initiated at 32 weeks of gestation. Women with respiratory infections should be hospitalized.

During labor, monitoring for fluid and electrolyte balance is required. Sodium losses through sweat can be significant, and hypovolemia can occur. Cor pulmonale is common, and fluid overload may occur. Oxygen is administered by face mask during labor, and monitoring by pulse oximetry is recommended (Whitty & Dombrowski, 2004). Epidural or local analgesia is the preferred analgesic for birth, with vaginal birth recommended.

Breastfeeding appears to be safe as long as the sodium content of the milk is not abnormal (Lawrence & Lawrence, 2005). Pumping and discarding the milk is done 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 monitored.

**INTEGUMENTARY DISORDERS**

The skin surface may exhibit many physiologic and pathologic conditions during pregnancy. Dermatologic disorders induced by pregnancy include melasma (chloasma), herpes gestationis, noninflammatory puritis of pregnancy, vascular “spiders,” palmar erythema, and epulis (tumors on the gingiva). 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 disease), and pemphigus. Dermatologic disorders usually improved by pregnancy include acne vulgaris (in the third trimester), seborrheic dermatitis (dandruff), and psoriasis (Cunningham et al., 2005). An unpredictable course during pregnancy may be expected in atopic dermatitis, lupus erythematosus, and herpes simplex.

**NURSE ALERT** Isotretinoin (Accutane), commonly prescribed for cystic acne, is highly teratogenic and therefore contraindicated in pregnancy. Fetuses exposed are at increased risk for craniofacial, cardiac, and CNS malformations.

Explanation, reassurance, and commonsense measures should suffice for normal skin changes. In contrast, disease processes during and soon after pregnancy may be extremely difficult to diagnose and treat.

**NEUROLOGIC DISORDERS**

The pregnant woman with a neurologic disorder needs to deal with 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 woman is taking and the associated potential for producing congenital anomalies. As the pregnancy...
Epilepsy

Epilepsy is a disorder of the brain that causes recurrent seizures and is the most common neurologic disorder accompanying pregnancy (Constantino & Varner, 2004). Epilepsy may result from developmental abnormalities or injury, as well as having no known cause. Convulsive seizures may be more frequent or severe during complications of pregnancy, such as edema, alkalosis, fluid-electrolyte imbalance, cerebral hypoxia, hypoglycemia, and hypocalemia. However, the effects of pregnancy on epilepsy are unpredictable: some women have no change or even a decrease in seizure frequency (Constantino & Varner, 2004).

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

During pregnancy, the risk of vaginal bleeding is doubled, and there is a threefold risk of abruptio placenta. Abnormal presentations are more common in labor and birth, and there is an increased possibility that the fetus will experience seizures in utero (Aminoff, 2004).

Metabolic changes in pregnancy usually alter pharmacokinetics. In addition, nausea and vomiting may interfere with ingestion and absorption of medication. Failure to take medications is a common factor leading to worsening of seizure activity during pregnancy, particularly during the first trimester (Constantino & Varner, 2004). This is largely because of the message that drugs for epilepsy are harmful to the fetus. Teratogenicity of antiepileptic drugs (AEDs) is well documented. Therefore, polytherapy and the use of the smallest dose possible to control seizures during pregnancy is recommended (Constantino & Varner, 2004; Shehata & Okosun, 2004). Congenital anomalies that can occur with AEDs include cleft lip or palate, congenital heart disease, urogenital defects, and neural tube defects (Weiner & Buhimschi, 2004). AEDs prescribed in pregnancy should also be administered with folic acid. Daily folic acid supplementation is important because of the depletion that occurs when anticonvulsants are taken (Shehata & Okosun, 2004).

The risk of seizures during labor exists; approximately 1% to 2% of women have a tonic-clonic seizure, and another 1% to 2% have a seizure within 24 hours postpartum (Shehata & Okosun, 2004). If the woman cannot take oral AEDs, then phenytoin can be administered intravenously. Serum levels of AEDs should be monitored at 48 hours postpartum and at 1 to 2 weeks postpartum. During the neonatal period, infants can have a hemorrhagic disorder associated with AED-induced vitamin K deficiency. Prophylaxis consists of administering vitamin K during the last month of pregnancy and administering 1 mg intramuscularly to the newborn (Constantino & Varner, 2004).

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 to 40 (Shehata & Okosun, 2004). Remissions during pregnancy are common, particularly in the third trimester, and generally MS does not affect the course of the pregnancy (Aminoff, 2004; Shehata & Okosun, 2004). Treatment includes bedrest and steroids for acute exacerbations. Drugs commonly used for MS include beta-interferon and glatiramer acetate but are contraindicated in pregnancy (Shehata & Okosun, 2004). Nursing care of the pregnant women with MS is similar to the care of the normal pregnant women.

Bell’s Palsy

The incidence of Bell’s palsy (idiopathic facial paralysis) in pregnancy is approximately 57 per 100,000 per year. The incidence usually peaks during the third trimester and the puerperium (Shehata & Okosun, 2004).

The clinical manifestations include the sudden development of a unilateral facial weakness, with maximal weakness within 48 hours after onset (Ahmed, 2005; Cunningham et al., 2005), pain surrounding the ear, difficulty closing the eye on the affected side, and hyperacusis (abnormal acuteness of the sense of hearing) (Aminoff, 2004). In addition, taste on the anterior two thirds of the tongue may be lost, depending on the location of the lesion. There is no relationship between Bell’s palsy and maternal and fetal outcomes. The exception is when there is complete nerve conduction block. Antiviral therapy and steroids may be prescribed, although controversy exists regarding whether they hasten recovery. Treatment 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 normal neurologic function is likely in 85% of affected women (Shehata & Okosun, 2004).

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 (Nader, 2004a). 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 are systemic lupus erythematosus (SLE), myasthenia gravis, and rheumatoid arthritis.

**Systemic Lupus Erythematosus**

One of the most common serious disorders of childbearing age, systemic lupus erythematosus (SLE) is a chronic, multisystem inflammatory disease characterized by autoimmune antibody production that affects the 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 affects approximately 1 in 2000 to 3000 births (Hankins & Suarez, 2004). It is three times more common in African-American women.

Early symptoms, such as fatigue, weight loss, skin rashes, and arthralgias, may be overlooked. Anemia and leukopenia are common (Cunningham et al., 2005). 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 has been in remission for at least 6 months before attempting to get pregnant (Gilbert & Harmon, 2003). An exacerbation of SLE during pregnancy or postpartum occurs in approximately one third of women with SLE. Women are at increased risk for complications such as preeclampsia, renal disease, and preterm birth (Hankins & Suarez, 2004). Because signs and symptoms are similar, it can be difficult to distinguish between a SLE exacerbation and the onset of preclampsia.

Medical therapy is kept to a minimum in women who are in remission or who have a mild form of SLE. Antiinflammatory drugs such as prednisone and aspirin may be used. It is recommended that aspirin not be used after 24 weeks of gestation, because of an increased risk of premature closure of the fetal ductus arteriosus (Cunningham et al., 2005). Immunosuppressive drugs are not recommended during pregnancy but may be used in some situations when there is greater 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 the postpartum period, the mother should rest as much as possible to prevent an exacerbation of SLE. Adverse perinatal outcomes include preterm births, fetal growth restriction, stillbirth, and neonatal lupus (Cunningham et al., 2005). Breastfeeding is encouraged unless the mother is on immunosuppressive agents. Women with SLE should limit their number of pregnancies because of increased adverse perinatal outcomes, as well as the guarded maternal prognosis (Cunningham et al., 2005). Family planning is important. Oral contraceptives are used with caution secondarily to the vascular disease accompanying SLE; however, progestin implants (when available) have been used with no observed negative effects (Cunningham et al., 2005; Hankins & Suarez, 2004).

**Gastrointestinal Disorders**

Compromise of GI 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 GI disorders that may occur during pregnancy.

**Cholelithiasis and Cholecystitis**

Women are at increased risk to have cholelithiasis (presence of gallstones in the gallbladder), in pregnancy (Blackburn, 2003) with 1 in 1000 pregnant women developing cholecystitis (Cunningham et al., 2005) (Patient Instructions for Self-Care box). Decreased muscle tone allows gallbladder distention and thickening of the bile (biliary sludge) and prolongs emptying time. Increased progesterone levels result in a slight hypercholesterolemia.

Women with acute cholecystitis (inflammation of the gallbladder) usually have colicky abdominal pain in the right upper quadrant and nausea and vomiting, especially after eating a meal high in fat. Fever and an increased leukocyte count may also be present. Ultrasound is often used to detect the presence of stones or for dilation of the common bile duct (Samuels, 2002).

The woman with cholelithiasis or cholecystitis in the first trimester should be treated conservatively with IV fluids, bowel rest, nasogastric suctioning, diet and antibiotics. Meperidine or atropine alleviates ductal spasm and pain. In the past, gallbladder disease has been treated medically but more recently, as women have recurring symptoms cholecystectomies are being performed. Laparoscopic cholecystectomies are performed preferably in the first and second trimesters but if necessary in the third trimester with positive maternal and fetal outcomes (Cunningham et al., 2005; Samuels, 2002).

**Patient Instructions for Self-Care**

**Nutrition for the Pregnant Woman with Cholecystitis or Cholelithiasis**

- Assess diet for foods that cause discomfort and flatulence and omit foods that trigger episodes.
- Reduce dietary fat intake.
- 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.
Landon, 2004). If gallbladder disease is nonacute or nonrecurring then surgery is postponed until the puerperium.

**Inflammatory Bowel Disease**

The incidence of inflammatory bowel disease, particularly Crohn’s disease and ulcerative colitis, is not increased in pregnancy (Cunningham et al., 2005). Active disease at conception may continue during pregnancy and worsen with an increased risk of poor maternal-fetal outcomes (Cunningham et al., Scott & Abu-Hamda, 2004). Treatment of inflammatory bowel disease is the same for the pregnant woman as it is for the nonpregnant woman. Medicines include prednisone and sulfasalazine. Fat soluble vitamin and folic acid supplementation is especially important because of problems with intestinal malabsorption. With complications, such as hemorrhage or if there is no response to medical therapy, surgery may be indicated (Cunningham et al., 2005). Effects of inflammatory bowel disease on pregnancy are usually minimal; however, if the woman is severely debilitated, preterm birth, low birth weight, or fetal death can occur (Scott & Abu-Hamda, 2004). A familial component for inflammatory bowel disease is under investigation but it is unclear whether it is the susceptibility to the disease or the inflammatory disease itself which is inherited. Presently, with one parent with the disease there is approximately a 10% lifetime risk of developing inflammatory bowel disease with Jewish people disproportionately represented (Scott & Abu-Hamda, 2004).

**HIV AND AIDS**

Infection with HIV and the resultant acquired immunodeficiency syndrome (AIDS) are increasingly occurring in women. Women, particularly African-American and Hispanic are now the fastest growing population of persons with HIV and AIDS in the United States (CDC, 2001; Minkoff, 2004). Women of color are disproportionately affected; approximately 80% to 85% of HIV-infected women in the United States are African-American or Hispanic (CDC, 2001; Duff, 2002). This section addresses management of the pregnant woman who is HIV positive or has developed full-blown AIDS. See Chapter 5 for more information about the diagnosis and management of nonpregnant women with HIV and Chapter 27 for a discussion of HIV and AIDS in infants.

**Preconception Counseling**

Pregnancy is not encouraged in HIV-positive women. Preconception counseling is recommended because exposure to the virus has a significant impact on the pregnancy, neonatal feeding method, and neonatal health status. HIV-positive women should be counseled about use of highly active antiretroviral therapy (HAART), the risk of perinatal transmission, and possible obstetric complications. HIV-positive women should be encouraged to seek prenatal care immediately if they suspect pregnancy, to maximize chances for a positive outcome (CDC, 2001).

**Pregnancy Risks**

- **Perinatal transmission**

  Approximately 230 to 370 infants born with AIDS are a result of transmission of the virus from mother to child during the perinatal period (CDC, 2001). Exposure 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 (Lawrence & Lawrence, 2005; Riordan, 2005). Factors that increase the likelihood of perinatal viral transmission are listed in Box 22-2. Women who do not receive prenatal care or who choose not to have earlier HIV testing or are of unknown HIV status may be offered rapid (60-minute turnaround) HIV testing in labor (ACOG, 2004b; CDC, 2004). These women and their infants may receive short-term prophylactic antiretroviral therapy. If a positive HIV test result is confirmed with a second test, then the woman will be counseled regarding long-term care (CDC, 2004). The frequency of perinatal transmission has been reported to vary from a low of 5% to 10% to a high of 50% to 60%.

  Treatment of HIV-infected women with the triple drug antiviral drug during pregnancy decreases the mother-to-child transmission to 2% (Stephenson, 2005). Key to preventing vertical transmission is antiretroviral therapy and cesarean birth (ACOG, 2000b; Cunningham et al., 2005). A major concern with monotherapy (predominantly zidovudine) is the development of resistance. Women should be given the option of having a scheduled cesarean birth at 38 weeks to decrease the risk of vertical transmission of HIV to the infant.

- **Obstetric complications**

  It is difficult to determine obstetric risk in persons with HIV infection because many confounding variables are often present. Many HIV-positive women also suffer from drug

**BOX 22-2**

**Factors That Increase the Risk of Perinatal HIV Transmission**

- Previous history of a child with HIV infection
- AIDS
- Preterm birth
- Decreased maternal CD4 count
- Firstborn twin
- Chorioamnionitis
- Intrapartum blood exposure
- Failure to treat mother and fetus with HAART during the perinatal period
- Breastfeeding

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 and birth, PROM, IUGR, perinatal mortality, and postpartum endometritis (Duff, 2002).

### Antepartum care

HIV counseling and testing should be offered to all women at their initial entry into prenatal care, thereby giving them the opportunity to “opt out” (CDC, 2004; Semprini & Fiore, 2004). Universal testing is recommended versus selective testing for maternal HIV, because it results in a greater number of women being screened and treated (CDC, 2004). Identification of HIV-positive pregnant women is especially important, because antepartum and intrapartum HIV antiviral drug therapy (HART) has been shown to improve obstetric outcomes and greatly decrease the risk of viral transmission to the fetus (Tuomala et al., 2005).

HIV-infected women should also be tested for other STIs, such as gonorrhea; syphilis; chlamydial infection; hepatitis B, C, and D; and herpes (CDC, 2002). Cytomegalovirus and toxoplasmosis antibody testing should be done because both infections can cause significant maternal and fetal complications and can be successfully treated with antimicrobial agents. Any history of vaccination and immune status should be documented, and chickenpox (varicella) and rubella titers should be determined. A tuberculin skin test should be performed; a positive test result necessitates the taking of a chest x-ray film to identify active pulmonary disease. A Papanicolaou (Pap) test should be done (Duff, 2002).

All HIV-infected women should be treated with zidovudine or other antiretroviral drug during pregnancy, regardless of their CD4 counts (Perinatal HIV Guidelines Working Group, 2001). Zidovudine, administered orally, is usually started after the first trimester and continued throughout pregnancy. The major side effect of this drug is bone marrow suppression; periodic hematocrit, white blood cell count, and platelet count assessments should be performed (Duff, 2002). Women with CD4 counts less than 200 cells/mm³ should receive prophylactic treatment for Pneumocystis carinii pneumonia with daily trimethoprim-sulfamethoxazole (Duff, 2002). 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.

Women who are HIV positive should also be vaccinated against hepatitis B, pneumococcal infection, Haemophilus influenzae type B, and viral influenza. 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 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 “safer sex” practices. Use of condoms is encouraged to minimize further exposure to HIV if her partner is the source. Orogenital sex is discouraged.

### Intrapartum care

Several therapy regimens are available. 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 dose throughout labor. Every effort should be made during the birthing process to decrease the neonate’s exposure to infected maternal blood and secretions. If feasible, the membranes should be left intact until the birth. Women who give birth within 4 hours following membrane rupture are at twice the risk of vertical transmission (CDC, 2001). The longer the period between the rupture of membranes and birth the greater the risk of maternal-neonatal HIV transmission (Minkoff, 2004) Women who give birth by cesarean with intact membranes and before labor decrease maternal-infant transmission by 50% (Semprini & Fiore, 2004). The best predictor of vertical transmission is maternal plasma viral load (Semprini & Fiore, 2004). Fetal scalp electrode and scalp pH sampling should be avoided, because these procedures may result in inoculation of the virus into the fetus. Likewise, the use of forceps or vacuum extractor should be avoided when possible.

### Postpartum and newborn care

Immediately after birth, infants should be wiped free of all body fluids and then bathed as soon as they are in stable condition. All staff members working with the mother or infant must adhere strictly to infection control techniques and observe Standard Precautions for blood and body fluids.

Women who have HIV but who are without symptoms may have an unremarkable postpartum course. Immunosuppressed women with symptoms may be at increased risk for postpartum UTIs, vaginitis, postpartum endometritis, and poor wound healing. Women who are HIV positive but who were not on antiretroviral drugs before pregnancy should be tested in the postpartum period to determine whether therapy that was initiated in pregnancy should be continued (Perinatal HIV Guidelines Working Group, 2001).

After the initial bath, the newborn can be with the mother after birth, but breastfeeding is discouraged because of HIV vertical transmission in breast milk. In planning for discharge, comprehensive care and support services will need to be arranged. After discharge, the woman and her infant are referred to physicians who are experienced in the treatment of AIDS and associated conditions for intensive monitoring and follow-up (Perinatal HIV Guidelines Working Group, 2001).

### SUBSTANCE ABUSE

The term *substance abuse* refers to the continued use of substances despite related problems in physical, social, or interpersonal areas (American Psychiatric Association, 2000).
Recurrent abuse results in failure to fulfill major role obligations, and there may be substance-related legal problems and ethical issues (ACOG, 2004a). Any use of alcohol or illicit drugs during pregnancy is considered abuse (American Psychiatric Association, 2000). Chapter 4 discusses the commonly abused illicit and prescription drugs, and Chapter 27 discusses neonatal effects of maternal substance abuse. This discussion focuses on care of the pregnant woman who is a substance abuser. Prevalence rates for substance use during pregnancy range from 0.4% to 27% (Rayburn & Bogenschutz, 2004). Marijuana and cocaine are the illegal drugs most commonly used by pregnant women (Rayburn & Bogenschutz, 2004).

The damaging effects of alcohol and illicit drugs on pregnant women and their unborn babies are well documented (Ludlow, Evans & Hulse, 2004). 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, low birth weight, and sudden infant death syndrome (Andres, 2004; Savitz, Dole, Terry, Zhou, & Thorp, 2001). Congenital abnormalities have occurred in infants of mothers who have taken drugs. The safest pregnancy is one in which the woman is drug and alcohol free. For pregnant women addicted to heroin, methadone maintenance at the lowest effective dose demonstrates a threefold decrease in drug use (Rayburn & Bogenschutz, 2004).

Pregnant women who abuse substances commonly have little understanding of the ways in which these substances affect them, their pregnancies, and their babies. Often, pregnant mothers who use psychoactive substances receive negative feedback from society, as well as from health care providers, who may not only condemn them for endangering the life of the fetus, but may even withhold support as a result. Stigma, shame, and guilt lead to a high denial of substance use. The nurse should also screen for physical and sexual abuse accompanying substance use (Beck et al., 2003).

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. Some states prosecute pregnant women on charges of child abuse because they became pregnant while addicted to drugs. Some policy makers 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. Women’s health nurses can play a positive role by advocating primary prevention programs for women and counseling and treatment programs for those women already addicted.

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. Women who are heavily involved in substance abuse often receive no prenatal care or make only a limited number of visits beginning late in pregnancy. Because women frequently 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 in order to gain the woman’s trust and elicit a reasonably accurate estimate. Information about drug use should be obtained by asking first about the woman’s intake of OTC and prescribed medications. Next, her usage 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.

Screening for alcohol use is commonly done through the use of self-reporting questionnaires. Urine screening is unreliable because alcohol is undetectable within a few hours after ingestion (Russell et al., 1996). 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 often used. Two screening tests, the T-ACE (Box 22-3) and the TWEAK, have been developed to screen specifically for alcohol use during pregnancy (Russell et al., 1996).

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 (Gilbert & Harmon, 2003). In addition to screening for alcohol and drug abuse, the nurse should also screen for physical and sexual abuse and history of psychiatric illness, factors frequently accompanying substance abuse (Beck et al., 2003).

LEGAL TIP

Drug Testing during Pregnancy

There is no requirement in the United States for a health care provider to test either the pregnant woman 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 (Gottlieb, 2001).

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.

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 frequently more receptive to making lifestyle changes during pregnancy than at any other time in their lives. The casual, experimental, or recreational drug user is frequently able to achieve and maintain sobriety when she lives. The casual, experimental, or recreational drug user is frequently able to achieve and maintain sobriety when she

treatment facility, far too few of them are available to meet the demand.

Alcohol withdrawal treatment consists of the administration of benzodiazepines, an improvement in the woman’s nutritional intake (folic acid and other vitamins), and psychotherapy (Rayburn & Bogenschutz, 2004). The safety of disulfiram (Antabuse) during pregnancy has not been established, so it has limited use for detoxification for pregnant women (Weiner & Buhimschi, 2004).

Methadone treatment for pregnant women dependent on heroin or other narcotics is controversial. If women withdraw from heroin during pregnancy, blood flow to the placenta is impaired. The substitution of methadone for the heroin not only promotes withdrawal from heroin but also does not cause impaired blood flow to the placenta. However, methadone can cause detrimental fetal effects, and withdrawal from it after birth can be worse for the newborn than heroin withdrawal (Weiner & Buhimschi, 2004).

Cocaine use during pregnancy has increased dramatically. Maternal and fetal complications accompany cocaine use, including placental abruption, stillbirth, prematurity, and SGA infants. Pregnant women who use cocaine should be advised to stop using immediately. Such women 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.

The increased use of methamphetamine, also known as crystal, meth or its variant, ecstasy, during pregnancy is a growing health care concern. Methamphetamine may be snorted, smoked or ingested and is associated with drug dependence. Pregnancy outcomes reported have included maternal mortality, IUGR, and preterm birth (Weiner & Buhimschi, 2004).

Because of the lifestyle often associated with drug use, substance-abusing women are at risk for STIs, including HIV (CDC, 2002). 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.

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 infants who are small for gestational age, and the potential for hypoxia, nonstress testing may be done in women who are known substance abusers.

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

BOX 22-3

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 felt 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 two indicates a high probability that the woman is a risk drinker.

EVIDENCE-BASED PRACTICE

Social Support for Prevention of Low-Birth-Weight Babies

**BACKGROUND**
- Low-birth-weight (LBW) babies include small-for-gestational-age (SGA) babies, who have not grown adequately during gestation, and preterm babies, who are normal size for gestation but are born too soon (earlier than 37 weeks). These two conditions have different diagnoses and treatments. The SGA baby may be at a greater long-term deficit, particularly if brain growth has been compromised. Prematurity is a more acute problem of survival until the lungs mature. One of the major risk factors for LBW babies (less than 2500 g) is chronic poverty, which can lead to malnutrition, unhealthy living conditions, infections, and increased stress. Psychologic stress increases the likelihood of pregnancy and labor complications, fetal growth restriction, preterm birth, and poor health in mother and child. Social support may mitigate this stress somewhat. Accordingly, many countries have attempted to decrease their LBW rates by offering social support programs to women in distress. The programs usually include advice and counseling, tangible assistance, and emotional support. Support is offered by multidisciplinary teams, which may include lay peer counselors. Health care workers have the knowledge and training but may not have experienced social disadvantage, as the lay peer counselor would.

**OBJECTIVES**
- Reviewers sought to determine the effects of social support for women at high risk for LBW babies, compared with routine care. The authors also planned to compare the effectiveness of health care workers with that of peer counselors. Interventions included some form of emotional support, such as counseling, reassurance, and sympathetic listening, with or without advice about nutrition, rest, stress management, and substance abuse. Tangible assistance included transportation to clinic appointments and household help. Support could start during the first or second trimester and continue at least until birth. Settings could be clinics or home visits, with telephone follow-up. Outcome could include preterm birth, LBW, miscarriage, pregnancy termination, complications of pregnancy or labor, hospitalization, distress, operative birth, perinatal death, length of stay, and postnatal physical or mental health.

**METHODS**

**Search Strategy**
- The reviewers searched Cochrane, MEDLINE, 30 journals and conference proceedings, and a current awareness service of 37 journals. Search keywords were not noted.
- Sixteen randomized, controlled trials were selected, representing 13,651 women from Australia, the United Kingdom, France, Latin America, the Netherlands, South Africa, and the United States. The trials were dated 1986 to 2001.

**Statistical analyses**
- Similar data were pooled. Categoric data were reported by effect size. Continuous data were assigned a weighted mean difference (between intervention and control group).

**FINDINGS**
- Additional social support did not significantly lower the rate of LBW or preterm births. It did significantly decrease the cesarean birthrate. Women who received additional support were three times more likely to terminate their pregnancy than controls. There was equivocal evidence that the support group required less analgesia than controls. Supported women had improved psychosocial outcomes of significantly less worry and increased satisfaction. No comparison was possible of lay versus professional support.

**LIMITATIONS**
- The definitions of “high risk for low birth weight” and “social disadvantage” were murky. There was no way to blind the subjects or evaluators to the presence or absence of additional support. Some subjects were lost to follow-up, so long-term data were not available. Various support teams included nurses, doctors, midwives, social workers, psychologists, and trained lay women. Randomization was not consistent.

**CONCLUSIONS**
- Social support was not able to mitigate the effects on birth weight or prematurity of chronic poverty and the stresses caused by that poverty, or psychologic stress. However, other positive outcomes were seen: a reduction in cesarean birthrate, less worry, and increased satisfaction.

**IMPLICATIONS FOR PRACTICE**
- The decrease in cesarean birthrate and the improved psychosocial outcomes are reasons to offer support to high-risk pregnant women. The additional support may not be powerful enough to overcome the social disadvantage associated with low birth weight and preterm birth. The marked increase in number of pregnancy terminations in the supported group may have been a result of the women’s increased awareness of their fragile situations, and feelings of empowerment to change it.

**IMPLICATIONS FOR FURTHER RESEARCH**
- Researchers have not identified how social disadvantage causes preterm birth and low birth weight. Clear definitions of high risk women may better show any benefits of additional support. The value of lay peer counselors is yet undecided. Lay peer counselors have insight into the lives of the women that professionals may lack, and may offer a cost-effective support system that benefits the community.

threshold for pain. 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. Even women who are actively abusing drugs will experience pain during labor and after giving birth and may need pain medication, as well as nonpharmacologic interventions. It is helpful to develop a standardized plan of care so that patients have limited opportunities to play staff members against one another. 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 abused substances appear in breast milk, some in greater amounts than others (Lawrence & Lawrence, 2005), breastfeeding is definitely contraindicated in women who 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.

Smoking can interfere with the let-down reflex. Women who smoke in the postpartum period and breastfeed should avoid smoking for 2 hours before a feeding to minimize the nicotine in the milk and improve the let-down reflex. Mothers should also be discouraged from smoking in the same room with the infant because exposure to secondhand smoke can increase the likelihood that the infant will experience behavioral and respiratory health problems (Lawrence & Lawrence, 2005).

Before a known substance abuser is discharged with her baby, the home situation is 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 hospital’s social services department 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 and infant after 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 will probably be referred to the state’s child protective services agency for further action.

Contact your local health department to assess the resources available for pregnant women who have a substance abuse problem. Assess specific resources for women who report alcohol, tobacco and drug/polydrug use. Ascertain the numbers of women who abuse drugs and alcohol locally and compare with national statistics. Determine the availability of inpatient and outpatient treatment programs for substance abusing women, specifically as covered by private and public monies.

Key Points

- Lack of maternal glycemic control before conception and in the first trimester of pregnancy may be responsible for fetal congenital malformations.
- 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.
- Poor glycemic control before and during pregnancy can lead to maternal complications such as miscarriage, infection, and dystocia (difficult labor) caused by fetal macrosomia.
- Careful glucose monitoring, 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.
- Because gestational diabetes mellitus (GDM) is asymptomatic in most cases, most women undergo routine screening during pregnancy.
- Thyroid dysfunction during pregnancy requires close monitoring of thyroid hormone levels to regulate therapy and prevent fetal insult.
- The stress of the normal maternal adaptations to pregnancy on a heart whose function is already taxed may cause cardiac decompensation.
- In the case of cardiac arrest in a pregnant woman, the standard resuscitation guidelines should be implemented with the modification of positioning the woman so that the uterus is displaced laterally.
- Maternal morbidity or mortality is a significant risk in a pregnancy complicated by mitral stenosis.
- Anemia, the most common medical disorder of pregnancy, affects at least 20% of pregnant women.
- Autoimmune disorders (e.g., SLE) show a predilection for women in their reproductive years; therefore associations with pregnancy are not uncommon.
- HIV may be transmitted through blood, semen, and perinatal events.
- Perinatal administration of AZT and planned cesarean birth are recommended to decrease transmission of HIV from mother to fetus.
Because medical history and examination cannot reliably identify all persons with HIV or other blood-borne pathogens, blood and body fluid precautions should be consistently used for everyone.

Much 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.

It is crucial that health care providers provide compassionate, nonjudgmental care to substance abusers.

Answer Guidelines to Critical Thinking Exercise

Diabetes Mellitus

1. Women who are obese are at greater risk for diabetes mellitus, type 2. Marva’s laboratory data, FBS, and HgbA1c, are elevated and indicate uncontrolled hyperglycemia. Further assessments are necessary to determine fetal development, such as ultrasound.

2. a. Possible diagnoses for Maria include type 2 diabetes. Less likely diagnoses are type 1 diabetes mellitus and gestational diabetes as determined by her reported use of glucophage.

b. Physical assessment to include specifically: ophthalmologic examination, renal function and cardiovascular status, weekly fasting blood sugars and 2 hour postprandial blood sugars, HgbA1c, level 2 ultrasound, fetal heart rate, daily kick counts, and biophysical profile would further ascertain her maternal-fetal status.

c. Factors contributing to Maria’s elevated blood sugar may include excess or wrong kinds of food, insufficient exercise, and obesity. In addition, insulin needs increase during the second and third trimesters.

d. While oral hypoglycemics are not commonly ordered for pregnant diabetics, they may be the treatment of choice for pregnant diabetics with uncontrolled diabetes who are cognitively impaired or refuse to take insulin.

3. Priorities for nursing care at this time include controlling Maria’s blood sugar and monitoring her fetal status. In addition, it is important to answer her questions regarding the safety of the use of oral hypoglycemics during pregnancy. She needs written and verbal information at her level of understanding.

4. Yes, there is initial clinical evidence to support the use of oral hypoglycemics in pregnant diabetics. Adverse maternal and fetal outcomes have not been reported with its use.

5. Some providers may continue to prescribe insulin for pregnant diabetics even when they refuse to comply. This may necessitate teaching family members, or friends how to give insulin injections or having a home health nurse visit to provide injections.

Resources

AIDS Network Hotline
800-342-2437 (AIDS)
AIDS resource list
www.hivnet.org/aidsres.html

American Diabetes Association (ADA)
Diabetes Information Service Center
1660 Duke St.
Alexandria, VA 22314
800-342-2383
www.diabetes.org

American Heart Association
Women’s heart information: 1-888-MYHEART (1-888-694-3278)
800-242-8721
www.americanheart.org

Asthma and Allergy Foundation of America
www.aafa.org

Cardiopulmonary resuscitation information
www.cpr-ecc.org

CDC Perinatal HIV Prevention Web Site
http://www.cdc.gov/hiv/projects/perinatal/

CDC Rapid Testing Web Site
http://www.cdc.gov/hiv/rapid_testing/

Center for Sickle Cell Disease
2121 Georgia Ave., NW
Washington, DC 20059
202-636-7930

COPE (Coping with the Overall Pregnancy/Parenting Experience)
37 Clarendon St.
Boston, MA 02116
617-337-5588

March of Dimes Birth Defects Foundation
1275 Mamaroneck Ave.
White Plains, NY 10605
914-428-7100
888-663-4637
www.modimes.org

National AIDS Information Clearinghouse
P.O. Box 6003
Rockville, MD 20849-6003
800-458-5231 (English and Spanish)

National Association for Sickle Cell Disease
3345 Wilshire Blvd., Suite 1106
Los Angeles, CA 90010-1880
213-736-5455
800-421-8453

National Bed Rest Support Group
Sidelines
P.O. Box 1808
Laguna Beach, CA 92652
714-497-2265
www.sidelines.org
References


