Working with women who are dealing with high-risk pregnancies has given me a much deeper appreciation of the stress a family faces when their unborn child is threatened or when the mother is ill. Some families seem so strong and resilient—they use me as a resource, and I am delighted to assist them in that way. Other families seem to crumble and have such needs. I do my best to help them gain the tools they need to cope. When I succeed, I am elated. When they can’t seem to cope, no matter what any of us do, I feel such a sense of sadness for the family and their future.

—A Perinatal Nurse Practitioner (PNNP)

Objectives

- Contrast the etiology, medical therapy, and nursing interventions for the various bleeding problems associated with pregnancy.
- Identify the medical therapy and nursing interventions indicated in caring for a woman with an incompetent cervix.
- Discuss the medical therapy and nursing care of a woman with hyperemesis gravidarum.
- Delineate the nursing care needs of a woman experiencing premature rupture of the membranes or preterm labor.
- Describe the development and course of hypertensive disorders associated with pregnancy.
- Explain the cause and prevention of hemolytic disease of the newborn secondary to Rh incompatibility.
- Compare Rh incompatibility to ABO incompatibility with regard to occurrence, treatment, and implications for the fetus or newborn.
- Summarize the effects of surgical procedures on pregnancy and explain ways in which pregnancy may complicate diagnosis.
- Discuss the impact of trauma due to an accident on the pregnant woman or her fetus.
- Explain the needs and care of the pregnant woman who experiences abuse.
- Describe the effects of infections on the pregnant woman and her unborn child.
Pregnancy is usually an uncomplicated experience. In some cases, however, problems arise that place the pregnant woman and her unborn child at risk. Regular prenatal care serves to detect these potential complications quickly so that effective care can be provided. This chapter focuses on problems that primarily occur during pregnancy; that is, problems with a gestational onset.

Care of the Woman with a Bleeding Disorder

During the first and second trimesters of pregnancy, the major cause of bleeding is abortion. Abortion is the expulsion of the fetus prior to viability, which is considered to be 20 weeks’ gestation or weight of less than 500 g (Cunningham, Gant, Leveno et al., 2001). Abortions are either spontaneous (occurring naturally) or induced (occurring as a result of artificial or mechanical interruption). Because the term abortion may carry a negative connotation, spontaneous abortion is often called miscarriage.

Other complications that can cause bleeding in the first half of pregnancy are ectopic pregnancy and gestational trophoblastic disease, discussed shortly. In the second half of pregnancy, particularly in the third trimester, the two major causes of bleeding are placenta previa and abruptio placentae. (They are discussed in detail in Chapter 21.) However, regardless of the cause of bleeding, the nurse has certain general responsibilities in providing nursing care.

General Principles of Nursing Intervention

Spotting is relatively common during pregnancy and usually occurs following sexual intercourse or exercise because of trauma to the highly vascular cervix. However, the woman is advised to report any spotting or bleeding that occurs during pregnancy so that it can be evaluated.

It is often the nurse’s responsibility to make the initial assessment of bleeding. In general, the following nursing measures should be implemented for pregnant women being treated for bleeding disorders.

- Monitor blood pressure and pulse frequently.
- Observe the woman for behaviors indicative of shock, such as pallor, clammy skin, perspiration, dyspnea, or restlessness.
- Count and weigh pads to assess amount of bleeding over a given time period; save any tissue or clots expelled.
- If pregnancy is of 12 weeks’ gestation or beyond, assess fetal heart tones with a Doppler.
- Prepare for intravenous (IV) therapy. There may be standing orders to begin IV therapy on clients who are bleeding.
- Prepare equipment for examination.
- Have oxygen available.
- Collect and organize all data, including antepartal history, onset of bleeding episode, and laboratory studies (hemoglobin, hematocrit, hormonal assays) for analysis.
- Obtain an order to type and crossmatch for blood if evidence of significant blood loss exists.
- Assess coping mechanisms of woman in crisis. Give emotional support to enhance her coping abilities by continuous, sustained presence; by clear explanation of procedures; and by communicating her status to her family. Prepare the woman for possible fetal loss. Assess her expressions of anger, denial, silence, guilt, depression, or self-blame.
- Assess the family’s response to the situation.

Key Terms

- Abortion
- Eclampsia
- Ectopic pregnancy (EP)
- Erythroblastosis fetalis
- Gestational trophoblastic disease (GTD)
- HELLP syndrome
- Hydatidiform mole
- Hydrops fetalis
- Hyperemesis gravidarum
- Incompetent cervix
- Miscarriage
- Preeclampsia
- Premature rupture of membranes (PROM)
- Preterm labor (PTL)
- Rh immune globulin (RhoGAM)
- Tocolysis
Spontaneous Abortion (Miscarriage)

Many pregnancies end in the first trimester because of spontaneous abortion. Often the woman assumes she is having a heavy menstrual period when she is really having an early abortion; thus, statistics are inaccurate. The incidence is about 10% to 12% for clinically recognized pregnancies but may be higher overall. The likelihood of recurrent miscarriage is thought to be 25% to 30% (Simpson, 2002).

A majority of early spontaneous abortions are related to chromosomal abnormalities. Other causes include teratogenic drugs, faulty implantation due to abnormalities of the female reproductive tract, a weakened cervix, placental abnormalities, chronic maternal diseases, endocrine imbalances, and maternal infections. Research does not support the belief that accidents and psychic trauma are primary causes of spontaneous abortion.

Classification

Spontaneous abortions are subdivided into the following categories.

- **Threatened abortion** (Figure 15–1A ■). The embryo or fetus is jeopardized by unexplained bleeding, cramping, and backache. The cervix is closed. Bleeding may persist for days. It may be followed by partial or complete expulsion of the embryo or fetus, placenta, and membranes (sometimes called the “products of conception”).

- **Imminent abortion** (Figure 15–1B ■). Bleeding and cramping increase. The internal cervical os dilates. Membranes may rupture. The term inevitable abortion also applies.

- **Complete abortion.** All the products of conception are expelled.

- **Incomplete abortion** (Figure 15–1C ■). Some of the products of conception are retained, most often the placenta. The internal cervical os is dilated slightly.

- **Missed abortion.** The fetus dies in utero but is not expelled. Uterine growth ceases, breast changes regress, and the woman may report a brownish vaginal discharge. The cervix is closed. If the fetus is retained beyond 6 weeks, the breakdown of fetal tissues results in the release of thromboplastin, and disseminated intravascular coagulation (DIC) may develop.

- **Recurrent pregnancy loss** (formerly called habitual abortion). Abortion occurs consecutively in three or more pregnancies.

- **Septic abortion.** Presence of infection. May occur with prolonged, unrecognized rupture of the membranes, pregnancy with an intrauterine device (IUD) in utero, or attempts by unqualified individuals to terminate a pregnancy.

**FIGURE 15–1 ■ Types of spontaneous abortion.** A. Threatened. The cervix is not dilated, and the placenta is still attached to the uterine wall, but some bleeding occurs. B. Imminent. The placenta has separated from the uterine wall, the cervix has dilated, and the amount of bleeding has increased. C. Incomplete. The embryo/fetus has passed out of the uterus; however, the placenta remains.
Clinical Therapy

One of the more reliable indicators of potential spontaneous abortion is the presence of pelvic cramping and backache. These symptoms are usually absent in bleeding caused by polyps, ruptured cervical blood vessels, or cervical erosion. Ultrasound scanning may be used to detect the presence of a gestational sac or cardiac activity if the cause of bleeding is unclear. Results of human chorionic gonadotropin (hCG) levels are not particularly helpful because hCG levels fall slowly after fetal death and therefore cannot confirm a live embryo or fetus. Hemoglobin and hematocrit are obtained to assess blood loss. Blood is typed and crossmatched for possible replacement needs.

The therapy prescribed for the pregnant woman with bleeding is bed rest, abstinence from coitus, and perhaps sedation. If bleeding persists and abortion is imminent or incomplete, the woman may be hospitalized, IV therapy or blood transfusions may be started to replace fluid, and dilatation and curettage (D&C) or suction evacuation is performed to remove the remainder of the products of conception. If the woman is Rh negative and not sensitized, Rh immune globulin (RhoGAM) is given within 72 hours (see discussion on Rh sensitization later in this chapter).

In missed abortions, the products of conception eventually are expelled spontaneously. Diagnosis is based on history, pelvic examination, and a negative pregnancy test and may be confirmed by ultrasound if necessary. If this does not occur within 4 to 6 weeks after embryo or fetal death, hospitalization is necessary. Dilatation and curettage or suction evacuation is done if the pregnancy is in the first trimester. In the second trimester, labor is induced. Alternately, dilatation and evacuation (D&E) may be used.

Nursing Plan and Implementation

Community-Based Nursing Care

If a woman in her first trimester of pregnancy begins cramping or spotting, she is often evaluated on an outpatient basis. The nurse provides analgesics for pain relief if the woman’s cramps are severe and explains what is occurring throughout the process.

Feelings of shock or disbelief are normal. Couples who approached the pregnancy with feelings of joy and a sense of expectancy now also feel grief, sadness, and possibly anger.

Because many women, even with planned pregnancies, feel some ambivalence initially, guilt is also a common emotion. These feelings may be even stronger for women who were negative about their pregnancies. The women may harbor negative feelings about themselves or even believe that the abortion may be a punishment for some wrongdoing.

The nurse can offer invaluable psychologic support to the woman and her family by encouraging them to talk about their feelings, allowing them the privacy to grieve, and listening sympathetically to their concerns about this pregnancy and future ones. The nurse may help decrease feelings of guilt or blame by informing the woman and her family about the causes of spontaneous abortion. The nurse can also refer them to other healthcare professionals for additional help as necessary. The grieving period following a spontaneous abortion usually lasts 6 to 24 months. Many couples can be helped during this period by an organization or support group established for parents who have lost a fetus or newborn.

Nursing Assessment and Diagnosis

The nurse assesses the woman’s vital signs, amount and appearance of any bleeding, level of comfort, and general physical health. If the pregnancy is 10 to 12 weeks or more, fetal heart rates should be assessed by Doppler. The nurse also assesses the responses of the woman and her family to this crisis and evaluates their coping mechanisms and ability to comfort each other.

Examples of nursing diagnoses that may apply include the following:

- Pain related to abdominal cramping secondary to threatened abortion
- Anticipatory Grieving related to expected loss of unborn child

Complementary & Alternative Therapies

Herbs Used for Prevention of Miscarriage

Three herbs are frequently used by herbalists for the prevention of miscarriage: black haw, cramp bark, and false unicorn root. (Note that black haw and cramp bark are sometimes considered synonymous, as they are part of the same family: black haw is *Viburnum prunifolium* and cramp bark is *Viburnum opulus*.)

**Black Haw:** This herb is administered in tincture; tea, or capsule/tablet form, it has a uterine relaxant effect (Skidmore-Roth, 2001).

**Cramp Bark:** A “cousin” plant to black haw, cramp bark is reported to also have a relaxant effect on the uterine muscles.

**False Unicorn Root:** Considered a uterine tonic, this root is administered in tincture or dried root form. These three herbs are frequently combined in formulas. They should only be administered by a qualified herbalist. Refer to “Complementary and Alternative Therapies: Homeopathy and Herbal Medicine” in Chapter 2) for reminders about the use of herbs during pregnancy.
is the implantation of the fertilized ovum in a site other than the endometrial lining of the uterus. It has many causative factors including tubal damage caused by pelvic inflammatory disease (PID), previous tubal surgery, congenital anomalies of the tube, endometriosis, previous ectopic pregnancy, presence of an IUD, and in utero exposure to diethylstilbestrol (DES). The incidence of EP has increased dramatically in the past several years from 4.5 per 1000 pregnancies in 1970 to 19.7 per 1000 pregnancies in 2000 (Gracia & Barnhardt, 2001). However, although the incidence has increased, the mortality rate has declined almost 90% because of better diagnostic techniques that allow detection before tubal rupture.

Ectopic pregnancy occurs when the fertilized ovum is prevented or slowed in its passage through the tube and thus implants before it reaches the uterus. The most common location for implantation is the ampulla of the fallopian tube. Figure 15–2 illustrates this and other implantation sites.

Initially the normal symptoms of pregnancy may be present, specifically amenorrhea, breast tenderness, and nausea. The hormone hCG is present in the blood and urine. As the pregnancy progresses, the chorionic villi grow into the wall of the tube or site of implantation and a blood supply is established. When the embryo outgrows this space, the tube ruptures and there is bleeding into the abdominal cavity. This bleeding irritates the peritoneum, causing the characteristic symptoms of sharp, one-sided pain, syncope, and referred shoulder pain. The woman may also experience lower abdominal pain. Vaginal bleeding occurs when the embryo dies and the decidua begins to slough.

Physical examination usually reveals adnexal tenderness. (The adnexae are the areas of the lower abdomen located over each ovary and fallopian tube.) An adnexal mass is palpable about half the time. Bleeding tends to be slow and chronic, and the abdomen gradually becomes rigid and very tender. With extensive bleeding into the abdominal cavity, pelvic examination causes extreme pain, and a mass of blood may be palpated in the cul-de-sac of Douglas. Laboratory tests may reveal low hemoglobin and hematocrit levels and rising leukocyte levels.

**Hospital-Based Nursing Care**

A woman with an incomplete or missed abortion may need a D&C or other procedure, which is typically done on an outpatient basis. Barring any complications, the woman can return home a few hours after the procedure. The nurse monitors the woman’s condition closely and provides instruction for self-care. The nurse also administers Rh immune globulin if it is indicated.

**Evaluation**

Expected outcomes of nursing care include the following:

- The woman is able to explain spontaneous abortion and the treatment measures employed in her care.
- The woman suffers no complications.
- The woman and her partner begin verbalizing their grief and acknowledge that the grieving process lasts several months.

**Care of the Woman with an Ectopic Pregnancy**

**Ectopic pregnancy** (EP) is the implantation of the fertilized ovum in a site other than the endometrial lining of the uterus. It has many causative factors including tubal damage caused by pelvic inflammatory disease (PID), previous tubal surgery, congenital anomalies of the tube, endometriosis, previous ectopic pregnancy, presence of an IUD, and in utero exposure to diethylstilbestrol (DES).

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**Clinical Therapy**

Diagnosis of ectopic pregnancy begins with an assessment of menstrual history, including the last menstrual period (LMP), followed by a careful pelvic exam to identify any abnormal pelvic masses and tenderness. A serum progesterone level is drawn. A viable intrauterine pregnancy can be diagnosed with 97.5% sensitivity if the progesterone level is 25 ng/mL or higher, whereas a serum progesterone lower than 5 ng/mL indicates a nonviable pregnancy. Transvaginal ultrasound is indicated for levels between 5 ng/mL and 25 ng/mL (Simpson, 2002). Serum β-hCG levels are drawn and reassessed in 48 hours if necessary. A woman with ectopic pregnancy tends to have abnormally low hCG levels. Moreover, in normal pregnancy, hCG levels double every 48 to 72 hours. Nondoubling hCG levels occur in ectopic pregnancy and in nonviable uterine pregnancies. If the β-hCG levels are above 1500 milli-international units per milliliter, transvaginal ultrasound is used to check for a uterine pregnancy or an adnexal mass. Confirming a uterine pregnancy nearly eliminates the diagnosis of ectopic pregnancy.

Treatment may be medical or surgical. Medical treatment using methotrexate is indicated for the woman who...
desires future pregnancy if her ectopic pregnancy is unruptured and of 4 cm size or less and if her condition is stable. In addition, there must be no fetal cardiac motion and the woman must have no evidence of acute intraperitoneal bleeding, a blood disorder, or kidney or liver disease. Methotrexate, a folic acid antagonist that interferes with DNA synthesis and cell multiplication, is administered intramuscularly. The woman is advised that transient abdominal pain (usually lasting 4 to 12 hours) is common 3 to 7 days after the methotrexate is administered. As an outpatient, the woman is monitored for increasing abdominal pain because a primary consideration of treatment is differentiating between the transient pain that indicates successful methotrexate therapy and the abdominal pain associated with a ruptured ectopic pregnancy. Serum \( \beta \)-hCG titers are also monitored regularly. Typically the hCG levels increase for 1 to 4 days and then decrease. If hCG levels do not continue to fall, a second dose of methotrexate may be needed. As many as 25% to 30% of women require a second dose (Cunningham et al., 2001).

If surgery is indicated and the woman desires future pregnancies, treatment involves salpingostomy via a laparoscope. With this method, a linear incision is made and the products of conception are gently removed. The surgical incision is left open and allowed to close by secondary intention. If the tube is ruptured or if future childbearing is not an issue, laparoscopic salpingectomy (removal of the tube) is performed, leaving the ovary in place unless it is damaged.

With both medical and surgical therapies for ectopic pregnancy, the Rh-negative nonsensitized woman is given Rh immune globulin to prevent sensitization (discussed later in this chapter).

**Nursing Assessment and Diagnosis**

When the woman with a suspected ectopic pregnancy is admitted to the hospital, the nurse assesses the appearance and amount of vaginal bleeding and monitors vital signs for evidence of developing shock.

The nurse assesses the woman’s emotional state and coping abilities and determines the couple’s informational needs. The woman may experience marked abdominal discomfort, so the nurse also determines the woman’s level of pain. If surgery is necessary, the nurse performs the ongoing assessments appropriate postoperatively.

Nursing diagnoses that may apply for a woman with an ectopic pregnancy include the following:

- Pain related to abdominal bleeding secondary to tubal rupture
- Anticipatory Grieving related to expected loss of unborn child

**Nursing Plan and Implementation**

**Community-Based Nursing Care**

Women with ectopic pregnancy are often seen initially in a clinic or office setting. Nurses need to be alert to the possibility of ectopic pregnancy if a woman presents with complaints of abdominal pain and lack of menses for 1 to 2 months. If a woman is to
receive medical treatment using methotrexate, she is followed as an outpatient. The nurse advises the woman to avoid sun exposure because methotrexate causes photosensitivity. The nurse also stresses that some abdominal pain is common following the injection, but generally it is mild and lasts only 24 to 48 hours. More severe pain, which might indicate that the medical treatment was not successful and the ectopic pregnancy ruptured, should be evaluated. The woman should also report heavy vaginal bleeding, dizziness, or tachycardia. The nurse stresses the need to return for follow-up hCG testing.

Hospital-Based Nursing Care

Once a diagnosis of ectopic pregnancy is made and surgery is scheduled, the nurse starts an IV as ordered and begins preoperative teaching. The nurse should immediately report signs of developing shock. If the woman is experiencing severe abdominal pain, the nurse can administer analgesics and evaluate their effectiveness.

Regardless of the treatment used, the woman and her family will need emotional support during this difficult time. Their feelings and responses to this crisis are generally similar to those that occur in cases of spontaneous abortion. As a result, similar nursing actions are required.

Evaluation

Expected outcomes of nursing care include the following:

- The woman is able to explain ectopic pregnancy, treatment alternatives, and implications for future childbearing.
- The woman and her caregivers detect possible complications early and manage them successfully.
- The woman and her partner are able to begin verbalizing their loss.

Cultural Perspectives

- The incidence of ectopic pregnancy is higher for nonwhite women than for whites in every age category.
- The incidence of preeclampsia is also related to genetic predisposition. Women of African American descent are at higher risk.
- Until recently, researchers thought that the incidence of GTD was significantly higher in women of Asian ancestry. However, population-based studies show that the incidence of GTD in most of the world is similar to that found in the United States—about 1 in 1000 pregnancies (Cunningham et al., 2001).

Gestational trophoblastic disease (GTD) is the pathologic proliferation of trophoblastic cells (the trophoblast is the outermost layer of embryonic cells). Worldwide, GTD occurs in about 1 in 1000 pregnancies (Cunningham et al., 2001). Risk factors are largely unknown. GTD includes hydatidiform mole, invasive mole (chorioadenoma destructens), and choriocarcinoma.

Hydatidiform mole (molar pregnancy) is a disease in which (1) abnormal development of the placenta occurs, resulting in a fluid-filled, grapelike cluster; and (2) the trophoblastic tissue proliferates. The disease results in the loss of the pregnancy and the possibility, though remote, of developing choriocarcinoma, a form of cancer, from the trophoblastic tissue.

Molar pregnancies are classified into two types, complete and partial, both of which meet the previously mentioned criteria. A complete mole develops from an ovum containing no maternal genetic material, an “empty egg,” which is fertilized by a normal sperm. The embryo dies very early, no circulation is established, the hydropic (fluid-filled) vesicles are avascular, and no embryonic tissue or membranes are found. Choriocarcinoma seems to be associated exclusively with the complete mole.

The partial mole usually has a triploid karyotype (69 chromosomes). Most often, a normal ovum with 23 chromosomes is fertilized by two sperm (dispermy) or by a sperm that has failed to undergo the first meiotic division and therefore contains 46 chromosomes. There may be a fetal sac or even a fetus with a heartbeat. The fetus has multiple anomalies because of the triploidy and little chance for survival. The villi are often vascularized and may be fluid-filled in only portions of the placenta. Often partial moles are recognized only after spontaneous abortion, and they may go unnoticed even then.

Invasive mole (chorioadenoma destructens) is similar to a complete mole, but it involves the uterine myometrium. Treatment is the same as for complete mole.

Clinical Therapy

Initially the clinical picture is similar to that of pregnancy; however, classic signs soon appear. Vaginal bleeding occurs almost universally. It is often brownish (like prune juice) due to liquefaction of the uterine clot, but it may be bright red. Uterine enlargement greater than expected for gestational age is a classic sign, present in about 50% of cases. In the remainder of cases, the uterus is appropriate or small for the gestational age. Hydropic vesicles (grapelike clusters) may be passed; if so, they are diagnostic (Figure 15–3). With a partial mole the vesicles are often smaller and may not be noticed. In addition, because serum hCG levels are
higher with molar pregnancy than with normal pregnancy, the woman may experience hyperemesis gravidarum. Anemia occurs frequently and is due to blood loss and poor nutrition secondary to hyperemesis. Symptoms of preeclampsia prior to 24 weeks’ gestation strongly suggest a molar pregnancy. No fetal heart tones are heard, and no fetal movement is palpated. The advent of transvaginal ultrasound has led to earlier diagnosis of molar pregnancy, often in the first trimester.

Therapy begins with suction evacuation of the mole and curettage of the uterus to remove all fragments of the placenta. Early evacuation decreases the possibility of other complications. If the woman is older and has completed her childbearing, or if there is excessive bleeding, hysterectomy may be the treatment of choice to reduce the risk of choriocarcinoma.

Because of the risk of persistent GTD and choriocarcinoma, the woman treated for hydatidiform mole should receive extensive follow-up therapy. Follow-up care includes a baseline chest x-ray to detect metastasis and a physical exam including pelvic exam. Serum β-hCG levels are monitored weekly until the woman has normal titers for 3 consecutive weeks. Titers are then monitored monthly for 6 months, followed by every 2 months for 6 months more (Copeland & Landon, 2002). The woman avoids pregnancy during that time because the elevated hCG levels associated with pregnancy would cause confusion about whether choriocarcinoma had developed.

Continued high or rising hCG titers are abnormal. If they occur, D&C is performed and the tissue examined. If malignant cells are found, treatment at a center specializing in GTD is advised. Chemotherapy for choriocarcinoma is started using methotrexate alone or in combination with other chemotherapy agents. Persistent GTD is almost 100% curable if diagnosed early and treated appropriately.

If, after a year of monitoring, the hCG serum titers remain within normal limits, a couple may be assured that subsequent normal pregnancy can be anticipated, with a low probability of recurring hydatidiform mole.

**Nursing Care**

**Management**

**Nursing Assessment and Diagnosis**

It is important for nurses involved in antepartum care to be aware of symptoms of hydatidiform mole and observe for them at each antepartal visit. The classic symptoms used to diagnose molar pregnancy are found more frequently with the complete than with the partial mole. Before evacuation, the partial mole may be difficult to distinguish from a missed abortion. If a molar pregnancy is diagnosed, the nurse should assess the woman’s (or the couple’s) understanding of the condition and its implications.

Nursing diagnoses that may apply to a woman with a hydatidiform mole include the following:

- Fear related to the possible development of choriocarcinoma
- Anticipatory Grieving related to the loss of the pregnancy secondary to GTD

**Nursing Plan and Implementation**

**Community-Based Nursing Care**

When a molar pregnancy is suspected, the woman needs emotional support. The nurse can relieve some of the woman’s anxiety by answering questions about the condition and explaining what ultrasound and other diagnostic procedures will entail. If a molar pregnancy is diagnosed, the nurse supports the parents as they deal with their grief about the lost pregnancy. Healthcare counselors, a member of the clergy, or a professional counselor may be able to help them deal with this loss.

**Hospital-Based Nursing Care**

When the woman is hospitalized for evacuation of the mole, the nurse must monitor vital signs and vaginal bleeding for evidence of hemorrhage. In addition, the nurse determines whether abdominal pain is present and evaluates the woman’s emotional state and coping ability.
Typed and crossmatched blood must be available for surgery because of previous blood loss and the potential for hemorrhage. Oxytocin is administered to keep the uterus contracted and prevent hemorrhage. If the woman is Rh negative and not sensitized, she is given Rh immune globulin to prevent antibody formation.

The woman needs to understand the importance of the follow-up visits. She is advised to delay becoming pregnant again until after the follow-up program is completed.

**Evaluation**

Expected outcomes of nursing care include the following:

- The woman has an uneventful recovery following successful evacuation of the mole.
- The woman is able to explain GTD and its treatment, follow-up, and long-term implications for pregnancy.
- The woman and her partner are able to begin verbalizing their grief at the loss of their anticipated child.
- The woman can discuss the importance of follow-up care and indicates her willingness to cooperate with the regimen.

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**Care of the Woman with an Incompetent Cervix**

**Incompetent cervix** refers to the premature dilatation of the cervix, usually in the fourth or fifth month of pregnancy. Occurring in 0.1% to 2% of pregnancies, it is associated with repeated second-trimester abortions (Norwitz, 2002). Possible causes include cervical trauma, infection, congenital cervical or uterine anomalies, or increased uterine volume (as with a multiple gestation).

Diagnosis is established by eliciting a positive history of repeated, relatively painless spontaneous second-trimester abortions. Serial pelvic exams early in the second trimester reveal progressive effacement and dilatation of the cervix and bulging of the membranes through the cervical os. If incompetent cervix is suspected, serial ultrasound provides information on dilatation of the internal cervical os before a dilated external os is detected.

Incompetent cervix is traditionally managed surgically with a Shirodkar-Barter operation (cerclage)—or a modification of it by McDonald—which reinforces the weakened cervix by encircling it at the level of the internal os with suture material (Figure 15–4 ■). A purse-string suture is placed in the cervix in the first trimester or early in the second trimester. Once the suture is in place, a cesarean birth may be planned, which allows the suture to be left in place for subsequent pregnancies, or the suture may be released at term and vaginal birth permitted. Recent research has called into question the effectiveness of cerclage in preventing late miscarriage or preterm birth (ACOG, 2003).

The woman must understand the importance of contacting her physician immediately if her membranes rupture or labor begins. The physician can remove the suture to prevent possible complications.

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**Care of the Woman with Hyperemesis Gravidarum**

**Hyperemesis gravidarum**, a relatively rare condition, is excessive vomiting during pregnancy. It may be mild at first, but true hyperemesis may progress to a point at which the woman not only vomits everything she swallows but also retches between meals.

Although the exact cause of hyperemesis is unclear, increased levels of hCG may play a role. Other variables that may relate to hyperemesis include transient hyperthyroidism, hypofunction of the anterior pituitary gland and adrenal cortex, abnormalities of the corpus luteum, *Helicobacter pylori* infection, and psychologic factors.

In severe cases, the pathology of hyperemesis begins with dehydration, which leads to fluid-electrolyte imbalance and alkalosis from loss of hydrochloric acid. Hypovolemia,
hypotension, tachycardia, increased hematocrit and blood urea nitrogen (BUN), and decreased urine output can also occur. If untreated, metabolic acidosis may develop. Severe potassium loss may disrupt cardiac functioning. Starvation causes muscle wasting and severe protein and vitamin deficiencies. Fetal or embryonic death may result, and the woman may suffer irreversible metabolic changes or death.

**Clinical Therapy**

The goals of treatment include control of vomiting, correction of dehydration, restoration of electrolyte balance, and maintenance of adequate nutrition. If the woman does not respond to standard approaches to the control of nausea and vomiting in pregnancy (see Chapter 11), she may require IV fluids on an outpatient basis. If her symptoms do not improve, hospitalization may be indicated. Initially the woman is given nothing by mouth (NPO), and IV fluids are administered. Potassium chloride is typically added to the IV infusion to prevent hypokalemia. Thiamine and pyroxidine (vitamin B6) may also be replaced to correct deficiencies and prevent peripheral neuropathy. Antiemetics may also be administered. Typically the woman remains NPO for 48 hours. If her condition does not improve, total parenteral nutrition may be needed. She then begins controlled oral feedings.

**Nursing Care**

**Management**

**Nursing Assessment and Diagnosis**

When a woman is hospitalized for control of vomiting, the nurse regularly assesses the amount and character of any emesis, intake and output, fetal heart rate, evidence of jaundice or bleeding, and the woman’s emotional state.

Nursing diagnoses that may apply to a woman with hyperemesis gravidarum include the following:

- Altered Nutrition: Less than Body Requirements related to persistent vomiting secondary to hyperemesis
- Fear related to the effects of hyperemesis on fetal well-being

**Nursing Plan and Implementation**

**Community-Based Nursing Care**

Total parenteral nutrition therapy provided at home in collaboration with a physician and a registered dietitian is sometimes used to enable the woman to remain in her home. It also gives the nurse an opportunity to observe family interactions and evaluate the home environment. This assessment is often useful in determining the pregnant woman’s level of support, any significant stressors in her life, and her understanding of nutrition and self-care measures.

**Hospital-Based Nursing Care**

Nursing care is supportive and directed at maintaining a relaxed, quiet environment away from food odors or offensive smells. Once oral feedings resume, food needs to be attractively served. Oral hygiene is important because the mouth is dry and may be irritated from vomitus. Weight is monitored regularly. In some cases emotional factors have appeared to play a role in this condition, although that remains controversial. Nevertheless, psychotherapy may sometimes be recommended. With proper treatment, prognosis is favorable.

**Evaluation**

Expected outcomes of nursing care include the following:

- The woman is able to explain hyperemesis gravidarum, its therapy, and its possible effects on her pregnancy.
- The woman’s condition is corrected and complications are avoided.

**Care of the Woman with Premature Rupture of Membranes**

Premature rupture of membranes (PROM) is spontaneous rupture of the membranes prior to the onset of labor. Preterm PROM (PPROM) is the rupture of membranes occurring before 37 weeks’ gestation. Although the exact cause is unknown, PROM is associated with infection, previous history of PROM, hydramnios, multiple pregnancy, urinary tract infection (UTI), amniocentesis, placenta previa, abruptio placentae, trauma, incompetent cervix, bleeding during pregnancy, and maternal genital tract anomalies.

Maternal risk is related to infection, specifically chorioamnionitis (intra-amniotic infection resulting from bacterial invasion before birth) and endometritis (postpartal infection of the endometrium). In addition, abruptio placentae (discussed in Chapter 21) occurs more frequently in women with PROM.

Fetal-newborn implications include risk of respiratory distress syndrome (with PPROM), fetal sepsis due to ascending pathogens, malpresentation, prolapse of the umbilical cord, and increased perinatal morbidity and mortality.
Clinical Therapy

A sterile speculum examination is done to detect the presence of amniotic fluid in the vagina. If fluid is not obviously pooling, the diagnosis can be confirmed with nitrazine paper (which turns deep blue) and a microscopic examination (ferning test). Digital examination increases the risk of infection and is not recommended until a management plan has been determined.

Fetal well-being is assessed through a fetal heart rate tracing or biophysical profile. In addition, the gestational age of the fetus is calculated in order to decide on a management plan. The gestational age of the fetus and the presence or absence of infection determine the direction of treatment for PROM. If maternal signs and symptoms of infection are evident, antibiotic therapy (usually by intravenous infusion) is initiated immediately, and the fetus of infection are evident, antibiotic therapy (usually by intravenous infusion) is initiated immediately, and the fetus is born vaginally or by cesarean regardless of the gestational age. Prophylactic antibiotics are often administered for the first 48 hours while awaiting culture results. Upon admission to the nursery, the newborn is assessed for sepsis and placed on antibiotics. (Chapter 28 provides further information about the newborn with sepsis.)

Management of PROM in the absence of infection and gestation of less than 37 weeks is usually conservative. The woman is hospitalized on bed rest. On admission, complete blood cell count (CBC), C-reactive protein, and urinalysis are obtained. Continuous electronic fetal monitoring may be ordered at the beginning of treatment but usually is discontinued after a few hours, unless the fetus is estimated to be very low birth weight (VLBW). Regular nonstress tests (NSTs) or biophysical profiles are used to monitor fetal well-being. (These tests are discussed in Chapter 16.) 

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Maternal blood pressure, pulse, and temperature and fetal heart rate (FHR) are assessed every 4 hours. Regular laboratory evaluations are done to detect maternal infection. Vaginal exams are avoided to decrease the chance of infection. As the gestation approaches 34 weeks, fetal lung maturity studies are indicated (see Chapter 16).

Although controversial, after initial treatment and observation, if leaking of fluid ceases, some women (typically those with sufficient amniotic fluid, no infection, and cervical dilatation less than 4 cm) may be followed at home. The woman is advised to continue bed rest (with bathroom privileges), monitor her temperature and pulse four times a day, keep a fetal movement chart, and have weekly NSTs. She is advised to contact her physician and return to the hospital if she has fever, uterine tenderness or contractions, increased leakage of fluid, decreased fetal movement, or foul-smelling vaginal discharge.

Maternal corticosteroid administration to promote fetal lung maturity and prevent respiratory distress syndrome remains controversial because of possible adverse effects on the fetus and mother. Currently a single dose of betamethasone is recommended for women with PROM prior to 30 to 32 weeks’ gestation, if there is no intra-amniotic infection (see Drug Guide: Betamethasone). Repeat courses of corticosteroids should not be routinely used (National Institutes of Health [NIH] Consensus Development Panel, 2001).

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Nursing Assessment and Diagnosis

Determining the duration of the rupture of the membranes is a significant component of the intrapartal assessment. The nurse asks the woman when her membranes ruptured and when labor began, because the risk of infection may be directly related to the time involved. Gestational age is determined to prepare for the possibility of a preterm birth. The nurse observes the mother for signs and symptoms of infection, especially by reviewing her white blood cell (WBC) count, temperature, pulse rate, and the character of her amniotic fluid. If the mother has a fever, hydration status should be checked. When a preterm or cesarean birth is anticipated, the nurse evaluates the childbirth preparation and coping abilities of the woman and her partner.

Nursing diagnoses that may apply to a woman with PROM include the following:

- Risk for Infection related to premature rupture of membranes
- Impaired Gas Exchange in the fetus related to compression of the umbilical cord secondary to prolapse of the cord
- Risk for Ineffective Individual Coping related to unknown outcome of the pregnancy

Nursing Plan and Implementation

Nursing actions should focus on the woman, her partner, and the fetus. The nurse monitors for and reports signs of infection to the certified nurse-midwife or physician. Uterine activity and fetal response to the labor are evaluated, but vaginal exams are not done unless absolutely necessary. The woman is encouraged to rest on her left side to promote optimal uteroplacental perfusion. Comfort measures may help promote rest and relaxation. The nurse must also ensure that hydration is maintained, particularly if the woman’s temperature is elevated.

Education is another important aspect of nursing care. The woman and her partner, if he is involved, need to understand the implications of PROM and all treatment methods.
TeachingTip

To help a laboring woman and her family understand how the amniotic membranes provide protection, use a color chart that shows a side view of the fetus in the uterus with the membranes intact. Ask the couple to visualize what would happen if the membranes rupture. They will be able to see that pathogens have direct access to the uterus, increasing the risk of infection. They will also see that, when the membranes rupture and the fluid escapes, the cord could “wash out” with the fluid and become trapped between the pelvis and fetal head, causing cord compression.

It is important to address side effects and alternative treatments. The couple needs to know that although the membranes are ruptured, amniotic fluid continues to be produced.

Providing psychologic support for the couple is critical. The nurse may reduce anxiety by listening empathetically, relaying accurate information, and providing explanations of procedures. Preparing the couple for a cesarean birth, a preterm newborn, and the possibility of fetal or newborn demise may be necessary.

Evaluation

Expected outcomes of nursing care include the following:

- The woman’s risk of infection and cord prolapse decrease.
- The couple is able to discuss the implications of PROM and all treatments and alternative treatments.
- The pregnancy is maintained without trauma to the mother or fetus.

Overview of Maternal-Fetal Action

Studies have provided ample evidence that glucocorticoids such as betamethasone are capable of inducing pulmonary maturation and decreasing the incidence of respiratory distress syndrome in preterm infants. The mechanism by which corticosteroids accelerate fetal lung maturity is unclear, but it is related to the stimulation of enzyme activity by the drug. The enzyme is required for biosynthesis of surfactant by the type II pneumocytes. Surfactant is of major importance to the proper functioning of the lung in that it decreases the surface tension of the alveoli. Glucocorticoids also increase the rate of glycerogen depletion, which leads to thinning of the interalveolar septa and increases the size of the alveoli. The thinning of the epithelium brings the capillaries into closer proximity with the air spaces and improves oxygen exchange.

Route, Dosage, Frequency

Prenatal maternal intramuscular injections of 12 mg of betamethasone are given once a day for 2 days. Dexamethasone may also be given in doses of 6 mg every 12 hours for four doses (NIH Consensus Development Panel, 2001). To obtain maximum results, birth should be delayed for at least 24 hours after completing the first round of treatment. The effect of corticosteroids may be transient. Currently, it is suggested that repeat courses of corticosteroids should not be used routinely.

Contraindications

Inability to delay birth
Adequate L/S ratio
Presence of a condition that necessitates immediate birth (e.g., maternal bleeding)
Presence of maternal infection, diabetes mellitus (relative contraindication)
Gestational age greater than 34 completed weeks

Maternal Side Effects

Increased risk for infection has not been supported in large studies. There may, however, be some increase in the incidence of infection in women with premature rupture of the membranes. Maternal hyperglycemia may occur during corticosteroid administration. Insulin-dependent diabetics may require insulin infusions for several days to prevent ketoacidosis. Corticosteroids possibly may increase the risk of pulmonary edema, especially when used concurrently with tocolytics (Lams, 2002; NIH Consensus Development Panel, 2001).

Effects on Fetus/Newborn

Lowered cortisol levels at birth, but rebound occurs by 2 hours of age
Hypoglycemia
Increased risk of neonatal sepsis

Animal studies have shown serious fetal side effects such as reduced head circumference, reduced weight of the fetal adrenal and thymus glands, and decreased placental weight. Human studies have not shown these effects, however.

Nursing Considerations

Assess for presence of contraindications.
Provide education regarding possible side effects.
Administer betamethasone deep into gluteal muscle, avoiding injection into deltoid (high incidence of local atrophy) (Dexamethasone may be administered IM or IV.)
Periodically evaluate BP, pulse, weight, and edema.
Assess lab data for electrolytes and blood glucose.

Although concomitant use of betamethasone and tocolytic agents has been implicated in increased risk of pulmonary edema, the betamethasone has little mineral corticoid activity; therefore, it probably doesn’t add significantly to the salt and water retention effects of beta-adrenergic agonists. Other causes of noncardiogenic pulmonary edema should also be investigated if pulmonary edema develops during administration of betamethasone to a woman in preterm labor.
Care of the Woman at Risk Due to Preterm Labor

Labor that occurs between 20 and 37 completed weeks of pregnancy is called preterm labor (PTL). Prematurity continues to be the number-one perinatal and neonatal problem in the United States, with 11.6% of all live births occurring prematurely (March of Dimes Birth Defects Foundation, 2003). Often PTL is related to multiple risk factors; only rarely is there a single cause. Table 15–1 presents a list of risk factors for spontaneous preterm labor.

Maternal implications of PTL include psychologic stress related to the baby’s condition and physiologic stress related to medical treatment for preterm labor.

Fetal-neonatal implications include increased morbidity and mortality, especially due to respiratory distress syndrome (RDS), increased risk of trauma during birth, and maturational deficiencies (fat storage, heat regulation, immaturity of organ systems).

Clinical Therapy

Women who are at risk for PTL are taught to recognize the symptoms associated with preterm labor and, if any symptoms are present, to notify their certified nurse-midwife or physician immediately. Prompt diagnosis is necessary to stop preterm labor before it progresses to the point at which intervention will be ineffective.

Prompt diagnosis of PTL is often difficult because many of the symptoms are common in normal pregnancy. Research suggests that the strongest predictors of preterm birth include the following: cervicovaginal fibronectin, abnormal cervical length on ultrasound, history of previous preterm birth, and the presence of bacterial vaginosis infection (discussed later in this chapter) (Iams, 2002).

Fetal fibronectin (fFN) is a protein normally found in the fetal membranes and decidua. It is found in the cervicovaginal fluid in early pregnancy but is not usually present in significant quantities between 22 and 37 weeks’ gestation (Iams, 2002). A positive fFN test (fFN found in the cervicovaginal fluid) during this time puts the woman at increased risk for preterm birth. Conversely, a negative fFN in a woman with preterm contractions is associated with a very low risk of birth within 7 days (Giles, Bisits, Knox, et al., 2000). The test is over 99% accurate for predicting no preterm birth within 7 days. The procedure for collecting a sample is similar to that of the Pap smear; results can be available within 1 hour.

The length of the cervix can be measured fairly reliably after 16 weeks’ gestation using an ultrasound probe inserted into the vagina. A cervix that is shorter than expected may be useful in assisting a physician to identify the need for a cerclage to prevent preterm birth because of incompetent cervix. In general, cervical length less than 25 mm prior to term is abnormal (American Academy of Pediatrics [AAP] & ACOG, 2002).

Diagnosis of preterm labor is confirmed if the pregnancy is between 20 and 37 weeks, there are documented uterine contractions (four in 20 minutes or eight in 1 hour), and documented cervical change or cervical dilatation of greater than 1 cm or cervical effacement of 80% or more (AAP & ACOG, 2002).

Labor is not interrupted if one or more of the following conditions are present: severe preeclampsia or eclampsia, chorioamnionitis, hemorrhage, maternal cardiac disease, poorly controlled diabetes mellitus or thyroidosis, severe abruptio placentae, fetal anomalies incompatible with life, fetal death, nonreassuring fetal status, or fetal maturity.

The goal of clinical therapy is to prevent preterm labor from advancing to the point that it no longer responds to medical treatment. The initial management of preterm labor is directed toward maintaining good uterine blood flow, detecting uterine contractions, and quieting the fetus. The mother is asked to lie on her side to increase placental profusion, an IV infusion is started to promote maternal hydration, and maternal laboratory studies including CBC, C-reactive protein, vaginal cultures, and urine culture are completed.

Tocolysis is the use of medications in an attempt to stop labor. Drugs currently used as tocolytics include the β-adrenergic agonists (also called β-mimetics), magnesium

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**Table 15–1**

Risk Factors for Spontaneous Preterm Labor

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Clinical Significance</th>
</tr>
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<tbody>
<tr>
<td>Multiple gestation</td>
<td>Cervical shortening &lt; 1 cm</td>
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<tr>
<td>DES exposure</td>
<td>Uterine irritability</td>
</tr>
<tr>
<td>Known cervical incompetence</td>
<td>Age (&lt; 18 or &gt; 35)</td>
</tr>
<tr>
<td>Polyhydramnios</td>
<td>Low socioeconomic status</td>
</tr>
<tr>
<td>Uterine anomaly</td>
<td>Cigarettes—more than 10/day</td>
</tr>
<tr>
<td>Cervix dilated &gt; 1 cm at 32 weeks</td>
<td>Substance abuse</td>
</tr>
<tr>
<td>Second-trimester abortion</td>
<td>Low maternal weight</td>
</tr>
<tr>
<td>Fetal abnormality</td>
<td>Poor weight gain</td>
</tr>
<tr>
<td>Febrile illness</td>
<td>More than 2 first-trimester abortions</td>
</tr>
<tr>
<td>Bleeding after 12 weeks</td>
<td>Non-white race</td>
</tr>
<tr>
<td>History of pyelonephritis or other</td>
<td>Cervical cerclage in situ</td>
</tr>
<tr>
<td>maternal infection</td>
<td>In vitro fertilization (singleton or multiple gestation)</td>
</tr>
<tr>
<td>Maternal medical disease</td>
<td>STD (trichomoniasis, chlamydia)</td>
</tr>
<tr>
<td>Previous preterm birth</td>
<td>Anemia</td>
</tr>
<tr>
<td>Previous preterm labor with term birth</td>
<td>Abdominal trauma</td>
</tr>
<tr>
<td>Abdominal surgery during second or third trimester</td>
<td>Foreign body (IUD)</td>
</tr>
<tr>
<td>History of cone biopsy</td>
<td>Bacterial vaginosis, E. coli (ascending intrauterine infection)</td>
</tr>
<tr>
<td>Uteroaplacental ischemia</td>
<td>Periodontal disease</td>
</tr>
<tr>
<td>Stress</td>
<td>Inadequate prenatal care</td>
</tr>
</tbody>
</table>
**Pregnancy Risk Category: B**

**Overview of Obstetric Action**
Magnesium sulfate acts as a CNS depressant by decreasing the quantity of acetylcholine released by motor nerve impulses and thereby blocking neuromuscular transmission. This action reduces the possibility of convulsion, which is why magnesium sulfate is used in the treatment of preeclampsia. Because magnesium sulfate secondarily relaxes smooth muscle, it may decrease the blood pressure, although it is not considered an antihypertensive. Magnesium sulfate may also decrease the frequency and intensity of uterine contractions; as a result it is also used as a tocolytic in the treatment of preterm labor.

**Route, Dosage, Frequency**
Magnesium sulfate is generally given intravenously to control dosage more accurately and prevent overdosage. An occasional physician still prescribes intramuscular administration. However, it is painful and irritating to the tissues and does not permit the close control that IV administration does. The intravenous route allows for immediate onset of action. It must be given by infusion pump for accurate dosage.

**For Treatment of Preterm Labor**
Loading dose: 4–6 g magnesium sulfate in 100 mL solution administered over a 15- to 20-minute period (Cunningham et al., 2001).
Maintenance dose: 1–4 g/hr via infusion pump.

**For Treatment of Preeclampsia**
Loading dose: 6 g magnesium sulfate is administered over a 20-minute period.
Maintenance dose: 2 g/hr via infusion pump (Sibai, 2002).
Note: Magnesium sulfate is excreted via the kidneys. Because women in preterm labor typically have normal renal function, they generally require higher levels of magnesium to achieve a therapeutic range than women who have preeclampsia and may have compromised renal function. Maintenance dose may need to be adjusted based on serum magnesium levels.

**Maternal Contraindications**
Diagnosed maternal myasthenia gravis is the only absolute contraindication to the administration of magnesium sulfate. A history of myocardial damage or heart block is a relative contraindication to use of the drug because of the effects on nerve transmission and muscle contractility. Extreme care is necessary in administration to women with impaired renal function because the drug is eliminated by the kidneys, and toxic magnesium levels may develop quickly.

**Maternal Side Effects**
Most maternal side effects are dose related. Lethargy and weakness related to neuromuscular blockade are common. Sweating, a feeling of warmth, flushing, and nasal congestion may be related to peripheral vasodilation. Other common side effects include nausea and vomiting, constipation, visual blurring, headache, and slurred speech. Signs of developing toxicity include depression or absence of reflexes, oliguria, confusion, respiratory depression, circulatory collapse, and respiratory paralysis. Rapid administration of large doses may cause cardiac arrest.

**Effects on Fetus/Neonate**
The drug readily crosses the placenta. Some authorities suggest that transient decrease in FHR variability may occur; others report that no change occurred. In general, magnesium sulfate therapy does not pose a risk to the fetus. Occasionally, the newborn may demonstrate neurologic depression or respiratory depression, loss of reflexes, and muscle weakness. Ill effects in the newborn may actually be related to fetal growth retardation, prematurity, or perinatal asphyxia.

**Nursing Considerations**
1. Monitor the blood pressure closely during administration.
2. Monitor maternal serum magnesium levels as ordered (usually every 6–8 hours). Therapeutic levels are in the range of 4.8–9.6 mg/dL. Reflexes often disappear at serum magnesium levels of 8–12 mg/dL; respiratory depression occurs at levels of 15–17 mg/dL; cardiac arrest occurs at levels above 30 mg/dL (Sibai, 2002).
3. Monitor respirations closely. If the rate is less than 12/minute, magnesium toxicity may be developing, and further assessments are indicated. Many protocols require stopping the medication if the respiratory rate falls below 12/minute.
4. Assess knee jerk (patellar tendon reflex) for evidence of diminished or absent reflexes. Loss of reflexes is often the first sign of developing toxicity. Also note marked lethargy or decreased level of consciousness and hypotension.
5. Determine urinary output. Output less than 30 mL/hr may result in the accumulation of toxic levels of magnesium.
6. If there are respiratory or urinary output fall below specified levels or if the reflexes are diminished or absent, no further magnesium should be administered until these factors return to normal.
7. The antagonist of magnesium sulfate is calcium. Consequently, an ampule of calcium gluconate should be available at the bedside. The usual dose is 1 g given IV over a period of about 3 minutes.
8. Monitor fetal heart tones continuously with IV administration.
9. Continue magnesium sulfate infusion for approximately 24 hours after birth as prophylaxis against postpartum seizures if given for preeclampsia.
10. If the mother has received magnesium sulfate close to birth, the newborn should be closely observed for signs of magnesium toxicity for 24–48 hours.

Note: Protocols for magnesium sulfate administration may vary somewhat according to agency policy. Consequently, individuals are referred to their own agency protocols for specific guidelines.

Magnesium Sulfate

*Commonly used tocolytics include β-mimetics (ritodrine [Yutopar] and terbutaline sulfate [Brethine]) and magnesium sulfate are the most widely used tocolytics. Ritodrine is approved by the U.S. Food and Drug Administration (FDA) for tocolysis; however, it is used less frequently than terbutaline, which is not approved by the FDA for this use. Although tocolytic drugs suppress uterine contractions and allow pregnancy to continue, they may cause maternal side effects; the most serious is maternal pulmonary edema.*
Reducing the dose and duration of therapy sometimes reduces the side effects.

Because it is effective and has fewer side effects than the \( \beta \)-mimetics, magnesium sulfate administered intravenously is often the initial drug of choice for therapy. Therapy with magnesium sulfate is indicated in women with cardiopulmonary disease, diabetes, or infection. In all other cases, the selection of magnesium sulfate or \( \beta \)-mimetics depends on the experience of the healthcare providers. For magnesium sulfate, the recommended loading dose is 4 to 6 g IV in 100 mL of IV fluid using an infusion pump over 15 to 20 minutes, followed by a maintenance dose of 1 to 4 g/hr titrated to response and side effects (Cunningham et al., 2001). The therapy is continued for 12 to 24 hours at the lowest rate that maintains cessation of contractions.

Side effects with the loading dose may include flushing, a feeling of warmth, headache, nystagmus, nausea, and dizziness. Other side effects include lethargy, sluggishness, and pulmonary edema (see Drug Guide: Magnesium Sulfate). Fetal side effects may include hypotonia and lethargy that persists for 1 or 2 days following birth.

One calcium channel blocker, nifedipine, is becoming increasingly popular as a tocolytic because it is easily administered orally or sublingually and has few serious maternal side effects. It decreases smooth muscle contractions by blocking the slow calcium channels at the cell surface. The most common side effects are related to arterial vasodilation and include hypotension, tachycardia, facial flushing, and headache. Nifedipine may be coadministered with the \( \beta \)-mimetics. However, it should not be used with magnesium because both drugs block calcium and simultaneous administration has been implicated in serious maternal side effects related to low calcium levels.

Prostaglandin synthesis inhibitors (PSIs) such as indomethacin (Indocin) are used for tocolysis in selected instances. However, potential fetal side effects, such as constriction of the ductus arteriosus, have been reported, especially in pregnancies at 32 weeks’ gestation and beyond. Consequently, indomethacin use is limited to pregnancies less than 32 weeks’ gestation; the duration of therapy should be less than 72 hours, if possible (Vermillion & Scardo, 2000).

The National Institutes of Health Consensus Development Panel (2001) recommends that corticosteroids (typically betamethasone or dexamethasone) be administered antenatally to women at risk for preterm birth because of their beneficial effect on fetal lung maturation. Women who are candidates for tocolysis are candidates for antenatal corticosteroids, regardless of fetal gender, race, or availability of surfactant therapy for the newborn, especially between 24 and 34 weeks’ gestation. (See Drug Guide: Betamethasone.)

Recent research trials have shown that progesterone therapy may be effective in reducing the incidence of preterm birth, at least in certain high-risk populations (Da Fonseca, Bittar, Carvalho, & Zugaib, 2003; Meis, Klebanoff, Thom et al., 2003). Currently experts are evaluating whether this therapy should become an accepted part of clinical practice.

### Nursing Care Management

#### Nursing Assessment and Diagnosis

During the antepartal period, the nurse identifies the woman at risk for preterm labor by noting the presence of predisposing factors. During the intrapartal period, the nurse assesses the progress of labor and the physiologic impact of labor on the mother and fetus.

Nursing diagnoses that may apply to the woman with preterm labor include the following:

- Fear related to risk of early labor and birth
- Ineffective Individual Coping related to need for constant attention to pregnancy

#### Nursing Plan and Implementation

##### Community-Based Nursing Care

Once the woman at risk for preterm labor has been identified, she needs to be taught about the importance of recognizing the onset of labor (see Client Teaching: Preterm Labor). This teaching is often provided by clinic nurses or home care nurses.

Home uterine activity monitoring transmitted by telemetry to review stations combined with daily telephone calls from a nurse to offer support and advice remains a common approach to care following discharge. However, research does not support its effectiveness in preventing preterm birth. Periodic home visits by a home care nurse are also a common part of care. During these visits the nurse completes physical assessments similar to those done in the hospital and assesses the woman’s emotional state. The nurse can also provide information about support groups and other community resources for women at risk for preterm birth.

Increasing the woman’s awareness of the signs and symptoms of preterm labor is one of the most important teaching objectives of the nurse. These include the following:

- Uterine contractions that occur every 10 minutes or less, with or without pain
- Mild menstrual-like cramps felt low in the abdomen
- Constant or intermittent feelings of pelvic pressure that feel like the baby pressing down
- Rupture of membranes
- Constant or intermittent low, dull backache
A change in the vaginal discharge (an increase in amount, a change to more clear and watery, or a pinkish tinge)

Abdominal cramping with or without diarrhea

The woman is also taught to evaluate contraction activity once or twice a day. She does so by lying down tilted to one side with a pillow behind her back for support. The woman places her fingertips on the fundus of the uterus, which is above the umbilicus (navel). She checks for contractions (hardening or tightening in the uterus) for about 1 hour. It is important for the pregnant woman to know that uterine contractions occur occasionally throughout the pregnancy. If they occur every 10 minutes for 1 hour, however, the cervix could begin to dilate, and labor could ensue.

The nurse ensures that the woman knows when to report signs and symptoms. If contractions occur every 10 minutes (or more frequently) for 1 hour, if any of the other signs and symptoms are present for 1 hour, or if clear fluid begins leaking from the vagina, the woman should telephone her physician or certified nurse-midwife, clinic, or hospital birthing unit and make arrangements to be checked for ongoing labor. Caregivers need to be aware that the woman’s call must be taken seriously. When a woman is at risk for preterm labor, she may have many episodes of contractions and other signs or symptoms. If she is treated positively, she will feel freer to report problems as they arise.

Preventive self-care measures are also important. The nurse has a vital role in communicating the self-care measures described in Table 15–2.

### Table 15–2

<table>
<thead>
<tr>
<th>Self-Care Measures to Prevent Preterm Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rest two or three times a day lying on your left side.</td>
</tr>
<tr>
<td>• Drink 2 to 3 quarts of water or fruit juice each day. Avoid caffeine drinks. Filling a quart container and drinking from it will eliminate the need to keep track of numerous glasses of fluid.</td>
</tr>
<tr>
<td>• Empty your bladder at least every 2 hours during waking hours.</td>
</tr>
<tr>
<td>• Avoid lifting heavy objects. If small children are in the home, work out alternatives for picking them up, such as sitting on a chair and having them climb on your lap.</td>
</tr>
<tr>
<td>• Avoid prenatal breast preparation such as nipple rolling or rubbing nipples with a towel. This is not meant to discourage breastfeeding but to avoid the potential increase in uterine irritability.</td>
</tr>
<tr>
<td>• Pace necessary activities to avoid overexertion.</td>
</tr>
<tr>
<td>• Sexual activity may need to be curtailed or eliminated.</td>
</tr>
<tr>
<td>• Find pleasurable ways to help compensate for limitations of activities and boost the spirits.</td>
</tr>
<tr>
<td>• Try to focus on 1 day or 1 week at a time rather than on longer periods of time.</td>
</tr>
<tr>
<td>• If on bed rest, get dressed each day and rest on a couch rather than becoming isolated in the bedroom.</td>
</tr>
</tbody>
</table>

Source: Prepared in consultation with Susan Bennett, RN, ACCE, Coordinator of the Prematurity Prevention Program.
Evidence-Based Practice

Preterm Birth Prevention

Clinical Question
How can the nurse provide education, monitoring, and intervention for the prevention of preterm birth?

The Evidence
The Institute for Clinical Systems Improvement assembled an expert team of physicians and advanced practice nurses to review the literature and develop recommendations for the prevention of preterm birth. The group developed a clinical practice algorithm supported by annotated recommendations and research references. The evidence revealed that only 50% of women who give birth prematurely come from identified high-risk groups. As a result, these recommendations focus on education and intervention to mediate risk factors in all pregnant women as opposed to weighted risk assessment.

What Is Effective?
Early confirmation of pregnancy is desirable because it allows for early mediation of risk factors for preterm birth. Risk status should be monitored at each prenatal visit. Manageable or modifiable risk factors should be identified, and interventions applied to reduce or remove those that can be changed. Modifiable risk factors include family stress, domestic abuse, tobacco and alcohol use, sexually transmitted infections, and poor nutritional status. Women should be educated about these risk factors during early prenatal visits, and changes in status should be monitored. Nonmodifiable risk factors should also be monitored, including previous preterm birth, multiple gestation, inflammation, decidual hemorrhage, and pathologic distention of the uterus. Maternal illnesses associated with preterm birth (e.g., hypertension, diabetes, cardiac and renal disease) should be managed effectively. The warning signs of preterm labor should be reviewed at each prenatal visit so that early intervention is possible.

What Is Unclear?
Most of the studies associated inadequate weight gain with an increased risk of preterm labor. A slower weight gain, even in the third trimester, may also be a risk factor. The specific level of weight gain that reflects a risk, and its timing, is less clear. More research is needed to determine exactly which weight gain patterns are most indicative of increased risk.

Best Practice
All women should be educated about the risk factors associated with preterm labor. You should counsel women with modifiable risk factors about the potential for early labor, and suggest ways to minimize their risk. All women should be educated to note the warning signs of preterm labor and advised to contact their provider as soon as possible if they suspect early onset of labor.

Critical Thinking
How can you help women modify risk factors that are behavior or lifestyle based? What teaching plan will help you educate women to differentiate signs of preterm labor from those expected in a normal pregnancy?

Reference

Hospital-Based Nursing Care
Supportive nursing care is important to the woman in preterm labor during hospitalization. This care consists of promoting bed rest, monitoring vital signs (especially blood pressure and respirations), measuring intake and output, and continuous monitoring of FHR and uterine contractions. Placing the woman on her left side facilitates maternal-fetal circulation. Vaginal examinations are kept to a minimum. If tocolytic agents are being used, the nurse administers them and closely monitors the mother and fetus for any adverse effects.

Whether preterm labor is arrested or proceeds, the woman and her partner, if he is involved, experience intense psychologic stress. Decreasing the anxiety associated with the risk of a preterm newborn by providing emotional support is a primary aim of the nurse. The nurse also recognizes the stress of prolonged bed rest and of lack of sexual contact and helps the couple find satisfactory ways of dealing with those stresses. With empathetic communication, the nurse can assist the couple to express their feelings, which commonly include guilt and anxiety, thereby helping the couple identify and implement coping mechanisms. The nurse also keeps the couple informed about the labor progress, the treatment regimen, and the status of the fetus. In the event of imminent vaginal or cesarean birth, the couple should be offered brief but ongoing explanations to prepare them for the actual birth process and the events following the birth.

Evaluation
Expected outcomes of nursing care include the following:

● The woman is able to discuss the cause, identification, and treatment of preterm labor.

● The woman states that she feels comfortable in her ability to cope with her situation and has resources available to her.

● The woman can describe appropriate self-care measures and can identify characteristics that need to be reported to her caregiver.

● The woman successfully gives birth to a healthy infant.
Care of the Woman with a Hypertensive Disorder

A number of hypertensive disorders can occur during pregnancy. Various attempts have been made to classify these disorders. The following classification is recommended by the National Institutes of Health (NIH) (2000):

- Preeclampsia-eclampsia
- Chronic hypertension
- Chronic hypertension with superimposed preeclampsia or eclampsia
- Gestational (or transient) hypertension

Preeclampsia and Eclampsia

Preeclampsia, the most common hypertensive disorder in pregnancy, occurs in 3% to 7% of nulliparas and 0.8% to 5% of multiparas (Sibai, 2002). It is defined as an increase in blood pressure after 20 weeks’ gestation accompanied by proteinuria. Previously edema was included in the definition but was removed because it is such a common finding in pregnancy. However, sudden onset of severe edema warrants close evaluation to rule out preeclampsia or other pathologic processes such as renal disease (Higgins & deSwiet, 2001).

Preeclampsia, typically categorized as mild or severe, is a progressive disorder. In its most severe form, eclampsia, generalized seizures or coma develop. Most often preeclampsia is seen in the last 10 weeks of gestation, during labor, or in the first 48 hours after childbirth. Although birth of the fetus and removal of the placenta is the only known cure for preeclampsia, it can be controlled with early diagnosis and careful management. Preeclampsia is seen more often in teenagers and in women over age 35, especially if they are primigravida. Women with a history of preeclampsia are at increased risk, as are women with a large placental mass associated with multiple gestation, GTD, Rh incompatibility, and diabetes mellitus.

Pathophysiology of Preeclampsia

The exact cause of preeclampsia-eclampsia remains unknown, despite decades of research. Preeclampsia affects all the major systems of the body. The following pathophysiologic changes are associated with the disease.

- In normal pregnancy, the lowered peripheral vascular resistance and the increased maternal resistance to the pressor effects of angiotensin II result in lowered blood pressure. In preeclampsia, blood pressure begins to rise after 20 weeks’ gestation, probably in response to a gradual loss of resistance to angiotensin II. This response has been linked to the ratio between the prostaglandins prostacyclin and thromboxane. Prostacyclin is a potent vasodilator. It is decreased in preeclampsia, often several weeks before symptoms develop. This changes the ratio between the two prostaglandins, allowing the potent vasoconstriction and platelet-aggregating effects of thromboxane to dominate. These hormones are produced partially by the placenta, which would help explain the reversal of the condition when the placenta is removed and why the incidence is increased when there is a larger than normal placental mass.
- In addition, nitric oxide, a potent vasodilator, plays a role in the pregnant woman’s resistance to vasopressors. Decreased nitric oxide production in women with preeclampsia may contribute to the development of hypertension.
- The loss of normal vasodilation of uterine arterioles and the concurrent maternal vasospasm result in decreased placental perfusion. The effect on the fetus may be growth restriction, decrease in fetal movement, and chronic hypoxia or nonreassuring fetal status.
- In preeclampsia, normal renal perfusion is decreased. With a reduction of the glomerular filtration rate (GFR), serum levels of creatinine, BUN, and uric acid begin to rise from normal pregnant levels, while urine output decreases. Sodium is retained in increased amounts, which results in increased extracellular volume, increased sensitivity to angiotensin II, and edema. Stretching of the capillary walls of the glomerular endothelial cells allows the large protein molecules, primarily albumin, to escape in the urine, decreasing serum albumin levels. The decreased serum albumin concentration causes decreased plasma colloid osmotic pressure. This lowered pressure results in a further movement of fluid to the extracellular spaces, which also contributes to the development of edema.
- The decreased intravascular volume causes increased viscosity of the blood and a corresponding rise in hematocrit.

HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count) is sometimes associated with severe preeclampsia. Women who experience this multiple-organ-failure syndrome have high morbidity and mortality rates, as do their offspring.

The hemolysis that occurs is termed microangiopathic hemolytic anemia. It is thought that red blood cells are distorted or fragmented during passage through small, damaged blood vessels. Elevated liver enzymes occur from blood flow that is obstructed by fibrin deposits. Hyperbilirubinemia and jaundice may also be seen. Liver distention causes epigastric pain. Thrombocytopenia (platelet count less than 100,000/mm³) is a frequent finding in preeclampsia. It occurs when platelets aggregate at the sites
of vascular damage associated with vasospasm. Symptoms may include nausea, vomiting, flulike symptoms, or epigastric pain. HELLP syndrome is sometimes complicated by disseminated intravascular coagulation (DIC). See the discussion on DIC on p. 000.

Women with HELLP syndrome are best cared for in a tertiary care center. Initially the mother’s condition should be assessed and stabilized, especially if her platelet counts are very low. The fetus is also assessed, using a nonstress test and biophysical profile. Once HELLP syndrome is diagnosed and the woman’s condition is stable, expeditious birth of the child is indicated regardless of gestational age.

### Maternal Risks

Central nervous system changes associated with preeclampsia are hyperreflexia, headache, and seizures. Hyperreflexia may be due to increased intracellular sodium and decreased intracellular potassium levels. Cerebral vasospasm causes headaches, and cerebral edema and vasoconstriction are responsible for seizures.

Women with severe preeclampsia or eclampsia are at increased risk for renal failure, abruptio placenta, DIC, ruptured liver, and pulmonary embolism.

### Fetal-Neonatal Risks

Infants of women with preeclampsia tend to be small for gestational age (SGA). The cause is related specifically to maternal vasospasm and hypovolemia, which result in fetal hypoxia and malnutrition. In addition, the neonate may be premature because of the necessity for early birth.

At birth, the newborn may be oversedated because of medications administered to the mother. The newborn may also have hypermagnesemia due to treatment of the woman with large doses of magnesium sulfate.

### Clinical Therapy

The goals of medical management are prompt diagnosis of the disease; prevention of cerebral hemorrhage, seizures, hematologic complications, and renal and hepatic diseases; and birth of an uncompromised newborn as close to term as possible. Reduction of elevated blood pressure is essential in accomplishing these goals.

### Clinical Manifestations and Diagnosis

#### Mild preeclampsia

Women with mild preeclampsia may exhibit few if any symptoms. The blood pressure is elevated to 140/90 mm Hg or higher. (Note: Previously it had been recommended that an increase in blood pressure of 30 mm Hg systolic and 15 mm Hg diastolic be used as a diagnostic criterion. However, that finding is no longer used because it has been found that, in the absence of other symptoms, women in this group are not likely to suffer adverse outcomes.)

With mild preeclampsia, proteinuria is generally between 300 mg/L (1+ dipstick) and 1 g/L (2+ dipstick).

Although edema is no longer considered a diagnostic criterion, generalized edema, seen as puffy face or hands, and in dependent areas such as the ankles, may be present. Edema is identified by a weight gain of more than 3.3 lb (1.5 kg) per month in the second trimester or more than 1.1 lb (0.5 kg) per week in the third trimester. Edema is assessed on a 1+ to 4+ scale.

#### Severe preeclampsia

Severe preeclampsia may develop suddenly. Blood pressure is 160/110 mm Hg or higher on two occasions at least 6 hours apart while the woman is on bed rest. Proteinuria ≥ 5 g is found in a 24-hour urine collection while a dipstick urine protein measurement is 3+ to 4+ on two random samples obtained at least 4 hours apart. Oliguria is present with urine output ≤ 500 mL in 24 hours. Other characteristic symptoms include visual or
cerebral disturbances (frontal headaches, blurred vision, scotomata [spots before the eyes]), cyanosis or pulmonary edema, epigastric or right upper quadrant pain, impaired liver function, thrombocytopenia or evidence of hemolysis or both, and intrauterine fetal growth restriction (AAP & ACOG, 2002). Other signs or symptoms that may be present include nausea, vomiting, irritability, hyperreflexia, and retinal edema (retinas appear wet and glistening), with narrowed segments on the retinal arterioles when examined with an ophthalmoscope. Epigastric pain is often the sign of impending convulsion and is thought to be caused by increased vascular engorgement of the liver.

**Eclampsia.** Eclampsia, characterized by a grand mal convolution or coma, may occur before the onset of labor, during labor, or early in the postpartal period. Some women experience only one seizure; others have several. Unless they occur quite frequently, the woman often regains consciousness between seizures.

**Antepartal Management**

The clinical therapy for preeclampsia depends on the severity of the disease.

**Home care of mild preeclampsia.** In general, women with preeclampsia are admitted to the hospital. However, for some women with mild preeclampsia, home care is now an option. The woman monitors her blood pressure, weight, and urine protein daily. Weight gains of 1.4 kg (3 lb) in 24 hours or 1.8 kg (4 lb) in a 3-day period are generally cause for concern. Remote NSTs are performed on a daily to bi-weekly basis. Nursing contact varies from daily to weekly, depending on physician request. It is extremely important to advise the woman to report to the doctor if she develops signs of worsening preeclampsia.

**Hospital care of mild preeclampsia.** The woman is placed on bed rest, primarily on her left side, to decrease pressure on the vena cava, thereby increasing venous return, circulatory volume, and placental and renal perfusion. Improved renal blood flow helps decrease angiotensin II levels, promotes diuresis, and lowers blood pressure.

Diet should be well balanced and moderate to high in protein (80 to 100 g/day, or 1.5 g/kg/day) to replace protein lost in the urine. Sodium intake should be moderate, not to exceed 6 g/day. Excessively salty foods should be avoided, but sodium restriction and diuretics are no longer used in treating preeclampsia.

To achieve a safe outcome for the fetus, tests to evaluate fetal status are done more frequently as preeclampsia progresses. The following tests are used.

- Fetal movement record
- Nonstress test
- Ultrasonography every 3 or 4 weeks for serial determination of growth

**Severe preeclampsia.** If the uterine environment is considered detrimental to fetal well-being, birth may be the treatment of choice for both mother and fetus, even if the fetus is immature. Other medical therapies for severe preeclampsia include the following:

- Bed rest. Bed rest must be complete. Stimuli that may bring on a seizure should be reduced.
- Diet. A high-protein, moderate-sodium diet is given as long as the woman is alert and has no nausea or indication of impending seizure.
- Anticonvulsants. Magnesium sulfate is the treatment of choice for convulsions. Its depressant action on the central nervous system (CNS) reduces the possibility of seizure (see Drug Guide: Magnesium Sulfate).
- Fluid and electrolyte replacement. The goal of fluid intake is to achieve a balance between correcting hypovolemia and preventing circulatory overload. Fluid intake may be oral or supplemented with intravenous therapy. Intravenous fluids may be started “to keep lines open” in case they are needed for drug therapy even when oral intake is adequate. Electrolytes are replaced as indicated by daily serum electrolyte levels.
- Corticosteroids. Betamethasone or dexamethasone is often administered to the woman whose fetus has an immature lung profile. Corticosteroids may also have a beneficial effect in women with HELLP syndrome (Magann & Martin, 2000).
- Antihypertensives. Antihypertensive therapy is generally given for diastolic blood pressures of 105 to 110 mm Hg or higher. Hydralazine (Apresoline) is the antihypertensive medication most commonly used. It is generally administered in IV boluses. Methyldopa is often used for long-term control of mild to moderate hypertension in pregnancy because it is effective and has a well-documented safety record. Labetalol is used as a second-line IV drug, but should be avoided in women with asthma or congestive heart failure.

**Eclampsia.** An eclamptic seizure requires immediate, effective treatment. A bolus of 4 to 6 g magnesium sulfate is given intravenously over 5 minutes to control convulsions. A sedative such as diazepam or amobarbital is used only if the seizures are not controlled by magnesium sulfate. Dileantin may be used for seizure prevention. The lungs are auscultated for pulmonary edema. The woman is observed...
for circulatory and renal failure and signs of cerebral hemorrhage. Furosemide (Lasix) may be given for pulmonary edema; digitalis may be given for circulatory failure. Intake and output are monitored hourly.

The woman is observed for signs of labor. She is also checked every 15 minutes for evidence of vaginal bleeding and abdominal rigidity, which might indicate abruptio placentae. While she is comatose, she is positioned on her side with the side rails up.

Because of the severity of her condition, the woman is often cared for in an intensive care unit. Invasive hemodynamic monitoring of either central venous pressure (CVP) or pulmonary artery wedge pressure may be started using a Swan-Ganz catheter. When the condition of the woman and the fetus are stabilized, induction of labor is considered, because birth is the only known cure for preeclampsia. The woman and her partner should be given a careful explanation about her status and that of her unborn child and the treatment they are receiving. Plans for further treatment and for birth must be discussed with them.

**Intrapartal Management**

Labor may be induced by IV oxytocin when there is evidence of fetal maturity and cervical readiness. In severe cases, cesarean birth may be necessary even if the fetus is immature.

Assessment for signs of worsening preeclampsia continues. The woman may receive intravenous oxytocin and magnesium sulfate simultaneously. Infusion pumps should be used, and bags and tubing must be carefully labeled. Magnesium levels are assessed regularly.

Meperidine (Demerol) or fentanyl may be given intravenously for pain relief in labor. A pudendal block is often used for vaginal birth. An epidural block may be used if it is administered by a skilled anesthesiologist who is knowledgeable about preeclampsia.

Electronic fetal monitoring is used to assess fetal status continuously. Birth in the Sims’ or semisitting position should be considered. If the lithotomy position is used, a wedge should be placed under the right buttock to displace the uterus. The wedge should also be used if birth is by cesarean. Oxygen is administered to the woman during labor if the need is indicated by fetal response to the contractions.

A pediatrician or neonatal nurse practitioner must be available to care for the newborn at birth. This caregiver must be informed of all amounts and times of medication the woman has received during labor.

**Postpartum Management**

The woman with preeclampsia usually improves rapidly after giving birth, although seizures can still occur during the first 48 hours postpartum. When the hypertension is severe, the woman may continue to receive hydralazine or magnesium sulfate postpartially.

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**Nursing Care Management**

See Nursing Care Plan: A woman with Preeclampsia for information on nursing care.

**Nursing Assessment and Diagnosis**

Blood pressure is taken and recorded during each antepartal visit. If the blood pressure rises, or if the normal slight decrease in blood pressure expected between 8 and 28 weeks of pregnancy does not occur, the woman should be followed closely. The woman’s urine is checked for proteinuria at each visit.

If hospitalization becomes necessary, the nurse then assesses the following:

- **Blood pressure.** Blood pressure should be assessed every 1 to 4 hours, or more frequently if indicated by medication or other changes in the woman’s status.
- **Temperature.** Temperature should be taken every 4 hours, or every 2 hours if elevated.
- **Pulse and respirations.** Pulse rate and respirations should be determined along with blood pressure.
- **Fetal heart rate.** The fetal heart rate should be checked with the blood pressure or monitored continuously with the electronic fetal monitor if the situation indicates.
- **Urinary output.** Every voiding should be measured. The woman frequently has an indwelling catheter. In this case, urine output can be assessed hourly. Output should be 700 mL or greater in 24 hours, or at least 30 mL/hr.

**Hints for Practice**

The following factors may lead to errors in measuring blood pressure (BP).

Incorrect cuff size—a cuff that is too small results in a falsely elevated blood pressure, whereas one that is too large falsely lowers blood pressure.

Elevating the arm above the level of the heart, such as occurs when a woman lies on her left side using her right arm for a blood pressure measurement, will falsely lower the blood pressure 10 to 20 mm Hg.

Korotkoff’s phase—when blood pressure is checked during pregnancy, the disappearance of the sound (phase V) is the preferred indicator rather than the muffling of the sound (phase IV). Anxiety, exercise, and smoking can elevate blood pressure. Wait 10 minutes after the woman’s arrival to check a resting blood pressure.
Ingrid Fruehoff, a 36-year-old primigravida, is 34 weeks pregnant. Four days ago, during a routine prenatal visit, the nurse discovered that her blood pressure was elevated slightly, to 130/84. Normally, Ingrid’s blood pressure readings had been 118/74. She had gained 4 lb since her previous monthly visit. A trace level of protein was found with a dipstick urine. In addition, Ingrid reported experiencing some headaches over the previous few days that had not been relieved by Tylenol. The nurse explained to Ingrid the signs and symptoms of preeclampsia and encouraged her to call the clinic if her condition worsened over the next few days. She was sent home on bed rest and scheduled for a recheck in 4 days.

When Ingrid returns to the clinic today, she is admitted to the hospital with worsening preeclampsia. She is placed on complete bed rest. The nurse monitors her closely for signs of severe preeclampsia, which include hypertension, proteinuria, oliguria, cerebral or visual disturbances, pulmonary edema, epigastric pain, and sudden onset of severe edema. Ingrid is also observed for eclamptic seizure. Tests for fetal status, such as documentation of fetal movement, nonstress tests, biophysical profile, amniocentesis, and Doppler flow studies, are performed. The nurse reassures Ingrid that everything will be done to make her comfortable and ensure the well-being of her baby.

**Nursing Diagnosis #1**  
Deficient Fluid Volume related to fluid shift from intravascular to extravascular space secondary to vasospasm

**Client Goal**  
The signs and symptoms of preeclampsia will decrease.

**AEB:**
- Decreased blood pressure
- Decreased levels of protein in urine
- Deep tendon reflexes return to normal (2+)

**NURSING INTERVENTIONS**

1. Place client in the left lateral recumbent position.

2. Assess blood pressure every 1 to 4 hours as necessary.

3. Monitor urine for volume and proteinuria every shift or every hour per agency protocol.

4. Assess deep tendon reflexes and clonus.

5. Assess for edema.

**RATIONALES**

- **Rationale:** The left lateral recumbent position will decrease pressure on the vena cava thereby increasing venous return, circulatory volume, and placental and renal perfusion. Angiotensin II levels are decreased when there is improved renal blood flow, which helps to promote diuresis and lower blood pressure.

- **Rationale:** Frequent monitoring helps identify progression of the disorder and allows for early intervention to ensure maternal and fetal health and well-being.

- **Rationale:** These measures help to assess renal perfusion. Urinary output decreases when there is a reduction of the glomerular filtration rate. Urinary output that falls below 30 mL per hour or less than 700 mL in a 24-hour period should be reported. Normally urine does not contain protein. As the disorder worsens, the capillary walls of the glomerular endothelial cells stretch, allowing protein molecules to pass into the urine. Readings of 3+ and 4+ indicate loss of 5 g or more protein in 24 hours.

- **Rationale:** Hyperreflexia indicates central nervous system (CNS) irritability and may develop as preeclampsia worsens. Eliciting deep tendon reflexes provides information about CNS status and is also used to assess for magnesium sulfate toxicity. Reflexes are graded on a scale of 0 to 4+ using the deep tendon reflex rating scale (refer to Clinical Skill: Assessing Deep Tendon Reflexes and Clonus). A rating of 0 or no response is abnormal and occurs with high maternal serum magnesium levels. Clonus, an abnormal finding, indicates a more pronounced hyperreflexia secondary to marked CNS irritability.

- **Rationale:** Edema develops as fluid shifts from the intravascular to the extravascular spaces. Edema is assessed either by weight gain (more than 3.3 lb per month in the second trimester or more than 1.1 lb per week in the third trimester) or by assessing for pitting edema (assessed by using finger pressure to a swollen area, usually the lower extremities, and grading on a scale of 1+ to 4+).
### Nursing Interventions and Rationales

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Rationales</th>
</tr>
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<tbody>
<tr>
<td><strong>6.</strong> Administer magnesium sulfate per infusion pump as ordered.</td>
<td><strong>Rationale:</strong> As preeclampsia worsens, the risk of an eclamptic seizure increases. Magnesium sulfate is the treatment of choice for seizures because of its CNS depressant action. As a secondary effect, magnesium sulfate also relaxes smooth muscles and may therefore decrease the blood pressure.</td>
</tr>
<tr>
<td><strong>7.</strong> Assess for magnesium sulfate toxicity.</td>
<td><strong>Rationale:</strong> Side effects of magnesium sulfate are dose related. Therapeutic levels are in the range of 4.8 to 9.6 mg/dL. As maternal serum magnesium levels increase, toxicity may occur. Signs of toxicity include decreased or absent DTRs, urine output below 30 mL/hour, respirations below 12, and confusion.</td>
</tr>
<tr>
<td><strong>8.</strong> Provide a balanced diet that includes 80 to 100 g/day or 1.5 g/kg/day of protein.</td>
<td><strong>Rationale:</strong> A diet rich in protein is necessary to replace protein that is excreted in the urine. Sodium intake should be moderate but should not exceed 6 g/day.</td>
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</tbody>
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### Evaluation of Client Goal
- Blood pressure returns to client’s normal level.
- Urine protein levels are decreased to zero.
- Deep tendon reflexes remain at 2+ with no beats of clonus.

### Nursing Diagnosis #2
**Client Goal**
- The fetus will have adequate supply of oxygen and nutrients.
- No signs of fetal distress
- Fetal diagnostic tests within normal limits

### Nursing Interventions and Rationale

<table>
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<tr>
<th>Interventions</th>
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<tbody>
<tr>
<td><strong>1.</strong> Instruct woman to count fetal movements three times a day for 20 to 30 minutes, maintain a record of movement, and share the record with the nurse.</td>
<td><strong>Rationale:</strong> Fetal activity provides reassurance of fetal well-being. Decrease in fetal movement or cessation of movement may indicate fetal compromise.</td>
</tr>
<tr>
<td><strong>2.</strong> Encourage woman to rest in the left lateral recumbent position.</td>
<td><strong>Rationale:</strong> Lying in the left lateral recumbent position decreases pressure on the vena cava, which increases venous return, circulatory volume, and placental and renal perfusion. Blood flow to the fetus is increased, thereby reducing the risk of fetal hypoxia and malnutrition.</td>
</tr>
<tr>
<td><strong>3.</strong> Assist with serial ultrasounds.</td>
<td><strong>Rationale:</strong> Maternal vasospasm and hypovolemia result from preeclampsia, which may lead to a small-for-gestational-age newborn. Ultrasound provides assessment of fetal growth by measuring the biparietal diameter of the fetal head or the fetal femur length.</td>
</tr>
<tr>
<td><strong>4.</strong> Perform nonstress tests as ordered.</td>
<td><strong>Rationale:</strong> A nonstress test is performed to assess the fetal heart rate in response to fetal movement. Accelerations of fetal heart rate with fetal movement may indicate the fetus has adequate oxygenation and an intact central nervous system. (Refer to Chapter 16 for interpretation of NST results.)</td>
</tr>
<tr>
<td><strong>5.</strong> Describe for the woman the purposes of a biophysical profile (BPP).</td>
<td><strong>Rationale:</strong> Preeclampsia or eclampsia places the woman at risk for uteroplacental insufficiency due to the loss of normal vasodilation of uterine arterioles and maternal vasospasm. This results in decreased uteroplacental perfusion, which may lead to fetal hypoxia. A BPP is one assessment tool used to evaluate fetal well-being. Providing explanation of the diagnostic test helps relieve anxiety and ensures that the woman understands what the test evaluates and what the results mean. See discussion of BPP in Chapter 16.</td>
</tr>
<tr>
<td><strong>6.</strong> Assist with amniocentesis to obtain lecithin/sphingomyelin (L/S) ratio.</td>
<td><strong>Rationale:</strong> Women with preeclampsia may give birth before term. Amniotic fluid may be analyzed to determine the maturity of the fetal lungs. A lecithin/sphingomyelin ratio of 2:1 or greater indicates fetal lung maturity and is usually achieved by 35 weeks’ gestation.</td>
</tr>
<tr>
<td><strong>7.</strong> Explain the purpose of Doppler flow studies.</td>
<td><strong>Rationale:</strong> Doppler flow studies (umbilical velocimetry) help to assess placental function and sufficiency. Uteroplacental insufficiency is a risk for a woman with preeclampsia (see Chapter 16).</td>
</tr>
</tbody>
</table>
Evaluation of Client Goal

• All diagnostic tests are within normal limits, which indicates that uteroplacental sufficiency is maintained.
• No signs of fetal distress were documented during testing.

CRITICAL-THINKING QUESTIONS

1. A woman gives birth at 39 weeks’ gestation. The prenatal record reveals a history of preeclampsia with this pregnancy. Even though the newborn was full term, the birth weight falls below the 10th percentile. Describe how preeclampsia in the prenatal period can affect the growth of the fetus.

Answer: Maternal vasospasm and loss of normal vasodilation of uterine arterioles occur with preeclampsia. This results in decreased placental perfusion leading to fetal hypoxia and malnutrition. Therefore newborns tend to be small for gestational age.

2. The nurse is assisting a woman with preeclampsia to select a dinner menu. The choices include: menu #1: grilled chicken, broccoli with peanut sauce, brown rice, an oatmeal cookie, and a milkshake; menu #2: pasta with tomato sauce, fresh green salad, garlic bread, chocolate cake, and iced tea. Which menu plan is best for a woman with preeclampsia? Why?

Answer: Menu #1 is the better choice because it provides more protein. Each protein choice is a complete protein. Protein is excreted in the urine as a result of severe preeclampsia and replacement is needed. Recommended protein needs include 80 to 100 g/day or 1.5 g/kg/day of protein.

3. The nurse is admitting three women to the antepartum unit. Two rooms are available, one private room and one double occupancy room. One woman being admitted is in preterm labor, the second has preeclampsia, and the third has third-trimester bleeding. Which room assignment would be most appropriate for the woman with preeclampsia? Why?

Answer: The private room would be most appropriate for the woman with preeclampsia. Preeclampsia causes CNS irritability. If the disorder worsens, bright lights and loud noises may precipitate seizures. A private room allows the nurse to maintain a quiet, low-stimulus environment for the woman. Visitors and phone calls are also limited.

4. Your assessment of a client receiving magnesium sulfate for severe preeclampsia includes nausea and vomiting, blurred vision, absent deep tendon reflexes (previously DTRs were 3+/H11001), 70 cc total urine output over 4 hours. Are these findings normal? What, if any, actions would you take?

Answer: Nausea and vomiting and blurred vision are common side effects of magnesium sulfate. Absent deep tendon reflexes and urine output less than 30 mL/hr are signs of magnesium toxicity. Actions include the following: Notify the physician, stop the infusion, and obtain a maternal serum magnesium level. Calcium gluconate should be available at the bedside.

* For your reference, this care plan provides an example of how two nursing diagnoses might be addressed.

- Urine protein. Urinary protein is evaluated hourly if an indwelling catheter is in place or with each voiding. Readings of 3+ or 4+ indicate loss of 5 g or more of protein in 24 hours.
- Urine specific gravity. Specific gravity of the urine should be checked hourly or with each voiding. Readings over 1.040 correlate with oliguria and proteinuria.
- Edema. The face (especially eyelids and cheekbone area), fingers, hands, arms (ulnar surface and wrist), legs (tibial surface), ankles, feet, and sacral area are inspected and palpated for edema. The degree of pitting is determined by pressing over bony areas.
- Weight. The woman is weighed daily at the same time, wearing the same robe or gown and slippers. Weighing may be omitted if the woman is to maintain strict bed rest.
- Pulmonary edema. The woman is observed for coughing. The lungs are auscultated for moist respirations.
- Deep tendon reflexes. The woman is assessed for evidence of hyperreflexia in the brachial, wrist, patellar, or Achilles tendons. The patellar reflex is the easiest to assess (see Clinical Skill: Assessing Deep Tendon Reflexes and Clonus). Clonus should also be assessed by vigorously dorsiflexing the foot while the knee is held in a fixed position. Normally no clonus is present. If it is present, it is measured as beats and recorded as such.
- Placental separation. The woman should be assessed hourly for vaginal bleeding and/or uterine rigidity.
- Headache. The woman should be questioned about the existence and location of any headache.
- Visual disturbance. The woman should be questioned about any visual blurring or changes or scotomata. The results of the daily fundoscopic exam should be recorded on the chart.
OBJECTIVE: Preparation.
1. Explain the procedure, indications for its use, and information that will be obtained.
2. Most nurses check the patellar reflex and one other such as the biceps, triceps, or brachioradialis.

OBJECTIVE: Assemble and Prepare the Equipment.
Percussion hammer

OBJECTIVE: Prepare the Woman.
1. Elicit reflexes.
   - Patellar reflex. Position the woman with her legs hanging over the edge of the bed (feet should not be touching the floor). (See Figure 15–5.) Briskly strike the patellar tendon, which is located just below the patella. Normal response is extension or a thrusting forward of the foot.
   - Biceps reflex. Flex the woman’s arm 45 degrees at the elbow and place your thumb on the biceps tendon. Allow your fingers to hold the biceps muscle. Strike your thumb in a slightly downward motion and assess the response. Normal response is flexion of the arm.
   - Triceps reflex. Flex the woman’s arm up to 90 degrees and allow her hand to hang against the side of her body. Using the percussion hammer, strike the triceps tendon just above the elbow. Normal response is contraction of the muscle, which causes extension of the arm.
   - Brachioradialis reflex. Flex the woman’s arm slightly and lay it on your forearm with her hand slightly pronated. Using the percussion hammer, strike the brachioradialis tendon, which is found about 1 to 2 inches above the wrist. Normal response is pronation of the forearm and flexion of the elbow.

DTRs are assessed to gain information about CNS irritability secondary to preeclampsia and to assess the effects of magnesium sulfate if the woman is receiving it.

In an inpatient setting the patellar reflex is often assessed while the woman lies supine. Flex her knees slightly and support them.

The correct position causes the muscle to be slightly stretched. Then when the tendon is stretched, with a tap the muscle should contract. Correct positioning and technique are essential to elicit the reflex.

(continued on next page)
## Assessing Deep Tendon Reflexes and Clonus (continued)

### NURSING ACTION

2. Grade reflexes. Reflexes are graded on a scale of 0 to 4+, as follows:
   - 4+ Hyperactive; very brisk, jerky, or clonic response; abnormal
   - 3+ Brisker than average; may not be abnormal
   - 2+ Average response; normal
   - 1+ Diminished response; low normal
   - 0 No response; abnormal

3. Assess for clonus. With the woman’s knee flexed and the leg supported, vigorously dorsiflex the foot, maintain the dorsiflexion momentarily, and then release (Figure 15–6 ■). With a normal response, the foot returns to its normal position of plantar flexion. Clonus is present if the foot “jerks” or taps against the examiner’s hand. If so, record the number of taps or beats of clonus.

4. Report and record findings. For example: DTRs 2+, no clonus or DTRs 4+, 2 beats clonus.

### RATIONALE

- Normally reflexes are 1+ or 2+.
- With CNS irritation, hyperreflexia may be present; with high magnesium levels, reflexes may be diminished or absent.
- Clonus occurs with more pronounced hyperreflexia and indicates CNS irritability.

### Clinical Skills

- **Epigastric pain.** The woman should be asked about any epigastric pain. It is important to differentiate it from simple heartburn, which tends to be familiar and less intense.
- **Laboratory blood tests.** Daily tests of hematocrit to measure hemoconcentration; BUN, creatinine, and uric acid levels to assess kidney function; clotting studies for any indication of thrombocytopenia or DIC; liver enzymes; and electrolyte levels for deficiencies are all indicated. Magnesium levels are monitored regularly in women receiving magnesium sulfate.
- **Level of consciousness.** The woman is observed for alertness, mood changes, and any signs of impending convulsion or coma.
- **Emotional response and level of understanding.** The woman’s emotional response should be carefully assessed so that support and teaching can be planned accordingly.

In addition, the nurse continues to assess the effects of any medications administered. Since the administration of prescribed medications is an important aspect of care, the nurse is, of course, familiar with the more commonly used medications and their purpose, implications, and associated untoward or toxic effects.
Examples of nursing diagnoses that might apply to the woman with preeclampsia include the following:

- Fluid Volume Deficit related to fluid shift from intravascular to extravascular space secondary to vasospasm
- Risk for Injury related to the possibility of seizure secondary to cerebral vasospasm or edema

**Nursing Plan and Implementation**

**Community-Based Nursing Care**

A woman with preeclampsia has several major concerns. She may fear losing her fetus, she may worry about her personal relationship with her other children and her personal and sexual relationship with her partner, she may be concerned about finances, and she may also feel bored and a little resentful if she faces prolonged bed rest. If she has small children, she may have trouble providing for their care. The nurse should help the couple identify and discuss these concerns. The nurse can offer information and explanations if certain aspects of therapy cause difficulty. The nurse can also refer the woman and her family to community resources such as support groups or homemaker services as appropriate.

The woman needs to know which symptoms are significant and should be reported at once. Usually the woman with mild preeclampsia is seen once or twice a week, but she may need to come in earlier than her next scheduled appointment if symptoms indicate that her condition is progressing. She must understand her diet plan, which should reflect her culture, finances, and lifestyle (Figure 15–7).**

**Hospital-Based Nursing Care**

The development of severe preeclampsia is a cause for increased concern for the woman and her family. The most immediate concerns usually are the prognosis for the woman and her fetus. The nurse can explain medical therapy and its purpose and offer honest, hopeful information. The nurse keeps the couple informed of fetal status and discusses other concerns the couple may express. The nurse provides as much information as possible and seeks other sources of information or aid for the family as needed. The nurse can also offer to contact a member of the clergy or hospital chaplain for additional support if the couple so chooses.

The nurse maintains a quiet, low-stimulus environment for the woman. The woman is generally placed in a private room in a quiet location where she can be watched closely. Visitors are limited to close family members or main support persons. The woman should maintain the left lateral recumbent position most of the time, with side rails up for her protection. Unlimited phone calls are avoided because the phone ringing unexpectedly may be too jarring. To avoid a sense of isolation, however, some women find it preferable to limit calls to a certain time of day. Bright lights and sudden loud noises may precipitate seizures in the woman with severe preeclampsia.

The occurrence of a convulsion is frightening to any family members who may be present, although the woman will not be able to recall it when she becomes conscious. Therefore, it is essential to offer explanations to the family members and the woman herself later.

A grand mal seizure has both a tonic phase, marked by pronounced muscular contraction and rigidity, and a clonic phase, marked by alternate contraction and relaxation of the muscles, which causes the woman to thrash about wildly. When the tonic phase of the contraction begins, the woman should be turned to her side (if she is not already in that position) to aid circulation to the placenta. Her head...
Preeclampsia and Eclampsia

- Preeclampsia, which occurs after the 20th week of pregnancy, involves elevated BP and proteinuria. It may be mild or severe.
- A woman with preeclampsia who has a seizure is said to have eclampsia.
- The exact cause of preeclampsia is unknown.
- Vasospasm is responsible for most of the clinical manifestations, including the CNS signs of headache, hyper-reflexia, and convulsion.
- Vasospasm also causes poor placental perfusion, which leads to IUGR.
- The only known cure for preeclampsia is birth of the infant, but symptoms may develop up to 48 hours postpartum.
- Management is supportive and includes anticonvulsant therapy, generally with magnesium sulfate; prevention of renal, hepatic, and hematologic complications; and careful assessment of fetal well-being.

Nursing Management During Labor and Birth

The laboring woman with preeclampsia must receive all the care and precautions necessary for normal labor, as well as those required for managing preeclampsia. The woman is kept positioned on her left side as much as possible. Both the woman and the fetus are monitored carefully throughout labor. The nurse notes the progress of labor and is alert to signs of worsening preeclampsia or its complications.

During the second stage of labor, the woman is encouraged to push in the side-lying position if possible. If she is unable to do so comfortably or effectively, she can be helped to a semisitting position for pushing and can then resume the lateral position between contractions. Birth is in the side-lying position or in the lithotomy position with a wedge placed under the woman’s right hip.

A family member or other support person is encouraged to stay with the woman as much as possible. The woman in labor and the support person are kept informed of the progress and plan of care. In addition, their wishes concerning the birth experience are respected when possible. Preferably, the woman should be cared for by the same nurses throughout her stay.

Nursing Management During the Postpartal Period

Because the woman with preeclampsia is hypovolemic, even normal blood loss can be serious. The amount of vaginal bleeding must be assessed and the woman observed for signs of shock. Blood pressure and pulse are monitored every 4 hours for 48 hours. Hematocrit is checked daily. The woman is assessed for any further signs of preeclampsia. Intake and output are measured. Normal postpartum diuresis helps eliminate edema and is a favorable sign.

Postpartal depression can develop after such a difficult pregnancy. To help prevent it, the nurse provides opportunities for frequent maternal-infant contact and encourages family members to visit. The couple may have many questions, and the nurse should be available for discussion. The couple should be given family-planning information. Oral contraceptives may be used if the woman’s blood pressure has returned to normal by the time they are prescribed (usually 4 to 6 weeks after birth). For a brief summary of preeclampsia, see Key Facts to Remember: Preeclampsia and Eclampsia.

Evaluation

Expected outcomes of nursing care include the following:

- The woman is able to explain preeclampsia, its implications for her pregnancy, the treatment regimen, and possible complications.
- The woman suffers no eclamptic seizures.
- The woman and her caregivers detect early evidence of increasing severity of the preeclampsia or possible complications so that appropriate treatment measures can be instituted.
- The woman gives birth to a healthy newborn.
**Chronic Hypertensive Disease**

Chronic hypertension exists when the blood pressure is 140/90 mm Hg or higher before pregnancy or before the 20th week of gestation or when hypertension persists 42 days following childbirth. If the diastolic blood pressure is greater than 80 mm Hg during the second trimester, chronic hypertension should be suspected. The cause of chronic hypertension has not been determined. In most women with chronic hypertension the disease is mild.

The goals of care are to prevent the development of preeclampsia and to ensure normal growth of the fetus. The woman is seen regularly for prenatal care (every 2 weeks until 28 weeks and then weekly until birth).

The woman is taught the importance of daily rest periods in the left lateral recumbent position and also learns to monitor her blood pressure at home. Sodium is limited to about 2.4 g/day. Antihypertensive medication is generally used only for women with blood pressure over 160/110. The drug of choice is methyldopa (Aldomet). Twenty-four-hour urines, serum creatinine, uric acid, hematocrit, and ultrasound examinations are repeated at least once in the second and third trimesters.

Nursing care is directed at providing sufficient information so that the woman can meet her healthcare needs. She is given information about her diet, the importance of regular rest, her medications, the need for blood pressure control, and any procedures used to monitor the well-being of her fetus.

**Chronic Hypertension with Superimposed Preeclampsia**

Preeclampsia develops in about 25% of women previously found to have chronic hypertension (NIH, 2000). Close monitoring and careful management are indicated if the following signs develop: (1) elevations of systolic blood pressure 30 mm Hg above the baseline or diastolic blood pressure 15 to 20 mm Hg above the baseline, on two occasions at least 6 hours apart; (2) proteinuria; and (3) edema occurring in the upper half of the body. A woman with chronic hypertension who develops superimposed preeclampsia often progresses quickly to eclampsia, sometimes before 30 weeks of pregnancy.

**Gestational or Transient Hypertension**

Gestational hypertension exists when transient elevation of blood pressure occurs for the first time after midpregnancy without proteinuria (NIH, 2000). The final diagnosis of gestational hypertension is made in the postpartum period if preeclampsia does not develop and if the blood pressure returns to normal by 12 weeks postpartum.

**Disseminated Intravascular Coagulation**

Disseminated intravascular coagulation (DIC) occurs more often in pregnancies complicated by preeclampsia, abruptio placentae, intrauterine fetal demise, amniotic fluid embolism, maternal liver disease, and septic abortion (Celik, Gezginc, Altintepe, et al., 2003; Tank, Nadanwar, & Mayadeo, 2002). Although DIC is not considered a component of severe preeclampsia, eclampsia, or HELLP syndrome, it can occur as a complication when any of these conditions exist (Celik et al., 2003). The incidence of DIC occurring when HELLP is the only risk factor is approximately 5% (Sibai, 2002).

DIC occurs when there is an overactivation of the normal clotting process. In most instances, tissue factor entering the circulation is the primary trigger for DIC (Osterud & Bjorklid, 2001). When this occurs, there is an imbalance between the coagulation and the fibrinolytic systems. This mechanism leads to hemorrhage and shock. During these events, clots are being formed and fibrin deposited into the microcirculation, resulting in cell or tissue damage. This triggers further coagulation, which eventually depletes the plasma clotting factors. These fibrin clots can lead to intravascular obstruction and infarctions. In addition, the fibrinolytic system is activated which results in the formation of fibrin-fibrinogen degradation products or fibrin split products. The release of these products decreases platelet functioning and further inhibits coagulation (Blackburn, 2003).

DIC is diagnosed when thrombocytopenia, low fibrinogen levels, and elevated fibrin split products are found in the laboratory findings. Serial platelet and serum fibrin degradation product counts are performed to monitor the mother’s hematologic status. Supportive measures and reversing the causative factors are the primary interventions used to manage DIC (Letsky, 2001).

**Care of the Woman at Risk for Rh Alloimmunization**

The Rh blood antigen, or Rh factor, is present on the surface of erythrocytes of a majority of the population. When it is present, a person is designated as Rh positive. Those without the factor are designated as Rh negative. If an Rh-negative individual is exposed to Rh-positive blood, an antigen-antibody response occurs, and the person forms anti-Rh agglutinin and is said to be sensitized. Subsequent exposure to
Rh-positive blood can then cause a serious reaction that results in agglutination and hemolysis of red blood cells. Rh alloimmunization (sensitization) most commonly occurs when an Rh-negative woman carries an Rh-positive fetus, either to term or to termination by spontaneous or induced abortion. It can also occur if an Rh-negative nonpregnant woman receives an Rh-positive blood transfusion.

The RBCs from the fetus invade the maternal circulation, thereby stimulating the production of Rh antibodies. Because this transfer of RBCs usually occurs at birth, the first offspring is not affected. In a subsequent pregnancy, however, Rh antibodies cross the placenta and enter the fetal circulation, causing severe hemolysis. The destruction of fetal RBCs, causing anemia in the fetus, is proportional to the extent of maternal sensitization (Figure 15–8). Rh-positive blood can then cause a serious reaction that results in agglutination and hemolysis of red blood cells. Rh alloimmunization (sensitization) most commonly occurs when an Rh-negative woman carries an Rh-positive fetus, either to term or to termination by spontaneous or induced abortion. It can also occur if an Rh-negative nonpregnant woman receives an Rh-positive blood transfusion.

The antibody screening test (indirect Coombs’ test) is important for the Rh-negative woman who may be pregnant with an Rh-positive fetus because it indicates whether the woman is sensitized to the Rh antigen. The test measures the number of antibodies in the maternal blood.

Occasionally a woman can become sensitized in early pregnancy because of a transplacental hemorrhage. Thus the American Association of Blood Banks recommends that a second antibody screening test be done at 28 weeks’ gestation. If the maternal antibody screen is positive, a maternal antibody titer is obtained. A woman with an antibody titer greater than 1:4 should be considered sensitized and her pregnancy should be managed closely (Jackson & Branch, 2002).

**Fetal-Neonatal Risks**

Although maternal sensitization can now be prevented by appropriate administration of Rh immune globulin (RhoGAM, or RhIgG), Rh alloimmunization still occurs in 6.7 of every 1000 live births (Moise, 2004). If treatment is not initiated, the anemia resulting from this disorder can cause marked fetal edema, called hydrops fetales. Congestive heart failure may result; marked jaundice (called icterus gravis), which can lead to neurologic damage (kernicterus), is also possible. This severe hemolytic syndrome is known as erythroblastosis fetalis.

**Screening for Rh Incompatibility and Sensitization**

At the first prenatal visit, caregivers (1) take a history of previous sensitization, abortions, blood transfusions, or children who developed jaundice or anemia during the newborn period; (2) determine maternal blood type (ABO) and Rh factor and do a routine Rh antibody screening test; and (3) identify other medical complications such as diabetes, infections, or hypertension.

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Clinical Therapy

The goals of clinical management are the early identification and treatment of maternal conditions that predispose to hemolytic disease, identification and evaluation of the Rh-sensitized woman, coordinated obstetric-pediatric treatment for the seriously affected newborn, and prevention of Rh sensitization if none is present.

Antepartal Management

If the antibody screen obtained at 28 weeks’ gestation is negative, the woman is given 300 mcg of Rh immune globulin (RhoGAM) intramuscularly as a prophylactic (preventative) measure. RhoGAM provides passive antibody protection against Rh antigens. This “tricks” the body, which does not then produce antibodies of its own (active immunity).

When the woman is Rh negative and not sensitized and the father is Rh positive or unknown, Rh immune globulin is also given after each abortion (whether spontaneous or induced), ectopic pregnancy, or amniocentesis. If abortion or ectopic pregnancy occurs in the first trimester, a smaller (50 mcg) dose of Rh immune globulin (MICRhGAM or Mini-Gamuline Rh) is used. A full dose is used following second-trimester amniocentesis.

The fetus of a woman who is sensitized to the Rh factor is at risk. Two primary interventions can help the fetus whose blood cells are being destroyed by maternal antibodies: early birth and intrauterine transfusion; both carry risks. Ideally, birth should be delayed until fetal maturity is confirmed at about 36 to 37 weeks.

Ultrasound is an invaluable tool in managing the pregnancy of a woman with Rh alloimmunization. Ultrasound should be done at 14 to 16 weeks to determine gestational age. Then serial ultrasounds and amniotic fluid analysis can be used to follow fetal progress.

New technology, now available in some clinical facilities, enables clinicians to use a Doppler to measure peak systolic middle cerebral artery (MCA) velocity in the fetus. The increased fetal cardiac output and decreased blood viscosity seen in fetal anemia results in increased MCA blood flow velocity. MCA Dopplers can be done starting as early as 18 weeks’ gestation but are unreliable after 35 weeks. The test is valuable because it reduces the need for invasive diagnostic procedures such as ultrasound (Moise, 2004).

Ultrasound can also be used to detect ascites and subcutaneous edema, which are signs of severe fetal involvement. Other indicators of the fetal condition include an increase in fetal heart size and hydramnios.

As indicated previously, negative antibody titers can consistently identify the fetus not at risk. However, the titers cannot reliably point out the fetus in danger, since titer level does not always correlate with the severity of the disease. Thus, if the maternal antibody titer is 1:16 or greater, an optical density (ΔOD) analysis of the amniotic fluid is performed. This optical density analysis measures the amount of pigment from the breakdown of red blood cells and can determine the severity of the hemolytic process.

If ΔOD indicates severe anemia or when fetal hydrops is present, percutaneous umbilical blood sampling (PUBS) (see Chapter 16) is performed to determine fetal hematocrit. If the hematocrit is low (generally < 30%), the fetus is given an intrauterine blood transfusion. Severely sensitized fetuses may require birth at 32 to 34 weeks.

Postpartal Management

The Rh-negative mother who has no antibody titer (indirect Coombs’ test negative, nonsensitized) and has given birth to an Rh-positive fetus (direct Coombs’ test negative) is given an intramuscular injection of Rh immune globulin (RhoGAM). The woman must receive Rh immune globulin within 72 hours of childbirth so she does not have time to produce antibodies to fetal cells that entered her bloodstream when the placenta separated. Administration of Rh immune globulin in a dose of 300 mcg generally provides temporary passive immunity to the mother, which prevents the development of permanent active immunity (antibody formation).

Rh immune globulin is not given to the newborn or the father. It is not effective for, and should not be given to, a previously sensitized woman. However, sometimes after birth or an abortion the results of the blood test do not clearly show whether the mother is already sensitized to the Rh antigen. In such cases, the Rh immune globulin should be given; it will cause no harm. For the major considerations in caring for an Rh-negative woman, see Key Facts to Remember: Rh Sensitization. (The treatment of the newborn with hemolytic disease is discussed in Chapter 27.)

Nursing Care Management

Nursing Assessment and Diagnosis

As part of the initial prenatal history, the nurse asks the mother if she knows her blood type and Rh factor. Many women are aware that they are Rh negative and that this status has implications for pregnancy. If the woman knows she is Rh negative, the nurse can assess the woman’s knowledge of what that means. The nurse can also ask the woman if she has ever received Rh immune globulin, if she has had any previous pregnancies and what their outcome was, and if she knows her partner’s Rh factor. If the partner is Rh negative, there is no risk to the fetus, who will also be Rh negative.
RH Sensitization

When trying to work through Rh problems, the nurse should remember the following:

- A potential problem exists when an Rh-negative mother and an Rh-positive father conceive a child who is Rh positive.
- In this situation, the mother may become sensitized or produce antibodies to her fetus’s Rh-positive blood.

The following tests are used to detect sensitization:

- Indirect Coombs’ tests—done on the mother’s blood to measure the number of Rh-positive antibodies.
- Direct Coombs’ test—done on the infant’s blood to detect antibody-coated Rh-positive RBCs.

Based on the results of these tests, the following may be done:

- If the mother’s indirect Coombs’ test is negative and the infant’s direct Coombs’ test is negative (confirming that sensitization has not occurred), the mother is given Rh immune globulin within 72 hours of birth.
- If the mother’s indirect Coombs’ test is positive and her Rh-positive infant has a positive direct Coombs’ test, Rh immune globulin is not given, in this case, the infant is carefully monitored for hemolytic disease.
- It is recommended that Rh immune globulin be given at 28 weeks antenatally to decrease possible transplacental bleeding concerns.
- Rh immune globulin is also administered after each abortion (spontaneous or therapeutic), antepartum hemorrhage, mismatched blood transfusion, ectopic pregnancy, amniocentesis, chorionic villi sampling (CVS), percutaneous umbilical blood sampling (PUBS), fetal cephalic version, or maternal trauma.

If the woman does not know what Rh type she is, intervention cannot begin until the initial laboratory data are obtained. Once that is done, the nurse plans care based on the findings.

If the woman becomes sensitized during her pregnancy, nursing assessment focuses on the knowledge and coping skills of the woman and her family. The nurse also provides ongoing assessment during procedures to evaluate fetal well-being, such as ultrasound and amniocentesis.

After birth, the nurse reviews data about the Rh type of the fetus. If the newborn is Rh positive, the mother is Rh negative, and no sensitization has occurred, nursing assessment reveals the need to administer Rh immune globulin. If both the mother and her newborn are Rh negative, Rh immune globulin is not indicated.

Nursing diagnoses that might apply to the pregnant woman at risk for Rh sensitization include the following:

- Health-Seeking Behaviors: information about Rh immune globulin related to an expressed need to understand the implications of being Rh negative and pregnant
- Ineffective Individual Coping related to depression secondary to the development of indications of the need for fetal exchange transfusion

Nursing Plan and Implementation

During the antepartal period the nurse explains the mechanisms involved in alloimmunization and answers any questions the woman and her partner have. It is imperative that the woman understand the importance of receiving Rh immune globulin after every spontaneous or therapeutic abortion or ectopic pregnancy. The nurse also explains the purpose of the Rh immune globulin administered at 28 weeks’ gestation if the woman is not sensitized.

If the woman is sensitized to the Rh factor, it poses a threat to any Rh-positive fetus she carries. The nurse provides emotional support to the family to help the members deal with their grief and any feelings of guilt about the infant’s condition. If an intrauterine transfusion becomes necessary, the nurse continues to provide emotional support while also assuming responsibility as part of the healthcare team.

During labor, the nurse caring for an Rh-negative woman who has not been sensitized ensures that the woman’s blood is assessed for any antibodies and also has been crossmatched for Rh immune globulin. On the postpartum unit the nurse generally is responsible for administering the Rh immune globulin intramuscularly if the newborn is Rh positive (see Clinical Skill: Administration of Rh Immune Globulin).

Evaluation

Expected outcomes of nursing care include the following:

- The woman is able to explain the process of Rh sensitization and its implications for her unborn child and for subsequent pregnancies.
- If the woman has not been sensitized, she is able to discuss the importance of receiving Rh immune globulin when necessary and cooperates with the recommended dosage schedule.
- The woman gives birth to a healthy newborn.
- If complications develop for the fetus or newborn, they are detected quickly and therapy is instituted.

Care of the Woman at Risk Due to ABO Incompatibility

In addition to the Rh antigen, human red blood cells may present one or more antigens of the ABO group. People whose RBCs present the A antigen have type A blood. Those whose RBCs present the B antigen have type B
OBJECTIVE: Preparation.

1. Confirm that Rh immune globulin is indicated by checking the woman’s prenatal or intrapartum record to verify that she is Rh negative. Then confirm that sensitization has not occurred—maternal indirect Coombs’ negative. Postpartum, confirm that the baby is Rh positive but not sensitized (direct Coombs’ negative) and that the mother’s indirect Coombs’ is negative. Rh immune globulin is not indicated if the infant is Rh negative, too.

2. Confirm that the woman does not have a history of allergies to immune globulin preparations by checking entries on medication allergies in her chart and by asking her whether she has ever had any allergic reactions to medications, globulins, or blood products.

3. Explain purpose and procedure. Have consent form signed if required by agency policy.

OBJECTIVE: Assemble and Prepare the Equipment.

• Rh immune globulin, which is obtained from the blood bank or pharmacy according to agency protocol. Lot numbers for the drug and the crossmatch should be the same.

• Syringe and IM needle

OBJECTIVE: Prepare the Woman.

1. Confirm the woman’s identity and administer one vial of 300 mcg Rh immune globulin IM in the deltoid muscle.

2. An immune globulin microdose is used after miscarriage, elective abortion, ectopic pregnancy, or molar pregnancy occurring within the first 12 weeks’ gestation. Antepartum, the Rh immune globulin is generally given within 3 hours but not longer than 72 hours of the event.

3. If a larger bleed is suspected at birth (as in cases of severe abruptio placentae), additional doses may be administered at one time using multiple sites at regular intervals as long as all doses are given within 72 hours of childbirth.

4. Provide opportunities for the woman to ask questions and express concerns.

5. Chart according to agency policy. Most agencies chart lot number, route, dose, and client education.

Rh immune globulin is only indicated for Rh-negative, unsensitized women.

Rh immune globulin is made from the plasma portion of blood. Allergic reactions are possible.

Many agencies require separate consent for the administration of Rh immune globulin because it is a blood product. The woman should clearly understand the purpose of the Rh immune globulin, its rationale, the administration procedure, and any related risks. Generally the primary side effects are redness and tenderness at the injection site and allergic responses.

The normal 300 mcg dose provides passive immunity following exposure of up to 15 mL of transfused RBCs or 30 mL of fetal blood.

Many women, especially primigravidas, are not aware of the risks for an Rh-positive fetus of a sensitized Rh-negative mother. They need to understand the importance of receiving Rh immune globulin for each pregnancy to ensure continued protection.

Blood. People whose RBCs present both types of antigen have type AB blood, and those whose blood cells present neither A nor B have type O blood. ABO incompatibility occurs when a mother with one blood type is pregnant with a fetus of a different blood type. It is seen in about 20% to 25% of pregnancies, but it rarely causes significant hemolysis.

Group O infants, because they have no antigens on their red blood cells, are never affected regardless of the mother’s blood type. In most cases ABO incompatibility is limited to type O mothers who become pregnant with a type A, B, or AB fetus. The incompatibility occurs as a result of the interaction of antibodies present in maternal serum and the antigen sites on the fetal red blood cells.

Anti-A and anti-B antibodies are naturally occurring; that is, women are naturally exposed to the A and B antigens through the foods they eat and through exposure to infection by gram-negative bacteria. As a result, some women have high serum anti-A and anti-B titers even before they become pregnant for the first time. Once they become pregnant, the maternal serum anti-A and anti-B antibodies cross the placenta and produce hemolysis of the fetal red blood cells. With ABO incompatibility, the first infant is frequently involved, and no
relationship exists between the appearance of the disease and repeated sensitization from one pregnancy to the next.

Unlike Rh incompatibility, antepartal treatment is not warranted because it does not cause severe anemia. As part of the initial assessment, however, the nurse should note whether the potential for an ABO incompatibility exists (type O mother and type A or B father). This note alerts caregivers so that, following birth, the newborn can be assessed carefully for the development of hyperbilirubinemia (see Chapter 28).

Care of the Woman Requiring Surgery During Pregnancy

A nonobstetric surgical condition—most commonly appendicitis, cholecystitis, pancreatitis, or bowel obstruction—complicates about 1 in 500 pregnancies (Angelini, 2003). Elective surgery should be delayed until the postpartal period, but essential surgery can generally be undertaken during pregnancy. Surgery poses some risks, however. The incidence of spontaneous abortion is increased for women who have surgery in the first trimester. There is also an increased incidence of fetal mortality and of low-birth-weight (less than 2500 g) infants. Finally, when surgery is necessary, the incidence of preterm labor and intrauterine growth restriction increases.

Although general preoperative and postoperative care is similar for gravid and nongravid women, special considerations must be kept in mind when the surgical client is pregnant. The early second trimester is the best time to operate because there is less risk of spontaneous abortion or early labor, and the uterus is not so large as to impinge on the abdominal field. If a chest x-ray is done, the fetus should be shielded from the radiation.

To prevent uterine compression of major blood vessels while the woman is supine, the caregiver must place a wedge under the woman’s right hip to tilt the uterus during both surgery and recovery. The decreased intestinal motility and delayed gastric emptying that occur in pregnancy increase the risk of vomiting when anesthetics are given and during the postoperative period. Thus inserting a nasogastric tube is recommended before a pregnant woman has major surgery. An indwelling urinary catheter prevents bladder distention, decreases risk of injury to the bladder, and permits convenient monitoring of output.

Pregnancy causes increased secretions of the respiratory tract and engorgement of the nasal mucous membrane, often making breathing through the nose difficult. Consequently, pregnant women often need an endotracheal tube for respiratory support during surgery.

Caregivers must guard against maternal hypoxia. During surgery, uterine circulation decreases and fetal oxygenation may be reduced quickly. Fetal heart rate must be monitored electronically before, during, and after surgery. Blood loss is also closely monitored throughout the procedure and following it.

Postoperatively, the nurse encourages the woman to turn, breathe deeply, and cough regularly and to use any ventilation therapy, such as incentive spirometry, to avoid developing pneumonia. The pregnant woman is at increased risk for thrombophlebitis, so the nurse applies antiembolism stockings, encourages leg exercises while the woman is confined to bed, and introduces ambulation as soon as possible.

Discharge teaching is especially important. The woman and her family should clearly understand what to expect regarding activity level, discomfort, diet, medications, and any special considerations. In addition, they should know the warning signs they need to report to the physician immediately.

Care of the Woman Suffering Trauma from an Accident

Trauma complicates 6% to 7% of pregnancies and is the leading nonobstetric cause of maternal death. When major blunt trauma to the mother occurs in the second or third trimester the risk of fetal loss is 40% to 50%. Abruptio placentae (see Chapter 21) is the leading cause of fetal death when the mother’s injuries are not fatal (Ludmir & Stubblefield, 2002). Motor vehicle accidents are the most common cause of trauma. Falls and direct assaults account for most of the remaining cases. (Domestic violence is discussed in the next section.)

Late in pregnancy, when balance and coordination are adversely affected, the woman may fall. Her protruding abdomen is vulnerable to a variety of minor injuries. The fetus is usually well protected by the amniotic fluid, which distributes the force of a blow equally in all directions, and by the muscle layers of the uterus and abdominal wall. In early pregnancy, while the uterus is still in the pelvis, it is shielded from blows by the surrounding pelvic organs, muscles, and bony structures.

Trauma that causes concern includes blunt trauma (from an automobile accident, for example); penetrating abdominal injuries, such as knife and gunshot wounds; and the complications of maternal shock, premature labor, and spontaneous abortion. Maternal mortality most often occurs
from head trauma or hemorrhage. Uterine rupture is a rare but life-threatening complication of trauma. It may result from strong deceleration forces in an automobile accident, with or without seat belts. Traumatic separation of the placenta can occur; it causes a high rate of fetal mortality. Premature labor, often following rupture of membranes during an accident, is another serious hazard to the fetus. Premature labor can ensue even if the woman is not injured. To help prevent trauma from automobile accidents, all pregnant women should wear both lap seat belts and shoulder harnesses.

Treatment of major injuries during pregnancy focuses initially on life-saving measures for the woman. Such measures include establishing an airway, controlling external bleeding, and administering intravenous fluid to alleviate shock. The woman must be kept on her left side to prevent further hypotension. Fetal heart rate is monitored. Exploratory surgery may be necessary following abdominal trauma to determine the extent of injuries. If the fetus is near term and the uterus has been damaged, cesarean birth is indicated. If the fetus is still immature, the uterus can often be repaired, and the pregnancy continues until term. In all cases, emotional support and information about the woman's condition and its implications for her and for her fetus are essential components of care.

In cases of trauma in which the mother's life is not directly threatened, fetal monitoring for 4 hours should be sufficient if there are no contractions, vaginal bleeding, uterine tenderness, or leaking amniotic fluid. Abruptio placentae may occur following a blow to the abdomen. Increased uterine irritability in the first few hours after trauma helps identify women who may be at risk for this potentially catastrophic complication.

**Care of the Battered Pregnant Woman**

Domestic violence, most often the intentional injury of a woman by her partner, often begins or increases during pregnancy. The incidence of abuse during pregnancy ranges from 1% to 20%; most studies have found an incidence of 4% to 8% (AAP & ACOG, 2002). Physical abuse may result in loss of pregnancy, preterm labor, low-birthweight infants, and fetal death. Abused women have significantly higher rates of complications such as anemia, infection, low weight gain, and first- and second-trimester bleeding (McFarlane, Parker, Soeken, et al., 1999).

The first step toward helping the battered woman is to identify her. Asking every woman about abuse at various times during pregnancy is crucial because a woman may not disclose abuse until she knows her caregivers better. ACOG (1999a) recommends that all women be screened for abuse at the first prenatal visit, at least once each trimester, and then again during the postpartum period. Samples of questions the nurse can ask are provided in Chapter 5.

Chronic psychosomatic symptoms can also be an indicator of abuse. The woman may have nonspecific or vague complaints. It is important to assess old scars around the head, chest, arms, abdomen, and genitalia and to evaluate any bruising or evidence of pain. The nurse should be especially alert for signs of bruising or injury to the woman's breasts, abdomen, or genitalia because these areas are common targets of violence during pregnancy. Other indicators include a decrease in eye contact; silence when the partner is in the room; and a history of nervousness, insomnia, drug overdose, or alcohol problems. Frequent visits to the emergency room and a history of accidents without understandable causes are possible indicators of abuse.

The goals of treatment are to identify the woman at risk, increase her decision-making abilities to decrease the potential for further abuse, and provide a safe environment for the pregnant woman and her unborn child. An environment that is private, accepting, and nonjudgmental is necessary so the woman can express her concerns. She needs to be aware of community resources available to her, such as emergency shelters; police, legal, and social services; and counseling. Ultimately, it is the woman's decision to either seek assistance or return to old patterns.

Abuse may begin during pregnancy and may thus be a new, unexpected experience for the woman, one she believes is an isolated incident. She needs to know that battering may continue after childbirth and may extend to the child as well. This is an important time for the nurse to provide information and establish a trusted link for the woman with a health professional. (For further discussion see Chapter 5.)

**Care of the Woman with a Perinatal Infection Affecting the Fetus**

Fetal infection may develop at any time during pregnancy. In general, perinatal infections are most likely to cause harm when the embryo is exposed during the first trimester when organ development is occurring. Infections that occur later in pregnancy create other concerns such as growth restriction, preterm birth, and neurologic changes. This section addresses several of the most commonly occurring viral and parasitic infections that may have an impact on the fetus if acquired during pregnancy.
Toxoplasmosis

Toxoplasmosis is caused by the protozoan Toxoplasma gondii. It is innocuous in adults, but, when contracted in pregnancy, it can profoundly affect the fetus. The pregnant woman may contract the organism by eating raw or undercooked meat, by drinking unpasteurized goat’s milk, or by contact with the feces of infected cats, either through the cat litter box or by gardening in areas frequented by cats.

Fetal–Neonatal Risks

The likelihood of fetal infection increases with each trimester of pregnancy, but the risk of serious impact on the fetus decreases. Thus maternal infection contracted during the first trimester is associated with the lowest incidence of fetal infection but the highest risk of severe fetal disease or death. Maternal infection that occurs before conception is rarely associated with congenital effects (Lopez, Dietz, Wilson, et al., 2000). Most infants born with congenital toxoplasmosis are asymptomatic at birth but develop symptoms later. The infection may vary from mild to severe. In mild cases, retinochoroiditis (inflammation of the retina and choroid of the eye) may be the only recognizable damage, and it and other manifestations may not appear until adolescence or young adulthood. Severe neonatal disorders associated with congenital infection include convulsions, coma, microcephaly, and hydrocephalus. The infant with a severe infection may die soon after birth. Survivors are often blind, deaf, and severely retarded. Treatment of the mother can reduce the incidence of fetal infection by 60% (ACOG, 2000).

Clinical Therapy

The goal of therapy is to identify the woman at risk for toxoplasmosis and to treat the disease promptly if diagnosed. Diagnosis can be made by serologic testing of antibody titers, specifically the IgG and IgM fluorescent antibody (IFA) tests. The indirect hemagglutination test (IHAT) or the Sabin-Feldman dye test can also be used to establish the diagnosis. Ultrasound may be useful in detecting signs of fetal infection such as ascites, microcephaly, and fetal growth restriction (ACOG, 2000).

If diagnosis can be established by serologic and radiographic testing, the woman may be treated with a combination of antiparasitic drugs—usually sulfadiazine and pyrimethamine. This combination therapy should not be started until after the first trimester because of the teratogenic effects of pyrimethamine. In Europe, another drug, spiramycin, has been used to treat toxoplasmosis with very good success. It is available for therapy in the United States through the CDC. Infants born with congenital toxoplasmosis are treated aggressively using a combination of sulfadiazine, pyrimethamine, and leucovorin for 1 year (Duff, 2002). Such treatment reduces but does not completely prevent the late problems such as retinochoroiditis often seen with the disease.

Nursing Assessment and Diagnosis

The incubation period for the disease is 10 days. The woman with acute toxoplasmosis may be asymptomatic, or she may develop myalgia, malaise, rash, splenomegaly, and enlarged posterior cervical lymph nodes. Symptoms usually disappear in a few days or weeks.

Nursing diagnoses that might apply to the pregnant woman with toxoplasmosis include the following:

- Risk for Altered Health Maintenance related to lack of knowledge about ways in which a pregnant woman can contract toxoplasmosis
- Anticipatory Grieving related to potential effects on infant of maternal toxoplasmosis

Nursing Plan and Implementation

The nurse caring for women during the antepartal period has the primary opportunity to discuss methods of preventing toxoplasmosis. The woman must understand the importance of avoiding poorly cooked or raw meat, especially pork, beef, lamb, and, in the Arctic region, caribou. Fruits and vegetables should be washed. She should avoid contact with the cat litter box and have someone else clean it frequently, since it takes approximately 48 hours for a cat’s feces to become infectious. The nurse should also discuss the importance of wearing gloves when gardening and of avoiding garden areas frequented by cats.

Evaluation

Expected outcomes of nursing care include the following:

- The woman is able to discuss toxoplasmosis, its methods of transmission, the implications for her fetus, and measures she can take to avoid contracting it.
- The woman implements health measures to avoid contracting toxoplasmosis.
- The woman gives birth to a healthy newborn.
Rubella

The effects of rubella (German measles) are no more severe for and there are no greater complications in pregnant women than in nonpregnant women of comparable age. However, the effects of this infection on the fetus and newborn are great because rubella causes a chronic infection that begins in the first trimester of pregnancy and may persist for months after birth.

Fetal-Neonatal Risks

Fortunately, the success of the rubella vaccination program in the United States has led to a dramatic decrease in the incidence of rubella. However, estimates suggest that approximately 10% to 20% of women are still susceptible to rubella and consequently their fetuses are at risk of congenital rubella syndrome should the mother become infected while pregnant (Duff, 2002).

The period of greatest risk for the teratogenic effects of rubella on the fetus is the first trimester. The most common clinical signs of congenital infection include congenital cataracts, sensorineural deafness, and congenital heart defects, particularly patent ductus arteriosus. Other abnormalities, such as mental retardation or cerebral palsy, may become evident in infancy. Diagnosis in the newborn can be conclusively made in the presence of these conditions and with an elevated rubella IgM antibody titer at birth.

Infants born with congenital rubella syndrome are infectious and should be isolated. These infants may continue to shed the virus for months.

The expanded rubella syndrome relates to effects that may develop for years after the infection. These include an increased incidence of insulin-dependent diabetes mellitus; sudden hearing loss; glaucoma; and a slow, progressive form of encephalitis.

Clinical Therapy

The best therapy for rubella is prevention. Live attenuated vaccine is available and should be given to all children. Women of childbearing age should be tested for immunity and vaccinated if susceptible once it is established that they are not pregnant. Postpartally, a woman who is not immune to rubella and who did not become infected during pregnancy should be vaccinated immediately. The vaccine can be administered with other immune globulins such as Rh immune globulin and is not a contraindication for breastfeeding. All women of childbearing age who receive the rubella vaccine should carefully avoid pregnancy for at least 3 months following vaccination (Duff, 2002).

As part of the prenatal laboratory screen, the woman is evaluated for rubella using hemagglutination inhibition (HAI), a serology test. The presence of a positive titer (1:16 or greater) is evidence of immunity. A negative titer (less than 1:8) indicates susceptibility to rubella.

Because the vaccine is made with attenuated virus, pregnant women are not vaccinated. However, it is considered safe for newly vaccinated children to have contact with pregnant women. If a woman becomes infected during the first trimester, therapeutic abortion is a legally available alternative.

Nursing Care Management

Nursing Assessment and Diagnosis

A woman who develops rubella during pregnancy may be asymptomatic or may show signs of a mild infection including a maculopapular rash, lymphadenopathy, muscular aches, and joint pain. The presence of IgM antirubella antibody is diagnostic of a recent infection. These titers remain elevated for approximately 1 month after infection.

Nursing diagnoses that may apply to the woman who develops rubella early in her pregnancy include the following:

- Ineffective Family Coping due to an inability to accept the possibility of fetal anomalies secondary to maternal rubella exposure
- Risk for Altered Health Maintenance related to lack of knowledge about the importance of rubella immunization before becoming pregnant

Nursing Plan and Implementation

Nursing support and understanding are vital for the couple contemplating abortion due to a diagnosis of rubella. Such a decision may initiate a crisis for the couple who has planned the pregnancy. The parents need objective data to understand the possible effects on their unborn fetus and the prognosis for the offspring.

Evaluation

Expected outcomes of nursing care include the following:

- The woman is able to describe the implications of rubella exposure during the first trimester of pregnancy.
- If exposure occurs in a woman who is not immune, she is able to identify her options and make a decision about continuing her pregnancy that is acceptable to her and her partner.
- The nonimmune woman receives the rubella vaccine during the early postpartal period.
- The woman gives birth to a healthy infant.
Cytomegalovirus

Cytomegalovirus (CMV) belongs to the herpes virus group and causes both congenital and acquired infections referred to as cytomegalic inclusion disease (CID). The significance of this virus in pregnancy is related to its ability to be transmitted by asymptomatic women across the placenta to the fetus or by the cervical route during birth.

In the United States, over half of adults have antibodies for the CMV virus. The virus can be found in virtually all body fluids. It can be passed between humans by any close contact, such as kissing, breastfeeding, and sexual intercourse. Asymptomatic CMV infection is particularly common in children and gravid women. It is a chronic, persistent infection in that the individual may shed the virus continually over many years. The cervix can harbor the virus, and an ascending infection can develop after birth. Although the virus is usually innocuous in adults and children, it may be fatal to the fetus.

Accurate diagnosis in the pregnant woman depends on the presence of CMV in the urine, a rise in IgM levels, and identification of the CMV antibodies within the serum IgM fraction. At present, no treatment exists for maternal CMV or for the congenital disease in the neonate.

CMV is the most frequent cause of viral infection in the human fetus, infecting 0.5% to 2.5% of all newborns (Azam, Vial, Fawer, et al., 2001). Of these, about 5% to 18% have overt symptoms at birth and 30% of severely affected infants die; 80% of the surviving infants develop severe neurologic problems, eye abnormalities, or hearing loss (Duff, 2002). Subclinical infections in the newborn may produce mental retardation and hearing loss, sometimes not recognized for several months, or learning disabilities not seen until childhood. CMV may be the most common cause of mental retardation.

For the fetus, this infection can result in extensive intrauterine tissue damage that leads to fetal death; in survival with microcephaly, hydrocephaly, cerebral palsy, or mental retardation; or in survival with no damage at all. The infected newborn is often SGA. The principal tissues and organs affected are the blood, brain, and liver; however, virtually all organs are potentially at risk.

Herpes Simplex Virus

Herpes simplex virus (HSV-I or HSV-2) infection can cause painful lesions in the genital area. Lesions may also develop on the cervix. This condition and its implications for nonpregnant women are discussed in Chapter 6. However, because the presence of herpes lesions in the genital tract may profoundly affect the fetus, herpes infection as it relates to a pregnant woman is discussed here.

Fetal-Neonatal Risks

Primary infection poses the greatest risk to both the mother and her infant. Primary infection has been associated with spontaneous abortion, low birth weight, and preterm birth. Transmission to the fetus almost always occurs after the membranes rupture and the virus ascends or during birth through an infected birth canal. Transplacental infection is rare. Approximately 40% of all infants who are born vaginally to a mother who is experiencing a primary genital HSV infection develop some form of herpes infection. If antiviral therapy is not used, almost half of these infants will die, while 35% to 40% will experience severe problems such as microcephaly, mental retardation, seizures, retinal dysplasia, apnea, and coma (Duff, 2002).

The infected infant is often asymptomatic at birth but develops symptoms of fever (or hypothermia), jaundice, seizures, and poor feeding after an incubation period of 2 to 12 days. Approximately half of infected infants develop the characteristic vesicular skin lesions. Infants who show signs of neonatal herpes should be evaluated promptly and treated with intravenous acyclovir. Dosage is calculated based on the infant’s weight; treatment length varies based on the extent of the infection (CDC, 2002).

Clinical Therapy

The vesicular lesions of herpes have a characteristic appearance, and they rupture easily. Definitive diagnosis is made by culturing active lesions.

The ACOG (1999b) recommends antiviral therapy for women with primary HSV infection during pregnancy to decrease viral shedding and promote healing. Women with recurrent infection may also benefit from antiviral therapy. Three medications are available for that purpose: acyclovir, valaclovir, and famciclovir. Acyclovir has been shown to be effective and safe during pregnancy, but it is not as well absorbed as the other two drugs.

If there is no evidence of genital infection, vaginal birth is preferred. However, if the woman has any signs of active genital lesions or prodromal symptoms of infection such as vulvar pain or burning, cesarean birth is indicated. The woman with active HSV infection and ruptured membranes should also give birth by cesarean as soon as the necessary caregivers and equipment can be assembled (Duff, 2002).

HSV has not been found in breast milk. Present experience shows that breastfeeding is acceptable if there are no herpes lesions on the mother’s breasts and if she washes her hands well to prevent any direct transfer of the virus.
Nursing Care Management

Nursing Assessment and Diagnosis
During the initial prenatal visit it is important to learn whether the woman or her partner have had previous herpes infections. Ongoing assessment is indicated as pregnancy progresses.

Nursing diagnoses that may apply to the pregnant woman with HSV infection include the following:

- Sexual Dysfunction related to unwillingness to engage in sexual intercourse secondary to the presence of active herpes lesions
- Ineffective Individual Coping related to depression secondary to the risk to the fetus if herpes lesions are present at birth

Nursing Plan and Implementation
Nurses need to be particularly concerned with client education about this fast-spreading disease. Women should be informed of the association of HSV infection with spontaneous abortion, newborn mortality and morbidity, and the possibility of cesarean birth. A woman needs to inform all healthcare providers of her infection. She should also know of the possible association of genital herpes with cervical cancer and the importance of a yearly Pap smear.

The woman who acquired HSV infection as an adolescent may be devastated as a mature young adult who wants to have a family. Clients may be helped by counseling that allows them to express the anger, shame, and depression often experienced by those with herpes. Literature may be helpful and is available from Planned Parenthood and many public health agencies. The American Social Health Association has established the HELP program to provide information and the latest research results on genital herpes. The association has a quarterly journal, The Helper, for clients with HSV infection and nurses.

Evaluation
Expected outcomes of nursing care include the following:

- The woman is able to describe her infection with regard to its method of spread, therapy and comfort measures, implications for her pregnancy, and long-term implications.
- The woman gives birth to a healthy infant.

Group B Streptococcal Infection
Group B streptococcus (GBS) infection is a bacterial infection found in the lower gastrointestinal or urogenital tracts. Women may transmit GBS infection to their fetus in utero or during childbirth. GBS is one of the major causes of early-onset neonatal infection occurring in 1 to 2 per 1000 live births (Duff, 2002). Newborns become infected in one of two ways: by vertical transmission from the mother during birth or from horizontal transmission from colonized nursing personnel or colonized infants. GBS infection causes severe, invasive disease in infants. In newborns, the majority of cases occur within the first week of life and are thus designated as early-onset disease. Late-onset disease occurs 1 week or more after birth.

Early-onset GBS infection is often characterized by signs of serious illness including pneumonia and overwhelming septicemia. Late-onset GBS infection often manifests as meningitis or pneumonia. Long-term neurologic complications are common in both types of GBS.

Risk factors for GBS neonatal sepsis include preterm labor, maternal intrapartum fever, prolonged rupture of the membranes, previous birth of an infected infant, and GBS bacteriuria in the current pregnancy. Guidelines for the detection and preventive treatment of newborns at risk include the following (Schrag, Gorwitz, Fultz-Butts, & Schuchat, 2002):

- All pregnant women should be screened for both vaginal and rectal GBS colonization at 35 to 37 weeks’ gestation.
- Women identified as GBS carriers should receive antibiotic prophylaxis at the onset of labor or the rupture of membranes.
- Women with GBS in their urine in any concentration should receive antibiotic prophylaxis intrapartally because such women typically have heavy colonization with GBS and thus have an increased risk of giving birth to a newborn with early-onset disease. These women do not need vaginal and rectal cultures at 35 to 37 weeks because therapy is already indicated.
- Women who have already given birth to a newborn with invasive GBS disease should receive intrapartum antibiotic prophylaxis. Culture-based screening is not necessary for them.
- If the results of GBS screening are not known when labor begins, prophylaxis is indicated for women with any of the following risk factors: gestation < 37 weeks, membranes ruptured ≥ 16 hours, temperature ≥ 100.4°F (≥38.0°C).
<table>
<thead>
<tr>
<th>Condition and Causative Organism</th>
<th>Signs and Symptoms</th>
<th>Treatment</th>
<th>Implications for Pregnancy</th>
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</thead>
<tbody>
<tr>
<td><strong>Urinary Tract Infections (UTI)</strong></td>
<td></td>
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<tr>
<td>Asymptomatic bacteriuria (ASB): <em>Escherichia, Klebsiella, Proteus</em> most common</td>
<td>Bacteria present in urine on culture with no accompanying symptoms.</td>
<td>Oral sulfonamides early in pregnancy, ampicillin and nitrofurantoin (Furadantin) in late pregnancy. Antibody sensitivity results will guide the selection of an appropriate antibiotic.</td>
<td>Women with ASB in early pregnancy may go on to develop cystitis or acute pyelonephritis by third trimester if not treated. Oral sulfonamides taken in the last few weeks of pregnancy may lead to neonatal hyperbilirubinemia and kernicterus. If not treated, infection may ascend and lead to acute pyelonephritis.</td>
</tr>
<tr>
<td><strong>Cystitis (lower UTI):</strong> Causative organisms same as for ASB</td>
<td>Dysuria, urgency, frequency; low-grade fever and hematuria may occur. Urine culture (clean catch) shows leukocytes. Presence of 10⁵ (100,000) or more colonies bacteria per mL urine.</td>
<td>Same</td>
<td>Increased risk of premature birth and intrauterine growth restriction (IUGR). These antibiotics interfere with urinary estriol levels and can cause false interpretations of estriol levels during pregnancy.</td>
</tr>
<tr>
<td><strong>Acute pyelonephritis:</strong> Causative organisms same as for ASB</td>
<td>Sudden onset. Chills, high fever, flank pain. Nausea, vomiting, malaise. May have decreased urine output, severe colicky pain, dehydration. Increased diastolic BP, positive fluorescent antibody (FA) test, low creatinine clearance. Marked bacteremia in urine culture, pyuria, WBC casts.</td>
<td>Hospitalization; IV antibiotic therapy. Other antibiotics safe during pregnancy include carbencillin, methenamine, cephalosporins. Catherization if output is ↓. Supportive therapy for comfort. Follow-up urine cultures are necessary.</td>
<td>If the infection is present at birth and the fetus is born vaginally, the fetus may contract thrush.</td>
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<tr>
<td><strong>Vaginal Infections</strong></td>
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<tr>
<td>Vulvovaginal candidiasis (yeast infections): <em>Candida albicans</em></td>
<td>Often thick, white, curdy discharge, severe itching, dysuria, dyspareunia. Diagnosis based on presence of hyphae and spores in a wet-mount preparation of vaginal secretions.</td>
<td>Intravaginal insertion of miconazole butoconazole, or other topical azole preparations, clotrimazole suppositories at bedtime for 1 week. Cream may be prescribed for topical application to the vulva if necessary (CDC, 2002).</td>
<td>CDC (2002) reports that multiple studies have failed to demonstrate a teratogenic effect from metronidazole.</td>
</tr>
<tr>
<td>Bacterial vaginosis: <em>Gardnerella vaginalis</em></td>
<td>Thin, watery, yellow-gray discharge with foul odor often described as “fishy.” Wet-mount preparation reveals “clue cells.” Application of potassium hydroxide (KOH) to a specimen of vaginal secretions produces a pronounced fishy odor.</td>
<td>Metronidazole 250 mg PO TID × 7 days or clindamycin 800 mg PO BID × 7 days (CDC, 2002). CDC (2002) reports that multiple studies have failed to demonstrate a teratogenic effect from metronidazole.</td>
<td>Increased risk for PROM, preterm birth, and low birth weight.</td>
</tr>
<tr>
<td>Trichomoniasis: <em>Trichomonas vaginalis</em></td>
<td>Occasional asymptomatic. May have frothy greenish gray vaginal discharge, pruritus, urinary symptoms. Strawberry patches may be visible on vaginal walls or cervix. Wet-mount preparation of vaginal secretions shows motile flagellated trichomonads.</td>
<td>Single 2 g dose of metronidazole orally (CDC, 2002).</td>
<td>Increased risk for PROM, preterm birth, and low birth weight.</td>
</tr>
<tr>
<td><strong>Sexually Transmitted Infections</strong></td>
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<tr>
<td>Chlamydial infection: <em>Chlamydia trachomatis</em></td>
<td>Women are often asymptomatic. Symptoms may include thin or purulent discharge, urinary burning and frequency, or lower abdominal pain. Lab test available to detect monoclonal antibodies specific for <em>Chlamydia.</em></td>
<td>Although nonpregnant women are treated with tetracycline, it may permanently discolor fetal teeth. Thus, pregnant women are treated with erythromycin or amoxicillin followed by repeat culture in 3 weeks (CDC, 2002).</td>
<td>Infant of woman with untreated chlamydial infection may develop newborn conjunctivitis, which can be treated with erythromycin eye ointment (but not silver nitrate). Infant may also develop chlamydial pneumonia. May be responsible for premature labor and fetal death. Syphilis can be passed transplacentally to the fetus. If untreated, one of the following can occur: second trimester abortion, stillborn infant at term, congenitally infected infant, uninfected live infant.</td>
</tr>
<tr>
<td>Syphilis: <em>Treponema pallidum,</em> a spirochete</td>
<td>Primary stage: chancre, slight fever, malaise. Chancre lasts about 4 weeks, then disappears. Secondary stage: occurs 6 weeks to 6 months after infection. Skin eruptions (condyloma lata) also symptoms of acute arthritis, liver enlargement, iritis, chronic sore throat with hoarseness. Diagnosed by blood tests such as VDRL, RPR, FTA, ABS. Dark-field examination or spirochetes may also be done.</td>
<td>For syphilis less than 1 year in duration: 2.4 million units benzathine penicillin G IM. For syphilis of more than 1 year’s duration: 2.4 million units benzathine penicillin G once a week for 3 weeks. Sexual partners should also be screened and treated (CDC, 2002).</td>
<td>For syphilis less than 1 year in duration: 2.4 million units benzathine penicillin G IM. For syphilis of more than 1 year’s duration: 2.4 million units benzathine penicillin G once a week for 3 weeks. Sexual partners should also be screened and treated (CDC, 2002).</td>
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</tbody>
</table>
Your friend Jena Yoo, G1PO, is 6 months pregnant and mentions to you that she is developing symptoms of a bladder infection. She has had several bladder infections over the past few years and feels she has warded off others by increasing her fluid intake and drinking acidic juices. Jena tells you that she plans to use the same approach this time because she just had her prenatal appointment last week. She assures you that if symptoms persist, she will discuss it with her caregiver at her next prenatal visit. What advice would you give her?

Answer can be found in Appendix H.

### Critical Thinking

#### CASE STUDY

Your friend Jena Yoo, GIPO, is 6 months pregnant and mentions to you that she is developing symptoms of a bladder infection. She has had several bladder infections over the past few years and feels she has warded off others by increasing her fluid intake and drinking acidic juices. Jena tells you that she plans to use the same approach this time because she just had her prenatal appointment last week. She assures you that if symptoms persist, she will discuss it with her caregiver at her next prenatal visit. What advice would you give her?

Intrapartum antibiotic therapy is recommended as follows: initial dose of penicillin G 5 million units intravenously (IV) followed by 2.5 million units IV every 4 hours until childbirth. Alternately, ampicillin 2 g initial dose IV followed by 1 g IV every 4 hours until childbirth may be used. Women at high risk for an anaphylactic reaction to penicillin because of marked allergy may be treated with clindamycin or erythromycin.

#### Other Infections in Pregnancy

Table 15–3 summarizes other urinary tract, vaginal, and sexually transmitted infections that contribute to risk during pregnancy. (These are described in more detail in Chapter 6.) Spontaneous abortion is frequently the result of a severe maternal infection. Some evidence links infection and prematurity. In addition, if the pregnancy is carried to term in the presence of infection, the risk of maternal and fetal morbidity and mortality increases. Thus it is essential to maternal and fetal health that infection be diagnosed and treated promptly.

### CHAPTER HIGHLIGHTS

- Several health problems associated with bleeding arise from the pregnancy itself, such as spontaneous abortion, ectopic pregnancy, and gestational trophoblastic disease. The nurse needs to be alert to early signs of these situations, to guard the woman against heavy bleeding and shock, to facilitate the medical treatment, and to provide educational and emotional support.
- Ectopic pregnancy is the implantation of a fertilized ovum in a site other than the uterus. Treatment may be medical, using IM methotrexate, or surgical.
- Incompetent cervix, the premature dilatation of the cervix, is the most common cause of second-trimester abortion. It is treated surgically with a Shirodkar-Barter operation (cerclage), which involves placing a purse-string suture in the cervix to keep it closed.

- Hyperemesis gravidarum, excessive vomiting during pregnancy, may cause fluid and electrolyte imbalance, dehydration, and signs of starvation in the mother and, if severe enough, death of the fetus. Treatment is aimed at controlling the vomiting, correcting fluid and electrolyte imbalance, correcting dehydration, and improving nutritional status.

- Both premature rupture of the membranes and preterm labor place the fetus at risk. Women with PROM and no signs of infection are managed conservatively with bed rest and careful monitoring of fetal well-being. If preterm labor develops, tocolytics are often effective in stopping labor, but they have associated side effects.

- Hypertension may exist before pregnancy or, more often, may develop during pregnancy. Preeclampsia can lead to growth retardation for the fetus, and if untreated it may lead to convulsions (eclampsia) and even death for the mother and fetus. A woman's understanding of the disease process helps motivate her to maintain the required rest periods in the left lateral recumbent position.

- Antihypertensive or anticonvulsive drugs may be part of the therapy.

- Rh incompatibility can exist when an Rh-negative woman and an Rh-positive partner conceive a child who is Rh positive. The use of Rh immune globulin has greatly decreased the incidence of severe sequelae due to Rh because the drug "tricks" the body into thinking antibodies have been produced in response to the Rh antigen.

- The impact of surgery, trauma, or battering on the pregnant woman and her fetus is related to timing in the pregnancy, seriousness of the situation, and other factors influencing the situation.

- Physical violence often begins or continues during pregnancy. The nurse needs to be alert for signs of abuse, including bruising or injury to the breasts, abdomen, or genitalia. The woman should be given information about female partner abuse and about community resources available to assist her.

- Toxoplasmosis, rubella, cytomegalovirus, herpes, GBS, and other perinatal infections pose a grave threat to the fetus. Prevention is the best therapy. There is no known treatment for rubella or CMV, but antimicrobial drugs are available for toxoplasmosis, herpes, and GBS.

- Universal screening for GBS is now recommended for all pregnant women at 35 to 37 weeks' gestation.

NCLEX review questions, case studies, and other interactive resources for this chapter can be found on the Companion Website at www.prenhall.com/ladewig. Click on “Chapter 15” to select the activities for this chapter.

For tutorials including animations and videos, more NCLEX review questions, and an audio glossary, access the accompanying CD-ROM in this book.

### CHAPTER REFERENCES


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