When we decided to have children we were so excited, so ready. I never expected that I would have two miscarriages. I can’t tell you how hard that was to handle. Even today, with two healthy children, I remember the pain, the loss, the sense of failure, and I grieve for the children we will never know.

—Jasmine, 36

LEARNING 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.

CD-ROM
Nursing bedside review
Skill 2–3: Assessing Deep Tendon Reflexes and Clonus
Skill 2–4: Administration of Rh Immune Globulin (RhIGG) (RhoGAM, HypRho-D)
Animation: Early Premature Labor
Audio Glossary

Companion Website
Nursing bedside review
MediaLink Applications:
  Case Study: Client with Preclampsia
  Care Plan Activity: Client at Risk for Preterm Labor
  Case Study
In some pregnancies, problems arise that place the woman and her unborn child at risk. Regular prenatal care helps detect these complications quickly so that effective care can be provided. This chapter focuses on problems that develop during pregnancy, that is, problems with a gestational onset.

### CARE OF THE WOMAN WITH A BLEEDING DISORDER

During the first and second trimesters, 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. Definitions vary somewhat according to state reporting laws (Cunningham, Leveno, Bloom et al., 2005). Abortions are either **spontaneous** (occurring naturally) or **induced** (occurring as a result of medical or surgical means). Because the term *abortion* may have 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. In the second half of pregnancy, particularly in the third trimester, the two major causes of bleeding are placenta previa and abruptio placentae. (See Chapter 21 for more information.) Regardless of the cause of bleeding, however, 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 are indicated:

- 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 and have oxygen available.
- Collect and organize all data, including antepartal history, onset of bleeding episode, and laboratory studies (hemoglobin, hematocrit, hormonal assays) for analysis.
- Notify other members of the healthcare team, including the physician or nurse-midwife, operating room staff if a surgical procedure is planned, and so forth.
- Obtain an order to type and crossmatch for blood if evidence of significant blood loss exists.
- Assess coping mechanisms of the 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.

**SPONTANEOUS ABORTION (MISCELLANEOUS)**

The incidence of first-trimester spontaneous abortion is about 10% to 12% for clinically recognized pregnancies, but the number may be higher overall. The likelihood of recurrent miscarriage is thought to be 25% to 30% (Simpson, 2002).

A majority of early miscarriages 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 15–1). 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 (habitual) abortion.** Abortion occurs consecutively in three or more pregnancies.

- **Septic abortion.** Infection is present. It may occur with prolonged, unrecognized rupture of the membranes, pregnancy with an intrauterine device

![Figure 15–1](image_url)

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 or fetus has passed out of the uterus, but the placenta remains.
Pelvic cramping and backache are reliable indicators of potential spontaneous abortion. 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 fetal heartbeat 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 sex, 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 dilation 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 alloimmunization beginning on page 361 in this chapter).

In missed abortions the products of conception usually 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. If in the first trimester, D&C or suction evacuation is done. In the second trimester, labor is induced or dilation and evacuation (D&E) may be used.

**NURSING ASSESSMENT AND DIAGNOSIS**

**Acute Pain** related to abdominal cramping secondary to threatened abortion

**Anticipatory Grieving** related to expected loss of unborn child

**Clinical Therapy**

**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, 2003).
- **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.

**PLANNING AND IMPLEMENTATION**

**Nursing Care in the Community**

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

Feelings of shock or disbelief are normal. Couples who approached the pregnancy with joy and excitement now 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 pregnancy.

**DEVELOPING CULTURAL COMPETENCE**

Remember that individual responses to fetal loss following miscarriage may vary greatly and may be influenced by ethnic or cultural norms.

- Miscarriage may be viewed in many ways. For example, it may be seen as a punishment from God, as the result of the evil eye or of a hex or curse by an enemy, or as a natural part of life.
- When grieving over a pregnancy loss, women from some cultures and ethnic groups may show their emotions freely, crying and wailing, whereas other women may hide their feelings behind a mask of stoicism.
- In some cultures the woman’s partner is her primary source of support and comfort. In others, the woman turns to her mother or close female relatives for comfort.
- Avoid falling into the trap of stereotyping women according to culture. Individual responses are influenced by many factors, including the degree of assimilation into the dominant culture.
about their pregnancies. The women may even believe that
the miscarriage is a punishment for some wrongdoing.

Offer psychologic support to the woman and her fam-
ily 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. To
help decrease feelings of guilt or blame, inform the woman
and her family about the causes of miscarriage. Refer them
to other healthcare professionals for additional help as nec-
 essary. The grieving period following a miscarriage 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.

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. Monitor
the woman’s condition closely and provide instruction for
self-care. Administer Rh immune globulin if it is indicated.

EVALUATION
Expected outcomes of nursing care include the following:

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

ECTOPIC PREGNANCY
Ectopic pregnancy (EP) is the implantation of the fertil-
ized ovum in a site other than the endometrial lining of the
uterus. It has many causes, including tubal damage from
pelvic inflammatory disease (PID), previous tubal surgery,
genital anomalies of the tube, endometriosis, previous
EP, presence of an IUD, and in utero exposure to diethyl-
stilbestrol (DES).

The incidence of EP has increased in the past several
years, from 4.5 per 1000 pregnancies in 1970 to 19.7 per
1000 pregnancies in 2000 (Gracia & Barnhart, 2001). Al-
though incidence has increased, mortality rates have de-
clined almost 90% due to better diagnostic techniques that
allow detection before tubal rupture.

EP occurs when the fertilized ovum is prevented or
slowed in its passage through the tube and thus implants
before it reaches the uterus, usually in the ampulla of the
fallopian tube. “Pathophysiology Illustrated: Ectopic Preg-
nancy” identifies other implantation sites.

Initially symptoms of pregnancy may be present, in-
cluding 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 tube
wall or implantation site and establish a blood supply.

Various implantation sites in ectopic pregnancy. The most common site is within the fallopian tube, hence the name “tubal pregnancy.”
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 have lower abdominal pain. Vaginal bleeding occurs when the embryo dies and the decidua sloughs.

Physical examination usually reveals adnexal (area over each ovary and fallopian tube) tenderness. 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 bleeding into the abdominal cavity, pelvic examination is very painful, and a mass of blood may be palpated in the lower abdomen. Laboratory tests may reveal low hemoglobin and hematocrit levels and rising leukocyte levels.

**Clinical Therapy**

Diagnosis of EP begins with an assessment of menstrual history, including the date of the last menstrual period, followed by a pelvic examination to identify any 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 EP tends to have abnormally low hCG levels. In a normal pregnancy, hCG levels double every 48 to 72 hours. Nondoubling hCG levels occur in EP. If the β-hCG levels are above 1500 milli-international units/mm, transvaginal ultrasound is used to check for a uterine pregnancy or an adnexal mass. Confirming a uterine pregnancy nearly eliminates the diagnosis of EP.

Treatment may be medical or surgical. Methotrexate is used 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 heart motion and the woman must have no evidence of a blood disorder or kidney or liver disease. Methotrexate, a folic acid antagonist that interferes with DNA synthesis and cell multiplication, is given intramuscularly (IM). As an outpatient the woman is monitored for increasing abdominal pain because a primary consideration is differentiating between the transient abdominal pain that indicates successful methotrexate therapy and the abdominal pain associated with a ruptured ectopic pregnancy. Serum β-hCG titers are also monitored regularly. Typically the hCG levels increase for 1 to 4 days and then decrease. If they do not, the woman may need a second dose of methotrexate or surgery (Cunningham et al., 2005).

If surgery is indicated and the woman desires future pregnancies, treatment involves salpingostomy via a laparoscope. With this method an incision is made lengthwise and the products of conception are gently removed. The surgical incision is left open and allowed to close naturally. 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 EP, the Rh-negative nonsensitized woman is given Rh immune globulin to prevent sensitization.

**DEVELOPING CULTURAL COMPETENCE**

**COMPLICATIONS OF PREGNANCY**

- 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., 2005).

**NURSING MANAGEMENT**

**NURSING ASSESSMENT AND DIAGNOSIS**

When the woman with a suspected ectopic pregnancy is admitted to the hospital, assess the appearance and amount of vaginal bleeding and monitor vital signs for developing shock. Assess the woman's emotional state and coping abilities, and determine the couple's informational needs. Determine the woman's level of pain, which can be significant. If surgery is necessary, complete the appropriate ongoing assessments postoperatively.

Nursing diagnoses that may apply for a woman with EP include the following:

- **Acute Pain** related to abdominal bleeding secondary to tubal rupture
- **Anticipatory Grieving** related to expected pregnancy loss
- **Health-Seeking Behaviors: Request for Information about Treatment of Ectopic Pregnancy and its Long-Term Implications** related to stated unfamiliarity with the condition

**PLANNING AND IMPLEMENTATION**

**Nursing Care in the Community**

Women with EP are often seen initially in a clinic or office setting. Be alert to the possibility of EP if a woman presents...
with complaints of abdominal pain and lack of menses for 1 to 2 months. A woman receiving medical treatment using methotrexate is followed as an outpatient. Advise the woman that some abdominal pain is common following the injection, but generally it is mild and lasts only 24 to 48 hours. More severe pain might indicate treatment failure and should be evaluated. The woman should also report heavy vaginal bleeding, dizziness, or tachycardia. Stress the need to return for follow-up hCG testing.

**Hospital-Based Nursing Care**

Once a diagnosis of EP is made and surgery is scheduled, start an IV as ordered and begin preoperative teaching. Immediately report signs of developing shock. If the woman experiences severe abdominal pain, 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; 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.

**GESTATIONAL TROPHOBLASTIC DISEASE**

Gestational trophoblastic disease (GTD) is the pathologic proliferation of trophoblastic cells (the trophoblast is the outermost layer of embryonic cells). It includes hydatidiform mole, invasive mole (chorioadenoma destruens), and choriocarcinoma, a form of cancer.

**Hydatidiform mole** (molar pregnancy) is a disease in which (1) abnormal development of the placenta occurs, resulting in hydropic vesicles (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 vesicles are avascular, and no embryonic tissue is 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 and little chance for survival. Often partial moles are recognized only after miscarriage, and they may go unnoticed even then.

**Invasive mole** (chorioadenoma destruens) 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 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. If hydropic vesicles are passed, they are diagnostic (Figure 15–2). With a partial mole, the vesicles are often smaller and may not be noticed. Because serum hCG levels are higher with molar pregnancy than
with normal pregnancy, the woman may experience hyperemesis gravidarum. Anemia occurs frequently 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. Transvaginal ultrasound is used for diagnosis.

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 choriocarcinoma, the woman treated for hydatidiform mole should receive extensive follow-up therapy. Follow-up care includes a baseline chest x-ray to detect lung metastasis and a physical examination including a pelvic examination. 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 should avoid pregnancy during that time because the elevated hCG levels associated with pregnancy would cause confusion about whether cancer had developed.

Continued high or rising hCG titers are abnormal. If they occur, a D&C is performed and the tissue is examined. If cancer cells are found, treatment at a center specializing in GTD is advised. Chemotherapy is started using methotrexate alone or with other chemotherapy agents. If, after a year of monitoring, the hCG serum titers are within normal limits, a couple may be assured that a normal pregnancy can be anticipated, with a low risk of recurring hydatidiform mole.

**NURSING MANAGEMENT**

**NURSING ASSESSMENT AND DIAGNOSIS**

Observe for symptoms of hydatidiform mole at each antepartal visit. The classic symptoms are found more frequently with the complete mole. Before evacuation the partial mole may be difficult to distinguish from a missed abortion. If a molar pregnancy is diagnosed, assess the woman’s (or the couple’s) understanding of the condition and its implications.

Nursing diagnoses that may apply include the following:

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

**PLANNING AND IMPLEMENTATION**

**Nursing Care in the Community**

When a molar pregnancy is suspected, the woman needs emotional support. Answer questions about the condition and explain what ultrasound and other diagnostic procedures will entail. If a molar pregnancy is diagnosed, support the parents as they deal with their grief about the lost pregnancy. Healthcare counselors, a member of the clergy, or a professional counselor may also be of help.

**Hospital-Based Nursing Care**

When the woman is hospitalized for removal of the mole, monitor vital signs and vaginal bleeding for signs of hemorrhage. Determine the presence of abdominal pain and evaluate the woman’s emotional state and coping ability. Have typed and crossmatched blood available for surgery. Administer oxytocin as ordered to keep the uterus contracted and to prevent hemorrhage. If the woman is Rh negative and not sensitized, give Rh immune globulin to prevent antibody formation.

Stress the importance of follow-up visits. Advise the woman to delay another pregnancy until the follow-up program is completed.

**EVALUATION**

Expected outcomes of nursing care include the following:

- The woman has a smooth 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 talking about 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.

**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. It is associated with repeated second-trimester abortions. Possible causes include cervical trauma, infection, congenital cervical or uterine anomalies, or increased uterine volume (as with a multiple gestation).

Diagnosis is based on a positive history of repeated, relatively painless and bloodless second-trimester abortions. Serial pelvic examinations early in the second trimester reveal progressive effacement and dilatation of
A cerclage or purse-string suture is inserted in the cervix to prevent preterm cervical dilatation and pregnancy loss. After placement the string is tightened and secured anteriorly.

**FIGURE 15–3**

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 managed surgically with a Shirodkar procedure (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 15–3). 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 (to prevent repeating the procedure in subsequent pregnancies), or the suture may be cut at term and vaginal birth permitted. Recent research questions the effectiveness of cerclage in preventing late miscarriage or preterm birth (American College of Obstetricians and Gynecologists [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.

**CARE OF THE WOMAN WITH HYPEREMESIS GRAVIDARUM**

Hyperemesis gravidarum, a relatively rare condition, is excessive vomiting during pregnancy. Clinicians now view hyperemesis as the far end of a continuum of nausea and vomiting of 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. Women with a history of migraine headaches, motion sickness, sickness related to oral contraceptives, and a family or personal history of hyperemesis are at increased risk. Other variables that may relate to hyperemesis include transient hyperthyroidism due to the effect of hCG on the thyroid-stimulating hormone (TSH) receptor, Helicobacter pylori infection, and psychologic factors, although research suggests that psychologic findings may be a response to hyperemesis gravidarum rather than a cause (Goodwin, 2004). In severe cases, hyperemesis causes 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 and 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 often added to the IV to prevent hypokalemia. Thiamine and pyroxidine (vitamin B6) may 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 MANAGEMENT**

**NURSING ASSESSMENT AND DIAGNOSIS**

When a woman is hospitalized for control of vomiting, assess the amount and character of any emesis, intake and output, fetal heart rate, signs of jaundice or bleeding, and her emotional state.
Nursing diagnoses that may apply include the following:

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

**PLANNING AND IMPLEMENTATION**

**Nursing Care in the Community**

Parenteral 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. This therapy also gives an opportunity to observe family interactions and evaluate the home environment. This assessment helps determine 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. Monitor weight regularly. In some cases emotional factors have appeared to play a role, 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. PROM is associated with infection, previous history of PROM, hydramnios, multiple pregnancy, urinary tract infection, amniocentesis, placenta previa, abruptio placentae, trauma, incompetent cervix, bleeding during pregnancy, and maternal genital tract anomalies.

Maternal risk of infection increases as does the risk of abruptio placentae (discussed in Chapter 21). Fetal-newborn implications include risk of respiratory distress syndrome (with PROM), 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 unless a management plan has been developed.

Fetal well-being is assessed through a fetal heart rate tracing or biophysical profile, and the gestational age of the fetus is calculated. The gestational age of the fetus and the presence or absence of infection guide treatment for PROM. If maternal signs of infection are evident, antibiotic therapy (usually by IV infusion) is started 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. On admission to the nursery, the newborn is assessed for sepsis and placed on antibiotics. (For further information about the newborn with sepsis, see Chapter 28.)

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. Regular nonstress tests (NSTs) or biophysical profiles are used to monitor fetal well-being. (These tests are discussed in Chapter 16.) 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 examinations are avoided to decrease the chance of infection. As the gestation approaches 34 weeks, fetal lung maturity studies are indicated. [AAP]

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, although this is controversial. 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 a fever, uterine tenderness or contractions, increased leakage of fluids, 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 harmful effects on...
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 glycogen 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. Clients with type 1 diabetes 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 (Iams, 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.

NURSING MANAGEMENT

NURSING ASSESSMENT AND DIAGNOSIS

Determining the length of time the membranes have been ruptured is a major part of the intrapartum assessment. Ask the woman when her membranes ruptured and when labor began, because the risk of infection may be directly related to the time involved. Observe the mother for signs and symptoms of infection by reviewing her white blood cell count, her temperature, her pulse rate, and the character of her amniotic fluid. Check her hydration status. When a preterm or cesarean birth is anticipated, evaluate 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
PLANNING AND IMPLEMENTATION

Focus nursing actions on the woman, her partner, and the fetus. Report signs of infection to the certified nurse-midwife or physician. Evaluate uterine activity and fetal response to the labor but do not do vaginal examinations unless absolutely necessary. Encourage the woman to rest on her left side to promote optimal uteroplacental perfusion. Use comfort measures to help her rest and relax. Ensure that the woman is well hydrated, particularly if her temperature is elevated.

Educate the woman and her partner, if he is involved, about the implications of PROM and all treatment methods. Address side effects and alternative treatments. Explain that although the membranes are ruptured, amniotic fluid continues to be produced.

Psychologic support for the couple is critical. Listen empathetically, relay accurate information, and provide explanations as needed. 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 decreases.
- 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.

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 preterm labor 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, increased risk of trauma during birth, and maturational deficiencies (fat storage, heat regulation, immaturity of organ systems).

CLINICAL THERAPY

Women at risk for preterm labor are taught to recognize the symptoms associated with it and, if any symptoms are present, to notify their certified nurse-midwife or physician immediately. Though often difficult to diagnose because many of the symptoms are common in normal pregnancy, prompt diagnosis is necessary to stop preterm labor before it progresses to the point at which intervention will be ineffective. Research suggests that the strongest predictors of preterm birth include 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).

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TABLE 15–1 + Risk Factors for Spontaneous Preterm Labor

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple gestation</td>
<td>Cervical shortening &lt;1 cm</td>
</tr>
<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 maternal infection</td>
<td>Cervical cerclage in situ</td>
</tr>
<tr>
<td>Maternal medical disease</td>
<td>In vitro fertilization (singleton or multiple gestation)</td>
</tr>
<tr>
<td>Previous preterm birth</td>
<td>STD (trichomoniasis, chlamydia)</td>
</tr>
<tr>
<td>Previous preterm labor with term birth</td>
<td>Anemia</td>
</tr>
<tr>
<td>Abdominal surgery during second or third trimester</td>
<td>Abdominal trauma</td>
</tr>
<tr>
<td>History of cone biopsy</td>
<td>Foreign body (IUD)</td>
</tr>
<tr>
<td>Uteroplacental ischemia</td>
<td>Bacterial vaginosis, E. coli (ascending intrauterine infection)</td>
</tr>
<tr>
<td>Stress</td>
<td>Periodontal disease</td>
</tr>
<tr>
<td>Inadequate prenatal care</td>
<td></td>
</tr>
</tbody>
</table>

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AMNIOTIC MEMBRANES

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.
Fetal fibronectin (fFN) is a protein normally found in the cervical fluid in early pregnancy but is not usually present in significant quantities between 18 and 36 weeks’ gestation. A positive fFN test (fFN found in the cervical 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 an incompetent cervix. In general, cervical length less than 25 mm prior to term is abnormal (AAP & ACOG, 2002).

Diagnosis of preterm labor is confirmed if the pregnancy is between 20 and 37 weeks and if there are documented uterine contractions (four in 20 minutes or eight in 1 hour), documented cervical change, or cervical dilatation of greater than 1 cm or cervical effacement of 80% or more (AAP & ACOG, 2002). The goal of clinical therapy is to prevent the preterm birth of a compromised infant. Attempts to prevent labor are not indicated if one or more of the following conditions are present: severe preeclampsia or eclampsia, chorioamnionitis, hemorrhage, maternal cardiac disease, poorly controlled diabetes mellitus or thyrotoxicosis, severe abruptio placenta, fetal anomalies incompatible with life, fetal death, acute fetal distress, or fetal maturity.

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 profusion, and an IV is started to promote maternal hydration. Maternal laboratory studies, including CBC, C-reactive protein, vaginal cultures, and urine cultures, 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 sulfate, prostaglandin synthetase inhibitors, and calcium channel blockers. The 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 much less frequently used 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 IV 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 health care 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., 2005). 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 such as indomethacin (Indocin) are being 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 NIH 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.”)

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, Bit-tar, 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 MANAGEMENT**

**NURSING ASSESSMENT AND DIAGNOSIS**

During the antepartal period, identify the woman at risk for preterm labor by noting the presence of predisposing factors. During the intrapartal period, assess 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

**PLANNING AND IMPLEMENTATION**

**Nursing Care in the Community**

Once the woman at risk for preterm labor has been identified, teach her about the importance of recognizing the onset of labor (see “Teaching Highlights: Preterm Labor”).

Periodic home visits by a home care nurse are an important part of care. During these visits, complete physical assessments similar to those done in the hospital and assess the woman’s emotional state. Provide information about support groups and other community resources for women at risk for preterm birth.

Increasing the woman’s awareness of the subtle symptoms of preterm labor is an important teaching objective. The signs and symptoms of preterm labor 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
- Pelvic pressure that feels 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

Also teach the woman 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.
Magnesium sulfate acts as a central nervous system 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 IV to control dosage more accurately and prevent overdosage. An occasional physician still prescribes IM administration. However, it is painful and irritating to the tissues and does not permit the close control that IV administration does. The IV 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 to 6 g magnesium sulfate in 100-mL solution administered over a 15 to 20-minute period (Cunningham et al., 2005).
Maintenance dose: 1 to 4 g/hr via infusion pump

For Treatment of Preeclampsia
Loading dose: 6 g magnesium sulfate 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/Newborn
The drug readily crosses the placenta. Some authorities suggest that transient decrease in fetal heart rate 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 to 8 hours). Therapeutic levels are in the range of 4.8 to 9.6 mg/dL. Reflexes often disappear at serum magnesium levels of 8 to 12 mg/dL; respiratory depression occurs at levels of 15 to 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/min, magnesium toxicity may be developing, and further assessments are indicated. Many protocols require stopping the medication if the respiratory rate falls below 12/min.
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 the respirations 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-eclampsia.
10. If the mother has received magnesium sulfate close to birth, the newborn should be closely observed for signs of magnesium toxicity for 24 to 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.
If they occur every 10 minutes for 1 hour, however, the cervix could begin to dilate, and labor could begin.

Ensure 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 and make arrangements to be checked for ongoing labor. When a woman is at risk for preterm labor, she may have many episodes of contractions and other signs or symptoms. Thus, the woman’s call must be taken seriously. If she is treated positively, she will feel freer to report problems as they arise.

Preventive self-care measures are also very important. They are described in Table 15–2.

**Hospital-Based Nursing Care**

Supportive nursing care is important to the woman in preterm labor during hospitalization. Promote bed rest, monitor vital signs, measure intake and output, and monitor the fetal heart rate continuously, and monitor uterine contractions. Having the woman lie on her left side facilitates maternal-fetal circulation. Keep vaginal examinations to a minimum. If tocolytic agents are being administered, monitor the mother and fetus closely for any adverse effects.

Whether preterm labor is arrested or proceeds, the woman and her partner, if he is involved, experience intense psychologic stress. Provide emotional support to help decrease the anxiety associated with the risk of a preterm newborn. Also recognize the stress of prolonged bed rest and of lack of sexual contact and help the couple find satisfactory ways of dealing with those stresses. Empathetically assist the couple to express their feelings, which commonly include guilt and anxiety, and identify and implement coping mechanisms. Keep 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, offer the couple brief but ongoing explanations to prepare them for the actual birth process and the events following the birth.
PREECLAMPSIA AND ECLAMPSIA

Preeclampsia, the most common hypertensive disorder in pregnancy, occurs in 2% to 7% of nulliparous women. For women who have a twin pregnancy, the rate is much higher (14%) as it is for those who had preeclampsia in a previous pregnancy (18%) (Coppage & Sibai, 2004). Preeclampsia is defined as gestational hypertension with a blood pressure of 140/90 or higher on two occasions at least 6 hours apart 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 & de Swiet, 2001).

Preeclampsia, typically categorized as mild or severe, is a progressive disorder. In its most severe form, eclampsia, (generalized seizures or coma) develops. Most often preeclampsia occurs 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 primigravidas. Women with a history of preeclampsia are at increased risk, as are women with GTD, Rh incompatibility, diabetes, and a large placental mass (as in multiple gestation).

Pathophysiology of Preeclampsia

The 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 helps 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.

- 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 (see “Pathophysiology Illustrated: Preeclampsia”). The effect on the fetus may be growth restriction, decrease in fetal movement, and chronic hypoxia or fetal distress.

- In preeclampsia, normal renal perfusion is decreased. With a reduction of the glomerular filtration rate, 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 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.

The mother’s condition should be assessed and stabilized, especially if her platelet counts are very low. Platelet transfusions are indicated for platelet counts below 20,000/mm³. The fetus is also assessed, using a nonstress test and biophysical profile. Once HELLP syndrome is diagnosed and the woman’s condition is stable, birth of the child is indicated.

Maternal Risks

Central nervous system changes associated with preeclampsia-eclampsia are hyperreflexia, headache, and
In a normal pregnancy, the passive quality of the spiral arteries permits increased blood flow to the placenta.

In preclampsia vasoconstriction of the myometrial segment of the spiral arteries occurs.

Preeclampsia

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. There is also increased risk for renal failure, abruptio placentae, 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 newborn may be premature because of the necessity for early birth. At birth the newborn may be oversedated because of medications given to the mother. The newborn may also have hypermagnesemia due to treatment of the woman with large doses of magnesium sulfate.

Clinical Therapy

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, 1+ proteinuria may occur, and liver enzymes may be elevated minimally. Although no longer considered a diagnostic sign of preeclampsia, edema may be present.

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 of 5 g or higher 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. 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 may 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, may occur before labor, during labor, or early in the postpartal period. Some women experience only one seizure; others have several.

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

Home Care of Mild Preeclampsia. For some women with mild preeclampsia, home care is 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 a cause for concern. Remote NSTs are performed on a daily to biweekly 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. Her 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
- Biophysical profile
- Serum creatinine determinations
- Amniocentesis to determine fetal lung maturity
- Doppler velocimetry beginning at 30 to 32 weeks to screen for fetal compromise

Severe Preeclampsia In severe cases, 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 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 IV therapy. IV 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.** These medications are most commonly used. Antihypertensive therapy is generally given for diastolic blood pressures of 105 to 110 mm Hg or higher. Hydralazine (Apresoline) is the medication most commonly used. Methyldopa is often used for long-term control of mild to moderate hypertension in pregnancy because it is safe and effective. 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 IV 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. Phenytoin (Dilantin) 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 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-eclampsia. 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 very severe cases, cesarean birth may be necessary even if the fetus is immature.
Assessment for signs of worsening preeclampsia continues. The woman may receive IV oxytocin and magnesium sulfate simultaneously. Infusion pumps should be used, and bags and tubing must be carefully labeled.

Analgesics may be used to decrease discomfort, or the woman may have an epidural block. 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 response to the contractions.

Postpartal 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 antihypertensives or magnesium sulfate postpartally.

NURSING MANAGEMENT

See “Nursing Care Plan: The Woman with Preeclampsia” for information on nursing care.

NURSING ASSESSMENT AND DIAGNOSIS

Take and record the blood pressure during each antepartal visit. If the blood pressure rises, or if the normal decrease in blood pressure expected between 8 and 28 weeks of pregnancy does not occur, the woman should be followed closely. Also check the woman’s urine for proteinuria at each visit.

If hospitalization becomes necessary, assess the following:

**Blood pressure.** Assess every 1 to 4 hours, or more frequently if indicated by medication or other changes in the woman’s status.

**Temperature.** Take every 4 hours, or every 2 hours if elevated.

**Pulse and respirations.** Determine pulse rate and respirations along with blood pressure.

**Fetal heart rate.** Check the fetal heart rate with the blood pressure, or monitor continuously with the electronic fetal monitor if the situation indicates.

**Urinary output.** Measure every voiding. 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.

**Urine protein.** Evaluate urinary protein 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.** Check specific gravity of the urine hourly or with each voiding. Readings over 1.040 correlate with oliguria and proteinuria.

**Weight.** Weigh the woman daily at the same time. She should be wearing the same robe or gown and slippers. Weighing may be omitted if the woman is to maintain strict bed rest.

**Pulmonary edema.** Observe the woman for coughing. Auscultate the lungs for moist respirations.

**Deep tendon reflexes.** Assess the woman for evidence of hyperreflexia in the brachial, wrist, patellar, or Achilles’ tendons (Table 15–3). The patellar reflex is the easiest to assess. Clonus is assessed by vigorously dorsiflexing the foot while the knee is held in a fixed position (Figure 15–4). Normally no clonus is present. If it is present, it is measured as beats and recorded as such. See Skill 2–3 in the Clinical Skills Manual SKILLS as well as on the CD-ROM that accompanies this text.

**Placental separation.** Assess hourly for vaginal bleeding and uterine rigidity.

**Headache.** Ask about the existence and location of any headache.

**Visual disturbance.** Ask about any visual blurring or changes or scotomata. The results of the daily funduscopic examination should be recorded on the chart.

**Epigastric pain.** Ask 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 signs of thrombocytopenia or DIC; liver enzymes; and electrolyte levels are all indicated. Magnesium levels are monitored regularly in women receiving magnesium sulfate.

**Level of consciousness.** Observe the woman for alertness, mood changes, and any signs of impending convulsion.

**Emotional response and level of understanding.** Carefully assess the woman’s emotional response so that support and teaching can be planned accordingly.

In addition assess the effects of any medications administered. Become familiar with the more commonly used medications and their purpose, implications, and associated untoward or toxic effects.
**NURSING CARE PLAN**

**THE WOMAN WITH PREECLAMPSIA**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Rationale</th>
<th>Expected Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NIC Intervention:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fluid management:</strong> Promotion of fluid balance and prevention of complications related to fluid shifts</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NOC Outcome:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fluid balance:</strong> Balance of fluid in the intracellular and extracellular compartments of the body</td>
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</tbody>
</table>

**Goal:** Client is restored to normal fluid volume levels.

- Encourage woman to lie in the left lateral recumbent position.
- Assess blood pressure every 1 to 4 hours as necessary.
- Monitor urine for volume and proteinuria every shift or every hour per agency protocol.
- Assess deep tendon reflexes and clonus.

- The left lateral recumbent position decreases 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.
- Frequent monitoring will assess for progression of the disorder and allow for early intervention to ensure maternal and fetal health and well-being.
- Monitoring provides information to assess renal perfusion. Proteinuria is the last cardinal sign of preeclampsia to appear. As the disorder worsens, the capillary walls of the glomerular endothelial cells stretch, allowing protein molecules to pass into the urine. Normally urine does not contain protein. Reading of 3+ and 4+ indicate loss of 5 g or more protein in 24 hours. 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.
- Hyperreflexia may occur 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. A rating of 4+ is abnormal and indicates hyperreflexia. A rating of 0 or no response is also abnormal and is seen with high maternal serum magnesium levels. Clonus, an abnormal finding, is present if the foot "jerks" or taps the examiner’s hand, at which time the examiner counts the number of taps or beats. The presence of clonus indicates a more pronounced hyperreflexia and is indicative of CNS irritability.
### NURSING CARE PLAN—continued

#### THE WOMAN WITH PREECLAMPSIA

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Rationale</th>
<th>Expected Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Assess for edema.</td>
<td>Edema develops as fluid shifts from the intravascular to the extravascular spaces. Edema is assessed either by weight gain (more than 3.3 lb/month in the second trimester or more than 1.1 lb/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+).</td>
<td></td>
</tr>
<tr>
<td>■ Administer magnesium sulfate per infusion pump as ordered.</td>
<td>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 relaxes smooth muscles and may therefore decrease the blood pressure.</td>
<td></td>
</tr>
<tr>
<td>■ Assess for magnesium sulfate toxicity.</td>
<td>Side effects of magnesium sulfate are dose related. Therapeutic levels are in the range of 4.8–9.6 mg/dL. As maternal serum magnesium levels increase, toxicity may occur. Signs of toxicity include decreased or absent DTRs, urine output below 30 mL/hr, respirations below 12, and confusion.</td>
<td></td>
</tr>
<tr>
<td>■ Provide a balanced diet that includes 80–100 g/day or 1.5 g/kg/day of protein.</td>
<td>A diet rich in protein is necessary to replace protein that is excreted in the urine.</td>
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2. **Nursing Diagnosis:** Risk for Injury to the Fetus related to uteroplacental insufficiency secondary to vasospasm

**NIC Intervention:**

- **High-risk pregnancy care:** Identification and management of preeclampsia to promote healthy outcomes for mother and baby

**NOC Outcome:**

- **Risk control:** Actions to manage signs and symptoms of preeclampsia and thereby reduce fetal risk

**Goal:** The fetus avoids complications related to uteroplacental insufficiency.

- **Instruct client to count fetal movements 3 times a day for 20 to 30 minutes.**

- **Encourage client to rest in the left lateral recumbent position.**

- **Collaborative:** Assist with serial ultrasounds.

- **Fetal activity provides reassurance of fetal well-being.** Decrease in fetal movement or cessation of movement may indicate fetal compromise.

- **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.

- **Maternal vasospasm and hypovolemia result from preeclampsia,** which may lead to SGA newborns. Ultrasound provides assessment of fetal growth by measuring the biparietal diameter of the fetal head or the fetal femur length.

- **The fetus will have an adequate supply of oxygen and nutrients as evidenced by absence of signs of fetal distress and fetal diagnostic test results within normal limits.**

(continued)
### THE WOMAN WITH PREECLAMPSIA

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Rationale</th>
<th>Expected Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform nonstress test as ordered.</td>
<td>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>
<td>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 the woman understands what the test evaluates and what the results mean. See discussion of BPP in Chapter 16.</td>
</tr>
<tr>
<td>Describe for the woman the purposes of a biophysical profile (BPP).</td>
<td>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 the woman understands what the test evaluates and what the results mean. See discussion of BPP in Chapter 16.</td>
<td></td>
</tr>
<tr>
<td>Assist with amniocentesis to obtain lecithin/sphingomyelin (L/S) ratio.</td>
<td>Women with preeclampsia may give birth before term. Amniotic fluid may be analyzed to determine the maturity of the fetal lungs. An L/S ratio of 2:1 or greater indicates fetal lung maturity and is usually achieved by 35 weeks' gestation. 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>
<td></td>
</tr>
<tr>
<td>Explain the purpose of Doppler flow studies.</td>
<td>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>
<td></td>
</tr>
</tbody>
</table>

#### 3. Nursing Diagnosis: Risk for Ineffective Health Maintenance related to deficient knowledge about new diagnosis (preeclampsia)

**NIC Intervention:**

**Disease process teaching:** Assisting the woman to understand information related to the diagnosis of preeclampsia

**NOC Outcome:**

**Knowledge:** Treatment regimen: Extent of understanding conveyed about treatment regimen for preeclampsia

**Goal:** The woman will describe the condition and treatment regimen.

- Assess the woman and family’s understanding of preeclampsia and its implications for pregnancy.
- Provide information about the disease process, impact on maternal well-being, risks of progression, implications for the fetus, and dangers of eclampsia.
- Emphasize the importance of self-monitoring for signs that her condition is worsening and the importance of regular prenatal care for the purpose of maternal and fetal surveillance.
- This assessment provides information about the woman’s cognitive level and her understanding of her diagnosis. Behavior changes occur when teaching strategies are appropriate for the woman and family’s cognitive level.
- Basic understanding of the condition and its implications is necessary for the woman to understand the treatment plan. A woman who shows signs of early preeclampsia often feels well and may have difficulty accepting the need to rest.
- The woman should be able to identify signs of disease progression, including evidence of increasing edema, decreased urine output, signs of cerebral disturbance (frontal headache, blurred vision, scotomata), epigastric or right upper quadrant pain, nausea or vomiting, and increased irritability.
- Woman will demonstrate understanding of preeclampsia and its implications as evidenced by verbalization of basic condition, signs and symptoms of progression, importance of sufficient rest in side-lying position, and need to follow prescribed diet.
To elicit clonus, with the knee flexed and the leg supported, sharply dorsiflex the foot, hold it momentarily, and then release it. Normally the foot returns to its usual position of plantar flexion. Clonus is present if the foot “jerks” or taps against the examiner’s hand. If so, the number of taps or beats of clonus is recorded.

Examples of nursing diagnoses that might apply include the following:
- **Deficient Fluid Volume** 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

**PLANNING AND IMPLEMENTATION**

**Nursing Care in the Community**

A woman with preeclampsia may fear losing her fetus, worry about her personal relationship with her other children and her personal and sexual relationship with her partner, be concerned about finances, and 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. Help couples identify and discuss these concerns. Offer information and explanations if certain aspects of therapy cause difficulty. 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 weekly, but she may need to come in earlier than her next appointment if symptoms indicate that her condition is progressing.

**Hospital-Based Nursing Care**

The development of severe preeclampsia is a cause for increased concern about the prognosis for the woman and her fetus. Explain medical therapy and its purpose and offer honest, hopeful information. Keep the couple informed of fetal status and discuss other concerns the couple may express. Provide as much information as possible and seek other sources of information or aid for the family as needed. Offer to contact a member of the clergy or hospital chaplain for additional support if the couple so chooses.

Maintain a quiet, low-stimulus environment for the woman. She should be in a private room in a quiet location where she can be watched closely. Limit visitors 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.

Avoid unlimited phone calls 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.

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### TABLE 15–3  Deep Tendon Reflex Rating Scale

<table>
<thead>
<tr>
<th>Rating</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4+</td>
<td>Hyperactive; very brisk, jerky, or clonic response; abnormal</td>
</tr>
<tr>
<td>3+</td>
<td>Brisker than average; may not be abnormal</td>
</tr>
<tr>
<td>2+</td>
<td>Average response; normal</td>
</tr>
<tr>
<td>1+</td>
<td>Diminished response; low normal</td>
</tr>
<tr>
<td>0</td>
<td>No response; abnormal</td>
</tr>
</tbody>
</table>

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**FIGURE 15–4**

To elicit clonus, with the knee flexed and the leg supported, sharply dorsiflex the foot, hold it momentarily, and then release it. Normally the foot returns to its usual position of plantar flexion. Clonus is present if the foot “jerks” or taps against the examiner’s hand. If so, the number of taps or beats of clonus is recorded.
Monitor the effectiveness of medications administered. Be alert for signs of untoward effects or developing toxic levels.

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, turn the woman to her side (if she is not already in that position) to aid circulation to the placenta. Turn her head face down to allow saliva to drain from her mouth. Attempting to insert a padded tongue blade is no longer advocated in many facilities; in others, it is used if it can be inserted without force because it may prevent injury to the woman’s mouth. The side rails should be padded or a pillow put between the woman and each side rail.

After 15 to 20 seconds, the clonic phase starts. When the thrashing subsides, intensive monitoring and therapy begin. An oral airway is inserted, the woman’s nasopharynx is suctioned, and oxygen is administered by nasal catheter. Fetal heart tones are monitored continuously. Monitor maternal vital signs every 5 minutes until they are stable, then every 15 minutes.

**Nursing Management During Labor and Birth.** Keep the woman positioned on her left side as much as possible. Carefully monitor both the woman and the fetus throughout labor. Note the progress of labor and remain alert for signs of worsening preeclampsia or its complications.

During the second stage of labor, encourage the woman 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. Encourage a family member or other support person to stay with the woman as much as possible. Keep the woman and her support person informed of the progress and plan of care. Whenever possible, respect their wishes concerning the birth experience.

**Nursing Management During the Postpartal Period.** Because the woman with preeclampsia is hypovolemic, even normal blood loss can be serious. Assess the amount of vaginal bleeding and observe the woman for signs of shock. Monitor blood pressure and pulse every 4 hours for 48 hours. Check hematocrit daily. Assess the woman for any further signs of preeclampsia. Measure intake and output. Normal postpartum diuresis helps eliminate edema and is a favorable sign.

Postpartum depression can develop after such a difficult pregnancy. To help prevent it, provide opportunities for frequent maternal-infant contact and encourage family members to visit. The couple may have many questions, so be available for discussion. Give the couple 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).

**EVALUATION**

Expected outcomes of nursing care include the following:

- The woman is able to explain preeclampsia-eclampsia, 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 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. The cause of chronic hypertension has not been determined. In most women 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 information so that the woman can meet her healthcare needs. Provide information about her diet, the need for 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 HYPERTENSION**

Gestational hypertension is characterized by hypertension occurring for the first time after midpregnancy without proteinuria. It is called transient hypertension if preeclampsia does not develop and if the blood pressure returns to normal within 12 weeks following childbirth.

**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, Altinteppe 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).

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 is being 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 group is present on the surface of erythrocytes of most of the population. When it is present, a person is said to be Rh positive. Those without the factor are 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 hemolysis and hemolysis of red blood cells (RBCs). Rh alloimmunization (sensitization), also called isoimmunization, most often occurs when an Rh-negative woman carries an Rh-positive fetus, either to term or to termination by miscarriage or induced abortion. It can also occur if an Rh-negative nonpregnant woman receives an Rh-positive blood transfusion.

The red blood cells 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 child 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 causes anemia in the fetus (Figure 15–5).

**FETAL-NEONATAL RISKS**

Although maternal sensitization can now be prevented by administration of Rh immune globulin (RhoGAM, or RhIgG), sensitization still occurs and infants still die of Rh hemolytic disease. If treatment is not initiated, the anemia resulting from this disorder can cause marked fetal edema, called hydrops fetalis. 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, healthcare providers (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 screen; and (3) identify other medical complications such as diabetes, infections, or hypertension. When assessment identifies an Rh-negative woman who may be pregnant with an Rh-positive fetus, an antibody screen (indirect Coombs’ test) is done to determine if the woman is sensitized (has developed alloimmunization) to the Rh antigen. The indirect Coombs’ test measures the number of antibodies in the maternal blood.

Negative antibody titers and a negative indirect Coombs’ test can identify the fetus not at risk. However, the titers cannot reliably point out the fetus in danger, since titer level does not correlate with the severity of the disease. Antibody titers are determined periodically throughout the pregnancy. If the maternal antibody titer is 1:16 or greater, a delta optical density (ΔOD) analysis of the amniotic fluid
Rh alloimmunization sequence. A, Rh-positive father and Rh-negative mother. B, Pregnancy with Rh-positive fetus. Some Rh-positive blood enters the mother’s bloodstream. C, As the placenta separates, the mother is further exposed to the Rh-positive blood. D, Anti-Rh-positive antibodies (triangles) are formed. E, In subsequent pregnancies with an Rh-positive fetus, Rh-positive red blood cells are attacked by the anti-Rh-positive maternal antibodies, causing hemolysis of the red blood cells in the fetus.

is performed. This ΔOD analysis measures the amount of pigment from the breakdown of RBCs and can determine the severity of the hemolytic process.

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. Ascites and subcutaneous edema are signs of severe fetal involvement. Other indicators of the fetal condition include an increase in fetal heart size and hydramnios.

**CLINICAL THERAPY**

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

**Antepartal Management**

Since transplacental hemorrhage is possible during pregnancy, an antibody screen is performed on an Rh-negative woman at 28 weeks’ gestation. If she has no antibody titer, she is given an IM injection of 300 mcg Rh immune globulin (RhoGAM, HypRho-D). *(Note: A new form of human Rh immune globulin—Rhophylac—is also available and can be administered either intravenously or intramuscularly.)* The Rh immune globulin provides passive antibody protection against Rh antigens. This “tricks” the body, which does not then produce antibodies of its own (active immunity). As discussed later, Rh immune globulin is also given postpartally.

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, hydatidiform mole, chorionic villus sampling (CVS), amniocentesis, placenta previa with bleeding, blunt trauma to the abdomen, external cephalic version, suspected abruption, or stillbirth. When CVS is performed or if abortion or ectopic pregnancy occurs in the first trimester, a smaller (50 mcg) dose of Rh immune globulin (MICRhoGAM or Mini-Gamulin Rh) may be used; however, many clinical agencies no longer stock the lower dose preparation, which costs about the same as the standard dose (Moise, 2004). A full 300-mcg dose is used after the first trimester.

Rh immune globulin is not given to the newborn or the father. It 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 is given; it will cause no harm (Table 15–4). *(The treatment of the newborn is discussed in Chapter 27.)*

Two primary interventions can help the fetus whose blood cells are being destroyed by maternal antibodies:
When trying to work through Rh problems, 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’ test—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 red blood cells.

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, 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 placental bleeding concerns.

Rh immune globulin is also administered after each abortion (spontaneous or therapeutic), ectopic pregnancy, or amniocentesis.

TABLE 15–4 Rh Alloimmunization

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Rh immune globulin is also administered after each abortion (spontaneous or therapeutic), ectopic pregnancy, or amniocentesis.

During the antepartal period, explain the mechanisms involved in alloimmunization (isoimmunization) and answer any questions the woman and her partner have. It is imperative that the woman understand the importance of receiving Rh immune globulin after every miscarriage, abortion, or ectopic pregnancy. In addition, explain the purpose of the Rh immune globulin administered at 28 weeks’ gestation if the woman is not sensitized.

If the woman is sensitized during her pregnancy, nursing assessment focuses on the knowledge and coping skills of the woman and her family. After birth, review data about the Rh type of the fetus. If the newborn is Rh positive, the mother is Rh negative, and no sensitization has occurred, it is necessary to administer Rh immune globulin.

Nursing diagnoses that might apply 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 Coping related to depression secondary to the development of indications of the need for fetal exchange transfusion

PLANNING AND IMPLEMENTATION

During the antepartal period, explain the mechanisms involved in alloimmunization (isoimmunization) and answer any questions the woman and her partner have. It is imperative that the woman understand the importance of receiving Rh immune globulin after every miscarriage, abortion, or ectopic pregnancy. In addition, explain 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. Provide emotional support to the family to help the members deal with their concern and any feelings of guilt about the infant’s
condition. If an intrauterine transfusion becomes necessary, provide support while also assuming responsibility as part of the healthcare team. During labor, when caring for an Rh-negative woman who has not been sensitized, ensure that the woman’s blood is assessed for any antibodies and also has been crossmatched for Rh immune globulin. The postpartum nurse is usually responsible for administering the Rh immune globulin IM if the newborn is Rh positive. See Skill 2–4 in the Clinical Skills Manual as well as on the CD-ROM that accompanies this text.

**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 of the antigens of the ABO group, namely A or B. People with these antigens are then said to have type A, type B, or type AB blood. People whose blood cells present neither A nor B antigens have type O blood. In most cases ABO incompatibility is limited to type O mothers with a type A, B, or AB fetus. Group O infants, because they have no antigenic sites on the red blood cells, are never affected regardless of the mother’s blood type. 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, a low serum anti-A and anti-B titers cross the placenta and produce hemolysis of the fetal red blood cells. With ABO incompatibility, the first infant is often 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 never warranted. As part of the initial assessment, however, note whether the potential for an ABO incompatibility exists (type O mother and type A or B father). This alerts healthcare providers 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 postpartum, but essential surgery can generally be done during pregnancy. Surgery poses some risks, however. The incidence of miscarriage 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. When surgery is necessary, the incidence of preterm labor and intrauterine growth restriction increases.

Although general preoperative and postoperative care is similar for pregnant and nonpregnant women, special considerations must be kept in mind whenever the surgical client is pregnant. The early second trimester is the best time to operate because there is less risk of miscarriage or early labor, and the uterus is not so large as to block the surgical site. If a chest x-ray is done, the fetus should be shielded from 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, a nasogastric tube is usually inserted before a pregnant woman has major surgery. An indwelling urinary catheter prevents bladder distention, decreases risk of injury to the bladder, and permits 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 to maintain an airway 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 during and after surgery. Blood loss is also monitored throughout the procedure and following it.

Postoperatively encourage 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 apply antiembolism stockings, encourage leg exercises while the woman is in bed, and have her ambulate as soon as possible.

Discharge teaching is very important. The woman and her family should 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 blunt trauma, accounting for 60% to 80% of cases; another 10% to 12% of cases involve pregnant pedestrians hit by a car (Divekar & Keith, 2004). 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 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 bones.

Trauma that causes concern includes blunt trauma, 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 begin 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 lifesaving measures for the woman. Such measures include establishing an airway, controlling external bleeding, and administering IV fluid to alleviate shock. The woman must be kept on her left side to prevent further hypotension. Oxygen is administered at 100%. Fetal heart rate and fetal movement are 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 cases of trauma in which the mother’s life is not directly threatened, fetal monitoring for a minimum of 4 hours is suggested if there are no contractions, vaginal bleeding, uterine tenderness, or leaking amniotic fluid. Monitoring for 24 hours is recommended if the woman has experienced major trauma or shows signs of obstetric complications such as uterine bleeding, persistent contractions, premature rupture of the membranes, or abnormal fetal heart rate patterns (Divekar & Keith, 2004). 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 4% to 8% (AAP & ACOG, 2002). Physical abuse may result in loss of pregnancy, preterm labor, low-birth-weight infants, and fetal death. Abused women have higher rates of complications such as anemia, infection, low weight gain, and first- and second-trimester bleeding (McFarlane, Parker, Soeken, Silva, & Reed, 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 screening for abuse at the first prenatal visit, at least once each trimester, and then again during the postpartum period.

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. Any bruising or evidence of pain is also evaluated. 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 department and a history of accidents without understandable causes are possible indicators of abuse.

The goals of treatment are to identify the woman at risk, to increase her decision-making abilities to decrease the risk for further abuse, and to provide a safe environment for the 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.

Because abuse often begins during pregnancy, it may 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 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 barely noticeable 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, Navin, & Jones, 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

Diagnosis can be made by serologic testing of antibody titers, specifically Toxoplasma-specific antibodies IgG and IgM using the indirect fluorescent antibody (IFA) test. 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 physical findings, history, and blood tests, the woman may be treated with sulfadiazine and pyrimethamine. This combination should not be started until after the first trimester because of the teratogenic effects of pyrimethamine. 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 MANAGEMENT

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 include the following:

- Risk for Ineffective 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
PLANNING AND IMPLEMENTATION

During the antepartal period, 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. Stress 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) 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

The period of greatest risk for the 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 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.

The expanded rubella syndrome relates to effects that may develop for years after the infection. These include an increased incidence of type 1 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.

As part of the prenatal laboratory screen, the woman is evaluated for rubella using hemagglutination inhibition (HAI), a serology test. The presence of a 1:16 titer or greater is evidence of immunity. A 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 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 Ineffective Health Maintenance related to lack of knowledge about the importance of rubella immunization before becoming pregnant

PLANNING AND IMPLEMENTATION

Support is vital for the couple considering abortion due to a diagnosis of rubella. Such a decision may trigger a crisis for the couple. The parents need objective data to understand the possible effects on their unborn fetus and the long-term prognosis.

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.
for nonpregnant women are discussed in Chapter 5.

Herpes Simplex Virus (HSV) infection can develop on the cervix. (This condition and its implications cause painful lesions in the genital area. Lesions may also recur 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 newborn.

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.

For the fetus, this infection can result in (1) extensive tissue damage that leads to fetal death; (2) survival with microcephaly, hydrocephaly, cerebral palsy, or mental retardation; or (3) survival with no damage at all. The infected newborn is often small for gestational age. The principal tissues and organs affected are the blood, brain, and liver. However, virtually all organs are potentially at risk.

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 born vaginally to a mother 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 (Centers for Disease Control and Prevention [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.

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, valacyclovir, 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 no evidence of genital infection exists, 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 healthcare providers 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 MANAGEMENT

NURSING ASSESSMENT AND DIAGNOSIS

During the initial prenatal visit, it is important to learn whether the woman or her partner have had previous her-
pes infections. If so, ongoing assessment is indicated as pregnancy progresses.

Nursing diagnoses that may apply 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

**PLANNING AND IMPLEMENTATION**

Client education about this fast-spreading disease is crucial. Inform women 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 adult who wants to have a family. Counseling that allows her to express the negative feelings she may have about the infection may help. Literature may also help and is available from Planned Parenthood and public health agencies. The American Social Health Association has established the HELP program to provide information on genital herpes and has a quarterly journal, *The Helper*, for clients with HSV infection.

**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) is a bacterial infection found in the lower gastrointestinal or urogenital tracts. Women may transmit GBS 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 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 one week or more after birth.

Early-onset GBS is often characterized by signs of serious illness, including pneumonia and overwhelming sepsis. Late-onset GBS 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 intrapartal antibiotic prophylaxis 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 intrapartal 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 less than 37 weeks, membranes ruptured 16 hours or more, or temperature 100.4°F (38.0°C) or higher.

Intrapartum antibiotic therapy is recommended as follows: initial dose of penicillin G, 5 million units IV followed by 2.5 million units IV every 4 hours until childbirth. Alternatively, 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 15–5 summarizes other urinary tract, vaginal, and sexually transmitted infections that contribute to risk
### Table 15–5  Infections That Put Pregnancy at Risk

<table>
<thead>
<tr>
<th>Condition and Causative Organism</th>
<th>Signs and Symptoms</th>
<th>Treatment</th>
<th>Implications for Pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urinary Tract Infections (UTI)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asymptomatic bacteriuria (ASB): Escherichia, Klebsiella, Proteus 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.</td>
</tr>
<tr>
<td>Cystitis (lower UTI): 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>If not treated, infection may ascend and lead to acute pyelonephritis.</td>
</tr>
<tr>
<td>Acute pyelonephritis: 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 carbenicillin, methenamine, cephalosporins. Catheterization if output is ↓. Supportive therapy for comfort. Follow-up urine cultures are necessary.</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>Vaginal Infections</strong></td>
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<tr>
<td>Vulvovaginal candidiasis (yeast infection): Candida albicans</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 preparation, clotrimazole suppositories at bedtime for 1 week. Cream may be prescribed for topical application to the vulva if necessary (CDC, 2002).</td>
<td>If the infection is present at birth and the fetus is born vaginally, the fetus may contract thrush.</td>
</tr>
<tr>
<td>Bacterial vaginosis: Gardnerella vaginalis</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).</td>
<td>CDC (2002) reports that multiple studies have failed to demonstrate a teratogenic effect from metronidazole.</td>
</tr>
<tr>
<td>Trichomoniasis: Trichomonas vaginalis</td>
<td>Occasionally 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>
</tbody>
</table>
Pregnancy at Risk: Gestational Onset

Spontaneous abortion is frequently the result of a severe maternal infection. Some evidence links infection and prematurity. 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.

<table>
<thead>
<tr>
<th>Condition and Causative Organism</th>
<th>Signs and Symptoms</th>
<th>Treatment</th>
<th>Implications for Pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sexually Transmitted Infections</strong></td>
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</tr>
<tr>
<td>Chlamydial infection: Chlamydia trachomatis</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 Chlamydia.</td>
<td>Although nonpregnant women are treated with tetracycline, it may permanently discolored 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.</td>
</tr>
<tr>
<td>Syphilis: Treponema pallidum, 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>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>Gonorrhea: Neisseria gonorrhoeae</td>
<td>Majority of women asymptomatic; disease often diagnosed during routine prenatal cervical culture. If symptoms are present they may include purulent vaginal discharge, dysuria, urinary frequency, inflammation, and swelling of the vulva. Cervix may appear eroded.</td>
<td>Nonpregnant women are treated with cefixime orally or ceftriaxone IM plus doxycycline. Pregnant women are treated with ceftriaxone plus erythromycin (CDC, 2002). Some practitioners use azithromycin to treat possible coinfection with chlamydia. All sexual partners are also treated.</td>
<td>Infection at time of birth may cause ophthalmia neonatorum in the newborn.</td>
</tr>
<tr>
<td>Condyloma acuminata: caused by a papovavirus</td>
<td>Soft, grayish pink lesions on the vulva, vagina, cervix, or anus.</td>
<td>Podophyllin not used during pregnancy. Trichloroacetic acid, liquid nitrogen, or cryotherapy CO2 laser therapy done under colposcopy is also successful (CDC, 2002).</td>
<td>Possible teratogenic effect of podophyllin. Large doses have been associated with fetal death.</td>
</tr>
</tbody>
</table>

**THINKING CRITICALLY**

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 care provider at her next prenatal visit. What advice would you give her?
LEARNING OBJECTIVES

1. Contrast the etiology, medical therapy, and nursing interventions for the various bleeding problems associated with pregnancy.

2. Identify the medical therapy and nursing interventions indicated in caring for a woman with an incompetent cervix.

3. Discuss the medical therapy and nursing care of a woman with hyperemesis gravidarum.

4. Delineate the nursing care needs of a woman experiencing premature rupture of the membranes (PROM) or preterm labor.

5. Describe the development and course of hypertensive disorders associated with pregnancy.

6. Explain the cause and prevention of hemolytic disease of the newborn secondary to Rh incompatibility.

CONCEPTS

1. Several health problems associated with bleeding arise from the pregnancy itself:
   - Spontaneous abortion.
   - Ectopic pregnancy.
   - Gestational trophoblastic disease.

2. The nurse needs to be alert to early signs of these situations:
   - Guard the woman against heavy bleeding and shock.
   - Facilitate the medical treatment.
   - Provide educational and emotional support.

3. Medical therapy for incompetent cervix:
   - Placement of a cerclage to hold the cervix closed.

4. Nursing care:
   - Monitor the woman for premature labor.
   - Teach the woman signs of premature labor.

5. Treatment of hyperemesis gravidarum is aimed at:
   - Controlling the vomiting.
   - Correcting fluid and electrolyte imbalance.
   - Correcting dehydration.
   - Improving nutritional status.

6. Nursing care includes:
   - Maintain a relaxed, quiet environment.
   - Monitor weight.
   - Vigilant oral hygiene.

7. PROM nursing care focuses on prevention of infection such as limiting vaginal exams and changing the bed pads frequently.

8. Nursing care during preterm labor focuses on administration of tocolytics and monitoring for progression of labor.

9. Hypertension may exist before pregnancy or, more often, may develop during pregnancy.

10. Preeclampsia can lead to growth retardation for the fetus.

11. Untreated preeclampsia may lead to seizures and death of the mother and infant.

12. It is important to educate the mother about the disease process. This may help motivate her to maintain the required rest periods in the left lateral recumbent position.

13. Antihypertensive and anticonvulsive drugs may be used.

14. Rh incompatibility can occur when an Rh-negative woman and an Rh-positive partner conceive a child who is Rh positive.

15. Use of Rh immune globulin has greatly decreased the incidence of severe complications due to Rh incompatibility because the drug “tricks” the body into thinking antibodies have been produced in response to the Rh antigens.
**LEARNING OBJECTIVES**

**CONCEPTS**

**Compare Rh incompatibility to ABO incompatibility with regard to occurrence, treatment, and implications for the fetus or newborn.**

1. ABO incompatibility occurs when the mother has type O blood and the infant has A, B, or AB.
2. Unlike Rh incompatibility, no treatment exists to prevent the occurrence.
3. It creates hyperbilirubinemia in the infant, which is treated with phototherapy.

**Summarize the effects of surgical procedures on pregnancy and explain ways in which pregnancy may complicate diagnosis.**

1. During surgery, a wedge is placed under the mother’s hip to prevent compressing vessels while the mother is supine.
2. Pregnancy may hinder diagnosis because of the risk x-rays pose to the developing fetus.
3. Surgery increases the risk of miscarriage, preterm labor, and growth retardation in the fetus.

**Discuss the impact of trauma due to an accident on the pregnant woman or her fetus.**

1. Trauma during pregnancy increases the risk of bleeding due to the increased blood volume of the mother.
2. The types of trauma that are of most concern are blunt trauma, penetrating injuries, and gunshot wounds.
3. Treatment centers on lifesaving measures to the mother.
4. Mother and fetus should be monitored after an accident even if no injury is apparent.

**Explain the needs and care of the pregnant woman who experiences abuse.**

1. The nurse needs to be alert for signs of abuse, including bruising or injury to the breasts, abdomen, or genitalia.
2. The woman should be given information about female partner abuse and about community resources available to assist her.

**Describe the effects of infections on the pregnant woman and her unborn child.**

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

**CRITICAL THINKING IN ACTION**

*View the Critical Thinking in Action video in Chapter 15 of the CD-ROM. Then, answer the questions that follow.*

Carol Smith, a 40-year-old, single, G2, P0010 presents to you while you are working in the birthing unit, at 32 weeks’ gestation. Her chief complaint is severe headache, nausea, and trouble seeing. She describes “blackened areas” in her visual fields bilaterally. Her prenatal record reveals long-term substance abuse, depression, and hypertension currently treated with nifedipine 60 mg by mouth once in the morning. You note that she has had two prenatal visits with this pregnancy. You determine her blood pressure to be 170/110; deep tendon reflexes are 3+, clonus negative. She has general edema and 3+ proteinuria. You place Carol on the external fetal monitor to observe for fetal well-being and any contractions. You position her on her left side with her head elevated and use pillows for comfort. You observe that the fetal heart rate is 143–148 with decreased long-term variability. No fetal heart rate decelerations or accelerations are noted. The uterus is soft, and no contractions are palpated or noted on the fetal monitor. Carol asks you why she should stay on her left side.

1. How would you explain the importance of the left side-lying position when on bed rest?
2. You administer nifedipine 10 mg sublingual and a loading dose of magnesium sulfate 4 gm IV piggyback to the main IV line of Ringer’s lactate. What findings would indicate that Carol has therapeutic levels of magnesium?
3. What signs of magnesium toxicity should you monitor Carol for?
4. Carol asks if magnesium sulfate will affect her infant. How would you answer her?
5. Which signs of premature labor would you ask Carol to notify you of if she experiences?
REFERENCES


