chapter 4

Physiologic and Psychological Changes During Pregnancy

evolve
http://evolve.elsevier.com/Leifer/maternity

Objectives

1. Define key terms listed.
2. Calculate the expected date of delivery and duration of pregnancy.
3. Relate the difference between probable, presumptive, and positive signs of pregnancy.
4. Outline the physiologic changes in pregnancy.
5. Explain how pregnancy affects blood volume and blood plasma.
6. Describe aortocaval compression or supine hypotension during pregnancy.
7. Explain why frequency of urination occurs early and late in pregnancy.
8. Recognize the changes in skin pigmentation during pregnancy.
9. Discuss the influence of pregnancy on the skeletal system.
10. Differentiate the risk categories assigned to drugs as they relate to use during pregnancy.
11. Summarize the psychological changes that occur during pregnancy.
12. Describe the developmental tasks of pregnancy.
13. Discuss the impact and special needs of pregnancy on the adolescent, single parent, and extended family.

Key Terms

Braxton Hicks contractions (p. 50)
chloasma (klō-ĂZ-mă, p. 53)
colostrum (kŏ-LŌS-trŭm, p. 50)
diastasis recti abdominis (dī-ĂS-tă-sĭs RĔK-tīăb-DŌM-ĭnĭs, p. 53)
effacement (ĕFĀS-mĕnt, p. 50)
lightening (p. 50)
lordosis (lŏr-DŌ-sĭs, p. 53)
Nägele's rule (nah'gĕ-le, p. 44)
orthostatic hypotension (ŏr-thō-STĂT-ĭc hī-pō-TĔN-shŭn, p. 50)
striae gravidarum (STRĪ-ā grăv-ĭDĂrŭm, p. 54)
supine hypotensive syndrome (SOO-pīn hī-pō-TĔN-sĭv, p. 51)
trimesters (trī-MĔS-tĕrz, p. 44)

The nurse and other caregivers need to understand the physiologic and psychological changes that occur during pregnancy to promote health and prevent complications. Also, the nurse should know appropriate nursing and medical interventions for the uneventful (normal) pregnancy. Because culture often determines health beliefs, values, and family expectations, the assessment of cultural beliefs is important to include in patient care. With this knowledge, the nurse can develop adequate nursing care plans that include nursing diagnoses, nursing interventions related to body changes, and appropriate outcomes. Patient self-care should be a part of the care plan.

TERMINOLOGY

Understanding terms used to describe the pregnant woman is important in studying maternity care. Commonly used terms include:

Ante: before
Antepartum: time before delivery
Gravida: any pregnancy, regardless of duration, including the present one
Prenatal: time before birth
Nulligravida: a woman who has never been pregnant
Para: number of births after 20 weeks' gestation, regardless of whether the infants were born alive or dead (multifetal pregnancies are considered a single birth)
Preterm: a pregnancy that ends after 20 weeks' and before 37 weeks' gestation
Postterm: a pregnancy that goes beyond 40 weeks' gestation
Primigravida: a woman pregnant for the first time
Multigravida: a woman who is in her second or a subsequent pregnancy
Nullipara: a woman who has not given birth at more than 20 weeks' gestation

Primipara: a woman who has given birth to a fetus (dead or alive) that had reached at least 20 weeks' gestation

Multipara: a woman who has given birth two or more times to fetuses that had reached at least 20 weeks' gestation

Stillbirth: a fetus born dead after 20 weeks' gestation

EDD: estimated date of delivery

PROFILE OF PREVIOUS OBSTETRIC HISTORY

GTPALM is a mnemonic (an aid to memory) that is commonly used for recording, with the use of shorthand symbols, a woman's pregnancy history (Box 4-1). It provides a systematic, quick way to indicate the number of pregnancies the woman has had, as well as the outcomes. The letters indicate the following: *G,* gravida; *T,* term pregnancies; *P,* preterm births; *A,* abortions; *L,* number of living children; and *M,* multiple gestations and births. For example, a pregnant woman who has four living children, all single births, and who has had no preterm births and no abortions would be a gravida 5-4-0-0-4-0.

Some institutions use only two letters, *P* and *G,* to indicate **para** and **gravida.** A woman pregnant for the first time would be P0, G1.

DETERMINING DATE OF BIRTH

After the diagnosis of pregnancy, the woman's question usually is, "When is the baby due?" In the past, the term *estimated date of confinement* (EDC) was used to describe the time of birth as a period of confinement. Currently, the term *estimated date of delivery* (EDD) is considered the more accurate term. Some texts, however, also use the term *estimated date of birth* (EDB). Therefore, EDC, EDD, and EDB are interchangeable terms that refer to the expected time of labor and birth. This text uses EDD.

Nägele's rule is a method for obtaining an EDD (Box 4-2). To calculate the EDD, identify the first day of the last normal menstrual period (LNMP), count backward 3 months, and then add 7 days. An example is as follows:

1. First day of LNMP: November 18
2. Minus 3 months: August 18
3. Add 7 days: August 25

The average duration of pregnancy is approximately 280 days. This period is calculated in 28-day months, called **lunar months**. There are 10 lunar months (40 weeks, 280 days) in a full-term pregnancy, which is approximately the same as 9 calendar months. For convenience, the 9 months of pregnancy are divided into three **trimesters**, each generally representing a 3-month period. Although most women refer to their pregnancy in terms of months, the medical community refers to pregnancy in terms of weeks. The first trimester is considered the first 14 weeks, the second trimester is 15 to 28 weeks, and the third trimester is 29 weeks to delivery (Gabbe, Niebyl, & Simpson, 2007).

Not all pregnancies continue to term (40 weeks). A pregnancy that terminates before the fetus reaches 20 weeks' gestation is called an **abortion** (laypersons use the term **miscarriage**). A pregnancy that terminates after the age of 20 weeks but before full-term is called a **preterm** (premature) **birth.** A pregnancy that terminates 2 weeks after the EDD, or 42 weeks' gestation, is called a **postterm birth.**

Box 4-1 Two Methods of Documenting Obstetric History

GTPALM
- **G:** gravida (total number of pregnancies, including current pregnancy)
- **T:** number of term pregnancies
- **P:** number of preterm deliveries
- **A:** number of abortions
- **L:** number of live births
- **M:** number of multiple births

PG
- **P:** para (number of births after 20 weeks' gestation)
- **G:** gravida (total number of pregnancies, including current pregnancy)

Box 4-2 Nägele's Rule to Determine Estimated Date of Delivery

1. Determine first day of last normal menstrual period.
2. Count back 3 months.
3. Add 7 days.
4. Correct year if needed.

SIGNS OF PREGNANCY

It is important to establish the diagnosis of pregnancy or to confirm that the woman is pregnant. Many signs of pregnancy assist in the confirmation. These signs are divided into the following three categories: (1) **presumptive** signs, which suggest pregnancy; (2) **probable** signs, which indicate that the woman is probably pregnant; and (3) **positive** signs, which give definite evidence that the woman is pregnant (Table 4-1). The three positive signs are the only signs that clearly establish a diagnosis of pregnancy. They are hearing fetal heart sounds (Figure 4-1), which are audible by a Doppler device by 10 to 12 weeks' gestation; palpating active fetal movements; and visualizing the fetus via ultrasound. The gestational sac can be detected as early as 10 days after implantation. Many of the signs and symptoms that are present in pregnancy also may be present in other conditions.

In recent years, the accuracy of pregnancy tests has improved. These tests are based on the presence of the

Table 4-1 Signs of Pregnancy: Presumptive, Probable, and Positive

SIGNS	DESCRIPTION	POSSIBLE ALTERNATIVE CAUSES
Presumptive (May Suggest Pregnancy)		
Amenorrhea	Cessation of menses; often the first sign of pregnancy	Emotional stress, chronic disease, or metabolic factors such as menopause
Nausea and vomiting	Occurs during first trimester in 50% of pregnancies; called "morning sickness" because it is usually present in morning	Gastrointestinal disorders or acute infections
Urinary frequency	Related to pressure on bladder	Urinary tract infection
Fatigue	Noticed during early pregnancy by many women	Response to increased hormones or depression
Quickening	Feeling of slight, fluttery movements of fetus at about 18-20 weeks of pregnancy	Gas movements within bowel or increased peristalsis
Breast tenderness	Tenderness and tingling caused by hormonal changes	Premenstrual status or oral contraceptives
Probable (Strongly Indicate Pregnancy)		
Uterine enlargement	Enlarged abdomen occurring as a result of growth of uterus from fetal growth	Obesity or pelvic tumors
Pigmentation changes	Darkening of skin such as linea nigra on abdomen and of nipples and areolae because of hormonal increase	Hormone stimulation related to a medical condition
Goodell's sign	Softening of cervix	Estrogen related to oral contraceptives
Hegar's sign	Softening of lower portion of uterus	Abnormal hormonal activity
Chadwick's sign	Bluish purple discoloration of vaginal mucous membrane caused by increased vascularity or pelvic congestion	Pelvic congestion due to inflammation
Ballottement	Rebounding of fetus in amniotic fluid felt by examiner during pelvic examination	Uterine polyps or ascites
Braxton Hicks contractions	Painless, irregular uterine contractions; may be felt by the woman as a tightening across the abdomen	Medical condition such as fibroids
Positive pregnancy tests	Presence of human chorionic gonadotropin indicative of pregnancy	False results because of timing or technique or use of recreational drugs
Positive (Confirm Pregnancy)		
Ultrasound visualization	One of three signs that clearly establish a pregnancy: fetal heart sounds heard, fetal movements palpated by the examiner, and fetal outline visualized by ultrasound	Ultrasound visualization of fetus is a positive sign of pregnancy

FIGURE 4-1 The fetal heart is audible by Doppler ultrasound by 10 to 12 weeks' gestation and is checked at each prenatal visit. Hearing the fetal heartbeat helps the mother accept the reality of her pregnancy.

hormone human chorionic gonadotropin (hCG), which is produced by the chorionic villi of the placenta. It is present in a pregnant woman's urine or blood as early as 1 week after conception. Home pregnancy test kits are uncomplicated and convenient and are capable of greater than 97% accuracy; however, the instructions must be followed precisely to obtain this accuracy. Pregnancy test kits are probable indicators because several factors may interfere with their accuracy, including medications such as antianxiety drugs or anticonvulsant drugs, blood in the urine, malignant tumors, and menopause.

PHYSIOLOGIC CHANGES IN BODY SYSTEMS

Many physiologic changes occur during pregnancy. Because of these changes, a number of minor symptoms or discomforts result. Most of these discomforts do not require medical treatment. However,

they do require evaluation, explanation, and reassurance to allay fears and anxieties. Many discomforts during pregnancy can be alleviated by relatively simple nursing care, including patient self-care instruction.

The two major sources of the physiologic changes during pregnancy are changes in the endocrine system and the physical changes in the body. The hormonal changes and mechanical pressures that occur from an enlarging uterus account for many of the physiologic changes and psychological adaptations that occur during pregnancy (Table 4-2).

CHANGES IN THE ENDOCRINE SYSTEM

The dramatic increase in hormones during pregnancy affects all body systems. Hormones are essential to maintain pregnancy. Most are produced initially by the corpus luteum and later by the placenta. The most striking change in the endocrine system during pregnancy is the addition of the placenta as a temporary

Table 4-2 Physiologic and Psychological Changes in Pregnancy, Nursing Interventions, and Teaching

MATERNAL CHANGES	SIGNS AND SYMPTOMS	NURSING INTERVENTIONS AND TEACHING
First Trimester		
Fertilization occurs. Increased progesterone results in amenorrhea. Sodium (Na) retention increases. Nitrogen (N) store decreases.	Pregnancy test is positive. Amenorrhea occurs.	Guide patient regarding nutritional needs and folic acid requirements. Encourage patient to seek early prenatal care. Assess attitude toward this pregnancy and how it affects family.
Blood volume increases. Levels of relaxin hormone increase. Levels of human chorionic gonadotropin (hCG) hormone increase.	Fainting is possible. Morning nausea can occur. Relaxation of gastrointestinal muscles can cause "heartburn." Sensitivity to odors increases.	Teach patient how to rise slowly from prone position. Teach patient how to cope with nausea without medication: • Eat dry crackers before arising. • Use acupressure.
Pituitary gland releases melanocyte-stimulating hormone.	Pigmentation deepens on face (chloasma) and on abdomen (linea nigra).	Discuss body changes and reassure patient that most pigmentation will fade after puerperium.
Fetus grows.	Abdomen enlarges at end of first trimester when uterus rises out of pelvis. Small weight gain occurs.	Teach methods to minimize fetal problems: • Avoid high temperatures around abdomen (baths and spas). • Discuss the effect of medications and herbs on fetal development. • Discuss nutritional and folic acid needs, control of caffeine intake in second and third trimesters, and omega-3 fatty acid intake. Facilitate communication with partner concerning relationships during pregnancy.
Uterus begins to enlarge.	Enlarged uterus presses on bladder.	Discuss effect of frequency of urination on lifestyle and activities.
For fathers, the announcement phase begins when pregnancy is confirmed, followed by an adjustment phase, and, finally, the focus phase in third trimester and during labor, when "feeling like a father" develops.	Parents adjust to the reality of pregnancy.	Review father's or partner's role and mother's responses. Refer to community agencies as needed. Assess for misinformation and knowledge deficit. Help parents identify concerns. Answer questions. Discuss care of siblings, role of grandparents, etc.
Second Trimester		
Corpus luteum is absorbed and placenta takes over fetal support (between third and fourth months).	Blood volume increases in placental bed.	Teach patient how to minimize risk of habitual abortion between third and fourth months when placenta begins to take over.
Broad ligament stretches as uterus enlarges.	Occasional pain in groin area occurs.	Teach patient Kegel exercises to strengthen pelvic muscles.
Vascularity of pelvis increases.	Sexual pleasure and desire increase. White discharge may occur.	Discuss modifications of positions for sexual comfort and pleasure. Teach patient to avoid routine douches. Teach patient perineal skin hygiene.

Table 4-2 Physiologic and Psychological Changes in Pregnancy, Nursing Interventions, and Teaching—cont'd

MATERNAL CHANGES	SIGNS AND SYMPTOMS	NURSING INTERVENTIONS AND TEACHING
Second Trimester—cont'd		
Blood volume and vasomotor lability increases.	Orthostatic hypotension can occur.	Teach patient to change positions slowly and to avoid warm, crowded areas.
Cardiac output increases.	Physiologic anemia may occur.	Iron supplements may be prescribed for anemia. Teach patient how to prevent constipation, and teach change in stool color during iron therapy.
Renal threshold decreases.	Perineal itching may occur.	Test for sugar in urine and require glucose tolerance test in second trimester to rule out gestational diabetes. Teach patient hygienic measures when high glucose is present (front to back wiping; wearing cotton panties).
Uterus rises out of pelvis.	Center of gravity of body changes.	Teach patient proper shoe heel height to avoid falling. Teach placement of automobile restraints across hips rather than across abdomen. Teach patient to avoid lying supine in bed after the fourth month of pregnancy to prevent supine hypotensive syndrome. Teach posture and pelvic rocking exercises. Instruct patient that clothes should hang from shoulders.
Estrogen relaxes sacroiliac joint.	Pressure on bladder and rectum increases.	Anticipate urinary frequency during long trips. Teach patient Kegel exercises to strengthen pelvic floor.
Enlarging uterus compresses nerves supplying lower extremities.	Leg muscle spasms occur, especially when reclining.	Check for Homans' sign. Teach patient how to dorsiflex the foot to help relieve spasms. Massage foot.
Decreased calcium levels and increased phosphorus levels are possible.	Abnormal laboratory results.	Use oral aluminum hydroxide gel to reduce phosphorus levels if elevated (when recommended by health care provider).
Decreasing cardiac reserve and increasing respiratory effort start late in the second trimester.	Physiologic stress is possible if exercise levels are not decreased.	Teach patient to monitor pulse (maximum 90 beats/minute), and teach patient that inability to converse without taking frequent breaths is a sign of physiologic stress. Teach patient to stop exercising if numbness, pain, or dizziness occurs.
Hormonal influence causes "id" to come to the surface.	Mood swings occur.	Prepare spouse or significant other and family for mood swings, outspoken behavior, and labile emotions ("speaks before she thinks").
Levels of relaxin hormone increase.	Sphincter of stomach relaxes, and gastrointestinal motility is slowed.	Teach patient how to prevent constipation. Instruct patient to increase fluid intake and avoid gas-forming foods.
Increase in estrogen causes increased excretory function of the skin.	Skin itches.	Teach patient to wear loose clothing, shower frequently, and use mild soaps and oils for comfort.
Anterior pituitary secretes melanocyte-stimulating hormone.	Skin pigmentation deepens.	Prepare patient to anticipate development of spider nevi and skin pigmentation. Reassure patient that most fade after the puerperium.
Estrogen levels increase.	Increased estrogen develops increased vascularity of oral tissues, resulting in gingivitis and stuffy nose.	Teach proper oral hygiene techniques.
	Estrogen levels develop network of increased arterioles.	Edema can occur. Assess blood pressure and report proteinuria.

Continued

Table 4-2 Physiologic and Psychological Changes in Pregnancy, Nursing Interventions, and Teaching—cont'd

MATERNAL CHANGES	SIGNS AND SYMPTOMS	NURSING INTERVENTIONS AND TEACHING
Second Trimester—cont'd		
Pituitary gland secretes prolactin.	Colostrum leaks from nipples and sometimes cakes. Breasts enlarge.	Teach patient to cleanse nipples to keep ducts from being blocked by colostrum. She should avoid soaps, ointments, and alcohol that dry skin. Teach patient not to stimulate nipples by massage or exercise because doing so may increase the risk for preterm labor.
Traction on brachial plexus is caused by drooping of shoulders as breast size increases.	Fingers tingle.	Teach patient proper posture. Encourage the use of a supportive maternity bra.
Placental barrier allows certain elements and organisms to pass through to the fetus.	Some medications can pass through the placental barrier and cause fetal defects.	Advise patient not to smoke and not to self-treat with medications. Teach patients to avoid certain jobs (e.g., working as a parking attendant, in a dry cleaning plant, or in a chemistry laboratory).
Travel during pregnancy Lowered oxygen levels can cause fetal hypoxia.	Traveling to countries that have endemic diseases can have negative effect on fetus; certain active immunizations should be avoided.	Advise patient regarding travel. Most commercial airlines have cabin pressure controlled at or below 5000-ft level and therefore do not pose a risk to the fetus.
Platelet levels increase.	Women are prone to thrombophlebitis if they are inactive for long periods.	Encourage patient to keep hydrated because of low cabin humidity in airplanes and to move around to help prevent thrombophlebitis.
Fetal growth continues.	Mother feels signs of life; fetus moves and kicks.	
Third Trimester		
Maternal weight gain of 9-22 kg (20-25 lbs) occurs.		Teach proper nutrition to foster fetal growth without adding extra "empty" calories. Encourage patient to attend childbirth or parenting classes.
Colostrum forms.	Colostrum may leak from breasts.	Teach patient the need for rest periods and organization of work. Teach patient care of nipples. Introduce nipple pads. Teach patient to avoid nipple stimulation to prevent preterm labor.
Increased estrogen levels causes edema of larynx.	Voice changes. Patient tires easily.	Professional singers may lose voice quality. Teach patient the need for rest periods.
Maximum increase in cardiac output (increase in stroke volume) occurs.	Maximize cardiac output when woman lies on her side.	Teach patient signs of gestational hypertension, and assess water retention.
Edema of hands and wrists is possible.	Risk for carpal tunnel syndrome increases.	Elevate hands; decrease repetitive motion activities.
Uterus increases in size.	Pressure on stomach occurs. Pressure on diaphragm occurs. Venous congestion increases.	Discuss how to cope with decrease in appetite and shortness of breath. Teach "talk test" for self-evaluation of exercise tolerance to prevent fetal hypoxia (must be able to finish a sentence before taking a breath). Teach patient how to avoid constipation and leg varicosities.
Sensitivity to Braxton Hicks contractions increases.	Fetal head may engage (uterus drops) (lightening).	Teach patient the signs of labor and when to come to hospital. Offer tour of labor and delivery unit.
Hormone levels increase.	"Id" is at the surface. Woman becomes self-centered and worries how she will manage labor.	Review labor management learned in prenatal classes. Discuss sibling care and support system.

endocrine organ whose role is to produce large amounts of estrogen and progesterone to maintain the pregnancy (as well as hCG and hPL [human placental lactogen]).

Table 4-3 highlights the major hormones and their influence during pregnancy. The hPL increases maternal insulin resistance during pregnancy, providing the fetus with glucose needed for growth.

CHANGES IN THE REPRODUCTIVE SYSTEM

Uterus

The uterus changes dramatically during pregnancy. Before pregnancy, the uterus is a small, semisolid, pear-shaped organ weighing approximately 60 g (2 oz). At the end of pregnancy, it is a thin-walled, muscular container housing the fetus, placenta, and amniotic fluid that weighs approximately 1000 g (2 lbs, 3 oz). This enlargement is primarily the result of an increase in size of preexisting muscle cells (hypertrophy) and the formation of new cells (hyperplasia). The ease with which the fetus can be palpated through the abdominal wall indicates its thin structure.

The circulatory requirements of the uterus greatly increase as it enlarges and the fetus and placenta develop. The growth of the uterus is stimulated by hormones (estrogen and progesterone) and by pressure of the growing fetus against the uterine wall.

The growth and position of the uterus provide useful information about fetal growth. The position of the uterus helps confirm the EDD. For example, by 12 weeks' gestation, the uterus can be felt above the symphysis pubis, and at 20 weeks, the fundus is near the umbilicus. By 36 weeks, the fundus is at its highest,

Table 4-3 Hormones Essential in Pregnancy

HORMONE	SIGNIFICANCE
Estrogen	Produced by ovaries and placenta Responsible for enlargement of uterus, breasts, and genitalia Promotes fat deposit changes Stimulates melanocyte-stimulating hormone in hyperpigmentation of skin Promotes vascular changes Promotes development of striae gravidarum Alters sodium and water retention
Progesterone	Produced by corpus luteum and ovary and later by placenta Maintains endometrium for implantation Inhibits uterine contractibility, preventing abortion Promotes development of secretory ducts of breasts for lactation Stimulates sodium secretion Reduces smooth muscle tone (causing constipation, heartburn, varicosities)
Thyroxine (T_4)	Influences thyroid gland's size and activity and increases heart rate Increases basal metabolic rate 23% during pregnancy
Human chorionic gonadotropin (hCG)	Produced early in pregnancy by trophoblastic tissue Stimulates progesterone and estrogen production by corpus luteum to maintain pregnancy until placenta takes over Used in pregnancy tests to determine pregnancy state
Human placental lactogen (hPL); also called chorionic somatomammotropin	Produced by placenta Affects glucose and protein metabolism Has a diabetogenic effect—allows increased glucose to stimulate pancreas and increase insulin level
Melanocyte-stimulating hormone	Produced by anterior pituitary gland Causes pigmentation of skin to darken, resulting in brown patches on face (chloasma [melasma gravidarum]), dark line on abdomen (linea nigra), darkening of moles and freckles, and darkening of nipples and areolae
Relaxin	Produced by corpus luteum and placenta Remodels collagen, causing connective tissue of symphysis pubis to be more movable and cervix to soften Inhibits uterine activity
Prolactin	Prepares breasts for lactation
Oxytocin	Produced by posterior pituitary gland Stimulates uterine contraction Is inhibited by progesterone during pregnancy After birth, helps keep uterus contracted Stimulates milk ejection reflex during breastfeeding

at the xiphoid process of the rib cage (see Figure 5-3). By 40 weeks, the fetus descends, with the fetal head entering into the pelvis (**lightening** occurs; see Chapter 6).

Early in pregnancy, irregular, painless uterine contractions (**Braxton Hicks contractions**) occur. As pregnancy progresses, these contractions help move the blood through the placenta to the fetus. They can be mistaken for labor contractions, especially near term.

Cervix

The cervix of the uterus becomes shorter and softer during pregnancy. These adjustments prepare the cervix for thinning (**effacement**) and enlargement **(dilation)** of the opening, which are necessary to permit the fetus to pass from the uterus at birth. The softening of the cervix is caused by (1) a hormonal influence that causes an increased blood supply and (2) an increase in secretions from the cervical glands. The secretions from the cervical glands form a mucous plug in the cervical canal that acts as a barrier to prevent organisms from entering the uterus. The mucous plug is usually expelled from the vagina during labor.

Ovaries

During pregnancy, follicles in the ovaries cease to develop to maturity. Ovulation does not occur. The corpus luteum persists and produces estrogen and progesterone for the first 7 to 10 weeks' gestation to maintain the pregnancy until the placenta develops and can take over hormone production. The corpus luteum of pregnancy also secretes the hormone **relaxin.** The role of relaxin, along with placental progesterone, is thought to be relaxing the symphysis pubis and other pelvic joints and ripening (or softening) the cervix in preparation for labor.

FIGURE 4-2 Striae and pigmentation of breasts. Note the darkened pigmentation of areolae and the pink-white lines at the base of the breasts that are caused by a stretching of the elastic tissue as the breasts enlarge. Pigmentation will disappear after pregnancy, and striae will fade into silvery strands.

Vagina

The changes that occur in the vagina prepare it for the tremendous stretching necessary for the birth of the baby. The proliferation of cells and hyperemia of the vaginal connective tissue cause the vaginal walls to become thickened, pliable, and expandable. As the mucosa thickens, the vaginal rugae (folds) become prominent. The vaginal discharge increases, bringing on greater amounts of glycogen. This presents an increased risk for a vaginal infection and favors the growth of the yeast *Candida albicans*. However, as the pH of the vagina decreases, the acidic conditions work to prevent growth of harmful microbes typically found in the vagina.

Breasts

Several hormones, including estrogen, progesterone, prolactin, and hPL, interact during pregnancy to prepare the breasts for **lactation** (milk production). Estrogen and progesterone seem to be the most important. The breasts rapidly enlarge in the first 8 weeks, mostly from vascular engorgement. Thereafter, the breasts enlarge progressively throughout pregnancy as a result of ductal growth stimulated by estrogen and alveolar hypertrophy stimulated by progesterone.

The breast changes during pregnancy can be summarized as follows: size increases; breasts become full, sensitive, and tender; the pigmentation of the areola and nipple darkens; and Montgomery's glands become more prominent and lubricate and protect the nipple in preparation for breastfeeding. Striae may occur (pinkish-white lines caused by stretching of the elastic tissue as the breasts enlarge). Striae will fade into silvery strands after pregnancy (Figure 4-2).

Colostrum—a thin, yellowish fluid (premilk fluid)—begins to be excreted by the breasts as early as the tenth week of gestation and continues until approximately the third postpartum day, when it is replaced by milk. Lactation is initiated by the profound drop in estrogen and progesterone levels after delivery of the placenta, allowing an increase in **prolactin** levels. Prolactin is responsible for milk production.

CHANGES IN THE CARDIOVASCULAR SYSTEM

The cardiovascular system exhibits profound changes during pregnancy (Table 4-4). These changes are essential to deliver oxygen and nutrients to the growing fetus and the enlarging uterus. Blood must be delivered into uterine vessels at pressures sufficient to meet the requirements of the placental circulation, which is necessary for an adequate exchange of oxygen between mother and fetus.

Orthostatic hypotension (a decrease in blood pressure occurring when moving from a recumbent to an upright position) may cause faintness due to a temporary decrease in cardiac output. As pregnancy progresses, the vena cava can be compressed to some degree if the pregnant woman lies on her back, which

Table 4-4 Changes in the Cardiovascular System During Pregnancy

PHYSIOLOGIC CHANGE	CLINICAL SIGNIFICANCE
Heart is displaced by elevation of diaphragm.	Palpitations, benign arrhythmias, and systolic murmurs result from change in position of heart.
Cardiac output increases.	Cardiac output, or volume of blood injected into the system, is increased 30% to 50% to meet demands of enlarging uterus and fetal oxygenation.
Blood flow increases in skin.	Warmth, moist skin, and nasal congestion are experienced.
Blood flow increases to kidneys.	Removal of waste products improves for mother and fetus.
Pulse rate and stroke volume increase.	Pulse rate increases approximately 10-20 beats/minute, and the amount of blood ejected into the circulation with each heart beat increases.
Blood volume increases 30% to 45%.	Blood volume increases early in pregnancy; begins at roughly 10 weeks and peaks at 34 weeks. Blood volume increase meets circulatory and nutritional needs of maternal and fetal tissues.
Plasma and red blood volumes increase.	Plasma volume increases more than red cell mass, causing hemoglobin and hematocrit levels to fall; oral supplementation of 60-80 mg/day of elemental iron is routine. If hemoglobin level drops below 11 g/dL or hematocrit level below 35%, the patient should be evaluated for anemia.
White blood cell count increases (average >15,000/mm^3).	A protective mechanism against infection, the increased white blood cell count during pregnancy makes it difficult to detect infection; the level returns to normal approximately 1 week after delivery.
Blood clotting factors increase.	This provides rapid blood clotting mechanism of placental site when expelled, increasing risk of postpartum embolism; therefore women are asked to ambulate early after delivery.
Femoral venous pressure increases.	Enlarged uterus places pressure on veins of lower extremities, and stagnation of blood in lower extremities may occur.
Compression of the inferior vena cava in the third trimester by gravid uterus can decrease cardiac output.	Supine hypotensive syndrome may occur; women are instructed to lie on the left side and to not lie flat on their backs.
Decrease in cardiac output may occur when a woman moves rapidly from a recumbent to an upright position.	Orthostatic hypotension may occur.
Blood pressure does not increase.	An arbitrary upper limit of normal is 140/90 mm Hg; an increase of ≥30 mm Hg systolic or ≥15 mm Hg diastolic above baseline may indicate a potential hypertensive disorder.
Pressure from enlarged uterus causes obstructed venous return, and progesterone causes relaxation of muscles.	Varicose veins develop in the vulva, anus (hemorrhoids), and legs. Sitting or standing for long periods should be avoided; crossing legs decreases blood flow.

can decrease cardiac output. This is called **supine hypotensive syndrome** or *aortocaval compression* (Figure 4-3). Cardiac output doubles, and there is a 30% to 45% increase in blood volume (Blackburn, 2007). Ten percent of the maternal cardiac output is channeled to uterine blood flow in the third trimester. Cardiac output is best when the woman lies on her side. The greatest increase in cardiac output occurs during labor and delivery. An increase in various clotting factors and fibrinogen protects the woman from excess bleeding during and after birth but makes the woman more vulnerable to blood clotting events (thrombus formation). Other changes in blood values are listed in Table 4-5.

CHANGES IN THE RESPIRATORY SYSTEM

Thoracic circumference increases during pregnancy because of the relaxation of the ligaments (primarily from progesterone) and the flaring of the lower ribs. Therefore, despite the elevation of the diaphragm (as much as 4 cm [1.6 inches]) in the latter part of pregnancy, the lung capacity remains the same.

Inspiration increases during pregnancy, allowing greater intake of oxygen. Increased expiration facilitates carbon dioxide removal. In other words, the exchange of carbon dioxide and oxygen that takes place at the alveolar cell level is improved. The pregnant woman breathes more deeply (but not more frequently) to maintain oxygen for herself and her

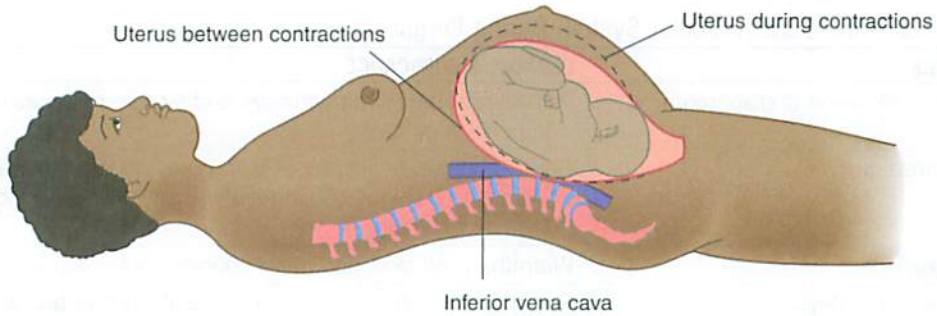

FIGURE 4-3 Supine hypotensive syndrome. When a pregnant patient lies on her back (supine), the weight of the uterus and its fetal contents presses on the vena cava and abdominal aorta, decreasing blood flow to the heart. Maternal hypotension and fetal hypoxia may result.

Table 4-5 Normal Blood Values in Nonpregnant and Pregnant Women

VALUE	NONPREGNANT	PREGNANT
Hemoglobin (g/dL)	12-16	11-12
Hematocrit (%)	37-48	33-46
Red blood cells (million/mm^3)	3.8-5.1	4.5-6.5
White blood cells (thousand/mm^3)	5-10	5-15; rises during labor and postpartum up to 25
Fibrinogen (mg/dL)	200-400	300-600

fetus. Breathing changes from abdominal to thoracic as pregnancy progresses. Oxygen consumption increases by 15% to 40% during pregnancy (Gordon, 2007).

Dyspnea

Shortness of breath (dyspnea) is a common complaint of pregnancy. The sensation of dyspnea appears to be related to a greater sensitivity of the respiratory system caused by increased progesterone. Dyspnea is also related to the pressure of the uterus on the diaphragm. Dyspnea normally does not interfere with activities of daily living and does not occur at rest.

Epistaxis

Nosebleeds (epistaxis) and nasal stuffiness are common during pregnancy. These discomforts are thought to be caused by the increased vascularity that results from increased estrogen. Another change that can occur is a change in the woman's voice. A pregnant woman's voice may become deeper because of an increase in the size of the vocal cords, which is caused by increased progesterone.

CHANGES IN THE GASTROINTESTINAL SYSTEM

Changes in the mouth often occur during pregnancy. Gum hypertrophy may occur; sensitivity and bleeding can be reduced by use of a soft toothbrush and good oral hygiene. Saliva production is often increased (ptyalism), and nausea, with or without vomiting, is common during the first trimester of pregnancy and is thought to be caused by the rising level of estrogen in the blood. During pregnancy, the peristaltic action of the gastrointestinal tract decreases, mainly because of the increase in progesterone and relaxin. With the relaxation of the cardiac sphincter, gastric contents can reach the esophagus and cause heartburn (pyrosis), a common discomfort of pregnancy. Pregnant women should be encouraged to sit up for 30 minutes after eating, rather than immediately lying down, to reduce the risk of heartburn. Common interventions to decrease nausea and vomiting are discussed in Chapter 5.

With the loss in muscle tone, there is a delayed emptying of the intestines, which allows more water to be absorbed from the bowel. This change causes constipation, another common discomfort.

Progesterone and estrogen relax the muscle tone of the gallbladder, resulting in the retention of bile salts, and this can lead to pruritus (itching of the skin) during pregnancy. Pregnancy also produces metabolic changes. Carbohydrate metabolism is altered, with increased resistance to insulin, allowing the fetus to have a source of high energy in the form of glycogen. Fat metabolism also changes, which facilitates growth and provides maternal stores for lactation. Periodic hyperglycemia can result during pregnancy, a condition called **gestational diabetes.**

CHANGES IN THE RENAL (URINARY) SYSTEM

Early in pregnancy, the growing uterus puts pressure on the bladder, causing frequent urination. Later in pregnancy, as the fetus settles down in the pelvic cavity, the woman again has pressure on the bladder, and frequency of urination returns. Stasis of urine in the bladder increases the risk of a urinary tract infection (Figure 4-4).

The ureters dilate from smooth muscle relaxation caused by an increase in progesterone and pressure from engorged circulation and an enlarging uterus. Renal plasma flow may increase by 75% to remove

metabolic wastes of the mother and fetus (Gordon, 2007). Pregnant women with asymptomatic bacteriuria (bacteria in the urine) are more prone to develop pyelonephritis (infection of the upper urinary tract).

Fluid and Electrolyte Balance

The increased glomerular filtration rate in the kidneys increases sodium filtration by 50%, but the increase in the tubular reabsorption rate results in 99% reabsorption of the sodium. Sodium retention is influenced by many factors, including elevated levels of the hormones of pregnancy. Although much of the sodium is used by the fetus, the remainder is in the maternal circulation and can cause a maternal accumulation of water (edema). This fluid retention may cause a problem if the woman in labor is given intravenous fluids containing oxytocin (Pitocin), which has an antidiuretic effect and can result in water intoxication. Agitation and delirium, possible signs of water intoxication, should be recorded and reported, and an accurate intake and output record should be kept during labor and in the immediate postpartum phase.

In pregnancy, blood is slightly more alkaline than in the nonpregnant state, and this mild alkalemia is enhanced by hyperventilation that often occurs during pregnancy. This status does not influence a normal pregnancy.

CHANGES IN THE INTEGUMENTARY AND SKELETAL SYSTEMS

The relaxation and softening of the pelvic joints and widening of the symphysis pubis are primarily caused by relaxin and placental progesterone. In the last trimester, when the fetal presenting part settles into the brim of the pelvis and a slight separation of the symphysis pubis occurs, the woman develops a "waddling" gait. This widening facilitates passage of the fetus through the pelvis in preparation for a vaginal delivery. As the uterus enlarges, the woman's center of gravity shifts forward. To compensate for this change, women develop a progressive **lordosis** (curvature of the lower spine). The woman may experience low backaches, and, in the last months of pregnancy, rounding of the shoulders may occur, with aching in the cervical and upper thoracic spines (Figure 4-5). A change in the center of gravity and joint instability resulting from relaxation of the ligaments predispose the pregnant woman to problems with balance. Interventions concerning safety should be part of prenatal education.

Enlargement of the uterus stretches the round ligaments that support the uterus, and this can cause an abrupt, sharp pain when the woman moves quickly, such as getting up from a chair. In addition, as the abdominal muscles are gradually stretched during pregnancy, the rectus abdominis muscles may separate, causing a condition called **diastasis recti abdominis**. The muscles return to their normal position after delivery. This process is facilitated by exercise.

During pregnancy, weight gain and edema can produce a compression of the medial nerve, particularly around the wrist. This is referred to as **carpal tunnel syndrome.** This syndrome commonly consists of pain, numbness, or tingling in the hand and wrist; weakness and decreased motor function can also occur.

During pregnancy, the skin undergoes hyperpigmentation (primarily as a result of melanocyte-stimulating hormone and estrogen).

Chloasma (also known as *melasma*) is a blotchy, brownish "mask of pregnancy" that typically fades

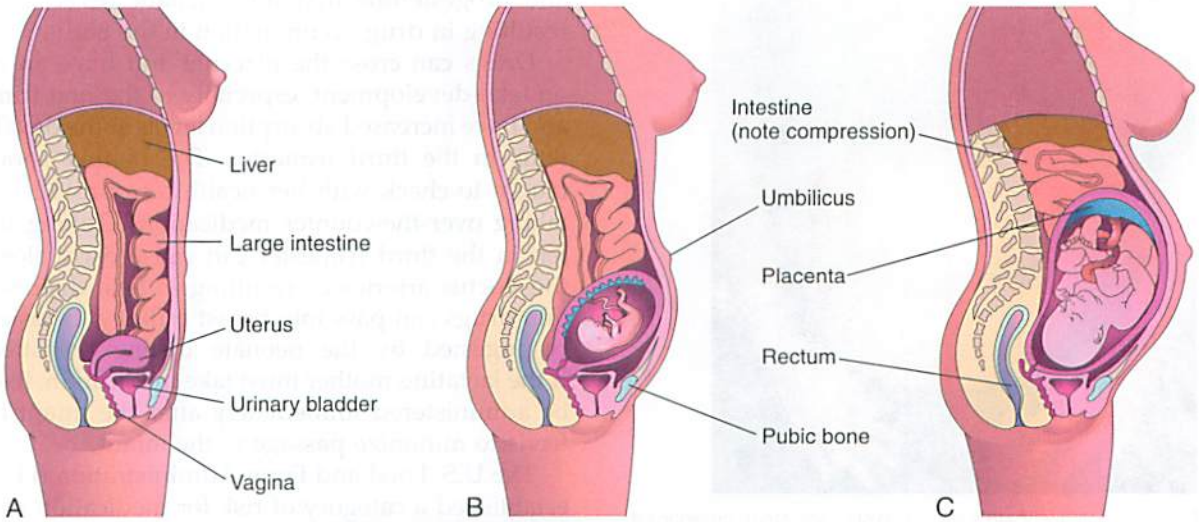

FIGURE 4-4 Compression of abdominal contents as the uterus enlarges. A, Nonpregnant. **B,** Twenty weeks' gestation. **C,** Thirty weeks' gestation. The bladder is compressed, causing urinary frequency.

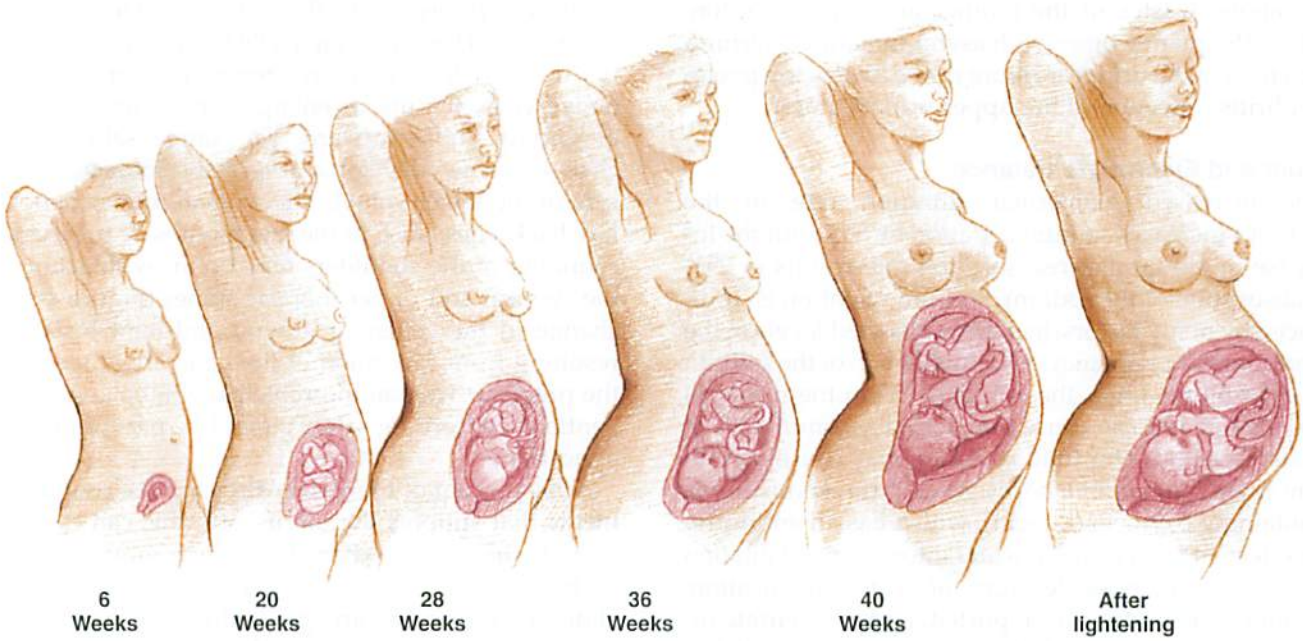

FIGURE 4-5 As pregnancy progresses, obvious posture changes occur and lordosis increases.

after delivery. The linea alba darkens and becomes a darkened line on the abdomen, called the **linea nigra.**

Striae gravidarum, or stretch marks, are pinkish or purplish lines caused by a weakening of the elastic tissues (Figure 4-6). Striae are often found on the abdomen, breasts, thighs, and buttocks. After delivery, these streaks turn to a fine pinkish or silver tone on fair-skinned women and a brownish color on darker skinned women. Nipples, areolae, vulva, and perineum all darken. Moles, freckles, and recent scars may also darken. In some women, hair growth may increase. In addition, blood vessels have increased permeability, causing palmar erythema and small red elevations on the skin with red lines radiating from the center, called *spider nevi*.

FIGURE 4-6 A pregnant woman's abdomen showing striae gravidarum (stretch marks) and linea nigra (the darkened line from the umbilicus to the pubis).

THE EFFECT OF PREGNANCY AND LACTATION ON MEDICATION INGESTION

The physiologic changes in pregnancy affect the metabolism of ingested medications. Subtherapeutic drug levels may occur due to the increased plasma volume, cardiac output, and glomerular filtration that occur during pregnancy. A decreased gastric emptying time during pregnancy changes absorption of drugs and can delay onset of action. Parenteral medication may be absorbed more rapidly because of increased blood flow and have a faster onset of action than in the nonpregnant state. The increased levels of estrogen and progesterone may alter hepatic (liver) function, resulting in drug accumulation in the body.

Drugs can cross the placenta and have an impact on fetal development, especially in the first trimester, and have increased absorption levels in the developing fetus in the third trimester. The mother should be taught to check with her health care provider before taking over-the-counter medications. Taking ibuprofen in the third trimester can cause early closure of the ductus arteriosus, resulting in fetal distress. Certain drugs can pass into breast milk by diffusion and be ingested by the neonate during breastfeeding. If the lactating mother must take medication, it should be administered immediately after the infant breastfeeds to minimize passage to the infant.

The U.S. Food and Drug Administration (FDA) has established a category of risk for medication use during pregnancy. All women of childbearing age should be counseled about the risk of ingesting drugs during

pregnancy and lactation. Pregnancy category risk allows for some assessment of risk to the fetus when a drug is prescribed to a pregnant woman (Box 4-3).

PSYCHOLOGICAL CHANGES DURING PREGNANCY

Pregnancy is a profound event in the life of a woman and her family. It is a time when she and her partner are faced with the challenges of redefining their present roles, working through previous conflicts, and taking on the parental role. The emotional and physical adjustments of pregnancy plus those required to become parents can cause varying levels of stress and anxiety.

Some specific factors that contribute to either a positive or a negative psychological response to pregnancy include body image changes, emotional security, cultural expectations, support from partners, whether the pregnancy is unexpected, and financial situations. Major factors that influence the psychological impact of pregnancy are a woman's level of maturity and readiness for childbearing. Hormonal changes that occur during pregnancy contribute to mood swings. Many women have ambivalent feelings, being both happy at the thought of parenthood and sad at the thought of lost freedom. Both the mother and father or partner identify tasks and responsibilities and begin the process of establishing a relationship with the fetus (Figure 4-7).

FIGURE 4-7 The father begins to develop a relationship with the fetus as he hears the fetal heart and feels movement.

BODY IMAGE

Body image is a person's perception of his or her own body. Body image can be considered from four aspects: appearance, function, sensation, and mobility.

Appearance is very meaningful to some women. During pregnancy, changes in a woman's body shape and function are so noticeable that she may become anxious. Also, the speed with which the changes occur makes it difficult for some women to integrate them into their self-perception. They may begin to feel ugly or fat, which can cause them to feel negatively about their pregnancy. These women need reassurance and must recognize that their feelings are common and normal. Other women feel beautiful during their pregnancy and will say things such as "I feel good when I am pregnant."

Function may be difficult when the pregnant woman feels that she is losing control. If she has urinary incontinence, she may feel out of control and negatively about the pregnancy. If her experience is explained as normal, she may be able to accept it with less difficulty.

Sensation may become more acute. Pregnant women may be more sensitive to touch. The change in sexuality and libido varies from woman to woman. The apparent physiologic basis of heightened sexuality is the greater vasocongestion in the pelvic area during pregnancy.

Mobility may be a problem when the woman feels restricted in her usual routine physical activities. She may be discouraged and need encouragement to participate in many of the same activities (including sports) during pregnancy that she participated in before pregnancy. Moderation is the key instruction to determining physical activity.

Box 4-3 FDA Pregnancy Risk Category for Drugs

A: Evidence of fetal harm is remote. Controlled studies show no risk.

B: Animal studies have not shown a risk in the second or third trimesters. No available data on effect in the first trimester.

C: Studies in animals have shown negative effects on fetal development, but no controlled studies are available to know the effect on pregnant women. Risk cannot be ruled out.

D: There is positive evidence of fetal damage when the drug is used during pregnancy. The need for the drug should be carefully evaluated.

X: Studies in animals and human beings indicate definite fetal risk, and it should not be used during pregnancy.

From Meadows, M. (2001). Pregnancy and the drug dilemma. *FDA Consumer*, 35(3),16-20.

DEVELOPMENTAL TASKS

Pregnant women are known to go through certain developmental tasks. Tasks relate to the sequence of trimesters and are more apparent in some women than in others.

Task 1: Pregnancy validation. In the first trimester (first 3 months), the pregnancy is confirmed and introversion occurs, which is used as a coping mechanism. The woman's focus is centered on nurturing and protecting the fetus. At this time, she may question her identity as a woman and mother.

Task 2: Fetal embodiment. During the second trimester (second 3 months), the woman usually attempts to incorporate the fetus into her body image as an integral part of self. She begins to readjust her roles, and she reviews her relationships with others. At this time, repressed thoughts are dealt with, and maturation with a greater inner strength occurs.

Task 3: Fetal distinction. When the woman feels fetal movements (quickening), the fetus starts to become distinct and separate from herself. At this time, she often daydreams about the baby, speaks of having a boy or girl, and envisions a perfect, beautiful baby (Figure 4-8).

Task 4: Role transition. During the last trimester (last 3 months), the pregnant woman usually psychologically separates the fetus from herself and makes concrete plans for the baby. For example, she may purchase the crib and layette. At this time, she may show greater irritability, may complain about her physical discomforts, and wants the pregnancy to end. Her normal coping mechanisms frequently do not work as well for her, and she may need additional emotional support and anticipatory guidance.

FIGURE 4-8 When the body changes of pregnancy are evident, the woman may welcome them as a sign to the world that her pregnancy is real and her fetus is thriving.

Ambivalence, acceptance, mood swings, introversion, and passivity are common and normal during pregnancy. Women commonly experience emotional lability; heightened sensitivity; increased need for affection; and greater irritability, fear, and anxiety. The pregnant woman needs to receive, rather than give, emotional support. Guidance and instruction are an important part of nursing care and can help make pregnancy a more positive and gratifying experience.

Table 4-6 shows the tasks of the parent in relation to Erikson's stages of child development. The table also includes some suggested nursing interventions that can assist in the development of effective parenting attitudes and behaviors. The growth and development of a parent begin in the first trimester of pregnancy.

RESPONSES TO PREGNANCY

Impact on the Father

The partner also travels through stages of adjustment to fatherhood. The *announcement* phase begins when the pregnancy is confirmed. The *adjustment* phase occurs in the second trimester, when the partner faces the reality of the pregnancy, asks questions, and participates in prenatal classes. In the *focus* phase, the partner begins to feel like a father, participates in the labor process, and discusses care of siblings and household modifications. Cultural values influence the role of the father. The nurse should not assume that a father is uninterested if he takes a less active role during the pregnancy and the birth process.

Impact on the Adolescent

Pregnant adolescents often have to struggle with feelings they find difficult to express. They are fraught with conflict about how to handle an unplanned pregnancy. Initially, they must face the anxiety of breaking the news to their parents and the father of the child. Denial of the pregnancy until late in gestation is not uncommon. There may be financial problems, shame, guilt, relationship problems with the infant's father, and feelings of low self-esteem. Alcoholism and substance abuse may be a part of the complex picture.

The nurse must assess the girl's developmental and educational level and her support system to provide the best care for her. A critical variable is the girl's age. Young adolescents have difficulty considering the needs of others, such as the fetus. The nurse helps the adolescent girl complete the developmental tasks of adolescence while assuming the new role of motherhood. Ideally, separate prenatal classes

Table 4-6 The Growth and Development of Parents

CHILD'S TASKS (ERIKSON'S STAGES)	PARENTS' TASK	NURSING INTERVENTIONS
First Trimester		
Growth	Develop attitude toward newborn: • Happy about child? • Parents of one disabled child? • Unwed mother? These factors and others will affect the parents' developing attitude.	Develop positive attitude in both parents concerning expected birth of child. Use referrals and agencies as needed.
Second Trimester		
Growth	Mother focuses on infant because of fetal movements felt. Parents picture what infant will look like, what future he or she will have, and other ideas.	Parents' focus is on child care and needs and providing physical environment for expected infant. Therefore, information concerning care of the newborn should be given at this time.
Third Trimester		
Growth	Mother feels large. Attention focuses on how fetus is going to get out.	Detailed information should be presented at this time concerning the birth processes, preparation for birth, breastfeeding, and care of sibling at home.
Birth		
Adjust to external environment	Elicit positive responses from child and respond by meeting child's need for food and closeness. If parents receive only negative responses (e.g., sleepy infant, crying infant, difficult feeder, congenital anomaly), parents' development will be inhibited.	Encourage early touch, feeding, and other practices. Explain behavior and appearance of newborn to allay fears. Help parents identify positive responses (e.g., use infant's reflexes, such as grasp reflex, to identify a positive response by placing mother's finger into infant's hand).
Infant		
Develop trust	Learn "cues" presented by infant to determine his or her individual needs.	Help parents assess and interpret needs of infant (avoid feelings of helplessness or incompetence). Do not let grandparents take over parental tasks. Help parents cope with problems such as colic.
Toddler		
Autonomy	Try to accept the pattern of growth and development. Accept some loss of control but maintain some limits for safety.	Help parents cope with transient independence of child (e.g., allow child to go on tricycle but do not yell "Don't fall" or anxiety will be radiated).
Preschool		
Initiative	Learn to separate from child.	Help parents show structure but "let go" so child can develop some independence. A preschool experience may be helpful.
School-Age		
Industry	Accept importance of child's peers. Parents must learn to accept some rejection from child at times. Patience is needed to allow children to do for themselves, even if it takes longer. Do not *do* the school project *for* the child. Provide chores for child appropriate to age level.	Help parents understand that child is developing his or her own limits and self-discipline. They should be there to guide child, but not constantly intrude. They need to help child get results from his or her own efforts at performance.
Adolescent		
Establishing identity Accepting pubertal changes Developing abstract reasoning Deciding on career Investigating lifestyles Controlling feeling	Parents must learn to let child live his or her own life and not expect total control over the child. Expect, at times, to be rejected by teenager. Expect differences in opinion and respect them. Guide but do not push.	Help parents adjust to changing role and relationship with adolescent (e.g., as child develops his or her own identify, he may become a Democrat if parents are Republican). Expose child to varied career fields and life experiences. Help child understand emerging emotions and feelings brought about by puberty.

tailored to their needs help adolescent girls learn to care for themselves and assume the role of mother (see Chapter 18).

Impact on the Older Couple

Mothers who become pregnant for the first time after age 35 years are called "elderly primips" because they are at a later stage in their childbearing cycle, and they may face special problems during pregnancy and labor. Many factors contribute to the trend of postponing pregnancy until after age 35 years:

- Effective birth control alternatives
- Increasing career options for women
- High cost of living (delays childbearing until financial status is secure)
- Development of fertilization techniques to enable later pregnancy

The "older couple" usually adjusts readily to pregnancy because they are often well educated, have achieved life experiences that enable them to cope with the realities of parenthood, and are ready for the lifestyle change. Advances in maternal care and delivery practices have decreased the risk of negative pregnancy outcomes, although special problems continue. Women over age 35 years may have a decreased ability to adjust their uterine blood flow to meet the needs of the fetus (Stables & Rankin, 2005). There may be an increase in multiple pregnancies if fertility drugs were used, which increases fetal risk. The increased risk of a congenital anomaly usually results in the offering of special tests during pregnancy (chorionic villi sampling, amniocentesis), which increases the cost of prenatal care. Although the older couple may adjust to the process of pregnancy and parenthood, they may find themselves "different" from their peers, and this can result in impaired social interaction. Concerns of the older parent relate to age and energy level as the child grows, confronting the issues of their own mortality, and child care requirements. Meeting financial needs of a college-age child at retirement is a special issue that may require discussion and planning. Many older parents are placed in a high risk prenatal group that may limit their options for selecting a birthing center. However, the pregnancy should be treated as normal unless problems are identified.

Impact on the Single Mother

The single mother may still be an adolescent, or she may be a mature woman. She has special emotional needs, especially if the father has left her, if he does not acknowledge the pregnancy, or if she does not care to have a relationship with the father. Some single mothers can turn to their parents, siblings, or close friends for support. Other single women are homosexual and have the support of their female partner. Women who do not have emotional support from significant others may have more difficulty completing the tasks of pregnancy. Their uncertainty in day-to-day living competes with the need to master the emotional tasks of pregnancy.

Some single mothers may have conceived by in vitro fertilization because of a strong desire to have a child even in the absence of a stable heterosexual relationship. These women often are nearing the end of their childbearing years and hold a "now or never" view of motherhood. Single women who plan pregnancies often prepare for the financial and lifestyle changes. Achieving social acceptance is not as difficult today as it was many years ago when single motherhood was taboo and considered a disgrace to the maternal family. The nurse should maintain a nonjudgmental attitude and assist the single mother in successfully achieving the psychological tasks of pregnancy.

Impact on the Single Father

The single father may take an active interest in and financial responsibility for the child. The couple may plan marriage eventually, but it is often delayed. A single father may provide emotional support for the mother during the pregnancy and birth. He often has strong feelings of surprise and accomplishment when he becomes aware of his partner's pregnancy. He may want to participate in plans for the child and take part in infant care after birth. However, his participation is sometimes rejected by the woman.

Impact on the Grandparents

Prospective grandparents have different reactions as well to a woman's pregnancy. They may eagerly anticipate the announcement that a grandchild is on the way, or they may feel that they are not ready for the role of grandparent, which they equate with being old. The first grandchild often causes the most excitement for grandparents. Their reaction may be more subdued if they have several grandchildren, which may hurt the excited pregnant couple.

Grandparents have different ideas of how they will be involved with their grandchildren. Distance from the younger family dictates the degree of involvement for some. They may want to be fully involved in the plans for the infant and help with child care, often traveling a great distance to be there for the big event. Other grandparents want less involvement because they welcome the freedom of a childless life again. Many grandparents are in their forties and fifties, a time when their own career demands and care of their aging parents compete with their ability to be involved with grandchildren.

If grandparents and the expectant couple have similar views of their roles, little conflict is likely. However, disappointment and conflict may occur

if the pregnant couple and the grandparents have significantly different expectations of their role and involvement. The nurse can help the young couple understand their parents' reactions and help them negotiate solutions to conflicts that are satisfactory to both generations.

Get Ready for the NCLEX® Examination!

Key Points

- EDD can be calculated with Nägele's rule: subtract 3 months and add 7 days to the first day of the LNMP. However, only a small number of births occur on that exact date.
- Signs of pregnancy often resemble signs of other conditions and are therefore categorized as presumptive, probable, and positive signs of pregnancy.
- Physiologic and anatomic adaptations that occur during pregnancy are profound, but the body systems generally return to the nonpregnant state after birth.
- Being aware of the maternal adaptations that occur during pregnancy is essential to understanding the discomforts and disorders of pregnancy.
- An increase in clotting factors and fibrinogen in the blood during pregnancy makes the woman vulnerable to thrombus formation.
- Cardiac output doubles during pregnancy, and there is a 40% increase in blood volume.
- When a pregnant woman lies flat on her back, the weight of the uterus and fetal contents presses on the vena cava, abdominal aorta, decreasing blood flow and causing maternal hypotension and fetal hypoxia.
- Oxygen consumption increases 15% during pregnancy.
- Maternal insulin resistance increases during pregnancy.
- Many metabolic functions increase during pregnancy.
- Frequency of urination often occurs early in pregnancy because of the pressure on the growing uterus or the bladder, and late in pregnancy because of the pressure of the fetus on the bladder as it settles in the pelvic cavity.
- During pregnancy, hyperpigmentation of the skin occurs due to the melanocyte-stimulating hormone and estrogen. The pigmentation fades following pregnancy.
- Stretch marks (striae) occur as the elastic tissue of the skin stretches, resulting in pinkish or purplish lines on the abdomen, breasts, or buttocks. Striae fade to silver lines after pregnancy.
- Categories of drug safety during pregnancy include A, B, C, D, and X. Only drugs in the A or B category may be considered safe during pregnancy.
- Psychological changes during pregnancy are influenced by appearance, function, sensation, and mobility.
- Developmental tasks are related to the trimesters of pregnancy.
- Pregnancy has an impact on all family members.

Additional Learning Resources

SG Go to your Study Guide on pages 479–480 for additional Review Questions for the NCLEX® Examination, Critical Thinking Clinical Situations, and other learning activities to help you master this chapter content.

evolve Go to your Evolve website (http://evolve.elsevier.com/Leifer/maternity) for the following FREE learning resources:

- Animations
- Answer Guidelines for Critical Thinking Questions
- Answers and Rationales for Review Questions for the NCLEX® Examination
- Concept Map Creator
- Glossary with pronunciations in English and Spanish
- Patient Teaching Plans
- Skills Performance Checklists and more!

Online Resources

- www.alexandertechnique.com/articles/pregnancy
- www.allaboutparenting.org/parenting-skills.htm
- www.lamaze.org
- www.nursingcenter.com
- www.mypyramid.gov
- www.makewayforbaby.com/prenatalcare.htm

Review Questions for the NCLEX® Examination

1. A pregnant woman arrives at her first obstetric appointment and asks, "When is the baby due?" The woman's last normal menstrual period started on June 11. Using Nägele's rule, the nurse determines that the estimated date of delivery is:
   1. March 4
   2. March 18
   3. September 4
   4. September 18

2. The nurse can expect to palpate the uterine fundus at its highest, at the xiphoid process of the rib cage, by:
   1. 12 weeks' gestation
   2. 20 weeks' gestation
   3. 36 weeks' gestation
   4. 40 weeks' gestation

3. The hormone responsible for the production of breast milk is:
   1. Estrogen
   2. Oxytocin
   3. Progesterone
   4. Prolactin

4. A pregnant woman reports pain and a tingling sensation in her hand and wrist. The nurse is aware that these symptoms are most likely related to:
   1. Carpal tunnel syndrome
   2. Striae gravidarum
   3. Chloasma
   4. Diastasis recti abdominis

5. Which woman would be considered an "elderly primip?"
   1. 30-year-old pregnant for the first time
   2. 35-year-old pregnant for the third time
   3. 37-year-old pregnant for the first time
   4. 40-year-old pregnant for the second time

6. Which FDA risk category for drugs indicates the least risk if taken during pregnancy?
   1. A
   2. B
   3. C
   4. X

7. What would be considered positive sign(s) of pregnancy? *(Select all that apply.)*
   1. Positive home pregnancy test
   2. Doppler auscultation fetal heart sounds
   3. Palpation of active fetal movements by examiner
   4. Ultrasound visualization of the fetus

8. Put the following developmental tasks of pregnancy in sequential order by numbering 1 *(first)* to 4 *(last)*.
   ___ Fetal distinction
   ___ Pregnancy validation
   ___ Role transition
   ___ Fetal embodiment

Critical Thinking Questions

1. A woman in her first trimester of pregnancy asks, "What procedures will the nurse-midwife do to determine that I am pregnant?" What explanation would you give her?

2. A woman in the first trimester of pregnancy would like information about her pregnancy. Her first question is, "Why do I have brown patches on my face, a brown line down my abdomen, and darker nipples?" She also asks, "Why do I urinate so often?" Why do you think these are concerns?