Module 3. Prenatal Care and Preparation for Childbirth

Introduction

Getting early and regular prenatal care is one of the best ways to promote a healthy pregnancy. Adequate prenatal care is very important for a successful pregnancy outcome. By seeing the woman regularly, medical provider has better chance to find problems early so that the woman can be treated as soon as possible to avoid complication that can endanger her and fetus health or even life.

Prenatal care is more than just health care; it often includes education and counseling about how to handle different aspects of pregnancy (for example, nutrition, physical activity, discomforts during pregnancy), what to expect from the birth itself, and basic skills for caring for a newborn.

The goals of prenatal care are:

1. Monitor pregnancy progression
2. Assess the well-being of the fetus and mother
3. Identify medical and psychosocial complications and provide appropriate interventions
4. Provide education and reassurance of the mother and the family

Prenatal visits also give the woman and her family a chance to talk to medical provider about any questions or concerns she has related to the pregnancy, delivery, parenthood, or newborn care.

Many women in less developed countries have limited access to special care provided by obstetrician-gynecologists. Prenatal care can be provided by primary health care providers which will make it more available and affordable for women. That is why knowledge and skills in basic prenatal care are essential for family physicians and nurses/midwives.

Cognitive objectives

After completing this chapter learners will be able to:

- Discuss the importance of preconception care
- Identify preconception risk factors
- Discuss topic for preconception care
- Discuss the importance and objectives of prenatal care
- Distinguish high-risk from low-risk pregnancies
- Describe the steps of routine prenatal care for normal pregnancy
- Describe details of each step of prenatal care at different gestational ages
- Identify topics to discuss with the woman during each prenatal visit
- Describe topic to cover to prepare the woman for childbirth

Expected practice outcomes

After fulfilling learning objectives and completing this chapter learners are expected to:

- Conduct preconception visit
- Conduct physical examination of a pregnant woman
- Estimate the status of current pregnancy
- Prescribe necessary laboratory exams and medication
- Read prescribed test results

- Counsel pregnant women on different health related topics (nutrition, vitamin supplementation, medication use, physical activity, anemia prevention and other)
- Recognize danger signs during pregnancy
- Help pregnant women and their families to develop emergency preparedness plan
- Help the woman to be prepared for childbirth
- Schedule the next prenatal visit
- Strengthen interpersonal skills between medical provider and client
- Refer timely complicated pregnancies

Expected practical skills

- Performing general physical examination
- Calculating gestational age and estimated date of delivery
- Measuring fundal height of the uterus
- Performing Leopold maneuvers
- Perform auscultation of fetal heartbeat

The following sections are included in this chapter:

I. Preconception care
II. Routine prenatal care
    1. The first (initial) prenatal visit:
        - Step 1. Taking initial history
        - Step 2. General physical examination
        - Step 3. Evaluation of the status of current pregnancy
        - Step 4. Laboratory screening and other diagnostic procedures
        - Step 5. Education of the woman and her family
        - Step 6. Scheduling the next visit
    2. Subsequent prenatal visits
III. Preparation for childbirth
IV. Psychological support and communication with the woman

I. Preconception care

To have better pregnancy outcome many health care providers recommend that a woman who is only thinking about getting pregnant should has a preconception visit and counseling to reduce the risk of certain problems during her pregnancy. The goals of preconception care are to identify and treat the conditions that can affect a future pregnancy and to provide a woman and her husband with information that can help them to make timely informed decisions about future pregnancies.

Preconception counseling should include identification of preconception risks and provision of education based on identified risks through assessment of:

- Family history
- Genetic history
- Medical history
- Current medication use
- Obstetrical and gynecological (reproductive) history
- Risk factors for STIs
- Nutrition
- Immunization
- Environmental and occupational exposures
- General physical examination
- Assessment of socioeconomic, educational and cultural context
- Family planning and birth spacing
- Substance use (smoking, alcohol, drugs)
- Domestic violence and abuse [1]

Table 1 below describes the preconception risks that can be identified during preconception counseling of a woman and her husband.

Table 1. Preconception risk factors [1]

Medical history	The woman has: • Diabetes mellitus • Thyroid disorders • Asthma • Heart disease • Chronic hypertension • Deep venous thrombosis • Kidney disease • Systemic lupus erythematosus • Epilepsy • Cancer • Hemoglobinopathy • Hyperphenylalaninemia • Toxoplasmosis • Rubella • Varicella • Currently taking medications

Reproductive history	The woman has: • Uterine or cervical abnormalities • 2 or more repeated 1st trimester spontaneous abortions • One or more induced abortions • One or more fetal, neonatal or infant deaths • One or more preterm deliveries • One or more low-births infants • One or more infants requiring intensive care • One or more infants with birth defect(s) • High-risk behaviors for STIs and HIV/AIDS • Gonorrhea, Syphilis, Chlamydia, HIV/AIDS, Hepatitis B
Nutrition	The woman has: • Vegetarian or other special diet • Bulimia, anorexia or other eating disorders • Weight<85% or >135% of the ideal weight
Family history	The woman or her husband have in their families people with: • Hemophilia • Talassesmia • Tay-Sachs trait or disease • Sickle cell trait or disease • Phenylketonuria • Cystic fibrosis • Births defects • Mental retardation
Social history	The woman: • drinks beer, wine, vodka or other alcohol product regularly • smokes tobacco • uses substances (cocaine, marijuana or other drugs) • is or was exposed to a blood, bodily secretion, chemicals or radiation at home or at work • is or was physically, sexually or emotionally abused • participates in activities that can result in overheating (sauna, hot tub)

A couple who has risk factors described in Table 1 should be provided with information on how to reduce the risks and in majority of cases a couple should be referred to an appropriate specialist.

During preconception visit it is very important to emphasis the importance of early and regular prenatal care to have better pregnancy outcome. [1]

II. Routine Prenatal Care

The objectives of basic prenatal care include:

1. To establish good relationships with the woman
2. To promote optimal health of the woman and her fetus
3. To establish an accurate gestational age
4. To assess and monitor of the woman and her fetus for the present and/or development of health complications that can place them at risk for poor outcomes
5. To educate the woman and her husband/partner regarding concerns and problems that can arise in pregnancy, birth and parenting [2]

These objectives should be addressed by:

- completing medical history
- physical examination and interpretation of findings
- routine laboratory assessment
- assessment of gestational age, and normal progress of pregnancy
- ongoing risk identification
- education of the woman
- psychosocial support
- coordination of the care, mechanisms for consultation and referral [3]

Prenatal care should begin as early as possible. The first (initial) visit ideally should take place in the first trimester of pregnancy as soon as the woman finds that she is pregnant. The schedule for following prenatal visits should be determined by risk factors the woman has and her needs taking into consideration her psycho-emotional and socio-economic status, ease of access to the medical facility, transportation means and other.

Current recommendations of World Health Organization are at least 4 prenatal visits during normal pregnancy without any complications:

- First visit at 4-16 weeks of gestation
- Second visit at 16-24 weeks
- Third visit at 24-32 weeks
- Fourth visit 36 and + weeks

Women who has risk factors or develop complications should come more often, at least 8-10 times during pregnancy (see ACOG schedule) or even more frequent depending on condition. Every pregnant woman should be encouraged to visit her medical provider at any time she has questions, concerns about her pregnancy or she does not feeling well. [4]

American College of Obstetricians and Gynecologists recommends 8-10 prenatal visits for low-risk pregnancies:

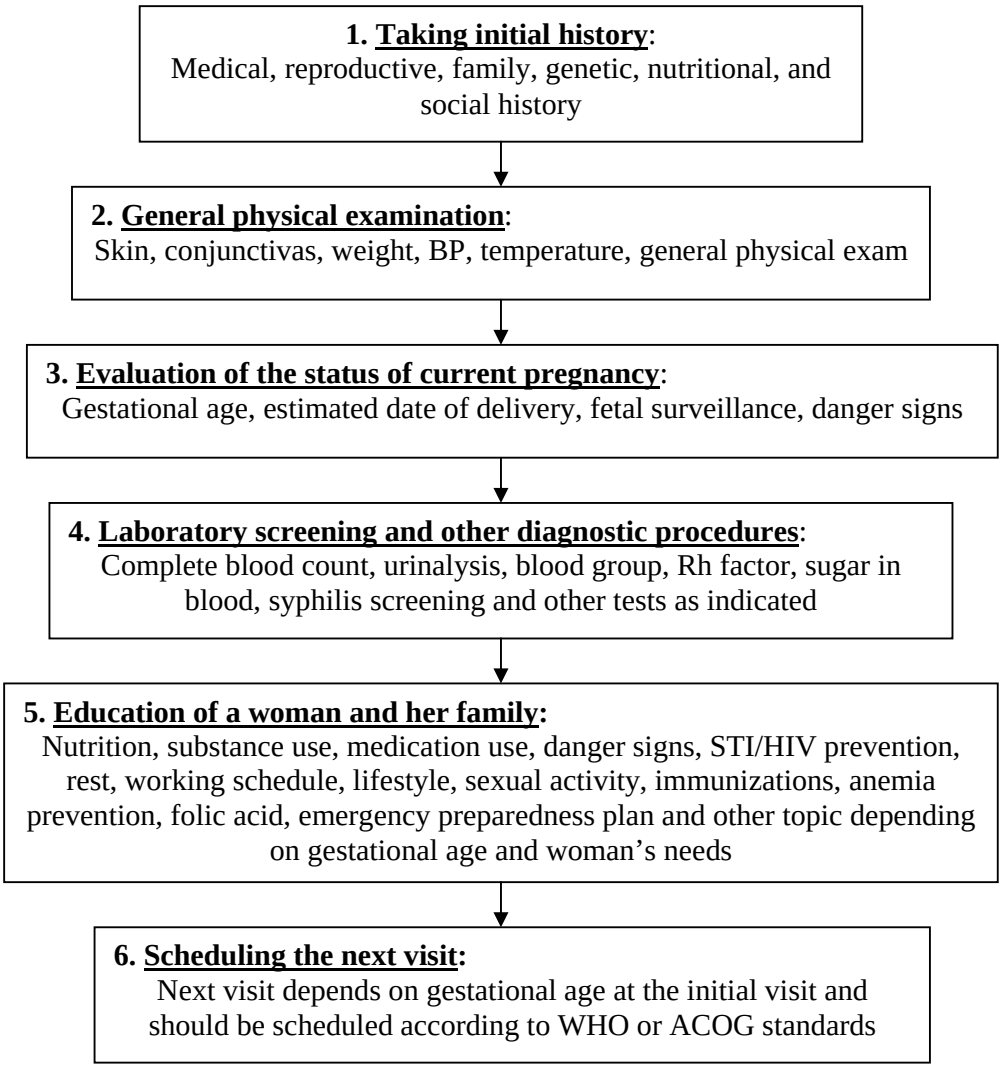
- Every 4 weeks for the first 28 weeks of pregnancy
- Every 2-3 weeks until 36 weeks of pregnancy
- Weekly after 36 weeks of pregnancy, (see also Table 2)

Table 2. Recommended by ACOG number of prenatal visits by trimester of pregnancy

Trimester	Number of visits
First (1-12 weeks of gestation)	1-2
Second (12-28 weeks of gestation)	4
Third (28-40 weeks of gestation)	3-4

1. The initial (first) prenatal visit

During the initial (first) prenatal visit, no matter at what stage of pregnancy the woman comes, 6 steps should be performed [5]:



Step 1. Taking initial history

Taking the initial history is one of the most important components of prenatal care. Initial history together with the evaluation of a status of current pregnancy allows assess the risk during pregnancy. Although World Health Organization (WHO) currently does not classify pregnancies as high- or low-risk and recommend consider all pregnancies as a high-risk, identification of risk factors is still useful for minimizing maternal and neonatal complications. Risk assessment should include taking complete medical, genetic, reproductive, nutritional, family, and social history and evaluation of a status of current pregnancy. Table 3 presents risk factors divided by categories. [5]

Table 3. Risk assessment during pregnancy [2]

Medical history	• Cardiac diseases • Methobolic disorders • Gastrointestinal disorders • Chronic hypertension • Seizure disorders • Pulmonary diseases • Renal diseases/repeated uninary tract infections/bacteriuria • Hemoglobinopathies • Malignant tumors	• Reproductive tract abnormalities • History of abnormal Pap smear • Sexually transmitted diseases • Emotional disorders or mental retardation • Family history of severe inherited disorders • Previous surgeries involving reproductive organs
Obstetrical history	• History of infertility • Grand multiparity • Incompetent cervix • Uterine/cervical abnormality • Previous preterm labor/birth • Previous cesarean birth • Previous macrosomic infant • Two or more spontaneous or induced abortions • Last pregnancy <1 year before present conception	• Previous hydatiform mole or choriocarcinoma • Previous infant with neurological deficit/birth injury/congenital abnormality • Previous ectopic pregnancy • Previous stillbirth or neonatal death • Previous multiple gestation • Previous prolonged labor • Previous low-birth infant • Previous midforceps delivery
Current pregnancy status	• Inadequate prenantal care • Intrauterine growth retardation • Large-for-gestational-age fetus • Pregnancy induced hypertension/preeclampsia • Polyhydramnios • Placenta praevia • Abnormal presentation • Maternal anemia • Weight gain< 5 kg • Weight loss > 2.5 kg • Over/underweight • Incomplete immunization	• Rh sensibilization • Fetal/placental malformations • Preterm labor • Multiple gestation • Premature rupture of membranes • Placental abruption • Postdated pregnancy • Uterine fibroids • Fetal manipulations • Cervical cerclage • Sexually transmitted diseases • Maternal infection
Psychosocial factors	• Inadequate finances • Social problems • Pregnant is adolescent • Poor nutrition • More than 2 children at home • Nonacceptance of pregnancy • Poor housing conditions	• Attempt of suicide • Unwed/father of baby uninvolved • Inadequate social and physical support of the mother • Physical, sexual and/or emotional abuse of the woman • Psychiatric disorder
Demographic factors	• Maternal age <16 or >35 years old	• Education < 11 years
Lifestyle	• Smoking • Substance abuse • Alcohol intake	• Heavy lifting/long periods of standing • Unusual stress • Exposure to environmental hazards

If the woman has at least one of these conditions her pregnancy is considered high-risk and her schedule of prenatal visits can be different than recommended for normal pregnancies.

Most of these factors are self-explanatory or will be described further in this module. Recently *domestic violence* during pregnancy started to get attention of medical providers since many studies have shown that different forms of domestic abuse may affect health and sometimes even life of both the mother and her fetus. That is why risk assessment during pregnancy should always include identification of women who are victims of domestic violence. Many studies have shown that violence against woman usually begins before pregnancy, but it also may begin or escalate in pregnancy. There are no established symptoms of domestic violence but medical provider should suspect violence in the family if:

- woman's complains are multiple, repeated somatic
- pregnancy is unwanted
- woman's wounds and bruises do not comply with her explanations
- late entry in prenatal care, missed appointments
- poor weight gain and nutrition
- suicidal attempts and thoughts
- IBS (irritable bowel syndrome) [5]

After taking the initial history physical examination of the woman should be performed.

Step 2. General physical examination

During the first prenatal visit assessment of woman's skin and conjuctivas (color, rash, and pallor), cardiovascular, respiratory, renal, gastrointestinal, neurological, endocrinological systems and organs and evaluation for edema should be performed to identify high-risk pregnant women. Physical examination of a woman during her first as well as subsequent prenatal visits should include measurements of her weight, blood pressure, pulse, and body temperature. Height measurement is no longer recommended by WHO as a standard procedure unless the woman is very short and there is a risk of cephalo-pelvic disproportion (CPD).

Weight measurement is one of the important examinations since it allows evaluating weight gain during pregnancy which is a parameter to evaluate woman's nutritional status. The optimal weight gain during pregnancy depends on many factors such as her weight before pregnancy, her height, bone structure, age, and activity level. Recommended weight gain during pregnancy for women with different preconception weight is presented in Table 4.

Table 4. Recommended weight gain during pregnancy [6]

Weight before pregnancy	Weight gain
Underweight	12.5-18 kg
Average weight	11.5-16 kg
Overweight	7-11.5 kg
Obese	< 7 kg
Twin gestation	16-20 kg

Evaluation of blood pressure (BP), pulse and body temperature helps to identify danger signs or women who are at high-risk of development of problems during pregnancy. High or very low BP and/or body temperature and fast or very slow pulse can be sign of problems during pregnancy (see Chapter 3 on Emergencies in prenatal, intranatal and postpartum periods).

Step 3. Evaluation of the status of current pregnancy

Evaluation of the status of current pregnancy includes 1) estimation of expected date of delivery and gestational age, 2) assessment of uterine activity, and 3) fetal surveillance.

Expected date of delivery and gestational age [4]

Evaluation of a status of current pregnancy should start with estimation of gestational age and expected date of delivery (EDD). Expected date of delivery as well as age of gestation is calculated based on last normal menstrual period (LNMP) if the woman has regular 28-days menstrual period. The EDD should be calculated during the first (initial) prenatal visit and is estimated by counting 9 month forward from the first day of the LNMP and adding 7 days. If the woman has 35-day menstrual period 7 additional days should be added to EDD.

- For example:
  If the LNMP started on June 29, 2005, than the EDD is April 6, 2006 for 28-day cycle and April 13, 2006 for 35-day menstrual cycle.

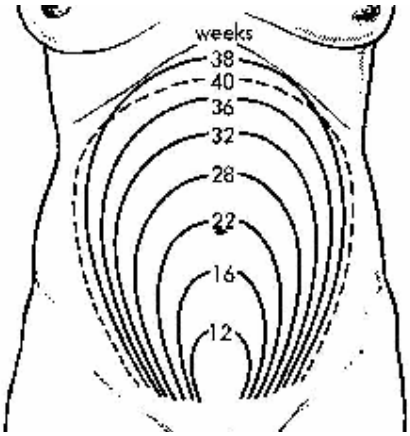
The gestational age is estimated by counting the number of months or weeks since the last normal menstrual period. This should be done at every prenatal visit. [4]

- For example:
  If the LNMP is June 26, 2005, and the date of prenatal visit is November 21, 2005 than gestational age at this visit is 5 months or 21 weeks and 1 day.

If the LNMP is unreliable or the woman has irregular periods the EDD and gestational age can be estimated according to the early dating ultrasound performed prior to 14 weeks which gives the most accurate estimated of gestational age.

If early ultrasound is not available and the woman doesn't know her last menstrual period, the EDD and gestational age can be estimated based on the size of the uterus or based on the date when the woman first felt her baby moving (quickening). The size of the uterus is determined by measuring fundal height in centimeters from the top of the fundus to the symphisis pubis. The measurement should correlate with gestational age (+/- 2 cm) between 22 and 34 weeks. The height of the uterine fundus and its correlation to gestational age is shown in Figure 1 below.

Figure 1. Fundal height according to the age of gestation in weeks



Calculation of gestational age based on the date when the woman first felt her baby quickening is based on assumption that the primigravidae women to begin feeling fetal movements from around 20-22 weeks and multigravidae women from around 18-20 weeks. Each woman will experience fetal movements at an amount that is normal for her. Estimations of EDD and gestational age based on fetal first movements that the woman feels is inaccurate. If possible, date of delivery and gestational age should be estimated by other methods. [4]

Uterine activity

To evaluate the status of current pregnancy the woman should be asked how she feels, if she has any complains and problems related to pregnancy. After 20th week of gestation during each visit uterine activity should be assessed by asking the woman if she signs and symptoms of miscarriage or preterm labor such as:

- Uterine cramping (menstrual-like cramps)
- Uterine contractions more than 3-4 time in an hour
- Low abdominal pressure
- Low backache
- Vaginal bleeding
- Increased vaginal discharge
- Pelvic pressure
- Persistent abdominal cramping
- Thigh pain that is intermittent or persistent
- Urinary frequency

Fetal surveillance

Fetal condition should be assessed during each prenatal visit after week of gestation. Fetal surveillance includes measuring fundal height, assessing fetal heart rate and fetal movements, and checking fetal position, lie and presentation (after 36 weeks of gestation).

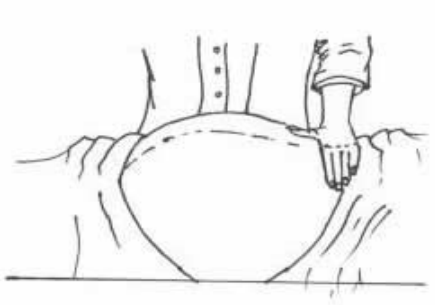
Fundal height should correspond to gestational age plus or minus 2 cm. If a discrepancy is more than 2 cm, i.e. 3 cm or more, or there is no increase from the previous prenatal visit it may indicate intrauterine growth retardation. [7]
The woman should be referred to the specialist.

How to measure fundal height?

Prior to start the examination:

- Explain the procedure to the mother and gain verbal consent
- Wash hands
- Have a non-elastic measure tape (in centimeters)
- Ensure the mother is comfortable in a semi-recumbent position, with an empty bladder
- Expose enough of the abdomen to allow a thorough examination
- Ensure the abdomen is soft (not contracting) [8]

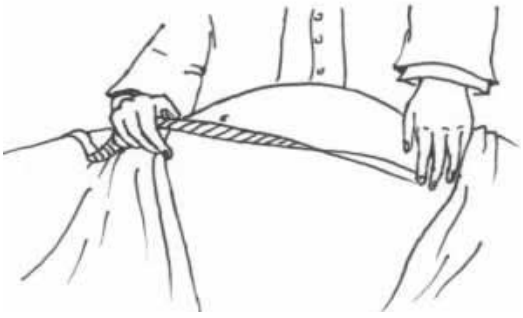
1. Palpate the abdomen to determine fundus with a hand.



2. Fix the tape measure at the fundus with one hand.

3. Measure the distance between the fundus and the symphysis pubis (the tape measure should stay in contact with the skin)

4. Measure along the most prominent part of the abdomen without correcting to the midline. Measure only once. Record the measurement.



Fetal position, lie and presentation should be assessed only after 36 weeks of pregnancy since before that period it can be changed multiple times.

Fetal lie is a relationship of the fetus to the long axis of mother. Normal lie is longitudinal; abnormal – transverse and oblique.

Fetal position of the fetus is determined based on the position of the fetal occiput or vertex to mother's pelvis.

Normal position is occiput anterior or transverse:

- Left Occiput Lateral (LOL) 40%
- Right Occiput Lateral (ROL) 25%
- Left Occiput Anterior (LOA) 12%
- Right Occiput Anterior (ROA) 10%

Occiput posterior (occiput at sacrum) position is considered abnormal:

- Left Occiput Posterior (LOP) 3%
- Right Occiput Posterior (ROP) 10% [8]

Fetal presentation of fetus can be cephalic or breech.

Checking fetal lie, position and presentation should be done by the Leopold maneuvers:

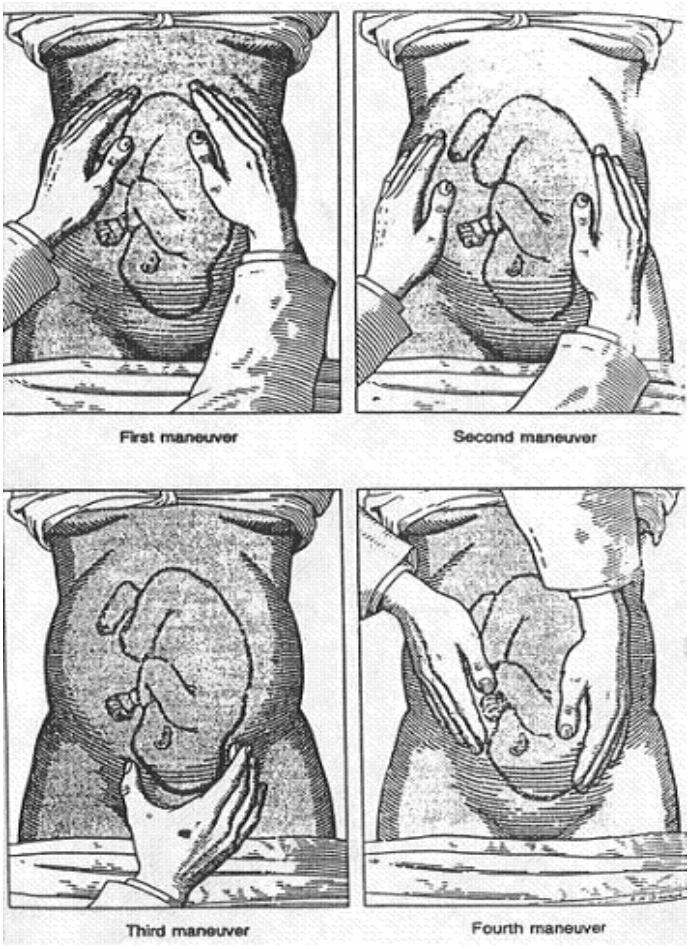
Maneuver 1. Assess fetal part that is located in the fundus of the uterus. The examiner should place both hands in each upper quadrant of the woman's abdomen. This allows determining what part lies in the uterine fundus, i.e. fetal head versus lower limbs (breech).

Maneuver 2. Assess fetal position and lie. The examiner should palpate with both hands the paraumbilical regions to differentiate the fetal spine from limbs, therefore to determine fetal position.

Maneuver 3. Assess fetal presenting part. The examiner should palpate suprapubic region with a single dominant hand which will allow to determine fetal presentation and to estimate fetal station and engagement of fetal presenting part into the pelvis.

Maneuver 4. Assess engagement of fetal presenting part in the pelvis. The fourth, the final maneuver involves palpation of bilateral lower quadrants in order to define the fetal head, further determine engagement of fetal presenting part into the pelvis. [9]

Figure 2. Leopold maneuvers



Source: *J.J. Sciarra, Gynecology and Obstetrics, volume 2, Chapter 67, 2000*

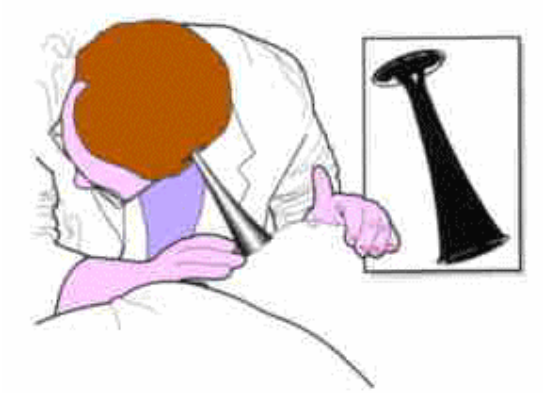
Assessment of *fetal heart rate* with a fetoscope can be started around 20th week of gestation. With the help of ultrasonic Doppler fetal heart beating can be detected between 14 and 20 weeks of gestation. [2]

Assessment of fetal heart with fetoscope (Pinard stethoscope)
The best place to hear the fetal heart through the fetal back. So it is better to assess fetal heart beat after determining fetal lie, position and presentation. If the position of the fetus seems to be left occipital anterior the wide end of the Pinard stethoscope should be placed at about half way between the umbilicus and the symphysis pubis and about 5 cm to the left. If presentation of the fetus is breech, the stethoscope should be placed above the umbilicus. [5]

1. Position the bell end of the stethoscope over the place on the maternal abdomen under which the baby's back is felt.

2. Apply the ear to the flat end. Apply gentle pressure and indent the abdomen nearly a centimeter, depending on the thickness of the abdominal wall.

3. Take your hand away from the stethoscope and listen.



4. You are listening for a sound that feels more like a vibration than a sound, or something similar to watch ticking under a pillow. If you hear a slow "shooching" noise, feel the maternal pulse at the same time and if it coincides with the "shooching" you are hearing the uterine vessels.

Normal fetal heart rate is regular, with a range is 120-160 beats per minute. [2]

Count of *fetal movements* is a simple but valuable screening tool to evaluate fetal conditions. This assessment should begin at 28 weeks of gestation. There are two methods to count fetal movements. With Cardiff method mother is asked to count the first movements each morning. Decreased fetal movements or less than 10 movements in 10 hours are considered abnormal and should be reported to a health care provider. By Sardovaky method the mother should count 4 movements 3 times a day after meals. Fewer than 4 movements in 2 hours after a meal should be reported to a medical provider. [2]

Fetal movements depend on many factors such as time of day, sleep stage of the fetus, gestational age, maternal medications and etc. That is why when the woman reports decreased fetal movements the medical provider should ask her about changes in her diet (food and fluid intake) and activity level. The woman should be given an advice to eat nutritious snack and drink fluids, then to lie down and focus on fetal movements. If fetal movements are still few, then the woman should be referred for more detailed fetal monitoring to a specialized medical facility. [2]

Step 4. Laboratory screening and other diagnostic procedures

Laboratory examinations that should be done during initial prenatal visit are presented in Table 5. The table also includes significant values of these tests when initiation of action is suggested.

Table 5. Initial laboratory examinations [2]

Test	Significant values
Complete blood count:	
Hematocrit	<32%
Hemoglobin	<110 g/L
Platelet count	<150,000 or > 400,000
White blood cells	>12,000/mm^3
Blood type and Rh factor	Mother is Rh- and father is Rh+
Antibody screen	Positive
Fasting plasma blood glucose	<80 mg/dl or >140 mg/dl
Urinalysis	Positive
Test for syphilis and gonorrhea	Positive
Recommended:	
HIV	Positive
Rubella	Positive
Urine culture	Positive

Some of these laboratory examinations should be repeated at each prenatal visit. Laboratory exams that should be preformed during following prenatal visits are described in Table 8 on page 23.

Ultrasound examination for uncomplicated pregnancy is no an essential examination, although it is desirable to have one or two ultrasound examination during pregnancy.
First trimester ultrasound is usually done to establish the pregnancy and to estimate:

- gestational age
- number of fetuses
- heart beating of the fetus

Second trimester ultrasound is usually done to detect:

- fetal abnormalities and malformations (head, extremities, spine, heart with four chambers, kidneys, stomach, bladder and other)

Third trimester ultrasound is usually done to detect:

- fetal lie, position and presentation
- location of placenta
- intrauterine growth retardation

For woman at age 35 or more it is highly recommended to perform a triple-test, if available, to detect women at increased risk of having an infant with neural tube defects, Down syndrome or other chromosomal abnormalities. Triple-test includes screening for maternal serum alphafetoprotein (AFP), human chorionic gonadotropin (hCG) and uncojugated estriol. Elevated levels of AFP are associated with neural tube defects. Low AFP and estriol together with high hCG levels are associated with Down syndrome and other chromosomal abnormalities. Low levels of all three substances suggest an increased risk for Trisomy 18. [2]

Step 5. Education of a woman and her family

Education of the woman is one of the most important components of preconception and prenatal care. During prenatal visits the following topic should be discussed:

- Nutrition
- Vitamins, iron (if needed) and folic acid supplementation
- Medication use
- Lifestyle and substance use
- Rest, work and travel
- Sexual and physical activity, STI/HIV
- Danger signs
- Emergency preparedness plan
- Breastfeeding
- Newborn care
- Birth spacing [5]

Nutrition

Each woman should be provided with information about balanced nutrition, ideal caloric intake and weight gain. Food should be rich in fiber, nutrients and vitamins. There are five groups of nutritional products that compose food pyramid presented in the Figure 1 Below.

<u>Figure 1</u>. Nutritional pyramid

Source: U.S. Department of Agriculture

According to the March of Dimes recommendations a pregnant woman should increase her daily food portions and include:

- 6 servings of breads and other whole grains
- 5½ servings of meat and protein foods
- 5 servings of vegetables
- 4 servings of fruits
- 3 servings of milk and milk products
- 6 to 8 glasses of water

- **NO more** than one soft drink or cup of coffee per day to limit caffeine
- **Limit** fats and sweets (6 teaspoons per day) [2]

Bread, grain, pasta group serving sizes:	- bread – 30-40 g - ½ cup rice or bulgur - ½ cup cooked pasta - ¾ cup dry cereal [2,5]
Vegetable group serving sizes:	- ½ cup raw vegetables - ½ cup cooked vegetable - ½ cup of tomato or vegetable juice [2,5]
Fruit group serving size:	- 1 medium fresh fruit - ½ cup dried, frozen or canned fruits - ½ cup fruit juice [2,5]
Meat, fish, dry beans group serving sizes:	- 30 g meat or poultry - 30 g fish - ½ cup (50-80g) dry beans - 1 egg [2,5]
Milk products group serving sizes:	- 1 cup yogurt - 1 cup milk - 45-50 g cheese - ½ cup cottage cheese [2,5]

Special consideration should be given to underweight women, women with vitamin deficiency or over-supplementation, vegetarians and women on special diets or with unusual food habits such as pica, anorexia or bulimia. Underweight women are at increased risk of having a low-birth baby; vegetarian diet as well as special diets and unusual diet habits can cause some vitamin and nutrient deficiencies that have impact on unborn child. [2]

Vitamins, iron and folic acid supplementation

Vitamin and mineral supplementation is very important for both mother and her fetus. All pregnant women should be advised to include in their diet food products that are reach of vitamins and minerals. These products are described below in Table 6.

Table 6. Sources of vitamins and minerals [3]

Vitamin or mineral	Food source
Vitamin A	Green leafy vegetables; dark yellow vegetables (carrots and sweet potatoes); eggs; whole milk; liver
Vitamin C	Citrus fruits (oranges, lemons, grapefruit), strawberries, broccoli, tomatoes, eggs
Vitamin D	Fish liver oil, exposure to sunlight
Vitamin E	Vegetable oil, whole-grain cereals, green leafy vegetables
Folic acid	Green leafy vegetables, orange juice, strawberries, liver, legumes
Calcium	Milk and milk products, sardines and salmon with bones; collard, kale, mustard, and turnip green
Iron	Meat, liver, dried beans and peas, iron-fortified cereals, prune juice

Vitamin deficiencies as well as over-supplementation are associated with some births defects or mental retardation. Low folic acid intake is associated with increased risk of neural tube defects. That is why it is **recommended** to take 0.6 mg folic acid daily during all pregnancy. It is recommended to start taking folic acid even before getting pregnant at the same dosage. [2]

Iron deficiency can lead to iron-deficiency anemia that is associated with increased risks for both mother and her fetus such as preterm labor, intrapartum and postpartum bleeding, placental abruption, low-birth weight baby. Anemia is diagnosed if hemoglobin is lower than 110 g/l. Therapy with iron tablets should be started; dosage depends on severity of anemia (usually 1 tablet 3 times per day). Iron is recommended to be taken with citrus juice for better absorption and should not be taken with tea or coffee since these drinks decrease gastric absorption of iron. For many women, especially in less developed countries, iron supplementation is recommended to prevent anemia even if hemoglobin level is normal. [2,5]

Although the recommended dietary allowances for most vitamins and minerals increase during pregnancy, their over-supplementation can have negative impact on the fetus leading to birth defects and mental retardation (vitamins A and D). [3] That is why it is recommended to take special multi-vitamins for pregnant women (Pregnavit, Nurture etc.) containing all needed vitamins and minerals in dosages pregnant women need. Recommended daily dietary allowances of vitamins and minerals for pregnant and lactating women are presented in Table 7 below.

Table 7. Recommended daily dietary allowances for pregnant and lactating women [3]

	Pregnant	**Lactating**
Fat-soluble vitamins		
Vitamin A	770 µg	1300 µg
Vitamin D	5 µg	5 µg
Vitamin E	15 mg	19 mg
Vitamin K	90 µg	90 µg
Water-soluble vitamins		
Vitamin C	85 mg	120 mg
Thiamin	1.4 mg	1.4 mg
Riboflavin	1.4 mg	1.6 mg
Niacin	18 mg	17 mg
Vitamin B_6	1.9 mg	2 mg
Folic acid	600 µg	500 µg
Vitamin B_{12}	2.6 µg	2.8 µg
Minerals		
Calcium	1000 mg	1000 mg
Phosphorus	700 mg	700 mg
Iron	27 mg	9 mg
Zink	11 mg	12 mg
Iodine	220 µg	290 µg
Selenium	60 µg	70 µg

Medication and substance use

Since many medications have teratogenic effect and can cause fetal congenital abnormalities and malformation use of all medications during pregnancy should be discussed with medical provider.

Substance use and abuse can affect health of the mother and her fetus or infant. Smoking increases risk of low-birth weight babies, placenta previa, placental abruption and sudden infant death syndrome. Use of alcohol during pregnancy can cause birth defects and mental retardation (fetal alcohol syndrome). Cocaine is a teratogen (can cause urinary tract malformations) and is associated with spontaneous abortion, low-birth-weight, and behavioral problems of the baby. All women should be advice not to use alcohol and drugs and refrain from smoking at least during pregnancy since they are harmful for her and her baby's health. [2]

Rest, work and travel

Pregnant women need more rest. In the first months of pregnancy a woman can feel tired and sleepy. With the fetus growing a woman can feel more need for rest. If she needs it she should lie down or sit with elevated legs. A woman should avoid long time standing or sitting [2,5]

A woman with normal pregnancy usually can continue to work until the onset of labor. Women with medical or obstetrical conditions may need to make adjustments based on the nature of their activities, occupation. Women whose work requires standing, repetitive movements and physical lifting may need to have more breaks during work or to change their work for another one that does not require heavy duties. [5]

In the absence of obstetrical and medical complications, pregnant women can travel with the same general precautions before 36 weeks of gestation. Traveling by air is usually restricted for pregnant women after 20 weeks of gestation. [3]

Physical and sexual activity

There is increasing medical evidence showing that exercise is healthy during pregnancy. However, a pregnant woman should check with her doctor before exercising. If she doesn't have any contraindications, she can do so 3 times a week for 30 minutes each time, as it is recommended by the American College of Obstetrics and Gynecology. Walking, swimming, riding a stationary bicycle, and joining a prenatal aerobics class are all excellent exercise choices for a pregnant woman (see also pages 24-17). Exercises that require jerky, bouncy movements and being outside in hot weather should be avoided. [3] The woman should wear a supportive bra and properly fitting athletic shoes while exercising and drink plenty of water. The woman should stop exercising if following signs appear:

- Dizziness
- Faintness
- Headaches
- Shortness of breath
- Uterine contractions
- Vaginal bleeding or fluid leaking
- Heart palpitations [3]

In general normal sexual activity can continue during pregnancy. Positions may vary as the tummy grows. If sexual activity causes any discomfort to the woman it should be discontinued. Sexual activity is not be recommended by medical practitioners in certain circumstances:

- History of premature birth or labor
- History of miscarriage

- Vaginal bleeding or fluid discharge
- Placenta previa or low-lying placenta
- Incompetent cervix [3]

Sexual intercourse should not take place if a woman doesn't want to for any reason. She should not be afraid to speak with her husband/partner and say "no". [5,10]

If a woman is at risk of getting STI or HIV (husband/partner infected with or at risk of getting an STI or HIV) she should preferably avoid sexual activity or use a condom to prevent herself and her fetus from getting infected.

Danger signs

Danger signs can indicate development of a complication or even an emergency situation during pregnancy. Knowing danger signs of pregnancy and recognize them is very important for the woman and her family in order to seek for medical care on time. Danger signs during pregnancy include:

- Vaginal bleeding
- Nausea and vomiting lasting over 24 hours
- Fever
- Pallor, weakness and fainting
- Breathing difficulties
- Leaking fluid from vagina
- Abdominal pain or backache (cramps)
- Bloody show with/without contractions
- High blood pressure (systolic >= 140 mm Hg, diastolic >= 90 mm Hg)
- Headache and visual disturbance, epigastric pain
- Convulsions or unconsciousness
- Generalized edema or rapid weight gain
- Decreased fetal activity
- Dyuria and backache or abdominal pain [2,11]

In case if at least one of afore-mentioned signs is present the woman should seek medical attention immediately. Diagnostics and management of emergency situations are described in chapter on Emergencies in prenatal, intranatal and postpartum periods.

Emergency and delivery preparedness plan

Pregnant woman and her family members should be always prepared for emergency situations that can occur during pregnancy because they usually occur unexpectedly. Each pregnant woman and her family members should have a plan of actions for emergency situation that will help them not panic and save precious time that is extremely important in such situations. Plan for emergency situations as well as for delivery should include:

- arrangements for transportation
- decision who is going with the woman to a medical care facility
- who is staying at home with children (if applicable)
- where to find financial resources
- what things should be taken for the woman what she might need

A woman should also have a bag with all needed clothes and supplies for her and a baby ready in case if delivery starts. It will help her and her family members not to forget anything in panic. [5]

Newborn care

Education regarding care of a newborn should be started already during pregnancy. Parents should be informed about normal newborn care, danger signs for a newborn, breastfeeding, and postpartum adjustments. Providing the woman and her husband with information will help them to adjust better for parenthood (more detailed information on care of a newborn can be found in the module on Postpartum and newborn care).

Breastfeeding

The successful management of breastfeeding begins during pregnancy. That is why it is very important to start counseling on breastfeeding during pregnancy, usually in the second part of it. The woman should be explained benefits of breastfeeding for her and her baby:

- Breast milk is indispensable source of nutrients for the newborn
- Breast milk contents immunoglobulins from the mother that protect the baby from many infectious diseases, especially from diarrhea, respiratory, ear and urinary tract infections
- Exclusive breastfeeding helps to prevent pregnancy during 6 months after birth
- Helps to involution of the uterus
- Helps to develop close relationships between mother and baby

The woman should be informed about nipple and breast care, correct technique and frequency of breastfeeding, correct attachment of the baby to the nipple. Usage of special soaps and ointments should be discouraged. [5]

Birth spacing

Planning the next pregnancy is important for both the mother and her newborn. The interval between pregnancies should be at least 2.5-3 years. The risk for adverse outcomes for mother and her fetus increases with short time interval between pregnancies. Optimal birth spacing helps to preserve health and fertility of women and reduces their work burden as well as it contributes to children welfare by increasing their access to food, housing, clothing and education. Both mother and infants will have health benefits from optimal birth spacing that low the risk of:

For mothers:

- Malnutrition from overlapping pregnancies and breastfeeding
- Anemia
- Postpartum endometritis
- Premature rupture of membranes
- Third trimester bleeding
- Maternal death

For infants:

- Small for gestational age or low birth weight
- Underweight child
- Preterm birth
- Fetal death
- Neonatal death
- Infant death
- Child death

Discussions on optimal birth spacing and family planning methods that can be used by breastfeeding mothers should be a part of good prenatal care. Family methods that can be used by breastfeeding mothers include:

- LAM
- IUD
- Tubal ligation
- Condoms
- Mini-pills
- DMPA

Detailed information on different family planning methods can be found in the module on Family planning.

NB!: Details of each topic depend on the stage of the woman's pregnancy. Topics that should be discussed with the woman during prenatal visits are described in Table 8 (page 23).

Step 6. Schedule the next visit

By the end of each prenatal visit health care provider should explain to or remind the woman importance of regular prenatal visits for better outcome for both mother and her fetus and schedule the next appointment for prenatal visit. The next prenatal visit should be scheduled according to WHO or ACOG recommendations (see page 5) and depends on gestational age and course of pregnancy. If the woman can come more frequently than ACOG recommendations are applicable to her. If she cannot come more than 4 times during the whole pregnancy, she should follow WHO recommendations.

- For example: If at the first prenatal visit gestational age was 14 weeks than the woman should come for her second prenatal visit between 16 and 24 weeks according to WHO schedule or in 4 weeks according to ACOG recommendations.

2. Subsequent prenatal visits

During following prenatal visits there is usually no need to repeat history taking but all other steps performed at the first (initial) visit should be the same:

1. General physical examination
2. Evaluation of a current status of pregnancy
3. Laboratory screening
4. Education of the woman
5. Schedule the next visit [5]

Specifications of each prenatal visit with particularities of physical examination, laboratory testing and counseling are presented in Table 8 (page 23).

Table 8. Components of prenatal care according to gestational age [5]

Prenatal visit number	Weeks of gestation	Physical exam and obstetrical status	Laboratory tests	Counseling
1st visit - WHO schedule **1st visit -** ACOG schedule	4-16 weeks	- Weight - Height (if short) - Blood pressure - Pulse - Temperature - Skin and conjunctivas	- Complete blood count - Urinalysis - Blood group and Rh factor - Antibody screen - Sugar in blood - Test for syphilis and gonorrhea	- Physiology of pregnancy - Nutrition - Substance use - Medication use - Danger signs - STI/HIV - Rest, work and travel - Sexual and physical activity - Immunizations - Vitamins and folic acid supplementation - Emergency preparedness plan
2nd visit - – WHO schedule **2nd – 4th visits -** ACOG schedule	16-24 weeks	- Weight - Blood pressure - Pulse - Temperature - Skin and conjunctivas - Fundal height - Fetal heartbeat - Fetal movements	- Urinalysis - Hemoglobin	- Danger signs - STI/HIV - Vitamins, iron (if needed) and folic acid supplementation - Nutrition, rest, work and travel - Breastfeeding - Signs and symptoms of preterm labor - Sexual and physical activity - Emergency preparedness plan
3rd visit - WHO schedule **5-7th visits -** ACOG schedule	24-36 weeks	- Weight - Blood pressure - Pulse - Temperature - Skin and conjunctivas - Fundal height - Fetal heartbeats - Fetal movements - Uterine activity	- Urinalysis - Hemoglobin - Sugar in blood - Test for syphilis and gonorrhea	- Delivery signs - Danger signs - STI/HIV - Breastfeeding - Vitamins, iron (if needed) and folic acid supplementation - Birth spacing - Delivery and emergency preparedness plan - Newborn care
4th visit - WHO schedule **8-10th visits -** ACOG schedule	36 and + weeks	- Weight - Blood pressure - Pulse - Temperature - Skin and conjunctivas - Fundal height - Palpation of fetal parts - Fetal heartbeats - Fetal movements	- Urinalysis - Hemoglobin	- Nutrition, rest, work and travel - Delivery signs - Danger signs - STI/HIV - Breastfeeding - Vitamins, iron (if needed) and folic acid supplementation - Birth spacing - Delivery and emergency preparedness plan - Newborn care

* Four minimal visits don't imply that a number of visits to Women's Consultations should be reduced but family physicians and family nurses should perform at least these 4 prenatal visits.

III. Preparation for childbirth

The prenatal visits should be used to educate and prepare the future parents and other members of the family about normal labor and delivery, pain relief, possible obstetric complications and procedures, breastfeeding, normal newborn care, and postpartum adjustments. Adequate preparation of family members is beneficial for the mother, the newborn, and the family unit as a whole. It may facilitate transition to parenthood. In some countries there are special prenatal classes for pregnant women and their family members. In regions where this type of service is unavailable, preparation for childbirth should be included as a component of prenatal care during one or two last prenatal visits.

While talking about labor and delivery the woman should be unformed about different positions during labor and delivery, their advantages and disadvantage. Physiologically the optimal position for childbirth is semi-sitting position with 40^{o} angle. Whichever position the woman chooses during the first stage of labor she should change positions frequently. [5,12] The most common positions during labor and delivery are:

Lithotomic position: May be easier for medical staff to assist childbirth in case of a difficult delivery, but generally uncomfortable. It can cause the uterus to press against the inferior vena cava blood vessel, decreasing the placenta blood supply, it can push against women's diaphragm causing difficulties in breathing, and it can prolong the second stage of the delivery.[12]

Lying on the side: This position takes pressure off the perineum and keeps the weight of the uterus off the vena cava, maximizing blood flow to the uterus and the baby.[12]

Semi-sitting or semi-reclining: This position can ease assistance of medical staff during childbirth and compared with lithotomic position it reduces pressure against vena cava, improving blood flow to the uterus and the baby. In this position the pelvis opens wider giving more space for the baby. [12]

On hands and knees: Can help to relief back pain and give a poorly positioned baby a chance to turn around, maximizes blood flow to the uterus and the placenta, thus recommended for situation when baby is stressed.[12]

Squatting or semi-squatting: In this position the pelvis open the widest, thus the baby has more space to move down into the birth canal. [5]

When actual delivery starts the women is usually encouraged to take a more reclined position (lithotomic or semi-reclining position) to allow more control from medical staff. The woman should listen to advices and guides from her doctor or midwife.

It is important to teach a woman how to breathe during labor and delivery and how to push during the second stage of labor. During pregnancy the woman and her husband can practice and explore breathing and some massage techniques that can help the woman to relax and control better pain during labor. Breathing should be close to woman's normal breathing pattern: slow, deep and rhythmical breathing. Massage can be provided in several ways:

- lightly stroking the abdomen;
- vigorously firm stroking where it hurts most;
- firm circular massage using the palm of the hand over the centre of the back or sacrum;
- rhythmical squeezing and letting go of the shoulder muscle (when pain is felt mainly in the back);
- a long stroke down the length of the back, buttocks and down the back of the legs; stroking across the forehead, down the neck and down the arms (when pain is felt mainly in the back). [13]

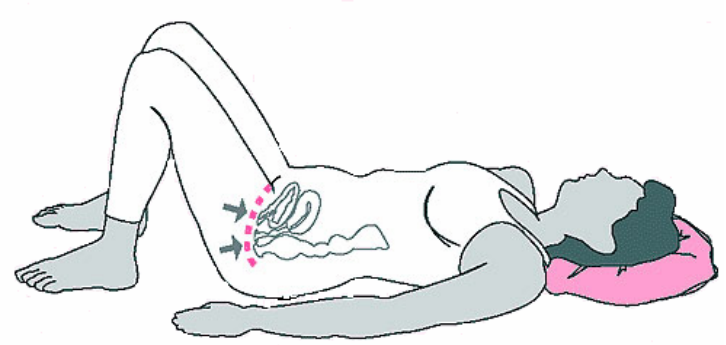
There are some physical exercises that can help the woman to prepare her body to childbirth. Physical exercising during pregnancy can help the woman:

- To breathe correctly
- To reduce stagnation
- To improve functioning of gastrointestinal organs
- To strengthen muscles of the pelvic floor
- To strengthen abdominal muscles
- To increase mobility of pelvic joins
- To reduce pain during labor [14]

Kegel exercise

Strengthening pelvic floor muscles by doing Kegels exercise may help a woman to protect her perineum - the muscular area between the anus and vagina - from tearing during childbirth. She can do this exercise anywhere; standing in line, sitting at computer desk, or watching TV. The woman should:

- tighten the muscles of the vagina as if trying to interrupt the flow of urine when going to the bathroom.
- hold for a count of four, then release. Repeat ten times. A woman should try to work up to three or four sets about three times a day. [14,15]

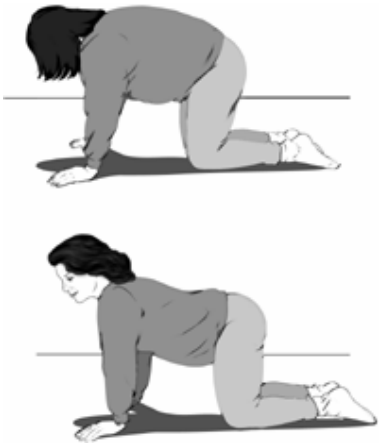


Credit: www.apta.org/ptandbody/images/ptandbody/incontinence/kegels.gif

"Angry cat"

This exercise is for strengthening abdominal muscles and ease back pain during pregnancy and labor. The woman should:

- get down on her hands and knees, arms shoulder width apart and knees hip width apart, keeping her arms straight;
- tighten her abdominal muscles and tuck her buttocks under and round her back, breathing in;
- relax her back into a neutral position, and breathe out;
- repeat at her own pace. [14,15]



Credit: www.cchs.net/health/health-info/docs/1600/1671.asp?index=6914

Squat

Squatting exercise is a one of the best ways of preparing woman's body for childbirth. This position strengthens her thighs and helps open her pelvis. The woman should:

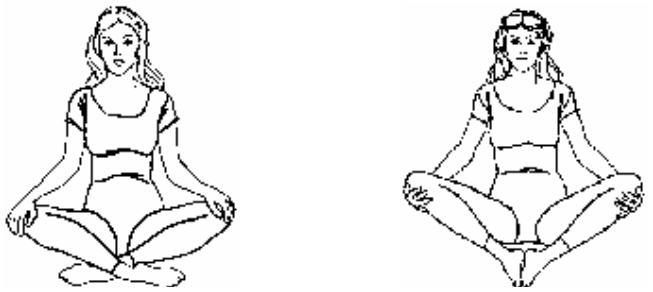
- stand facing the back of a chair with her feet slightly wider than hip-width apart, toes pointed outward, hold on to the back of the chair for support;
- squat toward the floor as though she were going to sit down on a chair; contract her abdominal muscles, lift her chest, and relax her shoulders. Most of her weight should be toward her heels;
- return to standing position. [14,15]

Credit: www.spiritfitnessenterprises.com/ squat.htm

Tailor position

This exercise can help open up woman's pelvis and loosen her hip joints in preparation for birth. It can also improve her posture and ease tension in her lower back. The woman should:

- sit cross-legged on the floor for as long as she is comfortable, legs crossed at the ankles.
- sit up straight against a wall with the soles of her feet touching each other. Gently press her knees down and away from each other — but she should not force them apart; stretch as long as she is comfortable. [14,15]



Credit: ***www.allayurveda.com/ pregnancy/pregnancy2.htm***

A pregnant woman should exercise approximately 30 minutes in cool room with good ventilation to avoid overheating. Her heart rate should not exceed 140 beats per minute. She should stop exercising if she has even one of the following signs:

- Dizziness
- Faintness
- Headaches
- Shortness of breath
- Uterine contractions
- Vaginal bleeding or fluid leaking
- Heart palpitations

Information about possible obstetric complications and procedures, breastfeeding, normal newborn care, and postpartum adjustments should be individualized for the woman and her family. The woman should have enough information about childbirth process in order not to be scared and not to panic when labor starts which can result in better cooperation with medical personnel, promoting normal process of delivery.

IV. Psychological support and communication with the woman

Although pregnancy and childbirth are natural processes, it is physically, physiologically and physiologically stressful. A pregnant woman needs attention, support and care not only from her family and friends but also from her medical providers. Health care provider should built trust of the woman and her family members and their confidence in him/her by providing effective communication, psychological support and appropriate care and treatment. Medical care providers should always:

- respect the woman's dignity and right to privacy;
- be interactive, responsive and sensitive to the woman's needs
- explain each step before performing any procedure and ask permission from the woman
- explain results of tests and procedures to the woman
- respect woman's decisions regarding her care
- approach each woman individually and give her information that she needs and wants [5]

Trust of the woman and her family is a key for a quality prenatal care, therefore for the best outcome of pregnancy.

References

1. Moos M-K. *Preconception Health Promotion: A Focus for Women's Wellness*. March of Dimes, 2003

2. Barron M.L. *Nursing assessment of the Pregnant Woman: Antepartal Screening and Laboratory Evaluation.* March of Dimes, 1998

3. American Academy of Pediatricians, The American College of Obstetricians and Gynecologists. *Guideline for perinatal care.* Fifth edition. 2002

4. World Health Organization. *Caring for mothers and babies.* A guide for midwives, 2003

5. Engelbrecht S, Kiplinger N, Hurber L, Oksuzyan S. *Prenatal care.* Learning Module for PHC providers in Armenia, 2003

6. The American College of Obstetrician and Gynecologists. *Your pregnancy and birth.* Fourth edition. 2005

7. The Royal Women's Hospital, Clinical Practice guidelines. *The standard antenatal check.* http://www.rwh.org.au/rwhcpg/maternity.cfm?doc_id=6034#fundal_h

8. Perinatal institute of maternal and child health. *Fetal Growth Fundal Height Measurements.* 2005. http://www.perinatal.nhs.uk/growth/fhm.htm

9. Khan, F.O., Razi, M.S. *Normal labor and delivery.* E-Medicine: http://www.emedicine.com/med/topic3239.htm

10. American Pregnancy Association. 2005 *http://www.americanpregnancy.org/pregnancyhealth/sex.html*

11. Mathai M, Sanghvi, H, Guidotti, R. *Managing complication in pregnancy and childbirth: a guide for midwives and doctors*. WHO; 2000.

12. Chen P., VeriMed Healthcare Network. *Delivery positions*. 2005 http://www.swmedicalcenter.com/17586.cfm

13. *Natural childbirth technique.* http://www.manbit.com/obstetspain/obnatindx.htm

14. E. Nahapetyan et al. *Reproductive health in family medicine.* Training module. Prime II project/Armenia, 2004

15. The Baby Center. *Exercises to ease pregnancy aches and help you prepare for childbirth*. 2005. http://www.babycenter.com/refcap/pregnancy/pregnancyfitness/1332762.html