437 Team: Obstetrics and Gynecology

Antepartum Care

Objectives:

➢ Diagnose pregnancy
➢ Determine gestational age
➢ Assess risk factors for pregnancy complications, including screening for intimate partner violence
➢ Describe appropriate diagnostic studies and their timing for a normal pregnancy
➢ List the nutritional needs of pregnant women
➢ Identify adverse effects of drugs and the environment on pregnancy
➢ Perform a physical examination on obstetric patients
➢ Discuss answers to commonly asked questions concerning pregnancy, labor and delivery
➢ Describe approaches to assessing the following: Fetal well-being , Fetal growth, Amniotic fluid volume and Fetal lung maturity
➢ Describe the impact of pregnancy on medical problems and the impact of medical problems on pregnancy

References:

➢ Kaplan USMLE step 2 CK - Obstetrics and Gynecology
➢ Online Meded videos
➢ Team 435

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Color index: Important | Notes | Meded | Video-Case

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Introduction

Antepartum (prenatal) care starts from the 1st prenatal visit.
• Women who received Antepartum care in 1st trimester had better pregnancy outcomes
• Home pregnancy test : **positive when beta HCG = 25 or more.**
• Early pregnancy symptoms include : fatigue, vomiting, nausea breast tenderness, and frequent urination.
• For low risk women : first prenatal visit "booking visit" will be an intake visit at 6-8 weeks 1 followed by first prenatal visit before <12 weeks.

Goals of prenatal care :

1. Early and continuous risk assessment.
2. Health promotion.
3. Medical and psychosocial intervention and follow up

1st Prenatal clinical visit components

First	**Take comprehensive History**, focusing on: 1.Chronic medical issues. 2.Past pregnancies and their outcomes. 3.Gynecological issues. 4.Genetic screening issues. 5.Social history : ● Smoking increases the risk of: Miscarriage, placental abruption, Growth retardation, Sudden Infant Death Syndrome (SIDS) , birth defect and preterm delivery. ● Alcohol increases the risk of : Mental retardation, Developmental Delay and birth defect. ● Drugs. ● STD. ● Environment and health hazard. ● Domestic violence. (8-10% of pregnant women are physically abused during pregnancy) ● Seatbelt use.
Second	**Determine Gestational age (GA):** start from the LMP = **first** day of Last Menstrual Period. **Calculate the estimated date of delivery (EDD)**= 40 weeks past LMP if she has a regular 28 days cycle OR vaginal ultrasound if the cycle is irregular and to confirm the EDD if the cycle is regular. - The accuracy of ultrasound dating is gestational-age-dependent. **Earlier sonograms are more accurate than later ones.** ● If the difference between menstrual dates and ultrasound dates is within the normal range of variation, use the menstrual dates. ● If the difference between menstrual dates and ultrasound dates is outside the normal range of variation, use the ultrasound dates.
Follow up	**-Normal low risk pregnancy:** ● Every 4 weeks, until 28 weeks **THEN** Every 2 weeks, until 36 weeks **THEN** Every 1 weeks, until delivery. ● During each visit we should check : weight , blood pressure and fetal assessment. - **Diabetes screening:** 1 hours glucose tolerance test between 24-28 weeks to screen for gestational diabeties. For obese women, diabetes screening should be done at the first visit.

First Trimester Laboratory Tests

Complete Blood Count (CBC):

- **Hemoglobin and hematocrit** (normal pregnancy hemoglobin 10–12 g/dL): Although nonpregnancy female hemoglobin reference range is 12–14 g/dL, normal values in pregnancy will reflect the dilutional effect of greater plasma volume increase than red blood cell (RBC) mass.

- **Mean corpuscular volume (MCV)**: Because hemoglobin and hematocrit reflect pregnancy dilution, MCV may be the most reliable predictor of true anemia. A low hemoglobin and low MCV (<80 µm3) most commonly suggests iron deficiency, but may also be caused by thalassemia. A low hemoglobin and high MCV (>100) suggests folate deficiency or, rarely, vitamin B12 deficiency.

- **Platelet count**: A low platelet count (<150,000/mm3) is most likely indicative of gestational (pregnancy-induced) thrombocytopenia. Preeclampsia with severe features and idiopathic thrombocytopenic purpura (ITP) are uncommon causes of low platelets. Disseminated intravascular coagulation is rare.

- **Leukocyte count** (normal pregnancy white blood cell count in pregnancy is up to 16,000/mm3): Leukopenia suggests immune suppression or leukemia.

Rubella IGg Antibody:

- **Immunity**: The presence of rubella antibodies rules out a primary infection during the pregnancy. Antibodies derived from a natural, wild infection lead to lifelong immunity. Antibodies from a live-attenuated virus are not as durable.

- **Susceptibility**: An absence of antibodies leaves the woman at risk for a primary rubella infection in pregnancy that can have devastating fetal effects, particularly in the first trimester. Rubella immunization is contraindicated in pregnancy because it is made from a live virus but is recommended after delivery.

Hepatitis B Virus (HBV):

- HBV **surface antibodies** are expected from a successful vaccination.

- The presence of HBV **surface antigen** (HBsAg) represents either a previous or current infection. HBV surface antigen indicates **high risk for vertical transmission** of HBV from the mother to the fetus or neonate. This is the only specific hepatitis test obtained routinely on the prenatal laboratory panel.

- The presence of **HBV E antigen** signifies a highly infectious state.

Type RH and Antibody screening :

- The patient's blood type and Rh is determined with the **direct Coombs test**. If the patient is Rh-negative, she is at risk for anti-D isoimmunization.

- The presence of atypical RBC antibodies is determined with the **indirect Coombs test** (or atypical antibody test [AAT]). Isoimmunization is identified if atypical antibodies are present. Follow-up testing is necessary to identify whether the fetus is at risk.

STD Screening :

- **Cervical cultures**: Screening cultures for **chlamydia** and **gonorrhea** will identify whether the fetus is at risk from delivery through an infected birth canal.

- **Syphilis**: Nonspecific screening tests (**venereal disease research laboratory** [VDRL] or **rapid plasma reagin** [RPR]) are performed on all pregnant women. Positive screening tests must be followed up with treponema-specific tests (microhemagglutination assay for antibodies to T. pallidum [**MHA-TP**] or **fluorescent treponema antibody absorption** [FTA]). **Treatment** of syphilis in pregnancy requires penicillin to ensure adequate fetal treatment.

HIV Screening :

HIV screening is recommended for all pregnant women as part of the initial lab testing.
The CDC recommends **Informed Refusal** (or "**Opt Out**," where a patient is tested unless she refuses), rather than **Informed Consent** (or "**Opt In**," where a patient must specifically consent). Retesting should take place in the third trimester in areas of high HIV prevalence or an at-risk patient. Rapid HIV testing in labor is recommended if the patient's HIV status is not known.

- **The ELISA test** (**screening test**) assesses presence of detectable HIV antibodies. A three-month lag exists between HIV infection and a positive ELISA test. All babies born to HIV-positive women will be HIV-antibody positive from passive maternal antibodies.

- T**he Western blot test** (**definitive test**) identifies the presence of HIV core and envelope antigens. Triple antiviral therapy is recommended for all HIV-positive women starting at 14 weeks and continuing through delivery. With cesarean delivery and triple antiviral therapy, transmission rates are as low as 1%.

Urine Screening :

- **Urinalysis**: Assessment of proteinuria, ketones, glucose, leukocytes, and bacteria is important to screen for **underlying renal disease**, diabetes, and infection.

- **Culture**: Screening for **asymptomatic bacteriuria** (ASB) is essential (~8% of pregnant women have ASB). Left untreated, 30% of ASB progresses to pyelonephritis, which is associated with septic shock, pulmonary edema, and adult respiratory distress syndrome.

Tuberculosis (TB) Screening :

Antituberculosis drugs are not contraindicated in pregnancy.

- **PPD or tine test**: This screening skin test determines **previous exposure to TB**. TB screening is not done routinely and performed only on high-risk populations. A negative test means no further follow-up is necessary. A positive test is induration, not erythema.

- **Chest x-ray**: If the screening skin test is positive, a chest x-ray is performed to rule out active disease. If the chest x-ray is **negative**, isoniazid (INH) (and vitamin B6) is given for 9 months. If the chest x-ray is **positive**, induced sputum is cultured and triple medications begun until cultures define the organisms involved.

chlamydia / gonorrhea (GC)	Screening	DNA probes
Hepatitis B Virus (HBV)	Screening	Hepatitis B surface antigen (HBsAg)
Syphilis	Screening	VDRL/rapid plasma reagin (RPR)
	Definitive	Microhemagglutination assay/fluorescent treponema antibody absorption (MHA/FTA)
HIV	Screening	Enzyme-linked, immunosorbent assay (ELISA)
	Definitive	Western Blot

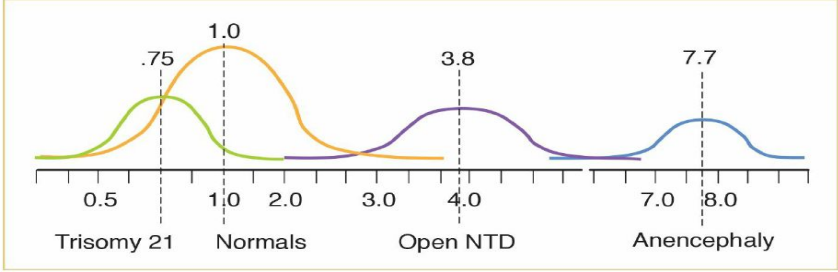
Second Trimester Laboratory Tests

Maternal Serum A-Fetoprotein (MS-AFP) :

- **Alpha-fetoprotein (AFP)** is the **major serum glycoprotein** of the embryo. The concentration peaks at 12 weeks in the fetus and amniotic fluid (AF), then rises until 30 weeks in the maternal serum. Fetal structural defects (open neural tube defect [NTD] and ventral wall defects) result in increased spillage into the amniotic fluid and maternal serum. Other causes include twin pregnancy, placental bleeding, fetal renal disease, and sacrococcygeal teratoma.

Major Serum Glycoprotein of the Embryo		
Normal AFP changes	Fetal Serum	Peaks at 12 Weeks
	Amniotic Fluid	Peaks at 12 Weeks
	Maternal Serum	Peaks at 30 Weeks

- **MS-AFP** is reported in multiples of the median (MoM) and is always performed as part of multiple marker screenings. Maternal serum testing is performed within a gestational window of **15–20 weeks**. Because reference ranges are specific to gestational age, accurate pregnancy dating is imperative.

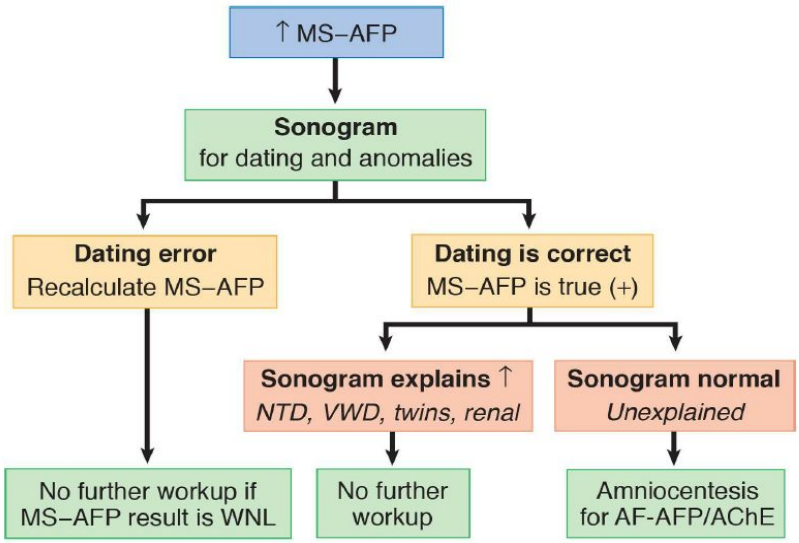


Elevated MS-AFP: A positive high value is >2.5 MoM. The next step in management is to obtain an obstetric ultrasound to confirm gestational dating. The most common cause of an elevated MS-AFP is **dating error**.

- If the true gestational age is more advanced than the assumed gestational age, it would explain the positive high value. In cases of dating error, repeat the MS-AFP if the pregnancy is still within the 15- to 20-week window. A normal MS-AFP will be reassuring.
- If the dates are correct and no explanation is seen on sonogram, perform amniocentesis for AF-AFP determination and acetylcholinesterase activity. Elevated levels of **AF acetylcholinesterase** activity are specific to open NTD.
- With unexplained elevated MS-AFP but normal AF-AFP, the pregnancy is statistically at risk for intrauterine growth restriction (IUGR), stillbirth, and preeclampsia.

Low MS-AFP: A positive low value is **<0.85 MoM**. The sensitivity of MS-AFP alone for trisomy 21 is only 20%. The next step in management is to obtain an obstetric ultrasound to confirm gestational dating. The most common cause of a low MS-AFP is **dating error.**

- If the true gestational age is less than the assumed gestational age, it would explain the positive low value. In cases of dating error, repeat the MS-AFP if the pregnancy is still within the window. A normal MS-AFP will be reassuring.
- If the dates are correct and no explanation is seen on sonogram, perform amniocentesis for **karyotype**.



Quadruple Marker Screen :

- **Trisomy screening**: The sensitivity for trisomy 21 detection can be increased to 80% by performing maternal serum screen for not only **MS-AFP**, but also **hCG, estriol**, and **inhibin-A**. The window for testing is also **15–20 weeks**. Because reference values are gestational age specific, accurate dating is important.

- **Trisomy 21**: With Down syndrome, levels for MS-AFP and estriol are decreased, but **hCG and inhibin-A are increased**. Perform an amniocentesis for **karyotype**.

- **Trisomy 18**: With Edward syndrome, levels for **all four markers** (MS-AFP, estriol, inhibin-A, and hCG) **are decreased**. Perform an amniocentesis for **karyotype**.

Third Trimester Laboratory Tests

Diabetic Testing :

- **1-h 50-g oral glucose tolerance test (OGTT):**

screening test administered to all pregnant women between 24–28 weeks' gestation (no fasting state is needed). A 50-g glucose load is given, and serum glucose is measured 1 h later.
A normal value is <140 mg/dL. An abnormal value is ≥140 mg/dL (15% of pregnant women).
Management is a 3-h 100-g OGTT.

- **3-h 100-g OGTT:**

definitive test for glucose intolerance in pregnancy (15% of women with an abnormal screening test will be found to have gestational diabetes mellitus). After an overnight fast, a fasting blood sugar (FBS) is drawn. An FBS value >125 mg/dL indicates overt diabetes mellitus, and no further testing is performed. An FBS value <126 mg/dL requires administration of a 100-g glucose load, followed by glucose levels at 1, 2, and 3 h.

- **Normal values** are FBS <95 mg/dL, 1 h <180 mg/dL, 2 h <155 mg/dL, and 3 h <140 mg dL.
- Gestational diabetes is diagnosed if ≥2 values are abnormal.
- Impaired glucose intolerance is diagnosed if only 1 value is abnormal.

Complete Blood Count (CBC):

- **Anemia:** A complete blood count (CBC) should be performed between 24–28 weeks' gestation in all women. With the increasing diversion of iron to the fetus in the second and third trimester, iron deficiency, which was not present early in pregnancy, may develop (particularly in those not taking iron supplementation).
  - Hemoglobin <10 g/dL is considered anemia.
  - The most common cause is **iron deficiency**, which occurs only after bone marrow iron stores are completely depleted.
- **Platelet count:** Reassessment of pregnancy-induced thrombocytopenia can be also be done with the CBC.

Atypical Antibody Screen :

- Before giving prophylactic RhoGAM to an Rh-negative woman, an indirect Coombs test is performed at 28 weeks. This is obtained to ensure she has not become isoimmunized since her previous negative AAT earlier in pregnancy.
- Two-tenths of a percent of Rh-negative women will become isoimmunized from spontaneous feto-maternal bleeding before 28 weeks.
- If it is discovered that the patient already has anti-D antibodies, administration of RhoGAM is futile.

Fetal monitoring during pregnancy

Fetal Heart rate	Assessed by Doppler device at 12 weeks
Chromosomal abnormality screening	**A- 1st trimester screen** provides the probability of trisomy 21 and trisomy 18. Performed between 10-13 weeks by using ultrasound to assess the nuchal translucency and a maternal serum test of : Pregnancy-associated plasma protein-A (PAPP-A) and free beta HCG 3 **B- Alternatively, we can use the maternal serum for screening**. Done between 15-20 weeks. (second trimester). Triple test : alpha-fetoprotein (AFP), estriol, HCG. Quad test : alpha-fetoprotein , estriol, HCG, inhibin A **C- Fetal survey ultrasound** performed between 18-20 weeks
Non stress Test (CTG)	• Only If we are concerned about the fetus such as in case of maternal diabetes, hypertension or fetal growth restriction. "see lecture antenatal fetal assessment" • It measures the fetal HR, patterns and accelerations for at least 20 minutes. • It considered reactive if there is at least 2 accelerations over the 20 minutes period.
Maternal kick counts	• **After 32 weeks** • If she concerned about the fetal wellbeing, she should lay on her side and feel 5 movement \ 1 hours, or 10 movement\2 hours
Fundal height	• Indicates fetal growth • Done by measuring the distance from the pubic symphysis to top of fundus. • The height = the number of weeks gestational (only if it's > 20 weeks)
Amniotic fluid index	• Assessed by amniotic fluid index • Decreased fetal urinary output lead to decrease amniotic fluid.
Fetal lung maturity	• Done by amniocentesis to check for markers of lung maturity (respiratory system is the last system to mature functionally, so it's important to assess it in case of preterm delivery)

Unique nutrition need during pregnancy

1- Folic acid :

0.4 mg/day to **reduce neural tube defect**.

In high risk women (DM, antiepileptic medication, previous NTD): give 4 mg/day

2- Weight:

Recommended weight gain based on **pre-pregnancy BMI**

Pre-pregnancy BMI	Estimated weight gain
<18.5	12-18 kg
18.5 – 24.9	11– 15 kg
25 – 29.9	6– 11 kg
>30	5– 9 kg

- **Excessive weight gain:**

Increase risk of complications:

-Macrosomia

-Postpartum obesity

- **Inadequate weight gain:**
  - Preterm delivery
  - IUGR
  - Low birth weight

3- Food with risk :

Unpasteurized milk and cold lunch meats could carry **Listeriosis** which increase the risk of IUFD.

Large fish (tuna , shark, king mackerel) increases mercury and should be avoided during pregnancy.

Frequently asked questions

1- Can pregnant women exercise ? Yes , but any exercise that might carry a risk of fall or abdominal trauma should be avoided. Balance exercise like yoga should avoided

2- Can pregnant women have sex ? Yes , except in the presence of abnormal conditions such as (placenta previa , PROM).

3- Can pregnant women travel by airplanes ? Yes up to 36 weeks of pregnancy, but she should wear the seatbelt low on her hip bones . She also should walk every 1-2 hours (to avoid the risk of DVT).

4- What teratogens should pregnant women avoid ?

- Medications such as (ACE inhibitors , Coumadin and Isotretinoin)
- Radiation exposure : The fetus exposure should be < 5 rads (gray = rad x 10)
  - CT scan for abdomen/pelvis : 3.5 rads
  - CT scan for head : < 1 rad
  - X ray for abdomen : 100-200 milirads
  - X ray for chest : 0.02-0.07 milirads

Physical examination on obstetric patients

A quick and clear video on how to do it (https://www.youtube.com/watch?v=rQBX2BC61P4)

OnlineMedEd

The first evaluation should be conducted at 10 week of the gestation, during the first visit to want to engage each one of the following:

1 Person:

- Is the pregnancy desired?
- Assess the barriers to care, the patient may not be able to come as open as you like so you need to make sure that they have access to the health care
- You should check the mother's blood pressure to check if she is a hypertensive
- You should check her weight
- Assess for abuse and safety

2 Pregnancy:

- You should do a full history and bi-manual examination and focus on the OB Hx
- Don't forget to cover the social, medical, medication, allergy and family Hx.

There are 2 systems:
1- **GPA** (Gravida, Para, Abortion) 2- TPAL (Term, Preterm, Abortion, Living child)
* some may add G before the TPAL

3 Diagnosis:

- First you do a Urine pregnancy test, if positive then you do US to confirm the pregnancy and assess for:

1. IUP 2. GA 3.Multiple gestations

- If the GA < 10 w you may not be able to see it by US, so you do serum β-HCG
- Serum β-HCG is usually done for pathological causes (e.g. ectopic, mole...etc)

4 Labs:

- Generally you do the labs to establish a baseline, determine the risks and check for STI

Blood	Urine	Cytology
- Blood typing + Rh-ag, if she is Rh -ve her immune system can attack the baby which lead to fetal anemia. - Hgb/Hct for anemia - HIV screening, and confirmation test if +ve - Hep B - PRP for syphilis, if +ve give penicillin regardless the allergy - Titers for varicella and rubella, if she is not immune advice her to be away from any potential exposures	- Urinalysis and culture - Check for proteinuria - Check for gonorrhea and chlamydia	- Pap-smear

- Some other stuff that you may do in the 1st visit is Genetic screening for CF, SC

5 How to do the follow up:

- The follow up appointments will become more frequent later on with pregnancy:
  - Every 4 weeks until 28 weeks **THEN** Every 2 weeks until term **THEN** Every week until delivery

Teaching case (video case)

A **24 -year-old** woman presents to the office for her routine prenatal visit. She appears anxious. She denies fever,chills, abdominal pain or cramping. She says that she has been urinating more frequently than usual, without pain, and notes **fatigue** that she attributes to stress at her work. Her last menstrual period was **7 weeks ago,** and she typically has **28-day cycles**. She **has never been pregnant**. She tells you that she and her boyfriend plan to marry in the next year. Her medical history is only significant for a **hyperthyroid** disorder, which she has had for over 10 years. Her last check up was about 6 months ago. She takes **methimazole**. Otherwise, she has had routine gynecologic follow up, with normal pap smears and she has never been diagnosed with a sexually transmitted infection. The patient is 170 pounds and is 5'5" tall. On physical exam, her vital signs include a pulse of 85, blood pressure of 115/70. Speculum exam reveals normal appearing vaginal epithelium and cervix. The cervical os is closed. Bimanual exam reveals a slightly enlarged and globular uterus consistent with a **7 week sized pregnancy**; the adnexae are without masses and tenderness.

Questions

1. What are the first steps in the assessment of this patient?

- If not confirmed, **urine or serum HCG** to determine if pregnant.

HCG can be detected in the blood after 1 week of implantation while in urine at the time of the first missed period (usually done at home). HCG labs could be given as quantitative or qualitative. So, be careful while ordering labs.

- Evaluate the early gestation with **ultrasound (transabdominal or transvaginal)** to determine location of pregnancy, confirm due date and number of embryos. Fetal cardiac activity visualized on ultrasound usually confirms early viability.

Ultrasound done mainly once in each trimester:
1st trimester for confirming GA
2ed trimester for placental location, fetal anomalies and amniotic fluid assessment
3ed trimester for fetal growth assessment

- **Gestational age** can be determined from her last menstrual period, and compared to her early ultrasound. GA calculated by (+ 7 days to her LMP/ + 9 months OR subtract 3 months/ + 1 to the year if needed).

Consideration to changing her gestational age on ultrasound criteria would be:

  - If less than 12 weeks, would use the ultrasound date if off by more than 5 days
  - If between 12 and 16 weeks, would use the ultrasound date if off by more than 7 days

- Address her **visible anxiety**
  - Related to viability?
  - Related to her medical issues with thyroid disease and medications?
- Help s**chedule her for follow up** with Maternal Fetal Medicine service, as well as an Endocrinologist

2. With routine prenatal care, what factors need to be discussed with this patient?

•Nutrition and weight gain counseling: recommended weight gain based on pre-pregnancy BMI <18.5
-The average weight gain during pregnancy is 10-12 Kg, obese woman will gain less weight in comparation to thin woman. Avoid reducing weight during pregnancy.
- Before pregnancy and during the 1st trimester, give folic acid only. THEN add iron and calcium supplements with multivitamins (some multivitamins contain vitamin A which is teratogenic so, we should avoid it in the 1st trimester).
• Sexual activity: is not restricted during pregnancy, unless conditions such as preterm labor, placenta previa or preterm premature rupture of membranes is present.
• Exercise: up to 30 minutes of moderate exercise per day is encouraged, as permitted by personal tolerance.
• Travel: without complication, air travel is generally safe up to 36 weeks. However, prolonged periods of inactivity (sitting) should be avoided.
• Environmental and work hazards.
• Tobacco and alcohol use.
• Substance abuse.
• Medication use. teratogenic drugs should avoid before conception and during pregnancy
• Intimate partner violence.

3. What are the routine laboratory studies collected at the first prenatal visit?

- Blood and Rh typing
- hepatitis and rubella titers (IgG for chronic infection or immunity, IgM for recent infection)
- antibody screening
- HIV antibodies screening
- screening for chlamydia and gonorrhea
- Toxoplasmosis (check for both IgG & IgM, it is a silent infection)
- Syphilis (RPR or VDRL screening tests)
- Urine culture
- Consideration can be given to screening for hemoglobinopathies (with hemoglobin electrophoresis) and cystic fibrosis.

4. What additional screening tests does she require with her thyroid disease?

• Evaluation of the thyroid should include TSH and Free T4 levels.

5. What additional concerns should be discussed with the patient regarding management of her pregnancy?

• With poorly controlled thyroid disease, there may be increased need for medically indicated preterm delivery.
• Slight increased risks in intrauterine growth restriction and fetal loss, requiring antenatal testing in the third trimester, or sooner with more severe disease.
• Increased risks of fetal heart rate abnormalities.
• Increased risks of preeclampsia.

6. What concerns are there for medication use for hyperthyroidism in pregnancy?

• Propylthiouracil generally safe in pregnancy, but small amounts cross into breast milk.
• Methimazole thought to have increased risk of fetal aplasia cutis (recently refuted), also has higher secretion into breast milk, but generally considered safe.

7. How can this patient be followed for fetal well being in the third trimester?

• Initial development can be evaluated with anatomic survey (scheduled in 16-20 weeks).
• Fetal growth can be measured monthly with ultrasound.
• Well being can be assessed with either non-stress tests (twice a week) or biophysical profiles (once a week). Biophysical profile includes:

- Fetal movement: three or more discrete body/limb movements in 30 minutes.
- Fetal tone: one or more episodes of extremity extension/flexion, or open/close of hand.
- Fetal breathing movements: episode of rhythmic fetal breathing for 30 seconds.
- Amniotic fluid volume: pocket of fluid that measures at least 2 cm in 2 perpendicular planes.