SECTION 1

Obstetric Aspects of Antenatal Care
CHAPTER 1

Routine Prenatal Care

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A 27-year-old primigravida at 11+1 weeks’ gestation by menstrual dating presents for her first visit for routine prenatal care, accompanied by her husband. While discussing the comprehensive medical history with you before you meet the couple, your obstetric trainee mentions that the patient is allergic to penicillin.

LEARNING OBJECTIVES

1. Take a comprehensive prenatal history, demonstrating the ability to appropriately assign a gestational age based on clinical and sonographic parameters
2. Appreciate defining features for a severe penicillin allergy and provide safe alternative intrapartum pharmacologic treatment where clinically indicated
3. Address common aspects of prenatal care for a low-risk patient, including, but not limited to, routine prenatal investigations and pharmacologic treatments, vaccinations, nutritional intake, chemical exposure, umbilical cord blood banking, and potential for air travel during pregnancy
4. Appreciate the importance of maintaining a low threshold for multidisciplinary collaboration where unexpected events occur among low-risk singleton pregnancies
5. Recognize important elements of the routine postpartum visit

SUGGESTED READINGS

Antenatal Care

Chemical Exposure during Pregnancy

Gestational Age Assignment


Immunizations


Iron-Deficiency Anemia and Rh Immunoglobulin


Physical Activity


Travel during Pregnancy


Umbilical Cord Blood Banking


Universal Cervical Length Screening in Low-Risk Singleton Pregnancies


POINTS

1. Elaborate on defining features for high risk of anaphylaxis or a severe reaction to penicillin, appreciating that one feature is satisfactory. (1 point each)

High risk for IgE-mediated reactions:
- Pruritic rash
- Urticaria (hives)
- Immediate flushing
- Hypotension
- Angioedema
- Respiratory distress (e.g., wheezing, stridor, dyspnea, throat/chest tightness, repetitive dry cough)

High risk for severe non-IgE-mediated reactions:
- Eosinophilia and drug-induced hypersensitivity syndrome
- Stevens–Johnson syndrome
- Toxic epidermal necrolysis

Other:
- Positive penicillin allergy test
- Reaction to multiple beta-lactam antibiotics
- Recurrent reactions

Special note:
2. In the absence of drug or environmental allergies, outline aspects of the comprehensive patient history elicited by your obstetric trainee at this patient’s first prenatal visit. (1 point each)

**Current/recent pregnancy-related features and management, if any:**
- Nausea and/or vomiting (*i.e.*, duration, frequency, quantity); effect of symptoms on daily living
- Vaginal bleeding
- Pelvic cramping, especially that prevents or awakens from sleep
- Determine whether a dating sonography or other investigations were performed

**Gynecologic history:**
- First day of the last menstrual period
- Cycle regularity
- Recent contraceptive use and whether pregnancy was planned
- Determine if and when prenatal vitamins have been initiated
- History of sexually transmitted infections (STIs); specifically, inquire about history of genital herpes simplex virus (in the patient or her partner)
- Duration since last cervical cytology test (*i.e.*, Papanicolaou test) and history of abnormal results
- Inquire about spontaneous or therapeutic undisclosed early pregnancy losses in confidence with the patient (individualized timing and setting)

**Medical and surgical history:**
- Determine if the patient accepts transfusion of blood products (*e.g.*, enquire whether patient is a Jehovah’s Witness) and prior receipt of blood transfusions
- Chronic active or dormant medical or psychological conditions, including treatments
- Prior surgeries (*e.g.*, cerebral, cardiothoracic, abdominal-pelvic)

**Social history and routine health maintenance:**
- Ethnicity of the patient and partner
- Occupation (*e.g.*, exposure to daycare children, toxic chemicals, radiation, prolonged standing, physical activity, or risk of injury) and socioeconomic status (including food and housing security and potential barriers to accessing medical care)
- Dietary restrictions (*i.e.*, assess adequacy of calcium and iron intake)
- Vaccination status, namely, to COVID-19, hepatitis B, and annual *H. influenza*, and history of varicella disease or prior vaccination
- Exercise patterns (*i.e.*, type, frequency, and duration per week)
- Cigarette smoking, including quantity (*i.e.*, type [cigarette, cigar, water pipe/hookah, vape], quantity, and duration of use)
- Alcohol consumption (*i.e.*, type, quantity, and duration of use)
- Illicit drug use (*i.e.*, source, type, quantity, and duration of use)
You learn that the patient continues to practice as an attorney, as she has not experienced any obstetric complications to date. Sonographic pregnancy dating has not been performed, although the patient is confident of her menstrual dates. Medical and surgical histories are unremarkable; she confirms having remotely had varicella infection. She practices noncontact aerobic as well as strength-conditioning exercise as 30-minute sessions four times weekly and consumes a Mediterranean diet, as consistent with her ethnicity. Neither of the couple smokes cigarettes or uses illicit substances; they do not have pets. As the couple planned conception two months prior to pregnancy, she discontinued her two-year use of combined oral contraception, initiated folic acid-containing prenatal vitamins, received the COVID-19 and flu vaccines, and has abstained from twice-weekly glasses of wine with dinner. Although she has never received blood products, the patient is not against receipt for medical indications. In confidence, the patient ascertained to your obstetric trainee that there are no undisclosed pregnancies; neither she nor her husband has had STIs. A routine cervical smear performed eight months ago was normal, as per her usual. Family history is noncontributory.

She elaborates that her penicillin allergy entails onset of hives and a generalized pruritic rash shortly after exposure; the patient does not have any other drug or environmental allergies.

Having met the couple and reviewed the clinical history, you confirm that she is normotensive and that her prepregnancy body mass index is 23.5 kg/m², and remaining maternal findings on physical examination are unremarkable. You inform the patient that in addition to routine prenatal investigations discussed earlier by your obstetric trainee, you advise an obstetric ultrasound scan at this time.
3. Indicate advantages of first-trimester sonography for consideration in counseling this patient. (1 point each)

- Determine pregnancy location
- Confirm viability
- Improved accuracy for determining gestational age compared to menstrual dating among spontaneously conceived pregnancies, regardless of menstrual cycle regularity
- Ascertain fetal number, and ascertain chorionicity and amnionicity in the case of multiples
- Highlight that her recent discontinuation of oral contraceptives may contribute to inaccurate menstrual dating
- Inform the patient that bleeding in early pregnancy may have been misperceived as menses
- Allow early detection of embryo-fetal malformations
- Contribute to fetal aneuploidy risk assessment, improving performance of prenatal screening
- Contribute to preeclampsia risk assessment
- Decreased maternal anxiety about pregnancy†

**Special note:**

The patient appreciates your counseling and understands that ultrasound is a nonionizing form of radiant energy where the risk of bioeffects is minimal when performed in accordance with sonographic principles. As such, ultrasound performed during this clinical visit by your colleague with sonographic expertise reveals a viable intrauterine singleton at 12+2 weeks’ gestation with normal early morphology and no markers of aneuploidy. To optimize aneuploidy risk assessment, the patient agrees to complement first-trimester sonographic findings with noninvasive tests available in your jurisdiction.†

**Special note:**
† Refer to Chapter 5.

4. Among the reported fetal crown–rump length (CRL) and mean diameters of gestational sac and yolk sac, inform your obstetric trainee how the sonographic estimated due date was established.

- Direct measurement of the CRL is the most accurate indicator of dating spontaneous conceptions when the embryo is clearly seen, where the narrowest confidence interval appears to be between 7 and 60 mm for CRL (SOGC†).
5. Based on clinical and sonographic estimated due dates, rationalize your chosen assigned gestational age for this patient. (1 point each)

Superiority of ultrasound redating:
- There is a greater than seven-day discrepancy between clinical and ultrasound dating at gestational age between 9\(\pm0\) and 13\(\pm6\) weeks (ACOG\(^t\))\(^\dagger\); accepted practice also favors selecting first-trimester CRL dating, when appropriate, irrespective of discrepancy from clinical dating (SOGC\(^t\))\(^\dagger\).
- Improved performance of prenatal screening programs (i.e., increase the sensitivity for Down syndrome and/or decrease false-positive rates).
- Reduced rates of postdate pregnancy, related labor inductions, or iatrogenic prematurity.

Special note:
- At \(\leq 8^{th}\) weeks’ gestation, the CRL-based dating is accurate within five days of the birthdate.

You explain that guidance for an optimal frequency of prenatal visits is limited: among nulliparous women with uncomplicated pregnancies, this may involve 10 visits per pregnancy (NICE\(^t\))\(^\dagger\), or scheduled to accommodate a minimum of 8 visits, which would entail 1 visit in the first trimester, 2 in the second trimester, and 5 thereafter, regardless of parity (WHO)\(^\dagger\); or prenatal visits arranged at monthly intervals until \~28 weeks’ gestation, followed by bimonthly visits until 36 weeks and weekly visits thereafter until delivery.\(^\dagger\)\(^\ddagger\)

Special notes:
- Parous women with uncomplicated pregnancies may have less frequent prenatal visits.
- For postdate pregnancies, increased fetal surveillance is recommended according to local protocols.
6. Outline your recommended routine prenatal investigations for this patient and provide her with an overview of subsequent routine investigations until the estimated due date.

(1 point each)

**Initial prenatal visit:**
- Full/complete blood count (FBC/CBC)
- Ferritin
- Blood type and antibody screen
- Hepatitis B surface antigen (HBsAg) and antibody (HBsAb)
- Hepatitis C antibody
- Human immunodeficiency virus (HIV) conventional third-generation enzyme-linked immunoassay (ELISA) or fourth-generation antigen/antibody assay (using the 'opt-out' approach)
- Rubella IgG antibodies
- Syphilis nontreponemal or treponemal test†
- Hemoglobin protein electrophoresis (HPEP) [i.e., Mediterranean ethnicity]
- Fetal aneuploidy screening by either the first component of integrated prenatal screening (IPS) test or cell-free DNA (cfDNA) [the second component of the IPS test is performed in the second trimester, if indicated]
- Urinalysis and culture
- Urine chlamydia nucleic acid amplification test (NAAT); a vaginal or endocervical swab demonstrates similar sensitivity to urine testing

**Second trimester:**
- Sonographic fetal morphology survey at 18–22 weeks’ gestation
- Screening for gestational diabetes at 24–28 weeks’ gestation
- Repeat a CBC between 24+0 and 28+6 weeks’ gestation to screen for anemia

**Third trimester:**
- Vaginal-rectal group B Streptococcus swab (GBS) at 36–37 weeks’ gestation, unless known positive GBS bacteriuria at any time during pregnancy or a positive vaginal-rectal swab resulted during investigations for preterm labor§ [screening all women for GBS colonization is not routinely offered in the United Kingdom; refer to the clinical description after Question 19]†

**Special notes:**
† Refer to Chapter 65, ‘Syphilis in Pregnancy’
§ Given self-reported history of infection, varicella serology is unnecessary for this patient; refer to Question 2 in Chapter 67, ‘Varicella in Pregnancy.’ There no specified high-risk features in this case scenario to suggest routine toxoplasmosis, cytomegalovirus (CMV), or parvovirus serologies, although international practice variations exist.
# A positive vaginal-rectal GBS swab may also be repeated if more than five weeks have elapsed since the at-risk episode for preterm labor; refer to Question 1 in Chapter 15, ‘Labor at Term.’
You inform her that she will complete a short, validated screening tool for depression and anxiety at least once during the antenatal and/or postpartum period, which she is pleased to complete today. You explain that the routine physical examination components of each prenatal visit will entail measurement of her blood pressure (BP), weight, and auscultation of the fetal heart rate, while fundal height assessments will commence at ~24 weeks’ gestation.

7. Address a patient inquiry regarding routine antenatal pharmacologic treatments, apart from vitamin and mineral supplementation. (1 point per main bullet)

- Flu vaccine in any trimester if the patient is pregnant in the fall or winter
- Pertussis vaccine, ideally at 27–32 weeks’ gestation; administration outside this gestational window, including while breastfeeding, is also possible
- Single-dose Rh immunoglobulin at 28–30 weeks’ gestation or two-dose regimen given at around 28 and 34 weeks, respectively, if D-negative and nonsensitized; repeat antibody screen is necessary prior to drug administration†
  - Where cell-free DNA (cfDNA) is available for fetal blood group genotyping, maternal prophylactic anti-D immunoglobulin may be obviated, particularly among male fetuses

**Special note:**

† Selection of single- or two-dose regimen may depend on cost and local practice.

8. Highlight the contraindicated vaccinations during pregnancy, which you intend to teach your obstetric trainee after this consultation. (1 point each)

<table>
<thead>
<tr>
<th>Live-attenuated bacterial vaccines</th>
<th>Live-attenuated viral vaccines</th>
<th>Inactivated viral vaccines</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Oral typhoid</td>
<td>□ Measles, mumps, rubella (MMR)</td>
<td>□ Human papilloma virus (HPV)</td>
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<tr>
<td>□ Bacillus Calmette–Guérin</td>
<td>□ Varicella</td>
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<td>□ Yellow fever†</td>
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<td></td>
<td>□ Japanese encephalitis</td>
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<td>□ Live-attenuated influenza</td>
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<td></td>
<td>□ Smallpox (vaccinia)</td>
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**Special note:**

† Pregnancy is a precaution for receipt of the yellow fever vaccine by the Advisory Committee on Immunization Practices (ACIP) as risk of exposure to yellow fever virus may outweigh risks of vaccination; refer to www.cdc.gov/vaccines/pregnancy/hcp/guidelines.html, accessed August 26, 2022.