

8. Prenatal Care

MARGARET R. HELTON

Key Clinical Questions

1. What are the most important risk factors in the prenatal phase of pregnancy?
2. What screening tests are useful in the first trimester of pregnancy?
3. What psychosocial issues affect pregnant women and their families?

The prenatal period offers a unique opportunity for practicing health promotion. At no other time in the human life cycle do patients in good health visit the physician so frequently. It is a time when many women (and couples) are particularly receptive to changing their own health behaviors. Furthermore, the entire process of prenatal care revolves around preventive measures: the identification and management of risk factors, the early detection of potential problems, and health education.

For many physicians, prenatal care is one of the most rewarding aspects of family practice because it is a time during which strong doctor-patient bonds often develop. The continuity of care provided by family physicians allows these bonds to continue postpartum, since the family physician provides ongoing care of the infant and mother after delivery. Continuing to care for the woman, other family members, and the new baby are gratifying aspects of the comprehensive care provided by family physicians. This chapter explores some of the medical and social issues facing family physicians who deliver prenatal care.

PRENATAL CARE IN PERSPECTIVE

In the United States, the maternal mortality rate has decreased from 582 per 100,000 live births in 1935 to 7.5 per 100,000 live births in 1993 (1). Most of this decrease is due to innovations in the management of labor and delivery, such as the use of antibiotics, safer blood transfusion capabilities, and the development of safer methods of anesthesia. The independent contribution of prenatal care to this decline in maternal mortality is difficult to

assess because many of the modern advances responsible for better outcomes relate to the delivery. However, among the aspects of prenatal care that reduce maternal morbidity and mortality are the prevention of pyelonephritis through screening for bacteriuria, better control of diabetes mellitus, and improved detection and control of preeclampsia.

Several lines of evidence link proper prenatal care with reduced infant mortality rates. In 1940, the infant mortality rate in the United States was 47 per 1000 live births (2). By 1994, that rate had fallen to 8.0 infant deaths per 1000 live births (1). Although this is an impressive decline, 20 countries had 1994 infant mortality rates lower than that of the United States, led by Japan and Sweden at 4 per 1000 live births (3). In every country with an infant mortality rate below the United States', essentially all pregnant women receive early and adequate prenatal care. In contrast, women in the United States with the highest infant mortality rates are those who receive little or no prenatal care.

In the United States, twice as many African-American mothers receive no or inadequate prenatal care as whites, and the mortality of black infants is twice that of white infants (1). In settings where access to prenatal care is equally available to black and white persons, such as in the military, the difference between black and white infant mortality is markedly reduced. Thus, prenatal care seems to contribute to better pregnancy outcomes. The U.S. Public Health Service goal for the year 2000 is for at least 90% of American women to begin prenatal care in the first trimester (4).

Unfortunately, there have been times when prenatal care, rather than enhancing the pregnancy, brought about just the opposite effect. This occurred when harmful drugs were prescribed for nausea or fluid retention, inappropriate dietary restrictions were advised, or undue anxiety was caused by misguided patient education. *Primum non nocere* (first do no harm), the credo taught to all practitioners of medicine, is aptly applied to prenatal care, especially since most pregnancies will have a healthy outcome anyway. Pregnancy and childbirth are natural

processes, not disease states, and should represent joyful and enriching experiences for the woman and her family. The new paradigm for medical practice, known as evidence-based medicine, must be applied and no intervention accepted into the course of prenatal care unless it has been critically appraised and proven to be effective (5). The U.S. Preventive Services Task Force *Guide to Clinical Preventive Services* is an established source for evidence-based recommendations, which cover many components of prenatal care (6). The Cochrane Database is a computer-based collaborative effort that critically reviews aspects of prenatal and maternal care and is updated quarterly (7).

PLANNING THE PREGNANCY AND RISK ASSESSMENT

Ideally a pregnancy is planned or at least wanted, and the prospective mother visits her

health care provider before conception has occurred. At the time of such a visit, you should explore and clarify the motives for pregnancy, help the patient maximize her health in anticipation of pregnancy, and provide counseling about behaviors and exposures that might jeopardize the health of her or the fetus. The reality is that in most cases you will be reviewing these issues when the woman is already pregnant.

The points that should be covered before or in early prenatal care are listed in Table 8.1. Any conditions or behaviors that increase the likelihood of poor outcome, including medical complications, premature delivery, stillbirth, and neonatal mortality, should be identified. Maternal health should be reviewed, and women with significant medical illnesses will require closer surveillance. All medications used by the patient should be noted, including over-the-counter preparations. The woman's previous obstetric and gynecologic history should be reviewed. Nu-

Table 8.1.
Areas to Assess Early in Maternal Care

Maternal health	Medical diseases such as diabetes, hypertension, anemia, epilepsy, or cardiopulmonary disease Medications
Previous obstetric and gynecologic history	Number of previous deliveries, including method of delivery, or abortions (induced or spontaneous) Previous poor pregnancy outcome such as fetal or neonatal death, hemorrhage, preeclampsia, small or large-for-gestational age infant, cervical incompetence Cervical dysplasia or surgery
Nutrition	Obesity Folic acid supplementation
Genetic counseling	Familial genetic diseases or malformations Parental age Ethnic risks (e.g., Tay-Sachs, sickle cell, cystic fibrosis, and thalassemia)
Behaviors	Tobacco, alcohol, cocaine, or other drug abuse Promiscuity
Infectious diseases	Sexually transmitted diseases Tuberculosis Hepatitis Toxoplasmosis Rubella immunity
Environmental exposures	Toxins Radiation Physical stress
Psychosocial status	Marital status Personal support systems Medically significant religious beliefs Housing Education Work situation and income

conception has occurred, you should explain to the pregnant woman the importance of participation of the family in decision making about the pregnancy. The reality is that in reviewing these issues with the pregnant woman, the issues should be covered before or in addition to the issues listed in Table 8.1.

Factors that increase the risk of complications, including medical history, stillbirth, and previous obstetric history, should be identified. Maternal age, and women with a history of miscarriage will require closer monitoring. The use of the patient's history, including over-the-counter drugs, and previous obstetric history should be reviewed. Nu-

epilepsy, or

or abortions induced

ide hemorrhage,
incompetence

thalassemia)

trition should be assessed and obese patients should be encouraged to lose weight before or restrict weight gain during pregnancy. All women planning pregnancy or in the early phase of pregnancy should supplement their diet with 0.4 to 1 mg of folic acid per day, as this has been shown to reduce the risk of neural tube defects (8). A history of familial genetic diseases or malformations should be taken. The age of the parents should be assessed, as the risk of chromosomal defects increases with parental age. Ethnic risks (e.g., Tay-Sachs disease in Jews, sickle cell disease in African-Americans, and thalassemia in persons of Mediterranean or Asian descent) need to be identified.

The patient's behaviors should be assessed. Promiscuity increases the risk of sexually transmitted diseases. Smoking increases the risk of premature delivery, low birth weight babies, and perinatal death (9, 10). Alcohol abuse causes miscarriage and fetal alcohol syndrome (mental retardation, microcephaly, growth retardation, and facial deformities) (11). Cocaine use can cause placental abruption (12); other drugs can cause fetal withdrawal.

Certain occupations (e.g., those that involve exposure to toxic substances) pose significant health risks to the mother because of exposure to either toxins or physical stress, so these risk factors should be identified and minimized. Psychosocial factors, such as marital status, personal support systems, medically significant religious beliefs, poor housing, low education, and limited income, should be assessed. The woman's attitude toward the pregnancy and any psychosocial stresses should be evaluated; they can adversely affect pregnancy outcomes and contribute to a family's inability to care for the new baby.

Even though many risk factors associated with pregnancy are recognized, they are not reliably predictive of maternal and fetal morbidity and mortality. Just as perplexing is the fact that half of adverse pregnancy outcomes cannot be identified before labor.

DIAGNOSING AND DATING THE PREGNANCY

Pregnancy tests used today are very accurate, with a 98% sensitivity and 99% specificity at the time of the first missed menstrual period (13). Signs that the woman herself notices include a missed period, breast tenderness and enlargement, fatigue, and nausea. The clinician should

look for uterine enlargement (an accurate method of dating the pregnancy during the first trimester) and dark bluish coloring to the vaginal mucosa and cervix (Chadwick's sign).

Establishing a reliable expected date of confinement (EDC), or "due date," is important because effective detection and management of such problems as intrauterine growth retardation, premature labor, multiple gestation, and postdate pregnancy depend on accurate dating. The simplest method estimates the EDC as being 280 days from the date of the last menstrual period, taking into account the reliability of the patient's recall and the length and predictability of her cycles. Nägele's rule (14) estimates the EDC by adding 7 days to the first day of the last normal menstrual period and counting back 3 months. This same principle is embodied in pregnancy wheels (such as those provided by pharmaceutical companies), which are commonly used in office practice to calculate the EDC. Inaccurate dating can result from failure to consider menstrual irregularities, unusual cycle lengths, recent use of oral contraceptives, and the possibility that the presumed last menstrual cycle was really first-trimester or implantation bleeding.

Uterine size, which changes proportionately more from week to week in the first months than at any other time, is another helpful parameter to use in estimating the EDC. During the first trimester, uterine size is detected by bimanual pelvic examination. At 7 weeks, the uterus is the size of a large hen's egg. At 10 weeks, the uterus has grown to the size of an orange. After 12 weeks, the uterus is the size of a grapefruit, and the upper portion can be felt abdominally above the pelvic symphysis. The fetal heartbeat can first be heard with an ultrasonic Doppler at between 10 and 12 weeks and with a fetoscope (a specially adapted stethoscope) at 18 to 20 weeks. These milestones should be recorded to add support to other evidence dating the pregnancy.

If there is still doubt about the EDC, ultrasonography performed in the first or second trimester can be helpful. Third-trimester sonography is an unreliable predictor of gestational age.

PRENATAL CARE IN THE OFFICE

Prenatal care aims for three outcomes: a smooth labor and delivery, a healthy baby and mother, and a smooth adjustment of the mother and family to this life event. Prenatal care must emphasize clinical surveillance of both the mother and

her fetus. This aspect of the care is usually provided by a clinician such as a family physician, obstetrician, midwife, or nurse practitioner. Other important health care team members may include a nurse, nutritionist, and social worker. Expectant mothers and their partners should receive psychosocial support and patient education. They should be encouraged to write a birth plan detailing their expectations and hopes regarding the labor and delivery. The value of a prepared patient and support person in reducing complications of labor cannot be overemphasized. Companion support during childbirth has been shown to decrease the use of anesthesia, shorten the length of labor, and lower the rate of cesarean section (15). Thus, the time spent educating the patient and her support person(s) during prenatal care and the techniques they have learned in any prenatal education will generally pay great dividends during the stress of labor and delivery (16).

Pregnancies are conventionally split into three trimesters, each with unique medical and emotional issues. By convention, gestational age is stated as the number of weeks since the last menstrual period, even though conception does not occur until approximately 2 weeks after that date. Delivery occurs on average at 40 weeks. In the United States, women average 14 prenatal visits, a much higher number than most countries. The visit schedule is typically one visit per month during the first 32 weeks of pregnancy, bi-weekly visits between 32 and 36 weeks, and weekly visits thereafter until delivery. The U.S. Public Health Service's Expert Panel on the Content of Prenatal Care recommends fewer visits for most women and more resources directed toward higher-risk pregnancies (17). For women with low-risk pregnancies, good perinatal outcomes and patient satisfaction were maintained when the visit schedule was reduced by an average of 2.7 visits (18).

First-Trimester Prenatal Care

The first trimester (weeks 0 to 13) is in many ways the most crucial for the developing child. Nearly all organogenesis takes place during these early weeks, making this the period of greatest susceptibility to embryotoxic and teratogenic substances. For the mother, these weeks are often characterized by fatigue, nausea, and the emotional changes that accompany learning of, and adjusting to, the pregnancy. For the physician or

other health care provider, initial contacts during the first trimester should help set the stage for a healthy pregnancy.

History and Risk Assessment

If the patient did not have a preconception visit, you should conduct a thorough evaluation of the mother's general health, health behaviors, genetic assessment, and so forth (see Table 8.1) at the initial visit. The number of previous pregnancies should be determined and noted using the $G_N P_{PAL}$ shorthand method:

- G, gravidity, how many times (N) the patient has been pregnant, including the current pregnancy
- P, parity (results of previous pregnancies), designated:
 - F, number of full-term births
 - P, number of premature births
 - A, number of abortions, elected or spontaneous
 - L, number of living children

For example, a pregnant woman who has had five previous pregnancies that resulted in two full-term deliveries, one premature delivery, two miscarriages, and three living children would be designated $G_6 P_{2-1-2-3}$. Use this common mnemonic to remember the parity notation: "Florida Power And Light," or invent your own.

An obstetric history must include details of all previous pregnancies—the route of delivery, weight and gestation of the newborn, and any complications, especially those that resulted in morbidity or fetal mortality. From this historical information, patients requiring closer surveillance can often be identified. A history of premature delivery, for example, should alert you to the risk of recurrence of this outcome. A history of second-trimester losses due to early cervical dilation can signify cervical incompetence, a condition in which the patient may benefit from early placement of a purse-string suture (cerclage). It should also be remembered that women of high parity have an increased risk of placenta previa, puerperal hemorrhage, and multiple gestation.

Physical Examination

On the first prenatal visit, you should conduct a thorough physical examination, paying special

attention to blood pressure, the size and shape of the uterus and adnexal areas, and the configuration of the bony pelvis. On subsequent visits, your examination will generally be limited to blood pressure checks, verifying fetal cardiac activity, and watching for edema. At each visit in the second and third trimester, measure fundal height in centimeters from the pubic symphysis; fundal height when above 20 cm and below 36 cm corresponds to gestational age within 2 weeks (19). Figure 8.1 is a sample flowchart for recording prenatal visits.

Laboratory Testing

Table 8.2 lists the laboratory tests that are routinely performed in prenatal care, along with the sensitivity, specificity, and level of evidence of the test.

Maternal blood type and an antibody screen identify which women might develop ABO, D (formerly Rh), or other antigen incompatibility with the fetal blood cells. Approximately 15% of persons are D (Rh)-antigen-negative. If a mother is D-negative and the father is D-positive, the fetus has a 50% chance of inheriting the father's D antigen on the fetal red blood cells. The mother could develop an antibody to the D antigen that can cross the placenta into the fetal circulation and hemolyze the fetal red blood cells, causing hemolytic anemia that leads to hyperbilirubinemia or fetal hydrops, also known as erythroblastosis fetalis. The incidence of this problem has dropped dramatically in the past 30 years since the introduction of D immunoglobulin (RhoGAM), which is given to a D-negative pregnant woman at 28 weeks and within 72 hours of delivery, as well as at other times when there might be a maternal-fetal transfusion, such as with a miscarriage or at the time of amniocentesis.

Iron deficiency anemia (e.g., Hct < 30% or Hgb < 9 g/dL) is screened for because it is associated with poor outcomes (20, 21). Women at risk for hemoglobinopathies such as sickle cell disease and certain thalassemias (women of African, Middle Eastern, Mediterranean, Latin American, or Southeast Asian descent) should have hemoglobin electrophoresis performed.

Several blood tests will detect infectious diseases that could be transmitted to the fetus. Rubella immunity should be determined, since rubella contracted by the mother during early pregnancy is devastating to the fetus. Ideally, if the mother is not immune, she should be immu-

nized at least 3 months before attempting pregnancy. If she is already pregnant, she should be immunized after delivery, so that at least the next pregnancy will be protected. A screening test should be done to detect maternal active (acute or chronic) hepatitis B infection, since infants born to these mothers will need hepatitis B immune globulin and vaccine at birth (22). If the mother has syphilis, disease in the baby can be prevented with prenatal antibiotic therapy (23). Testing for human immunodeficiency virus (HIV) is strongly encouraged, since transmission of HIV to the baby can be significantly reduced by prenatal treatment with zidovudine (azidothymidine, or AZT) starting at 14 weeks' gestation (24, 25).

Other prenatal screening tests are aimed at reducing the risk of delivering a premature baby. A urine culture is recommended to detect asymptomatic bacteriuria, which increases the risk of maternal pyelonephritis, premature delivery, and low-birth-weight. Treatment with antibiotics significantly lowers this risk (26). Gonorrhea infection increases the risk of premature delivery, stillbirth, and low birth weight babies. Infants exposed to gonorrhea during birth can develop gonococcal conjunctivitis, which can cause blindness. Similarly, *Chlamydia* infection increases the risk of endometritis, premature delivery, and neonatal infection. Treatment reduces these risks, so screening is recommended. Gonorrhea screening is done by culturing a cervical swab sample, whereas *Chlamydia* screening can be done with culture, enzyme immunoassay, or direct fluorescent antibody.

If the woman has not had a Papanicolaou (Pap) test in the past year, early pregnancy is an opportune time to screen for cervical disease, although the sampling process is not as effective in the pregnant cervix as in the nonpregnant.

Patient Education and Psychosocial Support

First-trimester visits usually occur about once a month and help establish the doctor-patient relationship. In routine visits, ask about symptoms and milestones. Discuss the rapid physical and emotional adjustments that will be demanded of the mother, and educate the mother about fatigue, nausea, work, nutrition, and sexuality. Signs of miscarriage should be discussed at the earliest visit because nearly all miscarriages occur during the first trimester.

Encourage good nutrition, and advise patients that a total pregnancy weight gain should

Date	Week Gest.	Fundal Ht.	Fetal Heart	Presen- tation	Edema	BP	Urine pro/sug	Weight (lbs)	Next Visit	Last Menses 8/7/97 EDC 5/15/98 (Circle if reliable)		Resident/ Attending
										Comments	Resident/ Attending	
10/2	8	8 to 10	—	—	0	110/70	N/N	129	4 wk	Nausea Care plan reviewed	JF/CD	
10/30	12	12	+DT	—	0	110/78	N/N	131	4 wk	Excited to hear heart	JF/MN	
11/30	16	16	+DT	—	0	108/70	Tr/N	135	4 wk	UTI symptoms resolved	JF/TP	
12/27	20	21	+DT	—	0	112/68	N/N	139	4 wk	+ Fetal movement	JF/JG	
1/23	24	24	+FS	—	0	120/60	N/N	143	4 wk	Active fetus. Husband here today. Prenatal classes.	JF/DS	
2/20	28	29	+FS	VTX	0	120/68	N/N	146	4 wk	Occasional Braxton-Hicks contrac.	JF/AD	
3/16	31	31	+FS	VTX	Tr	130/72	N/N	151	2 wk	Reviewed birth plan	SKF/MF	
4/3	34	33	+FS	VTX	Tr	130/76	N/Tr	153	2 wk	Traveling home next week, doing well	SKF/MM	
4/19	36	36	+FS	VTX	0	120/70	N/N	154	2 wk	Active fetus, again reviewed pain management plans	SKF/WN	
4/24	37	37	+FS	VTX	Tr	120/80	N/N	155	1 wk	No complaints x back pain	JF/BG	

Figure 8.1. Sample flowchart for prenatal care. BP, blood pressure; DT, Doppler tones; FS, fetoscope; pro, protein; sug, sugar; Tr, trace; VTX, vertex.

Figure 8.1. Sample flowchart for prenatal care. BP, blood pressure; DT, Doppler tones; FS, fetoscope; pvo, protein; sug, sugar; Tr, trace; VTX, vertex.

Table 8.2.
Routine Laboratory Testing in Prenatal Care

Test	Purpose	Sensitivity* (%)	Specificity* (%)	Level of Evidence for Effectiveness ^b
First trimester				
Blood type and antibody screen	Determine likelihood of blood antigen incompatibility	99–100	99–100	A
Hepatitis B surface antigen	Screen for maternal infection, acute or chronic	98	98	A
Syphilis test (VDRL or RPR)	Screen for maternal syphilis infection	62–100	75–99	A
HIV	Screen for maternal infection	95	99.5	A
Urine culture	Screen for asymptomatic bacteriuria	98	94	A
Pap smear	Screen for cervical cancer	60–80	90–99	A
Hematocrit or hemoglobin	Screen for maternal anemia	90	44	B
Hemoglobin electrophoresis	Screen for hemoglobinopathies	99–100	99–100	B
Rubella titer	Determine maternal immunity status	92–100	71–100	B
Gonorrhea culture	Screen for maternal infection	80–95	99–100	B
Chlamydia	Screen for maternal infection	70–90	97–99	B
Second trimester				
Serum multiscreeen	Screening for congenital malformations	48–91	—	B
Third trimester				
Repeat gonorrhea, syphilis, chlamydia, hepatitis, and HIV tests	Repeat in women with behaviors that place them at high risk for acquiring these diseases.	—	—	A
Group B strep culture	Identify carriers	70	90	B
Diabetes testing	Identify mothers with gestational diabetes	71–83	78–87	C

VDRL, Venereal Disease Research Laboratory; RPR, rapid plasma reagin; HIV, human immunodeficiency virus.

*Modified from US Preventive Services Task Force. Guide to Clinical Preventive Services. Report of the US Preventive Services Task Force, 2nd ed. Baltimore: Williams & Wilkins, 1996.

^bLevel of evidence for effectiveness: A, strong or moderate research based evidence (consistent across several studies, including at least two randomized controlled trials); B, limited research based evidence (less consistent or extensive evidence, but preponderance of evidence supports use of treatment); C, common practice with little or no research based evidence.

be between 20 and 30 lbs. Calcium intake of 1200 to 1500 mg/d is important and should be supplemented if the patient is unable to take in three to four servings of dairy products daily.

Many patients and their partners wonder about sexual relations during pregnancy. Unless contraindicated by bleeding or premature labor, sexual intercourse can continue through the entire pregnancy. In fact, many couples find this period of time to be especially pleasurable.

Other psychosocial issues for the woman include a changing body image, a sense of loss of control, fears and fantasies, the father's adjustment, and financial concerns. Advice regarding work and pregnancy (whether it is safe, how long during pregnancy to continue working, and what plans to make for time off after delivery) is usually sought.

Ultrasound

Ultrasound has had a great positive impact on prenatal care. When clinically indicated, it helps in monitoring pregnancies with uncertain dating, multiple gestations, or malformations, or in assessing fetal growth. An ultrasound in the early second trimester is particularly helpful, as it can date the pregnancy to an accuracy of within 2 weeks (27). Other appropriate indications for ultrasound include evaluation of suspected fetal growth retardation, assessment of vaginal bleeding, and reassurance of fetal health in late pregnancy.

Many women have come to expect that an ultrasound will be performed routinely, and indeed in many practices it is, although when critically appraised, the routine use of ultrasound has not been shown to affect outcomes (28). The U.S. Preventive Services Task Force (6), the American College of Obstetricians and Gynecologists (29), and the National Institutes of Health (30) have all taken the position that ultrasound should only be used when clinically indicated. Assessment of the importance of its use will continue to be an issue, especially in this era of cost containment. However, it is widely desired and accepted by patients and physicians.

Second-Trimester Prenatal Care

Between 14 and 26 weeks' gestation, a woman really begins to feel pregnant. The common experience of disbelief in early pregnancy is supplanted by an obviously pregnant body and an awareness of fetal movements. Women are socially recog-

nized as being pregnant and start to notice reactions by others. The risk of miscarriage is largely past, nausea has faded, and the uterus is beginning to "show," but it is not yet large enough to significantly reduce mobility. Energy and spirits are often high. The blood pressure drops modestly, a phenomenon that can lead to patient complaints of lightheadedness or fainting.

For the physician, this is an ideal time to get to know the couple better, laying a solid groundwork for working together during labor and delivery. It is an excellent time to schedule a longer visit with both the mother and father, to obtain a genogram, and to discuss family and individual expectations about parenting.

Visits to the doctor normally occur at monthly intervals throughout the second trimester. During these visits, you should continue to follow the various parameters of pregnancy, as described previously. Assess uterine size from symphysis to fundus at every visit. Between the 18th and 34th week, the uterine height in centimeters approximates the gestational age in weeks. Discrepancies of several centimeters merit further investigation. At approximately 20 weeks, the uterus is at the umbilicus and fetal heart tones can usually be heard with a fetoscope.

Ask the patient when she first detected fetal movements. This is known as "quickening" and usually occurs between 16 and 20 weeks. The timing of this sign is too variable to really contribute to the dating of the pregnancy; however, it is a milestone to the woman and should be noted. These first flickerings of detectable life inside a woman can generate great excitement, as the pregnancy is made real by these movements and by the ever-growing belly. With the belly not yet large enough to interfere with sex, and birth control not an issue, many couples find this to be a time of great intimacy and satisfaction. The second trimester can be a high point psychologically and physically for the expectant mother.

Prenatal Diagnosis

Congenital malformations occur in approximately 3% of newborns. Although most of those malformations are minor and do not threaten life, congenital anomalies are now the leading cause of infant mortality in the United States. The most common defects that can be detected through antenatal screening are those caused by neural tube defects, such as anencephaly, and those caused by chromosomal abnormalities, such as Down's syndrome (trisomy 21). You

art to notice reaccarriage is largely e uterus is beginat l enough to inet and spirits assure drops modad to patient cominting.

deal time to get to g a solid grounding labor and deschedule a longer father, to obtain a ly and individual

occur at monthly trimester. During e to follow the varis described previ-symphysis to funhe 18th and 34th trimesters approxi-eks. Discrepancies ther investigation, se uterus is at the es can usually be

irst detected fetal "quickening" and id 20 weeks. The ble t really congru however, in an, should be detectable life ineat excitement, as these movements With the belly not ith sex, and birth oles find this to be isfaction. The secat psychologically at mother.

occur in approxi-ugh most of those do not threaten now the leading he United States, it can be detected e those caused by anencephaly, and al abnormalities, trisomy 21). You

should begin your assessment of genetic risks during the preconception visit or the first prenatal visit, but most of the effort toward early detection of congenital birth defects occurs during the second trimester, during which prenatal testing is routinely offered to pregnant women.

Screening for neural tube defects such as spina bifida, anencephaly, and encephalocele is one of the tests offered. These defects occur in 4 per 10,000 live births (31). The test involves measuring the maternal serum α -fetoprotein (MSAFP) between 16 and 18 weeks' gestation with an elevated level being a good predictor of a neural tube defect (32). Approximately 1 to 5% of women will have an elevated MSAFP level; however, 90 to 95% of these test results will be false-positives, due to underestimated gestational age, multiple gestation, or other anomalies. For this reason, you should not unduly alarm the parents, but should proceed to perform an ultrasound to assess gestational age and look for twins or other anomalies. Amniocentesis should be offered to women who are still without an explanation for the elevated MSAFP (33).

Screening for trisomy 21, or Down's syndrome, is focused primarily on mothers who will be over the age of 35 when they deliver, because the risk of having a baby with a chromosomal abnormality increases with age (34). Amniocentesis (done at 15 to 19 weeks' gestation) or chorionic villus sampling (done at 10 to 12 weeks' gestation) with karyotyping is routinely offered to these women. The age of 35 is the threshold for routine testing because that is when the risk of the chromosomal abnormalities first approximates the iatrogenic fetal loss rate of amniocentesis (0.5 to 1%) (35). However, the majority of pregnancies are in younger women; so—although the risk of trisomy 21 is highest in older mothers—most children with trisomy 21 are born to mothers under age 35. In an effort to detect these younger mothers whose fetuses have trisomy 21, all women are routinely offered a screening blood test for trisomy 21 that involves measuring maternal serum α -fetoprotein, unconjugated estriol levels, and human chorionic gonadotropin levels. Reduced levels of MSAFP and estriol, with elevated levels of human chorionic gonadotropin, have been associated with trisomy 21, and it is estimated that this method of screening will identify 62% of cases, with a false-positive rate of 5% (36). A definite diagnosis via amniocentesis is then offered to women who have a positive screening result.

Genetic screening remains controversial. Some

physicians are concerned that the unnecessary amniocenteses and parental anxiety associated with screening do not justify the relatively small number of abnormal fetuses detected. Many parents-to-be, for personal or religious reasons, would not choose to terminate a pregnancy even if a fetal abnormality were detected. For these reasons, parents should be carefully counseled regarding the benefits and limitations of these screening tests and allowed to make their own decision whether to proceed with testing. The discussion and decision should be documented in the chart.

Third-Trimester Prenatal Care

For the expectant mother, the third trimester (weeks 27 to 40) often seems to pass in slow motion. Her enlarging abdomen and loosening pelvic synostoses cause increasing discomfort, sleep problems, shortness of breath, urinary frequency, and fatigue. For the physician, this is a time of more intensive medical monitoring, as the incidence of complications (e.g., preeclampsia, maternal hypertension, malposition of the fetus) increases as the due date approaches.

An important parameter to follow is the patient's blood pressure. A blood pressure greater than 140 mm Hg systolic or 90 mm Hg diastolic or a rise of 30 mm Hg systolic or 15 mm Hg diastolic heralds the onset of a hypertensive disorder of pregnancy, which is a potentially life-threatening complication. Edema and proteinuria in addition to the blood pressure rise confirms a diagnosis of preeclampsia and warrants intensive surveillance, bed rest, hospitalization, and timely delivery of the endangered fetus.

Fetal growth is still assessed by measuring the distance in centimeters from the top of the pubic symphysis to the top of the uterine fundus. Fetal position should be determined using abdominal palpation. Most babies are vertex (head down) by the final month of pregnancy. If a breech (or other) presentation is detected, version (an attempt to turn the baby to vertex) should be offered to the mother. Versions are usually successful and increase the likelihood of the mother having a vaginal delivery.

If the woman has D (Rh)-negative blood, she should receive a RhoGAM shot at 28 weeks and again within 72 hours of delivery in an effort to prevent isoimmunization from fetal-maternal bleeds. This immune globulin will prevent D sensitization if the baby is D-positive. Such sensitization could seriously affect subsequent pregnancies.

Women at risk for gestational diabetes should be screened with a 1-hour 50-g glucose challenge at 26 to 28 weeks' gestation. This includes women with a previous poor pregnancy outcome, obesity, hypertension, or strong family history of diabetes. A positive screening test result should lead to a 3-hour, 100-g glucose tolerance test that, if its results are positive, is diagnostic for gestational diabetes. These women should then receive dietary counseling and glucose monitoring. Neither the U.S. Preventive Services Task Force (6) nor the American College of Obstetrics and Gynecology (37) recommend routine screening of all pregnant women for diabetes.

Women at high risk for sexually transmitted diseases should have a repeat gonorrhea culture, syphilis serology, and hepatitis B screen, so the need for treatment can be recognized before birth. If the patient has a past history of genital herpes, the patient should be questioned as to whether she believes she has an outbreak of the infection. If so, the perineal, vaginal, and cervical region must be carefully inspected, as neonatal herpes can be acquired by the baby during the birth process and is usually devastating to the neonate, causing neurologic impairment or death (38). Although the risk of transmission for recurrent disease is probably less than 1%, the consequences are so catastrophic that delivery by cesarean section is the standard of care in most settings.

Another serious neonatal problem is group B streptococcal (GBS) infection, which is also usually acquired by the baby during childbirth. In the United States, GBS sepsis occurs in 1.8 of 1000 live births, with a case-fatality rate of 5 to 20%, which leads to approximately 310 newborn deaths per year. It is now routine practice to screen pregnant women at 35 to 37 weeks with a rectovaginal culture to identify those women who are carriers of GBS (39). These women are offered prophylactic treatment with antibiotics during labor. An alternative strategy is to omit the prenatal screening but treat with antibiotics during labor any women who develop a fever, have ruptured membranes for more than 18 hours, deliver before 37 weeks' gestation, showed GBS bacteriuria during the pregnancy, or had a previous infant with significant GBS disease.

Once the medical assessment is complete, your attention should turn to the patient and her family's eager anticipation of labor and delivery. Be sure to discuss experiences that warrant calling the doctor: ruptured membranes, bleeding, and regular contractions. Allow time to talk about the myriad of sensations of late pregnancy,

such as heartburn, leg cramps, backache, and false labor.

In addition to preparing for the delivery itself, patient education should focus on caring for the new baby. Breast-feeding should be encouraged through discussion and recommended readings. In fact, promotion of breast-feeding should start early in pregnancy. Preparations for the new baby should be reviewed as well, particularly if your patient is having her first child.

Postdate Pregnancy

It is difficult to find a more weary and exasperated patient than a woman who has seen her due date come and go. Often, she will come to her appointment expecting her physician to "do something" to get labor started. Hopefully, the physician has educated her earlier in the course of prenatal care that delivering up to 2 weeks past her due date is still within the normal range.

Postdate pregnancy is defined as one that extends more than 42 weeks beyond the last menstrual period. The most common explanation for a postdate pregnancy is incorrect dating of the gestation. The concern with these extended pregnancies is development of oligohydramnios with umbilical cord compression and uteroplacental insufficiency, leading to fetal compromise during labor. Also significant is the fact that many postdate babies weigh more than 4000 g, resulting in a greater incidence of birth trauma, shoulder dystocia, and cesarean section.

Ideally, the due date will have been accurately established as part of your earlier prenatal care. Still, these data should be reviewed. In addition, you should verify fetal health through frequent monitoring as the woman approaches 42 weeks. This monitoring can include (a) an ultrasound study of the baby, to assess fetal movement and the amount of amniotic fluid present; and (b) a nonstress test on the fetal monitor, to verify the baby's cardiac rate and reactivity. Findings of concern may mandate labor induction.

FAMILY PHYSICIAN'S APPROACH TO MATERNAL CARE

The care of families throughout the life cycle enables family physicians and their patients to view prenatal care as part of an ongoing relationship. This view more closely matches how patients experience their own pregnancies, without artificial punctuation of their lives imposed by a health care system that recognizes pregnancy, newborn

backache, and

delivery itself, ca for the be e araged ded readings, g should start s for the new particularly if ld.

r and exasper- is seen her due ome to her ap- n to "do some- ally, the physi- the course of o 2 weeks past mal range. as one that ex- d the last men- explanation for t dating of the extended preg- dramnios with uteroplacental npromise dur- fact that many 4000 n. result- tra shoul- l. een accurately - prenatal care. d. In addition, ough frequent ches 42 weeks. an ultrasound movement and sent; and (b) a r, to verify the y. Findings of ction.

PROACH

he life cycle en- patients to view ig relationship. ow patients ex- without artifi- sed by a health iancy, newborn

care, and adult health as belonging to different specialties.

The provision of prenatal care is itself very rewarding to family physicians, but the benefits to the physician extend beyond the joy of childbirth. Family physicians who deliver babies, as compared with those who do not, report higher incomes, are more psychologically satisfied with their work, tend to perform more procedures, and serve a more diverse patient population, including more children (40). The same study found that despite the fact that these family physicians pay higher malpractice premiums, they rarely experience malpractice claims.

There has been a dramatic increase in childbirth technology over the past two decades. With this has come the assumption that the technologic approach should constitute the standard of care. The value of "high-tech" labor management in uncomplicated pregnancy has not been demonstrated. Thus, although high-risk pregnancies should receive appropriate intervention and technology, routinely applying these techniques to normal pregnancies is misguided. Heightened patient awareness and the emergence of evidence-based medicine have increased the demand for a "low-tech" approach to labor and delivery management.

One might hypothesize that family physicians practice a type of care that is somewhere between the more intensive practice style adopted by obstetricians and the less technologic approach practiced by midwives. Some studies have suggested this is true (41), whereas others have found that family physicians practice a similar style to obstetricians, with midwives standing out as using fewer interventions (42). Most practitioners claim that their approach is best, again underscoring the importance of critical appraisal regarding outcomes and resource use. Among family physicians, there is a broad range of practice styles, depending on the training received and the environment in which they practice.

The family physician should promote personalized care for the woman and her family, even in large institutions with many rules. Above all, any practitioner delivering babies must learn patience, patience, patience.

FAMILY PHYSICIANS AND OBSTETRIC CONSULTANTS

As generalists, family physicians at times serve their patients best by working with colleagues who have a greater depth of knowledge in a spe-

cialized field. Perinatal medicine, like most medical disciplines, has continued to grow and become more specialized. Family physicians are trained to provide independent prenatal and delivery care to women, identifying and managing emergencies and risk factors as they occur. In the care of complicated patients, family physicians work closely with obstetric colleagues, turning to them for expert opinion about patient management and technical skill for some operative maneuvers or deliveries. To clarify their shared responsibility for such patients, family practice and obstetric departments in many hospitals have negotiated a list of high-risk conditions appearing during prenatal care or labor and delivery, which constitute situations in which the family physician should consider involvement of obstetric colleagues in the care of the patient. Table 8.3 contains one such list of consultation guidelines.

Table 8.3.
Guidelines for Obstetric Consultation*

Prenatal Indications

Amniocentesis or chorionic villus sampling desired
Blood group antibodies
Cervical incompetence (by history)
Cervical cancer or CIN III
Deep venous thrombosis
Diabetes mellitus
DES exposure in utero
Intrauterine growth retardation
Significant medical disease (autoimmune, cardiac, endocrine, gastrointestinal, hematologic, neurologic, pulmonary, renal)
Multiple gestation
Preeclampsia, severe
Presentation nonvertex > 35 weeks
Placenta previa > 24 weeks
Premature labor < 35 weeks unresponsive to hydration and oral tocolysis
Uterine abnormality
Vaginal bleeding > 20 weeks, significant

Intrapartum Indications

Eclampsia
Fetal distress, significant
Labor abnormality, significant
Malpresentation
Operative vaginal delivery from above outlet
Placental abruption
Placental previa
Preeclampsia, severe
Vaginal bleeding, significant

CIN, cervical intraepithelial neoplasia; DES, diethylstilbestrol.

*The threshold for consultation will vary with the comfort level and experience of individual physicians.

which was developed at the University of North Carolina.

When the consultation process works well, the patient benefits from incorporation of specialty expertise while maintaining the trusted continuity relationship with her primary doctor. For such a collaborative effort to benefit the patient, the family physician must be aware of personal limitations, be committed to consultation agreements, communicate the needs and expectations of the consultation directly and clearly, and trust the consultant. The consultant must be responsive to the request for consultation or technical assistance, value the ongoing primary role of the family physician, respect the long-standing doctor-patient relationship, and be open and direct in negotiating the details of sharing responsibility for patient care.

CASE STUDY

Tonya is a 24-year-old G₃P₁₋₀₋₁₋₁ who comes to your office with a positive pregnancy test. This was an unplanned pregnancy; she had been taking birth control pills but admits to missing several doses. Her menstrual bleeding has been erratic, and she last bled 6 weeks ago. She lives in an apartment with her husband of 2 years and 5-year-old son; the father of her son was a former boyfriend with whom she now has minimal involvement. She works as a secretary, and her husband is a fireman. They are hoping to save money to buy a house. Tonya is interested in prenatal classes, but her husband thinks they are a "waste of time" and says that she will be "knocked out" at the time of delivery anyway.

General observation reveals a healthy-appearing woman. She complains of nausea and fatigue. On examination, she is average height but slightly underweight. Her uterus is the size of a grapefruit, and fetal heart tones are heard with Doppler ultrasonography.

QUESTIONS

1. Based on the aforementioned information, how would you estimate her EDC?

2. What information is important to elicit about her previous pregnancy?
3. What education will you provide on this visit?
4. Are there psychosocial concerns raised by this case? If so, how would you approach them?

DISCUSSION

Tonya's recent use of birth control pills and the uncertain timing of her last menstrual period lead to uncertainty regarding the dating of this pregnancy. If the bleeding 6 weeks ago was a menstrual period, then she is 6 weeks pregnant, but her uterine size is consistent with 12 weeks. The bleeding 6 weeks ago might have been bleeding during early pregnancy, which is very common. Twin gestation might also explain a larger than expected uterus. An ultrasound would be helpful because it can predict the EDC within 2 weeks of reliability and detect multiple gestations.

You'll want to take a thorough history of the previous pregnancy. In this case, Tonya explains that her previous pregnancy was without complications, but delivery was by cesarean section due to a breech presentation. This requires you to obtain the operative report from the previous delivery, to confirm that she received a low-transverse uterine incision, meaning she can be cleared for attempted vaginal birth after cesarean section.

Because she is slightly underweight, you'll want to review nutritional guidelines and encourage her to gain at least 25 lbs. She should be taking folic acid supplements. You should assess her interest in breast-feeding and address this repeatedly throughout the course of the pregnancy.

Your other patient education should focus on recommendations regarding her nausea and vomiting and assurance that these symptoms are usually self-limited. In addition, explain that you will be discussing many issues throughout the pregnancy. Among the topics you'll emphasize are: encouraging childbirth classes, empowering the patient to feel like she has some control over her labor and delivery,

encouraging her by suggesting that the odds are favorable that she can successfully deliver vaginally, and inviting her husband to as many prenatal visits as possible (and encouraging him to attend childbirth classes).

Psychosocial issues include addressing any substance abuse in either parent and assessing for significant marriage and family issues. The status of the 5-year-old sibling should be addressed. If you do not already have a relationship with this patient, you can better familiarize yourself with her situation during the pregnancy. She, in turn, is likely to develop a sense of trust in you.

REFERENCES

- Gardner P, Hudson BL. Advanced report of final mortality statistics 1993. *Monthly Vital Statistics Rep* 1996; 44 (suppl).
- Dunn HL. *Vital Statistics of the United States, 1941, Part 1*. Washington, DC: US Department of Commerce Bureau of Vital Statistics, 1943:27.
- UNICEF. *The State of the World's Children 1996*. New York: Oxford University Press for UNICEF, 1996:81.
- Public Health Service. *Healthy People 2000, National Health Promotion and Disease Prevention Objectives*. Washington, DC: US Department of Health and Human Services, Public Health Service, 1992:381.
- Guyatt G, Cairn SJ, Churchill D, et al. Evidenced-based medicine: a new approach to teaching the practice of medicine. *JAMA* 1992;268:2420-2425.
- US Preventive Services Task Force. *Guide to Clinical Preventive Services. Report of the US Preventive Services Task Force, 2nd ed.* Baltimore: Williams & Wilkins, 1996.
- The Cochrane Database of Systematic Reviews (available in the Cochrane Library). The Cochrane Collaboration, Issue 1. Oxford: Update Software, 1997.
- Milinski A, Jick H, Jick SS, et al. Multivitamin/folic acid supplementation in early pregnancy reduces the prevalence of neural tube defects. *JAMA* 1989;262:2847-2852.
- Department of Health and Human Services. *Reducing the Health Consequences of Smoking: 25 years of Progress. A Report of the Surgeon General*. Publication no. DHHS (CDC) 89-8411. Rockville, MD: Department of Health and Human Services, 1989.
- Department of Health and Human Services. *The Health Benefits of Smoking Cessation: A Report of the Surgeon General*. Publication no. DHHS (CDC) 90-8416. Rockville, MD: Department of Health and Human Services, 1990.
- Rosett HL, Weiner L, Edelin KC. Treatment experience with pregnant problem drinkers. *JAMA* 1983;249:2029-2033.

- Volpe JJ. Effect of cocaine use on the fetus. *N Engl J Med* 1992;327:399-407.
- Chard T. Pregnancy tests: a review. *Hum Reprod* 1992;7:701-710.
- Cunningham FG, MacDonald PC, Gant NF, Leveno KJ, Gilstrap LC III. *Prenatal care*. In: *Williams Obstetrics*, 19th ed. Norwalk, CT: Appleton & Lange, 1993:249.
- Kennell J, Klaus M, McGrath S, et al. Continuous emotional support during labor in a US hospital. *JAMA* 1991;265:2197-2201.
- Simkin P, Enkin M. Antenatal classes. In: Chalmers I, Enkin M, Keirse M, eds. *Effective Care in Pregnancy and Childbirth*. New York: Oxford University Press, 1989:318-334.
- Public Health Service Expert Panel on Prenatal Care. *Caring for Our Future: The Content of Prenatal Care*. NIH publication no. 90-3182. Washington, DC: Public Health Service, US Department of Health and Human Services, 1989.
- McDuffie RS, Beck A, Bischoff K, et al. Effect of frequency of prenatal care visits on perinatal outcome among low-risk women. *JAMA* 1996;275:847-851.
- Kochenour NK. Normal pregnancy and prenatal care. In: Scott JR, DiSaia PJ, Hammond CB, et al, eds. *Danforth's Obstetrics and Gynecology*, 7th ed. Philadelphia: JB Lippincott, 1994:67-104.
- Murphy JR, O'Riordan J, Newcombe RG, et al. Relation of haemoglobin levels in first and second trimester to outcome of pregnancy. *Lancet* 1986;1:992-994.
- Scholl TO, Hediger ML. Anemia and iron-deficiency. Compilation of data on pregnancy outcome. *Am J Clin Nutr* 1994;59:492S-501S.
- Wong VCV, Ip HMH, Reesink HW, et al. Prevention of the HBsAg carrier state in newborn infants of mothers who are chronic carriers of HBsAg and HBeAg by administration of hepatitis-B vaccine and hepatitis-B immunoglobulin: double-blind randomized placebo controlled study. *Lancet* 1984;1:921-926.
- Marx R, Aral SG, Rolfs RT, Sterk CE, Kahn JG. *Congenital syphilis, United States, 1983-1985*. *MMWR* 1986; 35:625-628.
- Connor EM, Sperling RS, Gelber R, et al. Reduction of maternal-infant transmission of HIV-1 with zidovudine treatment. *N Engl J Med* 1994;331:1173-1180.
- Fiscus SA, Adana A, Schoenbach VJ, et al. Perinatal HIV infection and the effect of zidovudine therapy on transmission in rural and urban counties. *JAMA* 1996; 275:1483-1488.
- Romero R, Oyarzun E, Mazor M, et al. Meta-analysis of the relationship between symptomatic bacteriuria and preterm delivery/low birth weight. *Obstet Gynecol* 1989;73:576-582.
- Campbell S, Warsaw SL, Little D, et al. Routine ultrasound screening for the prediction of gestational age. *Obstet Gynecol* 1985;65:613-620.
- Ewigman BD, Craine JP, Figoletto FD, et al. Effect of prenatal ultrasound screening on perinatal outcome. The RADIUS Study Group. *N Engl J Med* 1993;329: 821-827.
- American College of Obstetricians and Gynecologists. *Ultrasonography in pregnancy*. *Tech Bull* 1993;187: 1-9.
- National Institutes of Health Consensus Development Conference. *The use of diagnostic ultrasound imaging during pregnancy*. *JAMA* 1984;252:664-672.
- Flood T, Brewster M, Harris J, et al. Spina bifida

- incidence at birth—United States, 1983–1990. *MMWR* 1992; 41:497–500.
32. Maternal serum alpha-fetoprotein screening for neural tube defects: results of a consensus meeting. *Prenatal Diagn* 1985;5:77–83.
 33. American College of Obstetricians and Gynecologists. Maternal serum screening. *Tech Bull* 1996;228:1–9.
 34. Hansen JP. Older maternal age and pregnancy outcome: a review of the literature. *Obstet Gynecol* 1986; 41:726–742.
 35. NICHD National Registry for Amniocentesis Study Group. Midtrimester amniocentesis for prenatal diagnosis: safety and accuracy. *JAMA* 1976;236: 1471–1476.
 36. Haddow JE, Palomaki GE, Knight GJ, et al. Prenatal screening for Down's syndrome with use of maternal serum markers. *N Engl J Med* 1992;327:588–593.
 37. American College of Obstetricians and Gynecologists. Diabetes and pregnancy. *Tech Bull* 1994;200:1–8.
 38. Whitley R, Arvin A, Prober C, et al. Predictors of morbidity and mortality in neonates with herpes simplex virus infections. The National Institute of Allergy and Infectious Disease Collaborative Antiviral Study Group. *N Engl J Med* 1991;324:451–454.
 39. Centers for Disease Control and Prevention. Prevention of perinatal group B streptococcal disease: a public health perspective. *MMWR* 1996;45(RR-7):1–24.
 40. Larimore WL, Sapolsky BS. Maternity care in family medicine: economics and malpractice. *J Fam Pract* 1995;40:153–160.
 41. Rosenberg EE, Klein M. Is maternity care different in family practice? A pilot matched pair study. *J Fam Pract* 1987;25:237–242.
 42. Rosenblatt RA, Dobie SA, Hart LG, Schneeweiss RS, et al. Interspecialty differences in the obstetric care of low-risk women. *Am J Public Health* 1997; 87: 344–351.