Evidence-Based Prenatal Care: Part II. Third-Trimester Care and Prevention of Infectious Diseases

COLLEEN KIRKHAM, M.D., *University of British Columbia Faculty of Medicine, Vancouver, British Columbia*
SUSAN HARRIS, M.D., *Children's and Women's Health Centre of British Columbia, Vancouver, British Columbia*
STEFAN GRZYBOWSKI, M.D., *University of British Columbia Faculty of Medicine, Vancouver, British Columbia*

All pregnant women should be offered screening for asymptomatic bacteriuria, syphilis, rubella, and hepatitis B and human immunodeficiency virus infection early in pregnancy. Women at increased risk should be tested for hepatitis C infection, gonorrhea, and chlamydia. All women should be questioned about their history of chickenpox and genital or orolabial herpes. Routine screening for bacterial vaginosis is not recommended. Influenza vaccination is recommended in women who will be in their second or third trimester of pregnancy during flu season. Women should be offered vaginorectal culture screening for group B streptococcal infection at 35 to 37 weeks' gestation. Colonized women and women with a history of group B streptococcal bacteriuria should be offered intrapartum intravenous antibiotics. Screening for gestational diabetes remains controversial. Women should be offered labor induction after 41 weeks' gestation. (Am Fam Physician 2005;71:1555-60,1561-2. Copyright© 2005 American Academy of Family Physicians.)

See page 1465 for strength-of-recommendation labels.

This is part II of a two-part article on prenatal care. Part I, "General Prenatal Care and Counseling Issues," appeared in the April 1, 2005, issue of *AFP*.

▶ **Patient information:** A handout on infections during pregnancy, written by the authors of this article, is provided on page 1561.

Part I of this article covered general counseling issues of prenatal care, blood typing, genetic screening, and nutritional counseling.[1] Part II focuses on third-trimester care and screening for and prevention of infectious diseases.

Infectious Diseases

HIV

Human immunodeficiency virus (HIV) testing is recommended in all pregnant women.[2-8] Women at increased risk for HIV infection should be retested in the third trimester of pregnancy.[4-6] Testing should be voluntary and done with informed consent.[6,9] Targeted HIV testing in women thought to be at increased risk fails to identify a significant portion of infected women.[7] Ideally, pretest counseling should include a discussion of risk factors, including the risk of transmission to the fetus, and the availability of therapy to reduce the risk of transmission to the fetus. However, pretest counseling should be streamlined so that it does not become a barrier to testing.[2,6] Areas in the United States and Canada that use "opt-out" voluntary testing strategies or mandatory testing of newborns have higher rates of screening than areas with an "opt-in" policy.[10,11]

Genital herpes acquired during pregnancy does not seem to increase rates of neonatal illness or congenital infection as long as seroconversion has completed by the time labor begins.

SYPHILIS

Universal screening of pregnant women for syphilis at the first prenatal visit is recommended.[2-4,12,13] Women at increased risk should undergo repeat serologic testing at 28 weeks' gestation and delivery.[13] Most states have laws requiring antenatal syphilis testing.[14]

HERPES

All patients and their partners should be asked about a history of genital and orolabial herpes simplex virus (HSV) infection.[2,5,15-17] Rates of vertical transmission at the time of delivery are 50 percent for a primary HSV infection, 33 percent for a nonprimary first episode (acquisition of genital HSV-1 or HSV-2, with preexisting antibodies to the other type), and zero to 3 percent for a recurrent HSV infection.[18-20] Genital herpes that is acquired during pregnancy does not seem to increase rates of neonatal illness or congenital HSV infection as long as HSV seroconversion has completed by the time labor begins.[19,21] Neonatal HSV infection acquired in the birth canal can cause localized disease in the skin, eyes, or mouth (no associated mortality), central nervous sys-

Strength of Recommendations

Key clinical recommendation	*Label*	*References*
Labor induction should be offered after 41 weeks' gestation.	A	2, 3, 57, 59, 60
All pregnant women should be screened for active hepatitis B infection by surface antigen.	A	2, 3, 4, 15
All pregnant women should be screened for asymptomatic bacteriuria by urine culture at 12 to 16 weeks' gestation.	A	3, 4, 15
Sweeping of the membranes should be offered at term to reduce the need for labor induction.	A	3, 61
All pregnant women should be screened for syphilis during their first prenatal visit.	A	4, 12, 13
Routine screening for bacterial vaginosis is not recommended.	A	27, 28
All pregnant women should be tested for human immunodeficiency virus infection.	B	2, 3, 4, 6, 7, 8

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, or case series. See page 1465 for more information.

tem disease (15 percent mortality), and disseminated disease (57 percent mortality).[20,22] Women with no history of herpes should be counseled about avoiding exposure near term. Those with an HSV-positive partner should consider abstinence, condom use, antiviral therapy in the HSV-positive partner, and avoidance of oral-genital contact if the partner has orolabial HSV infection.[2,17] Women with recurrent HSV infection should be counseled about the use of acyclovir (Zovirax) at term to decrease the risk of cesarean delivery, the role of cesarean delivery in decreasing vertical transmission, and avoiding postpartum transmission to the infant through direct contact.[17,20,23] Type-specific HSV serology may be appropriate in some patients.[24]

Physicians may consider screening with Gram stain or Amsel criteria for bacterial vaginosis in women at increased risk of preterm labor.

CHLAMYDIA AND GONORRHEA

All women at increased risk for sexually transmitted diseases (STDs), including those younger than 25 years, should be screened for chlamydial infection and gonorrhea.[2,4,12,15,25] Some organizations[5,26] advocate universal screening of pregnant women for chlamydial infection. High-risk groups include women younger than 25 years; unmarried women; black women; women with a history of STDs, new or multiple sexual partners, cervical ectropion, and inconsistent use of barrier contraception; and women living in communities with high infection rates.[25] Affected women and their partners should be treated. The optimal testing time is uncertain, but most authors recommend testing at the first prenatal visit and again in the third trimester for high-risk patients.[2,4,5]

BACTERIAL VAGINOSIS

Routine screening of all pregnant women for bacterial vaginosis (BV) is not recommended.[27-30] Well-designed studies[27-30] of BV screening in women with a history of preterm delivery found inconsistent results. Physicians may consider screening women at increased risk of preterm labor with Gram stain or Amsel criteria (i.e., three of the following signs: homogeneous white or gray noninflammatory vaginal discharge, presence of clue cells, vaginal secretion pH of 4.7 or greater, and amine odor of vaginal discharge before or after addition of 10 percent potassium hydroxide [KOH]).[27-30] Symptomatic women should be treated.

RUBELLA

All pregnant women should be screened for rubella if testing was not performed before conception. Nonimmune women should be

counseled about the risks of rubella during pregnancy and offered vaccination in the immediate postpartum period.[2-4,15]

VARICELLA ZOSTER

Maternal chickenpox infection in the first 20 weeks of pregnancy is associated with a 1 to 2 percent risk of congenital varicella syndrome (i.e., low birth weight, limb hypoplasia, ophthalmologic and neurologic abnormalities).[31-33] Neonates born to mothers who contract chickenpox between five days before delivery and two days after delivery have a 17 to 30 percent chance of developing neonatal varicella.[34] All women of childbearing age should be asked about their history of chickenpox.[4,35,36] Women with no history can have serologic testing for varicella zoster IgG to determine immunity (80 to 90 percent of these women are found to be immune).[34] If testing is done in the preconception period, women can be offered two doses of varicella vaccine at least one month apart. Pregnancy should be delayed one month after vaccination.[34,37,38] Varicella vaccine is contraindicated in pregnant women.[34]

Women found to be nonimmune during pregnancy should be counseled to avoid exposure to chickenpox and to report exposure immediately. Susceptible pregnant women who are exposed are candidates for varicella zoster immune globulin.[2,36,38] Nonimmune women should be offered postpartum varicella vaccination. The vaccine is considered safe in breastfeeding women.[34,39] Immunization should be delayed for three months in women who have received Rh_oD immune globulin (Rhogam).[34] Maternal shingles is not a risk for the infant, who is protected from passively acquired maternal antibodies.[36]

HEPATITIS B AND C

Screening for active hepatitis B infection with hepatitis B surface antigen (HbsAg) is recommended at the first prenatal visit so that postnatal intervention can be offered to decrease mother-to-child transmission.[2-4,15,40] Women at increased risk of acquiring hepatitis B can be vaccinated safely during pregnancy and should be screened again for surface antigen before delivery. Women who were not screened during pregnancy and those at increased risk should be tested at admission for delivery.[2]

Hepatitis C antibody screening should be offered to women with risk factors (e.g., prison inmates, injection drug users, women exposed to blood or blood products, HIV-positive women, women with elevated aspartate transaminase levels, multiple sexual partners, or tattoos).[2,5,41] Vertical transmission of hepatitis C is estimated to be 8 percent.[41] Aside from vertical transmission, there does not appear to be an increased risk of adverse pregnancy outcomes in women infected with hepatitis C.[41]

All women of childbearing age should be asked about their history of chickenpox.

URINARY TRACT INFECTION

All pregnant women should be screened by urine culture for asymptomatic bacteriuria between 12 and 16 weeks' gestation.[2-4,12,15]

INFLUENZA

Influenza vaccination generally is recommended in women who will be in the second or third trimester of pregnancy during flu season.[4,42,43] Pregnant women with medical conditions that increase their risk of complications from influenza should be immunized regardless of gestational age. There is no evidence that vaccination in the first trimester of pregnancy is unsafe.[44]

GBS INFECTION

Group B streptococcal (GBS) infection is a significant cause of neonatal morbidity and mortality. Ten to 30 percent of women are colonized by GBS.[45] Risk factors for neonatal infection include: less than 37 weeks' gestation, prolonged rupture of membranes (more than 18 hours), and maternal fever.[46,47] The Centers for Disease Control and Prevention,[46] the American College of Obstetricians and Gynecologists,[48] and the Society of Obstetricians and Gynecologists of Canada[49] recommend that all women be offered GBS screening by vaginorectal culture at 35 to 37 weeks' gestation and that colonized women be treated with intravenous antibiotics (e.g., high-dosage penicillin or clindamycin

[Cleocin]) at the time of labor or rupture of membranes. This recommendation is based on a nonrandomized, population-based study[50] from 2002. GBS bacteriuria indicates heavy maternal colonization. Women with GBS bacteriuria or a previous infant with GBS infection should be offered intrapartum antibiotics routinely and therefore do not require vaginorectal culture.[46] Other organizations have made different recommendations, including recommending against GBS screening[3] and recommending universal screening with selective treatment of colonized women who also have clinical risk factors.[47]

OTHER INFECTIONS

Routine screening for toxoplasmosis, cytomegalovirus, or parvovirus infection is not recommended.[35]

Gestational Diabetes

Gestational diabetes is associated with hypertensive disorders, macrosomia, shoulder dystocia, and higher rates of cesarean delivery and diabetes later in life for the mother. The incidence of gestational diabetes is estimated at 2 to 5 percent.[51] Screening for this condition remains controversial because there are no randomized controlled trials showing improved perinatal outcomes with screening. The American College of Obstetricians and Gynecologists[51] and the American Diabetes Association[52] recommend that all pregnant women be screened for gestational diabetes at 24 to 28 weeks' gestation, except women who are at low risk (e.g., younger than 25 years, belonging to a low-risk ethnic group, normal prepregnancy weight, no history of abnormal glucose metabolism, poor obstetric outcomes, or first-degree relatives with diabetes).[4] Screening has become standard in the United States, with 94 percent of physicians reporting universal screening.[53] Other organizations[12,54,55] have found insufficient evidence to recommend for or against routine screening for gestational diabetes. British guidelines[3] recommend against screening. Screening protocols also differ: a two-step protocol (i.e., one-hour, 50-g glucose-challenge test followed by a diagnostic three-hour, 100-g glucose-tolerance test) is the main method used in North America, and a two-hour, 75-g glucose-tolerance test is offered in Europe. Neither method has been shown to predict adverse perinatal outcomes, and it is difficult to recommend a gold standard for diagnosis. A randomized trial[56] of 2,400 women, currently underway in the United States, should provide more answers.

Post-term Pregnancy

The risk of stillbirth increases with gestational age, from 1 per 3,000 pregnancies per week at 37 weeks' gestation, to 3 per 3,000 pregnancies at 42 weeks' gestation and 6 per 3,000 pregnancies at 43 weeks' gestation. Because of the increasing risk of stillbirth and the emotional impact on women and physicians, a number of trials have been conducted to study the impact of labor induction on obstetric outcomes. In one meta-analysis,[57] routine induction of labor at 41 weeks' gestation reduced rates of perinatal death without increasing rates of cesarean delivery. Although there is continued debate about the validity of these findings,[58] most guidelines recommend offering labor induction after 41 weeks' gestation.[2,3,59,60] For gestational periods beyond 42 weeks, fetal well-being should be assessed with nonstress testing and ultrasound assessment of amniotic fluid volume.[57] Sweeping of membranes reduces the need for labor induction.[3,61]

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