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- health plans, health systems, health care organizations, hospitals and integrated health care delivery systems;
- medical specialty and professional societies;
- researchers;
- federal, state and local government health care policy makers and specialists; and
- employee benefit managers.

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# Health Care Guideline: Routine Prenatal Care

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Numbers refer to specific annotations or discussion. [Bracketed] items refer to high-risk groups only.

* It is acceptable for the history and physical and laboratory tests listed under Visit 1 to be deferred to Visit 2 with the agreement of both the patient and the provider.

** Should also include all subjects listed for the preconception visit if none occurred.

† To be completed within 2 weeks of provider knowledge of pregnancy.
# Table of Contents

**Routine Prenatal Care**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prenatal Flow Chart</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Overview</strong></td>
<td></td>
</tr>
<tr>
<td>Scope and Target Population</td>
<td>3</td>
</tr>
<tr>
<td>Related ICSI Scientific Documents</td>
<td>3</td>
</tr>
<tr>
<td>Clinical Highlights for Individual Clinicians</td>
<td>3</td>
</tr>
<tr>
<td>(Recommendations for application in individual clinician practice)</td>
<td></td>
</tr>
<tr>
<td>Priority Aims and Suggested Measures for Health Care Systems</td>
<td>4</td>
</tr>
<tr>
<td>(Guideline implementation goals to pursue across health care systems and measures to assess progress at achieving them.)</td>
<td></td>
</tr>
<tr>
<td>Brief Description of Evidence Grading</td>
<td>4</td>
</tr>
<tr>
<td><strong>Annotations</strong> (Footnotes for Algorithm)</td>
<td>5-14</td>
</tr>
<tr>
<td><strong>Discussion &amp; References</strong> (Discussion with Reference Citations)</td>
<td>15-45</td>
</tr>
<tr>
<td>Disclosure of Potential Conflict of Interest</td>
<td>16</td>
</tr>
<tr>
<td>Full Description of Evidence Grading</td>
<td>17</td>
</tr>
<tr>
<td>Discussion with Reference Citations</td>
<td>18-45</td>
</tr>
<tr>
<td><strong>Support for Implementation</strong> (Implementation measures, strategies and materials)</td>
<td>46-56</td>
</tr>
<tr>
<td>Priority Aims &amp; Suggested Measures for Health Care Systems</td>
<td>47</td>
</tr>
<tr>
<td>(Guideline implementation goals to pursue across health care systems and measures to assess progress at achieving them.)</td>
<td></td>
</tr>
<tr>
<td>Measurement Specifications</td>
<td>48-52</td>
</tr>
<tr>
<td>Chart Abstraction Tool (for Measure 4c)</td>
<td>53</td>
</tr>
<tr>
<td>Recommendations for Health Care Systems</td>
<td>54</td>
</tr>
<tr>
<td>(Systems approaches to implementation)</td>
<td></td>
</tr>
<tr>
<td>Recommended Internet Websites for Providers and/or Patients</td>
<td>55-56</td>
</tr>
</tbody>
</table>

**Table of Contents**

Routine Prenatal Care

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<thead>
<tr>
<th>Section</th>
<th>Page</th>
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**Table of Contents**

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<thead>
<tr>
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<th>Page</th>
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**Table of Contents**

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<thead>
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<td>3</td>
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<td>17</td>
</tr>
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<td>18-45</td>
</tr>
<tr>
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</tr>
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</tr>
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</tr>
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<td>54</td>
</tr>
<tr>
<td>(Systems approaches to implementation)</td>
<td></td>
</tr>
<tr>
<td>Recommended Internet Websites for Providers and/or Patients</td>
<td>55-56</td>
</tr>
</tbody>
</table>
Overview

SCOPE AND TARGET POPULATION

All women who are pregnant or are considering pregnancy.

RELATED ICSI SCIENTIFIC DOCUMENTS

Other ICSI guidelines whose scope and/or recommendations are closely related to the content of this guideline are:

1. Preventive Services for Adults and Children
2. Domestic Violence
3. Preterm Birth Prevention
4. Preventive Counseling and Education
5. Vaginal Birth After Cesarean
6. Immunizations
7. Failure to Progress in Obstetrical Labor
8. Tobacco Use Prevention and Cessation for Adults and Mature Adolescents
9. Tobacco Use Prevention and Cessation for Infants, Children and Adolescents

Technology Assessment Reports related to the content of this guideline are:

1. First Trimester Prenatal Testing for Down Syndrome Using Nuchal Translucency (#61)
2. Prenatal Ultrasound as a Screening Test (#16)

CLINICAL HIGHLIGHTS FOR INDIVIDUAL CLINICIANS

1. Each pregnant patient should receive visit-specific screening tests, education, immunizations and chemoprophylaxis as described on the prenatal flow chart. (Page 1)
2. Each pregnant patient and each patient planning a pregnancy should receive a comprehensive risk assessment including risks for preterm labor, relevant infectious diseases, and relevant genetic disorders. (Annotation #2)
3. Providers should phase out unnecessary clinical prenatal practices including routine urine dipstick test, routine clinical pelvimetry, and universal multivitamin and iron supplementation. (Practices to Consider Discontinuing, page 14)
Overview (cont)

**Priority Aims and Suggested Measures for Health Care Systems**

1. Increase the percentage of pregnant women who receive timely, comprehensive screens for risk factors.

   Possible measures of accomplishing this aim:
   
   a. Percentage of initial risk assessment forms completed within 2 visits of initiation of prenatal care.
   
   b. Percentage of pregnant women with interventions documented for identified risk factors.
   
   c. Percentage of pregnant women with documented preconception risk assessment/counseling.

2. Increase the percentage of pregnant women who receive timely prenatal counseling and education as outlined in the guideline.

   Possible measures of accomplishing this aim:
   
   a. Percentage of pregnant women who received counseling and education before pregnancy.
   
   b. Percentage of pregnant women who received counseling and education at each visit as outlined in the guideline.
   
   c. Percentage of pregnant women who received counseling and education by the 28th week visit.

3. Improve the frequency of appropriate routine testing during pregnancy.

   Possible measures of accomplishing this aim:
   
   a. Percentage of pregnant women who have not received urine dipstick testing during pregnancy.
   
   b. Percentage of pregnant women who received specific test (e.g., HIV, chromosome/NTD, GBS, triple screen) during pregnancy.

4. Increase the percentage of pregnant women who are up-to-date with prenatal care activities.

   Possible measures of accomplishing this aim:
   
   a. Percentage of pregnant women who are up-to-date with the prenatal activities at the end of a prenatal visit.
   
   b. Percentage of pregnant women who are up-to-date with activities at 28th week visit.
   
   c. Percentage of prenatal activities up-to-date at the end of a prenatal visit.

**Evidence Grading**

Individual research reports are assigned a letter indicating the class of report based on design type: A, B, C, D, M, R, X.

A full explanation of these designators is found in the Discussion and References section of the guideline.
1. **Number of Prenatal Visits**

   Prenatal visits are organized as described in the table on the cover of this guideline. All prenatal visits, including the preconception visit, are organized to include screening, counseling and education, and immunization and chemoprophylactic maneuvers.

2. **Risk Profile Screening**

   Risk evaluation at the preconception visit or first prenatal visit should include an evaluation of the following concerns:

   A. **Preconception risk assessment** should be completed at all opportunities (see Algorithm Annotation #3, "Preventive Services"), followed by preconception counseling, if indicated.

      A comprehensive assessment should elicit information from the patient regarding the following:

      - Modifiable risk factors for preterm labor
      - Use of prescription or over-the-counter medications
      - Work-related exposure to chemicals or infectious agents
      - History of physical, emotional, or sexual abuse
      - Hereditary disorders
      - Risk for modifiable infectious diseases
      - Nutritional adequacy
      - Substance abuse

   B. **Preterm labor (PTL) risk** includes medical and obstetrical history that might cause a woman to be at high-risk for preterm delivery. Refer to the ICSI Preterm Birth Prevention guideline for risk factors pertaining to PTL. (The Minnesota Pregnancy Assessment Form includes the same risk factors.)

   C. **Potential workplace hazards/lifestyle risk assessment** should elicit information from the patient regarding the following:

      - Work-related risks for preterm labor
      - Work-related exposure to chemicals or infectious agents
      - Availability of health care professionals at work for blood pressure (BP) monitoring or rest/observation, if indicated
      - Risks to pregnancy from physical requirements of the occupation
      - Nutritional adequacy for pregnancy
      - Lifestyle risks to pregnancy
Algorithm Annotations (cont)

D. Infectious disease risks

Women found to be at high-risk for one or more infectious diseases may require additional infectious disease testing at 28 weeks.

- Rubella/varicella immunity status
- Human immunodeficiency virus (HIV) status of patient and partner
- History of sexually transmitted diseases (STDs)
- Sexual practices which place patient at increased risk for STDs
- Substance abuse, including intravenous (IV) drug use
- Socioeconomic factors which affect access to medical care and increase likelihood of exposure to infectious disease

Gonorrhea and Chlamydia

All women found to be at high-risk should be screened for Neisseria gonorrhoeae and Chlamydia trachomatis at a preconception visit or during pregnancy.

The optimal frequency of screening has not been determined, but due to concerns about reinfec- tion, an additional test in the third trimester is recommended for those at continued risk of acquiring gonorrhea or chlamydia.

Tuberculosis

Purified protein derivatives (PPD) screening of all high-risk mothers at a preconception visit or the first OB visit will identify most women who have old infections or active disease (10% of immunocompetent and 40% of HIV positive patients will have a false negative test). Follow-up chest x-ray is recommended for recent converters if pulmonary symptoms are present before 12 weeks gestation and in all circumstances after 12 weeks gestation.

Important risk factors include poverty, drug use, HIV, new immigrants from tuberculosis endemic areas, and exposure to proven and suspected tuberculosis.

HIV

All pregnant women should be encouraged to undergo HIV testing at their first prenatal visit. Those pregnant women found to be at high-risk for HIV should receive additional education about HIV testing.

E. Genetic risks

The history of both parents, as well as their family histories, should be reviewed for genetic disorders.

- Age of both parents at baby’s birth
- Racial background of both parents, and whether appropriate testing has been done if determined to be in a hereditary trait risk group
- Substance abuse
- Presence of hereditary defects/disorders in close relatives
- Family history of psychiatric disease/mood disorders
Algorithm Annotations (cont)

- Serious health conditions of mother
- History of unplanned pregnancy loss

(See the Discussion and References section for evidence grading by subtopic.)

3. Preventive Services

Preconception Visit or First Prenatal Visit

A preconception visit is defined in agreement with the ICSI Preterm Birth Prevention guideline. This includes any encounter between a woman of childbearing age and a health care professional for any issue related to possible pregnancy or contraception occurring within 12 months of pregnancy. This includes the following reasons for an encounter:

- Pregnancy planning or questions
- Fertility problems
- Contraception
- Periodic health assessment (including Pap testing)
- Recent amenorrhea, but pregnancy testing is negative
- Pregnant but plans to abort pregnancy
- Any visit with gynecologic concerns
- Other encounters which lead the provider to believe the patient is likely to become pregnant soon.

(See the ICSI Preterm Birth Prevention guideline.)

An age-appropriate periodic health assessment as described in the ICSI Preventive Services guidelines should be performed. The Preventive Services guidelines should be consulted regarding the indicated frequency of screening, counseling, and immunization maneuvers. Ideally, all such maneuvers would be performed at a preconception visit. A discussion of preconception issues does not mandate additional preventive services maneuvers. Pregnant women failing to receive a preconception visit should undergo an age-appropriate periodic health assessment at the first prenatal visit. This would include those screening maneuvers listed in the visit table, with the exception of cholesterol and high-density lipoprotein (HDL).

(These recommendations were made in accordance with the ICSI Preventive Services in Adults guideline.)

4. Rubella/Rubeola Status

Screening for rubella susceptibility by history of vaccination or by serology is recommended for all women of childbearing age at their first preconception encounter to reduce incidence of congenital rubella syndrome (CRS). All susceptible nonpregnant women of childbearing age should be offered vaccination. Susceptible pregnant women should be vaccinated in the immediate postpartum period.

Measles-mumps-rubella (MMR) vaccine should be administered to all persons born after 1956 who lack evidence of immunity to measles (receipt of live vaccine on or after the first birthday, laboratory evidence of immunity, or a history of provider-diagnosed measles). A second measles vaccination is
recommended for adolescents and young adults in settings in which such individuals congregate, if they have not previously received a second dose.

Administration of the MMR or measles vaccine during pregnancy is not recommended. Susceptible pregnant women should be vaccinated in the immediate postpartum period.

5. **Varicella Status**

The CDC recommends that all adults be immunized if seronegative. Immunity status should be elicited during the preconception counseling session. Testing and immunization should then be offered to the appropriate individuals. Administration of the varicella vaccine during pregnancy is not recommended.

6. **OB History and Physical**

Abdominal and pelvic examination to evaluate gynecologic pathology should be done at the preconception visit and the first prenatal visit.

7. **PTL Prevention**

In keeping with the ICSI Preterm Birth Prevention guideline, a comprehensive screening program to identify risk factors for preterm labor and birth should be a part of routine prenatal care. Systematic risk screening should be performed at the preconception visit and within two weeks of provider knowledge of the pregnancy. Those women assessed at high-risk by this screening should be managed in accordance with the Preterm Birth Prevention guideline.

All pregnant women should receive information on how to identify and manage signs of possible preterm labor at the 22 week visit, or at the first prenatal visit if care is initiated after 22 weeks and before 37 weeks gestation. A second systematic screening assessment for preterm labor and birth should also be performed at 28 weeks gestation.

(These recommendations were made in accordance with the ICSI Preterm Birth Prevention guideline.)

8. **List of Medications, Herbal Supplements and Vitamins**

Use of all prescription and nonprescription drugs, herbal supplements, and vitamins should be reviewed and documented with every woman at a preconception visit. A complete inventory of drug usage immediately prior to and during pregnancy should be performed at the first prenatal visit. All pregnant women should be counseled about the potential reproductive effects of medications.

9. **Accurate Recording of Menstrual Dates**

The most accurate determination of an estimated due date is the last menstrual period in women with regular menstrual cycles. This requires careful history taking, as many women erroneously determine this date. Some women can say with certainty exactly which day they became pregnant. In vitro fertilization and related reproductive technologies allow exact determination of due date from time of fertilization of the ovum in the laboratory.

10. **Hepatitis B**

Universal screening for Hepatitis B surface antigen is advised at the first prenatal visit. Those identified as high-risk based upon exposure to hepatitis or injection drug usage should be rescreened later in pregnancy.
11. Nutritional Supplements

The Institute of Medicine (IOM) and Centers for Disease Prevention and Control (CDC) recommend that all women of childbearing age take 400 µg of folic acid daily from fortified foods (such as commercial breads and cereals), supplements, or both in addition to consuming folate in food from a varied diet. During pregnancy, women should take 600 µg of folic acid from these sources. A 1991 guideline from the CDC recommends that women planning pregnancy who have previously had a pregnancy affected by a neural tube defect (NTD) consult their physician about taking a 4.0 mg daily dose of folic acid from at least one month before conception, through the first 3 months of pregnancy.

Multivitamin supplementation is recommended for multiple gestations, tobacco or chemical use, complete vegetarians, and for women with inadequate diets despite counseling.

Calcium supplementation is recommended for pregnant women with poor dietary calcium intake. Recommended calcium intake in pregnant women is 1,000 mg/day. Low intake is defined as < 600 mg/day. There is particular concern for women under age 25. Low intake may lead to decreased bone mass for the mother, but does not appear to affect the fetus.

Iodine supplementation in pregnancy may be necessary in certain communities with an increased incidence of childhood iodine deficiency (endemic cretinism).

Vitamin D supplementation in pregnancy is recommended for women who are complete vegetarians and others who have a lack of vitamin D fortified milk in their diet. These women should receive 400 IU or 10 µg of vitamin D daily, especially during the winter months.

12. HIV

All pregnant women should receive education and counseling about HIV testing as part of their routine prenatal care. HIV testing should be recommended at the first prenatal visit for all pregnant women with their consent. In the event of a refusal of testing, the refusal should be documented.

Pregnant women found to be at higher risk for HIV on the basis of a screening instrument for infectious disease risks should receive continued education about the health benefits of HIV testing and should be considered for repeat HIV testing later in pregnancy.

13. Hemoglobin Assessment

A hemoglobin assessment is recommended for all pregnant women at their first prenatal visit. If hemoglobin is < 11 g/dL in the first or third trimester or < 10.5 g/dL in the second trimester, a course of at least 30 mg oral elemental iron daily should be administered. If a repeat hemoglobin assessment one month after oral iron therapy remains low, a serum ferritin should be drawn. If the serum ferritin level is < 12 µg/L, one can still make the diagnosis of iron deficiency anemia. If daily doses of > 30 mg elemental iron are administered, consideration should be given to replacement of copper and zinc.

Pregnant women should be encouraged to drink water or orange juice and to eat foods high in available iron. Women should be counseled that drinking milk, coffee, or tea with meals lowers iron absorption. The value of breastfeeding as primary protection against iron deficiency anemia in infants should also be reviewed with all pregnant women.
14. **ABO/Rh/Ab (RhoGAM)**

   **D (Rh) Incompatibility**

   D (formerly Rh) blood typing and antibody screening is recommended for all pregnant women at their first prenatal visit. For purposes of chemoprophylaxis, D-negative and D<sup>+</sup> blood types are equivalent. As a consequence of the current laboratory testing procedure, ABO typing will also be determined through such screening. Repeat D antibody testing is recommended for all unsensitized D-negative women at 28 weeks gestation, followed by 300 µg D immunoglobulin if the woman is antibody-negative. A similar dose of D immunoglobulin is recommended for all unsensitized D-negative women after amniocentesis. There is currently insufficient evidence to recommend for or against the administration of D immunoglobulin after chorionic villus sampling, cordocentesis, external version, or antepartum placental hemorrhage.

15. **RPR**

   All pregnant women at the first prenatal visit and all high-risk women at a preconception visit should undergo routine serologic testing (RPR or VDRL) for syphilis. As the annual incidence of syphilis is less than 10 cases per 100,000 persons, there is insufficient evidence to recommend screening all women at the preconception visit.

   Early detection of syphilis at the preconception visit allows antibiotic therapy to prevent clinical disease and to prevent transmission to sexual contacts. Maternal antibiotic therapy prevents nearly all congenital syphilis.

16. **Urine Culture**

   Screening for asymptomatic bacteriuria (ASB) by urine culture is recommended for all pregnant women at the first prenatal visit.

17. **Counseling and Education**

   Prenatal education is the primary tool used to transmit information to women about their pregnancies. Prenatal education serves to help reduce modifiable risk factors and to add to women’s satisfaction by increasing their knowledge about pregnancy changes, fetal development, etc.

   Prenatal tobacco cessation programs can be effective in reducing smoking rates in pregnant women and reducing the incidence of low birth weight infants.

   Breastfeeding education and counseling by obstetrical personnel (nurses and midwives) can increase the incidence of breastfeeding and lengthen the duration of breastfeeding.

   Any infection during pregnancy can be a problem and an assessment of oral health should be considered as a part of prenatal care. There is a magnitude of infection that can be found in the oral cavity.

18. **Weight**

   Weight gain during pregnancy should be monitored at each prenatal visit. The initial height and weight measurement is used in determining the body mass index, which is the basis for recommended weight gain during pregnancy.
Pre-pregnant weight category

<table>
<thead>
<tr>
<th>Height</th>
<th>Under</th>
<th>Average</th>
<th>Over</th>
<th>Very Overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ft. 10 in.</td>
<td>&lt; 95 lbs</td>
<td>96-123 lbs</td>
<td>124-138 lbs</td>
<td>&gt;139 lbs</td>
</tr>
<tr>
<td>4 ft. 11 in.</td>
<td>&lt; 97 lbs</td>
<td>98-128 lbs</td>
<td>129-142 lbs</td>
<td>&gt;142 lbs</td>
</tr>
<tr>
<td>5 ft. 0 in.</td>
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<td>102-132 lbs</td>
<td>133-147 lbs</td>
<td>&gt;148 lbs</td>
</tr>
<tr>
<td>5 ft. 1 in.</td>
<td>&lt; 104 lbs</td>
<td>105-137 lbs</td>
<td>138-152 lbs</td>
<td>&gt;153 lbs</td>
</tr>
<tr>
<td>5 ft. 2 in.</td>
<td>&lt; 107 lbs</td>
<td>108-141 lbs</td>
<td>142-157 lbs</td>
<td>&gt;158 lbs</td>
</tr>
<tr>
<td>5 ft. 3 in.</td>
<td>&lt; 111 lbs</td>
<td>112-146 lbs</td>
<td>147-163 lbs</td>
<td>&gt;164 lbs</td>
</tr>
<tr>
<td>5 ft. 4 in.</td>
<td>&lt; 114 lbs</td>
<td>115-150 lbs</td>
<td>151-168 lbs</td>
<td>&gt;169 lbs</td>
</tr>
<tr>
<td>5 ft. 5 in.</td>
<td>&lt; 118 lbs</td>
<td>119-155 lbs</td>
<td>156-173 lbs</td>
<td>&gt;174 lbs</td>
</tr>
<tr>
<td>5 ft. 6 in.</td>
<td>&lt; 122 lbs</td>
<td>123-160 lbs</td>
<td>161-179 lbs</td>
<td>&gt;180 lbs</td>
</tr>
<tr>
<td>5 ft. 7 in.</td>
<td>&lt; 125 lbs</td>
<td>126-165 lbs</td>
<td>166-184 lbs</td>
<td>&gt;185 lbs</td>
</tr>
<tr>
<td>5 ft. 8 in.</td>
<td>&lt; 129 lbs</td>
<td>130-170 lbs</td>
<td>171-190 lbs</td>
<td>&gt;191 lbs</td>
</tr>
<tr>
<td>5 ft. 9 in.</td>
<td>&lt; 133 lbs</td>
<td>134-175 lbs</td>
<td>176-195 lbs</td>
<td>&gt;196 lbs</td>
</tr>
<tr>
<td>5 ft. 10 in.</td>
<td>&lt; 137 lbs</td>
<td>138-180 lbs</td>
<td>181-201 lbs</td>
<td>&gt;202 lbs</td>
</tr>
<tr>
<td>5 ft. 11 in.</td>
<td>&lt; 141 lbs</td>
<td>142-185 lbs</td>
<td>186-207 lbs</td>
<td>&gt;208 lbs</td>
</tr>
<tr>
<td>6 ft. 0 in.</td>
<td>&lt; 144 lbs</td>
<td>145-189 lbs</td>
<td>190-211 lbs</td>
<td>&gt;212 lbs</td>
</tr>
</tbody>
</table>

From the Institute of Medicine, 1990.

It is recommended that women who are underweight gain approximately 28 to 40 pounds, that those of average weight gain 25 to 35 pounds, that those who are overweight gain 15 to 25 pounds, and that those who are very overweight gain 15 pounds.


Blood pressure screening is recommended at the preconception visit and at all prenatal visits throughout the pregnancy.

20. Fetal Heart Tones

Fetal heart tones should be identified at 10-12 weeks and thereafter.

21. Chromosome/NTD Triple Screen

A form of chromosome/NTD screening should be offered to all pregnant women. Maternal serum triple screen, alpha-fetoprotein (AFP), human chronic gonadotropin (HCG), and estriol is performed optimally at 16 weeks. Alternatives to the triple screen are emerging. Nuchal translucency (NT) and first trimester serum screening are available on a limited basis in certain areas.

22. OB Ultrasound (Optional)

There is no scientific data available to support improved fetal outcome as a result of routine ultrasound. This work group acknowledges that ultrasounds have become an almost universal feature of prenatal care. If ultrasound is done without specific clinical indications, the optimal time is at 16 to 18 weeks gestation. This timing provides an opportunity to detect fetal malformations and to aid in pregnancy dating.

23. Domestic Abuse Screening

Domestic violence is a serious public health problem for many Americans. In accordance with the ICSI Preventive Services, Preventive Counseling and Education, and Preterm Birth Prevention guide-
lines, screening for domestic violence should be done at a preconception visit and the first and fifth prenatal visits. (See the ICSI Domestic Violence guideline for screening and intervention techniques.)

Due to the substantial potential benefit to families in which the cycle of abuse can be interrupted, providers should maintain a high index of suspicion for domestic violence when caring for pregnant women. Likewise, providers should have a clear plan for referring victims and perpetrators of domestic violence to other professionals and community services.

24. Fundal Height

A fundal height measurement should be performed at each visit during the second and third trimesters of pregnancy.

25. Gestational Diabetes Mellitus

Although there is a lack of consensus in medical literature regarding universal screening, it is recommended at this time that all pregnant women be screened for gestational diabetes mellitus at 28 weeks gestation.

26. Examination of the Cervix

All pregnant women should undergo digital examination at 28 weeks gestation. This is done as a screening maneuver for preterm birth prevention.

Cervical examinations at term are useful to diagnose abnormal presentation and to identify cervical dilation. Examinations do not increase the risk of rupture of membranes, rates of induction or cesarean section, or risk of neonatal or maternal infections.

27. Awareness of Fetal Movement

There is no evidence that a formal program of fetal kick counts reduces the incidence of intrauterine fetal deaths. Patients should be instructed on daily identification of fetal movement at the 28 week visit.

28. Influenza Vaccination

All pregnant women in their second or third trimester of pregnancy during the influenza season should be offered influenza vaccination. Vaccination is contraindicated for women with a history of hypersensitivity to chicken eggs or to vaccine components such as the preservatives.

29. Confirm Fetal Position

Confirm fetal position by Leopold’s and/or cervical examination at 36 weeks. Ultrasound may be used to confirm a questionable lie.

30. Group B Streptococcus Screening

The following protocol for the management of group B streptococcus (GBS) in pregnancy should be universally applied:

A. The recommended protocol is based on obtaining cultures at 35-37 weeks gestation:

1. All pregnant women should be screened at 35-37 weeks gestation for anogenital GBS colonization.
2. Culture techniques that maximize the recovery of GBS should be used.

3. Cultures from the lower vagina and rectum should be collected without speculum examination.
   a. At the time of screening, if the patient has a penicillin allergy with anaphylaxis, sensitivities for GBS should be obtained.

4. If the GBS culture is positive, the patient should be offered intrapartum prophylaxis with penicillin G (5 million units IV followed by 2.5 million units every 4 hours until delivery). Optimal timing of prophylaxis is 4 hours prior to delivery.

Women with the following risk factors should receive intrapartum antibiotic prophylaxis regardless of GBS culture results:
   a. Previous infant who had invasive GBS disease.
   b. GBS bacteriuria during this pregnancy.
   c. Delivery at less than 37 weeks gestation.

5. Women with the following risk factors should receive intrapartum antibiotic prophylaxis:
   1. Intrapartum maternal temperature $> 38^\circ \text{C} (> 100.4^\circ \text{F})$.
   2. Membranes ruptured $> 18$ hours.

Alternative antibiotic recommendations

- Ampicillin should be avoided because it has been associated with an increase in resistant \textit{E. coli} sepsis, particularly in premature newborns.
- For penicillin-allergic women without history of anaphylaxis, a first generation cephalosporin is the antibiotic of choice.
- For penicillin-allergic women with a history of anaphylaxis, susceptibility testing is recommended for clindamycin (900 mg every 8 hours) and erythromycin (500 mg every 6 hours). For resistant organisms, vancomycin should be used. For patients with suspected chorioamnionitis, broad-spectrum coverage is recommended.
- Oral antimicrobial agents should not be used to treat women who are found to be colonized with GBS during prenatal screening.

Practices to Consider Discontinuing

Pelvimetry

The evaluation of clinical pelvimetry during the prenatal period is of little value in predicting the occurrence of cephalopelvic disproportion (CPD) during delivery. In cases in which a previous cesarean section had been performed for CPD, or for women who are at high-risk for CPD, there may be some usefulness in performing clinical pelvimetry prior to the subsequent delivery.

Routine Urine Dipsticks and Routine Urinalysis

The conventional urine dipstick test is unreliable in detecting the moderate and highly variable elevations in albumin that occur early in the course of preeclampsia. Likewise, urine dipsticks for glycosuria are unreliable.
Routine Evaluation for Edema

The American College of Obstetricians and Gynecologists (ACOG) defines edema as a "generalized accumulation of fluid represented by greater than 1+ pitting edema after 12 hours of bed rest, or a weight gain of 5 lbs. or more in one week."

Edema has traditionally been an important diagnostic criterion for preeclampsia. However, by itself it is not useful to predict the development of preeclampsia because of the low specificity and sensitivity of this finding.

Routine Testing for CMV, Parvovirus, Toxoplasmosis

CMV

Testing is recommended for day care workers and adolescents with multiple partners or a history of sexually transmitted diseases, in order to advise them of their risk. Good hand washing and wearing gloves would significantly reduce risk for this virus.

Parvovirus

No routine testing is recommended. Affected pregnancies may result in fetal morbidity, but such outcomes are exceedingly rare.

Toxoplasmosis

Universal screening is not recommended because of the low prevalence of the disease during pregnancy, the uncertain and costly screening, and the possible teratogenicity of treatment. It is recommended that efforts be directed at education of patients in prevention of this disease, which is now more commonly acquired in pregnancy through the handling of contaminated meat than from cat litter boxes.

Routine Nutritional Supplements

There is no demonstrated benefit for universal prenatal supplementation of the following:

- Multivitamins (A)*
- Magnesium (A)*
- Amino acids/protein (A)*
- Pyridoxine (vitamin B6) (B)*
- Iron (see Annotation #11)
- Zinc (A)*

High doses of vitamin A and molybdenum supplements are contraindicated in pregnancy. (A)*

* Letters in parentheses denote the grade of evidence for each nutrient.

See the Discussion and References section for evidence grading by subtopics.
Discussion and References:

Routine Prenatal Care


The next scheduled revision will occur within 18 months.

Contact ICSI at:
8009 34th Avenue South, Suite 1200; Bloomington, MN 55425; (952) 814-7060; (952) 858-9675 (fax)
Online at http://www.ICSI.org
In the interest of full disclosure, ICSI has adopted the policy of revealing relationships work group members have with companies that sell products or services that are relevant to this guideline topic. The reader should not assume that these financial interests will have an adverse impact on the content of the guideline, but they are noted here to fully inform readers. Readers of the guideline may assume that only work group members listed below have potential conflicts of interest to disclose.

No work group members have potential conflicts of interest to disclose.

ICSI's conflict of interest policy and procedures are available for review on ICSI's website at www.icsi.org.
I. CLASSES OF RESEARCH REPORTS

A. Primary Reports of New Data Collection:
   Class A: Randomized, controlled trial
   Class B: Cohort study
   Class C: Non-randomized trial with concurrent or historical controls
            Case-control study
            Study of sensitivity and specificity of a diagnostic test
            Population-based descriptive study
   Class D: Cross-sectional study
            Case series
            Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:
   Class M: Meta-analysis
            Systematic review
            Decision analysis
            Cost-effectiveness analysis
   Class R: Consensus statement
            Consensus report
            Narrative review
   Class X: Medical opinion
1. Number of Prenatal Visits

The overall utility of prenatal care as a series of visits conducted from the time of conception through parturition has been well established. However, as Huntington and Connell have stated, "The evidence that prenatal care pays for itself is simply not strong enough to merit the virtual certainty with which this claim has been espoused."


In 1989, the Expert Panel on the Content of Prenatal Care established guidelines on the timing and content of prenatal care, including a schedule consisting of fewer prenatal visits than traditional models provided. This reduced schedule of visits applied to women considered at low risk of adverse perinatal outcomes. Timing and focusing prenatal visits at these intervals, along with providing designated education pieces at each visit, should serve to provide a more comprehensive and satisfying prenatal program than has existed in the past.


Alternative prenatal care schedules for women at low risk for adverse perinatal outcomes have been shown to deliver equivalent outcomes of preterm delivery, preeclampsia, cesarean delivery, low birth weight, and patient satisfaction rates. The research in this area includes the results of a randomized controlled trial. This guideline presents a schedule of visits in keeping with these studies.


2. Risk Profile Screening

In accordance with the ICSI Preterm Birth Prevention guideline, a brief systematic screening for preterm birth risks should be performed at the preconception visit or the first prenatal visit. Likewise, screening should be congruent with the aims outlined in the ICSI Preventive Services guideline. Providers should focus on modifiable risk factors, particularly factors which have been shown to be responsive to provider counseling or intervention. Examples would include:

- Tobacco use *
- Nutrition *
- Alcohol use*
- Other chemical use
- Domestic abuse **

Questions about domestic abuse and family stress should be asked privately (i.e., not in the presence of the patient’s partner).
• Family stress  
• Sexually transmitted diseases  
• Adverse environmental exposures at work and at home.

* Evidence-based recommendations support provider counseling for tobacco cessation, alcohol use and nutrition. No strong evidence exists against comprehensive counseling and education.


  Mullen PD. "Maternal smoking during pregnancy and evidence-based intervention to promote cessation." *Prim Care* 26:577-89, 1999. (Class R)

**Domestic abuse can occur before, during, and after pregnancy. In a population-based survey, prenatal abuse prevalence was 6.1%. A strong, significant association was identified between abuse prior to pregnancy and abuse during pregnancy.


**Work and Pregnancy**

Because the majority of pregnant women work outside the home, workplace risk factors should be assessed for all pregnant women.


Employment alone does not appear to increase risks to pregnancy. Rates of preterm delivery, low birth weight, fetal malformation and prenatal mortality are not increased among employed women. In fact, an overall reduced risk of adverse outcomes can be attributed to more favorable demographics and behavioral characteristics among employed women.

Certain working conditions have been associated with increased adverse outcomes of pregnancy including preterm birth, low birth weight, and PIH. These factors include:

• Working more than 36 hours per week or 10 hours per day  
• Prolonged standing (more than 6 hours per shift)  
• Heavy lifting  
• Excessive noise  
• High fatigue score (more than 4 hours standing per shift, mental stress, cold work environment, and loud noise).


Discussion and References (cont)

Occupational exposure to toxic chemicals, including anesthetic agents, solvents and pesticides can increase the risk of miscarriage, malformations, and other adverse pregnancy outcomes.

The council on scientific affairs has established guidelines for work in pregnancy.


Infectious Agents:

Gonorrhea

All high-risk women should be screened for *N. gonorrhoeae* at a preconception visit or during pregnancy.

The CDC reports that there are about 1 million new cases of gonorrhea each year, and up to 80% of women infected with gonorrhea are asymptomatic. The reported prevalence among pregnant women varies from 0.4% to 7.5%.


Pregnant women with gonococcal infections are at increased risk for obstetric complications (stillbirth, preterm delivery, chorioamnionitis, low birth weight, and intrauterine growth restriction).


Concerns about the frequency of antibiotic-resistant *N. gonorrhoeae* in the U.S. remain. Current data estimate 32% of gonococcal isolates are resistant to penicillin or tetracycline. These organisms are currently sensitive to broad-spectrum cephalosporins, but the potential emergence of new resistance is a concern.


Early detection and treatment of gonococcal infection in asymptomatic women offers the potential benefits of preventing future complications of infection as noted above. Similarly, early detection and treatment during pregnancy has the potential to reduce morbidity from obstetric complications.

A high-risk profile for women likely to have asymptomatic gonococcal infection can be devised. Over 60% of cases occur to persons under age 25 (CDC). A number of demographic and behavioral variables have been associated with higher rates of infection: unmarried, urban residence, multiple sexual contacts, early sexual activity, low socioeconomic status, and black race. Numerous clinical algorithms have been devised to aid the provider in identifying high-risk groups for screening.


Chlamydia

All high-risk women should be screened for *Chlamydia trachomatis* at a preconception visit or during pregnancy.
The CDC reports that there are about 4 million new cases of chlamydia each year, and up to 75% of women infected with chlamydia are asymptomatic. The reported prevalence among pregnant women varies from 2-37%.

Chlamydia is the presumed cause of 25-50% of the 2.5 million PID cases each year.


Infection during pregnancy increases the risk of postpartum and postabortal endometritis. Each year more than 155,000 infants are born to chlamydia-infected mothers, with a vertical transmission rate greater than 50% (CDC). Neonatal infection can result in ophthalmia neonatorum and pneumonia.


Early detection and treatment of chlamydial infection in asymptomatic women offers the potential benefits of preventing future complications of infection as noted above. Similarly, early detection and treatment during pregnancy has the potential to reduce morbidity from obstetric complications.

A high-risk profile for women likely to have asymptomatic chlamydial infection can be devised. A large majority of cases occur in persons under age 25 (CDC). A number of demographic and behavioral variables have been associated with higher rates of infection: unmarried, history of STDs, new or multiple sexual partners, early sexual activity, low socioeconomic status, and black race. Evidence of cervical ectopy, friability, or erythema as well as mucopurulent discharge on pelvic examination are suggestive of chlamydial infection. Numerous clinical algorithms have been devised to aid the provider in identifying high-risk groups for screening.


**Tuberculosis and PPD screening**

Reported cases of tuberculosis in the U.S. increased 20% from 1985 to 1992, with a 44% increase in those aged 25 to 44. The incidence of tuberculosis complicating pregnancy is rising in some cities.

Risks of maternal tuberculosis include fetal infection, which can occur as hematogenous spread from the mother, by aspiration of amniotic fluid/endometrium, or airborne after delivery. Congenital tuberculosis can result in mortality of 30 to 40%.

Active tuberculosis can be treated during pregnancy. Inactive tuberculosis could be treated prior to conception if detected then.


**Syphilis Screening**

Refer to the information provided in the discussion of Annotation #15, "RPR."

**HIV Screening**

Refer to the information provided in the discussion of Annotation #12, "HIV."
Genetic Screening

In the aggregate, common congenital abnormalities are frequent in the general population. A general figure for initial counseling of patients and families is 5%.


The determination of whether a couple, or anyone in the family, has a heritable disorder can easily be accomplished by using a questionnaire format. The genetic screening should be performed at the preconception or initial prenatal visit. Early identification of genetic risks allows a woman and her family to decide whether to conceive or whether to undergo additional testing to determine if the genetic disorder affects this pregnancy.


A discussion of the rationale and screening for Down syndrome and neural tube defects can be found in Discussion and References #21, "Chromosome/NT Screen." Folate chemoprophylaxis against NTD is discussed in Discussion and References #11, "Nutritional Supplements."

Hemophilia A is an X-linked disorder with an incidence of 1/10,000 males.

Duchenne and Becker muscular dystrophies are X-linked disorders of dystrophin structure and function occurring in 1/3300 live male births. Female carriers are usually only mildly affected.

Cystic fibrosis is the most common fatal autosomal recessive disorder among Caucasian children, with an incidence of 1/2000. All identified mutations account for about 90% of mutations in most populations. The effectiveness of testing in other than Caucasian children is not clear.

The American College of Obstetricians and Gynecologists (ACOG) recommends that all patients be asked about genetic risks for CF.


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Severe mental retardation has a definable etiology in 50% of cases. Thirty percent of all severe mental retardation is caused by Down syndrome. Other chromosomal abnormalities account for 1-4%. Fragile X syndrome and inborn errors of metabolism account for 20% and 3 to 7% of severe mental retardation, respectively.

In cases with three or more pregnancy losses, there is a 3.5-5% risk of a maternal chromosomal rearrangement, and a 1-2% risk of a paternal rearrangement.

Tay-Sachs disease is an autosomal recessive disorder occurring in 1/3600 children of Ashkenazi Jewish parents. Most individuals of Jewish descent in the U.S. are of Ashkenazi descent, so hexosaminidase screening should be offered to all Jewish patients. Pregnancy and oral contraceptives diminish serum levels of hexosaminidase, so leukocyte hexosaminidase A levels should be checked.

Sickle hemoglobin is due to a single base-pair change in the beta coding region. One of every 600 American blacks is born with sickle cell disease, and one in twelve American blacks is a heterozygote for the genetic alteration, i.e. is a carrier or has sickle cell trait.

Thalassemias are an imbalance in globin-chain synthesis. Collectively, thalassemias are the most common single-gene disorder. Alpha-thalassemia affects formation of both fetal and adult hemoglobins, causing intrauterine disease. The deletion leading to hydrops fetalis is largely restricted to Southeast Asian populations. Southeast Asian patients and the father of the fetus should be screened for microcytic anemia as a clue to carrier status.

Beta thalassemia is important only in postnatal life, so the affected fetus has no intrauterine problems. Beta thalassemia is common in Mediterranean populations. Carriers are detected by microcytic anemia and an elevation of HbA2.


3. Preventive Services

See the ICSI Preterm Birth Prevention and Preventive Services in Adults and Children guidelines.

4. Rubella/Rubeola Status

Burden of Suffering

Rubella in the first 16 weeks of pregnancy causes miscarriage, abortion, stillbirth, and CRS. The most common manifestations of CRS are hearing loss, developmental delay, growth retardation, and cardiac and ocular defects. The lifetime costs of treating a patient with CRS in 1985 exceeded $220,000. In 1993 the incidence rate was 0.1/100,000 (92 cases).


Adults accounted for 25% of the measles cases reported in 1994. Complications of measles, including pneumonia and encephalitis, are more common among adults than among school-aged children. Outbreaks have been known to occur in locations such as schools or barracks where young adults congregate. Measles was reported in 232 (0.1/100,000) American adults (age 20 or older) in 1994.


Accuracy of Screening Tests

Hemagglutination-inhibition (HI) tests, associated with both false positive and false negative results, have been replaced by enzyme immunoassay and latex agglutination with sensitivities of 92–100% and specificities of 71-100%.
A person with a history of rubella vaccination is more likely to be seropositive than those without such a history. In determining a person’s rubella immune status, a history of vaccination is preferred over a history of infection.


Efficacy of Early Detection

Efficacy studies in healthy vaccinees show that $\geq 90\%$ have protection against clinical rubella illness, and seropositivity is long-lasting.


A single dose of measles vaccine is 95% effective in producing long-term immunity. Seropositivity rates remain high at least 10-15 years following vaccination.


Measles outbreaks among young adults are much less common when two doses of vaccine are required.


Due to concerns about possible teratogenicity, MMR or measles vaccination is not recommended during pregnancy. There are no known adverse consequences to vaccination postpartum while breast-feeding.


5. Varicella Status

The CDC recommends that all adults be immunized if seronegative.

Among U.S. women of childbearing age, the mean incidence of varicella is 2.16/1000/year. After household exposure, approximately 90% of susceptible contacts will develop varicella. Varicella is an uncommon infection during pregnancy; its incidence is estimated at 1/7500 based on 8 cases occurring in 60,000 pregnancies prospectively studied. Maternal infection in the first half of the pregnancy has been associated with congenital varicella syndrome. Also, varicella infections during pregnancy may result in higher rates of complications from the infection such as varicella pneumonia and death.

Among adults having a negative or uncertain history of varicella, approximately 85-90% will be immune. Generally it is felt that if a patient has a positive history of varicella infection they should be considered immune. Patients with a negative or uncertain history of varicella infection should have their titers checked before receiving the immunization because of the high rate of seropositivity in those individuals.
One study demonstrates that this approach is cost-effective.


VZIG decreased maternal complications but there was no proof of improved fetal outcome.


6. OB History and Physical

Most of the major textbooks suggest a general history be obtained at the onset of prenatal care. The best summation regarding the extent of the history is given in Danforth’s Obstetrics and Gynecology, which states that the history “must be sufficiently penetrating to uncover any current abnormalities and any prior ones that could have a bearing in the course of pregnancy.”


7. PTL Prevention

See the ICSI Preterm Birth Prevention Guideline.

8. List of Medications, Herbal Supplements and Vitamins

With rare exceptions, any drug that exerts a systemic effect in the mother will cross the placenta to reach the embryo and fetus. The effects on the embryo and fetus cannot be predicted accurately either from the effects or lack of effects in the mother. Similarly, widespread use of a medication during pregnancy without recognized effects on the fetus does not guarantee the safety of the medication.


The average patient has been reported to consume four to five different prescribed drugs during pregnancy. Excluding vitamins and iron preparations, drugs are prescribed to 82% of all pregnant women, and 65% of all pregnant women take drugs not prescribed by a physician.

Forfar JO, Nelson MM. "Epidemiology of drugs taken by pregnant women: drugs that may affect the fetus adversely." Clin Pharmacol Ther 14:632-42, 1973. (Class A)


10. Hepatitis B

Each year in the United States an estimated 22,000 infants are born to women with chronic hepatitis B virus.

ACOG recommends universal screening of all pregnant women for hepatitis B early in pregnancy. In addition it recommends that infants of seropositive mothers receive hepatitis B immune globulin (HBIG) immediately after birth.


The use of high-risk factors to predict hepatitis B positive patients is variable.

In a pilot voluntary screening test at a large urban center only 8 of 20 hepatitis B surface antigen positive women had recognized risk factors.


Perinatal transmission of hepatitis B virus occurs if the mother has acute infection during late pregnancy or the early postpartum period or if the mother is a chronic hepatitis B antigen carrier.


A combination of passive HBIG and active (hepatitis vaccine) immunization of infants born to hepatitis B surface antigen positive mothers affords very good protection to the infected infants.


11. Nutritional Supplements

A randomized double-blind controlled trial of the efficacy of daily preconception multivitamin-multimineral supplements containing 0.8 mg of folic acid in preventing first occurrences of NTD was conducted in Hungary, enrolling 4,753 women planning pregnancy. Full supplementation was defined as taking them from 28 days before conception to at least the second missed menstrual period. The supplemented group experienced a significantly decreased prevalence of NTDs, congenital malformations as a whole, and genetic syndromes diagnosed by 8 months of age.


Several case control studies, including the one cited below, have also reported a reduced risk of NTD in women without a prior affected pregnancy who took daily multivitamins during the preconception period. The study cited below analyzed the amount of folic acid in most of the multivitamins as \( \geq 0.4 \text{ mg} \).


Randomized placebo-controlled trials and nonrandomized controlled trials in pregnant women with a prior pregnancy affected by an NTD have demonstrated that folic acid supplements substantially reduce the risk of recurrent NTD.

*Kirke PN, Daly LE, Elwood JH. "A randomised trial of low dose folic acid to prevent neural tube defects." Arch Dis Child 67:1442-46, 1992. (Class A)*

The average daily consumption of dietary folate by women aged 19 to 34 years in the United States is 0.2 mg/day.
Discussion and References (cont)


The IOM and CDC have issued recommendations on folic acid intake for women of childbearing age and women planning pregnancy who have previously had a pregnancy affected by a neural tube defect.


Calcium supplementation for selected populations and age categories is in accordance with recommendations from national groups.


Although current calcium intake recommendations for pregnancy are 1200-1500 mg per day, the median intake is 600 to 700 mg. There is evidence that those with lowest calcium intake (e.g., teenagers and African Americans) are also at highest risk for pregnancy-induced hypertension.


Iodine supplementation in a population with high levels of endemic cretinism reduces the incidence of that condition without apparent adverse effects.

Pharaoh POD, Buttfield IH, Hetzel BS. "Neurological damage to the fetus resulting from severe iodine deficiency during pregnancy." *Lancet* 1:308-10, 1971. (Class C)

In vulnerable communities (e.g., Southeast Asian women in northern climates), vitamin D supplementation during pregnancy reduces the risk of symptomatic neonatal hypocalcemia.


12. HIV

During the past decade, HIV infection has become a leading cause of morbidity and mortality among women. As the incidence of HIV infection has increased among women of childbearing age, increasing numbers of children have become infected through perinatal transmission.


A randomized placebo-controlled trial demonstrated that a regimen of zidovudine started by 14 to 34 weeks gestation and continued through 6 weeks postpartum reduced vertical transmission of HIV from 25.5% to 8.3%. The study involved mothers with mildly symptomatic HIV infection (CD4 > 200µL). Zidovudine has had a low incidence of severe side effects in the mothers and infants studied, but long-term effects are unknown.


There is evidence to suggest that pregnant women in high-risk categories or from communities with a higher prevalence of seropositive newborns (≥ 0.1%) should be counseled about the benefits of early intervention for HIV. Repeat testing in the third trimester may also be indicated for this group.
Several studies have indicated that counseling and testing strategies that offer testing only to those women who report risk factors fail to identify up to 50-70% of HIV-infected women.


A policy of universal screening for all pregnant women with their consent is recommended on grounds of easier implementation and greater sensitivity than risk-profile screening alone.


Identifying seropositive women may have other important benefits, including:

- Some women may be candidates for *Pneumocystis carinii* chemoprophylaxis;
- Male partners can be counseled about coitus and the use of condoms;
- Newborns can be monitored for signs of infection;
- Mothers can be counseled about breastfeeding; and
- Parents may elect to terminate the pregnancy.

It may be possible to increase patient acceptance of HIV testing by informing them about the opportunity to reduce vertical transmission to their baby with treatment.


A meta-analysis of cohort studies suggested that breastfeeding increased the vertical transmission rate by 14%.


### 13. Hemoglobin Assessment

A hemoglobin assessment is recommended for all pregnant women at their first prenatal visit.


Pregnant women should also be counseled that there is good evidence that breastfeeding can play a role in the primary prevention of iron deficiency anemia in infants.


Iron deficiency anemia may be related to preterm birth and low birthweight, though other studies failed to demonstrate this correlation.

Rasmussen KM. "Is there a causal relationship between iron deficiency or iron-deficiency anemia and weight at birth, length of gestation and perinatal mortality?" *J Nutr* 131:590S-603S, 2001. (Class R)

Dietary counseling to promote iron absorption from foods should be given to all pregnant women.
As hemoglobin measurement is a nonspecific test for iron deficiency, further evaluation should be performed to identify the etiology of anemia detected by screening. Serum ferritin appears to have the best sensitivity and specificity for diagnosing deficiency in anemic patients.


Patients of Southeast Asian or Mediterranean extraction who have anemia should be tested for hemoglobinopathy using hemoglobin electrophoresis.

ACOG Committee Opinion. "Genetic screening for hemoglobinopathies." Number 238, July 2000. (Class R)

There is insufficient evidence to support universal iron supplementation in pregnancy.


Excess supplementation may not be benign. Mineral imbalances, including zinc and copper, may result. Placental infarctions, a common cause of fetal death, are nonexistent with hemoglobin levels ≤ 8 g/dl. No benefit from supplementation can be demonstrated for non-anemic women in the prevention of IUGR, pregnancy-induced hypertension, PPH or fatigue.


14. ABO/Rh/Ab (RhoGAM)

D (Rh) Incompatibility

D (formerly Rh) blood typing and antibody screening is recommended for all pregnant women at their first prenatal visit.

D incompatibility (D-negative woman pregnant with D-positive fetus) occurs in up to 10% of pregnancies. If no preventive measures are taken, 0.7-1.8% of these women will be isoimmunized antenatally, 8-17% at delivery, 3-6% after elective or spontaneous abortion, and 2-5% after amniocentesis.


In subsequent D-positive pregnancies in such isoimmunized women, maternal D antibody will cross the placenta into the fetal circulation and cause hemolysis (erythroblastosis fetalis). Without treatment, 25-30% of such fetuses will develop detectable hemolytic anemia and hyperbilirubinemia, and another 20-25% will develop severe enough hydrops fetalis to die in utero or in the neonatal period.


Hemagglutination is the established standard to determine D blood type. The Coombs test (indirect antiglobulin) is the standard to detect anti-D antibody in women who are sensitized to D-positive blood.


A series of controlled clinical trials in the 1960's demonstrated the efficacy of D immunoglobulin in preventing maternal isoimmunization of most unsensitized D-negative women after delivery of a D-positive fetus.

The most frequent cause of failure of postpartum chemoprophylaxis is antenatal isoimmunization, which happens in 0.7 to 1.8% of pregnant women at risk. Nonrandomized trials have shown a reduction in the incidence of isoimmunization to ≤2.0% when D immunoglobulin is also administered to unsensitized pregnant women at risk at 28 weeks gestation.


There is similar evidence for the efficacy of such chemoprophylaxis after amniocentesis.


Studies documenting the effectiveness of D immunoglobulin prophylaxis are not available for chorionic villus sampling; cordocentesis, external version; or antepartum placental hemorrhage.


15. RPR

The CDC reported 20,000 cases of primary and secondary syphilis in the United States in 1994. 1990 incidence of syphilis approximates 1970 rates – which were 2,800 cases of congenital syphilis in 1990 in children less than one year old.

Crane MJ. "The diagnosis and management of maternal and congenital syphilis." *J Nurs Midwifery* 37:4-15, 1992. (Class R)

Premature birth occurs in 20% of cases of maternal syphilis, and a wide variety of severe abnormalities result from congenital syphilis. The vertical transmission rate is estimated at 70-100%.


Serologic tests have a sensitivity of 62-76% and near 100% in primary and secondary syphilis, respectively. Specific treponemal tests, such as fluorescent treponemal antibody absorption (FTA), have a specificity of 96%. Treponemal tests should not be used as initial screening tests in asymptomatic patients due to the increased expense and the persistent positive test in patients with previous, treated infection.


Early detection of syphilis at the preconception visit allow antibiotic therapy to prevent clinical disease and prevent transmission to sexual contacts. Maternal antibiotic therapy prevents nearly all congenital syphilis.

A high-risk profile for women likely to have asymptomatic syphilis can be devised. A growing number of cases occur in prostitutes and IV drug users. A number of demographic and behavioral variable have been associated with higher rates of *T. palladium* infection: large urban areas or southern states, history of sexually transmitted diseases or other current STD’s, low socioeconomic status, and black race or hispanic heritage according to the CDC.
16. Urine Culture

Screening for ASB by urine culture is recommended for all pregnant women. Bacteriuria occurs in 2-7% of pregnant women; of those who are not bacteriuric at initial screening, 1-2% will develop bacteriuria later in pregnancy.


Among pregnant women, a sensitivity of only 50% for dipstick testing compared to culture has been reported. In pregnant women, microscopic analysis, with either bacteriuria or pyuria indicating a positive test, had a sensitivity of 83% but a specificity of only 59%. Positive predictive value of dipstick tests is 13% for pregnant women.

Predictive value of bacteriuria found on microscopic urinalysis among pregnant women is 4.2-4.5%.

Early detection of ASB in pregnant women is of value as bacteriuria is an established risk factor for serious complications including acute pyelonephritis, preterm delivery, and low birth weight. Randomized controlled trials (RCTs), cohort studies and a meta-analysis of 8 RCTs have shown that treatment of ASB can reduce the incidence of such complications.


A urine culture obtained at 12-16 weeks of pregnancy will identify 80% of women who will ultimately have ASB in pregnancy, with an additional 1-2% identified by repeated monthly screening.


There are inadequate data to determine the optimal frequency of subsequent urine testing during pregnancy.

17. Counseling and Education

Education is an important component of prenatal care in that it helps a woman feel confident and comfortable in the ways in which her body is changing and in how her pregnancy is progressing. We know much erroneous information is exchanged between neighbors, work colleagues and family members; therefore it is important that a woman has the opportunity to receive accurate, up-to-date information from her health care team.

Prenatal education gives a woman information about how her body is changing and why, thus helping her to adjust to changes as they occur. Education during clinical visits as well as community and worksite prenatal programs provides an opportunity for her to learn about the early hormonal changes and the growing fetus as the changes occur, and provides information on labor, birth and care after birth, at appropriate times.


Education also provides information on the positive and negative impacts of the choices a woman makes. Subject matter might include providing adequate nutrition for the growing fetus or the effects of toxins in the woman’s environment. It provides the opportunity to discuss the impact smoking has
on her baby and the fact that even reducing the number of cigarettes smoked each day can lower her risks for preterm labor and positively impact the size of her baby.

Most parents make the decision about infant feeding during pregnancy. Prenatal education offers an excellent and well-timed opportunity to provide information to expectant parents about the benefits of breastfeeding. Those benefits include complete infant nutrition and fewer infant allergies and illnesses.

A study done in the inner-city showed that when obstetrical personnel are actively involved in counseling women about breastfeeding, more women will initiate breastfeeding and continue for a longer duration. Adequately trained health care staff can reinforce the counseling women have received in prenatal education sessions at each prenatal visit.


For the active woman, education on exercise helps her to understand what she can safely continue to do and what modifications need to occur. Education about the benefits of exercise, including possible reduced rates of cesarean section with regular exercise during pregnancy, should be emphasized.


Prenatal smoking cessation programs can be effective in reducing smoking rates in pregnant women and reducing low birth weight.


Intervention early in pregnancy, through written materials, education, counseling and a message from physician or midwife will significantly increase the number of women who stop smoking or reduce the number of cigarettes by > 50%, thereby reducing the number of low birth weight babies. It was also noted that with phone counseling between prenatal visits, there is greater success in smoking cessation.


If a pregnant patient is clearly not going to stop smoking without the use of nicotine replacement and/or bupropion (Zyban®), and if there is good reason to believe these substances would facilitate cessation in a particular patient, it is reasonable to inform the patient of potential risks and offer that form of support.


Women who did not receive complete prenatal health behavior advice were 1.5 times more likely to deliver very low birth weight (VLBW) infant.


Women who had periodontal disease were seven times more likely to have preterm low birth weight babies than women who were not affected by the disease.
**18. Weight**

There is evidence that being obese leads to increased rates of dystocia and of primary cesarean section. Therefore, excessive weight gain, especially in those patients who are already overweight, should be avoided. Women who are underweight at the beginning of their pregnancy have improved outcomes with higher birth weight babies if they have greater weight gains than generally have been recommended.

There is no association between the amount of weight gained, either week to week or over the course of the entire pregnancy, and pregnancy-induced hypertension. There is new evidence to suggest that patients who are significantly underweight or overweight during pregnancy have specific risks. Those who are underweight are at higher risk for preterm labor. Those who are overweight are at risk for gestational diabetes and various forms of hypertension.


**19. Blood Pressure**

The conventional urine dipstick test is unreliable in detecting the moderate and highly variable elevations in albumin that occur early in the course of preeclampsia. Twenty-four-hour urine protein collection and angiotensin II infusion are impractical screening tests for preeclampsia. The supine "roll over" test and elevation of edema lack adequate screening sensitivity and specificity as screening tests.


Hypertension occurs in 6-8% of all pregnancies. Hypertension in pregnancy is variously subdivided into disorders related to the pregnancy (preeclampsia) and disorders unrelated, but coincident, to the pregnancy. Both subdivisions of hypertension in pregnancy are nearly always asymptomatic at first; hence, only screening maneuvers can detect these disorders early in the disease process.


Hypertension in pregnancy can be defined as either a diastolic pressure above a defined cutoff point or a rise from a woman’s pre-existing blood pressure level. Common, but not universal, definitions describe preeclampsia as an acute rise in blood pressure greater than 140 mm Hg systolic or 90 mm Hg diastolic; or a rise of 30 mm Hg or 15 mm Hg above the usual systolic and diastolic pressures, respec-
Hypertension coincident with pregnancy as with hypertension outside of pregnancy is defined elsewhere. (See the ICSI Hypertension Diagnosis and Treatment guideline.)


The risks of untreated preeclampsia and coincident hypertension in pregnancy are manifold. Potential maternal complications include abruption, renal failure, cerebral hemorrhage, disseminated intravascular coagulation, pulmonary edema, circulatory collapse, eclampsia, and death. Fetal complications may include hypoxia, low birth weight, premature delivery, or perinatal death.


Therefore, the best screening strategy for hypertension in pregnancy appears to be early detection of an abnormal blood pressure trend over time. Although there is no direct proof that regular blood pressure screening reduces maternal or perinatal morbidity or mortality, it is unlikely that ethical concerns will allow a study to withhold blood pressure screening or treatment from a control group. Since the screening test is simple, inexpensive, and acceptable to patients, screening is indicated on an empirical basis.


The collection of meaningful blood pressure data requires consistent use of correct technique and a cuff of appropriate size. The patient should be in the sitting position and the blood pressure should be measured after the patient’s arm has rested at heart level for five minutes.


20. Fetal Heart Tones

No studies show improved perinatal outcome from identifying fetal heart tones, but expert opinion concurs that an occasional fetal demise may be found (with no other signs or symptoms) or an occasional cardiac anomaly might be detected. The primary indication for identifying fetal heart tones is the enormous psychological benefit to parents.

21. Chromosome/NTD Triple Screen

The triple and quadruple serum tests in the second trimester are well established tests given accurate gestational dating and appropriate interpretation of results. Triple and quadruple tests have a detection rate of approximately 60-76% with a 5% false positive rate. Nuchal translucency (NT) or the combination of NT and first trimester serum tests have the potential to detect 64-91% of Down Syndrome cases with a 5% false positive rate. The positive predictive values for NT alone and practicality of first trimester testing have not been proven.


Elevated maternal serum AFP is predictive for NTDs as well as a variety of other fetal anomalies including abdominal wall defects. Mass AFP screening programs can reduce central nervous system malformations by up to 50%.

For patients with elevated initial AFP screen, ultrasound is indicated for accurate gestational age assessment and fetal anatomic survey. Nadel reported a 100% detection rate for NTD, encephalocele, gastroschisis, and omphalocele by mid-trimester level II ultrasound, thereby recommending against amniocentesis for patients with elevated AFP but normal ultrasound.


Down syndrome (trisomy 21) occurs in 1/800 births, increasing in risk with advancing maternal age. Eighty percent of Down syndrome babies are born to women under 35, with no risk factors. Low maternal serum AFP is associated with increased risk for Down syndrome.


If risk for Down syndrome is calculated solely on age versus AFP, detection increases from 25% to 37%. Adding HCG and Estriol to AFP/triple screen increases detection of Down syndrome from 25-75% without increasing false positivity. Triple screen incidentally detects a variety of chromosome disorders, particularly sex chromosome abnormalities.


Ultrasound to assess fetal age is indicated for all women with low AFP/abnormal triple screen. It should be followed by amniocentesis for gestational age-adjusted persistent abnormal values. Following discussion with the patient, the benefit of increased detection of chromosome abnormalities should be weighed against the risk of fetal loss from amniocentesis (0.2–1.3%).


More recent evidence shows that ultrasound as an adjunct to triple screen improves identification of aneuploids, including Down syndrome, while reducing the need for amniocentesis.


Customary practice is to offer amniocentesis or chorionic villus sampling to all women age 35 or older at the time of birth, and to those whose risk of Down syndrome by AFP/triple screen is equivalent to that of a 35-year-old woman.

For gravidas over 35, triple screen can identify up to 89% of fetuses with Down syndrome, with a false positive rate of 25%. For patients over 35 who are willing to accept a false negative screen, the triple screen is a cost effective alternative to routine amniocentesis. This alternative practice could make 75% of amniocenteses unnecessary, thereby also reducing amniocentesis-associated fetal losses.


Providers counseling patients on genetic screening need to take into consideration a variety of factors, including attitudes toward miscarriage, elective termination, and having a child with Down syndrome or other birth defect.


A number of emerging technologies may one day replace or supplant the triple screen as currently constituted. Testing modalities include a quadruple screen (triple screen plus inhibin A), nuchal translucency ultrasonographic evaluation (NT) or NT combined with other first trimester serum markers such as free beta hCG and pregnancy-associated plasma protein A. These modalities have been evaluated at various institutions. As yet, the use of these as universal screens for Down syndrome is either impractical due to the limitations of primarily trained ultrasonographers to perform NT evaluations, or is of unproven advantage (first trimester serum screen) over the presently constituted triple screen.


22. **OB Ultrasound (Optional)**

The ready availability of real-time ultrasonography has generated an ongoing controversy regarding its routine use in screening low-risk pregnancies.

Six randomized control studies have failed to show any consistent benefit to maternal or fetal outcome. Several of these studies showed ultrasonography to be beneficial in detecting intrauterine growth retardation. Only one study showed a slight decrease in perinatal death in the routinely scanned group (P = 0.11).

American College of Obstetricians and Gynecologists. ACOG Practice Patterns Number 5: "Routine ultrasound in low-risk pregnancy." August 1997. (Class R)


The Routine Antenatal Diagnostic Imaging with Ultrasound Study (RADIUS) study group concluded that screening ultrasonography did not improve perinatal outcome. This study excluded 40,214 out of 55,744 patients that registered to arrive at a randomized group of 15,530.

Ringa V, Blondel B, Breart G. "Ultrasound in obstetrics: do the published evaluative studies justify its routine use?" *Int J Epidemiol* 18:489-97, 1989. (Class R)
Most of the studies, randomized or otherwise, have suffered from deficiencies in statistical power to answer whether or not routine ultrasound screening affects perinatal outcome.


One additional RCT showed a significantly lower perinatal mortality in a screened population which was screened at 16-20 weeks of gestation. The decrease in perinatal mortality was mainly due to improved early detection of major malformations which led to induced abortion.


More recent literature suggests that routine ultrasound leads to a decrease in post-term pregnancy and a better ability to assess gestational age and multiple pregnancy.


23. Domestic Abuse Screening

Pregnant women do experience domestic violence, and some studies suggest pregnancy as a risk factor. In surveys (primarily from urban, public clinics), 7-18% of women reported physical abuse during the current pregnancy. Women of all ethnic, educational and socioeconomic backgrounds have reported abuse. Studies have also reported associations between partner abuse and unhealthy prenatal behaviors and poor perinatal outcomes.


In a survey study of urgent care OB/GYN patients, 40% of pregnant women reported a history of abuse and 8% of pregnant women reported recent abuse. Young age (under 20) was significantly associated with recent abuse independent of pregnancy status. In this study, young age was defined as under 20 years of age.

McGrath ME, Hogan JW, Peipert JF. "A prevalence survey of abuse and screening for abuse in urgent care patients." *Obstet Gynecol* 91:511-14, 1998. (Class D)

Some studies have described an increase in the reporting of domestic violence during pregnancy when a systemic screening approach is implemented. There is also some evidence to suggest that repeated screening for domestic violence during pregnancy may increase reporting of domestic violence. Direct interview screening resulted in a higher rate of reporting prenatal domestic abuse than a written, self-report questionnaire method.


Pregnant women who reported abuse and were offered intervention and resources increased their safety behaviors both during and after pregnancy. One study reported increased moderate or severe violence during the postpartum period. Identification of prenatal abuse and immediate intervention with safety information may prevent future abuse.
Discussion and References (cont)

24. Fundal Height

A measurement of the fundal height should be performed at each visit during the second and third trimesters of pregnancy.


Fundal height measurement is inexact and subject to inter- and intraobserver errors.


However, the screening maneuver is simple, inexpensive, and widely used during prenatal care. Furthermore, several studies have shown quite good sensitivity and specificity for predicting low birth weight for gestational age.


25. Gestational Diabetes Mellitus

Universal screening of pregnant women for GDM at 28 weeks gestation is current practice.

Gestational diabetes is defined as a glucose intolerance occurring during pregnancy. Incidence is usually quoted as 2% to 3%, with a range of .31% to 37.4% noted. There is a higher prevalence in American Indian and Hispanic populations and a very low incidence among Caucasian teens.


There is a lack of prospective studies to determine whether universal screening or selective screening based on high-risk criteria is better. There is also a lack of consensus among practitioners. ACOG recommends selective screening, while the Third International Workshop-Conference on Gestational Diabetes sponsored by the American Diabetes Association recommends universal screening.

Recent evaluation by the USPSTF concluded there is insufficient evidence for or against routine screening for gestational diabetes.


Recent studies reviewed universal screening versus risk-based screening. All concluded that a small but significant number of patients with GDM would be missed by selective screening, and 90% of patients would still need to be screened. All studies recommended continued universal screening of all pregnant patients.

Discussions and References (cont)


Screening is agreed to be most beneficial if done at 24 to 28 weeks gestation. Most practitioners use a 50 g oral glucose load followed one hour later by the blood draw. Screening levels should be based on ACOG guidelines as stated in ACOG Technical Bulletin Number 200. If the glucose challenge test results fall outside the guideline, a 100 g load followed by a 3 hour glucose tolerance test should be performed.


The guideline work group discussed the possibility that if the 140 mg/dl threshold was lowered sensitivity would improve. Thresholds of 140 yield 90% of gestational diabetes with 15% of all patients screened having a glucose tolerance test (GTT). Lowering the threshold to 130 would identify almost all the gestational diabetes cases but would require 25% of women to have the GTT.


Criteria for selective screening was fairly consistent with obesity and family history of diabetes as the main reasons. Age greater than 30, previous macrosomic baby or baby with anomalies, stillbirth and glycosuria are other criteria for screening. Most studies agree that selective screening fails to detect 43% to 50% of women with gestational diabetes.


O'Sullivan’s early work, published in 1973, is the only one that has looked at infant mortality as an outcome in association to gestational diabetes. His study showed higher rates of infant mortality among women over 25 with gestational diabetes, especially if overweight.


Weeks, et al. studied whether risk factors for gestational diabetes influenced perinatal outcome. This study showed little to no difference in macrosomic infants, cesarean deliveries and shoulder dystocia between women with gestational diabetes who had one or more risk factors when compared with those who had no risk factors. A control group of nondiabetic women who delivered in the same months as the study group was included. Cesarean-section rate was higher in the study group but shoulder dystocia rates did not reach statistical significance.

Cochrane states, "It is likely that glucose intolerance is simply a marker for other underlying conditions that adversely influence perinatal outcome." Is the gestational diabetes the cause of adverse outcomes, or are the risk factors? A recent excellent article reviews the controversies and current opinion regarding gestational diabetes mellitus.


The Canadian Task Force reviewed the literature on validity and potential effectiveness of the different screening methods. They concluded from the quality of evidence available that universal screening for gestational diabetes is not supported, and that a decision to screen needs to be made on other grounds.


Santini and Ales studied two populations of women in New York over a 5 month period in 1980. Depending on the practice of the clinic the women attended, some were screened and some were not.

The screening and treatment process was found not to decrease the rate of large infants or to improve pregnancy outcomes, and was associated with more intense surveillance during pregnancy and a higher rate of cesarean deliveries. Santini and Ales acknowledged the increased risk for women with gestational diabetes developing overt diabetes later in life and the possible long-term effects on the baby – diabetes, obesity. They suggested that perhaps a postpartum glucose tolerance test should be performed to identify women at high-risk, where exercise and diet might help, but not categorizing their pregnancies at high-risk, subjecting them to more screens and tests and higher cesarean rates.


### 26. Examination of the Cervix

For a discussion of cervical checks related to prevention of preterm birth, refer to the ICSI Preterm Birth Prevention guideline.

Stripping membranes at cervical examinations ≥ 38 weeks reduces the rate of post term (> 42 weeks) deliveries by up to 75%, significantly reduces the risk of infection of labor (8.1% vs. 18.8%), and increases the likelihood of a gravida presenting to labor and delivery in the active phase of labor. The greatest benefit is seen with unfavorable cervix in a primigravid patient. No increase in adverse outcomes is evident. The recommended method is digital insertion 2-3 cm above internal OS, and sweeping circumferentially twice. Daily membrane sweeping after 41 weeks has been shown to be more effective than the use of prostaglandins in reducing post-date pregnancies.


27. Awareness of Fetal Movement

Burden of Suffering

Reduction or cessation of fetal movements may precede death by a day or more.


Approximately 50% of antepartum late fetal deaths are not associated with any recognizable risk factor, and this is the rationale for screening all pregnancies in late pregnancy.

Accuracy of Screening Tests

There are no set counting criteria nor set values that can be universally applied to all antepartum patients when evaluating fetal movement.


Variables include activity of an individual fetus, perception of a baby’s movements by an individual mother, activity levels of individual fetuses, and perception between different women.


Effectiveness of Early Detection

Two randomized control trials have addressed the question of whether clinical actions taken on the basis of fetal movement counting improve fetal outcome, with the largest involving over 68,000 women. These trials collectively provide no evidence that routine formal fetal movement counting reduces the incidence of intrauterine fetal death in late pregnancy.


Neldam S. "Fetal movements as an indicator of fetal well-being." Dan Med Bull 30:274-78, 1983. (Class A)

28. Influenza Vaccination

Immune system alterations during pregnancy may increase the likelihood of influenza complications such as pneumonia, particularly in the third trimester. Historical data from the 1918 and 1957 influenza A pandemics described a 50% mortality rate for influenza-induced pneumonia in pregnancy. In addition, the presence of fever, tachycardia, and hypoxemia may be harmful to the developing fetus.


Influenza vaccines are made from inactivated/noninfectious viruses and are considered safe at any stage of pregnancy.

30. **Group B Streptococcus Screening**

GBS, or *Streptococcus agalactiae*, is recognized as an important cause of perinatal morbidity and mortality. About 7,600 cases of GBS sepsis occur in newborns in the United States and result in about 300 deaths per year. Invasive GBS disease in the newborn may manifest as sepsis, pneumonia, or meningitis.


Vertical transmission of GBS during labor or delivery constitutes about 80% of GBS disease in the newborn.


Ten to thirty percent of pregnant women are colonized with GBS in the vaginal or rectal areas.


**Testing**

Proper culture techniques include sampling the introitus (lower vagina) and the perianal area. Selective broth media should be used. Sensitivity and specificity of such cultures in the late third trimester are estimated at 70.0% and 90.4%, respectively.


DNA probe testing at time of delivery may identify those at highest risk of delivering an infant that may develop GBS sepsis.
Discussion and References (cont)

Prophylaxis

Some studies have demonstrated a reduction in the incidence of early-onset neonatal GBS disease when antibiotics were administered intrapartum to women with positive GBS colonization from prenatal cultures. Care should be used in the selection of antibiotics for intrapartum prophylaxis to minimize the risk of increasing the incidence of antibiotic resistance.


Practices to Consider Discontinuing

Pelvimetry

The evaluation of clinical pelvimetry during the prenatal period is of little value in predicting the occurrence of cephalopelvic disproportion (CPD) during delivery. In cases in which a previous cesarean section had been performed for CPD, or for women who are at high-risk for CPD, there may be some usefulness in performing clinical pelvimetry prior to the subsequent delivery.


Routine Urine Dipsticks and Routine Urinalysis

The conventional urine dipstick test is unreliable in detecting the moderate and highly variable elevations in albumin that occur early in the course of preeclampsia. (See blood pressure discussion, #19.) Likewise, a "trace positive" urine dipstick for glycosuria has a reported sensitivity of only 23-64%.

Gribble RK, Meier PR, Berg RL. "The value of urine screening for glucose at each prenatal visit." Obstet Gynecol 86:405-10, 1995. (Class C)


Routine Evaluation for Edema

ACOG defines edema as a generalized accumulation of fluid represented by greater than 1+ pitting edema after 12 hours of bed rest, or a weight gain of 5 lbs. or more in one week.

Edema has traditionally been an important diagnostic criterion for preeclampsia. However, by itself it is not useful to predict the development of preeclampsia because of the low specificity and sensitivity of this finding.

Smith MA. "Preeclampsia." Prim Care 20:655-64, 1993. (Class R)
Routine Checking for CMV, Parvovirus, and Toxoplasmosis

CMV

Selective testing for high-risk groups (day care workers, NICU nurses, adolescents with multiple partners or a history of sexually transmitted diseases) could be considered in order to advise them of their risk. Good hand washing and wearing gloves would significantly reduce risk for this virus.


Parvovirus

Affected pregnancies may result in fetal morbidity, but such outcomes are exceedingly rare.


Toxoplasmosis


Routine Nutritional Supplements

There are no well-controlled studies demonstrating the efficacy of universal multivitamin supplements in pregnancy. An RCT to evaluate the effects of multivitamin supplements without folic acid versus placebo from preconception through the first trimester for women at risk for NTD demonstrated no decrease in NTD nor other salutary effects.


Recent concern over the possible adverse effects of certain components of multivitamins would suggest against universal supplementation. Second, many patients experience significant gastrointestinal distress from such combination supplements. Finally, the cost of multivitamins can be a financial burden for some patients.

Balanced protein/energy supplementation results in increases in maternal weight gain and fetal growth. These increases do not appear larger in undernourished women, nor do they seem to confer long-term benefits to the child in terms of growth or cognitive development.


There is currently insufficient evidence to justify magnesium supplementation during pregnancy.


Pyridoxine supplementation during pregnancy cannot be recommended on the basis of current evidence.

The available data from controlled trials provide no convincing case for routine zinc supplementation during pregnancy.


**Bacterial Vaginosis**

This document provides resources, strategies and measurement specifications for use in closing the gap between current clinical practice and the recommendations set forth in the guideline.
Support for Implementation –
Priority Aims and Suggested Measures

**Overview**

The following aims were identified by the guideline work group as key areas in which medical groups may receive benefits in implementing this guideline.

The measures associated with these aims are presented as possible measures. Measures of aim help medical groups determine progress in achieving that aim. However, other approaches may be customized by individual medical groups to ferret out improvement information important to the medical group’s individual practice. Specifications for some measures appear on subsequent pages.

**Priority Aims for Medical Groups When Using This Guideline**

1. Increase the percentage of pregnant women who receive timely, comprehensive screens for risk factors.

   Possible measures of accomplishing this aim:
   a. Percentage of initial risk assessment forms completed within 2 visits of initiation of prenatal care.
   b. Percentage of pregnant women with interventions documented for identified risk factors.
   c. Percentage of pregnant women with documented preconception risk assessment/counseling.

2. Increase the percentage of pregnant women who receive timely prenatal counseling and education as outlined in the guideline.

   Possible measures of accomplishing this aim:
   a. Percentage of pregnant women who received counseling and education before pregnancy.
   b. Percentage of pregnant women who receive counseling and education at each visit as outlined in the guideline.
   c. Percentage of pregnant women who received counseling and education by the 28th week visit.

3. Improve the frequency of appropriate routine testing during pregnancy.

   Possible measures of accomplishing this aim:
   a. Percentage of pregnant women who have not received urine dipstick testing during pregnancy.
   b. Percentage of pregnant women who received specific test (e.g., HIV, chromosome/NTD, GBS, triple screen) during pregnancy.

4. Increase the percentage of pregnant women who are up-to-date with prenatal care activities.

   Possible measures of accomplishing this aim:
   a. Percentage of pregnant women who are up-to-date with the prenatal activities at the end of a prenatal visit.
   b. Percentage of pregnant women who are up-to-date with activities at 28th week visit.
   c. Percentage of prenatal activities up-to-date at the end of a prenatal visit.
Possible Success Measure #2c
Percentage of pregnant women who received counseling and education by the 28th week visit.

Population Definition
All women who are in the course of prenatal care and who are present for the 28th week visit.

Data of Interest
# of yes answers on the survey

| Total # of questions having either a "yes" or a "no" answer indicated on returned surveys |

Numerator/Denominator Definitions
Numerator: The survey questions are:
1. Has your provider or someone from the clinic, community health program, or worksite explained the benefits of breastfeeding? Yes No
2. Has your provider or someone from the clinic, community health program, or worksite told you to report vaginal bleeding during your pregnancy? Yes No
3. Has your provider or someone from the clinic, community health program, or worksite discussed attending or availability of childbirth classes with you? Yes No

Denominator: All returned survey forms.

Method/Source of Data Collection
These data can be collected by a patient survey at the 28th week visit. Since that visit uses a glucose tolerance test and there is a waiting time for completion of the test, this survey can be completed during that waiting time. The patient completes the survey by herself.

This may be collected on everybody, or a sample. If a sample is done, it is suggested that the data be collected on specific days (or times) to create a regular pattern for data collection. This pattern will allow for more consistent and regular data collection. The minimum sample size is 15 per month or 40 per quarter.

Time Frame Pertaining to Data Collection
These data can be collected monthly.

Notes
While this measure endeavors to understand what patient education takes place, the documentation of patient education in medical records is problematic. It was thought that the best way to discover what education the patient received was to ask the patient. Since waiting time is part of this visit, this time should allow the patient to complete the simple survey. Over time, it is expected that the specific questions within this measure may be changed, although the broad categories (warning signs, risk status, and baby care) may continue to be used. The act of surveysing patients may provide an added opportunity for further discussion about education and counseling with the provider.
For improvement purposes, it will be important to track the answers to the individual questions.
The medical group needs to determine the flow and processing of the surveys.
The survey can be handed out during the wait time for the glucose tolerance test.
Possible Success Measure #4c
Percentage of prenatal activities up-to-date at the end of a prenatal visit.

Population Definition
All women undergoing prenatal care.

Data of Interest
The number of prenatal activities where the status for current visit is up-to-date
The total number of prenatal care activities reviewed for the specific visit

Numerator/Denominator Definitions
Numerator: For each woman presenting for prenatal care, the visit number or timing is identified. Then for that visit, check to see if the time specific items (see list following) are completed or caught-up (as appropriate). The goal is to complete the items as they are needed.

- Preterm birth screening - visit 1 (6-8 wks) & 4 (28 wks); verify up-to-date at visits 2, 3, 4, & 6 (any preterm form used)
- Risk assessment, genetics* - visit 1 (6-8 wks); verify at visits 2-11 (any genetic risk form used)
- Height - visit 1 (6-8 wks); verify at visits 2-11
- Weight - ALL visits
- Chromosome/NTD - visit 2 or visit 3 (10-18 weeks)
- Urine culture † - visit 1 (6-8 wks); verify at visits 2-11
- Td booster † - visit 1 (6-8 wks); verify at visits 2-11
- Cervix check - visits 5 (28 wks) & 8-11 (38, 39, 40, 41 wks); verify at visit 6
- Hep B surface antigen † - visit 1 (6-8 wks); verify at visits 2-11
- Varicella immunity established †* - visit 1 (6-8 wks); verify at visits 2-11
- GBS test - visit 7

* = The visit 1 activity may take place during a preconception visit.
† = The visit 1 (6-8 wks) activity may take place at visit 2 (12 wks).

Example 1: Suppose a woman first presents herself at 20 weeks. Then 8 activities need to be done (all with exceptions of triple screen which is now beyond the useful time interval and cervix check which does not begin until 28 weeks). For this woman the measure is how many of these 8 services were done (or up-to-date) at that visit.

Example 2: The chart for a woman at the 36-week visit is assessed. Weight needs to be done and the following 6 activities need to be verified done in the past or caught
Support for Implementation – 
Measurement Specifications (cont)

Denominator: Any women presenting for prenatal care.

Method/Source of Data Collection

This measure is achieved through a chart abstraction of prenatal records. It is suggested that a minimum of 10 charts per month are randomly identified for abstraction.

The abstract tool is used. At any given time, the patient’s status can be addressed concerning the status on up to 9 activities: risk assessment (preterm birth & genetics), height, weight, triple screen (test or declination), urine culture, Td booster, cervix check, Hep B surface antigen, and varicella immunity established.

Time Frame Pertaining to Data Collection

These data would be gathered on a sample of at least 10 women monthly.

Notes

This is analogous to a proposed measure for preventive services, as this guideline is similar to a preventive services for those pregnant.

Gestational age should be used as the primary index for visit assessment.
Support for Implementation – Measurement Specifications (cont)

PROBING APPROACHES

Probing measures include answers to the specific questions in measurement 2c, and up-to-date at specific times or for specific test or activities in measurement 4c.

OTHER OPTIONS FOR MEASUREMENT

Average number of patient encounters in the 9 months prior to delivery.
Percentage of women at 28th week appointment who have completed any given test selected by the medical group.
Identify which visit (or between which visits) this is and determine if all areas marked with blanks for the visit have been completed or marked with "V" are verified up-to-date (representing earlier opportunities).
## Support for Implementation – Chart Abstraction Tool (for Measure 4c)

### Routine Prenatal Care

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<th>Routine Visit # or completion by date</th>
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<th>3</th>
<th>4</th>
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<th>6</th>
<th>7</th>
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<tr>
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</table>

- Preterm birth screen
- Risk, genetic*
- Height
- Weight
- Hep B Sur Antigen †
- Varicella immunity established*†
- Td Booster
- UC †
- Chromosome/NTD offered (tested or declined)
- Cervix check
- GBS

* = The visit 1 activity may occur with a preconception visit.
† = The visit 1 (6-8 wks) activity may take place at visit 2 (12 wks).
blank = Verify if done at this visit.
V = Verify if up-to-date (either done earlier or caught up at this visit).
x (shaded) = Ignore.
Systems Approaches to Implementation for This Guideline

1. Establish a process that increases provider awareness of opportunities for the timely initiation of a preconception visit during any encounter with a woman of childbearing age and capability.

2. Implement comprehensive, integrated routine screening procedures for major risk categories.
## Support for Implementation –
Recommended Educational Resources

**Recommended Website Resources**

*Note: Websites are listed in alphabetical order, not in order of work group preference.*

<table>
<thead>
<tr>
<th>Website Sponsor</th>
<th>Target Audience</th>
<th>Description</th>
<th>Website Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>March of Dimes</td>
<td>Public and professional</td>
<td>Includes fact sheets on a wide variety of topics related to healthy pregnancy and delivery of healthy babies that can be downloaded. Fact sheets include prenatal nutrition, healthy lifestyle before, during, and after pregnancy, and prevention of birth defects. Q &amp; A option.</td>
<td><a href="http://www.modimes.org">www.modimes.org</a>. Toll free number also available for direct contact with the March of Dimes: 888-MODIMES (663-4637)</td>
</tr>
<tr>
<td>Mayo Clinic</td>
<td>Public</td>
<td>Includes alphabetical listings of conditions as well as search capabilities for information on specific areas of health care including many aspects of prenatal care.</td>
<td><a href="http://www.mayoclinic.com">www.mayoclinic.com</a></td>
</tr>
<tr>
<td>National Women’s Health Information Center/Office of Women’s Health, U.S. Dept. of Health and Human Services</td>
<td>Public</td>
<td>Provides information on many pregnancy-related topics including nutrition and fitness, prevention of birth defects and complications of pregnancy, and financial assistance. Also provides information on preparing childbirth and tips on caring for a newborn. In English and Spanish.</td>
<td><a href="http://www.4woman.gov/pregnancy/index.htm">http://www.4woman.gov/pregnancy/index.htm</a> Call: 1-800-994-WOMAN (1-800-994-9662) or 1-888-220-5546 for the hearing impaired. 8:00 a.m.-5:00 p.m. CST Mon. - Fri.</td>
</tr>
<tr>
<td>UCSF Children’s Hospital</td>
<td>Public</td>
<td>Alphabetical listing of prenatal care and conditions including cystic fibrosis and genetic screening.</td>
<td><a href="http://www.ucsfhealth.org/childrens/medical_services/prev/prenatal/">www.ucsfhealth.org/childrens/medical_services/prev/prenatal/</a></td>
</tr>
</tbody>
</table>
These websites were reviewed by the ICSI Routine Prenatal Care guideline work group as credible resources. ICSI does not have the authority to monitor the content of these sites. Any health-related information offered from these sites should not be interpreted as giving a diagnosis or treatment.

* Criteria for Selecting Websites

The preceding websites were selected by the Routine Prenatal Care guideline work group as additional resources for practitioners and the public. The following criteria were considered in selecting these sites.

- The site contains information specific to the particular disease or condition addressed in the guideline.
- The site contains information that does not conflict with the guideline's recommendations.
- The information is accurate and/or factual. The author of the material or the sponsor of the site can be contacted by means other than e-mail. For example, a nurse line or other support is provided.
- The material includes the source/author, date and whether the information has been edited in any way. The site clearly states revision dates or the date the information was placed on the internet.
- The site sponsor is an objective group without an obvious or possible bias. For example, the site does not promote a product, service or other provider.
- The coverage of the topic is appropriate for the guideline's target audience. It is clearly written, well-organized and easy to read. The site is easy to navigate.