

# The clinical content of preconception care: an overview and preparation of this supplement

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In June 2005, the Select Panel on Preconception Care established implementation workgroups in 5 areas (clinical, public health, consumer, policy and finance, and research and surveillance) to develop strategies for the implementation of the Centers for Disease Control and Prevention recommendations on preconception health and healthcare. In June 2006, members of the clinical workgroup asked the following questions: what are the clinical components of preconception care? What is the evidence for inclusion of each component in clinical activities? What health promotion package should be delivered as part of preconception care? Over the next 2 years, the 29 members of the clinical workgroup and > 30 expert consultants reviewed in depth > 80 topics that make up the content of the articles that are contained in this supplement. Topics were selected on the basis of the effect of preconception care on the health of the mother and/or infant, prevalence, and detectability. For each topic, the workgroup assigned a score for the strength of the evidence that supported its inclusion in preconception care and assigned a strength of the recommendation. This article summarizes the methods that were used to select and review each topic and provides a summary table of the recommendations.

**Key words:** preconception care, pregnancy care

In the introductory article to this supplement, Atrash et al<sup>1</sup> review the accomplishments of the first 4 years of the Centers for Disease Control and Prevention Workgroup on Preconception Health and Health Care. A key component of this initiative was the organization of the Select Panel on Preconception

Care in June 2005. The panel established implementation workgroups to develop strategies for implementation of the preconception care recommendations that were published in the *Morbidity and Mortality Weekly Report*<sup>2</sup> in the following 5 areas: clinical, public health, consumer, policy and finance, and research

and surveillance. Meeting over 2 days in June 2006, the members of the clinical workgroup identified 7 important questions that were considered to be critical to the advancement of the clinical preconception care agenda. These questions were: What are the clinical components of preconception care? What is the evidence for inclusion of each component in clinical activities? What health promotion package should be delivered as part of preconception care? How can preconception risks be identified? What are the best interventions for preconception risks, once identified? What are the curriculum and teaching tools to teach these concepts to clinicians? What is the research agenda for preconception care?

In 2 subsequent meetings and in a series of conference calls over the next nearly 2 years, the 29 members of the clinical workgroup and > 30 expert consultants reviewed in-depth > 80 topics in an attempt to answer the first 3 of these 7 questions. The series of articles in this supplement of the *American Journal of Obstetrics and Gynecology* are the product of this work. This article summarizes the methods that were used to select and review each topic and provides a summary table of the recommendations.

## Selection of topics to be reviewed

The workgroup identified a set of specific criteria to assist in choosing among the clinical topics to be reviewed. The resulting selection criteria comprised the following items: (1) There is a good chance that the health of the mother or the infant will be improved if the condition is identified and addressed before pregnancy; (2) the burden of suffering and prevalence of the condition are sufficient to justify screening and treatment; (3) the condition is detectable in clinical care in either primary or specialty settings; (4) if screening is used, the screening methods that are available to detect the

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condition are sufficiently predictive to justify screening; or (5) clinical practice guidelines already exist that suggest that preconception interventions be implemented.

The workgroup reviewed > 700 papers that related to preconception care to create a list of potential topics; the group then applied the aforementioned criteria to determine approximately 83 topics that were reviewed. These topics, which were organized into 14 separate clinical areas, make up the accompanying articles of this supplement and together define the clinical content of preconception care.

### Health promotion and risk reduction

The clinical workgroup retained the organizational structure that was promulgated by the Expert Panel on the Content of Prenatal Care,<sup>3</sup> which suggested that the components of preconception care include the provision of health education that is individualized to a woman's or couple's needs (health promotion), a thorough and systematic identification of risks (risk assessment), and the initiation of actions to address those risks (interventions) with women and men of reproductive age to reduce risk factors that might affect future pregnancies. The article by Moos et al<sup>4</sup> describes the content of the health promotion activities that are part of preconception care. The remaining articles describe the content of preconception risk assessment activities: immunizations, infectious diseases, medical conditions, psychiatric conditions, parental exposures, genetics and genomics, nutrition, environmental exposures, psychosocial stressors, medications, and reproductive history. The final 2 articles cover special populations and preconception care for fathers.

### Presentation of each topic and recommendations for clinical care

The information that is provided about each topic was standardized based on the format that was developed by the United States Preventive Services Task Force.<sup>5</sup> Each topic is reviewed with the following structure: (1) The burden of suffering, which includes the prevalence and im-

portance of the target condition; (2) the accuracy of the screening methods that are available to detect the condition either in primary or specialty settings; (3) the effectiveness and availability of current treatments for the condition; (4) the impact of the detection and treatment of this condition in the preconception period (to be recommended, the intervention had to be more effective if the condition was identified and addressed before pregnancy, compared with screening for and treatment during pregnancy); (5) related recommendations by other groups.

The components of preconception care were then researched by a member of the clinical committee or by a selected content expert. The first author (B.W.J.), in concert with the editors, then identified members of the clinical committee with an interest and the expertise in that content area and asked them to contribute to that article. For all articles, individual content experts outside the clinical committee were sought to contribute to a particular section or to review and comment on the article. The author who prepared each component of an article was asked to provide a summary recommendation that was based on their review of the topic. The summary recommendation was to be supported by the evidence that was presented in the article and, in the opinion of the author, to represent the current best evidence-based preconception care practice for clinicians. The information that had been provided for each topic and the recommendations were then reviewed by the first author of the article, all other authors, and the editors. In some cases, these deliberations not only resulted in modifications of the recommendation but also resulted in consensus among the group regarding the recommendation.

### Strength of recommendations and quality of the evidence

The strength of the recommendation and the quality of the evidence for each of the clinical components were then rated by the authors and editors, and consensus was reached. The criteria that were used were adapted from those criteria that were used in the report of the

US Preventive Services Task Force Guide of Clinical Preventive Services.<sup>5</sup> The following criteria were used to determine the quality of the evidence and the strength of the recommendation:

*Strength of the recommendation.* (A) There is good evidence to support the recommendation that the condition be considered specifically in a preconception care evaluation. (B) There is fair evidence to support the recommendation that the condition be considered specifically in a preconception care evaluation. (C) There is insufficient evidence to recommend for or against the inclusion of the condition in a preconception care evaluation, but recommendation to include or exclude may be made on other grounds. (D) There is fair evidence to support the recommendation that the condition be excluded in a preconception care evaluation. (E) There is good evidence to support the recommendation that the condition be excluded in a preconception care evaluation.

*Quality of the Evidence.* (I-a) Evidence was obtained from at least 1 properly conducted randomized controlled trial that was done before pregnancy. (I-b) Evidence was obtained from at least 1 properly conducted randomized controlled trial that was done not necessarily before pregnancy. (II-1) Evidence was obtained from well-designed controlled trials without randomization. (II-2) Evidence was obtained from well-designed cohort or case-control analytic studies, preferably from > 1 center or research group. (II-3) Evidence was obtained from multiple-time series with or without the intervention. Dramatic results in uncontrolled experiments could also be regarded as this type of evidence. (III) Opinions were gathered from respected authorities, based on clinical experience, descriptive studies and case reports, or reports of expert committees.

The quality of the evidence that supports the efficacy of the various components of preconception care varies greatly. Most of the evidence comes from research that was done when the focus of delivery was on a single component; interventions that address multiple pregnancy-related risk be-

**TABLE**  
**Strength of the recommendations and the quality of the evidence**  
**for preconception clinical intervention to improve maternal or the infant health**

Potential component of preconception care	Strength	Quality	Recommendation
<b>Health promotion</b>			
Family planning and reproduction life plan	A	III	Routine health promotion activities for all women of reproductive age should begin with screening women for their intentions to become or not become pregnant in the short- and long-term and their risk of conceiving (whether intended or not). Providers should encourage patients (women, men, and couples) to consider a reproductive life plan and educate patients about how their reproductive life plan impacts contraceptive and medical decision-making. Every woman of reproductive age should receive information and counseling about all forms of contraception and the use of emergency contraception that is consistent with their reproductive life plan and risk of pregnancy.
Physical activity	C	II-2	All women should be assessed regarding weightbearing and cardiovascular exercise and be offered recommendations appropriate to their physical abilities.
Weight status	A	III	All women should have their body mass index (BMI) calculated at least annually. All women with BMIs $\geq 26$ kg/m <sup>2</sup> should be counseled about the risks to their own health, the risks for exceeding the overweight category, and the risks to future pregnancies, including infertility. These women should be offered specific behavioral strategies to decrease caloric intake and increase physical activity and be encouraged to consider enrolling in structured weight loss programs. All women with a BMI $\leq 19.8$ kg/m <sup>2</sup> should be counseled about the short- and long-term risks to the own health and the risks to future pregnancies, including infertility. All women with a low BMI should be assessed for eating disorders and distortions of body image. Women unwilling to consider and achieve weight gain may require referral for further evaluation of eating disorders.
Nutrient intake	A	III	All women of reproductive age should be assessed for nutritional adequacy and receive a recommendation to take a multivitamin supplement if any question of ability to meet the recommended daily allowance through food sources is uncovered. Care must be taken to counsel against ingesting supplements in excess of the recommended daily allowance.
Folate	A	I-a	All women of reproductive age should be advised to ingest 0.4 mg (400 $\mu$ g) of synthetic folic acid daily from fortified foods and/or supplements and to consume a balanced, healthy diet of folate-rich food.
Immunizations	A	III	All women of reproductive age should have their immunization status for tetanus-diphtheria toxoid/diphtheria-tetanus-pertussis; measles, mumps, and rubella; and varicella reviewed annually and updated as indicated. All women should be assessed annually for health, lifestyle, and occupational risks for other infections and be offered indicated immunizations.
Substance use	A	II-2 (tobacco) III (alcohol)	All women should be assessed for use of tobacco at each encounter with the healthcare system; women who smoke should be counseled to limit exposure. All women should be assessed at least annually for alcohol use patterns and risky drinking behaviors and be provided with appropriate counseling; all women should be advised of the risks to the embryo/fetus of alcohol exposure in pregnancy and that no safe level of consumption has been established.
Sexually transmitted infections (STIs)	A	III	Healthcare providers regularly and routinely should assess STI risks, provide counseling and other strategies (including immunizations) to prevent acquisition of STIs, and to provide indicated STI testing and treatment for all women of childbearing age.
<b>Immunization</b>			
Human papillomavirus (HPV)	B	II-2	Women should be screened routinely for HPV-associated abnormalities of the cervix with cytologic (Papanicolaou) screening. Recommended subgroups should receive the HPV vaccine for the purpose of decreasing the incidence of cervical abnormalities and cancer. By avoiding procedures of the cervix because of abnormalities caused by HPV, the vaccine could help maintain cervical competency during pregnancy.

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**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
Hepatitis B	A	III	All high-risk women who have not been vaccinated previously should receive hepatitis B vaccine before pregnancy; women who are chronic carriers should be instructed on ways to prevent transmission to close contacts and how to prevent vertical transmission to their babies.
Varicella	B	III	Because the varicella vaccine is contraindicated during pregnancy, screening for varicella immunity (by either a history of previous vaccination, previous varicella infection verified by a healthcare provider, or laboratory evidence of immunity) should be done as part of a preconception visit. All nonpregnant women of childbearing age who do not have evidence of varicella immunity should be vaccinated against varicella.
Measles, mumps, and rubella	A	II-3	All women of reproductive age should be screened for rubella immunity. Immunization should be offered to women who have not been vaccinated or who are not immune and who are not pregnant. Women should be counseled not to become pregnant for 3 months after receiving vaccination. This vaccination will provide protection against measles, mumps, and rubella.
Influenza	C	III	Influenza vaccination is recommended for women who will be pregnant during influenza season and for any woman with increased risk for influenza-related complications, such as cardiopulmonary disease or metabolic disorders, before influenza season begins.
Diphtheria-tetanus-pertussis vaccination	B	III	Women of reproductive age should be up-to-date for tetanus toxoid, because passive immunity is probably protective against neonatal tetanus. The diphtheria-tetanus-pertussis vaccine is recommended for women who might become pregnant or immediately after delivery to avoid complications of pertussis in the newborn infant.
<b>Infectious disease</b>			
Human immunodeficiency virus	A	I-b	All men and women should be encouraged to know their human immunodeficiency virus status before pregnancy and should be counseled about safe sexual practices. Women who test positive must be informed of the risks of vertical transmission to the infant and the associated morbidity and mortality probabilities. These women should be offered contraception. Women who choose pregnancy should be counseled about the availability of treatment to prevent vertical transmission and that treatment should begin before pregnancy.
Hepatitis C	C	III	There are no data that preconception screening for hepatitis C in low-risk women will improve perinatal outcomes. Screening for high-risk women is recommended. Women who are positive for hepatitis C and desire pregnancy should be counseled regarding the uncertain infectivity, the link between viral load and neonatal transmission, the importance of avoiding hepatotoxic drugs, and the risk of chronic liver disease. Women who are being treated for hepatitis C should have their reproductive plans reviewed and use adequate contraception while on therapy.
Tuberculosis	B	II-2	All high-risk women should be screened for tuberculosis and treated appropriately before pregnancy.
Toxoplasmosis	C	III	There is no clear evidence that preconception counseling and testing will reduce <i>Toxoplasma gondii</i> infection or improve treatment of women who are infected. However, if preconception testing is done, women who test positive can be reassured that they are not at risk of contracting toxoplasmosis during pregnancy; women who are negative can be counseled about ways to prevent infection during pregnancy. For women who convert during pregnancy, treatment should be offered.
Cytomegalovirus	C	II-2	Women who have young children or who work with infants and young children should be counseled about reducing the risk of cytomegalovirus through universal precautions (eg, the use of latex gloves and rigorous hand-washing after handling diapers or after exposure to respiratory secretions).

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**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
Listeriosis	C	III	Because it is not clear at what point in pregnancy women who are exposed to Listeria will become ill, preconception care should include teaching women to avoid pâté and fresh soft cheeses made from unpasteurized milk and to cook ready-to-eat foods such as hotdogs, deli meats, and left-over foods.
Parvovirus	E	III	There is not yet evidence that screening for antibody status against parvovirus or counseling about ways to avoid infection in pregnancy will improve perinatal outcomes. Good hygiene practices should be encouraged for all pregnant women.
Malaria	C	III	Women who are planning a pregnancy should be advised to avoid travel to malaria-endemic areas. If travel cannot be deferred, the traveler should be advised to defer pregnancy and use effective contraception until travel is completed and to follow preventive approaches. Antimalarial chemoprophylaxis should be provided to women who plan a pregnancy who travel to malaria-endemic areas.
Gonorrhea	B	II-2	High-risk women should be screened for gonorrhea during a preconception visit, and women who are infected should be treated. Screening should also occur early during pregnancy and be repeated in high-risk women.
Chlamydia	A	I-a	All sexually active women $\leq$ 25 years and all women at increased risk for infection with Chlamydia (including women with a history of STI infections, new or multiple sexual partners, inconsistent condom use, sex work, and drug use) should be screened at routine encounters before pregnancy.
Syphilis	A	II-1	High-risk women should be screened for syphilis during a preconception visit, and women who are infected should be treated. Because the United States Preventive Services Task Force and Centers for Disease Control and Prevention recommend screening all women during pregnancy for syphilis, screening for syphilis immediately before conception is recommended.
Herpes simplex virus	B	II-1	During a preconception visit, women with a history of genital herpes should be counseled about the risk of vertical transmission to the fetus and newborn child; women with no history should be counseled about asymptomatic disease and acquisition of infection. Although universal serologic screening is not recommended in the general population, type-specific serologic testing of asymptomatic partners of persons with genital herpes is recommended.
Asymptomatic bacteriuria	E	II-1	There have been no studies to show that women with asymptomatic bacteriuria who are identified and treated in the preconception period have lower rates of low birthweight births. Further, women often have persistent or recurrent bacteriuria, despite repeated courses of antibiotics; such re-infection frequently occurs within a few months of treatment. Thus, a woman who is identified and treated for asymptomatic bacteriuria before conception must be screened again during pregnancy. For these reasons, screening for this condition as part of routine preconception care currently is not recommended.
Periodontal disease	C	I-b	There are no studies that evaluate the role of preconception or interconception screening and treatment of periodontal disease and its effect on reproductive outcomes. Routine screening and treatment of periodontal disease during preconception care, although of considerable benefit to the mother, is not recommended at this time as part of preconception care, because there is no clearly shown benefit to the fetus.
Bacterial vaginosis (BV)	D (women without preterm delivery); C (women with preterm delivery)	I-b	There are no studies that evaluate the role of preconception or interconception screening and treatment for BV and its effect on reproductive outcomes; such studies are a high priority. Routine screening and treatment of BV among asymptomatic pregnant women of average risk should not be performed because of the lack of demonstrated benefit and the possibility of adverse effects of treatment for women without BV. For pregnant women with previous preterm delivery, the inconsistent results of well-done studies prevent a clear recommendation for or against screening; however, some studies support early screening and treatment with a regimen that contains oral metronidazole. For women with symptomatic BV infection, treatment is appropriate for pregnant women and for women planning pregnancy.

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**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
Group B <i>Streptococcus</i>	E	I-2	Screening for group B <i>Streptococcus</i> colonization at a preconception visit is not indicated and should not be performed.
<b>Medical conditions</b>			
Diabetes mellitus	A	I	All women with diabetes mellitus should be counseled about the importance of diabetes mellitus control before considering pregnancy. Important counseling topics include maintaining optimal weight control, maximizing diabetes mellitus control, self-glucose monitoring, a regular exercise program, and tobacco, alcohol, and drug cessation, along with social support to assist during the pregnancy. In the months before pregnancy, these women should demonstrate as near-normal glycosylated hemoglobin level as possible for the purpose of decreasing the rate of congenital anomalies. Women with poor control of their diabetes mellitus should be encouraged to use effective birth control. Testing to detect prediabetes and type 2 diabetes in asymptomatic women should be considered in adults who are overweight or obese (BMI $\geq$ 25 kg/m <sup>2</sup> ) and who have 1 or more additional risk factors for diabetes, including a history of gestational diabetes mellitus.
(overweight and obese adults)	B	II-2	
Thyroid disease	A	II-1	Women with hypothyroidism should be counseled about the risks of this condition to pregnancy outcomes and the importance of achieving optimal replacement therapy before conception. All women with symptoms of hypothyroidism should be screened for thyroid disease; if there is hypothyroidism, adequate therapy should be initiated.
Phenylketonuria	A	II-1	Women of reproductive age with phenylketonuria should be counseled about the importance of maintaining a low phenylalanine level during their childbearing years and should be encouraged to resume a low phenylalanine diet, particularly when they are planning to become pregnant, to avoid adverse outcomes for the offspring. Women who do not desire a pregnancy should be encouraged to use contraception.
Seizure disorders	A	II-2	Women of reproductive age with seizure disorders should be counseled about the risks of increased seizure frequency in pregnancy, the potential effects of seizures and anticonvulsant medications on pregnancy outcomes, and the need to plan their pregnancies with a healthcare provider well in advance of a planned conception. Women who take liver enzyme-inducing anticonvulsants should be counseled about the increased risk of hormonal contraceptive failure. Whenever possible, women of reproductive age should be placed on anticonvulsant monotherapy with the lowest effective dose to control seizures. Women who are planning a pregnancy should be fully evaluated for consideration of alteration or withdrawal of the anticonvulsant regimen before conception, and folic acid supplementation of 4 mg per day should be initiated for at least 1 month before conception and until the end of the first trimester to prevent neural tube defects.
Hypertension	A	II-2	Women of reproductive age with chronic hypertension should be counseled about the risks associated with hypertension during pregnancy for both the woman and her offspring and the possible need to change the antihypertensive regimen when she is planning a pregnancy. Women with hypertension for several years should be assessed for ventricular hypertrophy, retinopathy, and renal disease before pregnancy. Angiotensin-converting enzyme inhibitors and angiotensin-receptor blockers are contraindicated during pregnancy; women who could become pregnant while taking these medications should be counseled about their adverse fetal effects and should be offered contraception if they are not planning a pregnancy. Women who are planning a pregnancy should discontinue these medications before pregnancy.
Rheumatoid arthritis	A	III	Women with known history of rheumatoid arthritis should be advised of the natural history of the disease during pregnancy and the probability of a flare after pregnancy. The most important task is to review the patient's medication use. Nonsteroidal antiinflammatory drugs should be discontinued by 27 weeks of gestation. Methotrexate and leflunomide are extremely teratogenic and should be stopped in men and women planning a pregnancy.

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**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
Lupus	B	II-2	Women of reproductive age with lupus should be counseled about the risks associated with lupus during pregnancy for both the woman and her offspring, the importance of optimizing disease control before pregnancy, the possible need to change the medication regimen close to conception or early in pregnancy, and the importance of specialized prenatal care once pregnant. Women whose treatment regimen involves cyclophosphamide should be advised of its teratogenic nature; whenever possible, the treatment should be changed to a safer regimen before conception, and the women should be offered contraception if they are not planning a pregnancy.
Renal disease	B	II-2	Women of reproductive age with renal disease should be counseled about the likelihood of progression of renal disease during pregnancy and irrespective of pregnancy, the increased risk of adverse pregnancy outcomes for the woman and offspring, and the importance of achievement or maintenance of normal blood pressure before conception. Angiotensin-converting enzyme inhibitors and angiotensin-receptor blockers are contraindicated during pregnancy; women who could become pregnant while taking these medications should be counseled about their adverse fetal effects and should be offered contraception if they are not planning a pregnancy. Women who are planning a pregnancy should discontinue these medications before pregnancy in favor of a safer regimen, whenever possible. Women who do not desire pregnancy should be offered an appropriate method of contraception.
Cardiovascular disease	B	III-3	Women of reproductive age with cardiac disease should be counseled about the risks that pregnancy presents to their health and the risks of the cardiac condition and any medications needed to treat the condition (eg, warfarin) on pregnancy-related outcomes. Women who are considering or planning a pregnancy should be counseled to achieve optimum control of the condition before conception and should be offered a suitable contraceptive method to achieve optimum timing of the pregnancy. Women whose treatment regimen involves warfarin should be counseled about its teratogenic nature; whenever possible, the treatment should be changed to a less teratogenic anticoagulant before conception. Women with a congenital cardiac condition should be offered preconception genetic counseling. Women who do not desire a pregnancy should be offered a suitable form of contraception.
Thrombophilia	C (women not using warfarin); B (women using warfarin)	III  II-3	Providers may consider screening women of childbearing age for a personal or family history of venous thrombotic events or recurrent or severe adverse pregnancy outcomes. Women with a personal or family history suggestive of thrombophilia may then be offered counseling and testing for thrombophilias if they are contemplating pregnancy. Screening for thrombophilias with laboratory testing in routine care is not recommended. Women of reproductive age with a known genetic thrombophilia should be offered preconception genetic counseling to address the risk of the condition to the offspring. Women of reproductive age with a thrombophilia whose treatment regimen involves warfarin should be counseled about its teratogenic nature; whenever possible, the treatment should be changed to a less teratogenic anticoagulant before conception.
Asthma	B	II-3	All women with asthma should be counseled about the potential for their asthma control to worsen with pregnancy and the importance of achieving asthma control before a pregnancy through appropriate medical management and avoidance of triggers. Women with asthma who are planning to become pregnant or who could become pregnant should be treated with pharmacologic step therapy for their chronic asthma based on the American College of Allergy, Asthma, and Immunology–American College of Obstetricians and Gynecologists recommendations for the Pharmacologic Step Therapy of Chronic Asthma During Pregnancy. Women with poor control of their asthma should be encouraged to use effective birth control until symptom control is achieved.

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**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
<b>Psychiatric condition</b>			
Depression/anxiety	B	III	Providers should screen and be vigilant for depression and anxiety disorders among women of reproductive age because treating or controlling these conditions before pregnancy may help prevent negative pregnancy and family outcomes. Women of reproductive age with depressive and anxiety disorders who are planning a pregnancy or who could become pregnant should be informed about the potential risks of an untreated illness during pregnancy and about the risks and benefits of various treatments during pregnancy.
Bipolar disease	B	III	Women of reproductive age with bipolar disorder should be counseled that pregnancy is a time of substantial risk of relapse, particularly after discontinuation of ongoing mood-stabilizing maintenance treatment. A relapse prevention and management strategy for bipolar disorder should be outlined before the patient attempts conception. Women of reproductive age with bipolar disorder should be counseled regarding contraceptive options, which should include options that will prevent conception during bipolar episodes.
Schizophrenia	B	III	Women of reproductive age with schizophrenia should be counseled, together with a partner or family member whenever possible, about the risks of pregnancy on their condition and the risk of their condition on pregnancy-related outcomes. They should be counseled about the importance of prenatal care, and a relapse prevention and management strategy of the illness should be outlined before the patient attempts conception. Appropriate contraception should be offered to women who do not desire a pregnancy.
<b>Parental exposure</b>			
Alcohol	B	I-a	All women of childbearing age should be screened for alcohol use, and brief interventions should be provided in primary care settings, which should include advice regarding the potential for adverse health outcomes. Brief interventions should include accurate information about the consequences of alcohol consumption, which should include the effects of drinking during pregnancy, information about effects beginning early during the first trimester, and warnings that no safe level of consumption has been established. Women who show signs of alcohol dependence should be educated about the risks of alcohol consumption; for women who are interested in modifying their alcohol use patterns, efforts should be made to identify programs that would assist them in achieving cessation and long-term abstinence. Contraception consultation and services should be offered and pregnancy should be delayed until it can be an alcohol-free pregnancy.
Tobacco	A	I-a	All women of childbearing age should be screened for tobacco use. Brief interventions should be provided to all tobacco users and should include brief counseling that describes the benefits of not smoking before, during, and after pregnancy; discussion of medication; and referral for more intensive services (individual, group, or telephone counseling) if the woman is willing to use these services. For pregnant women, augmented counseling interventions should be used.
Illicit substances	C	III	A careful history should be obtained to identify use of illegal substances as part of the preconception risk assessment. Men and women should be counseled about the risks of using illicit drugs before and during pregnancy and offered information on programs that support abstinence and rehabilitation. Contraception services should be offered, and pregnancy should be delayed until individuals are drug free.

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**Potential component  
of preconception  
care**

Potential component of preconception care	Strength	Quality	Recommendation
<b>Family and genetic history</b>			
All individuals	B	III	All women who are considering pregnancy should have a screening history in the preconception visit. Providers should ask about risks to pregnancy on the basis of maternal age, maternal and paternal medical conditions, obstetric history, and family history. Ideally, a 3-generation family medical history should be obtained for both members of the couple, with the goal of identifying known genetic disorders, congenital malformations, developmental delay/mental retardation, and ethnicity. If this screening history indicates the possibility of a genetic disease, specific counseling should be given, which may include referral to a genetic counselor or clinical geneticist.
Ethnicity-based	B	II-3	Couples who are at risk for any ethnicity-based conditions should be offered preconception counseling about the risks of that condition to future pregnancies. Screening and/or testing should be offered on the basis of the couples' preferences. This may require referral to a genetic counselor or clinical geneticist, especially in the instance of a positive finding.
Family history	B	II-3	Individuals identified as having a family history of developmental delay, congenital anomalies, or other genetic disorders should be offered a referral to an appropriate specialist to better quantify the risk to a potential pregnancy.
Previous pregnancies	C	III	If at least 1 member of a couple has a known chromosomal anomaly, in vitro fertilization with preimplantation genetic diagnosis should be discussed.
Known genetic conditions	B	II-3	Suspected genetic disorders may require further work-up prior to conception. Known or discovered genetic conditions should be optimally managed before and after conception.
<b>Nutrition</b>			
Dietary supplements	C	III	All women of reproductive age should be asked about their use of dietary supplements (vitamins, minerals, traditional/home remedies, herbal products, weight loss products, etc) as part of preconception care and should be advised about what is or is not known about their safety, impact, and efficacy.
Vitamin A	B	III	Currently the recommended dietary allowance of preformed vitamin A for women is 700 retinal activity equivalents (RAEs) per day, with a tolerable upper intake level for pregnancy of 3000 RAEs/day or 10,000 IU/day).
Folic acid	A	I-a	All women of reproductive age should be advised to ingest 0.4 mg (400 $\mu$ g) of synthetic folic acid daily that is obtained from fortified foods and/or supplements. In addition, all women should be advised to consume a balanced, healthy diet that includes folate-rich foods.
Multivitamins	A	II-2	All women of reproductive age should be encouraged to take a folic acid-containing multivitamin supplement for the purpose of supporting healthy pregnancy outcomes and preventing congenital anomalies.
Vitamin D	B	II-3	There is insufficient evidence to recommend for or against routine screening or vitamin D supplementation during preconception counseling. Based on the emerging data of the importance of vitamin D for women and infants, however, clinicians should be aware of the risk factors for vitamin D deficiency. Additionally, for women with vitamin D deficiency, education on vitamin D in the diet and supplementation should be a part of preconception care. Currently, we do not have data for the optimal dose before and during pregnancy. More data are needed urgently.

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TABLE

**Strength of the recommendations and the quality of the evidence for preconception clinical intervention to improve maternal or the infant health**

Continued from page S274.

**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
Calcium	A	I-b	Women of reproductive age should be counseled about the importance of achieving the recommended calcium intake level through diet or supplementation. Calcium supplements should be recommended if dietary sources are inadequate.
Iron	A	I-b	At a preconception visit, screening should be conducted for women with risk factors for iron deficiency for the purposes of identifying and treating anemia. There is evidence to recommend that all women be screened at a preconception visit for iron deficiency anemia for the purpose of improving perinatal outcome.
Essential fatty acids	B	I-b	During the preconception period, women should be encouraged to eat a diet rich in essential fatty acids, including omega-3 and omega-6 fatty acids. To achieve this, women should be advised to consume at least 12 ounces of fish and no more than 6 ounces of canned albacore tuna weekly. More research is needed critically to assess the risks and benefits of fish and fish oil consumption during the preconception period.
Iodine	A	II-2	Women of reproductive age with iodine deficiency should be counseled about the risks of this condition to pregnancy outcomes and about the importance of maintaining adequate daily dietary iodine intake of 150 $\mu\text{g}$ during preconception and at least 200 $\mu\text{g}$ when pregnant or lactating. Public health efforts to implement salt iodization programs should be encouraged for all women who reside in regions with endemic iodine deficiency.
Overweight	A	I-b	All women should have their BMI calculated at least annually. All women with a BMI of $\geq 25 \text{ kg/m}^2$ should be counseled about the risks to their own health, the additional risks associated with exceeding the overweight category, and the risks to future pregnancies, including infertility. All women with a BMI of $\geq 25 \text{ kg/m}^2$ should be offered specific strategies to improve the balance and quality of the diet, to decrease caloric intake, and to increase physical activity and should be encouraged to consider enrolling in structured weight loss programs.
Underweight	A	III	All women should have their BMI calculated at least annually. All women with a BMI of $\leq 18.5 \text{ kg/m}^2$ should be counseled about the short- and long-term risks to their own health and the risks to future pregnancies, including infertility. All women with a low BMI should be assessed for eating disorders and distortions of body image.
Eating disorders	A	III	All women with anorexia and bulimia should be counseled about the risks to fertility and future pregnancies. Women with these disorders should be encouraged to enter into treatment programs before pregnancy.
<b>Environmental exposure</b>			
Mercury	B	III	Women of childbearing age who may become pregnant should avoid consumption of shark, swordfish, King mackerel, and tile fish. Other fish consumption (such as tuna) should also be limited but is allowed in up to 2 meals of 3 oz each per week. Many state government agencies issue fish advisories and bans relating to mercury concentration in locally caught fish. In addition, the maternal diet may be supplemented with essential fatty acids from nonseafood sources.
Lead	C	II-2	There is insufficient evidence to recommend that all women should be screened for elevated levels of lead for the purpose of improving perinatal outcomes. However, women who are exposed to high levels of lead or with a history of known high lead levels, including childhood lead poisoning, should be counseled about the risk of lead to the unborn child. For women with a history of high blood lead levels, it is reasonable to test the serum lead level and, if elevated, to initiate activities to lower the levels before conception.

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TABLE

**Strength of the recommendations and the quality of the evidence for preconception clinical intervention to improve maternal or the infant health**

Continued from page S275.

**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
Soil and water hazards	B	III	During a preconception visit, women should be asked if their well water has ever been tested or if there have been questions about their municipal water quality in the past. Any possible water quality problems should be investigated by the local health department; if concerns are identified, women should use bottled water for drinking and cooking. Depending on the contaminant and its concentrations, alternative locations for bathing may also be required. Although not derived from the ambient environment, dietary exposure to Bisphenol A (BPA) from canned food liners or water bottles is an emerging hazard generating conflicting recommendations from public health agencies. During the preconception visit, women should be advised about BPA avoidance in their diet.
	B (BPA avoidance)	II	
Workplace exposure	B	III	During a preconception visit, women should be asked about the work environment. If potential exposures are identified, consultation with an occupational medicine specialist may assist with a more detailed investigation regarding recommendations for work modification.
Household exposure	A	III	During a preconception visit, women should be asked about the home environment. If potential exposures are identified, consultation with an occupational medicine specialist may assist with a more detailed investigation regarding recommendations for modification of exposures.
<b>Psychosocial risk</b>			
Inadequate financial resources	C	III	All women should be asked about their economic status, and women who appear to be struggling financially should be referred to an agency that can check their eligibility for various types of financial assistance.
Access to care	C	III	All women should be asked about their health insurance coverage and their usual source of care. If they do not have health insurance, they should be referred to a welfare office or a private social service agency to determine their eligibility for public insurance. If they do not have a usual source of care, one should be established that will accept their insurance coverage or provide care free of charge or on a sliding fee basis.
Physical/sexual abuse	C	III	All women should be asked about their experiences of physical, sexual, or emotional violence from any source (parents, intimate partners, or strangers) currently, in the recent past, or as children. For women who are being abused or who have been abused in the recent past, the provider should express strong concern and willingness to assist in correcting the abusive situation. Appropriate evaluation, counseling, and treatment for physical injuries, sexually transmitted infections, unintended pregnancy, and psychologic trauma should be offered, which should include the provision of emergency contraception and empiric antimicrobial therapy in the case of sexual assault. Women should be offered information about community agencies that specialize in abuse for counseling, legal advice, and other services. Every clinician who sees women should have a list of such agencies easily available.
<b>Medication</b>			
Prescription	A	II-2	As part of preconception care, all women should be screened for the use of teratogenic medications and should receive counseling about the potential impact of chronic health conditions and medications on pregnancy outcomes for mother and child. Whenever possible, potentially teratogenic medications should be switched to safer medications before conception. For women with chronic conditions with serious morbidity (to mother and infant), the fewest number and lowest dosages of essential medications that control maternal disease should be used. For women who do not desire pregnancy, a plan for contraception should be addressed and initiated.
Over-the-counter medication	A	III	Health care providers should educate women of reproductive age about the need to discuss the use of over-the-counter medications with their provider when planning a pregnancy. Women should be advised specifically not to use aspirin if they are planning a pregnancy or become pregnant.

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TABLE

**Strength of the recommendations and the quality of the evidence for preconception clinical intervention to improve maternal or the infant health**

Continued from page S276.

**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
Dietary supplements	A	II-c	Health care providers should educate women of reproductive age about the need to discuss the use of dietary supplements before pregnancy (which include herbs, weight loss products, and sport supplements) and should caution women about the unknown safety profile of many supplements. High-quality and prescription-quality dietary supplements should be encouraged.
<b>Reproductive history</b>			
Prior preterm birth infant	A	I-a	Pregnancy history should be obtained from all women of reproductive age. Women with a history of preterm or low-birthweight infant should be evaluated for remediable causes to be addressed before the next pregnancy and should be informed of the potential benefit of treatment with progesterone in subsequent pregnancy.
Prior cesarean delivery	A	II-2	Preconception counseling of women with previous cesarean delivery should include counseling about waiting at least 18 months before the next pregnancy and about possible modes of delivery so the patient enters the next pregnancy informed of the risks and options. Ideally, the counseling should begin immediately after the cesarean delivery and continue at postpartum visits.
Prior miscarriage	A	I-a	Women with sporadic spontaneous abortion should be reassured of a low likelihood of recurrence and offered routine preconception care. Women with $\geq 3$ early losses should be offered a work-up to identify a cause. Therapy that is based on the identified cause may be undertaken. For women with no identified cause, the prognosis is favorable with supportive care.
Prior stillbirth	B	II-2	At the time of the stillbirth, a thorough investigation to determine the cause should be performed and communicated to the patient. At the preconception visit, women with a previous stillbirth should receive counseling about the increased risk of adverse pregnancy outcomes and may require referral for support. Any appropriate work-up to define the cause of the previous stillbirth should be performed if it was not done as part of the initial workup. Risk factors that can be modified before the next pregnancy should be addressed (eg, smoking cessation).
Uterine anomalies	B	II-3	A uterine septum in a woman with poor previous reproductive performance should be corrected hysteroscopically before the next conception. All other anomalies call for specific delineation of the anomaly and any associated vaginal and renal malformations. Although surgical correction may be advised in some cases, heightened awareness and surveillance during a subsequent pregnancy and labor should help optimize outcomes.
<b>Special populations</b>			
Women with disabilities	B	III	Women with disabilities should receive counseling about the risks of any medications that they use and about options to alter dosage or switch to safer medications before conception. The medical, social, and psychologic issues that are related to pregnancy and the disability should be assessed, and the woman and her family should be counseled about them. Healthcare providers should offer women with disabilities contraceptive choices that are practical and appropriate for the individual's medical and personal needs. Issues that involve informed consent and guardianship must be addressed when caring for women with developmental disabilities in relation to contraception and pregnancy. Referral for genetic counseling, if appropriate, is indicated for all women before conception; however, it may raise difficult psychosocial issues for women with disabilities; therefore, counseling referrals should be handled sensitively.

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**TABLE**  
**Strength of the recommendations and the quality of the evidence**  
**for preconception clinical intervention to improve maternal or the infant health**

Continued from page S277.

**Potential component of preconception care**

Potential component of preconception care	Strength	Quality	Recommendation
Immigrant and refugee populations	B	III	Given the opportunistic fashion in which preconception care of immigrant and refugee women typically must occur, it is important to consider preconception concerns as part of all health care encounters with such women of reproductive age. Referring immigrant and refugee women to a source of ongoing primary care that is culturally and linguistically competent, and that will accept their insurance coverage or provide care free of charge or on a sliding-scale basis, is important for all such women. Seek to identify and understand the needs of immigrant women and their families; understand immigrants' potential for increased medical and social risks and previously undetected medical problems; deliver services and written materials in the preferred language of the population served; ensure that interpretation and translation services comply with all relevant federal, state, and local mandates governing language access; integrate preconception care into refugee screening; work with ethnic community-based organizations to provide preconception care messages in nonhealth care settings such as English as a Second Language classes; screen immigrants at high risk for tuberculosis and refer for them for treatment as indicated; screen immigrants born in Asia, the Pacific Islands, Africa, and other countries where hepatitis B is highly endemic, with the hepatitis B surface antigen test; assess the immunization history, including the rubella status, of immigrant women and administer any needed vaccines, or refer the women for these services; assess the mental health of immigrant women and refer them for services as needed.
Cancer	A	III	Newly diagnosed cancer survivors should be educated about fertility preservation options as soon as feasible and should be referred to reproductive specialists if these options are desired. Cancer survivors who consider pregnancy should be counseled about the potential reproductive effects of various cancer treatments on fertility and on pregnancy. Women who have received alkylating chemotherapeutic agents and/or pelvic or abdominal radiation should be counseled that they have an increased risk for premature ovarian failure. Women who have had pelvic or abdominal irradiation should be counseled that they are at risk for having a low birthweight infant. When considering pregnancy, breast cancer survivors who are candidates for selective estrogen receptor modulators should be counseled that these agents are generally avoided during pregnancy because of case reports of animal and human birth defects. A reliable nonhormonal contraceptive method should be used during treatment with a selective estrogen receptor modulator. Genetic counseling and testing should be offered to survivors of cancers that are linked to genetic mutations to inform their decisions about future reproduction. Female cancer survivors who received anthracycline chemotherapy, radiation to the heart or surrounding tissues, or both should be evaluated by a cardiologist before conception. Annual breast screening for female childhood cancer survivors who received chest radiation is recommended beginning at age 25 years.
Men	B	III	Despite the challenges and barriers, we recommend that each man who is planning with their partner to conceive a pregnancy should undergo a comprehensive medical evaluation for the purposes of disease prevention and detection and preconception education. Management should be optimized for any high-risk behaviors or poorly controlled disease states before conception is attempted.

Jack. The clinical content of preconception care: an overview and preparation of this supplement. *Am J Obstet Gynecol* 2008.

haviors simultaneously (eg, the “package of preconception services”) have not been well-studied. There is strong evidence from multiple sources, which include randomized trials before pregnancy, for only a few conditions (eg, folic acid, diabetes mellitus). For some cases, the recommendations were based on case series that were

specific to the preconception period (eg, phenylketonuria, rubella immunization); other recommendations were extrapolated from pregnancy guidelines or from data that were collected during pregnancy (eg, periodontal disease). For others (such as interventions that are related to smoking, alcohol misuse, and obesity), recom-

mendations were based on studies of interventions that were delivered in primary care and not specifically delivered as part of preconception care. In some instances, recommendations were based on common sense. For example, most would agree that if genetic counseling is to be done, it is best done before pregnancy rather than

during pregnancy. Overall, based on the available evidence, there is a relatively short list of core interventions for which there is substantial evidence of efficacy when applied in the preconception period.

### Summary of preconception recommendations

The Table provides a summary list of the topics that were reviewed, the consensus recommendation for each topic, the strength of the recommendation, and the rating of the quality of the evidence. Together, we believe that these recommendations represent the current state of the art

in defining the evidence-based best practices in preconception care. These recommendations also identify the areas of preconception care in which more research is needed. We expect these recommendations to change as more information inevitably becomes available. ■

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