Preconception Care

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Protocols of health care for women as preparation for pregnancy have been practiced for many years. Methods have included general counseling by physicians, testing for rubella and syphilis as part of family planning programs, and genetic screening and counseling. Over the last two decades, increasingly varied programs have been developed, often as part of high-risk prenatal clinic activities that target specific medical risks before conception. In recent years the idea has emerged of an organized comprehensive program that identifies and reduces reproductive risks for women before conception. These concepts have been termed *preconception care.*

In *Preventing Low Birthweight,*[1] the Institute of Medicine (IOM) supports the concept of preconception care. The Committee to Study the Prevention of Low Birthweight of the IOM suggested that an attempt to identify and reduce the risks to pregnancy, particularly the risks of low birthweight, is worthwhile and should be extended into the prepregnancy period. As a follow-up to this report, the Expert Panel on the Content of Prenatal Care was commissioned by the US Public Health Service, Division of Maternal and Child Health, and the National Institute of Child Health and Human Development. The panel's report, *Caring for Our Future: The Content of Prenatal Care,*[2] recommended that preconception care be an integral part of prenatal care for all women.

Development of this concept has been identified as a priority for the 1990s.[3,4] Increasing the proportion of primary care physicians who provide age-specific preconception counseling to patients has been set forth as a national objective for the year 2000.[5] An understanding of the information available about preconception care will allow family physicians to begin to integrate these concepts into practice. This article describes specific conditions for which care before conception may be important, it reviews the history of and current approaches to preconception care, and it discusses access to and cost of preconception care.

Some Components of Preconception Care

The ability of preconception activities to improve obstetric outcome will depend upon the recognition of risks and the availability of effective interventions that are acceptable to women and their families. Consequently, the components of preconception care parallel those of prenatal care: (1) risk assessment, (2) health promotion, and (3) medical and psychosocial intervention including follow-up. Tables 1 through 3 list the activities of the preconception visit as suggested by the Expert Panel on the Content of Prenatal Care.[2]

An important consideration when recommending that an activity be done during the preconception period is whether its value is enhanced if done before conception or whether that activity is equally effective when performed early in pregnancy. The period of greatest sensitivity to the environment for the developing fetus is between 17 and 56 days after conception. Many structural anomalies have already occurred by the end of the 8th week and certainly by the end of the first trimester.[6] In 1985 in the United States, 24.5% of women initiated prenatal care only after the first trimester or had no prenatal care at all.[7] Preconception counseling may affect some patients who otherwise would not seek care until after this critical period. To reach women most in need, programs should be integrated not only into primary care practice but also into settings in which preventive reproductive medicine is not traditionally practiced, such as halfway houses, detention centers, substance abuse treatment centers, and women's shelters.

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Table 1. Components of Preconception Care as Part of Primary Care Services: Risk Assessment

History
Development of a pregnancy-oriented, health-risk profile based on a personal and psychosocial assessment for age extremes, smoking, alcohol or drugs, inadequate diet, inadequate social support, high stress levels, family violence, mental illness, exposure to teratogens, inadequate housing or finances, extremes of physical work and exercise, pregnancy readiness
Development of a pregnancy-oriented, health-risk profile based on a medical assessment to include menstrual, past obstetric, contraceptive, sexual, medical and surgical, family and genetic history
Physical examination
To include a general physical examination, blood pressure and pulse, height and weight, pelvic examination, clinical pelvimetry, and breast examination
Laboratory evaluation
For women identified at high risk: hemoglobin or hematocrit, and screening tests for gonococcus, syphilis, chlamydia, illicit drug use, tuberculosis, HIV, cytomegalovirus, herpes simplex, varicella, hemoglobinopathies and Tay-Sachs disease
Screening for all women whose Rh status is unknown, or whose immunity to rubella, hepatitis B, and toxoplasmosis has not been documented previously

High-Risk Behaviors

Smoking contributes to many obstetric problems such as low birthweight, placenta previa, and spontaneous abortion. During 1983 in the United States, some 35,816 low birthweight infants, or about 14.5% of all low birthweight deliveries, and 6.6% of all admissions to neonatal intensive care units can be attributed to maternal smoking. The neonatal intensive care unit admissions alone cost $272 million.[8] Nevertheless, 21% to 30% of pregnant women in the United States smoke throughout pregnancy.[9] When questioned in a 1985 national survey, 34% of women still smoking were unaware that smoking increases the risk of miscarriage; 43% were unaware that it is associated with stillbirth; 36% were unaware of its link with premature birth; and 26% did not know that it increases the risk of low birthweight.[10] A review of the literature found no studies that have identified whether stopping smoking before conception is of greater benefit to the pregnancy than stopping early in pregnancy. Common sense mandates that women contemplating pregnancy stop smoking.

Table 2. Components of Preconception Care as Part of Primary Care Services: Health Promotion

Advice about how to decrease risks; counseling to promote healthful behaviors that include proper nutrition; avoidance of smoking, alcohol, and teratogens; and safe sex
Referral for ongoing care as appropriate
Advice on birth spacing
Recommendation to record the date of the last menstrual period while the patient is attempting to conceive
Counseling regarding availability and importance of early registration and compliance with prenatal care, including in high-risk programs, if warranted
Identification of real or perceived barriers to family planning, and prenatal care and assistance in overcoming them
Arrangements for periodic follow-up

Table 3. Components of Preconception Care as Part of Primary Care Services: Interventions for Commonly Identified Reproductive Risks

Treatment of existing medical conditions including altering of medication use
Rubella and hepatitis immunization
Counseling or referral to treatment programs to reduce psychosocial risks, including smoking cessation, alcohol avoidance, and abstinence from illicit drug use
Nutrition counseling, supplementation (including vitamins and iron), or referral to improve adequacy of diet
Home visits to further assess and intervene in the home environment
Provision of family planning services
Other interventions that may involve home health agencies, community mental health centers, safe shelter, enrollment in medical assistance, assistance with housing, referral for social support

Excessive alcohol intake early in pregnancy can have devastating consequences for the fetus.[11] Fetal alcohol syndrome outranks Down syndrome and spina bifida in prevalence and is now the leading known cause of mental retardation.[12] Only 55% percent of women questioned in a 1985 study had heard of the fetal alcohol syndrome, and fewer than 25% knew it included congenital defects.[10] The understanding of the dose-related response to alcohol in pregnancy is still in evolution. An estimated 11% of women who drink between 1 and 2 oz of absolute alcohol a day during the first trimester have babies with features consistent with the prenatal effects of alcohol.[13] All women of childbearing age should be informed about the consequences of alcohol intake in the first trimester on the fetus and should limit intake.

Current studies show that many women of childbearing age use cocaine.[14] Its use during pregnancy can cause spontaneous abortion, premature delivery, premature detachment of the placenta, fetal growth retardation, and congenital anomalies.[15–19] Newborn infants exposed to cocaine during pregnancy may show signs of central

nervous system dysfunction.[20–22] One study showed that infants born to cocaine-using women when compared with infants born to drug-free women have a reduced mean gestational age at birth and are more likely to be small for gestational age. If the mother stopped using cocaine in early pregnancy, an increased proportion went to full term, and there was an improvement in intrauterine growth. When compared with the general population, those women using cocaine in the first trimester experienced an increased rate of premature detachment of the placenta. It may be that the damage done to placental and uterine vessels in early pregnancy by cocaine places these pregnancies at continued risk even if cocaine use ceases.[23] For this reason, there may be specific benefits of stopping cocaine before pregnancy. Alternatively, pregnancy prevention measures may be encouraged for those women who continue to use cocaine or other substances.

Nutrition

A women's nutrition before pregnancy may have profound effects on reproductive outcome. Babies born to underweight women who gain little weight during pregnancy are at particularly high risk of fetal and neonatal deaths.[24] Extreme obesity is associated with such conditions as gestational diabetes, hypertension, macrosomic infants, shoulder dystocia, and prolonged labor.[25] Preconception assessment of nutrition status should evaluate women for underweight or overweight status and also for conditions such as bulemia, anorexia, or pica and special dietary habits such as hypervitaminosis. Once problems are identified, nutritional counseling and in some cases treatment of an underlying emotional condition can be initiated.

Nutrition may be related to the occurrence of some neural tube defects (NTDs). Women from lower socioeconomic groups[26,27] and women whose dietary histories show evidence of vitamin deficiencies[28] more commonly give birth to offspring affected by NTDs. Women who have previously had fetuses affected by NTDs are at increased risk of having similarly affected fetuses in subsequent pregnancies. In separate studies mothers with one affected child have been given either folate alone[29] or a multivitamin preparation[30] to reduce the risk of having a second affected infant. In the latter study, lower rates of recurrent NTDs in the offspring of women followed the use of prenatal multivitamins that include folic acid begun at least 28 days before conception. The rate of recurrence in those supplemented before conception was 0.7%, compared with 4.7% of those not supplemented. Data from the Atlanta Birth Defects Case-Control Study showed that there was an overall apparent decrease of NTDs in babies of women who used multivitamins in the periconceptional period. Whether this outcome was a result of the multivitamin use or the result of other characteristics of women who use multivitamins is unclear.[31]

A recent study of 23,491 women questioned at 16 weeks' gestation about multivitamin intake showed that those who never used multivitamins before or after conception had a prevalence of infants with NTDs of 3.5 per 1000 births. The prevalence of NTDs for women who used multivitamins containing folic acid during the first 6 weeks of pregnancy was 0.9 per 1000. For women who used multivitamins without folic acid during the first 6 weeks of pregnancy and women who used multivitamins containing folic acid after 7 or more weeks of pregnancy, the prevalences were similar to those for nonusers.[32] Studies are now in progress to determine which, if any, components of multivitamins prevent birth defects when taken periconceptionally and in the first trimester.[33]

Psychosocial Risks

Preconception risk assessment provides a unique opportunity to identify risks related to social factors including single marital status, inadequate housing, low income, less than high school education, and working in a toxic environment. Psychological risks that can be identified by a sensitive interview include inadequate personal support, deficient coping skills, living in an abusive situation, high stress and anxiety, and psychiatric conditions. Further, psychosocial assessment can identify real or perceived barriers to family planning or early prenatal care enrollment. With the knowledge gained from preconception risk assessment, psychosocial interventions may be initiated, including referral to potentially helpful social and mental health programs.

Preconception health promotion provides the opportunity to offer counseling about pregnancy planning, spacing, and contraception as well as the opportunity to give counseling on the availability of social programs, including vocational training, which might be considered an alternative to pregnancy. The preconception visit provides an opportunity to intervene in such ways as home visitation to treat psychosocial risks,[34] provision of social services and financial assistance, referral to a community mental health center, and provision of contraception or referral for family planning.[35]

Maternal Medical Disease

Preconception care of women with known medical disease may prevent anomalies or newborn illness. There is

evidence that management of medical conditions such as diabetes mellitus and phenylketonuria before conception can positively influence pregnancy outcome. Also, in certain conditions such as epilepsy, modification of a therapeutic regimen before pregnancy may have benefit.

Phenylketonuria (PKU): Children affected by PKU can be treated effectively with a diet low in phenylalanine. By the childbearing years, however, this dietary treatment is often discontinued. A survey of children born to mothers who had no dietary management of their disease during pregnancy found that 92% of the children were mentally retarded, 73% had microcephaly, 12% had congenital heart disease, and 40% were low birthweight.[36] These abnormalities result from the effects of the mother's elevated blood phenylalanine or related abnormal metabolites on the developing fetus. Dietary therapy that reduces the maternal blood phenylalanine level and eliminates or reduces phenylalanine metabolite accumulation during pregnancy may protect the fetus. The diet needs to begin before conception and continue throughout pregnancy for maximal fetal protection.[37,38] Careful planning before conception is critical to the success of this treatment.[39]

Diabetes mellitus: Good control of maternal diabetes mellitus may reduce the risk of major malformations. Developmental morphologic dating shows that the common congenital malformations in infants of diabetic mothers occur before the 7th week of gestation. This suggests that any therapeutic intervention aimed at decreasing the rate of malformations must be instituted before this critical early period.[40] Several researchers have shown that there is an association between high glycosylated hemoglobin in early pregnancy and congenital abnormalities.[40] It may be possible to prevent such anomalies by control of glucose levels in diabetic women before conception.

In one study, insulin-dependent diabetic women who received care at a prepregnancy diabetes clinic registered for prenatal care earlier, and their glycosylated hemoglobin level at registration was lower than women who did not receive preconception care in the clinic.[42] In a retrospective record-based study, insulin-dependent diabetic women who had counseling before conception had significantly lower glycosylated hemoglobin levels and babies with lower birthweight than those who did not receive counseling.[43] The patient selection in both of these studies may be biased toward more highly motivated patients.

One group[44,45] has found that strict metabolic control of insulin-dependent diabetic women before conception reduces the rate of congenital malformations to a level comparable to that in the nondiabetic population. Their patients had outpatient consultations twice a week, had several hospital admissions, and took multiple insulin injections a day, suggesting that they were a particularly compliant, disciplined population.

A second group[46] studying diabetic women who entered prenatal care within 21 days of conception reported a malformation rate in infants that was intermediate between those of women who entered care late and those of a control group who were not diabetic. This study suggests that more sensitive measures are needed to identify the teratogenic mechanisms of hyperglycemia or that not all malformations can be prevented by good glycemic control. More favorable outcomes found in the early-entry diabetic women than in the late-entry group, however, support attempts to achieve good metabolic control around the time of conception.

Screening for medical disease: Other services can be offered to some women of reproductive age who are at risk for some medical conditions. Laboratory assessment of at-risk women can include a hemoglobin or hematocrit determination to detect iron deficiency anemia, and testing for gonorrhea, syphilis, and chlamydia can be done so that any abnormalities can be treated before conception. A PPD test can be done in areas where tuberculosis is prevalent, so that if treatment is necessary, it can precede pregnancy.[2]

Prescribed Medicines

A number of drugs prescribed to women of childbearing age can adversely affect fetal development. Women take an average of 4 to 11 drugs during pregnancy,[47,48] and 40% of this consumption is in the first trimester.[49] Routine preconception modification of therapeutic regimens, including elimination of known teratogenic drugs such as gold, lithium, isotretinoin, folic acid antagonists, valproic acid, and warfarin, can reduce anomalies. Alternatively, preconception counseling of women for whom such drugs are essential may lead to postponement or avoidance of pregnancy.

Environmental Exposures

The effects on human pregnancy of most of the chemicals used occupationally are unknown, but several, such as heavy metals[50] and organic solvents,[51] have been implicated in a variety of reproductive disorders. It is prudent to educate women for whom pregnancy is a possibility regarding such hazards, to help them identify their own exposure risks, and to provide them with the facts available, or referral to a genetic counseling center to obtain information regarding the teratogenic potential of any drug, chemical, or environmental agent to which they are exposed.[52]

Genetic Counseling

The ideal time for genetic investigation and counseling is before a couple attempts to conceive. Preconception genetic counseling should be offered to patients with a specific indication, such as advanced maternal age, a family history of genetic disease, or a previous affected pregnancy. Such counseling will allow the couple to understand their risk and, if necessary, arrange for such diagnostic tests as chorionic villous sampling or amniocentesis early in pregnancy. In some cases, genetic counseling may result in a decision to defer childbearing.[53]

It may be reasonable to screen some adults to determine whether they are heterozygotic for certain genetic conditions and therefore at increased risk for conceiving offspring with these disorders. Common disorders for which genetic screening may be recommended include Tay-Sachs in Ashkenazic Jews, β-thalassemia in Greeks and Italians, α-thalassemia in Southeast Asians and Filipinos, sickle cell anemia in blacks,[54] and cystic fibrosis in whites.[55] Such determinations could influence the reproductive choices of the couple and in some cases could alter the clinical management of the pregnancy and newborn.

Infectious Risks

Human immunodeficiency virus: An estimated one in 50 women presenting for prenatal care at inner-city New York City hospitals in 1986 was infected with human immunodeficiency virus (HIV).[56] One in 476 women in Massachusetts screened by newborn blood analysis in 1987 was infected with HIV.[57] Since the perinatal acquisition of HIV is associated with morbidity and mortality,[58,59] women of childbearing age must be informed of the risks of infection, and all HIV-positive women should be advised against pregnancy. The Centers for Disease Control (CDC) recommends that all women of childbearing age who have identifiable risk for HIV infection be counseled and tested for HIV infections. All primary care providers should be prepared to provide preconception screening, diagnosis, education, and counseling for women of childbearing age.[60,61]

Hepatitis: Each year in the United States, over 300,000 persons, primarily young adults, become infected with hepatitis B virus (HBV).[62] Although most infections resolve with time, 6% to 10% of patients develop a chronic carrier state that places them at risk for developing chronic active hepatitis, cirrhosis, and primary hepatocellular carcinoma.[63] An estimated 16,500 births occur to HBV-infected women each year in the United States.[64] Infants whose mothers are positive for hepatitis B "e" antigen have a 85% to 90% chance of becoming chronic hepatitis B surface antigen carriers.[65]

The CDC has defined recommendations for hepatitis vaccination for individuals with ongoing risk for HBV. Persons at substantial risk of acquiring HBV virus include heterosexual contacts of HBV-infected persons and users of illicit injectable drugs.[66] If a woman has ongoing risks for HBV at a preconception visit, vaccination can be initiated. Preconception immunization of women with ongoing risk for HBV will protect not only the woman but future offspring. Primary vaccination consists of three intramuscular doses of vaccine over a 6-month interval. Optimal protection is not conferred until after the third dose.[63] Thus, waiting to immunize those women at risk for HBV until early pregnancy may fail to protect them for much of the pregnancy.

Toxoplasmosis: Toxoplasma gondii is a sporozoa that is widely distributed in nature. Primary maternal infection with *Toxoplasma* acquired during pregnancy can result in congenital infection in the offspring.[67] It is transmitted to humans by ingestion of oocytes that can be found on raw meat or in feces of infected cats. Symptoms of acute infection are generally nonspecific and include fever, lymphadenopathy, and fatigue.[68] In two prospective studies performed in the United States, the observed incidence of congenital toxoplasmosis was 1.1 per 1000 live births.[69] Of children born whose mothers had toxoplasmosis during pregnancy, approximately 8% are severely affected at birth. The remainder are affected with mild disease or subclinical infection and are at risk for late sequelae, which include chorioretinitis, mental retardation, and sensorineural hearing loss.[70] Severe fetal effects are more likely if infection is acquired in the first or second trimester.[67]

Serological testing for antibody against *Toxoplasma gondii* during pregnancy is not optimal because of the poor predictive value of such testing[71]; however, testing before pregnancy does have benefit over testing during pregnancy, since those already positive and therefore not in need of further testing or hygienic measures in any future pregnancy are identified. The prevalence of toxoplasmosis infection and the prevalence of susceptibility to new infection during pregnancy vary in different parts of the United States, ranging from 50% to 95% susceptibility.[72] Subtracting those who test positive before pregnancy from those eligible to be tested during pregnancy and more precisely defining the population at risk will increase the positive predictive value of such clinical evaluation. If the preconception antibody titer is known, then those women already immune can be reassured that they cannot develop the acute infection during pregnancy.[67,68] Women who are not immune can be counseled before pregnancy about proper cooking of meat and

avoiding close contact with cats and with cat litter or soil that may contain feces.[71] Some evidence exists that treatment of seroconversion during pregnancy may lessen neonatal problems.[67] If toxoplasma antibody status is known before pregnancy, then seroconversion during pregnancy can lead to a more prompt and definite diagnosis than if the antibody status before pregnancy was not known, and appropriate treatment decisions can follow.

Rubella: Rubella is a highly contagious disease transmitted by the respiratory route. After a 14- to 21-day incubation period, 75% of infected individuals develop symptoms consisting of rash, arthralgias, and posterior cervical lympadenopathy. Rubella infection in pregnancy can result in spontaneous abortion, stillbirth, or a baby with the congenital rubella syndrome. The incidence of rubella has declined by more than 99% since 1969, the year the rubella vaccine was licensed, and declines in rates of congenital rubella syndrome have paralleled the decline in overall rubella incidence.[73]

Routine susceptibility testing is worthwhile, as most serological surveys of various populations carried out during the early 1980s found 10% to 20% of women of childbearing age lacked serological evidence of immunity to rubella. Physicians should offer rubella vaccine whenever they encounter a potentially susceptible woman lacking contraindications for vaccine.[73] The preconception period is an ideal time to screen for rubella immunity; if indicated, rubella vaccine should be given and the woman advised to let 3 months elapse before attempting to get pregnant.

Low Birthweight Prevention

More than 75% of perinatal mortality and morbidity in infants without congenital anomalies is caused by complications of prematurity.[74] There have been a variety of prematurity prevention programs that have shown beneficial results. Several of these programs have been based on a strategy that includes risk scoring, patient education, and early diagnosis and treatment,[75–77] whereas others have emphasized a variety of social and community strategies.[34] Other studies of this type in differing populations have yielded conflicting results.[78,79] Despite the complexity of this problem, there is a growing realization that prematurity prevention is an attainable goal and can be addressed in a comprehensive way that includes assessing and, when appropriate, modifying medical and psychosocial risk[80,81] and improving access to prenatal care.[82]

The Institute of Medicine in *Preventing Low Birthweight* states[1]:

> Much of the literature about preventing low birthweight focuses on the period of pregnancy . . . by contrast, little attention is given to opportunities for prevention before pregnancy. Only casual attention has been given to the proposition that one of the best protections available against low birthweight . . . is to have a woman actively plan for pregnancy, enter pregnancy in good health with as few risk factors as possible, and be fully informed about her reproductive and general health.

The Low Birthweight Committee[1] developed a list of risk factors for low birthweight. These risk factors include social, medical, behavioral, and environmental risk that predate pregnancy. Although these risks are generally identified by good history taking, few data exist to evaluate the effectiveness of identifying these risks before conception or modifying individual risk before conception. Further work to study the effects of a prematurity prevention program that is integrated into the preconception period should be supported.

Preconception Care Delivery

The components of preconception care have been incorporated into "preconception clinics," family planning clinics, or ongoing primary care. Although not reviewed below, school-based educational programs or community intervention programs also may contribute to improving the health of women before conception.[83] In addition, involvement of men may be appropriate. Preconception care programs should be designed to encourage men to seek counseling and educational information.

Preconception Care in a Prepregnancy Clinic

Chamberlain[84–86] described a special prepregnancy clinic established at Queen Charlotte's Maternity Hospital in 1978. Of the 130 women attending the clinic during its first 3 years,[86] about 20% had problems in a previous pregnancy or delivery. Previous preeclampsia, placental abruption, and anemia were the most common prenatal problems. Previous operative delivery and anesthesia complications were the most common delivery problems. Fewer than 10% of the women had a medical condition that worried them; uterine fibroids and seizure disorders were the most common problems. One third of the women attended because of a prior neonatal death. The commonest single cause of these deaths was low birthweight. Another 10% of the women attended the clinic because a previous infant had a congenital anomaly; 5% had complications from a previous multiple gestation.

Prepregnancy clinics run by specialists in maternal and fetal medicine attract patients with a history of complications in an earlier pregnancy or of a potentially complicating medical condition. Since a large majority of

women enter pregnancy without a chronic medical condition or prior poor medical outcome, only a small reduction in overall perinatal mortality and morbidity can be achieved by targeting only these patients. Once these conditions are identified by primary care physicians, however, referral of the women to prepregnancy clinics may be of substantial benefit.

Prepregnancy Care as Part of Family Planning Clinics

Family planning visits offer an opportunity to provide comprehensive preconception care. These visits include screening for sexually transmitted diseases, anemia, and cervical dysplasia. These visits also offer opportunities for reproductive education and counseling about pregnancy planning and the means to defer it. These all are major parts of preconception care.

Routine preconception activities have been extended to include a more comprehensive preconception assessment. The "preconception health appraisal"[6] is a self-administered survey that educates women about the effects of health risks and lifestyle on pregnancy outcomes. Its use was initiated at family planning clinics of the North Carolina Health Department and has expanded to other family planning clinics in other states. A woman's risks then are discussed, and individualized recommendations are made as part of the family planning visit. The appraisal serves to remind the woman of action she may take around the time she stops using birth control.

Respondents to this questionnaire had an average of 6.8 preconception risk factors; older respondents had slightly more risk factors than did younger respondents. Examples of frequently identified risks included eating fewer than three meals some days (76%), using prescription drugs (43%), using over-the-counter drugs (30%), drinking alcohol (28%), and using chemicals in hobbies or at home (16%). A prospective study is underway to determine how effective the program is for changing health behavior before pregnancy and ultimately for changing birth outcomes.

Preconception Care as Part of Ongoing Primary Care

The Expert Panel on the Content of Prenatal Care concluded that preconception care is most effectively provided as part of general preventive care or during primary care visits for other medical conditions. The Institute of Medicine defined primary care providers as ones providing continuous, comprehensive, coordinated care that is accessible and for which the providers are accountable.[87] Family physicians are in an excellent position to help patients stop smoking, lose or gain weight, participate in ongoing medical care including early entry to prenatal care, and practice effective birth control, and to help families clarify choices about lifestyle, education, and occupation that may affect the decision to become pregnant. Family physicians are also in a position to refer patients with high-risk medical conditions for specific early high-risk obstetric care and to offer advice and treatment for other patients when necessary.

Many family physicians give advice about future childbearing as part of routine health maintenance and during other activities. Examples include the school physical, premarital examination, family planning visit, the postpartum examination, the negative pregnancy test visit, and well-child care for another member of the family. In 1982, The Royal College of General Practitioners Working Party on Obstetric Care[88] described the primary care physician's role in prepregnancy care:

> Continue the good mutual understanding between patient and doctor which may have been developed over previous years; provide counseling before conception as a normal part of general practice; utilize consultations with young people as opportunities for giving advice on smoking, alcohol, exercise and drugs; provide preconception consultation for couples considering parenthood, with special attention given to patients with illnesses which will affect pregnancy; and, use family planning consultations as an opportunity for preconception counseling.

Preconception Care in Other Settings

Women at social risk often encounter major barriers to health services including counseling and care before conception. Such patients are also at increased risk of poor pregnancy outcome. Thus, women most likely to benefit from preconception care include those least likely to have access to this care. For this reason preconception care should be provided in health care settings such as neighborhood health centers, family planning clinics, sexually transmitted disease clinics, and substance abuse treatment centers.

Cost Considerations

No data exist about the cost of preconception care in healthy populations. Costs can be expected to increase directly with increased separation of such activities from ongoing primary care. Thus, costs will be modest when services are provided as part of routine visits for medical conditions or for general health care in primary care settings. When preconception care is the sole or major

reason for visits to a primary care setting, identifiable costs can be expected to increase. Separate preconception counseling clinics will be more expensive.

Including preconception health assessment in family planning clinic initial and annual screening is attractive from a cost standpoint. On a per-woman basis, the cost may be modest, since such an assessment modifies already existing activities. Since the population has been shown to be at considerable risk and may have special interest in preparing for pregnancy, its cost effectiveness may be increased.

There will be added costs for training of relevant providers in health-promotion skills and for promoting the teaching of health-promotion skills in training programs. Additional costs may be offset by a decrease in costs related to unwanted pregnancies and to adverse pregnancy outcomes.

Comment

Preconception care should be made available to all women and their partners as an integrated part of primary care services, particularly as part of initial and annual visit family planning services. Enhancement of health-risk assessment and health-promotion skills for all relevant providers will encourage the introduction of many preconception care concepts into clinical practice. Improving access to primary care providers, particularly for low-income women, is needed to promote the availability of these services. Preconception care will most effectively reach those at high psychosocial risk if introduced into health care settings likely to serve women for whom access to care is otherwise limited. The organization of clinical activity should focus the woman's or couple's attention on changeable risks to future pregnancies. Research priorities include research on (1) the influence of the time at which specific interventions are made relative to conception, (2) the cost and results of preconception care, (3) the efficacy and effectiveness of individual components, and (4) how to best influence the health-related behaviors of individuals, particularly teenagers and high-risk individuals.

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