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PREVENTION OF FETAL ALCOHOL SPECTRUM DISORDERS

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Alcohol use among women of childbearing age is a leading, preventable cause of birth defects and developmental disabilities in the United States. Although most women reduce their alcohol use upon pregnancy recognition, some women report drinking during pregnancy and others may continue to drink prior to realizing they are pregnant. These findings emphasize the need for effective prevention strategies for both pregnant and nonpregnant women who might be at risk for an alcohol-exposed pregnancy (AEP). This report reviews evidence supporting alcohol screening and brief intervention as an effective approach to reducing problem drinking and AEPs that can lead to fetal alcohol spectrum disorders. In addition, this article highlights a recent report of the National Task Force on Fetal Alcohol Syndrome and Fetal Alcohol Effect that describes effective interventions to reduce alcohol use and AEPs, and outlines recommendations on promoting and improving these strategies. Utilizing evidence-based alcohol screening tools and brief counseling for women at risk for an AEP and other effective population-based strategies can help achieve future alcohol-free pregnancies.

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Although the causes of many debilitating developmental disabilities are unknown, the etiology of fetal alcohol spectrum disorders (FASDs) [Warren et al., 2004] is known. Alcohol use among women of childbearing age (18–44 years) constitutes a leading, preventable cause of birth defects and developmental disabilities in the United States [American Academy of Pediatrics, 2000]. Alcohol is a teratogen [Michaelis and Michaelis, 1994] that can affect the development of multiple organ systems, including the central nervous system, during early and later fetal development [Coles, 1994; Streissguth and O'Malley, 2000]. Among nonpregnant women, population-based data from the Behavioral Risk Factor Surveillance System (BRFSS) for years 1991–2005 finds that ~52% report consuming any alcohol in the past month and ~12% report binge drinking (five or more drinks on one occasion) (Fig. 1). Pregnancy recognition does not occur in many women until 4- to 6-weeks gestation [Floyd et al., 1999], and thus many women may drink prior to realizing they are pregnant. Upon recognition of pregnancy, most women spontaneously reduce their alcohol use [Ebrahim et al., 1999; Floyd et al., 1999]. A recent report of alcohol use rates among women of childbearing age who are pregnant showed that use of any alcohol remains stable at ~12% and binge drinking is between 2 and 3% during pregnancy (Fig. 1). Thus, alcohol use during pregnancy continues to be an important public health concern.

The timing of exposure and the amount of exposure are the primary determinants of fetal morbidity and mortality [Michaelis and Michaelis, 1994]. A strong predictor of alcohol use during pregnancy is alcohol use levels prior to pregnancy [Day et al., 1993; Floyd et al., 1999]. Fetal alcohol exposure prior to and after pregnancy recognition and their effect on pregnancy outcomes are important public health concerns. Rates of alcohol use for both pregnant and nonpregnant women of childbearing age have changed very little for over a decade [Denny et al., 2009], stressing the importance of implementing effective strategies to prevent prenatal alcohol exposure. This report will describe evidence-based strategies for reducing alcohol-exposed pregnancies (AEPs) that lead to fetal alcohol syndrome (FAS) and other prenatal alcohol-related conditions in children.

SCREENING FOR ALCOHOL MISUSE IN WOMEN OF CHILDBEARING AGE

Although early studies of effective screening tools for identifying individuals at risk for poor health outcomes related to alcohol consumption included both males and females, overall they tended to include predominantly more males. One systematic review focusing on screening for alcohol prob-

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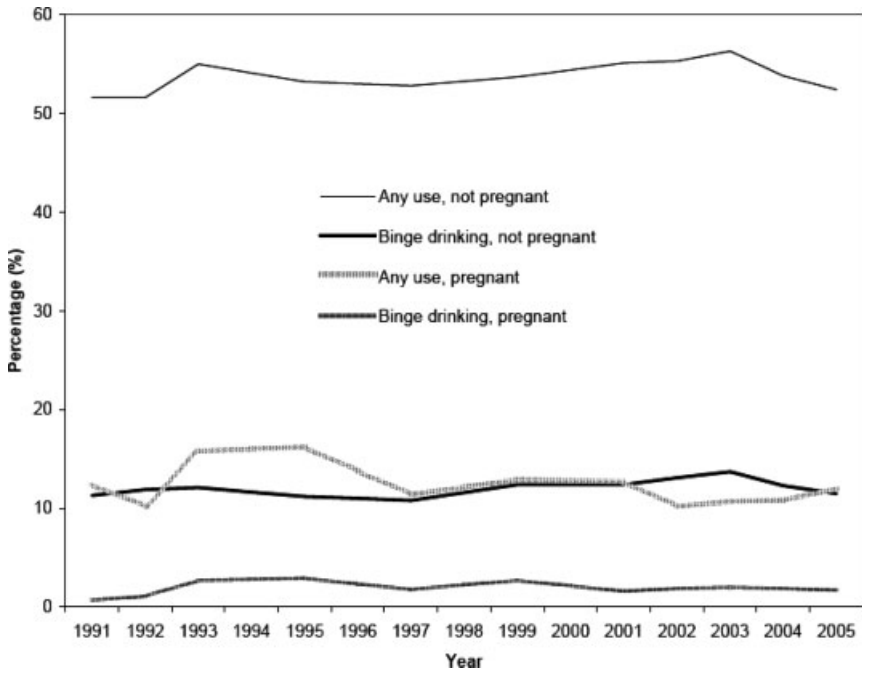

Fig. 1. Percentage of women aged 18–44 years who reported any alcohol use or binge drinking,* by pregnancy status—Behavioral Risk Factor Surveillance System, United States,[†]1991–2005[§].
*Defined as five or more drinks on at least one occasion. [†]BRFSS data were not available for 1994, 1996, 1998, and 2000. Data also were not available from Kansas, Nevada, and Wyoming for 1991; from Arkansas and Wyoming for 1992; from Rhode Island for 1993 and 1994; from the District of Columbia for 1995; and from Hawaii for 2004. [§]Beginning in 2006, the definition of binge drinking by women changed to four drinks on at least one occasion. Because of this change, data collected after 2005 are not included.

lems in primary care settings looked at studies conducted from 1966 through 1998 [Fiellin et al., 2000]. The authors identified 38 articles meeting inclusion criteria which included those that were written in English, published in peer review journals during the targeted time period, compared the performance of the screening tools to a standard clinical criterion, and reported the performance characteristics of the tools such as sensitivity and specificity.

The majority of the studies (27) focused on alcohol abuse or dependence and the remainder (11) focused on at-risk, heavy, or harmful drinking. A variety of screening methods were investigated, but the overall results showed the Alcohol Use Disorders Identification Test (AUDIT) [Saunders et al., 1993] performed best in identifying individuals with at-risk, hazardous, or harmful drinking and the CAGE [Ewing, 1984] performed best in identifying individuals with alcohol abuse and dependence. The AUDIT is a 10-item screening tool that asks questions about the quantity, frequency, and maximum level of 5 or more drinks on one occasion; personal and social consequences experienced (problems at work or with the family), and dependence symptoms (loss of control and loss of memory about events that occurred while drinking) [Saunders et al., 1993]. The CAGE [Ewing, 1984] is a four-item screener that includes questions on feeling the need to **C**ut down; ***A***nnoyed by criticisms about drinking; **G**uilty about drinking; and need for an **E**ye-opener first thing in the morning. Although citing a number of limitations among the studies reviewed, the authors concluded that formal screening instruments performed better than clinical measures in identifying individuals with alcohol use problems in primary care settings.

In recognition that many standardized alcohol screening tests were validated in predominantly male populations, studies focusing on alcohol screening in women began to appear in the scientific literature, including the development of screening tools for selected populations such as pregnant women. The first alcohol screening tool for pregnant women was the T-ACE [Sokol et al., 1989]. The T-ACE inquires about **T**olerance ("How many drinks does it take to make you feel high?"); being **A**nnoyed by criticisms from others about one's drinking; having felt the need to **C**ut down on drinking; and the need for an **E**ye-opener in the morning. A second screening tool developed for use in pregnant women, the TWEAK [Russell, 1994], is similar to the T-ACE and includes **T**olerance ("How many drinks can you hold?" or "How many drinks does it take before you begin to feel the first effects of alcohol?"), **W**orry by family members over the drinking behavior exhibited, **E**ye-opener, **A**mnesia, and need to **K**ut down. One review of alcohol use screening tools for women in the late nineties concluded that the CAGE, commonly used in screening for heavy drinking in males, was less accurate in identifying problem drinking in female populations as compared to the TWEAK and the AUDIT [Bradley et al., 1998]. More recently, the AUDIT-C, which includes the first three items of the full AUDIT that queries quantity, frequency, and maximum level of 5 or more drinks on any one occasion, has been found to be effective in screening for alcohol misuse in women when using a cut point score of 3 or more [Dawson et al., 2005; Bradley et al., 2007].

EFFICACY OF BRIEF INTERVENTIONS FOR REDUCING PROBLEM DRINKING IN WOMEN

The 1990s were characterized by mounting evidence supporting the use of advice and brief interventions for problem drinkers in primary care settings. Some brief interventions employ the use of motivational counseling and have been delivered by providers who are not specialists in the treatment of alcohol abuse or dependence. The main components of these interventions involve feedback of personal risk, responsibility for personal control, advice to change, strategies to help individuals reduce or stop drinking, an empathetic counseling style, and self-efficacy or optimism for behavioral change on the part of the individual. Brief intervention also involves establishing a drinking goal and follow up of progress with ongoing support.

One early review [Bien et al., 1993] reported on 32 studies of brief interventions targeting problem drinking behaviors conducted across 14 nations. Among the 6,000 subjects enrolled in these studies, the majority were males (75%). Although a number of the studies found significant effects for brief interventions over control

groups overall, others found differences in outcomes for males versus females with female groups more likely to show change in both intervention and control groups yielding no between group differences. Differing effects by sex were not reported uniformly in the studies reviewed that may have been related to small numbers of women represented in the selected studies. Authors of the review acknowledged some expected methodological problems including sample size, sample selection, additional treatment (i.e., additional treatment sought in the months following brief intervention), and reactivity to the assessment (i.e., did the drinking assessment alone alter behavior?). However, the weight of the findings led the authors to conclude that brief interventions are far better than no interventions; compare favorably in outcomes to more extensive interventions; appear to enhance the effects of subsequent treatment; and provide encouraging evidence for changing harmful drinking patterns among adults in health care and treatment settings.

In 1996, the World Health Organization (WHO) Brief Intervention Study Group [1996] reported the findings of a noteworthy study focused on the effects of simple advice and brief counseling on hazardous drinking in adults representing a variety of cultural groups in eight developing and developed countries. The study was conducted in diverse health care settings including primary care. Of the 1,559 subjects enrolled, ~75% were male. Subjects were randomized into three groups: a control group, a simple advice group, and a group receiving a brief intervention. Significant results were found in men receiving the interventions (advice or brief intervention), with a reported 17% lower average daily drinking amount as compared to men in the control group. Among women in the study, significant reductions in alcohol use occurred in both intervention and control groups with no significant between group differences.

A later report reviewed randomized trials specifically focusing on the efficacy of brief interventions for women in need of treatment for problem drinking [Chang, 2002]. The study populations included groups composed only of women or mixed groups that included both men and women with substantial numbers of women represented. One study found a brief intervention delivered by general practitioners to be effective in reducing excessive drinking in both men and women who received the intervention as compared to controls [Wallace et al., 1988]. In four reviewed studies, women performed significantly better in lowering their alcohol consumption than men when compared to controls [Sanchez-Craig et al., 1989, 1991; Fleming et al., 1997; Manwell et al., 2000]. Among the four remaining studies that just included women, no significant between group differences were found when intervention and control groups were compared [Scott and Anderson, 1990; WHO Brief Intervention Study Group, 1996; Chang et al., 1999; Aalto et al., 2000]. The authors noted that the benefits for women receiving brief intervention for problem drinking were not consistent across the studies reviewed. Other reviews with meta-analyses have found brief interventions effective across gender for heavy drinking and hazardous drinking [Wilk et al., 1997; Ballesteros et al., 2004], and extended brief interventions effective in women but not men [Poikolanen, 1999].

Taken together, these meta-analyses have yielded somewhat contradictory conclusions in part due to the fact that the various studies reviewed varied widely regarding inclusion criteria such as alcohol use severity level, age and sex of subjects, clinical setting used for recruitment, and differences in the components of the brief interventions. However, in spite of a number of differing findings from studies using different methodologies, some general conclusions can be derived from this research. It appears that both men and women benefit from brief interventions; women benefited more than men in some trials that may reflect lower levels of alcohol use and higher motivation for behavioral change in women, and, in the context of a therapeutic situation, women may change their behavior regarding alcohol use simply in response to questions about their drinking. This latter conclusion is based on the finding that, in some studies, women in the control groups who were just asked about their drinking levels performed similarly to the women in the brief intervention groups.

INTERVENTIONS FOR PREVENTING ALCOHOL-EXPOSED PREGNANCIES (AEP) IN WOMEN OF CHILDBEARING AGE

In 2004, a U.S. Preventive Services Task Force (USPSTF) report provided a summary of the evidence upon which the USPSTF would base their recommendations for identifying and intervening with risky or harmful drinkers [Whitlock et al., 2004]. The evidence summary was derived from a review of 12 randomized, controlled trials of brief interventions in adults. All but one was conducted in primary care practices. Most had more than 300 participants (one-third of which were women) and a 12-month follow-up period. The review concluded that behavioral counseling interventions were effective for risky or harmful drinking among adult primary care patients. The official recommendation statement released by the USPSTF recommended screening and behavioral counseling interventions to reduce alcohol misuse by adults, including pregnant women, in primary care settings [U.S. Preventive Services Task Force, 2004]. The statement acknowledged that there was limited evidence to support the effectiveness of counseling to reduce alcohol use during pregnancy, but stated that studies did show that behavioral counseling interventions were effective in reducing alcohol use among women of childbearing age in general. For example, one study from the USPSTF review found that two 15-min physician-delivered brief intervention sessions resulted in a 20–25% reduction in drinks per week and binge drinking episodes among childbearing-aged women 18–40 years who screened positive for problem drinking at study enrollment [Manwell et al., 2000].

Since the USPSTF review was conducted, two well-controlled studies have been reported on the use of brief interventions in pregnant women of childbearing age. A 2005 randomized study of pregnant women found that a single brief intervention counseling session that included partners was efficacious in reducing alcohol use among the heaviest drinkers in the treatment group [Chang et al., 2005]. A later randomized trial of a brief intervention targeted pregnant women attending Women, Infants, and Children Centers and followed them through the third trimester [O'Connor and Whaley, 2007]. Reported results showed that women in the brief intervention group were five times less likely to continue drinking during pregnancy than women in the assessment only group. In addition, newborns of mothers who were heavier drinkers in the intervention group had better growth (higher birth weights and longer birth lengths) and lower fetal mortality rates than those in the assessment only group. This study

Universal Prevention:

Recommendation 1:	Expand and test methodological approaches for assessing the effects of universal prevention strategies on alcohol use patterns and reproductive health outcomes of childbearing-aged women.
Recommendation 2:	Promote the implementation of effective population-based interventions for reducing alcohol-related harms in the general population, including women of childbearing age, as they are validated.

Selective and Indicated Prevention:

Recommendation 3:	Ensure that funded intervention studies on alcohol use, abuse, and dependence include analyses of gender and age effects and examine pregnancy outcomes where possible.
Recommendation 4:	Promote the use of evidence-based intervention strategies tested in primary care, emergency rooms, and college settings for use in populations of childbearing-aged women at risk for an alcohol-exposed pregnancy.
Recommendation 5:	Establish formal alcohol screening, using validated instruments, and brief intervention programs that are culturally and linguistically appropriate for women of childbearing age.
Recommendation 6:	Expand the education and training of health and social service professionals in the areas of screening and intervening with women at risk for alcohol-exposed pregnancies.
Recommendation 7:	Ensure access to appropriate alcohol treatment services for women of childbearing age, especially those with treatment barriers, such as pregnant women and adolescents.
Recommendation 8:	Ensure that alcohol treatment options for all childbearing-aged women take into consideration their unique needs, such as pregnancy, co-occurring disorders, and other special treatment needs.
Recommendation 9:	Conduct further research aimed at implementing and evaluating treatment and intensive case-management approaches for women at highest risk of having a child with a fetal alcohol spectrum disorder.
Recommendation 10:	Promote research investigating interventions focused on the potential intergenerational effects of prenatal alcohol use on offspring.

Fig. 2. Recommendations from the National Task Force on fetal alcohol syndrome and fetal alcohol effect.

was one of the few studies that have been conducted in a community, rather than a primary care setting using non-medical professionals for the administration of the brief intervention.

Given the high rates of hazardous use of alcohol among childbearing-aged women in the United States (Fig. 1), the ideal time to reach them with information, advice, and assistance is prior to conception. A randomized trial of a brief motivational intervention to do this was reported in 2007 [Floyd et al., 2007]. This study, conducted in diverse, community-based settings, provided four counseling sessions and a contraception consultation and services visit to women at high risk for an AEP. Women in the control group received information and resources for addressing problem drinking and for family planning services. At 3, 6, and 9 months, the odds of reducing the risk for an AEP were twofold higher in the intervention group over the information (control) group.

The evidence base for use of brief interventions in preventing AEPs in women of childbearing age led the Clinical Working Group of the Select Panel on Preconception Care, Centers for Disease Control and Prevention (CDC), to put forth the following recommendation in 2008 for women in the preconception period:

> All childbearing-aged women should be screened for alcohol use and brief interventions should be provided in primary care settings including advice regarding the potential for adverse health outcomes. Brief interventions should include accurate information about the consequences of alcohol consumption including the effects of drinking during pregnancy, that effects begin early during the first trimester and that no safe level of consumption has been established. Contraception consultation and services should be offered and pregnancy delayed until it can be an alcohol-free pregnancy. [Floyd et al., 2008, p. S335].

MOVING SCIENCE TO PRACTICE THROUGH POLICY DEVELOPMENT AND IMPLEMENTATION

In 1996, the Institute of Medicine (IOM) stressed the importance of integration and coordination at the federal level in order to prevent and treat the full spectrum of individuals with alcohol-related problems [Stratton et al., 1996]. Since that time, there have been several national efforts that have facilitated advances in this area. The National Institute on Alcohol Abuse and Alcoholism created the Interagency Coordinating Committee on FAS in 1996 comprised of various federal agencies conducting research and program activities on prenatal alcohol exposure. The committee helps to foster exchange of information and ideas across federal agencies and encourages collaborative projects. The National Task Force on Fetal Alcohol Syndrome was mandated by the U.S. Congress in 1998 to advise and foster coordination among agencies, academic bodies, clinicians, and community groups regarding research, programs on prenatal alcohol exposure, surveillance, and to address the needs of individuals with FASDs and their families. In 2002, the Substance Abuse and Mental Health Services Administration's FASD Center for Excellence was created to support the development of FASD prevention, treatment, and care systems at the state and community level. Other national groups, including the National Organization on FAS and its state affiliates, the Arc, the March of Dimes, the Center for Science in the Public Interest, the American Academy of Pediatrics, and the American College of Obstetricians and Gynecologists, along with other state and local organizations, have also worked together and with federal agencies to raise awareness and visibility about FASDs as an important public health problem.

Recognizing the need to identify effective interventions to reduce AEPs, the National Task Force on Fetal Alcohol Syndrome and Fetal Alcohol Effect, congressionally mandated and convened by the CDC, established a prevention working group in 2004 to develop a report on evidence-based strategies for FASD prevention. Several task force meetings focused on prevention, highlighting both population-based and clinical intervention strategies to reduce alcohol use and AEPs. A review of the literature to identify effective community-level FASD prevention interventions and policies, evidence from existing systematic reviews on brief alcohol interventions, and deliberations among task force members and the report writing group helped lay the groundwork for the information and recommendations (Fig. 2) put forth in the recent Task Force Report, *Reducing Alcohol-Exposed Pregnancies: A Report of the National Task Force on Fetal Alcohol Syndrome and Fetal Alcohol Effect* [Barry et al., 2009]. The report categorized interventions using the prevention framework developed by the IOM [Stratton et al., 1996]. This framework

consists of universal, selective, and indicated strategies for prevention. Below is a summary of the findings and recommendations from this report.

Universal Prevention Strategies

Universal prevention interventions attempt to promote the health of the general public or a particular group, regardless of risk. Although there has been some important work in this area, including media campaigns [Kaskutas and Graves, 1994; Glik et al., 2001], point-of-purchase signage [Prugh, 1986], and alcoholic beverage labeling [Hankin et al., 1993, 1996], the outcomes of these efforts do not demonstrate reductions in alcohol use or FASDs. The Task Force recognized the important role these kinds of strategies play in educating the general public and raising awareness about FASDs as part of a comprehensive FASD prevention approach; however, they recommended that more research is needed to determine the effects of universal approaches on alcohol use patterns and reproductive health outcomes of women of childbearing age. The Task Force also supported the implementation of effective broad-based alcohol prevention strategies, such as increasing alcohol taxes and reducing access to alcohol, to reduce alcohol-related harm in the general population [Babor et al., 2003; Guide to Community Preventive Services, 2009].

Selective and Indicated Prevention Strategies

S*elective and indicated prevention* strategies are targeted and intensive falling along a continuum of care depending on the severity of the alcohol-related problem. As the Task Force reviewed the evidence, the science to date pointed to brief alcohol intervention as an effective approach to reducing alcohol use and AEPs. As previously outlined, research indicates that alcohol screening and brief interventions have been found to be effective in multiple settings, including primary care [Bien et al., 1993; Wilk et al., 1997; Poikolanen, 1999; Ballesteros et al., 2004; Whitlock et al., 2004], emergency room [D'Onofrio and Degutis, 2002], community [O'Connor and Whaley, 2007], and college settings [Larimer and Cronce, 2002]. The Task Force recommended promoting the use of evidence-based strategies in these types of settings for women of childbearing age at risk for an AEP.

Two task force recommendations focused specifically on the implementation and improvement of screening and brief intervention efforts for women of childbearing age. Effective interventions exist for both pregnant [Chang et al., 2005; O'Connor and Whaley, 2007] and preconceptional women [Ingersoll et al., 2005; Floyd et al., 2007]. Thus, the Task Force recognized the importance of establishing formal alcohol screening and brief intervention programs that are culturally and linguistically appropriate for women of childbearing age. Related to this, the Task Force also recommended the expansion of education and training of health and social service professionals in the areas of screening and intervening with woman at risk for an AEP.

The greatest opportunities for healthy pregnancy outcomes, however, lie in prevention strategies implemented prior to conception.

Effective *indicated* approaches to FASD prevention among the highest risk women, including mothers who have previously given birth to a child with an FASD, could have a significant effect on the problem of prenatal alcohol exposure. However, reaching women at highest risk for an AEP is challenging and their treatment is complex. Substance abuse treatment programs designed for women that include support services such as child care, prenatal care, and mental health treatment can affect treatment outcomes. Improvements can include changes in substance use, mental health symptoms, perinatal or birth outcomes, employment, self-reported health status, and HIV risk reduction [Ashley et al., 2003; Brady and Ashley, 2005]. There has also been success with intensive case management approaches for women at highest risk for having a child with a FASD and women who themselves have a FASD [Grant et al., 1996, 2004], although more research in this area is warranted. The Task Force recognized this and also stressed the importance of assuring access to substance abuse treatment services and the availability of appropriate substance abuse treatment options for women of childbearing age. Additional research is also needed to explore interventions focused on the potential intergenerational effects of prenatal alcohol use on children of women who have FASDs.

CONCLUSIONS

Studies cited in this review have documented the efficacy of screening and brief interventions for women of childbearing age in reducing risky drinking and AEPs, and in improving fetal growth and decreasing fetal mortality among risky drinkers. Brief interventions should include clinical advice and counseling regarding the risk posed by prenatal alcohol exposure, discussion of the woman's readiness to change, and assistance in helping the woman to develop strategies and goals for reducing hazardous use of alcohol during pregnancy. In addition to providing brief interventions, follow-up should be conducted for every high-risk woman, and any woman who is unable to achieve her drinking goals should receive stepped up care including referral to formal treatment programs or community group interventions that provide support to women seeking to reduce hazardous alcohol use.

The greatest opportunities for healthy pregnancy outcomes, however, lie in prevention strategies implemented prior to conception. Importantly, health care providers should understand that early prenatal care is often too late for many women and babies particularly given that approximately half of the pregnancies in this country are unplanned [Finer and Henshaw, 2006]. Evidence-based interventions recommended for implementation during pregnancy would be most beneficial if implemented before conception. Brief behavioral interventions to reduce alcohol use prior to conception and counseling regarding effective contraceptive options when not planning a pregnancy have been proven to be effective methods for preventing an AEP.

The National Task Force on Fetal Alcohol Syndrome and Fetal Alcohol Effect has proposed many strategies for the future. These strategies include testing the effectiveness of *universal* prevention methods and promoting the implementation of empirically validated methods on the general population, including women of childbearing age. Regarding *selective* and *indicated* prevention, it is recommended that funded studies include analyses of individual differences, promote the use of culturally sensitive evidence-based intervention methods in multiple settings in which women are

seen, establish formal alcohol screening procedures based on validated instruments, expand the education and training of health care professionals, and ensure access to appropriate alcohol treatment services for all women, taking into account the unique needs of each women including the existence of co-occurring disorders. The Task Force report also concurs with the 1996 IOM report that emphasized the need for a comprehensive, multilevel prevention approach consisting of both population-based strategies and more targeted individual-level interventions to reduce prenatal alcohol exposure. A comprehensive FASD prevention approach along with collaboration and strong partnerships across federal, state, and local agencies; academia; medical and social service delivery systems; and with consumers is essential in order to strengthen the continuum of evidence-based services and treatment for women of childbearing age and to reduce the risk of AEPs.

In conclusion, FAS and all other conditions subsumed under the umbrella of FASDs are entirely preventable as long as a pregnancy is alcohol-free. Useful screening tools are available and brief advice and counseling are effective interventions for reducing a women's risk for an AEP. Health care practitioners are encouraged to incorporate alcohol screening into their routine assessment procedures for women of childbearing age and to provide advice and counseling for women who could benefit from a reduction or cessation of their alcohol consumption to protect current and future pregnancies. ■

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