Screening for substance use in pregnancy: A practical approach for the primary care physician

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Our goal was to identify risk factors for substance use during pregnancy for primary care physicians so that we could assess a woman's risk of alcohol or illicit drug use. Participants were 2002 Medicaid-eligible pregnant women with 52 visits to prenatal care clinics in South Carolina and Washington State. Structured interviews were used to collect data. Logistic regressions and classification and regression trees identified predictors for pregnant women at high risk for substance use. Approximately 8% of the sample reported current use of either drugs or alcohol or both. Past use of alcohol or cigarettes, including during the month before pregnancy, most differentiated current drug or alcohol users from current nonusers. Our analysis suggests that primary care physicians can ask 3 questions in the context of a prenatal health evaluation to target women for referral to a full clinical assessment for drug and alcohol use. (Am J Obstet Gynecol 2001;184:752-8.)

Keywords: Drugs, alcohol, screening

Over the past two decades, the use of alcohol, tobacco, and illicit drugs during pregnancy has become a major public health concern. An estimated 5.5% of pregnant women in 1992 used an illicit drug during pregnancy, and 18.8% used alcohol. 1 Much concern has arisen over the consequences of this prenatal substance use. A number of studies have found poor health outcomes among infants of women who used alcohol or illegal drugs during pregnancy,1,2 and recent publications have provided preliminary evidence that there are long-term effects of prenatal substance exposure on the development and behavior of the exposed child.3-5

Despite concern over the consequences of perinatal substance use, however, the use and abuse of alcohol and illicit drugs by the pregnant woman remains one of the most frequently missed diagnoses in perinatal medicine. Legal, social, and attitudinal barriers often restrain open communication between physician and patient. Physicians' reluctance to screen pregnant women for substance use and abuse stems from a number of factors. These include physicians' concerns and misconceptions about the liability and risks associated with treating pregnant substance users, a lack of knowledge about addiction and referral options, and a lack of physician confidence in treatment programs. In many cases screening also does not occur because physicians assume that substance use is not prevalent among their patients.6,10

In the past few years it has become increasingly clear that a mechanism for screening for the use of alcohol and illicit drugs within standard prenatal care is critically needed. The purpose of this study was to identify health, social, and psychologic risk factors for drug and alcohol use during pregnancy and to devise a screening protocol to guide primary care physicians in assessing a pregnant woman's likelihood of alcohol or illicit drug use.

Material and methods

Subjects. Data for this study were collected as a part of a federal project funded by the Health Care Financing Administration (HCFA), the "Evaluation of the Demonstration to Improve Access to Care for Pregnant Substance Abusers."18 The purpose of this demonstration project was to identify Medicaid-eligible pregnant women at risk for alcohol and illicit drug use and to provide them with linked prenatal care and substance abuse treatment. Over an 18-month period beginning in February 1994, Medicaid-covered pregnant women were interviewed in 9 prenatal care clinics. Seven of the clinics were in rural South Carolina, and 2 were in Washington State. Clinic
staff identified women receiving Medicaid who were at the clinic for their first or second prenatal visit and referred them to the interviewers, who administered a re-
search screening questionnaire in person. To ensure con-
identiality, all interviews were conducted in a private examination room at each office provided by the clinic.

All protocols were approved by the US Office of Man-
agement and Budget and the appropriate institutional re-
view boards. A confidentiality waiver was obtained from the US Department of Health and Human Services. This waiver protects the survey data from subpoena.11

Of the 2288 women with whom interviews were at-
tempted at the clinics, 2174 (95%) agreed to participate in the interview by signing informed consent forms. The major reason for nonparticipation was a language barrier (particularly when a woman spoke Spanish and the inter-
viewer did not). Of the women who did participate, 198 were later excluded because they had private insurance or had $2 or prior clinic visits for their current pregnancy. This left a total of 2066 Medicaid-eligible women who completed the survey. An additional 64 survey respon-
dents who did not answer the survey questions on current drug or alcohol use were excluded, leaving an analysis sample of 2002 women. About 45% of these women lived in rural South Carolina; 15% lived in an urban Washington site, and the remaining 42% lived in a rural Washington site. These women represented approximately 50% of Medicaid-covered women who gave birth in the 3 sites during the survey period.

Women in the two states had substantially different characteristics (Table I). On average, those in the South Carolina site were younger, more likely to be unmarried, more likely to be having their first pregnancy, and less likely to have completed high school than the women in the Washington sites. Furthermore, the racial-ethnic distribu-
tions of women in the two states were dramatically different. Almost 60% of the women in the Washington sites were His-
panic, whereas almost none of the women from South Car-
olina were Hispanic. Correspondingly, almost none of the Washington women were African American, whereas 76% of the South Carolina women were African American.

**Table I. Characteristics of pregnant women interviewed in 2 states (percentages)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>South Carolina</th>
<th>Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td>First pregnancy</td>
<td>52.1</td>
<td>58.5</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>6.8</td>
<td>58.3</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>76.1</td>
<td>0.9</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>20.6</td>
<td>39.3</td>
</tr>
<tr>
<td>Native American</td>
<td>7.1</td>
<td>1.5</td>
</tr>
<tr>
<td>&lt;18 years old</td>
<td>31.1</td>
<td>14.5</td>
</tr>
<tr>
<td>Unmarried</td>
<td>78.4</td>
<td>54.5</td>
</tr>
<tr>
<td>Less than high school education</td>
<td>39.1</td>
<td>59.6</td>
</tr>
</tbody>
</table>

Note: These estimates correspond to the 1222 women who were surveyed in 1994. For these women we were able to link our survey data to Medicaid and birth records to determine demo-
graphic characteristics. Whereas these women represent only 50% of the 2006 women interviewed, their characteristics are very similar to the characteristics of all Medicaid-covered women who gave birth in the South Carolina and Washington study sites. Thus, we believe that these women are representative of all the women included in our study. There is some item nonresponse, although it is typically <1% of the sample for any specific charac-
teristic. Race-ethnicity information is missing for 11 women.

There were 3 specific sets of questions about alcohol and illicit drug use. One set of questions asked the respondent if she had ever used drugs and asked explicitly about mari-
jana, cocaine, crack cocaine, heroin, or any other narcotics; methadone (in a treatment program or from the street); methamphetamine; sedatives or hypnotics; barbiturates; amphetamines; psychedelics or hallucinogens; inhalants; and opiates or alcohol. The second set of questions asked the woman whether she had used any illicit drugs or alco-
hol in the month before pregnancy, and the third set ad-
ressed current alcohol or illicit drug use in the past month. The women also were asked analogous questions about tobacco use. To encourage honest responses regarding illegal drug use, the women answered the questions about illicit drugs through a self-administered question-
naire. In a few cases the interviewers helped the respon-
dent by reading the drug use questions; in all cases, how-
ever, the respondents recorded the answers swiftly and confidentially on a separate form that was placed in a sealed envelope and not seen by the interviewer. All other questions were asked and recorded by the interviewers.

**Data analysis.** The data analysis sought to identify 2 groups of high-risk women: (1) current drug users (that is, those women who used only illicit drugs) and (2) cur-
rent drug or alcohol users (that is, a larger grouping that included women who used only illicit drugs, women who used only alcohol, and women who used both alcohol and illicit drugs).

Drug use and alcohol use were defined as follows: Cur-
rent users of drugs included women who reported use of any illicit drugs during the month preceding the inter-
view. Current alcohol users were women who reported use of alcohol during the month preceding the interview.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Total</th>
<th>Alcohol and drug users</th>
<th>Alcohol and drug nonusers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Another adult in household uses illicit drugs or substantial alcohol</td>
<td>16.4</td>
<td>26.7</td>
<td>15.4</td>
</tr>
<tr>
<td>Another adult in household has been in treatment for drug or alcohol use</td>
<td>8.7</td>
<td>15.3</td>
<td>8.0</td>
</tr>
<tr>
<td>Moderate or severe depression</td>
<td>51.6</td>
<td>43.8</td>
<td>50.4</td>
</tr>
<tr>
<td>Occasionally used marijuana (during past week)</td>
<td>22.6</td>
<td>29.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Occasionally felt blue (during past week)</td>
<td>22.3</td>
<td>27.5</td>
<td>21.9</td>
</tr>
<tr>
<td>Freq. pregnancy</td>
<td>45.6</td>
<td>51.1</td>
<td>42.9</td>
</tr>
<tr>
<td>Has a child who lives in another household</td>
<td>7.5</td>
<td>14.8</td>
<td>6.9</td>
</tr>
<tr>
<td>Lives alone or has small children</td>
<td>11.3</td>
<td>10.3</td>
<td>10.8</td>
</tr>
<tr>
<td>Homelss in past 3 y</td>
<td>12.9</td>
<td>25.9</td>
<td>11.5</td>
</tr>
<tr>
<td>No usual source of health care</td>
<td>34.3</td>
<td>45.5</td>
<td>33.2</td>
</tr>
<tr>
<td>Worried about pregnancy</td>
<td>33.5</td>
<td>40.6</td>
<td>32.2</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 y</td>
<td>29.9</td>
<td>28.9</td>
<td>29.9</td>
</tr>
<tr>
<td>20-24 y</td>
<td>40.3</td>
<td>43.8</td>
<td>39.9</td>
</tr>
<tr>
<td>25-29 y</td>
<td>29.9</td>
<td>27.3</td>
<td>30.2</td>
</tr>
<tr>
<td>Ever drank alcohol</td>
<td>35.9</td>
<td>39.9</td>
<td>30.7</td>
</tr>
<tr>
<td>Ever smoked cigarettes</td>
<td>36.6</td>
<td>77.7</td>
<td>32.8</td>
</tr>
<tr>
<td>Ever drank alcohol or ever smoked cigarettes</td>
<td>49.7</td>
<td>97.1</td>
<td>45.1</td>
</tr>
<tr>
<td>No. of cigarettes per day in month before pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>71.4</td>
<td>32.8</td>
<td>75.0</td>
</tr>
<tr>
<td>1-2</td>
<td>9.5</td>
<td>21.6</td>
<td>8.3</td>
</tr>
<tr>
<td>2+</td>
<td>19.1</td>
<td>46.6</td>
<td>16.7</td>
</tr>
<tr>
<td>Frequency of drinking in month before pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>82.7</td>
<td>28.6</td>
<td>87.8</td>
</tr>
<tr>
<td>1+</td>
<td>11.0</td>
<td>39.4</td>
<td>8.3</td>
</tr>
<tr>
<td>2+</td>
<td>6.4</td>
<td>52.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Maximum sample size (N)</td>
<td>1202</td>
<td>176</td>
<td>1826</td>
</tr>
</tbody>
</table>

Sample: Medicaid-covered women seeking prenatal care from selected clinics in South Carolina and Washington. Note: Because of item nonresponse, the sample size varies among the various characteristics. The range of sample sizes is 1969 to 2002 for the total sample, 171 to 176 for users of drugs or alcohol or both, and 1788 to 1826 for nonusers.

Throughout the analysis we treated the self-reports of alcohol or drug use as valid evidence of whether a woman actually used these substances. Clearly, this is a limitation of our study, because respondents may have misreported substance use, despite our efforts to ensure their confidentiality. We were reassured, however, that our estimates of the prevalence of use are consistent with those found in other surveys, such as the 1994 National Householl Survey on Drug Abuse.

We used 2 methods to identify predictors of women at high risk of alcohol or drug use during pregnancy. First, logistic regressions were used to identify factors that were significantly correlated with use of alcohol or drug during pregnancy. Included in the regression model were several psychosocial and demographic variables found in previous studies to be associated with perinatal drug or alcohol use, as follows: depression,13, 14 homelessness,13, 15, 16 having a family member who used drugs or alcohol,13, 17, 18 inadequate social support,13, 18 past use of alcohol or tobacco, and age.13 Second, classification and regression trees (CART) were used to identify a small number of variables that could be used to distinguish women at high risk for alcohol or drug use from those at lower risk. All variables used in the regression analysis were included in the CART analysis.

Results

Among the total sample of 2002 pregnant women, 176 women (8.8%) reported current use of either drugs or alcohol or both; 93 (4.6%) reported current use of illegal drugs; and 117 (5.8%) reported current use of alcohol.

The prevalence of substance use varied substantially among the sites. About 2% of pregnant women in the rural Washington site reported current drug or alcohol use compared with 9% in South Carolina and 27% in the more urban Washington site. The variation in substance use across sites suggests that overall substance use prevalence rates found in this sample should not be generalized to the population at large.

Substantial differences in demographic and psychosocial characteristics were found between reported drug or alcohol users and nonusers (Table II). Compared with women who reported no current substance use, women who were current illicit drug or alcohol users were more likely to report moderate or severe depression, ever using alcohol or cigarettes, use of alcohol or cigarettes in the month before pregnancy, homelessness in the past 3 years, no usual source of health care, living with someone who used illegal drugs or substantial alcohol, living with someone who had received drug or alcohol treatment,
• Moderate or severe depression was significantly associated with current drug use and current drug or alcohol use.

• Women who lived alone or with small children had a significantly greater likelihood of current use of either drugs or alcohol or both.

• Women who lived in rural Washington had a significantly lower likelihood of current use of either drugs or alcohol or both and a significantly lower likelihood of current drug use.

• Women who lived with someone who used drugs or alcohol had a significantly greater likelihood of current drug use.

Other characteristics such as homelessness, living with someone who currently uses illicit drugs or currently consumes substantial alcohol or who has undergone treatment for either or both of these, being worried about the pregnancy, having a first pregnancy, and having a child who does not live with the mother are factors that were positively associated with substance use during pregnancy, but the relationships were not statistically significant in our sample.

To refine the analysis and identify a small set of risk factors that could serve as the basis for a screening protocol for risk of drug or alcohol use during pregnancy, a CART analysis was performed. Separate analyses were performed to identify predictors of drug and alcohol use and use of only drugs during pregnancy. In each case the sample was divided randomly into the following 2 groups: (1) a developmental sample that was used to identify possible predictors and (2) a test sample on which the validity of the identified predictors could be examined. Because the predictors worked well, the results for the developmental test, and full samples are similar. Thus we report the results for only the full sample. (Results for the test sample are available from the corresponding author.)

Risk of either drug or alcohol use or both. As noted previously, 8.8% of the women in the total sample reported using drugs or alcohol since they became pregnant. Within the sample the CART analysis generated 3 groups with increasing levels of risk for alcohol or drug use during pregnancy: (1) low risk—those women who have never used alcohol; 1.4% of women in the low-risk group reported using either drugs or alcohol or both during the time they had been pregnant; (2) average risk—those women who have used alcohol in the past but not in the month before pregnancy; 8.7% of women in the average-risk group reported using either drugs or alcohol or both during the time they had been pregnant; (3) high risk—those women who used alcohol in the month before pregnancy; 56.0% of women in the high-risk group reported using either drugs or alcohol or both during the time they had been pregnant.

Among women who currently use either drugs or alcohol or both, 10% fall into the low-risk group, 18% fall into the average-risk group, and 71% fall into the high-risk group. Among current nonusers, 69% fall into the low-risk group, 18% fall into the average-risk group, and 12% fall into the high-risk group.

Risk of drug use. For drug use, CART gives results similar to those for drug or alcohol use, except that the number of cigarettes smoked in the month before pregnancy does a slightly better job of distinguishing the average-risk and high-risk groups than does alcohol use in the month before pregnancy. The 5 risk groups for predicting drug use are as follows: (1) low risk—those women who have never used alcohol; only 1.4% of women in this group reported using drugs during the time they had been pregnant; (2) average risk—those women who used alcohol in the past but did not smoke 23 cigarettes in the month before pregnancy; 5.4% of women in this risk group reported using drugs during the time they had been pregnant; (3) high risk—those women who used alcohol in the past and smoked 23 cigarettes in the month before pregnancy; 14.5% of women in this risk group reported using drugs during the time they had been pregnant.

Among all the women who reported currently using drugs, 19% fall into the low-risk group, 22% fall into the average-risk group, and 59% fall into the high-risk group. Among nonusers, 67% fall into the low-risk group, 19% fall into the average-risk group, and 14% fall into the high-risk group.

Robustness of the CART results. To test the robustness of the CART results, we ran the model separately on the data from each of the 3 sites that made up the full sample. The risk categories that CART identified when the full sample was used were not the optimal risk categories on a site-by-site basis. Nevertheless, each variable that was important in the full sample in distinguishing drug and alcohol users or drug users only from nonusers was also a powerful predictive variable at ≥1 of the 3 sites:

• Rural Washington site. In this site with a high representation of Hispanic women, the number of cigarettes smoked in the month before pregnancy was the most effective variable in distinguishing drug or alcohol users from nonusers.

• Urban Washington site. Drinking in the month before pregnancy was the most powerful predictive variable, and the number of cigarettes smoked in the month before pregnancy and age were the next most powerful variables in predicting drug and alcohol use.

• South Carolina site. Drinking in the month before pregnancy was the most powerful variable in distinguishing users and nonusers. The variable use drug was a second-tier distinguishing variable for predicting drug use and a third-tier distinguishing variable for predicting use of drugs and alcohol.

Comment

Substance use in pregnancy occurs across all socioeconomic and racial groups. Although the present study addresses substance use screening only in a Medicaid
population, such screening will benefit all women. If al-
cohol use is recognized early in pregnancy, even in a
chronically alcoholic woman, and the woman, through
treatment, becomes alcohol free by the third trimester,
the rate of fetal alcohol syndrome is significantly re-
duced.11 For a cocaine-using pregnant woman, if the
woman enters treatment and becomes drug free by the
third trimester, the rate of medical complications com-
monly associated with cocaine use during pregnancy (for
example, low birth weight, abruptio placenta, or pre-
term labor and delivery) is significantly reduced.12 These
data support the importance of screening all pregnant
women for substance use and referring for further assess-
ment any women with a positive screening result.

Consequently, over the past few years there has been an
emerging emphasis on the responsibility of the primary
prenatal care physician to identify those women at risk
for alcohol or drug use during pregnancy and to refer the
identified women for further assessment. Thus physicians
require a screening instrument that can be used in
the clinical setting. Ideally, a screening instrument would
be brief, easily administered and scored, sensitive, and inex-
pensive to administer. Unfortunately, the current state of
the art and of practice in this area is still far from ideal.
For example, primary prenatal care providers are not
trained to, nor do they have the time to, conduct a full as-
sessment for substance use on every pregnant woman.
The present study suggests, however, that it is feasible
for providers to identify pregnant women at high risk for
substance use, although it does not provide a tool for pre-
cisely identifying actual substance users. Specifically,
the data developed through the present study suggest that a
risk classification protocol for identifying women at risk
for drug or alcohol use during pregnancy can be con-
doncted on the basis of 5 questions identified in the full
sample and site-specific CART analyses. Those 5 ques-
tions would classify women into 3 risk groups as follows:
(1) low risk (<2% reporting use)—those women who had
never used alcohol, (2) average risk (6% reporting use)—
those women (a) who had used alcohol in the past,
(b) who had not smoked 25 cigarettes in the month be-
fore pregnancy, and (c) who had not drunk alcohol in
the month before pregnancy; (3) high risk (30% report-
ing use)—those women (a) who have used alcohol in
the past and either (b) who have smoked 25 cigarettes in
the month before pregnancy or (c) who have drunk alcohol
in the month before pregnancy.

On the basis of these 5 levels of risk, primary prenatal
care physicians or other providers can ask 5 questions in the
context of the health examination:
• Have you ever drunk alcohol?
• How much alcohol did you drink in the month be-
fore pregnancy?
• How many cigarettes did you smoke in the month before pregnancy?

Institutional policies should determine which women
(either average-risk or high-risk or both) should be re-
ferred for a full clinical assessment for drug and alcohol use.
Such clinical assessment serves a second-level func-
tion and, in practical terms, is performed outside the pri-
mary care physician’s immediate direction by a team trai-
ned to provide an in-depth evaluation. Most clinical
assessment use a multiproblem approach to substance use
evaluation that not only evaluates the woman’s sub-
stance use but also examines medical and psychoso-
cial issues affecting her. This multidimensional assess-
ment approach helps determine the need for specialized
intervention strategies and can support the prenatal care
provider’s delivery of health care services.

Because the data in this study cover only Medicaid-eqi-
vileged women and come from only 3 sites in 2 states, cau-
tion should be taken in generalizing the prevalence data
too broadly. However, the risk factors identified in this
analysis are generally consistent with the correlates of
substance use in pregnancy found in the research litera-
ture, and the logistic regression analysis that identified
predictors of substance use is unlikely to be biased.

Our findings demonstrate the potential use of a screen-
ing protocol in prenatal care clinics to identify women
using substances or at risk for using substances during preg-
nancy. Such a screening protocol is a fairly noninvasive
means for a physician to gather information about a
woman’s likelihood of substance use during pregnancy.
It has both legal and financial advantages over using a urine
toxicscreen at one point in gestation to identify women
using illicit drugs. Through the screening approach
suggested here, urine toxicscreen could be used on
a targeted population at highest risk for substance use.

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Chasnoff et al. 757