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Identifying patients at risk for alcohol-exposed pregnancies: The importance of addressing multiple risk factors

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Abstract

Background: The increasing prevalence of fetal alcohol spectrum disorders is a critical public health issue. Two behaviors, consuming alcohol and using less effective pregnancy prevention, may result in alcohol-exposed pregnancies (AEPs) in individuals who can become pregnant. In the context of alcohol Screening and Brief Intervention (SBI) services, cutoff scores on widely used alcohol risk assessments (e.g., Alcohol Use Disorders Identification Test [USAUDIT]), may fail to identify individuals whose relatively low alcohol consumption may still put them at risk for an AEP due to their pregnancy prevention method.

Methods—To identify this gap in alcohol SBI service delivery, we examined data from two reproductive healthcare systems implementing alcohol SBI, to explore the prevalence of individuals who met both of the following risk conditions: reported any alcohol use on the USAUDIT and a pregnancy prevention method <88% effective. Electronic health records for individuals ages 18–49 presenting for preventive care in 2021 were analyzed.

Results: Of 11567 screened, 7638 reported some alcohol use, but screened at a lower-risk level and were not flagged to receive an alcohol-focused BI. Of these, 1477 were using a method of pregnancy prevention that was less than 88% effective. Additionally, 118 of the 1676 who screened positive on the USAUDIT were using less effective contraception and did not receive a BI. In summary, the number of individuals at risk of an AEP who did not receive an alcohol BI was 1595 (13.8%) of the total patients screened for at-risk alcohol use.

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Conclusions: There is a need for systems modifications to assess multiple behaviors simultaneously and alert providers when a combination of behaviors increases a specific health risk, such as an AEP. Tailored alcohol BIs that include the risks/benefits of various pregnancy prevention methods to reduce AEPs provide opportunities to enhance the reach of standard alcohol SBI services.

Keywords

Alcohol Screening and Brief Intervention; Screening; Brief Intervention and Referral to Treatment; Alcohol Use Disorders Identification Test; Alcohol-Exposed Pregnancy; Fetal Alcohol Spectrum Disorders; Contraception Effectiveness; Pregnancy Prevention; USAUDIT; SBI; SBIRT; FASD

INTRODUCTION

Prenatal alcohol exposure is a leading preventable cause of birth defects and neurodevelopmental disorders in the United States (US). Fetal alcohol spectrum disorders (FASD) is a term used to describe a range of behavioral, intellectual, and physical problems that may appear at any time during childhood and last a lifetime.¹ Due to the high rates of alcohol use and unintended pregnancies common in the US, the preconception period provides a clinical opportunity to educate individuals who may become pregnant to reduce the risk of alcohol-exposed pregnancies (AEPs).² Evidence suggests that early intervention approaches, such as alcohol screening and brief intervention (SBI), have the potential to reduce the harm from alcohol on maternal and infant health.³

According to its Chronic Disease Indicators, the Centers for Disease Control and Prevention (CDC) estimates that approximately 45% of all pregnancies in the US are unintended.⁴ An unintended pregnancy is defined as one that is either unwanted, that is, the pregnancy occurred when no children or no more children were desired; or the pregnancy was mistimed. Most unintended pregnancies result from not using contraception or from not using it consistently or correctly.⁴ Further, data from CDC's Behavioral Risk Factor Surveillance System indicate that approximately half of adult women in the US report drinking alcohol in the past 30 days and 18% of those 18–44 years of age binge drink, consuming four or more drinks per occasion.⁵ During 2018–2020, 13.5% of pregnant adults reported current drinking, while 5.2% reported binge drinking.⁶

Alcohol SBI is an evidence-based clinical preventive service to identify and treat patients who are drinking at levels that put them at risk for short-term or long-term harms.^{7–10} Alcohol SBI involves the use of 1) validated screening tools to classify patients' risk levels, followed by 2) a short conversation with patients who are drinking too much and are at 'moderate- or high-risk' for harm. These BIs are designed to motivate patients to reduce their drinking levels or to accept a referral to specialty care as needed.⁹ A primary goal of this current initiative was to educate individuals at risk of an AEP through the implementation of alcohol SBI services in healthcare systems.

Although a number of reliable and valid alcohol screening tools exist, the World Health Organization's (WHO's) Alcohol Use Disorders Identification Test or AUDIT has been the

most widely tested for screening in primary health care settings.^{11–14} The AUDIT screens for the full spectrum of alcohol misuse and provides an assessment of lower-, moderate- or high-risk use. Based on the AUDIT-linked alcohol SBI protocol, patients who screen at moderate- or high-risk levels should receive a BI while those who screen at lower-risk levels do not.¹¹ Methods for identifying an individual's risk status, based solely on a positive AUDIT (or other screen) score, will fail to identify patients drinking at low levels and who may be using less effective contraception. Consequently, the provider may miss an opportunity for an AEP prevention-focused educational intervention.¹⁵

Over 30 years of implementation and effectiveness research has shown that BIs, when implemented and delivered with fidelity, can reduce the amount of alcohol consumed and associated problems in those who are drinking too much^{7–9}; however, a focus on early intervention for multiple behavioral risk factors should be addressed to improve the quality of health care.^{16–19} There have been fewer trials regarding implementation and effectiveness of interventions to reduce the risk of AEPs in individuals who may become pregnant. In a recent systematic review, Reid et al. described the results of 19 studies to evaluate preconception interventions to change alcohol use and/or contraceptive behavior, many of which were based on the seminal work of Floyd and colleagues.^{2,20} Although the interventions reviewed were more intensive than a typical BI session, 4 face-to-face single-session interventions were effective in reducing the potential for AEPs.^{21–24} Results of the overall systematic review indicated that many of the 19 interventions reduced AEP risk during the preconception period by preventing unplanned pregnancy and that changes in AEP risk were driven primarily by changes in contraception behavior; although, some approaches documented changes in both alcohol and contraception behavior.²

The background for this investigation was a cooperative agreement, funded by the Centers for Disease Control and Prevention across healthcare systems and academic institutions, to implement alcohol screening and brief intervention services.²⁵ The aim of this cross-sectional study was to identify the potential gap in alcohol SBI service delivery, by examining administrative data from two large reproductive health care systems: Planned Parenthood of Southern New England (PPSNE) and Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky (PPGNHAIK) to explore the prevalence of individuals who reported alcohol use that was categorized as 'lower-risk' on the USAUDIT screening tool, were using a "less effective" method of pregnancy prevention, and did not receive an alcohol-focused BI.

In the context of traditional alcohol SBI services, these patients would not be flagged to receive a BI because they did not meet the threshold for moderate- or high-risk use; however, they may be at risk of an AEP due to their method of pregnancy prevention. Opportunities for integrating electronic health record (EHR) flags to consider pregnancy prevention methods in conjunction with lower-risk drinking cutoff scores on standardized screening tools are discussed. Opportunities for providing AEP prevention-focused BIs are also considered.

METHODS

Sample Selection.

Ethics approval for the study was conducted in compliance with each academic institution's review board: University of Connecticut School of Medicine (exempt) and University of Alaska Anchorage (expedited). The combined study sample is comprised of data from the two health system affiliates, PPSNE and PPGNHAIK. PPSNE data are from 15 health centers in Connecticut and Rhode Island, while PPGNHAIK data are from 18 health centers across Washington state. The sample for both health systems comprises females (sex assigned at birth), 18–49 years of age who received preventive care between 1/1/2021 and 12/31/2021. Patients who were not screened for alcohol use or who did not have a recorded method of pregnancy prevention were excluded from the analyses. For patients who were seen for more than one preventive care visit during the year, the first visit with complete study data was utilized. For the combined sample, the initial data set included 13994 preventive visits of which 13521 were unique visits. After excluding incomplete data, the final sample was 11567. Due to the geographic locations of the health systems, differences in patient demographics and substance use were expected; however, the intent of this study was not to compare the two systems, but to highlight the screening and BI results of two healthcare systems implementing alcohol SBI services in a similar manner.

Measures.

Administrative data from each system's EHR included 1) substance use information about alcohol and other drug use; 2) documentation of Brief Intervention (BI) completion; and 3) method of pregnancy prevention as reported during the visit. Patient demographic data of sex, age, race/ethnicity and insurance coverage were also included.

EHR documentation accuracy was maintained through a variety of mechanisms including EHR data audits, feedback loops with health center managers, on-site clinician monitoring visits and technical assistance calls with health center staff.

Alcohol Risk Score.—Validated screening instruments were incorporated into each health system's EHR to collect alcohol and other drug use information. Quality improvement protocols ensured the completion and accuracy of the screening assessments. These included screening rate monitoring, health-center specific reporting and routine technical assistance that included role-play activities.

The Alcohol Use Disorders Identification Test or AUDIT, developed by the WHO, is a widely used alcohol screening tool designed to measure risk related to alcohol use in general health care settings.^{11,13} The U.S. version of the AUDIT, the USAUDIT,¹² was used by the two health systems reported in this study. It consists of 10 questions that ask about alcohol use in the past year, with the first three questions serving as a pre-screen assessment. Points for each question range from 0–6 for the first three questions and 0–4 for the remaining seven questions. Scores for all 10 questions are summed to compute a total Alcohol Risk Score ranging from 0–46. A higher score indicates greater risk.

The risk range cutoffs for females were utilized for the study. A Risk Score of 0 indicates that the patient is currently abstinent. Alcohol Risk Scores of 1–6 indicate ‘lower-risk,’ where a patient may be drinking, but likely within the recommended guidelines for healthy individuals. No further action is typically required for individuals at ‘lower-risk.’ Risk Scores of 7–24 indicate ‘moderate-risk,’ indicating a patient may be drinking above the recommended guidelines and/or experiencing some problems related to alcohol use. A BI for these individuals would be conducted to motivate the patient to modify their drinking pattern to be within the recommended guidelines to reduce associated risks. Scores greater than 25 indicate that the patient may be experiencing harms related to drinking and a referral for further assessment would be warranted. For patients who are pregnant, a score of 1 or more would warrant a brief intervention to discuss health risks, including FASDs.

The total USAUDIT screening score is recorded in the EHR for each patient. As indicated above, a score of 1–6 for healthy individuals typically indicates ‘lower-risk,’ and no further intervention would be needed. However, for this study, we examined those who scored in this ‘lower-risk’ range in conjunction with their potential for pregnancy as defined by the effectiveness of their current method of pregnancy prevention to determine if a BI would have been appropriate.

Assessment of Other Drug Use.—A common component of an SBIRT program includes the assessment of other drug use with validated screening instruments.⁷ PPSNE utilized the Alcohol, Smoking and Substance Involvement Screening Test, Frequency and Concern Items (ASSIST-FC)²⁶; while PPGNHAIK screened patients using the 10-item Drug Abuse Screening Test (DAST-10).²⁷ For patients who reported any drug use, clinic staff recorded in the EHR which drug(s) were used.

Method of Pregnancy Prevention.—The patient’s method of pregnancy prevention was recorded by the clinician and used to determine whether the patient was at risk for pregnancy. Method of pregnancy prevention is classified in terms of effectiveness.²⁸

Table 1 describes the methods identified as “more effective” in preventing pregnancy (e.g., implant, intrauterine device) compared to those that are “less effective” (e.g., condoms, spermicide). More effective methods of pregnancy prevention include contraception options that are approximately 88% effective or greater in preventing pregnancy, and often referred to as Tier 1 or Tier 2 contraception methods.²⁸ Additionally, documentation of menopause, abstinence, and same-sex partner were classified as more effective. Pregnancy prevention methods classified as less effective are less than 88% effective and typically referred to as Tier 3.

Brief Intervention Documentation.—EHR documentation of clinician-patient discussion components was used to identify whether an alcohol BI was completed. At PPSNE, clinicians identify the content of the BI within the EHR by selecting available BI “smart-phrases” such as “discussed the risks related to alcohol use,” or “advised the patient to cut down on alcohol use.” At PPGNHAIK, BIs are documented in the EHR via a series of checkboxes that providers use to indicate if they discussed or advised patients

regarding their alcohol use. Examples included “advised of health risks,” and “discussed patient reasons/ability for change.”

BI fidelity was guided by the EHR modifications that included the addition of BI order-sets and incorporation of smart-phrases to guide the interventions. EHR rate audits of completed BIs, online and in-person technical assistance, and incorporation of alcohol SBI modules into new-hire training and certification were used to monitor and improve clinician delivery of BI services.

Participants.

Participant characteristics are described in Table 2 for each healthcare system and for the combined sample. As expected, there were differences across the two healthcare systems with regard to socio-demographic and substance use characteristics. The combined sample included 11567 patients, 61.9% of whom identified as White, 14.2% as Black, and 8.0% as Asian/Pacific Islander; although, a higher percentage of Black patients are seen in PPSNE (20.8% vs. 7.7%) while a higher proportion of Asian/Pacific Islander patients are observed in PPGNHAIK (13.1% vs 2.8%) due to the geographic location of the health centers. In PPSNE, 25.0% of patients were of Hispanic ethnicity; however, with the exception of White race, Hispanic ethnicity was not reported separately from race at PPGNHAIK. On average, the female patients were 30 years old and approximately half received publicly supported health insurance or were uninsured. The predominant other drug used by patients at both health systems was marijuana.

Between the two health systems, patient substance use behavior and pregnancy prevention methods also differed. Overall, 66.1% of the combined sample of patients reported current lower-risk alcohol (64.1% percent of PPSNE and 68.0% of PPGNHAIK patients), and 23.8% of the combined sample used less effective contraception at the time of their visit (29.8% of PPSNE and 18.0% of PPGNHAIK patients). Overall, 14.4% of patients scored in the moderate- or high-risk alcohol use range on the USAUDIT (18.2% of PPSNE patients and 10.9% of PPGNHAIK patients).

Data Analysis.

Frequency statistics and chi-square analyses were conducted using IBM SPSS Statistics version 28.

RESULTS

Despite the significant differences in sample characteristics across the two health systems, between sample outcomes related to SBI delivery did not vary significantly, and for this reason the sample data were combined for the analyses. Figure 1 shows the combined samples of the 11567 screened patients. Of those, 7638 (66%) reported some alcohol use, but screened at a lower-risk level and thus would not have been flagged to receive an alcohol-focused BI based on their USAUDIT Risk Score. Of those reporting lower-risk use, 6439 (84.3%) did not receive a BI, consistent with the standard alcohol SBI protocol since they did not screen positive for at-risk alcohol use. Of those who were lower-risk drinkers and did not receive a BI, 1477 (22.9%) were using less effective pregnancy

prevention and were therefore at risk of an AEP. Among the lower-risk alcohol group, there were no significant differences in receiving a BI based on effectiveness of pregnancy prevention for PPSNE ($\chi^2_{(1, 3653)}=3.45, p=.06$) or PPGNHAIK ($\chi^2_{(1, 3985)}=1.31, p=.25$), indicating providers were equally likely to provide a BI to patients using effective pregnancy prevention as those patients using less effective pregnancy prevention.

Of the total screened sample, 1676 (14.5%) would have been flagged for a BI based on their Alcohol Risk Score (Figure 1). The majority of patients screening positive and flagged for at-risk alcohol use (moderate- or high-risk) received a BI, 1162 (69.3%) while 514 (30.7%) did not receive a BI. Of those missed, 118 (23.0%) were using less effective pregnancy prevention and were therefore at risk of an AEP. Like the lower-risk alcohol group, in this at-risk alcohol use group, there were no significant differences in receiving a BI based on effectiveness of pregnancy prevention for PPSNE ($\chi^2_{(1, 1038)}=2.42, p=.12$) or PPGNHAIK ($\chi^2_{(1, 638)}=2.64, p=.10$). While the likelihood of receiving a BI did not differ based on pregnancy prevention method, overall, BIs were delivered more often to patients who screened positive for at-risk alcohol use than those reporting lower-risk alcohol use. In summary, the number of individuals at risk of an AEP who did not receive an alcohol BI were 1595 (13.8%) of the total number of patients screened for at-risk alcohol use.

Discussion.

The primary focus of this study was to identify the potential gap in alcohol SBI service delivery by examining the prevalence of individuals who reported alcohol use that was categorized as 'lower-risk' on the USAUDIT screening tool, were using a less effective method of pregnancy prevention, and did not receive an alcohol-focused BI. Full integration of a preventive practice that included universal administration of a valid, standardized screening tool, automated scoring and EHR-based provider alerts when patients screened positive, still missed an opportunity to provide an alcohol-related intervention to approximately 14% of individuals who reported consuming some alcohol and reported using a less reliable form of pregnancy prevention, a combination of behaviors that increased their risk for an AEP.

The continued focus in health care on screening and intervening on singular behavioral risk factors has been reported as a substantial area for improving the quality of care.^{16–19,29} Like many health conditions that involve integrating behavioral and medical care,³⁰ preventing FASDs involves addressing not only alcohol use, but also identifying and addressing concurrent behaviors that contribute to pregnancy such as contraception use.³¹ This finding underscores the insufficiency of intervening on alcohol risk alone, without considering additional risk factors for AEP, and a need for interventions, tools and systems that are sufficiently flexible to assess multiple behaviors simultaneously.¹⁶

An EHR approach that uses patient-specific data to prioritize and tailor interventions is recommended given the potential of EHRs to not only document relevant demographic, physiological, health risk, and behavioral data, but to also combine data to guide care.^{32–35} While some progress has been made in using the medical information in the EHR to optimize medication prescribing for patients with chronic conditions (e.g., diabetes, cancer),

the EHR's usefulness in combining information to guide brief interventions is an unexplored opportunity.

Limitations.

The generalizability of these findings and recommendations are limited by the study of sexual and reproductive health care systems delivered across two regional affiliates. These systems used different EHRs and served demographically different patient populations, and their system of care differs from other primary care services. One could expect other systems implementing alcohol SBI that are less specialized in women's health and reproductive care may miss even more patients at risk for AEP because contraception use may not be a visit priority. Attending to bias in service delivery is recommended to reduce stigmatizing subgroups of patients or inequalities in services received.^{36–38}

Conclusions.

The goal of this federally funded initiative was to implement alcohol SBI for patients who may be at heightened risk for an AEP, with the ultimate goal of preventing FASDs. This required modification to traditional SBI services to include education and training materials, as well as modification to EHR systems. This study explores the gap in the provision of alcohol SBI services for patients who use less effective pregnancy prevention, especially those who drink at lower-risk levels and therefore would not have been identified as needing a BI. Integrating EHR flags to take into account pregnancy prevention methods with lower-risk drinking cutoff scores would provide opportunities for AEP prevention-focused BIs. Universal, systemized approaches that assist providers in identifying patients with multiple risk factors related to an AEP will ensure that patients are educated regarding information and advice to optimize health outcomes.

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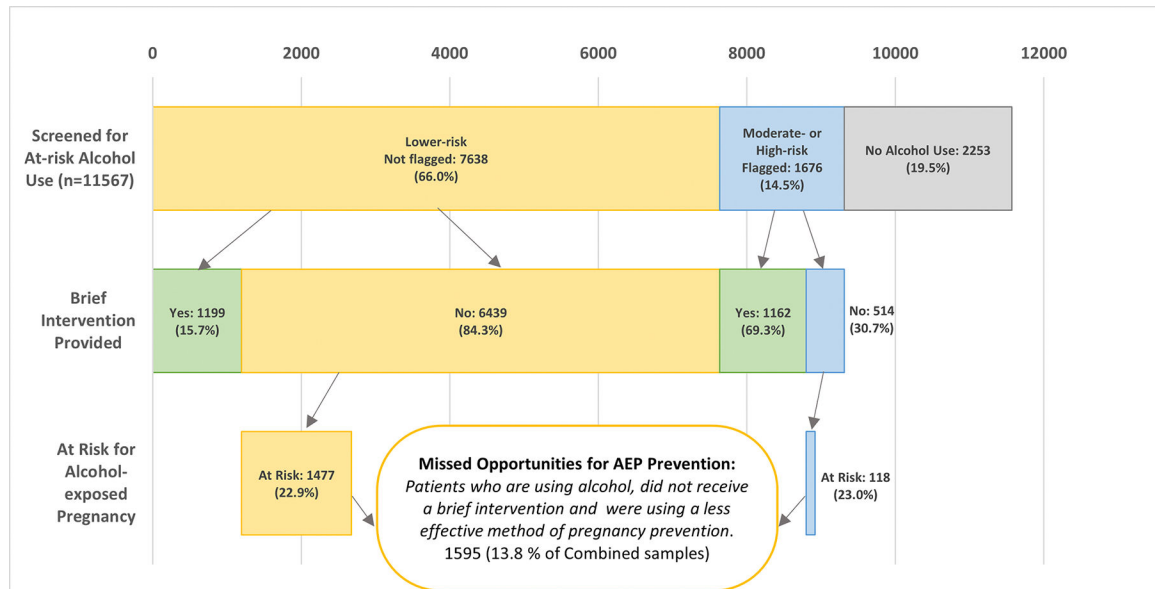


Figure 1. Planned Parenthood of Southern New England (PPSNE) and Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky (PPGNHAIK) Combined Samples: Missed Opportunities for AEP Prevention

Table 1.**Methods of Pregnancy Prevention¹**

More effective methods	Less effective methods
Abstinence	Condoms
Menopause	Withdrawal method
Same-sex partner	Natural family planning
Implant	Spermicide
Intrauterine Device (IUD)	Barrier method (including diaphragm, sponge)
Sterilization (including partner)	Emergency contraception
Injection	None (including 'seeking pregnancy')
Patch	
Ring	
Oral contraception pills	
Lactational amenorrhea method	

¹ More effective methods of pregnancy prevention include contraception options that are approximately 88% effective or greater in preventing pregnancy, and often referred to as Tier 1 or Tier 2 contraception methods. Those classified as less effective are less than 88% effective and typically referred to as Tier 3. For the purposes of this study, non-contraception methods, such as menopause, abstinence and having a same-sex partner are classified as more effective pregnancy prevention methods.

Table 2.

Sample Characteristics¹ for Planned Parenthood of Southern New England, Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky, and the Combined Health Systems Sample

Characteristic	PPSNE (n=5,703)	PPGNHAIK (n=5,864)	Combined Sample (n=11,567)
Age: Mean (SD) *	31.71 (7.44)	28.97 (6.91)	30.34 (7.18)
Female Sex	100.0%	100.0%	100%
Race ² *			
Asian/Pacific Islander	2.8%	13.1%	8.0%
Black	20.8%	7.7%	14.2%
Alaska Native/American Indian	0.5%	1.7%	1.1%
White	56.1%	Hispanic: 2.1% Not Hispanic: 65.5%	61.9%
Other/Unknown	19.9%	9.8%	14.8%
Hispanic Ethnicity ² *	25.0%		
Primary Insurance Type			
Commercial	44.1%	54.7%	49.5%
Public	42.6%	45.3%	44.0%
Self-pay/Uninsured	13.3%		
Method of Pregnancy Prevention *			
More effective	70.2%	82.0%	76.2%
Less effective	29.8%	18.0%	23.8%
Alcohol Risk Level *			
Abstinent (no risk)	17.7%	21.2%	19.5%
Low-risk (USAUDIT Score: 1–6)	64.1%	68.0%	66.1%
Moderate-risk (USAUDIT Score: 7–24)	17.8%	10.6%	14.1%
High-risk (USAUDIT Score: 25+)	0.4%	0.3%	0.3%
Other Substance Use ³ *			
Marijuana	32.4%	23.6%	27.9%
Cocaine/crack	0.9%	1.1%	1.0%
Amphetamine type stimulants (methamphetamine, prescription stimulants)	1.5%	0.4%	0.9%
Sedatives/sleeping pills	2.6%	0.0%	1.3%
Prescription opioids/heroin	1.5%	0.2%	0.8%
Other substances (LSD, psilocybin, ketamine, MDMA, OTC cough medicine)	0.2%	0.3%	0.3%

Legend. PPSNE: Planned Parenthood of Southern New England; PPGNHAIK: Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky; SD: standard deviation; USAUDIT: Alcohol Use Disorders Identification Test, US version; LSD: lysergic acid diethylamide; MDMA: methylenedioxy-methylamphetamine; OTC: over the counter; ASSIST-FC: Alcohol Smoking and Substance Involvement Screening Test-Frequency and Concern; DAST-10: Drug Abuse Screening Test

¹ Sample comprises data for 18–49-year-old females screened for alcohol use during a preventive visit from 1/1/2021–12/31/2021;

² Race and Hispanic Ethnicity are not mutually exclusive;

³ Indicates current use as defined by the ASSIST-FC (PPSNE) or the DAST-10 (PPGNHAIK) screening tools. Other Substance Use categories are not mutually exclusive;

* Significant differences between health systems occur for mean age, race (White vs. all other races), method of pregnancy prevention, alcohol risk level (low risk vs. moderate risk and abstinent vs. moderate risk), and other substance use (marijuana vs. all other substances). All tests are significant at $p < .001$

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