Problem drinking is a common phenomenon in the United States that encompasses a wide range of drinking behavior. The National Institute of Epidemiology’s Survey on Alcohol and Related Conditions found that more than 8% of the 43,093 adults surveyed had some drinking problem and as many as 3.8% had the disorder of alcohol dependence.1 Surveys indicate that more than a third of adults consume enough alcohol to be at risk for alcohol-related harm.2 Alcohol consumption is now the third leading cause of preventable death, contributing to at least 100,000 annual deaths.3,4 Problem drinking contributes to cancer, hypertension, and stroke.5 Furthermore, excessive alcohol consumption may decrease adherence to medications and follow-up for treatments, and limit therapeutic and pharmaceutical options for many diseases.

Problem drinking meets the criteria for screening in primary care patients as it is a prevalent, harmful, preventable, and treatable condition in the context of outpatient care. An estimated 20% of patients in outpatient primary
care settings consume enough alcohol to be problem drinkers. Unfortunately, primary care providers are extremely poor at identifying problem drinking among their patients and as many as three fourths of these drinkers escape their detection.\textsuperscript{9,12} The general ineffectiveness of primary care providers to screen for problem drinking may be due to many factors. For example, clinicians may have little training regarding identification and treatment of alcohol problems and may underutilize established screening strategies to detect problem drinking in primary care practice.\textsuperscript{11,13-15} Emerging pharmacologic and nonpharmacologic therapies for problem drinking that are designed for use by primary care providers will demand effective and efficient screening practices.

This review examines the rationale for screening patients for problem drinking, describes the spectrum of problem drinking, and examines screening strategies that are recommended for improving the identification of patients who are likely candidates for alcohol treatment. Whereas this review concentrates on primary care settings, strategies for screening of problem drinking may be appropriate for a host of outpatient clinical settings.

**Rationale for Alcohol Consumption Screening in Primary Care Settings**

Why screen for problem drinking? To screen for a condition, the typical standards are that the condition be: 1) harmful to patients; 2) prevalent in the setting where screening is to take place; 3) treatable in that setting; and 4) have effective, efficient, and practical screening methods available. Problem drinking meets these criteria as a disorder that causes significant harm to both patient and society, is prevalent in primary care settings, is treatable in outpatient settings, and has available, effective, and convenient screening procedures.

The harm caused by problem drinking has led to a call for implementation of screening in primary care settings. Primary care settings are the “first line” of contact for patients to access appropriate treatments, regardless of the disorder. The Institute of Medicine advocated that primary care clinicians identify the range of problem drinking in their patients and treat or refer for treatment the patients they identify.\textsuperscript{16} The World Health Organization (WHO) and the US Preventive Services Task Force (USPSTF) both recommend that primary care clinicians inquire about alcohol use and encourage, when necessary, treatment for alcohol abuse.\textsuperscript{17,18} The National Institutes of Health (NIH) has recommended that primary care clinicians screen all patients for problem alcohol consumption and treat identified patients in primary care settings.\textsuperscript{19}

Unfortunately, despite these calls for increased screening, many clinicians have yet to adopt alcohol screening practices. In part, clinicians may feel that they are already identifying patients who need help via “case finding,” a process in which a clinician asks questions or uses tests to identify alcohol problems in patients with a “red flag” for an alcohol disorder. Examples of red alerts include presenting complaints, recent injuries, medical conditions (eg, hypertension, depression), social and/or family histories, physical examination findings, and abnormal laboratory values. By contrast, alcohol screening involves administering a formal evaluation for problem alcohol use in all patients, regardless of the clinician’s index of suspicion. The use of an alcohol screening strategy is superior to the use of clinician judgments (eg, case finding) in the detection of problem drinking.\textsuperscript{20}

**The Spectrum of Alcohol Problems From Abstinence to Alcohol Dependence**

There are several mutually exclusive categories of alcohol drinking, and awareness of these categories can assist the clinician in assessing and treating the range of alcohol consumption in patients. Two general forms of problem drinking exist: “at-risk” consumption (ARC) and alcohol use disorders (AUDs). Both ARC and AUDs exist along a continuum of alcohol consumption including abstinence, safe drinking, and problem drinking. Safe alcohol drinking is that amount of consumption that does not exceed diagnostic criteria for ARC. ARC is defined as consumption of amounts of alcohol that places a patient “at risk” for alcohol-related harm but does not meet criteria for an AUD. AUDs include both alcohol abuse and alcohol dependence diagnoses.\textsuperscript{21-24}

An “at-risk” drinker is variably named and defined by different authorities. For example, ARC can constitute the terms “heavy drinking,” “hazardous drinking,” and “harmful drinking”—depending on the authority. The different definitions of “at-risk” drinking are partly based on varying cultural standards of consumption. For example, the WHO’s definition of ARC comprises fewer drinks per week than does the US criteria, owing to the different amounts of alcohol used to define a standard drink. In the United States, the National Institute on Alcohol Abuse and Alcoholism (NIAAA)
has defined a “standard drink” as 14 g (0.6 fluid oz) of pure alcohol (Figure 1). Based on this definition, the NIAAA defines at-risk levels of alcohol drinking as more than 14 drinks per week for men or more than 7 drinks per week for women (Table 1).¹⁹

Although ARC is defined by a weekly quantity of alcohol consumption, large amounts of alcohol consumed at 1 time (eg, 10 drinks once a week) may constitute a subset of ARC that requires specific screening strategies. Recent work has characterized binge drinking as the consumption of a specific quantity of alcohol over a short time frame (eg, in 1 sitting or 1 period of time).

Adolescents and young adults are particularly likely to binge drink. Binge drinkers have unique health risks and may indulge in risky behaviors, including drinking while driving and unsafe sexual practices.¹⁹,²⁵-²⁷ The NIAAA defines binge drinking as consumption of 5 or more standard drinks for men and 4 or more standard drinks for women on 1 occasion.¹⁹,²⁸

The most severe forms of problem drinking are AUDs. Patients with AUDs meet diagnostic criteria for alcohol abuse or alcohol dependence. Whereas ARC is defined by quantity and frequency of consumption, AUDs are defined by conditions and harm associated with consumption. Neither diagnoses of alcohol abuse nor alcohol dependence require quantification of alcohol consumption. ARC drinkers may consume more alcohol per week than those drinkers diagnosed with an AUD.

Alcohol abuse and dependence are defined by criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV).²¹ To be diagnosed as having alcohol abuse, patients must meet 1 of 4 criteria in the previous year. Likewise, to be diagnosed as having alcohol dependence, patients must meet 3 of 7 criteria in the past year. It is important that clinicians understand that physical dependence on alcohol is only the first criterion for the DSM-IV diagnosis of alcohol dependence. Therefore, it is conceivable that a patient may have a diagnosis of alcohol dependence without being physically dependent on alcohol.

**Screening Using History, Physical Examination, and Laboratory Findings**

A history of certain problems may prompt clinicians to suspect problem drinking among their patients (ie, case finding). Problem drinking may, for instance, incur increased absences from work or school and increased traumatic injuries. A recent job loss can be associated with increased alcohol consumption. Increased depression and anxiety can occur with problem drinking.²⁹ Patient complaints of dyspepsia, sexual dysfunction, sleep disorders, confusion, and syncope also should promote suspicion of alcohol problems. Drug use and tobacco use are associated with increased alcohol consumption and should prompt assessment of alcohol drinking. Pregnancy especially should prompt clinicians to ask about a patient’s level of alcohol use. Practitioners should inquire about alcohol problems in parents, siblings, and children as part of any family history.

Although history findings are associated with problem drinking, they are not specific to problem drinking and using these assessments as the sole means of identi-

---

**Table 1. Problem Drinking Definitions**

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>At-Risk Consumption (ARC)</td>
<td>Quantity or pattern of use that places person at risk for adverse consequences secondary to alcohol consumption. Usually defined by a quantity and frequency of alcohol consumption. National Institutes of Health criteria include: More than 14 standard drinks per week (men) More than 7 standard drinks per week (women) A quantity of alcohol consumed in 1 sitting in the past year. Usually defined as: 5 or more standard drinks in 1 sitting (men) in the past year 4 or more standard drinks in 1 sitting (women) in the past year</td>
</tr>
<tr>
<td>Binge Drinking (a subset of ARC)</td>
<td>Maladaptive pattern of alcohol use, leading to clinically significant impairment or distress, as manifested by 1 or more of the following secondary to alcohol consumption, in the prior year: Failure of roles at home, work, or school Risk of bodily harm at work or socially Run-ins with the law Interpersonal trouble with family or friends</td>
</tr>
<tr>
<td>Alcohol Abuse (an alcohol use disorder)</td>
<td>Maladaptive pattern of alcohol use, leading to clinically significant impairment or distress secondary to alcohol consumption, as manifested by 3 or more of the following, occurring at any time in the prior year: Tolerance defined by a need for increased alcohol to achieve an effect or diminished effect with continued alcohol use Physical or psychologic withdrawal defined by an alcohol withdrawal syndrome Alcohol is often taken in larger amounts or over a longer period than intended A persistent desire or unsuccessful efforts to cut down or control use A great deal of time is spent in activities necessary to obtain or use alcohol or recover from its effects Important social, occupational, or recreational activities are given up or reduced Alcohol use is continued despite knowledge of having a persistent or recurrent problem that is likely to have been caused or exacerbated by its use</td>
</tr>
<tr>
<td>Alcohol Dependence (an alcohol use disorder)</td>
<td>At-risk, alcohol abuse and alcohol dependence diagnoses defined by the DSM-IV. Diagnostic and Statistical Manual of Mental Disorders, 4th Edition and published references.¹³,¹⁷,¹⁹,²⁰</td>
</tr>
</tbody>
</table>
fying problem drinking may produce many false-positive screens. Furthermore, it is impractical for clinicians to inquire about these history features at every clinical visit.

Physical examination and routine laboratory findings are not sensitive to the detection of problem alcohol use because fluctuations occur with very high and/or prolonged consumption. Suggestive physical findings of significant alcohol consumption include unexplained tachycardia, tremor (hand or tongue), elevated blood pressure, hepatosplenomegaly, a tender liver edge, peripheral neuropathy, spider angiomata, conjunctival injection, and unexplained trauma.29,30 As with history findings, physical examination findings are not specific or sensitive or specific to routinely identify problem drinkers.

Laboratory abnormalities are common among people who consume alcohol and, therefore, such findings should prompt suspicion of alcohol problems. Laboratory tests are more specific than sensitive for detecting problem alcohol use and detection is improved when combined with other test strategies.31-33 Laboratory abnormalities have not consistently been shown to be an efficient and effective screen for problem drinking.29,32,34 However, laboratory evaluation is important when the practitioner is unable to interview the patient because of trauma or disability.

A serum aspartate aminotransferase to serum alanine aminotransferase ratio of greater than 2:1 is characteristic of damage due to alcohol consumption.32,33 In patients who have recently consumed alcohol, serum gamma glutamyl transferase and serum carbohydrate-deficient transferrin (CDT) are often increased.35-37,39,40 Although it is not often used in primary care practice, CDT can be used to identify chronic alcohol consumption with some success. CDT has shown sensitivities of 39% to 69% and specificities of 29% to 81% for the detection of ARCs, and sensitivities of 60% to 70% and specificities of 80% to 90% to detect AUDs.36,37,39 Furthermore, an increase in CDT over time may suggest increased or new alcohol consumption.40 Measuring CDT to screen for AUDs has been problematic in certain populations such as pregnant women and persons with iron overload.41,42 Other laboratory values, including low thiamine, low cobalamin, and increased mean corpuscular red cell width, can be found in patients with significant alcohol consumption.38,43,44 However, these abnormalities are not specific to patients with problem drinking, limiting their effectiveness as single screening strategies in primary care settings.

Specific tests to detect alcohol consumption do exist. Blood alcohol levels (BALs) and urine or breath tests for alcohol are useful measures of recent alcohol consumption. Unfortunately, their ability to assess the quantity of alcohol consumed, other than recent consumption, is limited and they are not able to screen for ARCs or AUDs. BAL and urine/breath tests are used often to assess levels of intoxication, and may have utility in screening for recent binge drinking. Like history and physical examination findings, laboratory values such as CDT and BAL are useful for the clinician in case finding problem drinking in primary care settings.

**SCREENING USING QUESTIONNAIRES**

Problem alcohol use usually is not identified by clinicians unless it is very severe and readily apparent. Detection and effective screening for the gamut of alcohol problems in primary care require the routine use of screening questionnaires. For several years, the NIH has advocated that clinicians employ a stepwise approach to identifying and treating problem alcohol use among their patients and this approach has been shown to be effective.3,19,45,46 One such stepwise approach for assessment of problem drinking is to assess for any drinking (step I), problem drinking (step II), AUDs (step III), and type of AUD (step IV) (Figure 2).

Screening instruments for problem alcohol use should maximize sensitivity even at the expense of low specificity.47 In order to rule out false-positive screens and to engage those with true-positive screens in effectively addressing alcohol problems, any positive screening test for alcohol problems should prompt the practitioner to explore the patient’s pattern of drinking and its consequences before applying an appropriate intervention. Therefore, in screening for problem drinking in primary care settings, it is important to achieve 2 goals: to identify and engage as many patients as possible who may potentially have alcohol problems and to accurately iden-
tify those who don’t. Furthermore, for alcohol screening to be effective and efficient, clinicians need to employ consistent strategies in their practices.

Validated screening questionnaires are superior to the unstructured history, physical examination, and laboratory tests in detecting the range of alcohol problems in primary care patients.\(^5\)\(^6\)\(^7\)\(^8\) Screening questionnaires can be self-administered or administered by clinicians, nurses, other staff, real or automated telephone interviews, or by use of computers.\(^9\) Fiellin et al recently reviewed and summarized the sensitivity and specificity of screening instruments for either at-risk drinking or AUDs in primary care settings.\(^5\)\(^5\) The variability in performance of screening instruments likely has to do with the variability of the settings, the manner in which the screening was performed, and the various gold standards used in evaluating the screening instrument. Several screening instruments and their operating characteristics to identify ARC or AUDs in primary care settings are described below.

**The Alcohol Use Disorders Identification Test**

Developed by the WHO, the Alcohol Use Disorders Identification Test (AUDIT) was developed to identify patients with alcohol problems in primary care settings. The AUDIT has been extensively tested and results of its ability to screen for a range of alcohol-related problems have been published. It is one of the few formal questionnaires that have been specifically developed to assess for a range of problem drinking from ARC to AUDs. Originally, the AUDIT consisted of not only a 10-item questionnaire, but a clinical screening procedure that included laboratory and physical examination evaluations.\(^5\)\(^2\)\(^2\)\(^5\) Practically, the 10-item core questionnaire seemed a useful screening instrument and has been examined apart from the clinical screening procedure (Figure 3).\(^5\)\(^4\)\(^9\) The AUDIT questionnaire can roughly be divided into questions about quantity/frequency of drinking, drinking behaviors, and adverse consequences of drinking.\(^8\) Each question has 5 possible answers with a possible score of 0 to 4 apiece. The questionnaire score is the sum of each item response. There are exceptions in questions 9 and 10, which have only 3 possible answer choices, each with a possible score of 0, 2, or 4. The range of possible scores of the AUDIT is 0 to 40. A score of 8 or higher should be interpreted as a positive AUDIT evaluation for ARC. Several investigators have examined whether certain scores of the AUDIT can distinguish AUD from ARC. The WHO originally proposed that certain ranges of AUDIT scores should prompt clinicians to offer different therapies: alcohol education (scores of 0 to 7); alcohol reduction advice (8 to 15); advice with brief counseling and monitoring (16 to 19); and referral to an addiction specialist (20 to 40). Many studies have examined the performance of the AUDIT in assessing for a host of alcohol problems.\(^2\) Fiellin et al recently reviewed 6 of these AUDIT studies to assess for ARC. In general, the AUDIT had a sensitivity of 97% and a specificity of 78% for ARC when a cutoff score of 8 or higher was used.\(^5\)\(^5\)\(^6\)\(^7\)\(^8\)\(^9\) Using the same cutoff, but different criterion standards, others have reported sensitivities between 51% and 59% and specificities of 91% to 96% for detecting ARC or heavy drinking.\(^6\)\(^6\)\(^7\)\(^8\)\(^9\) Likewise, the AUDIT has been used to detect AUDs. One study found that the AUDIT had a sensitivity of 63% to 93% and a specificity of 96%, for lifetime or current diagnoses, respectively, of alcohol abuse or dependence.\(^8\) In 2 other studies, the AUDIT had sensitivities from 33% to 38% with specificities of 91% to 95% to detect a lifetime diagnosis of alcohol abuse or dependence.\(^6\)\(^6\)

The AUDIT has several advantages over many instruments for primary care populations. The AUDIT detects less severe alcohol problems, is relatively short, can be performed in only a few minutes, has been tested internationally, and seems to have practical value in diverse primary care settings.\(^5\)\(^5\)\(^2\)\(^4\)\(^8\) In addition, the AUDIT identifies current drinking behavior (in the past year) and seems indifferent to sex or ethnicity in its screening performance.\(^6\) The AUDIT can be administered via a written questionnaire, an interview, or a computer screen.\(^5\)\(^4\)\(^6\)

**AUDIT-C**

The AUDIT measures both quantity/frequency of consumption and consequences of that consumption. Since ARC is defined by quantity of alcohol consumed, several investigators have explored using the quantity and frequency questions of the AUDIT as a brief screen for ARC.\(^5\)\(^5\)\(^6\)\(^7\)\(^8\)\(^9\) A shorter AUDIT instrument with comparable properties to the AUDIT may prove useful to the busy primary care provider. The AUDIT consumption questions (or AUDIT-C) are the first 3 questions of the AUDIT.\(^6\)\(^4\) Compared with a quantity/frequency definition of hazardous drinking (≥16 drinks/week for men and ≥12 drinks/week for women), the AUDIT and the AUDIT-C had comparable areas under the receiver operating characteristic curves (AUROC) of 0.940 and 0.949.\(^4\)\(^9\) Of a possible range of scores from 0 to 12, a score of 3 or higher on the AUDIT-C was found to be optimal for identifying patients with ARC and comparable with the test characteristics of the full AUDIT. Similar research also found that the AUDIT-C had greater AUROC than the full AUDIT in identifying heavy drinkers.\(^6\) Fiellin also reported that the AUDIT-C overall had a sensitivity of 54% to 98% and a specificity of 57% to 93% in detecting ARC.\(^6\)

**CAGE Questionnaire**

Many clinicians assess patients for problem alcohol use via the CAGE questionnaire. CAGE is an acronym
for 4 questions: (1) Have you ever felt you should Cut down on your drinking? (2) Have people Annoyed you by criticizing your drinking? (3) Have you ever felt bad or Guilty about your drinking? (4) Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover (Eye-opener)? The CAGE has been well validated in a variety of populations, scoring is simple, and it continues to be widely recommended for screening for AUDs.45,63,67-76

The CAGE questionnaire is best at detecting AUDs in clinical settings.51,66 With any affirmative answer, the CAGE increases its sensitivity from 21% to 94% (with specificities of 77% to 97%) in detecting an AUD.67 King evaluated the ability of the CAGE questions to detect drinkers who consumed 64 g (about 4 1/2 standard drinks) or more of alcohol per day with a sensitivity of 84% and a specificity of 95% when a cutoff of ≥2 positive responses was used.77 In an elderly population, Adams et al found, at the same cutoff value, the CAGE had a sensitivity of only 14% and a specificity of 97% for detecting ARC by a quantity/frequency definition.80 In 2 other studies, the CAGE questionnaire had sensitivities between 49% and 69% and specificities between 75% and 95% in screening for ARC.60

Because of the CAGE’s brevity and easily remembered mnemonic, this instrument is often recommended for use by busy primary care clinicians to screen for AUDs.67 Any positive response to a CAGE question should prompt further assessment of alcohol use and consequences.15,79

The CAGE does have limitations as a sole screening test for alcohol problems. Its inability to identify ARC limits its practicality in assessing for the majority of problem alcohol consumption seen in primary care settings.66 Adding some sort of quantity/frequency evaluation (to assess for ARC) may improve the ability of the CAGE to assess both ARC and AUDs.60,63,81

Another limitation of the CAGE is that it does not distinguish between current and past alcohol consumption and problems. Furthermore, some studies have identified possible sex and ethnicity biases in the response to the CAGE questionnaire.67,71,82

THE MICHIGAN ALCOHOLISM SCREENING TEST

The Michigan Alcoholism Screening Test (MAST) has been used in primary care settings to detect patients with problem alcohol use.83 The 25 questions of the MAST inquire about alcohol use, its social and occupational consequences, and patients’ previous attempts at alcohol treatment.83 The MAST, or versions of the MAST, as screening instruments for AUDs have been extensively studied.34,50,52,55,75,80,84,85

Original work on the MAST revealed a sensitivity of 98% and a specificity of 95%...
with a cutoff score of 5 for identifying alcohol abuse or dependence in a primary care sample. Unfortunately, use of the MAST in clinical practice has been difficult. The MAST is lengthy and scoring may be complicated. Although it does supply more alcohol consumption information than other instruments, its use as a brief screen in primary care practices, other than for investigative purposes, has been limited.

A shortened MAST has been investigated as a screening tool for alcohol abuse and dependence. The 10-item Short MAST (SMAST) had a sensitivity of 48% and a specificity of 95% to detect current or lifetime AUDs when a cutoff of 2 or higher was used. In another study, the SMAST had a sensitivity of 100% (specificity of 85%) to detect lifetime AUDs, and a sensitivity of 100% (specificity of 96%) for detecting current AUDs. Using a cutoff value of ≥25 on the 10-item questionnaire, Barry and Fleming found a sensitivity of 57% to 66% and specificity of 80% for current and lifetime AUDs, respectively. Still other studies have found various sensitivities ranging from 38% to 80% and specificities from 79% to 97% in other diverse populations with the use of various cutoffs for the SMAST. The SMAST’s ability to detect lifetime and current AUDs is noteworthy.

**The Self-Administered Alcoholism Screening Test**

The Self-Administered Alcoholism Screening Test (SAAST) is a self-administered questionnaire that can establish DSM-IV criteria for AUDs. Its length has limited its practicality. Some investigators have looked at reducing the length of the SAAST to improve applicability and a shortened, 9-item SAAST had a sensitivity of between 67% and 70% with a specificity of between 67% and 95% in different ethnic and sex groups in primary care to detect an AUD.

**The Structured Clinical Interview for the Diagnostic Statistical Manual**

The Structured Clinical Interview for the DSM-III (SCID) and later SCID DSM-IV can be used to assess for AUDs. The SCID is a formal interview that obtains Axis I and Axis II diagnoses for adults based on the DSM-IV. The SCID is lengthy and requires a trained interviewer. For the busy primary care practitioner, the SCID may be best utilized for the confirmation of an AUD diagnosis.

**Single-Item and Short Assessment Questionnaires**

Recent research has investigated the use of a single question or a few questions to assess for problem drinking in primary care practices. A single-question approach to screening is quite promising as it would be easier to incorporate into a busy primary care practice and may encourage clinicians to screen for problem drinking more routinely. Often these single alcohol screening questions are meant to identify only ARC or binge drinking behavior. Coupling this assessment of ARC with an assessment of AUDs (eg, the CAGE questionnaire) holds promise. Several single alcohol screening questions are described below.

The third question of the AUDIT screening questionnaire is a “binge” or quantity of consumption per-occasion question (known as the AUDIT-3). To detect a quantity/frequency definition of ARC (≥16 drinks/week for men and ≥12 drinks/week for women), the AUDIT-3 had an AUROC of 0.871 that is comparable to the AUDIT-C or the full AUDIT. Asking a similar question, “How often in the past year have you had 5 or more drinks in 1 day?” for men (4 or more for women) is recommended in the 2005 edition of NIAAA’s Helping Patients Who Drink Too Much: A Clinician’s Guide.

A single question, “On any single occasion during the past 3 months, have you had more than 5 drinks containing alcohol?” was studied in a primary care population and found to have sensitivity of 62% and a specificity of 93% for detecting problem drinkers. Williams and Vinson evaluated the question, “When was the last time you had more than X drinks in 1 day?, where X = 4 for women and X = 5 for men. With a positive screen defined as any time in the last 3 months, they found a sensitivity of 86% and a specificity of 86% when compared with reference standards for problem drinking.

A single question, “When was the last time you had more than X drinks in 1 day?” where X = 4 for women and X = 5 for men, was recently investigated by Canagasaby in a community-based sample as well as in patients with trauma or a medical illness. A positive score was any affirmative response for the previous 3 months. The question had similar screening performance to other quantity/frequency assessments. Similarly, a 2-item questionnaire that asked, “Have you ever had a drinking problem?” and “When was your last drink?” (a positive response for the latter question being <24 hours) has shown promise in detecting AUDs. Cyr and Wartman found these questions to have a sensitivity of 91% and a specificity of 90% when the MAST was the criterion standard for AUDs. However, other investigators have found that the sensitivities range from 48% to 53% (specificities from 76% to 93%) when applied to other primary care populations. Other variants of a single question (eg, “Have you ever had a drinking problem?”) have had a sensitivity of 40% to 70% with a specificity ranging from 93% to 99%.

Even asking about usual quantity and frequency of drinking can have adequate sensitivity and specificity, but only if a very low threshold is used. Although questions about usual drinking are still commonly used, specific questions about episodic heavy drinking and its frequency are just as easy to use, easier to interpret, better validated, and can lead into comfortable discussions with the patient about his or her drinking pattern and its consequences.
**Screening in Special Populations**

Whatever the screening instrument employed, clinicians should be aware that several instruments have been shown to have reduced (or enhanced) screening abilities in certain populations. Certain populations are at particular risk for problems with alcohol, are unique with regard to alcohol consumption behavior, and possess characteristics that reduce standard alcohol problem screening instrument performance. For example, screening instruments meant for the general adult population may not be sensitive or specific to detect women with problem alcohol use. This reduced sensitivity and specificity for women compared with the general population may be owing to physiologic differences or lower thresholds for alcohol-related consequences. Using lower cutoff values of standard screening test (eg, AUDIT and CAGE) for women may improve the screening sensitivity and specificity.

Furthermore, older patients present unique challenges for practitioners screening for alcohol problems. Several instruments have been used to uniquely identify problem alcohol use in elderly patients, including the MAST - Geriatric Version (MAST-G) and its shortened counterpart (SMAST-G). The CAGE performs well in identifying elderly persons with AUDs; sensitivities ranged from 63% to 70% and specificities from 82% to 91% with CAGE questionnaire scores of 1 or higher.

A surprising number of adolescents and young adults consume alcohol. In fact, it is estimated that 2 of 5 college students meet at least 1 diagnostic criterion for alcohol abuse and dependence. In addition, adolescents often binge drink, necessitating assessment for this type of consumption. Investigators have suggested using lower cutoff scores of standard instruments (eg, CAGE, AUDIT) in adolescent populations. Other investigators have modified existing questionnaires to make them more appropriate for adolescent samples. Finally, several adolescent-specific screening tools also have been investigated.

Ideally, the clinician would use a screening tool specific to the demographic of the individual being screened. However, employing multiple screening strategies in 1 clinic setting may lead clinicians to be less likely to screen for problem drinking. It may be advantageous to use 1 screening strategy for a practitioner’s entire practice and acknowledge that in some subpopulations a particular screening test may be less than optimal.

**Recommendations for Screening Strategies in Primary Care Settings**

Screening for any medical condition requires planning. The optimal introduction to alcohol questions is to give the patient a general idea of the content of the questions, their purpose, and the need for accurate answers. The clinician should be nonjudgmental and assure confidentiality. The questions may be introduced as part of a package of questions to assess general health behaviors. When the questions are embedded in a longer health interview, a transitional statement to introduce the alcohol-related questions may be helpful. For example, one such statement, “Please tell me about your drinking,” increases the sensitivity of the CAGE questionnaire.

Many effective approaches to screening for problem alcohol use are available for office-based practice. Each practice should choose 1 or a combination of approaches, and then use this screening method routinely for all patients in their practice. One approach is to screen first with 1 of the single questions. Another approach is to routinely screen using a quantity/frequency questionnaire (eg, AUDIT, AUDIT-C, AUDIT-3, and binge question) for assessment of ARC and use the CAGE questionnaire for assessment of AUDs. Recommended by NIAAA in 1995, this approach has the benefit of ample research demonstrating the effectiveness of the AUDIT (or AUDIT abbreviations) and the CAGE in screening problem drinking in outpatient practices (Table 2). If the quantity/frequency questionnaire is positive, and the CAGE negative, the clinician should further assess the alcohol history and consider treatments for ARC. When screening for problem drinking in special population samples such as adolescents or the elderly, alternative questionnaires can be employed that can improve screening performance.

In primary care settings, it is advantageous to employ a single, simple strategy to screen for alcohol problems in all patients in order to target appropriate treatments (Figure 4). Recent investigations have evaluated the use

---

**Table 2. Performance of the AUDIT and CAGE Instruments in Screening for Problem Drinking**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Cutoff Score</th>
<th>At-Risk Drinking</th>
<th>Alcohol Abuse/Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Specificity</td>
<td>Sensitivity</td>
<td>Specificity</td>
</tr>
<tr>
<td>AUDIT</td>
<td>≥8</td>
<td>57%</td>
<td>96%</td>
</tr>
<tr>
<td></td>
<td>59%</td>
<td>91%</td>
<td>66%</td>
</tr>
<tr>
<td></td>
<td>63%</td>
<td>90%</td>
<td>71%</td>
</tr>
<tr>
<td></td>
<td>97%</td>
<td>78%</td>
<td>96%</td>
</tr>
<tr>
<td>AUDIT - C</td>
<td>≥3</td>
<td>95%</td>
<td>69%</td>
</tr>
<tr>
<td></td>
<td>98%</td>
<td>57%</td>
<td></td>
</tr>
<tr>
<td>AUDIT - 3</td>
<td>≥1</td>
<td>99%</td>
<td>51%</td>
</tr>
<tr>
<td></td>
<td>81%</td>
<td>69%</td>
<td></td>
</tr>
<tr>
<td>CAGE</td>
<td>≥2</td>
<td>14%</td>
<td>97%</td>
</tr>
<tr>
<td></td>
<td>69%</td>
<td>95%</td>
<td>94%</td>
</tr>
<tr>
<td></td>
<td>49%</td>
<td>75%</td>
<td>82%</td>
</tr>
<tr>
<td></td>
<td>84%</td>
<td>95%</td>
<td></td>
</tr>
</tbody>
</table>

Evidence summarized for ability of the AUDIT and CAGE questionnaires in detecting at-risk drinking and alcohol abuse/dependence based on cutoff scores. Studies were conducted in outpatient practices. The sensitivities and specificities of studies presented were determined from various reference values. Modified from Flegal et al and Gordon and Saltz.
of single-item or brief alcohol screening questions prior to screening all patients with the AUDIT (or AUDIT abbreviations) and the CAGE. Recent recommendations by authorities regarding screening problem drinking in outpatient settings reflect this emerging evidence. For example, the 2005 NIAAA publication Helping Patients Who Drink Too Much: A Clinician's Guide suggests an approach of asking a single screening question as a "pre-screening" evaluation and advocates for a stepwise approach of assessing any use, quantity of use, and AUDs. This 2005 edition revised a previous NIAAA approach of assessing any use, quantity of use, and AUDs. The current recommendations continue to advocate for an assessment and identification of either ARC or an AUD in order to tailor appropriate interventions. With any screening approach, further assessment of positive screens is essential. Positive screens also should prompt treatment with brief interventions or other nonpharmacologic treatment, pharmacologic treatments, or referral guided by the severity of the patient’s problem drinking and by his or her readiness to change.

CONCLUSION

Clinicians should screen for the spectrum of problem drinking by assessing for quantity/frequency of alcohol consumption to detect ARC and by assessing alcohol-related harm to detect AUDs. In screening for these conditions, clinicians should employ a stepwise approach to screen all patients in their practice. By encouraging the use of these screening techniques, more patients may be encouraged to reduce their alcohol consumption and the public health harm associated with problem drinking may thus be diminished.

ACKNOWLEDGMENTS

Dr Gordon acknowledges Melissa Montlack for her editorial assistance with this manuscript.

REFERENCES


Figure 4. Simple Strategy to Screen for Alcohol Consumption in Primary Care Settings

- ASSESS FOR ANY ALCOHOL CONSUMPTION (“Do you sometimes drink alcoholic beverages?”)
- ASSESS FOR AUDIT CONSUMPTION OF ALCOHOL (Positive screen on a quantity/ frequency or binge assessment)
- ASSESS FOR ALCOHOL USE DISORDERS OF ALCOHOL ABUSE AND DEPENDENCE (Positive screen on a CAGE or other instrument with reassessment based on criteria)

TREAT PATIENT FOR AN "ARC\n" CONSUMPTION (eg, brief interventions, pharmacotherapy)

TREAT PATIENT FOR AN "AUD\n" CONSUMPTION (eg, referral, pharmacotherapy)

CONSIDER TREATMENT FOR AN "AUD\n" USE DISORDER (eg, referral, pharmacotherapy)

Reassess regularly.


57. Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project [ACQUIP].
Screening for Alcohol Abuse


