

## CLINICAL PRACTICE

## Alcohol Use in Adults

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*This Journal feature begins with a case vignette highlighting a common clinical problem. Evidence supporting various strategies is then presented, followed by a review of formal guidelines, when they exist. The article ends with the author's clinical recommendations.*

**A 57-year-old man with a history of alcohol dependence comes for an annual examination. He reports that he has reduced his drinking to two beers two to three times per week and has not had five or more drinks on any occasion or any adverse consequences for the past 2 years. He states that he drinks “for his health” and that “it is under control.” How should his case be assessed and managed?**

## THE CLINICAL PROBLEM

Alcohol contributes to 79,000 deaths and \$223.5 billion in societal costs annually in the United States.<sup>1,2</sup> Almost 9% of U.S. adults (approximately 13% of those who drink) meet the criteria for an alcohol-use disorder<sup>3</sup> (Table 1)<sup>4,5</sup>; the prevalence of alcohol-use disorders is higher in clinical settings.<sup>5</sup> Alcohol consumption can have adverse social, legal, occupational, psychological, and medical consequences. The risk of harmful consequences and disability exists on a continuum<sup>6</sup> (Fig. 1). Risk drinking is defined as an average of 15 or more standard drinks per week or 5 or more on an occasion for men and 8 or more drinks weekly or 4 or more on an occasion for women and people older than 65 years of age.<sup>5</sup> A standard drink (i.e., 12 oz of beer, 5 oz of wine, or 1.5 oz of 80-proof liquor) contains 14 g of ethanol. High average consumption or frequent heavy drinking can be clinically silent yet have adverse health and social consequences<sup>7,8</sup> (see Fig. S1 and S2 in the Supplementary Appendix, available with the full text of this article at NEJM.org).

Continued drinking despite adverse consequences constitutes an alcohol-use disorder<sup>4</sup> (Table 1). The *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition, text revision (DSM-IV-TR), differentiates abuse from dependence,<sup>4</sup> but recent research suggests that they represent one disorder, which the proposed taxonomy for the DSM-5 would consolidate into a single spectrum.<sup>9</sup> At the severe end of the spectrum, chronic, severe dependence is a recurring brain disorder characterized by loss of control over drinking, drinking despite harm, daily or near-daily drinking, a compulsion to drink (“craving”), tolerance, withdrawal, and substantial disability.

Despite observational studies that suggest that drinking lowers cardiovascular risk, the possibility of confounding raises concerns about recommending alcohol for heart health.<sup>10</sup> Definitive data from trials are lacking to prove the cardiovascular benefits of alcohol, and the harms associated with alcohol are well established<sup>7</sup> (Fig. S1 and S2 in the Supplementary Appendix). For example, beverage alcohol is a carcinogen, and even light drinking is associated with increased risks of oropharyngeal, esophageal, and breast carcinomas.<sup>11</sup> For people with a prior alcohol-use disorder, young adults at low risk for cardiovascular disease, women who are pregnant or trying to conceive, people with conditions that are caused or

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## KEY CLINICAL POINTS

## ALCOHOL USE IN ADULTS

- Consuming 15 or more standard drinks per week or 5 or more on an occasion, for men, or 8 or more drinks weekly or 4 or more on an occasion, for women and people older than 65 years of age, confers a risk of alcohol-related harm.
- Drinking at these risk levels can be clinically silent, so clinicians should screen adults with validated questionnaires about consumption.
- When risk drinking is suspected, the clinician should, at a minimum, assess the consumption pattern, adverse consequences (including alcohol-related health problems and criteria for an alcohol-use disorder), and readiness to change drinking.
- Brief interventions can reduce alcohol consumption and adverse consequences in risk drinkers without alcohol dependence.
- Pharmacotherapy with brief medical-management counseling can reduce heavy drinking in persons with alcohol dependence.
- Clinicians should monitor and manage risk drinking and alcohol-use disorders longitudinally.

exacerbated by alcohol (Table S1 in the Supplementary Appendix), and people who are going to operate a vehicle or machinery, the risks of drinking outweigh any supposed health benefits.

## REMISSION AND RECOVERY

The DSM-IV-TR definition of remission from dependence is based only on consequences and does not require abstinence.<sup>4</sup> Full remission (i.e., no consequences) differs from partial remission (fewer than three consequences after 1 month of no consequences). Remission is considered to be “early” after 1 month and “sustained” after 12 months.<sup>4</sup> Of U.S. adults with prior alcohol dependence, 52% continue to drink with consequences, 18% abstain completely, 12% remain heavy drinkers without consequences, and only 18% drink within lower-risk limits.<sup>12</sup> A long-term study showed that only 11% of men with alcohol dependence maintained nondependent drinking over a period of 50 years.<sup>13</sup> Persons with alcohol dependence who have impaired self-control, severe alcohol problems, or affective symptoms are less likely than those without these features to maintain controlled drinking.<sup>14</sup> The term “recovery,” as used in Alcoholics Anonymous (AA), can be defined as abstinence and active involvement in mutual support or treatment. In one study, 62% of persons with such involvement remained in remission at 3 years, as compared with only 43% of persons who did not receive help.<sup>15</sup> Only one quarter of persons with alcohol dependence ever receive treatment.<sup>16</sup>

## STRATEGIES AND EVIDENCE

## SCREENING

Health care providers should screen for and counsel risk drinkers as part of routine medical and preventive care. Risk drinking is often asymptomatic, so screening tools that elicit consumption patterns have supplanted older ones that focused on consequences. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) recommends that adults be screened annually with a validated self-report tool<sup>5</sup>; several brief tools have been validated in clinical settings (Table 2).<sup>5,17-19</sup> Medicare covers this screening, plus up to four visits in 12 months to counsel those with positive screening results. If universal screening is not feasible, then inquiry about alcohol use should be prompted by the presence of conditions, symptoms, or signs associated with alcohol use (e.g., sleep disturbance, erectile dysfunction, and hypertension)<sup>20</sup> (see Table S1 in the Supplementary Appendix for a comprehensive list).

## ASSESSMENT AND DIAGNOSIS

When risk drinking is suspected, the assessment should include consumption pattern, criteria for alcohol-use disorders (Table 1), alcohol-related health problems (Table S1 in the Supplementary Appendix), and readiness to change drinking. Evaluation of consumption includes the typical number of days per week on which alcohol is consumed, the number of standard drinks consumed on a typical day, the maximum number of

standard drinks consumed on an occasion, and the number of days per month of heavy drinking (five or more drinks for men and four or more for women). Frequent heavy drinking or high severity scores on screening tools are associated with an alcohol-use disorder. For example, a score of 7 to 9 on the Alcohol Use Disorders Identification Test–Consumption Questions (range, 0 to 12, with higher scores indicating risk drinking) (Table 2) is associated with a likelihood ratio of more than 3 for alcohol dependence.<sup>21</sup> In patients with positive screening results for risk drinking, a report of drinking in physically hazardous situations or drinking more or for longer than intended is 94 to 95% sensitive and 62 to 77% specific for an alcohol-use disorder.<sup>22</sup> Brief assessment can also include a symptom checklist (Table 1).

For patients with an alcohol-use disorder, either current or past, the history taking should include dates, duration, and type of prior substance-use treatment; other substance use; involvement in support groups; attempts to cut back and periods of sobriety; the circumstances surrounding recurrent drinking; and the recovery environment — i.e., whether the patient has a supportive place to live (e.g., with sober, supportive family members) and a structured daily life (e.g., regular employment or school attendance). This information is useful in identifying triggers for drinking and helping the patient devise strategies to avoid the triggers and thus reduce the risk of relapse<sup>23</sup> (Table S2 in the Supplementary Appendix).

Much research on behavioral change supports the idea that assessment of the patient's motivation to change is an essential bridge from screening to brief intervention.<sup>24</sup> A simple approach is to ask, "On a scale of 0 to 10, how ready are you to make a change right now in your drinking?" with 10 indicating ready to change right now, and 0 not ready to consider a change.<sup>24</sup> During a brief intervention, this scale can be used to elicit self-motivating statements. If the patient rates his readiness as 3, the clinician can inquire, "Why did you not say 0?" which will prompt the patient to voice reasons for considering a change. Discussion of how drinking and its consequences may conflict with the patient's beliefs, values, and goals may also build motivation.<sup>24</sup>

**Table 1. Checklist of DSM-IV-TR Criteria for Alcohol-Use Disorders.\***

**Criteria for alcohol abuse**

The patient's drinking has repeatedly caused or contributed to one or more of the following adverse consequences in the past 12 months:

- Risk of bodily harm (e.g., drinking and driving, operating machinery, or swimming)
- Problems with relationships (family or friends)
- Interference with home, work, or school role obligations
- Arrests or other legal problems

**Criteria for alcohol dependence**

The patient has had three or more of the following behavioral or physiological consequences in the past 12 months:

Behavioral consequences (loss of control or preoccupation)

- Has repeatedly exceeded drinking limits
- Has not been able to cut down or stop (repeated failed attempts)
- Has continued drinking despite recurrent physical or psychological problems
- Has spent a lot of time drinking (or anticipating or recovering from drinking)
- Has spent less time on activities that had been important or pleasurable

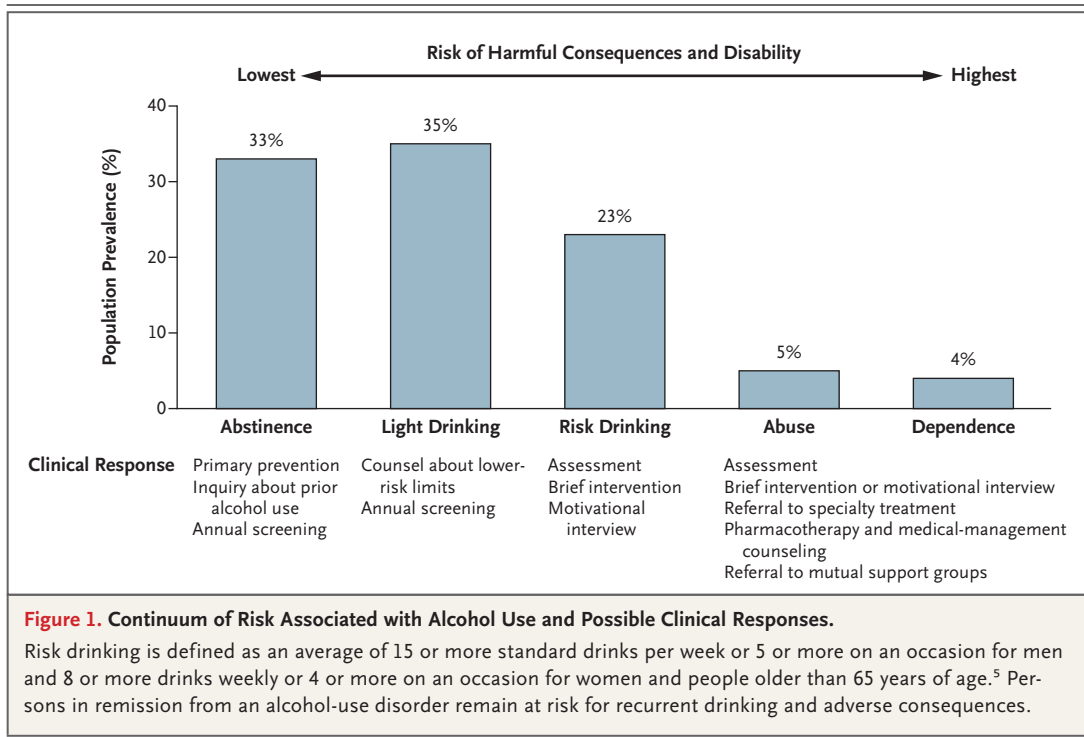
Physiological consequences

- Has shown tolerance (needed to drink a lot more to get the same effect)
- Has had signs of withdrawal (tremors, sweating, nausea, or insomnia when trying to quit or cut down)

\* The criteria are based on the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition, text revision (DSM-IV-TR).<sup>4</sup> A patient who meets the criteria for both abuse and dependence is considered to have dependence, the more severe disorder. The table is adapted from the DSM-IV-TR and information from the National Institute on Alcohol Abuse and Alcoholism.<sup>5</sup>

**BRIEF INTERVENTIONS**

Brief interventions provide nonjudgmental, individualized feedback about drinking and its potential harms, recommendations about lower-risk drinking, negotiation of an acceptable goal for changing risk drinking, and arrangement of follow-up to assess progress toward the goal. If the assessment does not identify high-risk features, reducing consumption to a level below the threshold for risk is a reasonable goal. Meta-analyses of randomized trials in primary care settings have shown that brief interventions reduce consumption in risk drinkers without alcohol dependence; these interventions have also been reported to reduce alcohol-related harms and mortality.<sup>25</sup> Data regarding the efficacy of brief interventions are less consistent in acute



care settings where alcohol dependence predominates.<sup>26,27</sup>

Randomized clinical trials have shown that online interventions that assess drinking patterns and provide normative feedback can modestly reduce risk drinking.<sup>28</sup> As with any brief intervention, follow-up care should focus on reinforcing success or providing a referral for specialty treatment if the patient cannot stop or cut back.

**SUPERVISED WITHDRAWAL**

Supervised withdrawal is used to manage acute withdrawal and its complications, ensure a supportive environment in which to initiate sobriety, and link the patient to specialty treatment. Most patients with alcohol dependence can withdraw without supervision or medication. For patients in mild-to-moderate withdrawal and for those who live in an unstable environment for recovery, clinically managed residential detoxification programs deliver supportive care; some are medically supervised and provide medication. A medically monitored inpatient or residential setting is appropriate for patients at risk for severe withdrawal (e.g., persons with acute medical illness, an age of 60 years or older, misuse of sedative hypnotic agents, daily consumption of 20 or more

standard drinks, or a history of severe withdrawal, seizures, or alcohol withdrawal delirium), for whom long-acting or intermediate-acting benzodiazepines are the standard of care.<sup>29</sup> Symptom-triggered doses of benzodiazepines administered by trained personnel using a withdrawal-severity tool are preferable to fixed doses, except for patients who are unable to communicate, those receiving medications that mask withdrawal manifestations (e.g., beta-adrenergic antagonists), and those at highest risk for severe withdrawal (who should receive medical care in a hospital).

**SPECIALTY TREATMENT**

Specialty treatment provides a supportive, structured environment for early sobriety, psychosocial counseling, and facilitated mutual support. High-quality specialty providers also address medical problems and psychological and social instability and initiate alcohol pharmacotherapy. Specialty treatment should be longitudinal and comprehensive, with adjustment in intensity and setting according to the severity of the disorder, coexisting conditions, treatment response, and the recovery environment. Most specialty treatment is delivered in a regular outpatient setting, but persons with an unstable recovery environment or a severe alcohol-use disorder can require

**Table 2. Brief Self-Report Screening Tests for Risk Drinking.**

Test	Positive Result	Test Characteristics
<b>Single item<sup>5,17</sup></b>		
How many times in the past year have you had five (four for women) or more drinks in a day?	≥1 time	82% sensitive, 79% specific for unhealthy use
<b>Alcohol Use Disorders Identification Test–Consumption Questions (AUDIT-C)<sup>18</sup></b>		
Question 1: How often did you have a drink containing alcohol in the past year? Never: 0 points Monthly or less: 1 point Two to four times per month: 2 points Two or three times per week: 3 points Four or more times per week: 4 points	For women, ≥3 points; for men, ≥4 points; a score of 7 to 10 suggests alcohol dependence	73% sensitive, 91% specific for alcohol-use disorder; 86% sensitive, 89% specific for alcohol dependence
Question 2: How many drinks did you have on a typical day when you were drinking in the past year? One or two: 0 points Three or four: 1 point Five or six: 2 points Seven to nine: 3 points Ten or more: 4 points		
Question 3: How often did you have six or more drinks (four or more for women) on one occasion in the past year? Never: 0 points Less than monthly: 1 point Monthly: 2 points Weekly: 3 points Daily or almost daily: 4 points		
<b>Quantity, frequency, maximum<sup>5,19</sup></b>		
Question 1: On average, how many days per week do you drink alcohol?	For men, >14 drinks per week or >4 per occasion; for women or persons >65 yr of age, >7 drinks per week or >3 per occasion	83% sensitive, 84% specific for alcohol abuse or dependence in the past year
Question 2: On a typical day when you drink, how many drinks do you have?		
Question 3: What is the maximum number of drinks you had on any given occasion during the past month?		

intensive outpatient treatment, day-hospital treatment, or residential treatment. Counseling can be provided in group, individual, couples, or family sessions. A systematic review of seven multi-site studies of treatment for alcohol-use disorders showed that 17 to 33% of patients were abstinent in the year after a single treatment episode, and another 7 to 12% reduced their drinking and no longer had adverse consequences.<sup>30</sup>

Specialty treatment should be recommended if the assessment shows any alcohol-use or drug-use disorder, continued use despite consequences (including medical contraindications), or unsuccessful attempts to stop or cut back. Clinicians should

preferentially refer patients to programs that use approaches proved to be effective in randomized trials, such as motivational-enhancement therapy, cognitive-behavioral therapy, 12-step facilitation therapy, community-reinforcement approach, behavioral couples therapy, and pharmacotherapy.<sup>30</sup>

#### PHARMACOTHERAPY

Medications approved by the Food and Drug Administration (FDA) for the treatment of alcohol dependence are disulfiram, acamprosate, and two forms of naltrexone (oral and extended-release injectable). All are modestly effective<sup>31-34</sup> but greatly underused.<sup>35</sup> Table 3 lists their mecha-

**Table 3. Medications for Alcohol Dependence.\***

Medication	Action	Contraindications	Precautions	Adverse Reactions	Evidence of Efficacy	Adult Dose
Disulfiram	Inhibits intermediate metabolism of alcohol, causing flushing, sweating, nausea, and tachycardia if patient drinks	Use of alcohol or alcohol-containing preparations, treatment with metronidazole, coronary artery disease, severe myocardial disease, hypersensitivity to rubber (thiuram)	Monitor liver function; patient should avoid alcohol in diet, OTC medications, or toilettries; use caution if patient has cirrhosis, cerebrovascular disease, psychosis, diabetes mellitus, epilepsy, hypothyroidism, or renal impairment or takes isoniazid, anticoagulants, metronidazole, or phenytoin; pregnancy category C†	Metallic taste, dermatitis, transient mild drowsiness, hepatotoxic effects, optic neuritis, peripheral neuropathy, psychotic reactions	Systematic review of 11 trials: improved short-term abstinence by a factor of almost 4 when daily dosing was supervised <sup>31</sup>	250 mg by mouth daily (range, 125 to 500)
Acamprosate	Stabilizes glutamate and GABA systems	Kidney disease with creatinine clearance of <30 ml/min	Evaluate renal function; adjust dose if patient has moderate kidney disease with creatinine clearance of 30–50 ml/min; use caution if patient has depression or suicidal ideation and behavior; pregnancy category C†	Diarrhea, somnolence, rare cases of suicidality	Meta-analysis of 22 trials: increased number of days of abstinence by 10% and doubled rate of abstinence, <sup>32</sup> but largest multisite U.S. trial was negative <sup>36</sup>	666 mg by mouth three times daily; 333 mg three times daily if creatinine clearance is 30–50 ml/min
Oral naltrexone	Blocks opioid receptors, reduces reward in response to drinking and craving	Current use of opioids, opioid withdrawal, future need for opioid analgesics, acute hepatitis or liver failure	Patient must be opioid-free for 7–10 days; if opioid analgesia needed, larger doses are required and respiratory depression is deeper, more prolonged; offer bracelet or wallet card to alert medical personnel; monitor liver function; pregnancy category C†	Nausea, vomiting, anorexia, headache, dizziness, fatigue, somnolence, anxiety, precipitation of opioid withdrawal, hepatotoxic effects at high doses	Meta-analysis of 50 trials: reduced short-term heavy drinking by 83% but did not increase abstinence <sup>33</sup>	50 mg daily
Extended-release injectable naltrexone	Same as oral naltrexone, but effects last 30 days	Same as oral naltrexone, plus rash or infection at injection site	Same as oral naltrexone; use caution if patient has a bleeding disorder	Same as oral naltrexone, plus injection-site reaction or infection, joint pain, muscle aches, depression, suicidality in rare cases, pneumonitis	Randomized, placebo-controlled trial: reduced heavy drinking by 25% <sup>34</sup>	380-mg gluteal intramuscular injection monthly

\* All medications listed have been approved by the Food and Drug Administration for the treatment of alcohol dependence. GABA denotes  $\gamma$ -aminobutyric acid, and OTC over the counter.  
 † Pregnancy category C indicates that adverse fetal effects have been seen in animal models and that there are no data from adequate and well-controlled studies involving humans, but the potential benefit for pregnant women might warrant use despite the risk to the fetus.

nisms of action, recommended doses, and adverse effects.

Other agents may be effective but are not FDA-approved for alcohol dependence. Short-term randomized trials have shown improved rates of abstinence and reduced heavy drinking with topiramate (but with side effects including weight loss, dizziness, and neurocognitive problems, often leading to discontinuation),<sup>37</sup> reductions in recurrent drinking with selective serotonin-reuptake inhibitors in persons with later-onset alcohol dependence or concurrent depression,<sup>38,39</sup> and reduced consumption with baclofen or ondansetron, the latter in persons with early-onset alcohol dependence.<sup>40</sup> However, data from longer-term studies are needed to establish the effectiveness of these agents in patients with alcohol dependence.

#### MEDICAL-MANAGEMENT COUNSELING

Patients with alcohol dependence who do not access specialty treatment for any reason can be treated in the primary care setting with pharmacotherapy and brief medical-management counseling.<sup>36</sup> Medical-management counseling includes providing feedback on changes in laboratory tests, medical conditions, and other consequences to increase motivation; recommending abstinence as the safest goal while allowing the patient to work toward it; monitoring and facilitating medication adherence; and encouraging the use of mutual support groups.<sup>5</sup> A large trial involving patients with alcohol dependence who had recently become abstinent showed that naltrexone with brief medical-management counseling resulted in a greater proportion of abstinence days than with more extensive counseling.<sup>36</sup>

#### MUTUAL SUPPORT GROUPS

Randomized trials suggest that facilitating involvement in mutual support groups, such as AA, can reduce the risk of relapse.<sup>41</sup> Although the 12 steps of AA guide a process of self-improvement, observational research suggests that their main effect is to build social support for sobriety.<sup>42</sup> Patients who object to aspects of AA can be counseled regarding the benefits of attending sessions in order to meet sober people, obtain telephone numbers to call in case of craving or imminent drinking, and find a sponsor.<sup>43</sup>

#### CONTINUING CARE

Up to three quarters of patients have a relapse in the year after alcohol-use treatment.<sup>15,44,45</sup> Re-

lapse risks are highest during the first 3 months of sobriety and around the 1-year anniversary.<sup>44</sup> Specialty “aftercare” offers low-intensity, longitudinal management that includes ongoing relapse-prevention counseling and monitoring for relapse, but dropout is common. Generalist clinicians should also deliver continuing care.<sup>23</sup> The clinician should emphasize that care is not contingent on abstinence and should inquire at regular visits in a nonjudgmental manner about progress toward functional and treatment goals, medication adherence, attendance at specialty aftercare and mutual support groups, alcohol consumption, craving, triggers, and coping strategies. Randomized trials have suggested that providing feedback regarding objective health improvements (e.g., graphing baseline and serial serum  $\gamma$ -glutamyltransferase levels and reviewing the plot with the patient) can reduce drinking and possibly mortality.<sup>46,47</sup> Alcohol biomarkers may be useful as motivational tools and indicators of relapse. Randomized studies have shown that supportive telephone monitoring and brief counseling can reduce recurrent drinking.<sup>48</sup>

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#### AREAS OF UNCERTAINTY

Although annual screening is recommended,<sup>5</sup> whether a different screening interval would be more effective is unknown. Brief interventions have uncertain effectiveness for heavier drinkers<sup>49</sup> and in the acute care setting.<sup>50</sup> Simple advice might be as effective.<sup>51</sup> The usefulness of ultra-brief and computer-based interventions requires further study.<sup>52</sup> Whether a strategy of screening, brief intervention, and referral for treatment works for persons with alcohol dependence is uncertain, and predicting which of them can cut back successfully remains a challenge.<sup>53,54</sup> The effectiveness of efforts by primary care clinicians to promote and monitor remission is also unknown. Medications for alcohol dependence have short-term efficacy, but long-term effectiveness remains undetermined. Chronic, severe dependence is often resistant to existing interventions, and effective strategies are needed to engage and treat patients with refractory alcohol dependence.

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#### GUIDELINES

The U.S. Preventive Services Task Force gives a grade B recommendation (fair evidence that the benefit outweighs the harm) for screening and

brief interventions for high-risk alcohol use in adult primary care settings.<sup>55</sup> The NIAAA clinician's guide includes an algorithm for alcohol screening, brief intervention, and referral for specialty treatment, as well as a guideline on the use of FDA-approved medications for alcohol dependence.<sup>5</sup> The recommendations in this article are consistent with those guidelines.

#### CONCLUSIONS AND RECOMMENDATIONS

Adults should be screened annually for risk drinking with the use of a validated measure of alcohol consumption. For risk drinkers, the assessment should determine the consumption pattern, consequences of alcohol use, alcohol-related health problems, and readiness to change drinking. Brief interventions can reduce alcohol consumption and adverse consequences in risk drinkers without alcohol dependence. Most patients with any substance-use disorder, with continued drinking despite consequences, or with unsuccessful attempts to cut back should be referred to specialty treatment programs and mutual help groups. Primary care clinicians should provide effective pharmacotherapy plus brief medical-management counseling, especially for patients who do not obtain specialty care. Given

the safety profiles of naltrexone and acamprostate, either agent is recommended, though disulfiram can be considered if the patient has an abstinence goal, someone to supervise dosing, and no contraindications.

Although the patient in the vignette is considered to be in "full, sustained remission"<sup>4</sup> (i.e., he has had no adverse consequences for >12 months) and should be lauded for cutting down on his use of alcohol, he should understand that he continues to be at risk for relapse. He should be counseled that abstinence remains his safest option,<sup>45</sup> because only about 1 in 10 men with alcohol dependence can maintain controlled drinking over the long term.<sup>13</sup> The clinician should inquire at regular follow-up visits about his alcohol consumption; its consequences and related health problems; attendance at specialty aftercare and mutual support groups; progress toward functional goals; craving, triggers, and coping strategies; and readiness to consider further reductions in drinking.

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