

Alcohol Use Disorder in Older Adults



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KEYWORDS

• Alcohol use • Geriatric • Elderly • Older adults

KEY POINTS

- Substance use in older adults is one of the fastest growing health problems in the United States
- Increased alcohol use adversely affects multiple aspects of one's life, including physical and mental health, as well as social and interpersonal relationships.
- Specific screening tools are available for AUD including the CAGE and AUDIT questionnaires and the MAST-G and SMAST-G which have been developed specifically for older adults.
- There are significant gaps in research concerning the 3 FDA-approved pharmacologic treatment options for alcohol use disorder in older adults. Nonpharmacological options are promising.

INTRODUCTION

Chronic conditions such as heart disease, arthritis, and diabetes have increased with the growth of the older adult population.¹ Historically, there has been one chronic condition that declined with increasing age, substance use. However, there is a particularity about baby boomers that was not observed in previously aging populations such as their high use of illicit substances in earlier life.² Additionally, it has been observed that substance use, including alcohol, remains high as this population

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transitions into older adulthood, thus making substance use in the elderly one of the fastest growing health problems in the United States (US).³

NATURE OF THE PROBLEM AND IMPORTANT DEFINITIONS

There are several theories that may explain the emergence or continuation of substance use disorders in later life. These include increasing older adult populations secondary to increased life expectancy which allows populations to use substances for longer, and as previously noted, it may be secondary to attitudes surrounding drug use, which are unique to the “baby boomers.”⁴

In this review, we will be concentrating specifically on alcohol use disorder (AUD), its characterization, effects on health, and treatment. AUD is a disorder with biosychosocial influences as it adversely affects health, increases the likelihood of psychiatric comorbidities which may increase mortality, and adversely affects family relationships.⁵ Thus, because of older adults’ health vulnerability, the National Institute of Alcohol Abuse and Alcoholism (NIAAA) recommends not drinking more than one drink per day in women and no more than two per day for men [for older adults aged 65+ years]. It is important to define that one drink is the equivalent of 1 to 1.5 ounces (28 g) of hard liquor.⁶

As defined by the NIAAA, AUD in older adults constitutes an impaired ability to stop or control alcohol use despite adverse health, occupational, or social consequences.⁶ This is differentiated from binge alcohol use which is characterized by a pattern of drinking that brings blood alcohol concentrations to 0.08 g/dL, which typically occurs after drinking about 4 drinks in women and 5 in men in a 2-hour period (this must happen on at least 1 day of the month). Moreover, heavy alcohol use is defined as binge drinking that has occurred for 5 or more days in the previous month.⁷

Recent epidemiological studies relative to alcohol use from the 2019 National Survey on Drug Use and Health (NSDUH) reported that the lifetime prevalence of alcohol use in adults aged 65 years or older was 81.9%, with the yearly prevalence of use being 56.1%. Additionally, the percentage of binge alcohol use in older adults was 10.7% and in heavy alcohol use, it was 2.7%. These estimates, although representing a slight decline from the 2014 NSDUH (yearly prevalence of use 62.1%), still encompass a high number of older adults with AUD.^{7–10}

According to the NIAAA in the US, alcohol contributes to approximately 18.5% of emergency department visits as well as to 22.1% of overdose deaths related to prescription opioids.¹⁰ Furthermore, there are an estimated 95,000 people (68,000 men and 27,000 women) who die annually from alcohol-related causes, which makes alcohol the third-leading preventable cause of death in the US.¹¹ Many of these deaths are considered to be attributable to alcohol because its use leads to chronic conditions, such as alcohol-associated liver disease, stroke and heart disease, cirrhosis (unspecified), upper digestive tract cancers, liver cancer, cardiac dysrhythmias, AUD, breast cancer, and hypertension. In the US, in 2020, the economic burden of alcohol misuse cost 249 billion dollars related to health care, crime, and lost work productivity.¹² (Fig. 1). Three-quarters of the total costs of alcohol misuse are associated with binge drinking, including resources, admissions, emergency department visits, and doctor visits.¹¹

According to Reczek and colleagues, “heavy alcohol use is strongly associated with (re)marriage and divorce and has significant effects on health in mid to late life.”¹³ Additionally, alcohol use may increase after divorce secondary to increased levels of stress and emotional turmoil related to the divorce. Furthermore, alcohol use may be most extreme during the transition of divorce, especially in older ages, when the

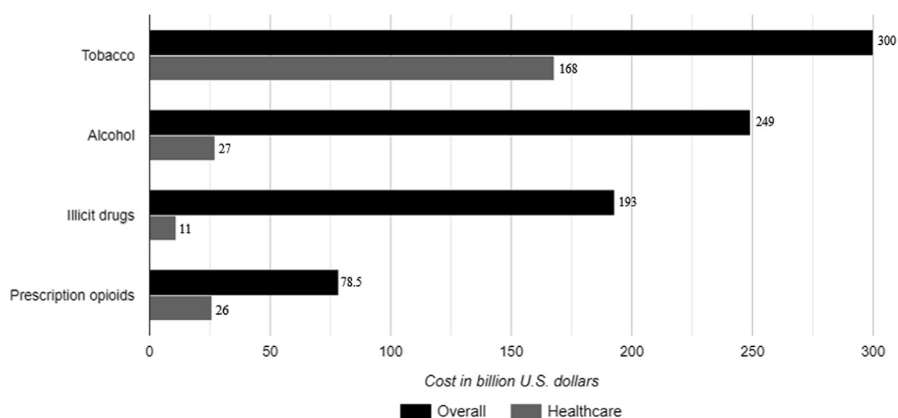


Fig. 1. Costs due to abuse of tobacco, alcohol, illicit drugs, and prescription opioids in the United States as of 2020. (Data from Elflein J. Tobacco, alcohol, and illicit drugs abuse costs in the U.S. 2020. Statista. <https://www.statista.com/statistics/367863/tobacco-alcohol-and-illicit-drugs-abuse-costs-in-the-us/>. Published October 12, 2020. Accessed May 13, 2021.)

loss of marital resources, as well as increased amounts of stress, is most severe.¹³ It is difficult to find data specific to the elder population owing to this population being either understudied or underreported; however, the World Health Organization (WHO) reported that the age range with the highest percentage of total deaths attributable to alcohol was between ages 60 and 64 years, with a rate of 17%.¹⁴

The Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association - 5th Edition (DSM-5) characterizes AUD as a maladaptive pattern of alcohol use that leads to significant impairment or distress in a 12-month period, with specific diagnostic criteria to be met that will be further explained in our article. Furthermore, it is important to note that it can range from mild to severe.¹⁵ Increased or excessive alcohol use may lead to intoxication and withdrawal, which at times may be life-threatening. Intoxication is characterized by clinically problematic behavioral and psychological changes, accompanied by impaired gait, coordination, speech, and attention, which may lead to stupor or coma.¹⁶ Moreover, the typical symptoms for alcohol withdrawal are usually experienced in stages. The first stage starts a few hours after substance abstinence (6–12 hours), and withdrawal symptoms are classified as mild. These may include autonomic instability (changes in blood pressure, heart rate, or breathing rate), tremors, nausea, or vomiting. The second stage of withdrawal usually begins after 12 hours and is characterized by transient alterations of perception, such as visual, auditory, or tactile hallucinations. The third stage occurs 24 to 48 hours after alcohol cessation, and patients may experience tonic-clonic seizures, usually with a brief or no postictal period. Lastly, delirium tremens, which usually can be experienced from 48 to 72 hours, are characterized by rapid fluctuations of perception and consciousness, accompanied by autonomic instability and agitation, which may be life-threatening.¹⁶ Thus, it is important to recognize and treat alcohol withdrawal in its early stages before symptoms become life-threatening. The most effective way to monitor withdrawal symptoms is using the Clinical Institute Withdrawal Assessment for Alcohol (CIWA-Ar) scoring system. The CIWA-Ar is an objective scale that aids in measuring withdrawal severity and comprises a 10-category scale from 0 to 7 (Table 1). The maximum score is 67, with 10 to 15 indicating mild withdrawal, 16 to 20 indicating moderate withdrawal, and greater than 20 indicating severe withdrawal. However, it has been suggested that the cutoff for severity may

Table 1	
CIWA-Ar scale	
Nausea and Vomiting	Headache
0: No nausea/vomiting	0: Not present
1	1: Very mild
2	2: Mild
3	3: Moderate
4: Intermittent nausea with dry heaves	4: Moderately severe
5	5: Severe
6	6: Very severe
7: Constant nausea, vomiting	7: Extremely severe
Auditory Disturbances	Paroxysmal Sweats
0: Not present	0: Not present
1: Very mild harshness	1: Barely perceptible
2: Mild harshness	2
3: Moderate harshness	3
4: Moderately severe	4: Sweat on forehead
5: Severe	5
6: Extremely severe	6
7: Continuous hallucinations	7: Drenching sweat
Anxiety	Visual Disturbances
0: Not present	0: Not present
1	1: Very mild photosensitivity
2	2: Mild photosensitivity
3	3: Moderate photosensitivity
4: Moderately anxious	4: Moderately severe visual hallucinations
5	5: Severe visual hallucinations
6	6: Extremely severe visual hallucinations
7: Acute panic	7: Continuous visual hallucinations
Agitation	Tactile Disturbances
0: Normal	0: Not present
1: Somewhat more than normal	1: Very mild paresthesias
2	2: Mild paresthesias
3	3: Moderate paresthesias
4: Moderately fidgety	4: Moderately severe hallucinations
5	5: Severe hallucinations
6	6: Extremely severe hallucinations
7: Pacing or thrashing during the interview	7: Continuous hallucinations
Tremor	Orientation and clouding sensorium
0: None	0: Normal, can do serial additions
1: Not visible, felt at fingertips	1: Cannot do serial additions
2	2: Disoriented to date for no more than 2 calendar days
3	3: Disoriented to date for more than 2 calendar days
4: Moderate when hands extended	4: Disoriented for place or patient
5	
6	
7: Severe, even when not extended	

Data from Jesse, S., Bråthen, G., Ferrara, M., Keindl, M., Ben-Menachem, E., Tanasescu, R., ... & Ludolph, A. C. (2017). Alcohol withdrawal syndrome: mechanisms, manifestations, and management. *Acta Neurologica Scandinavica*, 135(1), 4-16.

be lower in elderly patients because of them not showing withdrawal signs the same way and higher possibility of confusion or inability to communicate which may lead to underreporting of symptoms.¹⁷

Other complications following alcohol withdrawal are Wernicke encephalopathy and the risk of developing Korsakoff's syndrome in the long run. Wernicke's is an acute neurologic condition characterized by a triad of nystagmus, ataxia, and confusion secondary to thiamine deficiency. Moreover, Korsakoff's syndrome involves the progression of the disease and permanent damage to the brain thalamus and hypothalamus.¹⁶ These are particularly relevant on the differential for older adults presenting for delirium or dementia.

DIAGNOSIS OF ALCOHOL USE DISORDER

When diagnosing AUD, we must keep the DSM-5 Diagnostic criteria in mind as the various screening tools for AUD that were developed for older adults were modeled after these criteria. The DSM-5 characteristics of the disorder were defined into 11 criteria.¹⁵ Eight of these 11 criteria relate to a dependence on alcohol: the development of tolerance, having withdrawal effects, desire/unsuccessful efforts to reduce drinking, drinking more than intended/more often, having cravings, spending significant time drinking/recovering from drinking, social/recreational/occupational giving up activities because of alcohol use, or continued drinking despite it causing or exacerbating physical or psychological problems.¹⁵ The other three criteria relate to alcohol abuse, which include failure to fulfill obligations because of alcohol use, continued drinking even in situations where it may be physically hazardous (such as driving), and continued drinking despite harm to relationships with others.¹⁵ For the DSM-5 diagnosis of AUD, two criteria from the total detailed are required to be present in an individual for at least 12 months.¹⁵ AUD is also described in terms of severity: as mild with two or three criteria, moderate with four to five criteria, or severe with six or more criteria met. The caveat with older adults is that screening for these criteria is often missed in the office setting. Explanations for this phenomenon include the need to speed through the visit or that the elderly may be more reticent to discuss their alcohol use. In an effort to combat this, screening tools specific for the elderly have been developed to help identify individuals who may qualify for the diagnosis of AUD.

SCREENING TOOLS

Michigan Alcohol Screening Test-Geriatric Version

One screening tool designed specifically for older adults is the Michigan Alcohol Screening Test-Geriatric Version (MAST-G), which has been adapted from the original Michigan Alcohol Screening Test and tailored to an older adult population. This 24-item questionnaire uses only yes and no answers which may be easier for older adults with possible cognitive impairment. The test also addresses key features of AUD which may be present in older individuals such as the complications of alcohol use. For example, "After a few drinks, have you sometimes not eaten or been able to skip a meal because you didn't feel hungry¹⁸?" In the 24-item version, 5 or more yes responses indicate a problematic relationship with alcohol may be present, and in the condensed 10-question Short Michigan Alcohol Screening Test-Geriatric Version (SMAT-G), 2 yes responses are required for the indication of AUD.¹⁸ Both versions of this questionnaire have been shown to have comparable sensitivities in detecting hazardous drinking habits in the elderly, .86 for MAST-G and .75 for SMAT-G, and have detected hazardous drinking in geriatric patients not identified

by the CAGE Alcohol Questionnaire (CAGE) questionnaire, a short screening tool described later in discussion.^{19–21}

CAGE Alcohol Questionnaire and Alcohol Use Disorders Identification Test

Although not specific for the elderly, the CAGE questionnaire and the Alcohol Use Disorders Identification Test (AUDIT) screening tools offer a rapid means of screening with each only taking less than 5 minutes to complete and could even be quickly filled out by patients before a visit.²² With the CAGE questionnaire, patients are asked 4 questions noted in **Table 1** with regards to cutting down, annoyance at criticism of drinking habits, guilt with drinking, and eye-opener use.⁶ With this method, usually 2 or more yes responses indicate that a diagnosis of AUD should be explored by the provider.²³ The AUDIT screening tool has both a long and short form, consisting of 10 and 3 questions, respectively, with similar questions to the CAGE. However, the AUDIT also asks about the number of standard drinks an individual typically consumes, how often they drink, and specifically how often they have more than 6 drinks on 1 occasion.^{24–26} When examining sensitivity in geriatric patients, the AUDIT was seen to be superior in identifying geriatric patients with alcohol abuse, whereas the CAGE has been shown to be more sensitive in identifying older adults with dependence symptoms.²⁷ **Table 2** details the commonly used screening tools for AUD in older adults.

DISCUSSION

Psychological Impact of Alcohol Use Disorder on Patients

Depression/link to suicide

Some of the most common psychiatric illnesses observed in the older adult population are depressive disorders, with a prevalence of 10% to 20%, as per the WHO; however, depression among older adults is often underrecognized and underdiagnosed.¹⁴ It is important to note that older adult patients with depression may present with alcohol use or dependence arising for the first time later in their lives.¹⁴ Thorough anamnesis from the patient and collateral is important to establish this connection and to provide clarity. The elder population with depression is at a higher risk for completed suicide or self-harm than their younger counterparts as depression is the most common suicide risk factor in older adults.²⁸ Thus, each patient must be thoroughly screened and evaluated for suicidal thoughts and/or behaviors.²⁸ Risk factors for suicide among the elderly who suffer from depression include older age and male gender, severe anxiety, severe depression, domiciled alone, panic attacks, bereavement (more so in men), physical pain, previous suicide attempt(s), and comorbid alcohol/drug use. In a study by Carvalho and colleagues, the Dahlgren–Whitehead rainbow model was used to determine the elderly's risk of becoming ill, their ability to prevent illness, or their access to effective treatments based on economic, environmental, and social inequalities. It was determined that alcohol consumption is one of the main risk factors to demonstrate influence on morbidity and mortality in the elder population.^{29,30} “These harmful habits are intensified by the vulnerability of the elderly facing aging changes, loss of friends and family, loneliness, social isolation, and financial difficulties.”²⁹ Also, in case studies, significant associations were found between alcohol and an increase of psychotropic drug use in the elderly. Alcohol was found to be an intermediate determinant among suicide risk factors and as a modifiable factor subject to intervention.^{29,30}

“Chicken or the egg” issue

When discussing depression and the use of alcohol, the question arises, what is the primary cause, alcohol use or depression—a “chicken or egg” issue, also known as a causality dilemma. Do older adults use alcohol to cope with mental health concerns,

Table 2
AUD geriatric screening tools

Screening Tool Name	Questions Asked	Scoring Rubric
MAST-G ¹⁴	<ol style="list-style-type: none"> 1. After drinking have you ever noticed an increase in your heart rate or beating in your chest? 2. When talking with others do you ever underestimate how much you actually drink? 3. Does alcohol make you sleepy so that you often fall asleep in your chair? 4. After a few drinks, have you sometimes not eaten, or skipped a meal because you didn't feel hungry? 5. Does having a few drinks help decrease your shakiness or tremors? 6. Does alcohol sometimes make it hard for you to remember parts of the day or night? 7. Do you have rules for yourself that you won't drink before a certain time of the day? 8. Have you lost interest in hobbies or activities that you used to enjoy? 9. When you wake up in the morning do you ever have trouble remembering parts of the night before? 10. Does a drink help you sleep? 11. Do you hide your alcohol bottles from family members? 12. After a social gathering have you ever felt embarrassed because you drank too much? 13. Have you ever been concerned that drinking might be harmful to your health? 14. Do you like to end the evening with a night cap? 15. Did you find that your drinking increased after someone close to you died? 16. In general, would you prefer to have a few drinks at home rather than go out to social events? 17. Are you drinking more now than in the past? 18. Do you usually take a drink to relax or calm your nerves? 	≥5 yes responses indicative of problems with alcohol

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Table 2
(continued)

Screening Tool Name	Questions Asked	Scoring Rubric
	19. Do you drink to take your mind off of your problems? 20. Have you ever increased your drinking after experiencing a loss in your life? 21. Do you sometimes drive when you have had too much to drink? 22. Has a doctor or nurse ever said they were worried or concerned about your drinking? 23. Have you ever made rules to manage your drinking? 24. When you feel lonely does having a drink help?	
SMAST-G ¹⁴	1. When talking with others, do you ever underestimate how much you drink? 2. After a few drinks, have you sometimes not eaten or been able to skip a meal because you didn't feel hungry? 3. Does having a few drinks help decrease your shakiness or tremors? 4. Does alcohol sometimes make it hard for you to remember parts of the day or night? 5. Do you usually take a drink to calm your nerves? 6. Do you drink to take your mind off your problems? 7. Have you ever increased your drinking after experiencing a loss in your life? 8. Has a doctor or nurse ever said they were worried or concerned about your drinking? 9. Have you ever made rules to manage your drinking? 10. When you feel lonely, does having a drink help?	≥2 responses indicative of problems with alcohol
CAGE ²²	1. Have you ever felt you needed to cut down on your drinking? 2. Have people annoyed you by criticizing your drinking? 3. Have you ever felt guilty about drinking? 4. Have you ever felt you needed a drink first thing in the morning (eye-opener) to steady your nerves or to get rid of a hangover?	≥2 responses indicative of problems with alcohol

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Table 2
(continued)

Screening Tool Name	Questions Asked	Scoring Rubric
AUDIT ¹⁹	<ol style="list-style-type: none"> 1. How often do you have a drink containing alcohol? 0 = Never (Skip to Questions 9–10) 1 = Monthly or less 2 = 2 to 4 times a month 3 = 2 to 3 times a week 4 = 4 or more times a week 2. How many drinks containing alcohol do you have on a typical day when you are drinking? 0 = 1 or 2 1 = 3 or 4 2 = 5 or 6 3 = 7, 8, or 9 4 = 10 or more 3. How often do you have six or more drinks on one occasion? 0 = Never 1 = Less than monthly 2 = Monthly 3 = Weekly 4 = Daily or almost daily 4. How often during the last year have you found that you were not able to stop drinking once you had started? 0 = Never 1 = Less than monthly 2 = Monthly 3 = Weekly 4 = Daily or almost daily 5. How often during the last year have you failed to do what was normally expected from you because of drinking? 0 = Never 1 = Less than monthly 2 = Monthly 3 = Weekly 4 = Daily or almost daily 6. How often during the last year have you been unable to remember what happened the night before because you had been drinking? 0 = Never 1 = Less than monthly 2 = Monthly 3 = Weekly 4 = Daily or almost daily 	<p>≥8 indicates hazardous drinking. ≥15 score indicative of a problem with alcohol in men ≥13 score indicative of a problem with alcohol in women</p>

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Table 2
(continued)

Screening Tool Name	Questions Asked	Scoring Rubric
	<p>7. How often during the last year have you needed an alcoholic drink first thing in the morning to get yourself going after a night of heavy drinking?</p> <p>0 = Never 1 = Less than monthly 2 = Monthly 3 = Weekly 4 = Daily or almost daily</p> <p>8. How often during the last year have you had a feeling of guilt or remorse after drinking?</p> <p>0 = Never 1 = Less than monthly 2 = Monthly 3 = Weekly 4 = Daily or almost daily</p> <p>9. Have you or someone else been injured as a result of your drinking?</p> <p>0 = No 2 = Yes, but not in the last year 4 = Yes, during the last year</p> <p>10. Has a relative, friend, doctor, or another health professional expressed concern about your drinking or suggested you cut down?</p> <p>0 = No 2 = Yes, but not in the last year 4 = Yes, during the last year</p>	
Short-form AUDIT ^{17,18}	<p>1. How often do you have a drink containing alcohol?</p> <p>0 = never 1 = monthly or less 2 = 2–4 times a month 3 = 2–3 times a week 4 = 4 or more times a week</p> <p>2. How many standard drinks containing alcohol do you have on a typical day when drinking?</p> <p>0 = 1 or 2 1 = 3 or 4 2 = 5 or 6 3 = 7 to 9 4 = 10 or more</p> <p>3. How often do you have ≥ 6 drinks on 1 occasion?</p> <p>0 = never 1 = less than monthly 2 = monthly 3 = weekly 4 = daily or almost daily</p>	<p>≥ 4 score indicative of problem with alcohol in men</p> <p>≥ 3 score indicative of a problem with alcohol in women</p>

or has chronic drinking been the driving factor in the development of their mental health conditions? It is often difficult to make this distinction, especially when following the criteria for depression AUD according to the DSM-5. Although alcohol sometimes plays the role of a coping strategy for mental distress, other times, alcohol use itself causes mental distress after intake. However, in other instances, alcohol use can relieve mental distress in the short term but exacerbate it in the long term. The effects of alcohol intake on depressive disorders and episodes in the elderly are understudied. Despite this fact, alcohol consumption is increasing in many countries and excessive intake is particularly climbing in the elderly, which has been shown to have an association with depressive episodes. A study by Keyes and colleagues across 19 countries found that alcohol consumption was differentially associated with the incidence of depressive episodes across different drinking criteria; they observed that the rates of increased depressive episodes were highest among high- and low-alcohol consumers, those being long-term alcohol abstainers, and heavy drinkers.³⁰ It is notable that, after drinking, women were the most likely to develop a depressive episode when compared with men.³⁰

Impact of Alcohol Use Disorder on Organ Systems

Digestive diseases

Alcohol is a causal factor implicated in a variety of medical disorders and is the most used, and abused, drug around the world.³¹ Consequences of excessive and prolonged alcohol consumption include cirrhosis; gastrointestinal (GI) hemorrhage; various malignancies such as oral, pharyngeal/laryngeal, colorectal, hepatic, and esophageal cancers; vitamin deficiencies, especially thiamine; and pancreatitis. Cirrhosis as well as acute and chronic pancreatitis are proportionally linked to alcohol consumption; the higher the alcohol consumption, the higher the risk of developing these diseases.³¹ After hepatitis C virus-related chronic liver disease, alcohol represents the most common cause of chronic liver disease.³² In the US alone, it contributes to approximately 20% to 25% of cases of cirrhosis and roughly 50% of all hospital admissions among patients with cirrhosis.³³ Alcohol and its metabolites also directly injure pancreatic cells through necrosis–fibrosis, a sequence that leads to eventual atrophy and scarring of the pancreas—morphological hallmarks of alcoholic chronic pancreatitis.³³ According to the data collected by Metha and colleagues, acute pancreatitis is the most common GI cause of hospitalization in the US, with approximately 30% of cases being alcohol-induced.^{32,34} GI hemorrhage is another possible complication impacted by alcohol abuse. GI hemorrhage represents a frequent cause of intensive care unit admission and has a significant annual incident of approximately 100 cases per 100,000 in the US.³⁴ Of the most common causes of GI bleeds, mucosal erosions, peptic ulcer disease, and esophageal varices made up more than 80% of the cases, all of which were associated with alcohol abuse.³⁵

In 2016, there were an estimated 637,000 digestive disease deaths and 23.3 million digestive disease disabilities associated with harmful alcohol consumption; of those, alcohol-attributable liver cirrhosis led to 607,000 deaths and 22.2 million disabilities-adjusted life years (DALYs). Also in 2016, alcohol-attributable pancreatitis led to 30,000 deaths and 1.1 million DALYs.¹⁴ Furthermore, the harmful consumption of alcohol leads to roughly 3.0 million deaths per year while also taking into consideration the estimated benefit from low levels of alcohol use on some diseases in some population groups.¹⁴

Endocrine diseases

Mounting evidence demonstrates alcohol's negative effects on one of the body's most crucial systems, the endocrine system, which includes the hypothalamus, pituitary

gland, adrenal glands, gonads, thyroid, pancreas, hormones, and adipose tissue.³⁷ Alcohol, in high consumption, may disrupt all of these interconnected systems leading to hormonal disturbances which may result in various conditions or disorders, such as thyroid issues, immune abnormalities, stress intolerance, psychological and behavioral disorders, and reproductive dysfunction.³⁷ Diabetes mellitus is a significant and increasing cause of death and morbidity around the world, both directly and indirectly, because of its effects on the kidneys and cardiovascular system. There exists a growing consensus that the consumption of alcohol is an influential factor; however, the exact biologic mechanism remains uncertain. There are some factors that might explain the association including changes in levels of alcohol metabolites, increases in insulin sensitivity after moderate alcohol consumption, increases in HDL cholesterol concentrations, or through the anti-inflammatory effect of alcohol.^{38,39} Low to moderate alcohol consumption has been found to reduce the risk of diabetes mellitus because of its improvement in insulin sensitivity.³⁸ Ley and colleagues report that “based on a meta-analysis, the amounts of alcohol consumption most protective of diabetes were 24 g/d in women and 22 g/d in men, but alcohol became harmful at a consumption level more than 50 g/d in women and 60 g/d in men.”^{36,38} Prolonged, heavy intake has been observed to disrupt glucose homeostasis, leading to insulin resistance and, eventually, diabetes mellitus.^{37,38} Furthermore, the hypothalamic–pituitary–adrenal axis is one of the most sensitive endocrine pathways sensitive to the toxic effects of alcohol consumption. This hormone system is the main control center for stress response and regulates several of the body’s physiological processes, including cardiovascular, immune, and metabolic functions; disrupting this pathway may lead to increased disorders of these systems as well.³⁷

Peripheral nervous system

When discussing hazardous alcohol consumption, it is also important to note the effects on the peripheral nervous system as well. Alcohol abuse has been associated with a variety of neurologic disorders, including cognitive impairment, cerebellar ataxia, confusion, and peripheral neuropathy.^{40,41} It has also been associated with various vitamin deficiencies, including those necessary for proper nerve function, such as vitamins B1 (thiamine), vitamin B6 (pyridoxine), and B12 (cobalamin), the most important of these deficiencies when discussing peripheral neuropathies being vitamin B1.^{29,40,41} Prolonged alcohol intake results in thiamine deficiency and can cause peripheral neuropathies which most often manifest as bilateral lower extremity mixed motor and sensory neuropathies, which can present as lower limb weakness with pain, burning sensation, hyperesthesia, and/or numbness. Although older adults are more likely to suffer from diabetic neuropathy, alcohol-related neuropathy is a preventable cause of comorbidity.^{42,43}

Cardiovascular

Alcohol also exerts its effects on the cardiovascular and renal systems, contributing to hypertensive disease, cardiomyopathy and heart failure, arrhythmias, as well as hemorrhagic and other nonischemic strokes.⁴⁴ Importantly, it is a preventable and modifiable cause of these cardiovascular comorbidities; however, there has been little focus on the effects of alcohol consumption in the older population and while low to moderate intake could be of greatest benefit, abuse could have more severe detrimental effects. When discussing hypertension, the exact mechanism by which alcohol induces increased blood pressure remains unclear. Though there is limited research on the effect of alcohol on hypertension in the geriatric population, there does seem to be a consensus that the association between the two in this population is J-shaped

(semiparabolic).⁴⁵ In a study by Jaubert and colleagues, 24 ambulatory and various in-office blood pressure measurements in 533 adults with a mean age of 70 ± 10 years were obtained. After multivariate analysis, the investigators discovered that the average ambulatory diastolic pressure was significantly more elevated in the moderate-to-heavy group (more than a drink/day). Moreover, very light drinks (1 drink per month to 1 drink per week) demonstrated lower daytime blood pressure variability.⁴⁴

Central nervous system

Furthermore, alcohol abuse is also associated with the risk of an increase of lifelong disabling conditions such as dementia. In a multicohort study by Kivimäki and colleagues, 7 cohorts from the United Kingdom, Sweden, France, and Finland including 131,415 adults [mean (SD) age, 43.0 (10.4) years; 80,344 (61.1%) women] were examined.⁴⁵ At baseline (1986–2012), participants were between ages 18 and 77 years, reported alcohol use, and were not diagnosed with dementia. Dementia was then examined during an average follow-up of 14.4 years (range, 12.3–30.1). A 1.2-fold excess risk of dementia was demonstrated to be associated with moderate versus heavy alcohol abuse. Also, individuals who reported having an episode of losing consciousness because of alcohol consumption, regardless of overall weekly use, had a 2-fold increased risk of dementia compared with those who did not lose consciousness and were moderate drinkers. After adjusting for possible confounders, the hazard ratio (HR) was 1.16 [95% confidence interval (CI), 0.97–1.37] for consuming more than 14 versus 1 to 14 units of alcohol weekly and 1.22 (95% CI, 1.01–1.48) for more than 21 versus 1 to 21 U weekly. The findings thus suggest an association between alcohol use and the development of dementia, especially in individuals with alcohol-induced loss of consciousness.⁴⁵ Koch and colleagues conducted a cohort study of 3021 participants of age 72 years and older and reported “among participants without mild cognitive impairment (MCI) at baseline, daily low-quantity drinking was associated with lower dementia risk than infrequent higher-quantity drinking. Among participants with MCI, consumers of more than 14.0 drinks per week had the most severe cognitive decline than consumers of less than 1.0 drink per week.”⁴⁶ These results suggest that clinicians and physicians who are involved in the care of geriatric patients should carefully assess and address the full parameters of their patients’ drinking patterns, behavior, and cognition when providing support and guidance about their alcohol consumption.

Falls/fractures

Alcohol also plays a role as an important risk factor in different types of injury, such as balance and fall injuries. These are among the top 4 causes of injury death secondary to alcohol consumption, behind road injuries, self-harm, and interpersonal violence.¹⁴ Older adults are at an increased risk for low bone mass or osteoporosis which increases the likelihood of falls and fractures.⁴⁷ Additionally, falls and deaths increase with age, but modifiable factors which have been identified and can be addressed exist, including medication and substance use; having a history of alcoholism has been shown to be significantly associated with fall-related injuries.⁴⁷ As previously discussed, alcohol is a known cause of certain vitamin deficiencies which may lead to peripheral neuropathies, cognitive impairment, ataxia, and other concerns for balance which could all potentially lead to increasing concerns for falls.^{42,43} Being a modifiable risk factor, and considering the increased risk of falls with increasing age, alcohol abuse should be addressed to minimize this risk.

Treatment options for acute intoxication/withdrawal

Benzodiazepines are generally used with caution or not at all in the geriatric population. However, they continue to be the mainstay of treatment for alcohol withdrawal symptoms to help prevent seizures and delirium tremens.⁴⁸ The American Society of Addiction Medicine (ASAM) clinical practice guidelines recommend carbamazepine, gabapentin, or phenobarbital for patients with a contraindication to the first-line treatment of benzodiazepines.⁴⁹ In older adults, both chlordiazepoxide and diazepam should be avoided because of their extensive liver metabolism and long half-life. Short-acting benzodiazepines such as lorazepam and oxazepam are recommended for those with liver dysfunction.⁴⁸ Although limited studies are available on the management of alcohol withdrawal syndrome in older adults, one retrospective health record review set out to evaluate a symptom-triggered protocol approach in patients 70 years and older. The study found that a symptom-triggered protocol approach significantly reduced the duration of treatment as well as cumulative benzodiazepine dose in comparison with a physician-customized management without a protocol.⁵⁰

Treatment Options for Alcohol Use Disorder

Nonpharmacologic options

Adaptive interventions. A recent study assessed adaptive interventions for the treatment of AUD in patients aged 18 to 75 years, with a mean age of 51 years. These included brief advice (BA), motivational interviewing (MI), and behavioral self-control therapy (BSCT). Patients receiving any behavioral self-control therapy had the greatest reductions in drinking. Those who did not initially respond to BA received MI or MI plus BSCT also showed a reduction in alcohol use. For all interventions, prolonged treatment showed improved outcomes.⁵¹

Cognitive behavioral therapy. Although the need for Cognitive behavioral therapy (CBT) to be effective requires a highly motivated and supported individual, it has been shown to be more effective than no therapy for AUD.¹¹ One older study examined veterans aged 53 to 82 years who completed an age-specific cognitive behavioral treatment program titled The Geriatric Evaluation Team: Substance Misuse/Abuse Recognition and Treatment (GET SMART).⁵³ At a 6-month follow-up, 55% of participants who completed at least 13 of 16 GET SMART sessions were significantly more likely to remain abstinent from alcohol than those who did not ($P < .001$).⁵³ Of note, 35% of participants had previously been treated for alcohol and more than half had previously attended Alcoholics Anonymous (AA) meetings.

Self-Help Groups for AUD include AA, Rational Recovery, and Self-Management and Recovery Training. AA incorporates a 12-step approach. Members provide peer-to-peer support, have sponsors, and may attend a variety of meetings. A recent Cochrane review published in March 2020 evaluated 27 studies that compared AA and similar Twelve Step Facilitation (TSF) programs with other forms of therapy such as CBT. The review concluded that AA/TSF interventions are more effective than other established treatments for increasing abstinence and produce substantial health care cost benefits for those with AUD.⁵⁴ Of note, the average age of participants ranged from 34 to 51 years. One study compared 5-year alcohol and drug treatment outcomes of older adults aged 55 to 77 years versus middle-aged and younger adults, aged 40 to 55 years and 18 to 39 years, respectively. The study found that older adults have longer retention in treatment and are less likely to have people in their lives encouraging alcohol or drug use than younger adults. The same study examined ways in which older age contributes to better treatment outcomes and suggested that smaller AA groups or groups focusing specifically on older adult issues may benefit this population.⁵⁵

Pharmacologic treatment options for alcohol use disorder

Currently, there are 3 Food and Drug Administration (FDA)-approved pharmacologic options for the treatment of AUD in the US, including naltrexone, acamprosate, and disulfiram. The efficacy of each is based on strict medication adherence. There is some evidence supporting the off-label use of topiramate, gabapentin, and varenicline in the treatment of AUD. However, the efficacy and safety of these options for older adults are limited.

Naltrexone is a mu-opioid antagonist that works to alter the euphoric effects of alcohol use. It promotes abstinence, reduces heavy drinking and, for some, curbs cravings. Studies regarding the efficacy of naltrexone specifically in older adults for the treatment of AUD are limited. An older, 12-week, double-blind, placebo-controlled study set out to find the efficacy of naltrexone by following 44 Veterans older than 50 years taking 50 mg a day. The study found a significant reduction in a relapse of subjects on naltrexone (50%) who sampled any alcohol during the study versus placebo (100%).⁵⁶ In addition, naltrexone was well tolerated among the subjects, with sleep disturbances and anxiety being the most commonly reported. Another study observed treatment response of 50 mg of naltrexone daily in patients aged 55 years and older who met criteria for Major Depressive Disorder (MDD) along with alcohol dependence. All patients were concomitantly taking 100 mg of sertraline daily and receiving weekly psychosocial support. The study observed 42% of subjects had remission of their depression and no alcohol relapses during the trial.⁵⁷ However, in the general adult population, naltrexone's efficacy is well studied. The Combined Pharmacotherapies and Behavioral Interventions for Alcohol Dependence (COMBINE), a large randomized controlled trial (RCT) observed patients taking up to 100 mg of naltrexone a day for 16 weeks.⁵³ In COMBINE, naltrexone reduced the risk of heavy drinking days (HR: 0.72, 97.5% CI, 0.53–0.98, $P = .02$) and had a significantly higher percentage of days abstinent (80.6%) versus placebo (75.1%). A systematic review and meta-analysis calculated the Number Needed to Treat (NNT) to prevent a return to any drinking when using PO naltrexone 50 mg/d for AUD.⁵⁸ The calculated NNT is 20 with 95% CI of 11 to 500 and risk difference (RD) of -0.05 ; 95% CI, -0.10 to -0.002 .⁵⁸ A long-acting injectable of naltrexone is available as an alternative option for those struggling with adherence to PO. When compared with placebo for 6 months of therapy, a 25% decrease in the rate of heavy drinking days was observed for 380 mg of IM naltrexone ($P = .02$) and a 17% decrease with 190 mg ($P = .07$).⁵⁹ More recently, one study looking at older adults ranging in age from 65 to 83 years taking 50 mg of naltrexone for 2 months for severe pruritus showed no serious adverse effects.⁶⁰ However, caution should be taken in those with hepatic dysfunction because there have been cases of hepatotoxicity, demonstrating a need for baseline and periodic liver function tests.^{52,61,62} In addition, an alternative may be necessary for those who require opioid analgesics because of its antagonistic effects.⁵³ It can be given orally at a dose of 50 mg per day or intramuscularly at 380 mg every 4 weeks.⁶³

Acamprosate, an N-methyl D-Aspartic Acid (NMDA) and Gamma aminobutyric acid (GABA) receptor modulator, is the alternate option for those with contraindications to naltrexone. Although its safety and efficacy have not been studied in those older than 65 years, its low adverse effect profile across populations deems it relatively safe.⁶⁴ A Cochrane review of acamprosate (1332 mg/d) versus placebo analyzed 24 RCTs.⁶⁵ Acamprosate was found to significantly reduce the risk of any drinking (RR: 0.86, 95% CI: 0.81–0.9) and increase abstinence duration by 11%.⁶⁵ The FDA-approved dose is 1998 mg (666 three times a day) daily for sustaining abstinence in those who are abstinent at treatment initiation.⁶⁵ Because of renal excretion, caution and

dose adjustment should be taken into consideration in those with impaired kidney function.⁶³ For creatinine clearance between 30 and 50 mL/min, dose should be lowered to 333 mg, three times daily.⁶⁴ Because a decline in kidney function is common with aging, renal functions should be monitored regularly. Of note, when compared with naltrexone, meta-analyses found no statistically significant difference for return to any drinking (RD: 0.02; 95% CI, -0.03–0.08).⁵⁸

Disulfiram inhibits the enzyme aldehyde dehydrogenase, causing a buildup of acetaldehyde in blood when consuming alcohol. This leads to nausea, vomiting, and flushing, creating an aversion to alcohol. Because of the strain these side effects may have on the cardiovascular system (hypotension and arrhythmia), it is usually avoided in older adults.^{21,48,64} Patients must be abstinent for at least 12 hours before starting disulfiram. The recommended dose is 250 to 500 mg/d.⁶⁵

Few non-FDA-approved medications are being used for the treatment of AUD. The current APA guidelines, updated in 2018, include topiramate or gabapentin as an option for patients. These are offered for moderate to severe AUD in patients who wish to reduce their consumption or achieve abstinence, have not responded to the FDA-approved treatments, and have no contraindications to these medications.^{66,67} Although baclofen, a GABA B agonist, has recently been discussed for its use in AUD, it has not shown superiority versus placebo.⁶⁸ Doses up to 1200 mg/d have shown some efficacy versus placebo in AUD, with less heavy drinking days and improved abstinence.⁶⁹ Only moderately beneficial and marginally harmful effects have been observed, making it less ideal for patients of any age with AUD.^{68,70} Topiramate has been studied at doses of 25 to 300 mg/d titrated over 8 weeks. Although its mechanism of action in AUD remains unknown, patients had fewer drinks per day and more days abstinent than placebo.⁷¹ Nalmefene, a Mu/Delta opioid receptor antagonist, has also been used off-label in the treatment of AUD.^{68,72} However, the evidence to support its use remains weak.

It is important to emphasize the efficacy and safety of the FDA-approved pharmacologic treatment options that have yet to be specifically studied in patients aged 65 years or older with AUD.

Natural History of Alcohol Use Disorder

Once one begins to develop AUD, abstinence can become a lifelong battle. As noted previously, untreated AUD can lead to numerous physiological consequences affecting almost any organ system and may lead to social/economic problems. Studies have set out to observe what may influence the rate of alcohol dependence in adulthood and later life and its effects on the body as one ages.

About 24% of people remain abstinent within the year after treatment of AUD, and 10% are able to remain asymptomatic with moderate drinking.⁷¹ Relapse is complex and influenced by biopsychosocial factors; however, attempts at understanding its causes have been made. One study found that both age and severity of alcohol withdrawal symptoms during hospitalization play a role. A recent prospective study following up 158 alcohol-dependent patients aged 21 to 60 years observed increased odds of relapse; the older a patient was (OR 0.975, $P = .030$), the higher their CIWA-Ar was (CIWA for Alcohol revised, a shortened version of the CIWA), although hospitalized (OR 1.126, $P = .010$).⁷³ In addition, relapse rates have been shown to be higher in those who report impaired control over [alcohol] use (27.2%), having cravings (22.6%), and continued use despite social or interpersonal problems (21%).⁷³ However, as more time passes since remission, the observed relapse rate decreases to 12% after 20 years.⁷⁴

Influences on the chronicity of alcohol abuse have been found to be associated with age at first use, gender, and ethnicity.^{75,76} One longitudinal study following up 808 participants found that drinking regularly before the age of 21 years had a greater odds of lifetime alcohol dependence (OR: 1.71, $P < .05$). In addition, the earlier the alcohol use is initiated, the greater the rate of alcohol dependence is. Those who initiated use before the age of 11 years had a rate of alcohol dependence 1.62 times greater than those who delayed initiating until 15 to 17 years old ($P < .01$) and 3.67 times greater than those starting at the age of 18 to 20 years ($P < .05$).⁷⁷ The same study showed that men are more likely to have lifetime alcohol misuse than women (OR: 2.54, $P < .01$).⁷⁵ As abstinence from alcohol remains difficult to obtain, understanding that age, gender, and ethnicity play role in its misuse may be of great importance in screening for and treating AUD.

Alcohol as a "Gateway" Drug: What the Evidence Shows

The current research is focused on adolescence and excludes the older population. Alcohol as a gateway in older adults is an area of research that has yet to be conducted. Research relative to older adults may or may not parallel adolescents because their explanations for drinking may be drastically different. Although children and adolescents are often influenced by their peers, a systematic review summarized some of the potential facilitators of drinking in older adults as follows. Older adults may begin to use alcohol as a part of their social life, fun, and enjoyment. They also tend to adopt the drinking habits of those close to them who view it as a social norm. Some begin drinking for medicinal purposes such as for heart disease or to relieve physical symptoms. The review also found that older adults tend to drink to deal with life's difficulties such as anxiety; loneliness; loss of partners, family, friends; or loss of physical activity and mobility.⁷⁸ As polysubstance abuse continues to be a public health concern, addressing early alcohol use may be essential to reducing its abuse later in life.

FUTURE RESEARCH

With regards to further exploration into AUD in older adults, there seems to be a significant gap in research regarding the treatment of specific subsets of the elderly population. One such group is older adults with multiple comorbidities. Although there are recommendations such as avoidance of disulfiram in older individuals because of possible drug–drug interactions with commonly prescribed blood pressure medications, there is a gap in research recommendations on the management of AUD in elderly patients. Complicating issues such as polypharmacy which has become increasingly common in the elderly older than 65 years need to be examined.^{22,23} In addition, although there has been evidence that within racial groups there are significant differences in alcohol consumption based on ethnic origins, research has lagged on investigating the access, utilization, effectiveness, and tolerability of current treatments in various racial and ethnic elders.⁷⁹ By not addressing each of these subgroups, the complexities of cultural norms surrounding alcohol, beliefs regarding medical treatment, and the ability to access the health care system are being missed.

SUMMARY

Research on hazardous alcohol use specifically in the older adult population is limited; however, long-term adverse effects of prolonged alcohol use are seen in this group. Alcohol use has well-documented adverse effects on individuals and public health. It is imperative to create, support, and enforce efforts to mitigate its harmful use not

only in the younger population but also in older adults through alcohol policy as well as other policies and measures that are not enforced or implemented, such as education on consumption, effects, and long-term complications. It is hoped that this project can raise awareness relative to the need to understand alcohol abuse in the older adult population so that its effects and ramifications can be better identified and addressed and proper interventions can be made to reduce the harmful effects of alcohol in this vulnerable population.

CLINICS CARE POINTS

- Although there are currently 3 FDA-approved medications for the treatment of AUD, naltrexone remains the mainstay of treatment because of its side effect profile and efficacy.
- Chronic alcohol use affects multiple organ systems as well as mental health which may be especially important to monitor in older adults because they are at a higher risk for medical comorbidities and completed suicide.
- Screening tools have been developed specifically for AUD in the older adult population including the MAST-G and the shorter SMAST-G questionnaires with comparable sensitivities and specificity for screening for AUD.

DISCLOSURE

The authors have nothing to disclose.

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