Curr Treat Options Psych (2018) 5:242–254
DOI 10.1007/s40501-018-0146-0

Geriatric Disorders (K Zdanys, Section Editor)

Treatment Approaches for Opioid Use Disorders in Late Life

Rebecca A. Payne, MD[1]
Stephanie Hrisko, MD[2]
Shilpa Srinivasan, MD, DFAPA[1,*]

Address
[*,1]Department of Neuropsychiatry and Behavioral Science, University of South Carolina School of Medicine, 3555 Harden St. Ext., Suite 301, Columbia, SC, 29203, USA
Email: Shilpa.srinivasan@uscmed.sc.edu
[2]Palmetto Health, University of South Carolina School of Medicine, Columbia, SC, USA

Published online: 1 May 2018

This article is part of the Topical Collection on *Geriatric Disorders*

Keywords Opioid use disorder · Opioid epidemic · Older adults · Medication-assisted treatment · Psychosocial treatment

Abstract

Purpose of review The use of opioids and opioid-related deaths in the USA has risen to epidemic proportions. Until recently, the impact of this public health crisis in older adults has not been adequately emphasized. This paper reviews the extant literature for the management of opioid use disorder (OUD) in older adults, with a focus on both pharmacologic and non-pharmacologic interventions for OUD in older adults.
Recent findings Opioid prescriptions for older adults have dramatically increased since the 1990s. OUD in older adults is under recognized and under treated in clinical settings. Once identified, appropriate treatments for OUD should be offered to older adults. These include a combination of psychosocial and pharmacologic approaches. Pharmacologic treatments include antagonist and agonist therapies. Antagonist agents, such as naloxone for acute overdoses and naltrexone for maintenance treatment, and agonists, such as buprenorphine and methadone, have been used. Psychosocial treatments include motivational interviewing (MI) and motivational enhancement treatment (MET) approaches, as well as family support and community resource linkage.
Summary In order to optimally address OUD in older adults, a multi-dimensional approach involving pharmacotherapy in combination with psychosocial treatments is recommended. Directions for future research include studies aimed at evaluating the efficacy of such treatments specifically in older adults including those with chronic pain and other comorbidities for which opioid use presents both benefits and challenges.

Introduction

Since the 1990s, the number of opioid prescriptions dispensed in the USA has significantly increased [1]. Subsequently, the increase in heroin use and opioid-related overdose deaths has led to the designation of opioid use as a public health epidemic. Until recently, the impact of opioid use in older adults has been overlooked. Pain conditions are more prevalent in older adults potentially increasing their risk of exposure to opioid pain medications [2, 3•]. Age-related changes in drug metabolism, higher frequency of polypharmacy, and comorbid medical conditions may predispose older adults to drug-drug interactions and more severe adverse drug reactions associated with opioids (e.g., mild cognitive impairment, sedation, dizziness, delirium, falls and fractures, constipation, urinary retention, nausea, and vomiting) [2, 4, 5]. From 1995 to 2010, office-based opioid prescriptions for older adults increased nearly nine-fold [6]. Since then, opioids have been added to the Beers Criteria list of central nervous system (CNS) medications that should be avoided in individuals with a history of falls or fractures [7]. Nevertheless, a 2017 study found that opioids were the most common component of CNS polypharmacy and accounted for the largest share of the overall increase in CNS polypharmacy in older adults in the USA [8].

Studies have also shown an increase in misuse of opioids in older adults (e.g., prescription sharing, obtaining the same drug from more than one doctor) [9]. A 2016 study of adults age 60 and older in New Jersey ($n = 725$) revealed that 14% had a history of using prescription opioids recreationally, and those with a previous history of recreational opioid use had three times the risk of high risk opioid obtainment behavior compared to those without a history of recreational use [10]. Substance use disorders (SUDs) are likely under reported, undetected, and under treated in older adults [3•]. Physicians should universally screen for SUDs in older adults including those without a prior SUD diagnosis. Health care provider bias, insufficient training in screening older adults for SUDs, and stigma may be barriers for reporting SUDs, the symptoms of which may also be mistaken for other comorbidities, age-related changes, or reactions to stressful life situations [3•, 11].

An estimated 2.5 million older adults in the USA have an SUD, which has been cited by some as one of the fastest growing health problems in the USA [11]. From 2000 to 2012, SUD treatment admissions in older adults for heroin increased 26%, nonprescription methadone increased 200%, and other opiates/synthetics increased 221% [12•]. From 2006 to 2013, the death rates from intentional exposures to prescription opioids (i.e., abuse, misuse, and suicidal intent) for older adults increased nearly three-fold, surpassing that of younger adults [9]. Huang et al. found a cohort effect in baby boomers (born 1947 to 1964) with 20% increased mortality from prescription opioids and heroin overdose compared to the reference cohort (1977–1978) [13]. A gender difference was also noted with a stronger cohort effect for prescription opioid overdose mortality in men and for heroin overdose mortality in women. Another study showed that methadone overdose rates increased in those 65 years and older from 2014 to 2015 [14]. Clearly, older adults have been and continue to be affected by the opioid epidemic. Given that opioid use disorder (OUD) is the third leading cause of SUD-related deaths, it is important for physicians to be familiar with SUD screening, opioid prescribing guidelines, adherence monitoring (e.g., prescription drug monitoring programs, pill counts, urine drug screens), and available treatments for OUD [3•].

Medications for the treatment of OUD in older adults

The extant literature on pharmacotherapy for OUD is growing, though the literature specific to older adults remains quite limited. To our knowledge, there have been no trials conducted solely in the older adult population [15•]. However, studies have demonstrated that older adults benefit from treatment and, at times, have better outcomes compared to a younger cohort [16].

Determining the optimal medication for a patient with OUD begins with a thorough clinical evaluation. Information about current use of opioids including

frequency, amount, method of administration, duration, and level of physiological dependence, as well as concomitant other substance use, should be obtained. Past substance treatment approaches and medication trials should be assessed. A careful and thorough evaluation of mental health and medical problems should be performed, to include a current and accurate list of medications. Mood disorders are fairly prevalent among both treatment and non-treatment seeking patients with OUD, with 20–25% having a past history of major depression and 15% with current major depression [17]. A physical examination should be performed or a recent physical examination reviewed [18].

When selecting and recommending OUD pharmacotherapy, prescribers must consider factors such as patient presentation and history, medical or psychiatric comorbidities, concomitant medications, and patient preference. Logistic considerations such as access, transportation, and finances are equally salient. Psychosocial interventions are an integral part of OUD treatment and are recommended along with all pharmacotherapy for OUD [18]. Access to all treatment modalities, including detoxification, may not be available in the older person's local area. Methadone clinics may be the least accessible, or local providers prescribing buprenorphine may not be available [19, 20]. For patients with Medicare Part D coverage, only certain pharmacotherapies for OUD are covered [21]. Expensive medications and their associated copayments may be cost-prohibitive on a fixed income. Assessing and engaging family support is another consideration as family members may be able to assist with accessing treatment and providing important collateral information.

Antagonist treatment: naltrexone and naloxone

There are no studies examining oral naltrexone (NTX) or intramuscular injectable extended-release naltrexone (XR-NTX) specifically in older adults. Extrapolation of findings from studies in the general population is applied with special considerations for older adults with OUD. Of note, a naltrexone implant is available in some countries but is not approved for use by the Federal Drug Administration (FDA). This review will focus only on oral NTX or XR-NTX formulations, which both block opioid receptors and attenuate response to opioids.

Patients who may be good candidates for NTX treatment include those who are highly motivated for abstinence, those not successful with previous trials of methadone or buprenorphine, or those previously successful on an opioid agonist who desire to discontinue agonist treatment [16]. Patients must be fully detoxified to initiate NTX, which can present some challenges. Previous studies demonstrated that over half of discontinuations from XR-NTX occur after administration of one dose only [22]. A patient who is unable to tolerate detoxification, experiences prolonged withdrawal symptoms, or requires opioids for chronic pain management may not be appropriate for NTX treatment [15•]. Naltrexone is generally considered safe in individuals with Hepatitis C or heavy alcohol drinkers but should be avoided in those with advanced liver disease [23•]. Potential serious side effects include injection site reactions (for XR-NTX), allergic reactions, liver impairment, depression, and suicidality.

Oral NTX was approved for the treatment of OUD in 1984, and XR-NTX was approved in 2010 [16]. Studies examining efficacy in opioid abstinence maintenance typically utilize oral naltrexone [23•]. However, after FDA approval of XR-NTX for OUD, research on this formulation has continued to grow, which could be helpful as adherence with oral NTX can be particularly problematic [24]. Adherence concerns have prompted debate about the efficacy of NTX. Adherence rates for NTX decrease over time and are inferior to adherence rates with buprenorphine and methadone [23•]. A 2011 Cochrane review and other studies found no difference between NTX and placebo with regard to substance use and treatment retention [3•, 25, 26]. In other studies, both NTX and XR-NTX were superior to placebo for the maintenance of opioid abstinence, though some studies indicate that XR-NTX has better overall outcomes compared to oral NTX [23•, 25]. Supervised administration of oral NTX may improve adherence [18].

XR-NTX is considered safe and effective for OUD treatment [27]. In a 1-year open-label extension phase study, 114 patients in Russia were maintained on XR-NTX along with monthly counseling sessions. Approximately 20% of subjects experienced adverse effects from the medication which included injection site reactions (6.1%) and liver function elevations (16.7%). However, neither of these was considered clinically significant. At the end of the open-label phase, 62.3% of subjects completed the study, and 50.9% were abstinent from opioids [27]. Although these are robust outcomes, it is important to note that agonist therapy is not permitted in Russia where government funds are available for inpatient treatment [24]. In the USA, as noted above and discussed further below, XR-NTX induction can be challenging and affects treatment retention.

A recent study by Tanum et al. compared abstinence rates in 159 adult outpatients in Norway randomized to either XR-NTX or buprenorphine/naloxone [28]. XR-NTX was as effective as buprenorphine/naloxone in achieving short-term (12 weeks) abstinence from heroin and other illicit opioids. In a 24-week multi-site US study of individuals in acute inpatient detoxification settings ($n = 570$), XR-NTX induction was difficult, and relapse rates were higher in the intent-to-treat population with XR-NTX compared to buprenorphine/naloxone. However, once XR-NTX was successfully initiated, safety and effectiveness between the two groups was similar [29].

The combination of oral NTX and XR-NTX has also been examined to assess methods to improve both oral NTX adherence and XR-NTX induction. Sullivan and colleagues examined a behavioral therapy intervention and concomitant use of oral NTX with a single dose of XR-NTX (384 mg) given at the outset of treatment in 125 patients [30]. Individuals with lower severity opioid dependence (defined as < 6 bags of heroin per day) who received behavioral therapy along with the single dose of XR-NTX followed by oral NTX had improved treatment retention up to 6 months compared to individuals with higher severity opioid dependence (> 6 bags of heroin) [30]. In an effort to improve XR-NTX induction, Manelli and colleagues titrated the dose of oral NTX along with tapering doses of buprenorphine in the days leading up to administration of XR-NTX [31]. Fourteen of the twenty patients received XR-NTX and reported tolerability of the medications and the withdrawal procedure. A more recent study by Sullivan and colleagues also examined the use of buprenorphine and oral NTX in the transition period to XR-NTX in 150 patients [32]. One arm of the study administered one dose of buprenorphine followed by oral NTX over 1 week

followed by the transition to XR-NTX. The other arm administered 1 week of buprenorphine followed by 1-week washout after which they transitioned to XR-NTX. Those in the NTX titration arm were more likely to receive the first and second dose of XR-NTX (56.1 and 50% respectively) compared to those in the buprenorphine arm (32.7 and 26.9%, respectively) [32].

The effects of naltrexone on symptoms of depression, including anhedonia, have raised a concern. However, two recent studies have demonstrated that depression appears to improve after treatment with different formulations of naltrexone (oral, XR-NTX, and implant) without worsening anhedonia [33, 34]. Clinicians should nevertheless remain vigilant for the emergence of depressive symptoms.

Naloxone, also an opioid antagonist, is not a maintenance treatment for OUD but can play a vital role in OUD, specifically in overdose. The Centers for Disease Control published guidelines in 2016 encouraging providers to consider naloxone in patients prescribed opioids who have had a previous overdose, are on high doses of prescribed opioids, have a history of SUDs, or are also on benzodiazepines [35]. Several studies have shown naloxone reduces opioid overdose death rates in certain populations (e.g., newly released prisoners), but questions about optimum implementation remain [36]. Patients receiving treatment with methadone or buprenorphine should receive a prescription for naloxone in the event of overdose to provide the opportunity for family or friends to intervene [3•]. Patients should be counseled that tolerance to opioids is lower after detoxification, and patients may be at risk for fatal overdose if opioid use is resumed after treatment with NTX [18]. However, NTX does not increase the risk of overdose death more so than detoxification [30].

Agonist treatment: buprenorphine and methadone

Evidence supports agonist treatment, such as buprenorphine or methadone for OUD, with methadone as the gold standard of care [25]. Sublingual buprenorphine, a partial mu agonist and kappa antagonist, was approved by the FDA for use in patients with OUD in the USA after the Drug Addiction Treatment Act of 2000 paved the way for office-based treatment for OUD [21]. While several formulations of buprenorphine have been approved for OUD, including sublingual, implant, and depot, we will focus on the sublingual formulation in combination with naloxone, except when noted otherwise. The buprenorphine implant and depot injection were FDA approved in May 2016 and November 2017, respectively. Prior to the turn of the century, the only agonist treatment for OUD was methadone, a full mu opioid agonist. Methadone is available only in federally licensed clinics, also known as opioid treatment programs (OTP), and typically requires almost daily visits during the initial phase of treatment [23•]. Buprenorphine is increasingly available in OTPs also [20].

Patients on buprenorphine or methadone have consistently demonstrated improvement not only in health outcomes but in overall quality of life. Agonist maintenance treatment reduces overdose deaths, opioid use by diminishing craving, and risk of Hepatitis C and HIV infection. Further, it enhances adjustment and adherence to HIV treatment for those already infected, improves the

ability to work, improves quality of interpersonal relationships, and decreases crimes associated with drug use [23•, 24, 37]. The potential for diversion is also a consideration. Buprenorphine appears to have lower risk of abuse and less euphoria compared to methadone [15•], though abuse and diversion of buprenorphine still occurs [23•].

Both buprenorphine and methadone are effective treatments for moderate OUD [15•]. Patients with OUD, specifically those with prescription opioid use, have benefitted from either treatment. A 2013 secondary analysis of 731 subjects who completed a 6-month study found that buprenorphine was not superior to methadone in treating patients with OUD who identified prescription opioids as their preference (versus heroin or a combination of heroin and prescription opioids) [38]. In a 2016 Cochrane review across six studies with 607 prescription opioid dependent patients, Nielson and colleagues found low to moderate quality evidence that agonist treatment was effective and that methadone and buprenorphine appeared to be equally effective [39]. This finding was supported in a 2017 review of six studies [40].

There is some debate about the best choice of agonist therapy for OUD in older adults. Some sources cite that buprenorphine is a superior treatment for the elderly based on cohort and case-control studies, while others report that methadone is a safe option with close monitoring and medical oversight [15•, 41]. The use of agonist therapies in older adults should include consideration of other medical comorbidities [42]. Methadone has the potential to prolong the QTc interval, particularly in higher doses (defined as 100 mg or greater), which can cause arrhythmias, namely torsade de pointes [23•, 41]. Methadone doses reported to increase risk for QTc prolongation vary, ranging from as low as 30 mg daily up to 200 or 300 mg daily [15•, 41]. An electrocardiogram (EKG) should be obtained when initiating and titrating methadone or when combined with medications that may inhibit the CYP 450 3A4 pathway [15•]. Buprenorphine is not known to affect the QTc interval [41]. Older patients on opioids are at greater risk of falls, and buprenorphine may be a better choice for this reason as well [41]. Buprenorphine is also less likely to cause erectile dysfunction in men compared to methadone or constipation compared to other opioids [15•, 41]. Furthermore, individuals with severe cardiac or respiratory illness, such as sleep disordered breathing, may be more sensitive to methadone-related medical complications [23•].

Particular attention should be given to individuals with chronic pain conditions. The analgesic effects of methadone and buprenorphine are shorter than their effects on either craving or withdrawal symptoms; therefore, patients with comorbid chronic pain and OUD may not obtain adequate pain relief on either methadone or buprenorphine maintenance [43]. Generally, depressive symptoms improve within several weeks of treatment for OUD, and there is no data supporting better outcomes for either methadone or buprenorphine [17]. However, there is some evidence to suggest that individuals on buprenorphine perform better on cognitive and psychomotor testing compared to those on methadone [41]. A 6-month study examining liver health in patients ($n = 1260$) with OUD on either methadone or buprenorphine found no evidence of hepatic impairment and concluded that both medications are "without major concern for liver injury" [44].

Polypharmacy is common in older adults [42]. Sedating and depressant medications can pose serious risks to patients when used in conjunction with

Table 1. Pharmacologic interventions for opioid use disorder and special considerations

	Medication	Mechanism of action	Special considerations**
Maintenance treatments	Naloxone	Opioid antagonist	•Used specifically for overdose (rather than maintenance)
	Naltrexone	Opioid antagonist	•Consider for those highly motivated for abstinence •Available PO and in long-acting injectable •Not appropriate for persons requiring opioids for chronic pain management •Adherence to oral formulation can be problematic •Monitor for depression, anhedonia, and suicidal ideation •Consider liver function
	Buprenorphine	Partial mu opioid receptor agonist and kappa opioid receptor antagonist	•Effective for moderate OUD •May need lower doses for older adults due to risk of respiratory depression •Compared to methadone, less risk of falls, erectile dysfunction, and constipation •Potential for diversion •Available sublingual, as an implant, and depot
	Methadone	Full mu opioid agonist	•Effective for moderate OUD •May not provide adequate pain relief for those with chronic pain •May need lower doses for older adults due to risk of respiratory depression •Use with caution in those with severe cardiac and respiratory illness including sleep disordered breathing •Can cause QTc prolongation (obtain EKG prior to initiation) •CYP450 3A4 interactions •Available only at OTPs* •Potential for diversion

**There are limited data on pharmacologic treatments of OUD in older adults
**OTP* opioid treatment program

opioid agonists, particularly methadone [23•]. Older adults are more sensitive to drug-drug interactions, and age-related decrements in both hepatic and renal function may impair efficient clearance of medications [16]. In addition, reduced volume of distribution in older adults may dictate the need for lower doses of medications [15•].

The process of initiating buprenorphine or methadone must also be considered. Methadone induction can be challenging due to its long half-life which can result in overdose if the methadone dose is increased too quickly [23•]. Overall, mortality rates for buprenorphine induction are lower compared to methadone induction [23•]. However, buprenorphine induction can precipitate withdrawal if the patient is not already in mild to moderate withdrawal when given the initial dose [18]. Currently, evidence suggests that retention rates in methadone maintenance treatments are superior to those for

buprenorphine [23•, 45]. Patient characteristics associated with a lower retention rate include use of heroin, intravenous use, younger age, Hispanic ethnicity, and continued use of illicit substances during the treatment period [38, 45]. Patients on higher doses of buprenorphine (30-32 mg daily) had higher retention rates compared to those on lower doses of buprenorphine [45]. Additionally, a recent retrospective study in a commercially insured population which examined discontinuation rates of OUD treatments (oral naltrexone, XR-NTX, transdermal buprenorphine, and SL buprenorphine/naloxone) with the exception of methadone found that patients on oral NTX, XR-NTX, and transdermal buprenorphine had higher discontinuation rates compared to those on SL buprenorphine/naloxone [22].

Table 1 summarizes the pharmacologic interventions and associated special considerations.

Psychosocial treatments

Psychosocial treatments have undergirded the management of chronic or relapsing conditions, whether medical (such as diabetes mellitus or hypertension), psychiatric (such as major depression), substance-related, or a combination [23•, 46]. The American Society of Addiction Medicine (ASAM) recommends psychosocial treatments conjointly with any pharmacologic treatment of opioid use disorders. ASAM guidelines list the following psychosocial treatment components:

- Psychosocial needs assessment
- Supportive counseling
- Family support linkages
- Community services referrals [18]

A variety of treatments have been developed for the management and treatment of SUDs including cognitive-behavioral interventions (e.g., contingency management and relapse prevention). Motivational enhancement therapy (MET), based on motivational interviewing (MI), is another evidence-based framework focusing on enhancing motivation to change and treatment adherence through education and minimizing relapse [47]. Self-help programs (e.g., Narcotic Anonymous) and individual and group counseling are also components of rehabilitation approaches for SUDs [3•]. In a meta-analysis of psychosocial interventions for SUDs, combined approaches have been shown to decrease behaviors perpetuating substance use while enhancing development of new behaviors to diminish SUD-related problems [43].

In response to the opioid epidemic, various organizations and healthcare systems have developed clinical guidelines to aid in the management of OUDs. The US Department of Veterans Affairs and the Department of Defense (DoD), Substance Abuse and Mental Health Services Administration (SAMHSA), ASAM, American Psychiatric Association (APA), and the Center for Disease Control (CDC) all describe non-pharmacologic psychosocial approaches such as motivational counseling and contingency management in conjunction with medication-assisted treatment (MAT) as important elements of treatment [3•, 35, 48–49]. SAMHSA Treatment Improvement Protocol (TIP) 26 recommends

motivational counseling (based on MI) as part of the evidence-based approach to screening, brief intervention, and referral to treatment (SBIRT) for SUDs in older adults [50]. Nevertheless, the extant literature to date on approaches specific for older adults has been sparse. Limitations including findings generalized from studies of mixed age populations and those of older adults with alcohol use disorders [51•]. However, two projects have included older adults with OUDs.

The Florida BRITE Project was modeled after SBIRT and based on SAMHSA TIPs 26 and 34 recommendations for screening, brief intervention, and brief therapies to address the underutilization of substance abuse treatment services by older adults [52•, 53]. In this project, 3497 community-dwelling older adults (mean age 75 years) were screened for alcohol, illicit drug (heroin), and prescription and over-the-counter medication use. Nearly 30% of individuals screened were prescribed "pain medications" (specific medications were not recorded). Individuals with positive screens received brief intervention (BI) involving 1 to 5 MI-based sessions using the BRITE Health Promotion Workbook, modified from TIPS 26 and 34. Based on trained counselor determination, additional brief treatment (BT) consisting of 16 cognitive-behavioral therapy (CBT) and self-management-based sessions on relapse prevention was also implemented. Individuals receiving BI or BT were followed 30 days post-completion. At discharge, 32% of individuals who misused prescription medication at baseline ($n = 187$) had reduced misuse [52•].

An adaptation of the Geriatric Evaluation Team: Substance Misuse/Abuse Recognition and Treatment (GET SMART) examined the outcomes of an 18-session group therapy program using CBT, self-management, and psychoeducation sessions, supplemented by case management, individual therapy, and medication management [53]. One hundred and ninety-nine individuals age 50–89 (average age 58.5 years) participated in the study and 84 completed the program. Findings were noted at intake and 6 months post-intake. Completers reported an average 81% reduction in the number of days of non-medical prescription drug use (opiates other than heroin). Interestingly, those who completed the program were more likely to report improvement in their cognitive functioning and overall mental health [54•].

Conclusion

Stereotypes of aging once included the idea that older adults "mature out" of SUDs [55]. However, recent studies support the need for adequate screening for SUDs in older adults. Older adults may be at elevated risk for opioid-related harms due to higher percentage of chronic pain, other medical comorbidities, polypharmacy, and age-related changes. Prescribers of opioids should have an awareness of opioid prescribing guidelines and appropriate adherence monitoring. If OUD is identified, prescribers should be familiar with treatment approaches and special considerations for older adults.

Medications can play an important role in the treatment of OUD. Both naloxone and naltrexone block the effects of opioids. Naloxone is utilized to prevent overdose-related deaths and naltrexone for maintenance therapies for

OUD. Methadone is an option for opioid agonist treatment; however, it is associated with QTc prolongation and has the potential to interact with more medications than buprenorphine. It also has a longer half-life which may be problematic in older adults due to age-related changes in drug metabolism. Additionally, it may be difficult for older adults to access a methadone clinic. Buprenorphine can be administered in an office-based setting. It may be a better option for some older adults due to its lower risk of unwanted side effects and lower abuse potential. However, buprenorphine can precipitate withdrawal symptoms during induction, and prior studies have indicated that treatment retention rates may be higher for methadone versus buprenorphine.

Psychosocial interventions are important elements of OUD treatment regardless of medication selection. Components include a psychosocial needs assessment, supportive counseling, family support linkages, and community services referrals. Motivational enhancement therapy, contingency management, and screening, brief intervention, and referral to treatment have all been well studied for use in the treatment of SUDs. Self help groups as well as group therapy using CBT, self-management, and also be helpful for the management of OUD. Group therapy using CBT, self-management, and psychoeducation sessions supplemented by case management, individual therapy, and medication management may also be helpful for those with OUD.

Compliance with Ethical Standards

Conflict of Interest

Dr. Rebecca A. Payne, Dr. Stephanie Hrisko, and Dr. Shilpa Srinivasan declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent

This article does not contain any studies with human or animal subjects performed by any of the authors.

References and Recommended Reading

Papers of particular interest, published recently, have been highlighted as:

- • Of importance

1. IMS Health, National Prescription Audit, years 1997-2013, Data Extracted 2014.
2. Krebs EE, Paudel M, Taylor BC, Bauer DC, Fink HA, et al. Association of opioids with falls, fractures, and physical performance among older men with persistent musculoskeletal pain. J Gen Intern Med. 2016;31(5):463–9. https://doi.org/10.1007/s11606-015-3579-9.
3. • Le Roux C, Tang Y, Drexler K. Alcohol and opioid use disorder in older adults: neglected and treatable illnesses. Curr Psychiatry Rep. 2016;18:87. https://doi.org/10.1007/s11920-016-0718-x.

Comprehensive overview of opioid use disorders in older adults.

4. Grey C, Hall PB. Considerations of prescription opioid abuse and misuse among older adults in West Virginia—an under-recognized population at risk. W V Med J. 2016;112(3):42–7. Review
5. Dublin S, Walker RL, Gray SL, Hubbard RA, Anderson ML, et al. Prescription opioids and risk of dementia or cognitive decline: a prospective cohort study. J Am Geriatr Soc. 2015;63(8):1519–26. https://doi.org/10.1111/jgs.13562.
6. Olfson M, Wang S, Iza M, Crystal S, Blanco C. National trends in the office-based prescription of schedule II opioids. J Clin Psychiatry. 2013;74:932–9. as cited in Grey, C, Hall PB.

Considerations of prescription opioid abuse and misuse among older adults in West Virginia—an under-recognized population at risk. W V Med J. 2016: 112(3): 42–7. Review

7. American Geriatrics Society Beers Criteria Update Expert Panel. American Geriatrics Society 2015 updated. Beers criteria for potentially inappropriate medication use in older adults. J Am Geriatr Soc. 2015;63:2227–46. as cited in Gerlach LB et al. Opioids and other central nervous system-active polypharmacy in older adults in the United States. JAGS 2017: 65: 2052–6
8. Gerlach LB, Olfson M, Kales HC, Maust DT. Opioids and other central nervous system-active polypharmacy in older adults in the United States. JAGS. 2017;65:2052–6.
9. West NA, Severtson SG, Green JL, Dart RC. Trends in abuse and misuse of prescription opioids among older adults. Drug Alcohol Depend. 2015;149:117–21.
10. Gold SL, Powell KG, Eversman MH, Peterson A, Borys S, et al. High-risk obtainment of prescription drugs by older adults in New Jersey: the role of prescription opioids. JAGS. 2016;64:e67–71.
11. National Council on Alcoholism and Drug Dependence, Inc. (NCADD). Alcohol, drug dependence and seniors. https://www.ncadd.org/about-addiction/seniors/alcohol-drug-dependence-and-seniors. Last modified June 26, 2015.
12.• Chhatre S, Cook R, Mallik E, Jayadevappa R. Trends in substance use admissions among older adults. BMC Health Serv Res. 2017;17(1):584. https://doi.org/10.1186/s12913-017-2538-z.

Describes recent trends related to SUD admissions specific to older adults

13. Huang X, Keyes KM, Li G. Increasing prescription opioid and heroin overdose mortality in the United States, 1999–2014: an age-period-cohort analysis. Am J Public Health. 2018;108(1):131–6. https://doi.org/10.2105/AJPH.2017.304142.
14. Rudd RA, Seth P, David F, Scholl L. Increases in drug and opioid-involved overdose deaths—United States, 2010–2015. MMWR. 2016;65:1445–52.
15.• Burgos-Chapman I, Trevisan LA, Sevarino K. Abuse of opioid and prescription medications. In: Sullivan M, Levin FR, editors. Addiction in the older patient. New York: Oxford University Press; 2016.

Comprehensive review, specific to older adults.

16. Substance Abuse and Mental Health Services Administration (SAMHSA). Clinical use of extended-release injectable naltrexone in the treatment of opioid use disorder: a brief guide. HHS Publication No. (SMA) 14-4892R. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2015.
17. Savant JD, Barry DT, Cutter CJ, Joy MT, Dinh A, Schottenfeld RS, et al. Prevalence of mood and substance use disorders among patients seeking primary care office-based buprenorphine/naloxone treatment. Drug Alcohol Depend. 2013;127:243–7. https://doi.org/10.1016/j.drugalcdep.2012.06.020.
18. Kampman K, Jarvis M. American Society of Addiction Medicine (ASAM) national practice guideline for the use of medications in the treatment of addiction involving opioid use. J Addict Med. 2015;9:358–67. https://doi.org/10.1097/ADM.0000000000000166.
19. Lott DC. Extended-release naltrexone: good but not a panacea. Lancet. 2017; https://doi.org/10.1016/S0140-6736(17)32872-6. Accessed 10 Jan 2018
20. Sharma A, Kelly SM, Mitchell SG, Gryczynksi J, O'Grady KE, Schwartz RP. Update on barriers to pharmacotherapy for opioid use disorders. Curr Psychiat Rep. 2017;19:35. https://doi.org/10.1007/s11920-017-0783-9.
21. Loreck D, Brandt NJ, DiPaula B. Managing opioid abuse in older adults. J Geronton Nurs. 2016;43:10–5. https://doi.org/10.3928/00989134-20,160,314-04.
22. Morgan JR, Schackman BR, Leff JA, Linas BP, Wally AY. Injectable naltrexone, oral naltrexone, and buprenorphine utilization and discontinuation among individuals treated for opioid use disorder in a United States commercially insured population. J Subst Abuse Treat. 2018;85:90–6. https://doi.org/10.1016/j.jsat.2017.07.001.
23.• Schuckit MA. Treatment of opioid-use disorders. N Engl J Med. 2016;375:357–68. https://doi.org/10.1056/NEJMra1604339.

Comprehensive overview, however not specific to older adults.

24. Woody GE. Current progress in opioid treatment. Am J Psychiat. 2017;174:414–6. https://doi.org/10.1176/appi.ajp.2016.16121398.
25. Connery HS. Medication-assisted treatment of opioid use disorder: review of the evidence and future directions. Harv Rev Psychiatry. 2015;23:63–75. https://doi.org/10.1097/HRP.0000000000000075.
26. Minozzi S, Amato L, Vecchi S, Davoli M, Kirchmayer U, Verster A. Oral naltrexone maintenance treatment for opioid dependence (review). Cochrane Db Syst Rev. 2011;Issue 2. Art. No.:CD001333. https://doi.org/10.1002/14651858.CD001333.pub3.
27. Krupitsky E, Nunes EV, Ling W, Gastfriend DR, Memisoglu A, Silverman BL. Injectable extended-release naltrexone (XR-NTX) for opioid dependence: long-term safety and effectiveness. Addiction. 2013;108:1628–37. https://doi.org/10.1111/add.12208.
28. Tanum L, Solli KK, Latif Z, Benth JS, Opheim A, Sharma-Haase K, et al. Effectiveness of injectable extended-release naltrexone vs. daily buprenorphine-naloxone for opioid dependence. A randomized clinical noninferiority trial. JAMA Psychiat. 2017;74:1197–205. https://doi.org/10.1001/jamapsychiatry.2017.3206.
29. Lee JD, Nunes EV, Novo P, Bachrach K, Bailey GL, Bhatt S, et al. Comparative effectiveness of extended-release naltrexone versus buprenorphine-naloxone for opioid relapse prevention (X:BOT): a multicenter, open-label, randomized controlled trial. Lancet. 2017; https://doi.org/10.1016/S0140-6736(17)32812-X. Accessed 10 Jan 2018

30. Sullivan MA, Bisaga A, Glass A, Mishlen K, Pavlicova M, Carpenter KM, et al. Opioid use and dropout in patients receiving oral naltrexone with or without single administration of injection naltrexone. Drug Alcohol Depend. 2015;147:122–9. https://doi.org/10.1016/j.drugalcdep.2014.11.028.
31. Manelli P, Wu LT, Peindl KS, Swartz MS, Woody GE. Extended release naltrexone injection is performed in the majority of opioid dependent patients receiving outpatient induction: a very low dose naltrexone and buprenorphine open label trial. Drug Alcohol Depend. 2014;138:83–8. https://doi.org/10.1016/j.drugalcdep.2014.02.002.
32. Sullivan MA, Bisaga A, Pavlicova M, Choi CJ, Mishlen K, Carpenter KM, et al. Long-acting injectable naltrexone induction: a randomized trial of outpatient opioid detoxification with naltrexone versus buprenorphine. Am J Psychiatr. 2017;174:459–67. https://doi.org/10.1176/appi.ajp.2016.16050548.
33. Krupitsky E, Zvartau E, Blokhina E, Verbitskaya E, Walgren V, Tsoy-Podosenin M. Anhedonia, depression, anxiety, and craving for opiates in opiate dependent patients stabilized on oral naltrexone or an extended release naltrexone implant. Am J Drug Alcohol Abuse. 2016;42:614–20. https://doi.org/10.1080/00952990.2016.1197231.
34. Zaaijer ER, van Dijk L, de Bruin K, Goudriaan AE, Lammers LA, Koeter MWJ, et al. Effect of extended-release naltrexone on striatal dopamine transporter availability, depression and anhedonia in heroin-dependent patients. Psychopharmacology. 2015;232:2597–607. https://doi.org/10.1007/s00213-015-3891-4.
35. Dowell D, Haegerich TM, Chou R. CDC guidelines for prescribing opioids for chronic pain—United States, 2016. MMWR Recomm Rep. 2016;65(RR-1):1–49. https://doi.org/10.15585/mmwr.rr6501e1.
36. Kerensky T, Walley AY. Opioid overdose prevention and naloxone rescue kits: what we know and what we don't know. Addict Sci Clin Pract. 2017;12:4. https://doi.org/10.1186/s13722-016-0068-3.
37. Fei JTB, Yee A, Habil MHB, Danaee M. Effectiveness of methadone maintenance therapy and improvement in quality of life following a decade of implementation. J Subst Abuse Treat. 2016;69:50–6. https://doi.org/10.1016/j.jsat.2016.07.006.
38. Potter JS, Marino EN, Hillhouse MP, Nielsen S, Wiest K, Canamar K, et al. Buprenorphine/naloxone and methadone maintenance treatment outcomes for opioid analgesic, heroin, and combined users: findings from Starting Treatment with Agonist Replacement Therapies (START). J Stud Alcohol Drugs. 2013;74:605–13. https://doi.org/10.15288/jsad.2013.74.605.
39. Nielsen S, Larance B, Degenhardt L, Gowing L, Kehler C, Lintzeris N. Opioid agonist treatment for pharmaceutical opioid dependent people. Cochrane Db Syst Rev. 2016;5:CD011117. https://doi.org/10.1002/14651858.CD01.
40. Nielsen S, Larance B, Lintzeris N. Opioid agonist treatment for patients with dependence on prescription opioids. JAMA. 2017;317:967–8. https://doi.org/10.1001/jama.2017.0001.
41. Srivastava A, Kahan M, Nader M. Primary care management of opioid use disorders: abstinence, methadone, or buprenorphine-naloxone? Can Fam Phys. 2017;63(3):200–5.
42. Fried TR, O'Leary J, Towle V, Goldstein MK, Trentalange M, Martin DK. Health outcomes associated with polypharmacy in community-dwelling older adults: a systematic review. J Am Geriatr Soc. 2014;62(12):2261–72. https://doi.org/10.1111/jgs.13153.
43. Donroe JH, Holt SR, Tetrault MM. Caring for patients with opioid use disorder in the hospital. Can Med Assoc J. 2016;188:1232–9. https://doi.org/10.1503/cmaj.160290.
44. Saxon AJ, Ling W, Hillhouse M, Thomas C, Hasson A, Ang A, et al. Buprenorphine/naloxone and methadone effects on laboratory indices of liver health: a randomized trial. Drug Alcohol Depend. 2013;128:71–6. https://doi.org/10.1016/j.drugalcdep.2012.08.002.
45. Hser Y, Saxon AJ, Huang D, Hasson A, Thomas C, Hillhouse M, et al. Treatment retention among patients randomized to buprenorphine/naloxone compared to methadone in a multi-site trial. Addiction. 2014;109:79–87. https://doi.org/10.1111/add.12333.
46. O'Brien CP. Drug addiction. In: Brunton L, Chabner B, Knollman B, editors. Goodman & Gilman's the pharmacological basis of therapeutics. 12th ed. New York: McGraw-Hill; 2011. p. 649–66.
47. Dutra L, Stathopoulou G, Basden SL, Leyro TM, Powers MB, Otto MW. A metaanalytic review of psychosocial interventions for substance use disorders. Am J Psychiatry. 2008;165:179–87.
48. Kleber HD, Weiss RD, Anton RF, George TP, Greenfield SF, Kosten TR, et al. Treatment of patients with substance use disorders, American Psychiatric Association. Am J Psychiatry. 2007;164(4 Suppl):5–123.
49. Drexler K, Perry C, Kivlahan D, et al. VA/DoD clinical practice guideline for the management of substance use disorders. 2015.
50. Center for Substance Abuse Treatment. Substance Abuse among older adults. Treatment improvement protocol (TIP) series 26. Rockville, MD: Substance Abuse and Mental Health Services Administration, US Dept of Health and Human Services; 1998. DHHS publication no. SMA 98–3179.
51.• Kuerbis A, Sacco P. A review of existing treatments for substance abuse among the elderly and recommendations for future directions. Subst Abuse Res Treat. 2013;7:13–37.
Comprehensive review of SUD treatments in older adults (includes alcohol and other substance use disorders).
52.• Schonfeld L, King-Kallimanis BL, Duchene DM, Etheridge RL, Herrera JR, Barry KL, et al. Screening and

brief intervention for substance misuse among older adults: the Florida BRITE project. Am J Public Health. 2010;100(1):108–14.
First study to evaluate SBIRT for SUD in older adults.
53. Center for Substance Abuse Treatment. Brief interventions and brief therapies for substance abuse. Treatment improvement protocol (TIP) series 34. Rockville, MD: Substance Abuse and Mental Health Services Administration, US Dept of Health and Human Services; 1999. DHHS publication no. SMA 99–3353
54.• Outlaw FH, Marquart JM, Roy A, Luellen JK, Moran M, Willis A, et al. Treatment outcomes for older adults who abuse substances. J Appl Gerontol. 2012;31(1):78–100.
Psychosocial treatment study specific to older adults.
55. Winick C. Maturing out of narcotic addiction. Bull Narc. 1962;14(1):1–7.