Chapter 14
ADHD and Substance Use

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Case Example

Evan is a 17-year-old with long-standing ADHD and increasingly heavy use of marijuana. Treated with stimulant medication in elementary school, adherence diminished in his early adolescence. Marijuana use began when he was 14 years old, and he currently smokes daily to "calm down." He and his mother have been told that he cannot be treated for his ADHD while he continues his current level of substance use. However, he wants to graduate from high school and is struggling to stay focused to complete his work, whether he has been smoking or not. Evan, his parents, and his teachers find that his inattention is preventing him from succeeding in school.

Background

Substance use during adolescence is common and often associated with negative health outcomes [1]. While many of the negative consequences of substance use

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occur later in life, more than 95% of individuals who use substances initiate use before the age of 25 [2]. This early substance use initiation has a significant impact on the development of the brain, which continues well into the third decade of life [3].

The relationship between substance use and ADHD is complex and has been at the heart of many research investigations [4]. Youth with ADHD are at higher risk of misusing drugs and alcohol, and youth with substance use disorders (SUDs) are disproportionately affected by ADHD, which in turn may impact treatment and recovery [5]. After a brief discussion of the health effects of substance use in adolescents, we will explore some of the common risk and protective factors that may lead to or prevent SUDs in adolescents with ADHD. We will then review the implications of treated versus untreated ADHD in the development of SUDs and discuss strategies for the effective management of ADHD in the context of substance use.

Substance Use in Adolescence: An Overview

In the past three decades, advances in neuroimaging technology have improved understanding of the process of human brain development. We now know that specific parts of the brain reach maturity before others: this is particularly important when it comes to addictive behaviors [6]. In fact, while the amygdala and nucleus accumbens—two parts of the brain that play a key role in emotional processing and the experience of pleasure and reward, respectively—are fully developed by mid-adolescence, the prefrontal cortex, responsible for higher-level thinking, including planning, impulse control, and decision-making, is not fully developed until the late twenties [7]. This neurodevelopmental difference leads to what is sometimes recognized as a "rational thinking gap," leaving the brain of an adolescent more susceptible to the pleasurable effects and unwanted consequences tied to the use of addictive substances, such as alcohol, nicotine, marijuana, and other drugs, compared to the brain of an adult [8].

> The earlier the onset of substance use, the higher the likelihood of developing a SUD later in life [9].

For instance, if a young person starts using alcohol at the age of 13, the risk of having problematic alcohol use over the life span is approximately 50%, five times the population risk. This pattern of four- to fivefold increase in risk across the life span with early-onset substance use is similar for other substances [10].

The risk of developing SUDs is only one of the numerous health risks linked to early initiation of substance use. Perhaps one of the most concerning risks relates to the impact of alcohol and drug use on the process of brain maturation and development. In fact, exposure during adolescence to the three psychoactive substances most commonly used by adolescents (alcohol, nicotine, and marijuana) has been

associated with long-term losses in attention capacity, memory formation, and intellectual abilities [11, 12]. This capacity decline can lead to various impairments at school, at work, or in sports and extracurricular activities [13].

Another important and concerning impact of substance use during adolescent years is the strong association between alcohol and drug use and increased adverse mental health outcomes, like depression and anxiety, and in some cases suicidal ideation, bipolar disease, and psychosis [14]. While alcohol and drugs have not yet been shown to be a direct cause of mental illness, several studies have established a temporal relationship in which substance use often predated mental health symptoms; this was not seen only in youth with pre-established mental health problems. In several cases, substance use can complicate the course of mental health conditions and can represent an important barrier to treatment [15]. Finally, although this is beyond the scope of this chapter, alcohol and drugs have been shown to impact the physical health and well-being of adolescents. Increased risk of high blood pressure, stroke, cancer, and respiratory or liver problems are only some of the multiple risks associated with early onset of alcohol and drug use [16]. These health risks are particularly concerning for adolescents with ADHD who take medications that may have dangerous interactions with alcohol and drugs.

ADHD and Substance Use: Risk and Exacerbating Factors

Substance use exacerbates coexisting ADHD, and ADHD is a known risk factor for substance use and progression to SUDs [5].

The health risks associated with substance use in adolescence, whether physiological, cognitive, or mental/emotional as outlined above, are of considerable concern for individuals with ADHD given the higher rates of adolescent substance use in those who carry an ADHD diagnosis. The impact is bidirectional. An influential report published in 2011 documented the relationship between ADHD and substance use in 27 longitudinal studies [17]. The authors concluded that compared to children without ADHD, children with ADHD were significantly more likely to use nicotine in their lifetime and were three times more likely to develop nicotine dependence in adolescence or adulthood. Children with ADHD were also more likely to use marijuana and to develop SUDs with marijuana, cocaine, and alcohol in adolescence or adulthood. In general, they reported that individuals with ADHD were more than 2.5 times more likely than peers without ADHD to develop illicit substance abuse or dependence [17–22]. Specific substance use trends seen in adolescents with ADHD are listed below (Table 14.1).

Further, experiencing a higher number of ADHD symptoms is associated with a lower age at nicotine use initiation and vice versa [21]. Youth with ADHD may also

Table 14.1 Substance use trends seen in adolescents with ADHD

Substance use trends seen in adolescents with ADHD
Earlier initiation of use
Less time between use initiation and development of a SUD
Strong association with behavioral disorders
More acute substance use picture when ADHD is not detected, diagnosed, or treated early
Direct relationship with more severe and/or persistent ADHD symptoms [5, 20, 22–24]

be tempted to use substances like marijuana in an attempt to "self-medicate" or decrease symptoms of ADHD [25].

> While "self-medication" of ADHD symptoms with marijuana is commonly reported by adolescents with ADHD and may appear to provide temporary relief of some symptoms of impulsivity or hyperactivity, the use of marijuana is ultimately harmful and counterproductive and carries many more side effects than potential benefits [26].

The heightened risk for substance use and SUDs associated with ADHD extends into adulthood. One study conducted in a large group of adults followed since birth showed that individuals with ADHD who did not develop SUDs in adolescence still had higher rates of drug exposure as adults and were approximately 3.5 times more likely to develop new drug dependence in adulthood compared to individuals without ADHD [27]. This study raised the importance of close monitoring of these individuals for substance-related problems well into adulthood, especially if there is a co-occurring behavior disorder.

Connections Between ADHD and Substance Use

Potential explanations for the higher rates of substance use among adolescents with ADHD include neurobiological, psychiatric, environmental, and social factors. These factors are also known to interact with one another, creating a more complicated and severe health picture for youth who carry multiple risk factors [22]. Thus, it is important to understand these variables and their possible interplay in order to consider best intervention strategies.

Neurobiological Factors

The first set of factors to consider reside in the brain. Brain imaging technology has revealed that individuals with ADHD may experience lower levels of the chemical

neurotransmitter dopamine in specific areas of the brain, leading to decreased attention capacity and learning aptitude, as well as lower mood and sense of pleasure [20]. Substance use leads to an increase in dopamine levels, especially in the brain's reward center—the nucleus accumbens—reversing symptoms experienced with the lower dopamine levels associated with ADHD. Thus, one theory postulates that adolescents with ADHD find symptom relief with the use of psychoactive substances, using them as a form of self-medication [5]. This neurobiological vulnerability could account for the higher rates of problematic substance use and SUDs seen in adolescents and adults with ADHD.

Adolescents with ADHD have also been found to initiate use of substances earlier than their peers without ADHD [28]. As has already been discussed, earlier initiation of substance use is correlated with higher likelihood of any substance use escalating to problematic use and ultimately to meeting criteria for a SUD [23]. This correlation is in part due to the stage of brain development occurring during early adolescence, a stage in which the brain is actively identifying pleasurable and aversive environmental stimuli, cueing the individual toward the former and away from the latter [29]. Given the euphoric effects of dopamine the brain receives with substance use, it is "tricked" into believing that substances are essential to survival and will continue to send out signals encouraging substance use whenever possible. This phenomenon could also in part account for the larger numbers of adults with persisting ADHD symptoms who develop SUDs later in life [23]. Of note, some research has shown that there is a shorter time between initiation of use and meeting criteria for a SUD diagnosis for adolescents with ADHD than for their non-ADHD diagnosed peers, though the mechanism leading to this condensed time frame is not well known [22].

> With early initiation of use, adolescents become "hard-wired" to be prompted by their own brain to continue and even increase substance use.

Further, research has shown that substance use in adolescence can reduce attentional, memory, and impulse control capacities, negatively impacting the developing prefrontal cortex. This impact leads to decreased capacity for behavioral regulation, which in turn negatively impacts the course of the ADHD [24]. There is evidence that alcohol use alone hinders the connection between the pleasure center in the temporal lobe of the brain and the prefrontal cortex, where impulse control occurs, meaning that the more an individual consumes alcohol, the weaker their ability to control the impulse to consume alcohol over time [6].

Psychiatric Factors

The next category of factors is those in the psychiatric domain. There are several psychiatric disorders that are common in both adolescents with ADHD and adolescents with substance use. Behavioral disorders specifically have been found to be

not only common in individuals with ADHD but also a strong predictor of more severe clinical symptomatology, more severe functional impairments, higher persistence of ADHD into adulthood, and worse long-term outcomes related to ADHD disorder [23]. Epidemiological study findings show prevalence rates of oppositional defiant disorder/conduct disorder (ODD/CD) of at least 25% among teens with ADHD, with many studies showing even higher percentages [23, 30]. CD, which can blossom into antisocial personality disorder (ASP) in adults, is strongly linked with combined ADHD and substance use. This behavioral disorder is defined by deviance that can include aggression toward people or animals, lying, stealing, running away, skipping classes, and property destruction [31]. A number of studies have suggested that the increased risk for SUDs in adolescents with ADHD is actually attributable to the increased prevalence of CD in this population [17]. The association between ADHD and behavioral disorders tends to be stronger in teens with a predominance of hyperactivity/impulse control symptoms of ADHD, as compared to teens with more predominant inattentive-type symptoms [32]. This tendency makes it more likely for boys to be diagnosed with concurrent ADHD and SUDs, as girls with ADHD tend to display fewer of these hyperactivity/impulse control symptoms than their male counterparts.

With co-occurring ADHD and CD, SUDs are four times more frequent than in adolescents with neither of these diagnoses [2].

Depression and anxiety are two other mental health conditions strongly associated with both substance use and ADHD [33]. These two conditions share several of the psychosocial risk factors that are often seen in adolescents with ADHD, like poor peer relations and academic failure. Further, the symptoms of these disorders, such as low mood, sleep difficulties, physical agitation, chronic worry, muscle tension, difficulty concentrating, and decreased appetite [31], can exacerbate and/or mimic ADHD symptoms [34], increasing the risk of substance use as a means of symptom alleviation [19] and/or of managing emotional processes surrounding difficult psychosocial factors.

Environmental and Social Factors

This final set of factors connecting ADHD and substance use in adolescents includes psychosocial issues faced both at home and in the community. Home life for teens with ADHD can present several risk factors for exacerbated ADHD symptoms and substance use. Research has shown higher stress levels within families of children with ADHD, primarily when combined with ODD/CD, leading to greater frequency of conflict in parent-child relationships and decompensated family functioning [35]. More negative communication patterns between adolescents and parents that more

commonly include anger and aggressive conflict patterns have also been described [36]. Such communication and conflict patterns can both break down healthy communication and create a perception in adolescents of uncaring parents, both of which are associated with higher rates of substance use in teens [37]. These family dynamics can be even more impactful for families in which a parent also carries an active ADHD diagnosis. Adults whose ADHD symptoms persist beyond adolescence, more commonly seen in those with comorbid ODD/CD, are at increased risk for more severe functional impairments and resulting comorbidities such as affective disorders and problematic substance use [23]. All of these conditions lend themselves to the conflictual family dynamics detailed above, with parental substance use a commonly known risk factor for substance use in their offspring [17]. Finally, prenatal exposure to nicotine or alcohol is linked to greater risk of ADHD across the life span [22].

Community stressors, including academic and social challenges, faced by many adolescents with ADHD, can leave these teens feeling marginalized and/or experiencing internalizing problems such as depression and anxiety. Further, with less capacity for self-regulation, teens with ADHD may show their emotions through externalizing behaviors, such as anger outbursts or defiance [21], leading to further marginalization and ensuing low self-esteem. As they age, these teens may become comfortable relating to other marginalized peers who are more likely to have aberrant behaviors including substance use [38].

Impact of ADHD Treatment on Substance Use Disorders

ADHD and substance use not only are highly correlated but also, when found together, lead to worse clinical outcomes for each diagnosis with a higher number of comorbidities. Thus, it is imperative to consider the implications of treatment of ADHD and how various interventions can positively impact both ADHD symptom manifestation and substance use behaviors. When ADHD is left untreated, individuals most commonly experience worse long-term outcomes in multiple domains of functioning, including academic, antisocial behavior, driving, nonmedical drug use/addictive behavior, obesity, occupation, services use, self-esteem, and social function outcomes [23]. These findings point to the necessity of treating ADHD and treating it early.

> Recent studies find decreased incidence of SUDs in adolescents who were given pharmacological treatment for their ADHD as children [39].

Psychostimulant medications are often considered first-line treatment of ADHD. Whereas early research prompted concerns that treatment of childhood ADHD with stimulants might increase the risk of later substance use, more recent

studies show that pharmacological treatment of ADHD does not predispose to substance use, but rather is protective against it. It is unclear whether this effect persists into adulthood if medication is discontinued.

Adolescents will at times present for diagnosis and treatment with untreated ADHD and an active SUD. Although both disorders should be recognized and treated, for example, using behavioral interventions such as cognitive behavioral therapy, research suggests that pharmacotherapy for ADHD in this context is not as effective in treating either the ADHD symptoms or the SUD. Results are better if the adolescent can achieve a transient period of abstinence from substances before pharmacotherapy is initiated [40]; however, this intervention progression cannot always be achieved, especially if substance use is chronic. In this case, using a harm reduction approach, with the primary objective of decreasing use broadly and the frequency of use in high-risk situations more specifically, could be appropriate.

Treatment Strategies in Adolescents with Concurrent Substance Use and ADHD

There are several ways to prevent or address substance use in adolescents with or without ADHD. The American Academy of Pediatrics now recommends annual *S*creening, *B*rief *I*ntervention, and *R*eferral to *T*reatment (SBIRT) for alcohol and drug use in primary care for all adolescents [41]. This can be done using short, evidenced-based screening tools such as Screening to Brief Intervention (S2BI) [42] or *C*ar, *R*elax, *A*lone, *F*orget, *F*riends, *T*rouble (CRAFFT) [43]. In some states, like Massachusetts, where screening for alcohol and substance use by a school staff member is mandatory in all middle school and high schools, SBIRT has become a common practice in various healthcare settings including primary care offices and emergency rooms, as well as in school-based health centers. In the case of a positive screen, or a high clinical suspicion for a SUD, adolescents should undergo a thorough evaluation, and when possible, treatment for SUDs should be initiated before treatment for ADHD [40]. Adolescents can be referred to a specialized outpatient substance use program, an intensive outpatient program, or partial hospitalization program or a medium- to long-term residential treatment program [44]. In some cases, when substance use is very severe or in the case of a drug or alcohol overdose, acute stabilization in hospital or medical detoxification may be required.

Substance use may mimic many of the manifestations of untreated ADHD and prolong the course or make the management of ADHD symptoms more challenging. Inversely, ADHD symptoms may greatly improve if substance use is decreased or interrupted. In a policy statement specifically addressing co-occurring substance use and ADHD, the American Academy of Pediatrics recommends that youth should ideally be assessed for ADHD when not under the influence of alcohol or

drugs; however, in some cases, especially when there is strong addiction to alcohol or drugs or when there is long-standing history of substance use, this ideal may not be possible [5]. In these cases, if there is a suspicion that ADHD symptoms are not exclusively related to substance use, it is reasonable and encouraged to initiate careful treatment for ADHD before or while addressing substance use problems.

Health providers may hesitate to prescribe psychostimulant medication to individuals with known substance use problems and a new diagnosis of ADHD [45]. In fact, misuse and diversion of ADHD medication, especially psychostimulants such as methylphenidate (Ritalin) or amphetamines (Adderall), are common among adolescents, affecting up to 10% of high school and college students [46]. Adolescents may be tempted to take doses of medication that are higher than prescribed or crush the medication in order to inhale or inject it, to get "high" or get a stronger, more intense stimulating effect [47]. Prescription stimulants may also be combined with other substances, which increases the likelihood of severe side effects, including cardiac and neurological complications as severe as seizures or cardiac arrest [48]. Diversion and misuse of psychostimulant medications by parents and other household members are also common and reported in as many as 16% of parents of children and adolescents with ADHD [49].

There are several ways to reduce the risk of stimulant diversion and misuse among youth with ADHD. The first, and perhaps most important strategy, is to ensure a proper diagnosis of ADHD and to rule out other co-occurring conditions which, if left unaddressed, may worsen or mimic symptoms of ADHD [5]. Examples may include hearing or visual difficulties, untreated mental health issues such as depression or anxiety, and learning disabilities. Another important step, especially when substance use is known or suspected, is to maximize non-pharmacological treatment options, which may prove effective in reducing many of the most prominent symptoms of ADHD [50, 51].

Once non-pharmacological treatments have been explored, medication treatment should be considered but with careful consideration of risks and benefits. While psychostimulant treatments are often considered first-line treatment, their higher effectiveness needs to be balanced against diversion or misuse potential [25]. We provide below a list of the most commonly prescribed ADHD medications along with their suspected misuse/abuse potential (Table 14.2).

A useful strategy when initiating medication treatment for ADHD in adolescents with known substance use problems is to consider non-psychostimulant medications in the categories of alpha-agonists (i.e., clonidine or guanfacine) and selective norepinephrine reuptake inhibitors (i.e., atomoxetine, sold under the brand name Strattera). These medications, while not as effective as psychostimulant medications, have a lower misuse potential than other approved treatments for ADHD and have been shown to provide some symptom improvement in adolescents [52]. They can be used alone or in combination with other non-medication strategies and ADHD medications.

Table 14.2 List of most commonly used medications for ADHD with suspected relative abuse potential

Stimulant status	Medication type	US trade name	Suspected relative abuse potential[b]
Stimulants			
Short acting/immediate release	Methylphenidate	Ritalin[a]	High
		Methylin[a]	High
	Dexmethylphenidate	Focalin[a]	High
	Amphetamine-dextroamphetamine	Adderall[a]	High
	Dextroamphetamine	Dexedrine	High
		Dextrostat[a]	High
		Procentra	High
Long acting/extended release	Methylphenidate	Metadate CD	Medium
		Metadate ER[a]	Medium
		Ritalin LA[a]	Medium
		Ritalin SR[a]	Medium
		Methylin ER	Medium
		Daytrana Patch	Low
		Concerta[a]	Low
		Quillivant XR	Low
	Dexmethylphenidate	Focalin XR[a]	Low
	Dextroamphetamine	Dexedrine Spansule[a]	Medium
	Amphetamine-dextroamphetamine	Adderall XR[a]	Medium
	Lisdexamfetamine	Vyvanse	Low
Nonstimulants			
α2-Adrenergic agonists	Guanfacine	Intuniv[a]	Low
	Clonidine	Kapvay[a]	Low
Selective norepinephrine reuptake inhibitor	Atomoxetine	Strattera	Low

CR controlled release, *ER* extended release, *LA* long acting, *SR* sustained release, *XR* extended release

Note: (a) Indicates that generic formulation is available. (b) Indicates relative abuse potential is suspected based on length of action and formulation of medication. Reproduced with permission from Harstad et al. [5] by the AAP

When nonstimulant options have been exhausted, the use of an amphetamine precursor (or prodrug; a molecule that needs to be metabolized before it becomes active) such as lisdexamfetamine (sold under the brand name Vyvanse) is thought to carry lower misuse potential among psychostimulants [53]. If amphetamine salts (sold under the brand name Adderall) or methylphenidate (sold under the brand names Ritalin, Concerta, and Biphentin) is selected, the use of longer-acting

formulations instead of shorter-acting or immediate-release formulations, either in patch or oral form, should be preferred as they are less likely to be misused [54].

Once a medication has been selected, there are several ways for providers to help reduce the risk of medication misuse [5]. When there is evidence of substance use or prior diversion of prescription medication, providers can consider using a written contract with patients to discuss clear expectations around substance use, adherence to medication, medical follow-up visits, and consequences in the case of medication misuse. Providers should also consider writing shorter prescriptions with frequent refills and frequent follow-up visits, which can be used to monitor response to medication and potential misuse. Initially, it would be reasonable for physicians to schedule weekly or biweekly visits until a steady dose of medication is achieved. Adolescents should be asked at every visit about medication adherence and medication misuse. In some cases, clinic or home urine drug testing can be a helpful tool, which may help assess use of other substances and confirm that the medication is actually being taken [55].

Finally, parents or guardians can play an important role in decreasing misuse potential around ADHD medications. A responsible adult should be instructed to keep a teen's ADHD medication locked up, to minimize risk of patient misuse and, in some cases, misuse by siblings or other youth who may be visiting the home. Parents should also consider dispensing the medication themselves daily under direct observation, especially when there is ongoing substance use. Finally, when daytime medication doses are required, parents can collaborate with teachers or school health providers so that medication is stored in a safe space at school and taken under supervision. While in school, students should not carry bottles of ADHD medications which could be lost, stolen, diverted, or misused. Finally, families should be informed about the risk of medication misuse and diversion. Health providers can provide informational materials in print form or direct patients and families to sources curated by reliable organizations such as the American Academy of Pediatrics and Canadian ADHD Resource Alliance.

Overall, parents, families, and communities can play a key role in substance use prevention and treatment, whether specifically around ADHD medication diversion or substance use in general [56]. In addition, after-school programs, recovery support services such as Alcoholics Anonymous (AA), and other peer and family support groups often offer an important complement to behavioral and medical approaches [58]. Thus, when ADHD and substance use present together in an adolescent's diagnostic picture, the "village" of caregivers, whether at home, school, or medical office, needs to pull together in a collaborative effort of bridging the teen from ADHD and substance use turbulence to finding greater stability and steps toward a successful adulthood.

Family involvement in substance use treatment is associated with more favorable outcomes and sustained recovery for all substances [57].

Case Revisited

Evan's diagnostic profile should be carefully reconsidered, to determine if ADHD remains a problem and if additional disorders have emerged (depression, anxiety). If referral to a substance use program is not available or accessible, his pediatrician can provide psychoeducation about substance use and ADHD. Like many teens, Evan may experience his ADHD symptoms as temporarily improved when he uses marijuana. Using a harm reduction approach, with the primary objective of decreasing use broadly and the frequency of use in high-risk situations more specifically, his pediatrician may educate Evan about the harms caused by substance use, which outweigh the temporary subjective benefits. He is at increased risk of additional substance use into adulthood, and he faces greater legal implications if impaired judgment results in lawbreaking. Evan should also understand that ADHD treatment is less effective for a person with an active substance use disorder. Treatment might start with a nonstimulant medication. Should stimulant medication be indicated, longer-acting formulations are preferred, and careful medication monitoring is essential.

Conclusions

As highlighted throughout this chapter, ADHD and substance use often co-occur and, together, can lead to worsened ADHD and substance use symptom presentation, decreased sense of self, and increased behavioral concerns. There are several distinct opportunities for parents, healthcare providers, and school staff to help prevent, identify, and treat substance-use-related issues in the context of ADHD. Below are some key tips to consider when thinking about how and when to intervene.

Tips

- Screening:
  - Medication and non-medication treatment of ADHD during childhood are protective against later substance use in adolescence. Early intervention should be encouraged, and families hesitant to use medications should be provided information about increased risk of substance use problems when ADHD symptoms are poorly controlled.
  - As adolescents with ADHD tend to initiate substance use earlier than their non-diagnosed peers, universal screening for substance use should be implemented in early adolescence (i.e., by age 12–13).
- Behavioral concerns
  - Early behavioral issues with or without ODD/CD are often found in children with an ADHD subtype that is either mixed or predominantly

hyperactive (vs inattentive) and are strongly correlated with substance use in adolescence. Children with symptoms of hyperactivity should be monitored closely as they enter adolescence for poor behavioral choices, including early substance use.

- Girls
  - Because girls less frequently display hyperactivity and behavioral aspects of ADHD, their attentional issues may remain undetected and untreated until sometime during the adolescent years. This can lead to anxiety and depression which are risk factors for substance use in adolescence. ADHD should be considered with early signs of academic difficulties to ensure early diagnosis and treatment.
- Alcohol, marijuana, and nicotine
  - Alcohol, marijuana, and nicotine are by far the most commonly used substances during adolescence. Exposure to each of these substances has negative impacts on brain development and affects the brain's capacity for attention, memory, and executive functioning, further complicating ADHD symptom trajectory. Teens and families should be informed about these important long-term health risks.
- For parents and other caregivers
  - By keeping an open line of communication with school staff and health providers about signs of ADHD and evidence of substance use, families can support diagnosis and treatment of ADHD and possibly prevent substance-use-related problems.
  - In addition, parents and caregivers can play an important supporting role in keeping and dispensing ADHD medication and by monitoring adolescents for ADHD medication effectiveness and adherence.
- For teachers and school staff
  - Teachers and school staff should stay informed about their students' ADHD medications and their potential for being misused. School staff can also help keep ADHD medication in a safe place and dispense it under supervision.
  - Teachers can help recognize symptoms of ADHD in youth with substance use problems and signal to parents any suspected substance use in children known to have ADHD.
- For health providers
  - Providers should screen all adolescent patients with ADHD for substance use using a validated screening tool (e.g. CRAFFT, S2BI).

- Providers should maximize the use of non-pharmacological strategies for the management of ADHD symptoms and consider using nonstimulant medications; if prescribing psychostimulants, longer-acting formulations with lesser misuse potential are usually preferred.
- Providers should frequently monitor adolescent patients for medication effectiveness and medication misuse or diversion; they should opt for short prescription duration and frequent follow-up visits and consider using medication contracts and urine drug screens to monitor adherence in patients with known substance use problems.
- Providers should counsel patients and parents about the risks of misuse and diversion associated with stimulant ADHD medications.
- Providers *should not* withhold ADHD treatment for youth with co-occurring ADHD and substance use; rather, they should address both problems concurrently and take additional precautions for safe and effective treatment.

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