Case Study Activity: Management of Attention-Deficit/Hyperactivity Disorder
Answers to Interactive Questions and Resources

Case 3. Risk of Abuse of ADHD Medications

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ACPE Activity Type: Knowledge-based
Learning Level: 2
Fee: There is no fee associated with this activity.

Learning Objectives
At the completion of this knowledge-based activity, the pharmacist will be able to:

- Describe the risk of abuse regarding stimulants used to treat attention-deficit/hyperactivity disorder (ADHD).
- Identify appropriate patient counseling messages to minimize risk such as safe medication storage and not sharing ADHD medications.
Activity Preview
Substance abuse is an increasingly recognized public health problem that requires ongoing efforts for prevention and treatment. In 2010, an estimated 22.6 million Americans aged 12 years or older were current (within the past month) illicit drug users, according to a national survey on drug use and health from the Substance Abuse and Mental Health Services Administration (SAMHSA). The survey found that 8.9% of the population used marijuana/hashish, cocaine, heroin, hallucinogens, inhalants, or prescription-type psychotherapeutics nonmedically. Teenagers and young adults had the highest rates of illicit drug use. Marijuana was the most abused substance with 18 million users in 2010. Figure 1 shows variations in substance abuse rates by age in the United States.

Figure 1. Rates of Illicit Substance Use in the United States by Age Groups

Alcohol abuse also is common with 40.6% of young adults aged 18 to 25 years reporting binge drinking (defined as five or more drinks within a couple hours of each other) and 13.6% reporting heavy alcohol use (defined as five drinks or more per occasion). In 2010, heavy drinking was reported by 6.7% of the entire population aged 12 years or older, or 16.9 million people.

**Figure 2** shows rates of alcohol use, binge drinking, and heavy drinking stratified by age. Rates of binge drinking and heavy drinking were highest in 18- to 30-year-old individuals; however heavy alcohol use began as early as age 14 years.

**Figure 2. Prevalence of Alcohol Use by Age Groups in 2010**

![Figure 2](image)


ADHD Case Study 3: Risk of Abuse of ADHD Medications

Genetics, age (16 to 25 years old), psychosocial factors, and comorbidities all influence the risk for drug and alcohol abuse. Attention-deficit/hyperactivity disorder (ADHD) itself is a known risk factor for development of a substance use disorder, with alcohol and marijuana being the most commonly abused substances. A 3-year outcome study of children diagnosed with ADHD showed that they were at least twice as likely to engage in substance abuse (alcohol, cigarettes, marijuana) compared with youths without ADHD from their same school system. The rate of abusing alcohol, cigarettes, and/or marijuana was 17.4% in those diagnosed with ADHD compared with 7.4% in those without ADHD. Children receiving stimulant medication did not have higher rates of substance abuse compared with those not receiving stimulant medication.

Parents frequently express concern that treating their child with a stimulant, particularly early treatment, may increase the risk of substance abuse. Follow-up studies show that stimulant therapy for ADHD neither increases nor decreases the risk of subsequent drug or alcohol abuse. One study showed that later initiation of stimulant therapy (ages 8 to 12 years) led to greater substance abuse compared with those starting treatment earlier. In this study, the subgroup with early treatment (before the age of 8 years) did not differ from comparison subjects in lifetime rates of non-alcohol substance use (27% vs 29%, respectively). It is possible that early stimulant treatment of ADHD has a protective effect against the emergence of conduct disorder, which usually precedes antisocial personality disorder and increases the risk for delinquency and drug abuse. Oppositional defiant disorder (ODD) associated with ADHD in children is responsive to stimulant medication therapy and once treated, ODD may be less likely to develop into the more severe conduct disorder.

Several studies have shown higher rates of substance abuse in youths with ADHD and conduct disorder. In a prospective study of 11-year-old twins with ADHD and conduct disorder (760 female and 752 male twins) from the Minnesota Twin Family Study, the presence of conduct disorder and the hyperactive/impulsive subtype of ADHD predicted later substance abuse (nicotine, cannabis, alcohol) at 14 years of age, whereas the inattentive subtype of ADHD had a much lower risk of substance abuse. This study also found that youths with aggression plus hyperactive and inattentive symptoms had greater rates of substance abuse compared with ADHD Case Study 3: Risk of Abuse of ADHD Medications
healthy youths or those with only inattentive symptoms. Alcohol and drug use was significantly greater in those with both aggression and inattentive symptoms. Treatment plans targeting aggression and conduct disorder are needed to lower the risk of substance abuse.

In a study of 335 youths aged 7 to 16 years monitored prospectively, 28.4% reported illicit drug use (other than marijuana). Sixteen percent of the youths endorsed nonmedical use of a prescription drug (steroids [1.8%], amphetamines [11.5%], tranquilizers [6.7%], barbiturates [3.9%], and narcotics [7.3%]), and 18% used other “hard drugs” (inhalants [9.4%], LSD [8.8%], cocaine [5.7%], other psychedelics [3.3%], crack [1.5%], heroin [0.3%], and methaqualone [0.3%]).

Between 1998 and 2005, prescriptions for teenagers and preteenagers increased 133% for amphetamine products, 52% for methylphenidate products, and 80% for prescriptions of both. With increased prescribing, more drugs are available in the community for potential misuse and abuse. An 8-year (1998 to 2005) poison control center study noted that calls for teen stimulant abuse rose 76%. Overall, 42% of these adolescents experienced moderate effects, major effects, or death. The proportion of these clinically significant cases rose over time from 30% to 43%. Moderate effects, major effects, and death were significantly more frequent in those taking amphetamine/dextroamphetamine compared with methylphenidate (45% vs 37%; $P < .001$). The difference in severity between methylphenidate and amphetamine/dextroamphetamine did not change over time. Interestingly, reports of more severe ingestion effects were more frequent in boys than girls (boys: 1 death, 49 major effects; girls: 3 deaths, 9 major effects).

Several surveys and interview-based studies among youths in high school and college have documented stimulant abuse and drug diversion. One study examined stimulant drug use and abuse in 1,253 first-year college students aged 17 to 20 years old. Of the 1,208 students without ADHD, 218 (18%) engaged in nonmedical use of prescription stimulants. Of the 45 students with ADHD, 12 (26.7%) overused their ADHD medication at least once in their lifetime, and 7 (15.6%) nonmedically used someone else’s prescription stimulant at least once in their lifetime. Nonmedical use of stimulants was mainly associated with studying, although 35 students
admitted to using prescription stimulants at a party or to get high. These students had significantly higher rates of alcohol and marijuana dependence.

A Partnership for a Drug-Free America survey confirmed high rates of prescription drug misuse among teens: 1 in 5 (19%) teenagers reported abusing prescription medications that were not prescribed to them at least once. According to the National Survey on Drug Use and Health, 9% of adolescents aged 12 to 17 years used prescription drugs for nonmedical purposes in the past year, including 2% who admitted to nonmedical use of stimulant medication.

Health care providers should be vigilant regarding the use and misuse of ADHD medications particularly stimulants. All stimulant medications have the potential for misuse and abuse and are classified as C-II substances by the U.S. Drug Enforcement Administration. Due to their more rapid onset, immediate-release stimulants such as methylphenidate, dexamfetamine, dextroamphetamine, and mixed amphetamine salts are associated with greater abuse risk compared with osmotic controlled-release oral delivery system (OROS) methylphenidate or lisdexamfetamine. Individuals with active substance abuse disorders should be referred to 12-step substance abuse recovery programs such as Narcotics Anonymous and Alcoholics Anonymous. There are 12-step programs designed especially for teens and young adults. A trial of atomoxetine or bupropion is recommended for adolescents or adults with a substance use disorder who desire a treatment with no abuse potential. Bupropion should not be used in those actively abusing stimulants and/or alcohol because bupropion’s risk of associated seizures increases when coadministered with stimulants or alcohol.

Pharmacists should counsel patients on the proper storage of ADHD medications in a secure, cool, dry place. Parents should supervise medication administration with children and teenagers and all should be counseled not to share ADHD medication. Adolescents and adults should be counseled on the risks of abuse of stimulants and the dangers of mixing stimulants with alcohol and other drugs.
Case Study

Brett C. is a 12-year-old boy in the sixth grade who has been taking methylphenidate OROS since he was 8 years old for ADHD combined type and oppositional defiant disorder. He is getting A’s and B’s in school, has taken up basketball, and plays the violin. Brett’s parents are pleased with their son’s accomplishments but they are concerned that as he gets older, he may be at risk for substance use and abuse. They are particularly concerned given their family history of alcohol abuse. Brett’s parents have questions about substance abuse risk and wonder if a trial of atomoxetine should be considered before Brett enters high school.
**Question 1**
1. According to available research on substance abuse and ADHD, which of the following factors is most likely to increase the risk of substance abuse for Brett?
   a. A diagnosis of ADHD.
   b. Methylphenidate OROS therapy.
   c. Treatment before age 10 years.
   d. Family alcohol abuse.

**Answer to Question 1**
The correct answer is “a.” Many studies have shown that a diagnosis of ADHD increases the risk of substance abuse.

Options “b,” “c,” and “d” are incorrect because methylphenidate treatment does not increase the risk of substance abuse according to follow-up studies, and early treatment before age 8 years can be protective against substance abuse. The link between family alcohol abuse and stimulant abuse in patients with ADHD is not well studied.

**Question 2**
2. Brett’s parents ask if the stimulant that Brett takes has a higher abuse potential than other stimulants. Which ADHD stimulant medication has the greatest potential for abuse?
   a. Methylphenidate OROS.
   b. Lisdexamfetamine.
   c. Mixed amphetamine salts.
   d. Atomoxetine.

**Answer to Question 2**
The correct answer is “c.” Fast-acting immediate-release stimulant formulations have the greatest abuse potential.

Answers “a” and “b” are incorrect because delayed-onset stimulants (methylphenidate OROS, lisdexamfetamine) have lower abuse risk.
Answer “d” is incorrect because atomoxetine is not a stimulant and does not have abuse risk.

**Question 3**

3. Which counseling point is most appropriate to address the parents’ concern about substance abuse risk and optimal treatment of ADHD into Brett’s adolescence?
   
   a. Because stimulant treatment for ADHD increases the risk for substance abuse during adolescence, a transition to atomoxetine is indicated at 13 years of age.
   
   b. Parents should continue to supervise medication into adolescence to make sure it is not shared and that it is properly stored in a secure place.
   
   c. Since inhalants are the most commonly abused substances in adolescents with ADHD, all aerosol cans should be disposed of safely.
   
   d. Lisdexamfetamine is a stimulant with less abuse potential than methylphenidate OROS and a switch to it could prevent substance abuse.

**Answer to Question 3**

The correct answer is “b.” Adolescence poses the highest risk period for drug abuse. Therefore, monitoring is essential.

Answer “a” is incorrect. Stimulants do not increase the risk for substance abuse.

Answer “c” is incorrect. Cigarettes, alcohol, and marijuana are the most commonly abused substances.

Answer “d” is incorrect. There are no studies that prove a lower abuse potential of lisdexamfetamine compared with methylphenidate OROS.

**Question 4**

4. When evaluating symptoms of ADHD that are associated with a greater risk of substance abuse, which of these symptoms was shown to increase the likelihood for abuse more than other symptoms?

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a. Inattention.
b. Disorganization.
c. Distractibility.
d. Aggression.

**Answer to Question 4**

The correct answer is “d.” Aggression has been consistently associated with higher rates of substance abuse and delinquency in ADHD studies.

Answer “a” is incorrect. Inattention is associated with increased risk for substance abuse, but not more than aggression.

Answer “b” is incorrect. Disorganization is not the symptom most notably associated with substance abuse risk.

Answer “c” is incorrect. Distractibility falls within the symptom cluster of inattention.
References


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