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Drug Abuse by Adolescents: General Considerations

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Author Disclosure
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Objectives
After completing this article, readers should be able to:

1. Discuss current trends in adolescent substance use and the specific substances used most commonly among 8th, 10th, and 12th graders.
2. Identify risk and protective factors, including genetic and environmental correlates, for the initiation of substance use in adolescents.
3. Discuss the most common concomitant mental health disorders and how they can affect the course of diagnosis and treatment for substance abuse.
4. Delineate the variety of treatment options available.
5. Describe the role of the pediatrician in educating patients and families on substance abuse prevention; performing screening and initial assessments; and providing support, brief counseling, or referrals for in-depth treatment.

Introduction
Adolescence is a time of physical, emotional, and psychological maturation as well as a period of searching for independence and experimentation. One area of experimentation associated with adolescence is substance use. (1) Although many adolescents experiment with drugs and alcohol from time to time without enduring problems, those who develop the disorders of substance abuse and dependence make substance use a major public health concern.

Epidemiology
The Monitoring the Future Study (MTFS) is a nationwide survey measuring smoking, drinking, and illicit drug use among nearly 50,000 8th, 10th, and 12th graders in more than 400 secondary schools in the United States each year. (2)(3) According to the 2006 overview of findings from the MTFS, approximately one fifth (21%) of today’s 8th graders, more than one third (36%) of 10th graders, and nearly half (48%) of all 12th graders reported using an illicit drug at least once during their lifetimes. Despite a minimum legal age requirement to purchase alcohol, 6% of 8th graders, 19% of the 10th graders, and 30% of the 12th graders self-reported drunkenness during the month prior to being interviewed. (2)(3)

Among the problems experienced by adolescents who use alcohol and drugs are impaired peer relations, depression, anxiety, low self-esteem, acquisition of sexually transmitted infections, teenage pregnancy, date rape, and overall involvement in high-risk sexual behaviors. (4)(5) Motor vehicle crashes, suicide, and homicide also have been linked closely to adolescent substance use. In the United States, approximately 75% of all deaths among 10- to 24-year-olds result from only four causes: motor vehicle crashes, suicide, homicide, and other unintentional injuries, all of which are preventable and can be linked to substance use. (6)

Unfortunately, the adolescent’s misconception that pre-
Prescription medications are safe because they are prescribed by a physician has contributed tragically to a recent steady increase in misuse of prescription medications such as narcotics, stimulants (methylphenidate, dextroamphetamine), tranquilizers, and sedatives. The annual prevalence for oxycodone use has reached its highest rate so far in younger users, with an annual prevalence of 2.6% in 8th graders, 3.8% in 10th graders, and 4.4% in high school seniors. Over-the-counter cough and cold medications containing dextromethorphan account for yet another category of recent increase, with teens not fully appreciating the risk because these medicines are so easily accessible. The percent of students reporting use within the past year “with the intent to get high” was estimated to be 4%, 5%, and 7% in 8th, 10th, and 12th graders, respectively.

Alcohol is the most commonly abused licit substance by adolescents today, despite being illegal for use in the adolescent age group. Approximately 30% of 12th graders, 19% of 10th graders, and 6% of 8th graders reported being intoxicated or “experiencing drunkenness” during the past 30 days. Marijuana, on the other hand, continues to be the most common illicit drug of abuse, with an annual prevalence of 12% in 8th graders, 25% in 10th graders, and 32% in high school seniors.

**Stages of Use**

Substance use occurs on a continuum from the “developmental variation” of experimentation through “substance use problems” to the disorders of abuse and dependence. (8) Figure 1 illustrates a developmental model of substance use progression.

“Abstinence” is defined as the stage when adolescents have not yet begun to use any psychoactive substances. An initial trial of tobacco, alcohol, or other drugs defines “experimental use,” characterized by occasional use of alcohol or marijuana, usually with peers. At this stage, the teenager may experience good feelings without serious adverse consequences. However, experimentation still can be hazardous. Teenagers have insufficient experience to know safe “doses” of alcohol, and they may consume toxic quantities rapidly without realizing the potential danger. They may put themselves and others at risk by participating in hazardous activities such as operating a motor vehicle. “Nonproblematic use” is characterized by the intermittent, continuing use of alcohol or drugs in the absence of negative consequences. In addition to alcohol, most nonproblematic users tend to use marijuana and, occasionally, prescription drugs. Because of the rapidly addictive nature of some prescription drugs (eg, opioids), however, teens using them may progress rapidly to dependence.

“Problematic use” is defined by the occurrence of adverse consequences as a result of use, although the individual may not see any causal link. Substance-related problems include school failure, suspensions, relationship problems with parents or peers, motor vehicle crashes, injuries, emergency department visits, physical or sexual assaults, and legal problems. These behaviors may be accompanied by significant changes in dress, behavior, and peer group. At this stage, some individuals still can reduce or stop their use with limited intervention.

“Substance abuse” is a maladaptive pattern of substance use that impairs social or school functioning, causes recurrent physical risk or legal problems, and involves continued use despite harm occurring over a 12-month period, with no diagnosis of dependence. (9) “Substance Dependence” is a disorder characterized by a maladaptive pattern of compulsive use, negative consequences, loss of control over use, preoccupation with use, and tolerance or withdrawal symptoms. (9) Tolerance and withdrawal symptoms can be physiologic, psychological, or both. Dependence is synonymous with “addiction,” which is manifested by continual use of substances when available, solitary use, disrupted family relationships, and loss of outside supports. Referral to an

![Figure 1. Substance use progression during adolescence.](http://pedsinreview.aappublications.org/)

**Figure 1.** Substance use progression during adolescence.
intensive treatment program usually is required at this stage.

Etiology: Risks and Protective Factors
Numerous studies conducted over the past 3 decades have contributed to an understanding of the etiology of drug use, highlighting both the biopsychosocial risks and protective factors involved. (10) A dynamic interplay between individual, peer, family, and community risk factors is involved. Risk factors are those that precede drug use and increase the probability of later drug use and abuse; protective factors are those that either mitigate the effect of these risk factors or enhance the effect of other protective factors, leading to less drug use. (11)(12)

From a developmental perspective, a positive mutual attachment in the parent-child relationship is essential to preventing drug use. Children who are capable of identifying with healthy parental attitudes and behaviors are more likely to internalize these characteristics and express them in their own lives. As a result, such adolescents are less likely to drift toward affiliations with peers who use drugs and are more likely to select a pathway of abstinence for themselves. Conversely, conflicted parent-child relationships (low perceived parental support, poor communication), parental ineffectiveness (insufficient parental monitoring, inconsistent discipline, child abuse/neglect), and parental alcohol or drug use all have been found to be robust correlates and predictors of adolescent substance use. (11)

The presence of concomitant childhood psychopathology is another risk factor for the development of substance use disorders during adolescence or later in life. Some of the most frequently identified psychiatric disorders linked to substance use include conduct disorder, attention-deficit/hyperactivity disorder (ADHD), mood disorders, anxiety disorders, and learning disorders. (13) A more rapid progression through the stages of use is common among those who experience early-onset substance use and heightened exposure to peer groups and environments where drugs and alcohol are readily available. (14)

Long-term outcomes can vary over time. Although adolescents who meet criteria for a diagnosis of abuse may decrease or discontinue use later in life, those in whom dependence is diagnosed are likely to be the individuals who have higher risk factors and fewer protective factors and are more prone to extending substance use into their adult years. (15)(16) Early onset of use also has been shown to correlate significantly with the risk of developing alcohol dependence later in life. Those who begin drinking alcohol younger than 13 years of age are five times more likely to have a lifetime diagnosis of alcohol dependence compared with those who delay drinking to age 21 years or older. (17)

Most of the literature about the influence of biologic factors on addiction has focused on the familial transmission of possible genetic markers for alcoholism. As a result, the “disease model” of alcoholism has become central to expanding understanding of the biologic underpinnings of addiction as an illness. Genetic predisposition plays an instrumental role in determining a person’s risk for developing alcohol dependence, more so if the family history is positive in first- and second-degree relatives. In fact, children of alcohol-dependent parents are four to six times more prone to developing alcohol dependence compared with others in the general population who have no positive family histories. (18)

Although earlier twin studies had proposed that the heritability of alcoholism was approximately 50% in men, (18) a recent study of Australian twins suggested that approximately 66% of the risk is mediated genetically in both men and women, with the remainder being determined by environmental factors. (19) Currently, the strongest ties linking genes to alcoholism lie in the finding of specific polymorphisms of the alcohol dehydrogenase genes (ADH2 and ADH3), which encode for one of the key enzymes responsible for the breakdown of alcohol. When these alleles are expressed, they encode forms of alcohol dehydrogenase that metabolize alcohol to acetaldehyde quickly, leading to accumulation and toxicity. Symptoms of toxicity often include flushing, nausea and vomiting, sweating, head throbbing, hypotension, or palpitations, although cardiovascular collapse, convulsions, and death may occur in severe cases. A partial protective effect against the development of alcoholism can be seen in Asian populations in whom these alleles are common. (20)(21) Unfortunately, little information supports or refutes the possibility of biologic transmission for other psychoactive drugs.

Identification of At-risk Adolescents
The primary factors that appear to contribute to a teenager’s choice to select one drug over another are its perceived availability, the perceived degree of social approval associated with its use, and how risky the drug is perceived to be. The riskier and less accepted a drug is believed to be, the less likely it will be abused by adolescents; conversely, if a substance is readily available and is considered socially acceptable, an increased trend in use can be expected. (3)(22) For example, Ecstasy use increased by 71% between 1999 and 2001 such that by
the end of 2001, more than 1 in 10 teenagers reported using Ecstasy regularly. However, as the dangers associated with Ecstasy became more apparent, its popularity and social acceptance declined to just 4% by the end of 2005. (2) Clinicians must not disregard, however, the concept of “generational forgetting,” whereby knowledge of a drug’s adverse consequences fades throughout the years, allowing that drug to experience a comeback in subsequent generations long after falling from popularity. Phencyclidine (PCP), lysergic acid diethylamide (LSD), methamphetamine, and heroin are a few examples of drugs that have resurfaced from the 1960s, with a strong resurgence in heroin use due to its increased purity and use through noninjectable routes (snorting).

Making the Diagnosis
Substance abuse should be screened for as part of routine adolescent medical care. (23)(24) Pediatricians also should consider substance use when adolescents present with behavioral problems, school failure, or emotional distress. The most effective method of screening is a confidential history, taken without parents present in the room. Teenagers reliably report use of alcohol and drugs if they are assured of confidentiality. (25)(26)(27) Information they provide should be kept confidential unless their safety or someone else’s safety is at risk. A common approach for obtaining a structured, developmentally appropriate psychosocial history is by performing a HEADSS assessment, which facilitates communication about an adolescent’s Home life, Education/Employment, Activities, Drug use, Sexuality, and risk for Suicide/depression. (28) The interview should begin with general questions about health and progress to psychosocial functioning, including how things are at home and at school, recreational activities, psychological and emotional well-being, tobacco use, alcohol and drug use, and sexual behavior.

A screening can begin with three usage questions. “During the past year (or since your last clinic visit), have you consumed any alcohol? Have you smoked marijuana? Have you used any other drug to get high? By ‘other drug,’ I mean street drugs such as Ecstasy or heroin, prescription drugs such as OxyContin or Klonopin that were not prescribed by your doctor or taken the way he or she said, over-the-counter drugs such as dextromethorphan, or inhalants such as glue or nitrous oxide from spray cans.” If the answer to any of the three questions is “no,” the entire CRAFFT screen should be administered. The CRAFFT screen consists of six orally administered yes/no questions that are easy to score (each “yes” answer=1). Key words in the test’s six items form its mnemonic (CRAFFT).

During the past 12 months:
• Have you ever ridden in a CAR driven by someone (including yourself) who was “high” or had been using alcohol or drugs?
• Do you ever use alcohol or drugs to RELAX, feel better about yourself, or fit in?
• Do you ever use alcohol or drugs while you are by yourself, ALONE?
• Do you ever FORGET things you did while using alcohol or drugs?
• Do your family or FRIENDS ever tell you that you should cut down on your drinking or drug use?
• Have you ever gotten into TROUBLE while you were using alcohol or drugs?

Two or more “yes” answers define a positive “screen,” indicating a need for additional assessment.

A complete physical examination should be performed. When performing the eye examination, pupil size should be noted. The nasal mucosa should be examined for inflammation or erosion characteristic of drug insufflation (“snorting”). The liver should be palpated for tenderness or enlargement. The skin examination may reveal needle marks, although this finding is uncommon among adolescents presenting for regular medical care. Abnormal breath sounds, such as wheezing, may result from smoking tobacco, marijuana, cocaine, or heroin. Urine and serum toxicologic examinations are of limited usefulness for screening and generally are less sensitive than a good history. Except in emer-
gencies, laboratory testing should not be performed without the knowledge and consent of the competent adolescent. (31)

Pediatricians should avoid performing drug screens at the request of parents because the clinical information yielded by screens is very limited and performing such testing risks damaging the doctor-patient relationship when adolescents are pressured into providing specimens. Laboratory tests for drugs may be an important adjunct to outpatient substance abuse treatment when the results are available only to the patient and treatment team. Results always must be interpreted cautiously, and pediatricians should be familiar with the sensitivity and specificity (threshold values) for specific drugs and the different methods of testing. Urine specimens must be collected by using direct observation or according to the Mandatory Guidelines for Federal Drug Testing Programs (information available online at http://www.drugfreeworkplace.com).

Urine specific gravity and the creatinine concentration always must be obtained because urine concentration affects the validity of the drug test directly. All positive screen results must be confirmed by gas chromatography and mass spectrometry. In general, serum half-lives of drugs of abuse are brief, and urine testing only reflects drug use within the last 48 hours. A notable exception is marijuana, whose active ingredient, D9-tetrahydrocannabinol (THC), and its carboxylic acid metabolite may be detected in the urine for several weeks after discontinuation of daily use. (32) Therefore, when drug testing for THC is being performed as part of a treatment program, serial urine specimens must be obtained for quantitative THC and creatinine (as a measure of urine concentration/dilution) measurements. Abstinence is supported by a finding of serial decreases in the THC:creatinine ratio.

In the acute setting, adolescent patients may present with symptoms of acute or pathologic intoxication. Table 1 provides a comprehensive overview of the signs and symptoms of intoxication and withdrawal as well as treatments for common drugs of abuse. (The table can be accessed at pedsinreview.aappublications.org/cgi/data/30/3/83/DC1/2.)

Following the assessment, the clinician must determine the severity of the problem and the need for treatment. Individuals who are experimental users or non-problematic users do not necessarily need to be referred to mental health specialists. They may respond favorably to brief office interventions. On the other hand, teenagers who seem likely to have a diagnosis of dependence should be referred to specialized treatment as soon as possible. Clinicians also should refer those who have signs or symptoms of a concomitant mental disorder, such as major depression, bipolar disorder, bulimia, or ADHD. In all cases, the most important aspect of the assessment is the safety of the patient. If the patient is in any jeopardy, immediate admission to a hospital should be arranged.

**Substance Use and Comorbid Mental Health Disorders**

Psychiatric comorbidity in adolescents who misuse psychoactive substances often is the rule rather than the exception, with comorbidities including unipolar or bipolar depression, anxiety, conduct disorder, oppositional-defiant disorder, and ADHD (Table 2). (33)(34)(35)(36) Evidence suggests that adolescents who have substance use disorders also are more prone to report a history of trauma, as evidenced by physical or sexual abuse, than are adolescents who have no substance use disorder. (46) In addition, psychiatric disorders in

**TABLE 2. Comorbidity Diagnosis Pearls**

- Conduct disorder occurs concomitantly with substance use disorders (abuse or dependence) in 60% to 80% of cases; depression occurs concomitantly in 15% to 25% of cases; anxiety disorders occur concomitantly in 25% to 35% of cases. (37)(38)
- Conduct disorder is the most common psychiatric disorder in adolescents who abuse alcohol and is considered one of the strongest predictors of those who eventually develop alcohol abuse or dependence later in life. (37)
- 25% to 50% of teens who have attention-deficit/hyperactivity disorder (ADHD) also meet criteria for conduct disorder, a comorbidity that elevates their risk of consuming alcohol at any age. (37)
- Teenagers who smoke cigarettes are at increased risk for using other drugs (in adolescence, substance use disorders frequently occur concomitantly with nicotine dependence). (39)(40)
- Adolescents who smoke frequently or who begin smoking before age 13 years are at greater risk of developing a substance abuse problem at some point in their lifetimes (males more than females). (41)
- Teens who have ADHD and smoke cigarettes are more likely to use alcohol or illicit substances than are teens who have ADHD and do not smoke. (42)
- The risk of developing a substance use disorder decreases when ADHD is treated appropriately. (43)(44)(45)
adolescents often predate the substance use disorder, and once the substance use disorder develops, the psychiatric disorder may be exacerbated. (33)

Use of substances of abuse can induce, mimic, or exacerbate an underlying mental illness. For example, cocaine and alcohol use both can cause and be a consequence of depression and can result in (or exacerbate) anxiety or psychosis. Substance use is linked directly to a higher frequency of inpatient hospitalization among those who have concurrent mental illness. (47)(48) Adolescents who have comorbid disorders are more likely to be less compliant with medications, more likely to drop out of treatment, and at higher risk of relapse. (48) Although comorbidity complicates the treatment of both disorders and is associated with a poorer prognosis overall, simultaneous treatment of the psychiatric disorder often helps to alleviate the substance use disorder and vice versa. (48)(49)

Diagnostically and therapeutically, it is important to clarify whether an adolescent is struggling with a comorbid mental illness (eg, major depressive disorder or psychotic disorder) or if he or she is presenting with a substance-induced psychotic disorder (eg, cocaine-induced psychotic disorder or alcohol-induced anxiety disorder). Inquiring in detail about the presence or absence of psychiatric symptoms during “windows” of abstinence from drugs or alcohol can help distinguish between the two types of disorders. Regardless, if in doubt, it always is best to treat what appears to be the primary psychiatric disorder. (50)

Substance Abuse Treatment for Adolescents

Adolescent substance use differs from that of adult abuse in that progression from casual use to dependence occurs more quickly, teenagers are more likely to use multiple substances, and adolescents often are at higher risk of presenting with psychiatric comorbidities. Because no single approach is suitable for all individuals, treatment always should be tailored to each adolescent’s particular needs. A thorough assessment that evaluates his or her problems multidimensionally (biopsychosocially) is critical to matching youngsters to programs that are adolescent-specific and formulating treatments that are age-appropriate. (2) Physicians should inquire about the patient’s readiness for change, relapse potential, recovery environment, withdrawal risk, medical complications, and psychiatric or behavioral comorbidities prior to determining the most optimal, least restrictive treatment setting. The American Academy of Child and Adolescent Psychiatry has developed a list of principles for adolescent treatment (Table 3). (50)

<table>
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<tr>
<th>Table 3. Recommendations for the Assessment and Care of Adolescents Who Have Substance Use Disorders</th>
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<tbody>
<tr>
<td>1. The adolescent must be assured of an appropriate level of confidentiality.</td>
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<td>2. Assessment must include developmentally appropriate screening questions regarding the use of alcohol and drugs.</td>
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<td>3. A positive screen necessitates a more formal evaluation.</td>
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<td>4. Toxicology (ie, drug testing) must be a routine part of assessment and ongoing treatment.</td>
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<tr>
<td>5. Adolescents who have substance use disorders must include help to develop peer support.</td>
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<tr>
<td>6. Substance use disorders should be treated in the least restrictive setting.</td>
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<tr>
<td>7. Family therapy or substantial family involvement should be included in treatment of adolescents who have substance use disorders.</td>
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<tr>
<td>8. Treatment programs should strive to engage adolescents fully and maximize treatment completion.</td>
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<tr>
<td>9. Medication to manage craving or withdrawal or for aversion therapy can be used as indicated.</td>
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<tr>
<td>10. Treatment of adolescents who have substance use disorders must include help to develop peer support.</td>
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<tr>
<td>11. Involvement with 12-step groups, such as Alcoholics Anonymous (AA) or Narcotics Anonymous (NA), should be encouraged.</td>
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<tr>
<td>12. Programs should provide comprehensive services, eg, vocational, recreational, medical.</td>
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<tr>
<td>13. Adolescents who have substance use disorders must include help to develop peer support.</td>
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<tr>
<td>15. Programs must provide or arrange for aftercare.</td>
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</table>

Drug addiction is a complex illness that can affect every aspect of an adolescent’s functioning in the family, at school, and in the community. Because of addiction’s pervasive consequences, treatment typically involves several components, including rehabilitation, counseling, behavioral therapy, psychopharmacology, case management, family therapy, and other types of services. Options range and vary from outpatient office-based management to residential inpatient treatment or hospital care, with or without detoxification. (50)(51).
Outpatient Care

For patients deemed to be medically and behaviorally stable, outpatient treatment is the mainstay of substance abuse treatment and consists of individual therapy, group therapy, family therapy, or a combination of these. Day treatment programs such as intensive outpatient programs or partial hospitalization also may be implemented when an adolescent is making the transition from a more intensive level of care or needs greater supervision than can be provided by outpatient visits. Treatment can be delivered by a variety of practitioners, including certified drug abuse counselors, physicians, psychologists, nurses, and social workers. Although specific treatments often are associated with particular settings, a variety of therapeutic interventions or services can be included in any setting. (50)(51)

COGNITIVE BEHAVIORAL THERAPY (CBT). CBT is a structured, goal-oriented therapeutic approach designed to teach patients specific skills for maintaining abstinence by identifying and modifying thoughts and feelings that precede drug use. Through repeated recognition of high-risk situations, patients gradually are able to engage in healthy decision-making that results in substituting risky behaviors with behaviors other than drug use or avoiding high-risk situations altogether. Although the particular therapeutic techniques vary, they commonly include keeping a diary of significant events and associated feelings, thoughts, and behaviors; questioning and testing assumptions or habits of thoughts that might be unhelpful and unrealistic; gradually facing activities that might have been avoided; and trying out new ways of behaving and reacting. Relaxation and distraction techniques often are included. CBT sometimes is used with groups of people as well as individuals, and the techniques commonly are adapted for self-help manuals. CBT may be used alone or in combination with motivational enhancement therapy. (52)(53)

MOTIVATIONAL ENHANCEMENT THERAPY (MET). MET is a patient-centered counseling approach designed to initiating behavior change that aims to help adolescents resolve ambivalence about engaging in treatment and stopping drug use. MET employs strategies that evoke rapid and internally motivated change by eliciting self-motivational statements. Motivational interviewing principles are employed to strengthen motivation and structure a plan for change. The core constructs around which MET is organized are the “stages of change” (2) (Table 4), which represent categories along a continuum of motivational readiness to change a problem behavior. MET moves away from the belief that one is either “ready or not ready to change” and invites patients to accept a process in which motivation for change is more dynamic and fluctuates. Therapists work closely with patients on establishing decisional balances (the pros and cons of change), strengthening self-efficacy (confidence in the ability to change across problem situations), identifying situational temptations to engage in the problem behavior, and modifying behaviors that are specific to the problem area. Coping strategies for managing high-risk situations are reviewed; in subsequent sessions, the therapist monitors change, reviews cessation strategies being used, and continues to encourage commitment to change or sustained abstinence. (55)

GROUP THERAPY. Group therapy offers adolescents a safe environment where concerns about peer pressure, relationships, prevention of relapses, and other treatment issues can be addressed. The dynamics of group therapy set the stage for interpersonal and intrapersonal growth and differ from the dynamics played out in one-to-one interactions with an individual therapist. Teens also may find safety in numbers and become more involved with the encouragement and example of their peers. Gathering with other adolescents who share similar struggles not only provides some reassurance to the teen that he or she is “not the only one with a problem,” but also coincides with the developmentally normal preference of adolescents to be together. In addition, in the context of limited resources, group therapy is cost-effective, as long as potential group members are screened carefully to guarantee appropriateness for each of its members. (50)

TWELVE-STEP FELLOWSHIPS. Another form of peer-based support may be found in 12-step fellowships, such as Alcoholics Anonymous or Narcotics Anonymous. These fellowships provide a supportive community that can be helpful for adolescents recovering from substance abuse. (56)

Table 4. Stages of Change (54)(55)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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<tbody>
<tr>
<td>Precontemplation</td>
<td>Not yet acknowledging that there is a problem behavior that needs to be changed</td>
</tr>
<tr>
<td>Contemplation</td>
<td>Acknowledging that there is a problem but not yet ready or sure of wanting to make a change</td>
</tr>
<tr>
<td>Preparation/Determination</td>
<td>Getting ready to change</td>
</tr>
<tr>
<td>Action/Willpower</td>
<td>Changing behavior</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintaining the behavior change</td>
</tr>
<tr>
<td>Relapse</td>
<td>Returning to older behaviors and abandoning the new changes</td>
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as Alcoholics Anonymous (AA), Narcotics Anonymous (NA), and Alateen, which often form part of a substance abuse treatment program. Many adolescents begin to attend AA while they are hospitalized and often are encouraged to continue their attendance on discharge. Although not every patient affiliates with AA, it is important to make efforts to understand which patients are more likely to attend and benefit from attendance. The body of research into the characteristics and factors that predict success from self-help group attendance is limited, but evidence to suggest that AA/NA programs lead to higher levels of commitment to abstinence is growing. (56) Hohman and LeCroy (57) found 12-step affiliation to be associated with having prior alcohol or drug treatment, having friends who did not use drugs, having less parental involvement in treatment, and possessing more feelings of hopelessness (depression). Ideally, adolescents should attend young people’s meetings and, as is generally recommended for people early in recovery, obtain a sponsor who is aware of his or her individual developmental level when progressing through the 12 steps. (15)

**FAMILY THERAPY.** Multiple forms of family therapy have been studied in randomized clinical trials, including functional family therapy, (58) brief strategic family therapy, (59) family systems therapy, (60) multidimensional family therapy (MDFT), (61)(62)(63) and multisystemic therapy (MST). (64) Two of the modalities implemented most commonly are MDFT and MST. MDFT was developed to treat adolescents who have substance abuse and behavioral problems. This manual-based therapy is characterized by individual and family sessions occurring up to four times per week, coupled with interim phone contact and intensive advocacy with the adolescent’s school and the court system, when pertinent. (61)(62)(63) MST is an intensive 4-month program developed to address the needs of adolescents at high risk of incarceration or foster care. Therapists work closely with parents to identify the goals for treatment, ascertain the causes of the substance disorder, and implement solutions. MST includes comprehensive psychiatric and substance abuse services, with sessions held in the family’s home. (64)

**DRUG COURT.** A successful juvenile drug court uses the case management system, which includes positive reinforcement for compliance as well as clearly outlined consequences that are swiftly enforced for violation of court-ordered program guidelines. Limited studies indicate that juvenile drug court involvement reduces recidivism and substance use, arrests, and criminal behavior while simultaneously improving school and vocational outcomes. (65)

**CONTINGENCY MANAGEMENT.** Contingency management (CM) treatments are based on a simple behavioral principle that if a good behavior is rewarded, it is more likely to be repeated in the future. (66) The premise behind CM is to use these and other reinforcement procedures systematically to modify behaviors of substance-abusing adolescents in a positive and supportive manner. Patients are called at random to provide urine specimens at least once a week, and rewards are provided for each specimen that tests negative for drugs. These rewards often consist of vouchers that can be exchanged for gift certificates, clothing, music, sports equipment, theater tickets, or other items of interest to adolescents. (52) Although several studies have demonstrated that CM is efficacious in retaining patients in treatment, reducing substance use, increasing group attendance, and improving adherence to medications, additional research with adolescent populations is needed. (52)(67)

**PHARMACOTHERAPY.** Developing medication treatments for substance use disorders continues as an area of research. Unfortunately, opioids and alcohol are the only substances for which corresponding pharmacotherapies exist for treatment in adults. To date, the United States Food and Drug Administration (FDA) has not yet granted approval for treatment in adolescents. (68). Following the introduction of methadone as agonist replacement therapy in the mid-1960s, the treatment of opioid dependence in adults has relied primarily on the establishment of methadone maintenance programs, strictly monitored by federal guidelines. (69)(70) However, in the past decade, newer medications (levomethadyl acetate [LAAM] and buprenorphine) have been found to be similarly effective. (71) Concern regarding cardiotoxicity with levomethadyl acetate has led to cessation of its use, (72) thus opening the door for buprenorphine to gain popularity as an office-based alternative for opioid maintenance. Buprenorphine is a partial opioid agonist and, therefore, may have some advantages over methadone, including fewer withdrawal symptoms and a lower risk of overdose. (73) In addition, its availability as a buprenorphine-naloxone preparation lessens the risk for diversion or abuse and marks a milestone as a medication with the potential to increase the safety, availability, and acceptance of opioid abuse treatment in the United States. (74)(75)(76)(Additional information
can be obtained at http://www.samhsa.gov.) Finally, although disulfiram, naltrexone (oral and intramuscular), and acamprosate have received FDA approval for the treatment of alcohol dependence in adults, (77) they are not approved for use in adolescents.

Inpatient Care

DETOXIFICATION. Although most adolescents typically do not experience physical withdrawal symptoms from the most commonly used substances (eg, cannabis), those who are dependent on alcohol, other sedative-hypnotics (eg, benzodiazepines), or opioids often experience withdrawal symptoms that require monitored medical management in an inpatient facility. (50) Detoxification in a hospital should be considered for all patients who meet criteria for alcohol, opioid, or sedative-hypnotic dependence and who display symptoms of physical withdrawal from these substances (Table 1).

PSYCHIATRIC HOSPITALIZATION AND ACUTE RESIDENTIAL TREATMENT. Psychiatric hospitalization may be warranted for adolescents struggling with concomitant mental illness that either has preceded substance use, occurred simultaneously, or been exacerbated by persistent use of drugs and alcohol. In a structured 24-hour psychiatric treatment facility, adolescents are offered services ranging from assessment and consultation to psychopharmacology, family therapy, and recommendations and referrals for aftercare. Once medically stable, an adolescent may be a candidate for step-down to acute residential treatment (ART) as an alternative to prolonging inpatient hospitalization. Based on a multimodal approach and therapeutic milieu model, ARTs work closely with parents and teens to build and strengthen interpersonal relationships, learn more about themselves through groups and classroom experience, and reinforce emerging healthy alternative behaviors for managing feelings and impulsive behaviors rather than engaging in substance use. When deemed necessary, additional evaluation to address specific concerns such as childhood trauma, eating disorders, learning disabilities, and school conflict can be coordinated. The goal is to collaborate with each adolescent and his or her family to promote the smoothest possible transition from the therapeutic milieu back to the community. (50)(51)

LONG-TERM RESIDENTIAL TREATMENT. As occurs with ARTs, long-term residential programs provide a variety of daily therapeutic sessions, including individual, group, and family therapy, as well as psychological education and psychopharmacology over an average of 6 to 12 months. These programs can accommodate adolescents who have both psychiatric and substance use disorders and have been unable to stop using substances or may have other self-injurious behaviors such as “cutting” or a history of suicide attempts. Some residential programs are “locked” for the most at-risk youths. (50)(51)

THERAPEUTIC COMMUNITIES. Therapeutic communities provide treatment for adolescents who have severe chemical dependency and behavioral difficulties, have failed less intensive treatments, and are unable to live at home. This treatment modality generally is longer in duration (18 to 24 months) and potentially may serve as a step-down for adolescents who have completed more intensive treatment elsewhere. (50)(51)

THERAPEUTIC SCHOOLS. Therapeutic schools are designed to meet the academic and therapeutic needs of adolescents who have a variety of mental health and behavioral problems. Although these schools are not designed exclusively for substance abuse treatment, many have substance abuse services as part of their curricula. Therapeutic schools may be residential (include a boarding component) or function solely as a day school, with adolescents living at home. (50)

WILDERNESS THERAPY. Wilderness therapy programs typically serve adolescents who have a variety of behavior problems and have resisted changing their behaviors despite multiple treatments. Wilderness therapy promotes group living in an unfamiliar environment, with application of outdoor-living skills and physical challenges as vehicles for boosting personal and social responsibility and encouraging emotional growth. Although not specifically designed to treat drug problems, drug use is common among teens in these programs, and most such programs have some specific drug treatment component. Wilderness therapy programs generally last 3 to 8 weeks. Despite their growing popularity, however, they have not been studied adequately. Parents should inquire carefully about such programs, including whether the program is licensed by the state, before deciding which to use for their teenager. (50)

To view references and Table 1 for this article, visit pedsinreview.aappublications.org/cgi/content-embargo/full/30/3/83/DC1.
Summary

- Research evidence shows that early onset of substance use is significantly correlated with risk of developing alcohol dependence later in life. (17)
- Research evidence shows that the primary factors appearing to contribute to a teenager’s choice of selecting one drug over another are its perceived availability, the perceived degree of social approval associated with its use, and how risky the drug is perceived to be. (3)(22)
- Strong research evidence shows that the CRAFFT is a valid and reliable method of screening adolescents for substance abuse in medical settings. (27)(29)
- Strong research evidence shows that psychiatric comorbidity in adolescents who misuse psychoactive substances is the rule rather than the exception, with comorbidities, including unipolar or bipolar depression, anxiety, conduct disorder, oppositional-defiant disorder, and ADHD. (33)(34)(35)(36)
- Adolescent substance use differs from that of adults in that progression from casual use to dependence occurs more quickly, adolescents are more likely to use multiple substances, and adolescents often are at higher risk of presenting with psychiatric comorbidities. Treatment always should be tailored to each adolescent’s particular needs.
- Strong research evidence shows that family-based treatments are effective for adolescents who abuse substances and depend on them. (58)(59)(60)(61)(62)(63)(64)

Useful Web Sites

- [www.drugstrategies.com](http://www.drugstrategies.com). Drug Strategies is a non-profit research foundation that promotes more effective ways of dealing with the nation’s drug and alcohol problems. Drug Strategies also sponsors [www.bubblemonkey.com](http://www.bubblemonkey.com), a confidential Web site dedicated to answering teens’ questions about drugs and alcohol.
- [www.reclaimingfutures.org](http://www.reclaimingfutures.org). This Web site provides information about Reclaiming Futures sites that provide research-based interventions for teens who have substance use disorders.
- [www.dea.gov/pubs/abuse](http://www.dea.gov/pubs/abuse). This site provides text of *Drugs of Abuse*, a publication that offers straightforward information about drugs.
- [www.buprenorphine.samhsa.gov](http://www.buprenorphine.samhsa.gov). This Web site provides information about the use of buprenorphine in treating opioid dependence as well as a “physician locator” to help patients and families find treatment.
PIR Quiz
Quiz also available online at www.pedsinreview.aappublications.org

1. The latest stage in the progression of drug use at which a teenager might be able to reduce or stop using with limited intervention is:
   A. Abstinence.
   B. Abuse.
   C. Experimentation.
   D. Nonproblematic use.
   E. Problematic use.

2. Substance abuse is considered to be the result of both genetic and environmental predisposing factors. According to recent studies, the hereditability of alcoholism is closest to:
   A. \( \leq 1\% \).
   B. 5\%.
   C. 10\%.
   D. 25\%.
   E. \( \geq 50\% \).

3. Among the following, the most effective method of screening for drug or alcohol use is (a):
   A. Adherence to an athletic code of conduct.
   B. Confidential medical interview.
   C. Health questionnaire.
   D. Serum toxicology screen.
   E. Urine toxicology screen.

4. The presence of which of the following is the strongest indication for hospitalization of a teenage substance user?
   A. Bipolar disorder.
   B. Drug dependence.
   C. Eating disorder.
   D. Jeopardized safety.
   E. Major depression.

5. A 16-year-old boy became addicted to morphine following a skiing accident in which he lost his leg. You tell him and his parents that addiction can be treated medically. Among the following, the drug that is most likely to be helpful is:
   A. Acamprosate.
   B. Buprenorphine.
   C. Disulfiram.
   D. Levomethadyl acetate (LAAM).
   E. Methadone.
Drug Abuse by Adolescents: General Considerations
Ximena Sanchez-Samper and John R. Knight
*Pediatrics in Review* 2009;30;83
DOI: 10.1542/pir.30-3-83

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http://pedsinreview.aappublications.org/content/30/3/83

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American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™
The following references are available online only for the article “Drug Abuse by Adolescents: General Considerations.”

References


75. Strain EC, Stitzer ML, Liebson IA, Bigelow GE. Buprenorphine-


### Table 1. Medical Management of Drug Intoxication and Withdrawal

#### A. Alcohol

<table>
<thead>
<tr>
<th>Names/Preparations</th>
<th>Intoxication</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signs and Symptoms</td>
<td>Treatment</td>
</tr>
<tr>
<td>Beer</td>
<td>Mild to Moderate: Decreased level of consciousness, poor coordination, ataxia, nystagmus, conjunctival injection, slurred speech, orthostatic hypotension</td>
<td>Observe and provide supportive care, protect airway, position on side to avoid aspiration</td>
</tr>
<tr>
<td>Wine</td>
<td>Severe: Respiratory depression, stupor, coma, death (Chronic: pancreatitis, cirrhosis are rare in adolescents)</td>
<td>Ventilatory support, intensive care</td>
</tr>
<tr>
<td>Hard Liquor</td>
<td>Pathologic: Belligerent, excited, combative, psychotic state (even after small amount in susceptible person)</td>
<td>Physical restraint, low-dose benzodiazepine (lorazepam 1 to 5 mg PO as needed), or haloperidol 1 to 5 mg q 4 to 8 hr IM or 1 to 15 mg/dose PO</td>
</tr>
</tbody>
</table>

Miscellaneous Information: Alcohol is highly addictive, and withdrawal from it is associated with serious, potentially lethal adverse effects, which begin 6 to 24 hr after the last drink. Alcohol dependence is rare in adolescents, but alcohol-related deaths are not. Adolescents tend to be binge drinkers and are at high risk for alcohol-related accidents and acute alcohol poisoning.
### B. Cannabis

<table>
<thead>
<tr>
<th>Names/Preparation</th>
<th>Intoxication</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Signs and Symptoms</strong></td>
<td><strong>Treatment</strong></td>
</tr>
<tr>
<td>Marijuana (pot, herb,</td>
<td>Acute: Euphoria, sensory stimulation, pupillary constriction, conjunctival</td>
<td>Reassurance and observation</td>
</tr>
<tr>
<td>grass, weed, reefer,</td>
<td>injection, photophobia, nystagmus, diplopia, increased appetite, autonomic</td>
<td></td>
</tr>
<tr>
<td>dope, buds, sinsemilla,</td>
<td>dysfunction (tachycardia, hypertension, orthostatic hypotension), temporary</td>
<td></td>
</tr>
<tr>
<td>Thai sticks)</td>
<td>bronchodilatation</td>
<td></td>
</tr>
<tr>
<td>THC capsules</td>
<td><strong>Chronic: Gynecomastia, reactive airway disease, decreased sperm count, weight gain, lethargy, amotivational syndrome</strong></td>
<td>Discontinuation of use, symptomatic treatment/care (bronchodilators for wheezing)</td>
</tr>
<tr>
<td>Hashish</td>
<td></td>
<td>Chronic Users: Mild irritability, agitation, insomnia, electroencephalographic changes</td>
</tr>
<tr>
<td>Hashish oil</td>
<td></td>
<td>Reassurance, symptoms disappear in 3 to 4 days</td>
</tr>
</tbody>
</table>

Miscellaneous Information: Cannabis derivatives have relatively low addictive potential. These drugs are used commonly by adolescents and are associated with adverse psychological effects. The potency of marijuana has tripled over the past 25 years.

### C. Hallucinogens

<table>
<thead>
<tr>
<th>Names/Preparation</th>
<th>Intoxication</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Signs and Symptoms</strong></td>
<td><strong>Treatment</strong></td>
</tr>
<tr>
<td>Phencyclidine (PCP)</td>
<td>Acute: Perceptual (visual, auditory) distortion and hallucinations, nystagmus, feelings of depersonalization, mild nausea, tremors, tachycardia, hypertension, hyperreflexia</td>
<td>Reassurance and observation (For anticholinergics, ie, Jimson weed, nightshade, symptoms are more severe and may require gastric lavage, benzodiazepine sedation, and hospitalization)</td>
</tr>
<tr>
<td>(angel dust, super grass,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>peace weed)</td>
<td>Chronic: Flashbacks</td>
<td>Discontinuation of use</td>
</tr>
<tr>
<td>Ketamine (Special K)</td>
<td>Pathologic: Panic, paranoia, psychosis</td>
<td>Psychosis; Close observation in a quiet room and benzodiazepines (lorazepam 1 to 5 mg PO); use of neuroleptic medication is controversial</td>
</tr>
<tr>
<td>Lysergic acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>diethylamide (LSD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(acid, blotters, orange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sunshine, blue heaven,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>microdot, sugar cubes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mescaline (mesc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peyote (buttons, cactus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psilocybin (magic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mushrooms, 'shrooms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jimson weed (locoweed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nightshade</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Miscellaneous Information: PCP may be sprinkled on marijuana and smoked. Thus, exposure can occur without the user's knowledge.
### D. Inhalants

<table>
<thead>
<tr>
<th>Names/Preparations</th>
<th>Intoxication</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nitrous oxide (laughing gas, whippets)</strong></td>
<td>Acute: Euphoria, disorientation, sedation, conjunctival injection, acute toxicity to central nervous system, liver, kidneys</td>
<td>Symptomatic medical treatments</td>
</tr>
<tr>
<td><strong>Amyl nitrite (poppers, snappers)</strong></td>
<td>Nitrates: Sudden hypoxemia, hypotension</td>
<td>Discontinuation of use, supportive therapies (eg, dialysis)</td>
</tr>
<tr>
<td><strong>Butyl nitrate (rush, bullet, climax)</strong></td>
<td>Chronic: Peripheral nerve, central nervous system, liver, and kidney damage</td>
<td>Plumbism: Chelation therapy</td>
</tr>
<tr>
<td><strong>Chlorohydrocarbons</strong></td>
<td>Discontinuation of use, supportive therapies (eg, dialysis)</td>
<td>Resuscitation, hospitalization</td>
</tr>
<tr>
<td>(aerosol spray cans)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydrocarbons</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(gasoline, glue, solvents, White-out® typewriter correction fluid)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Miscellaneous Information: Nitrous oxide sometimes is sold at rock concerts inside balloons. Nitrates have been most popular among homosexual men, allegedly to enhance sexual experiences. The volatile hydrocarbon compounds are favored by younger adolescents and are popular in some Latin American countries, on Native American reservations, and in Latino communities within the United States.

### E. Stimulants

<table>
<thead>
<tr>
<th>Names/Preparations</th>
<th>Acute Intoxication</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cocaine (coke, snow, flake, blow, nose candy)</strong></td>
<td>Acute: Exhilaration, euphoria, restlessness, irritability, insomnia, pupillary dilatation, tachycardia, arrhythmia, chest pain, hypertension, anorexia, hyperpyrexia, hyperreflexia</td>
<td>Resassurance and observation</td>
</tr>
<tr>
<td><strong>Crack (freebase, rocks)</strong></td>
<td></td>
<td>Symptomatic care</td>
</tr>
<tr>
<td><strong>Amphetamines</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(speed, black beauties)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Methamphetamine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(crank, crystal meth, ice)</td>
<td>Chronic: If snorting: inflamed nasal mucosa, septal erosion or perforation, confusion, sensory hallucinations, paranoia, depression</td>
<td></td>
</tr>
<tr>
<td><strong>Methylphenidate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Ritalin®)</td>
<td>Pathologic: Sudden cardiac arrest, hypertensive crisis, seizures</td>
<td>Resuscitation, hospitalization</td>
</tr>
<tr>
<td><strong>Pemoline (Cylert®)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prescription diet pills</strong></td>
<td>Chronic Users: Severe depression with suicidal/homicidal ideation, exhaustion, prolonged sleep, voracious appetite</td>
<td>Close observation, reassurance, symptoms disappear in 3 to 4 days</td>
</tr>
<tr>
<td>(eg, Didrex®, Tenuate®, Ionamin®, Sanorex®)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>“Legal speed” (over-the-counter diet or stay awake pills)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Miscellaneous Information: Although the use of cocaine and crack has declined in recent years, amphetamines have become more popular. Methamphetamine is more commonly available in California and the western and southwestern United States. With the increased public awareness of attention-deficit/hyperactivity disorders and the popularity of stimulant medications to treat it, methamphetamine has become a drug of abuse among some adolescents. It can be ground up and “snorted” and has been implicated in several reports of sudden cardiac arrest and death. So-called “legal speed,” over-the-counter preparations that are available in pharmacies and through mail order houses, can cause toxicity similar to more potent stimulants when taken in high doses.
### F. Depressants

<table>
<thead>
<tr>
<th>Names/Preparations</th>
<th>Intoxication</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benzodiazepines</strong>&lt;br&gt; (Valium®, &quot;Vs,&quot; Librium®, Serax®, Klonopin®, Tranxene®, Xanax®, Halcion®, Rohypnol®, &quot;Ruffies&quot;)</td>
<td>Mild to Moderate: Central nervous system sedation, pupillary constriction, disorientation, slurred speech, staggering gait</td>
<td>Mild to Moderate: Restlessness, anxiety, agitation, tremor, abdominal cramps, nausea, vomiting, hyperreflexia, hypertension, headache, insomnia</td>
</tr>
<tr>
<td><strong>Barbiturates</strong>&lt;br&gt; (Nembutal®, Seconal®, Amytal®, Tuinal®, downers, barbs, blue devils, red devils, yellows, yellow jackets)</td>
<td>Severe: Respiratory depression, hypothermia, coma, death</td>
<td>Severe: Respirations, delirium, hyperpyrexia, hallucinations, death</td>
</tr>
<tr>
<td><strong>Methaqualone</strong>&lt;br&gt; (Quaaludes, ludes, sopors)</td>
<td>Pathologic: Paradox disinhibition, hyperexcitability Symptoms pass in a matter of hours; physical restraint, low-dose benzodiazepine rarely needed</td>
<td>Acute Overdose: Gastric lavage Supportive: Ventilator, warming blanket, intensive care unit care</td>
</tr>
</tbody>
</table>

#### Miscellaneous Information:
These compounds are similar to alcohol in effect and are highly addictive. Withdrawal symptoms are severe and may begin 12 to 16 hours after last dose or may be delayed for up to 1 week.

### G. Narcotics

<table>
<thead>
<tr>
<th>Names/Preparations</th>
<th>Intoxication</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heroin</strong> (smack, horse, junk, brown sugar, Big H, mud)</td>
<td>Acute: Euphoria, pupillary constriction, depression of respirations and gag reflex, bradycardia, hypotension, constipation</td>
<td>Acute Detoxification: Methadone (PO): 0.7 mg/kg per day divided q 4 to 6 hr for children; 30 to 40 mg/d in 3 to 4 divided doses, with 5 mg/d taper for adults</td>
</tr>
<tr>
<td><strong>Opium</strong>&lt;br&gt; Prescription narcotics (morphine, meperidine, fentanyl, oxycodone, hydrocodone, codeine, Darvon®, etc.)</td>
<td>Chronic: Complications of intravenous use include hepatitis B, human immunodeficiency virus/acquired immunodeficiency syndrome, subacute bacterial endocarditis, brain abscesses</td>
<td>Chronic Users: Restlessness, laceration, yawning, pupillary dilatation, rhinorrhea, sniffing, sneezing, sweating, flushing, tachycardia, hypertension, muscle cramps, abdominal cramps, nausea, vomiting, diarrhea</td>
</tr>
</tbody>
</table>

#### Miscellaneous Information:
Discontinuation of use, targeted medical care for infectious complications

#### Severe Users:
Restlessness, lacrimation, yawning, pupillary dilatation, rhinorrhea, sniffing, sneezing, sweating, flushing, tachycardia, hypertension, muscle cramps, abdominal cramps, nausea, vomiting, diarrhea

#### Pathologic:
Acute overdose may cause respiratory arrest and death

#### Intubation and ventilation, naloxone (IV, IM, SC, endotracheal tube) 0.1 mg/kg per dose q 2 to 3 hr for children <20 kg, 2 to 5 mg/kg per dose for children >20 kg

#### Airway protection, judicious use of naloxone

#### Long-term Treatment:
Long-term therapeutic support; methadone maintenance (specialized clinics only) or buprenorphine
### H. Designer Drugs

<table>
<thead>
<tr>
<th>Name/Preparation</th>
<th>Intoxication</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fentanyl analogs</td>
<td>Similar to narcotics</td>
<td>Similar to narcotics</td>
</tr>
<tr>
<td>(synthetic heroin, China white)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meperidine analogs</td>
<td>Similar to narcotics</td>
<td>Similar to narcotics</td>
</tr>
<tr>
<td>(MPPP, MPTP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amphetamine analogs</td>
<td>Similar to amphetamines</td>
<td>Similar to amphetamines</td>
</tr>
<tr>
<td>(MDMA, Ecstasy, Adam, EVE, STP, PMA, TMA, DOM, DOB, etc.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Miscellaneous Information:** More popular on the West Coast, designer drugs can be both stronger and cheaper than the parent compounds. Quality is not controlled during illicit manufacturing, posing great danger to users. For example, MPTP, a contaminant of the meperidine analog MPPP, causes irreversible Parkinson disease.

References

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