Opioids: Nonmedical Use and Abuse in Older Children

William A. Frese and Kimberly Eiden

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Opioids: Nonmedical Use and Abuse in Older Children

William A. Frese, MD,*
Kimberly Eiden, APN†

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Objectives

After completing this article, readers should be able to:

1. Characterize the prevalence of overall pediatric opioid use, both medical and nonmedical.
2. Identify demographic and clinical characteristics associated with pediatric nonmedical opioid use.
3. Discuss abuse and dependence comorbidities associated with pediatric nonmedical use of opioids.
4. Describe the pediatrician's role in prevention and screening for pediatric nonmedical prescription opioid use.
5. Explain opioid overdose management.

Introduction

Alone or in combination with other pain management modalities, the use of opioids can be a mainstay of adequate analgesia. However, increased prescribing and availability of opioid medications correlate with overall medication abuse and misuse rates. Prescription drug nonmedical use is second only to marijuana as the most common form of newly initiated illicit drug use (Fig. 1). (1) Surveys among adolescent populations similarly support a high incidence of nonmedical opioid medication use. (1)(2) Nonmedical opioid use rates among 12- to 17-year-old children have stabilized (Fig. 2), (3) but the overall prevalence of such inappropriate use may prompt pediatricians to consider decreasing opioid prescribing and potentially undertreat pain in an attempt to reduce the abuse of these medications. Pediatricians must be knowledgeable about the prevalence of pediatric nonmedical opioid use, its pattern, and appropriate prevention strategies. This article reviews the nonmedical use of prescription opioids in the pediatric population. The characteristics of such usage are incorporated into prevention, screening, and management strategies.

Definitions

To appreciate the characteristics of opioid use, it is essential to understand basic nomenclature. Terminology describing the pharmacology and clinical diagnoses associated with opioids and their nonmedical use frequently is used inconsistently and incorrectly, resulting in stigmatization and undertreatment of pain. Table 1 reviews definitions for opiate, narcotic, and opioid and selected opioid use and abuse definitions. Opioid is the preferred definition for referencing this class of analgesic medications. (4)(5)

Epidemiology

Prevalence

Cross-sectional studies of diverse pediatric populations indicate that opioid medications are the most widely prescribed among studied scheduled medications (opioids, stimulants, sedatives, anxiolytics, and sleep medications). (8)(10)(11) Almost half (46% to 48%) of children ages 10 to 18 years report using an opioid during their lifetimes for various medical and nonmedical purposes. (11)(12)

Although most children use opioids for medical reasons only, (8)(10)(11)(12) opioid medications also comprise the most common medication class that children take for nonmedical purposes. (8)(10)(11) Medical users are eight to ten times more likely to

*Assistant Professor, Department of Pediatrics, Medical College of Wisconsin and Children's Research Institute, Milwaukee, WI. Formerly Department of Pediatrics, Advocate Hope Children's Hospital, Oak Lawn, IL.
†Department of Pediatrics, Advocate Hope Children's Hospital, Oak Lawn, IL.

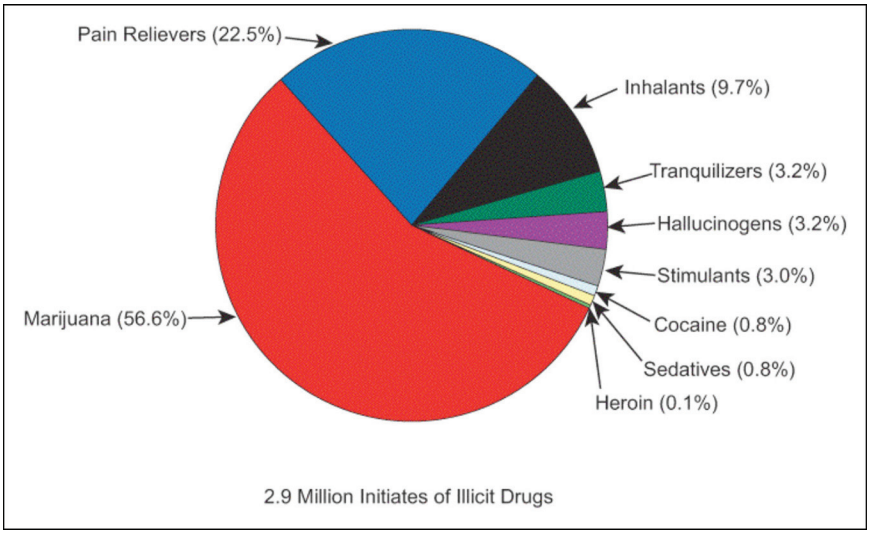

Figure 1. Specific drug employed when initiating illicit drug use among initiates of illicit drugs ages 12 years or older in the past year. Reproduced with permission from *Results From the 2008 National Survey on Drug Use and Health: National Findings.* (1)

report lifetime and past-year nonmedical opioid usage, respectively. (12) Because medical and nonmedical opioid use overlap, nonmedical use behaviors may be masked and make diagnosis difficult. Ranges of 2.7% to 3.8% (2)(3) of surveyed children, ages 12 to 17 years, engage in past-month nonmedical opioid use, comprising the second highest population group using opioids for nonmedical reasons (Fig. 2). A higher percentage of pediatric respondents (7% to 12%) identify themselves as past-year nonmedical opioid users. (2)(8)(9)(10) Lifetime nonmedical opioid prevalence is highest, ranging from almost 10% to 18% of all children, ages 12 to 18 years. (2)(11)(12)(13)

However, these increasing prevalence patterns over time do not equate to consistent usage; more than 50% of surveyed 12th graders report fewer than five occasions of lifetime nonmedical opioid use. (2) Similarly, 82% of respondents from a different study reported less than weekly or no past-year nonmedical opioid use. (13) The previously cited prevalence and usage rates suggest that nonmedical opioid use is inconsistent, yet increases over a lifetime. Anticipatory counseling regarding nonmedical opioid use, therefore, should focus both at regular intervals and during other identified "high-risk" periods through adolescence.

Compared with prescription opioids, lifetime prevalence of heroin abuse is less common, ranging between 1.2% and 1.4% among adolescents. (2) Prevalence of illicit, designer fentanyl analogs (china white, Mexican brown, tango & cash) usage among children is unknown.

Demographics

Certain demographic characteristics listed in Table 2 are significantly associated with pediatric nonmedical opioid use and can assist the pediatrician in screening.

Clinical Aspects

Use Motivations

Sixty-nine percent of pediatric respondents report pain control for conditions such as migraine headaches or menstrual cramps as the sole reason to engage in nonmedical opioid use. (8) Most pediatric nonmedical opioid use, therefore, may more appropriately be classified as self-medication or opioid misuse. This misuse pattern explains why most pediatric nonmedical users identify themselves as both medical and nonmedical users. Nonmedical users report taking opioids to aid sleep (15.7%) as the second most common motive, (8) which possibly indicates a transitional motivation to more concerning, abusive behaviors. Only a minority (11%) of pediatric nonmedical opioid users endorse using opioids solely to "get high." (8) Similarly, fewer than 10% of nonmedical opioid users cite motivations such as "helps decrease anxiety, counteracts other drugs, safer than street drugs, experimenta-

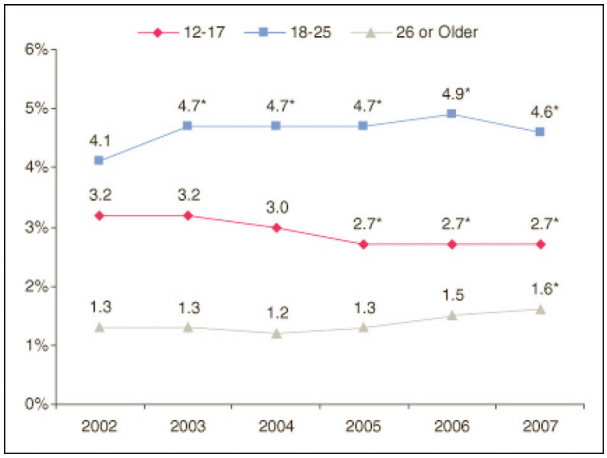

Figure 2. Nonmedical use of prescription pain relievers in the past month by age group: percentages, 2002 to 2007. Reproduced with permission from *The NSHUD Report: Trends in Nonmedical Use of Prescription Pain Relievers: 2002 to 2007.* (3)

tion, and because I'm addicted" for their nonmedical use. (8) Although males still report pain relief as the most common motivation for nonmedical opioid use, the other abuse motivations are significantly associated with males compared with females. (8) Understanding motivations behind pediatric nonmedical opioid use is important because most pediatric nonmedical opioid users may have unrecognized and inadequately treated pain that should be addressed and may require more aggressive analgesic treatment regimens.

Diversion Behaviors

Opioid diversion among pediatric nonmedical users is common and follows sex and age associations. After allergy medications, opioid medications are the second most commonly loaned and borrowed prescription medications by children aged 12 to 17 years (14) and comprise one of the most commonly diverted class of scheduled medications. (10) Twenty-five percent of older children report giving away their opioid prescriptions, and 10% report trading opioid medications. (10) Recent medical users are especially likely to contribute to diversion; 64% report being approached to give, trade, or loan opioid medications within the past year of receiving an opioid prescription. (10) Most pediatric nonmedical opioid users obtain opioid medications for free from well-known sources, such as family (34%) and friends (17%). (12) Girls are more likely than boys to divert pain medications, and older children are more likely to divert opioids than younger children. (14)

One consequence of such diversion behaviors is that 75% of children report borrowing medications in place of making an appointment with a health-care practitioner (HCP). (14) Moreover, 32% still sought a HCP after taking borrowed medications, but 41% did not inform the HCP about borrowing the medication during the

Table 1. Definitions

Pharmacologic Terms

- **Opiates:** Natural alkaloids and their semisynthetic compounds derived from the opium poppy. Examples of natural opiates include morphine and codeine. Semisynthetic opiates include hydrocodone, oxycodone, hydromorphone, and heroin.
- **Narcotic:** A predominantly legal term that refers to a wide range of substances, not limited to opioids, that are characterized by their analgesic effects, ability to alter mood, and potential for abuse. The United States Drug Enforcement Agency classifies opioids and cocaine together as narcotics. (6) Due to this broad classification, the World Health Organization recommends that "narcotic" be replaced with more specific terminology (eg, "opioid"). (7)
- **Opioid:** Opiates and fully synthetic compounds and naturally produced endorphins that bind to opiate receptors. Examples of fully synthetic opioids include methadone, fentanyl, and tramadol.

Psychiatric Terms

- **Medical Use:** The compliant use of a medication at the dose, frequency, treatment interval, and purpose intended by the prescriber.
- **Misuse:** Noncompliant use of a prescribed medication with the purpose intended by the prescriber; however, the medication is taken at different dosages, frequencies, or intervals than instructed by the prescriber. (8)
- **Nonmedical Use:** The noncompliant or illegal use of prescription medication by someone without a doctor's prescription for the experience or feeling caused by the medication. (1)
- **Abuse:** Recurrent substance use causing significant impairment or distress that has at least one of the following characteristics: failure to fulfill major obligations, use in hazardous scenarios, social or interpersonal problems caused by the substance, substance-related legal problems.
- **Subthreshold Dependence:** Some characteristics of dependence endorsed without meeting all necessary DSM-IV criteria for a dependence diagnosis. Used in research contexts. (9)
- **Physical Dependence:** Substance use causing significant impairment or distress that contains criterion 1 or 2 as part of at least three of the following criteria:
  1) Presence of tolerance.
  2) Presence of withdrawal.
  3) Substance is taken in larger amounts or periods than planned.
  4) There is a wish to control or cut down substance use.
  5) There is a great deal of time spent obtaining or recovering from the substance's effect.
  6) Substance use replaces or reduces social, occupational, and recreational activities.
  7) Substance use is continued despite awareness of persistent or recurring physical or psychological problems caused by the substance.

  Physical dependence can occur with both medical and nonmedical use.
- **Addiction:** A maladaptive state of periodic and chronic intoxication associated with strong physical and psychological dependence requiring maintenance of a certain level of intake for function. Addicts are driven by a compulsion to use a substance repeatedly despite disastrous consequences and attempts to control use.

DSM-IV=*Diagnostic and Statistical Manual of Mental Disorders*. 4th ed.

Table 2. Demographic Variables Related to Pediatric Nonmedical Opioid Use

Sex

- Females are up to two times more likely to report lifetime nonmedical opioid use than males. (12)

Age

- Nonmedical opioid use increases with age, as indicated by lifetime prevalence by age as follows: (13)
  - –4.9% among ages 12 to 13 years
  - –8.0% among ages 14 to 15 years
  - –16.4% among ages 16 to 17 years
- The average age for first-time nonmedical opioid use is 13.3 years. (13)

Race

- Nonmedical opioid use is highest among whites, nonwhite Hispanics, children of mixed racial ancestry, and Native American/Alaskan populations.
- Nonmedical opioid use among African American children is less than that of whites in most studies.
- Asian race is associated with the lowest nonmedical opioid use prevalence.

Education

- Nonmedical opioid prevalence is higher among school dropouts.
- Children who have no college plans report a higher prevalence of nonmedical opioid use compared to those who plan to attend college.

Health Indicators

- Children who have higher nonmedical opioid use prevalence rates report the following:
  - –Perceived poor-to-fair health.
  - –A past-year hospitalization.
  - –Three or more past-year emergency department visits.

Table 3. Characteristics Significantly Associated with Pediatric Opioid Abuse and Dependence

Clinical Characteristics

- Abuse
  - –Poor/fair health status
  - –Nonstudent status
- Dependence
  - –Female sex
  - –Polypharmacy (≥3 drug opioid products)
  - –Illicit drug dealing
- Common to abuse and dependence
  - –Weekly nonmedical opioid use
  - –History of major depressive episode(s)
  - –Past-year alcohol use disorder

Specific DSM-IV Diagnostic Criteria

- Abuse
  - –Hazardous use
  - –Role interference
- Dependence
  - –Withdrawal
  - –Giving up activities
  - –Continued use despite having physical/psychological problems
  - –Tolerance
  - –Salience

Modified from Wu et al. (9)

visit. (14) Patients and families must be reminded of the inherent medical risks, potential masking of symptoms, and inappropriate delay in seeking timely treatment associated with opioid diversion.

Abuse and Dependence Associations

Although most pediatric nonmedical opioid users report pain relief as the reason for opioid use, a significant minority endorse more concerning abuse and addiction motives. Pediatric nonmedical opioid use accordingly demonstrates a higher prevalence of opioid abuse and dependence diagnoses. Thirty-five percent of past-year nonmedical users meet criteria for abuse, subthreshold dependence, or dependence diagnoses versus 1.1% of a baseline population (9), and stands in contrast to the percentage of pediatric nonmedical users who report pain control as the sole motivation (69%) and are at decreased risk for substance abuse. (8) Table 3 describes characteristics and specific *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed criteria significantly associated with pediatric opioid abuse and dependence. Of note, 66% of respondents in the abuse group reported some symptoms of dependence and 58% of respondents in the dependence group reported symptoms of abuse, indicating symptom commonality. (9) This overlap has led to further studies suggesting that abuse and dependence should be combined as one clinical diagnosis for pediatric nonmedical users, rather than be considered two clinically distinct diagnoses. (9)(15)

Nonmedical opioid use also correlates positively with increased substance abuse beyond opioids, such as higher alcohol, marijuana, and inhalant use at younger ages, compared with nonusers. Nonmedical opioid users are more than eight times more likely than nonusers to engage in other underage and illicit drug use (medical users: odds ratio=1.5). (12) Nonmedical users are also more likely to use multiple substances. (11)(12)(13) However, when nonmedical opioid users are divided into "self-medication" versus "other reasons" for nonmedical usage, scores are significantly lower for the self-treatment group. (8) This difference supports previous assertions that there appear to be two distinct groups of nonmedical users: those who use opioids for self-medication/misuse purposes and those who use opioids for abuse/experimentation purposes.

Clinical Presentation

Opioids interact with μ_1, μ_2, κ, and δ opioid receptors predominantly located in nervous and gastrointestinal tissues. The μ_1 receptor is notably responsible for both analgesia and dependence symptoms. The κ receptor also produces analgesia as well as sedation. The μ_2 receptor produces common adverse effects. Most opioid medications affect several receptors, acting as agonists, antagonists, or mixed agonists/antagonists.

Opioids overall increase parasympathetic and decrease sympathetic activity. Table 4 lists select clinical symptoms and signs observed in opioid ingestion and overdose. Symptom severity is generally dose- and tolerance-related. (16) Most prescription opioids are taken orally (crushed or whole) and produce symptoms for 3 to 6 hours, with the exception of methadone, whose effects may last as long as 48 hours. Heroin acts within shorter time periods, producing euphoria in less than 5 to 30 minutes (intravenous and inhaled routes, respectively), with effects generally lasting less than 1 hour. Designer fentanyl analogs are taken for effects and by routes similar to heroin, yet are significantly more potent. Meperidine analogs have been known to cause irreversible Parkinson-like symptoms.

The combination of coma, respiratory depression, and pinpoint pupils suggests opioid overdose. Patients commonly are profoundly stuporous or comatose, prompting associated airway and aspiration concerns. Adverse respiratory and neurologic symptoms are the most life-threatening consequences that may be observed up to 24 hours after overdose. Central respiratory depression causes decreased respiratory rate and tidal volume, which leads to cerebral hypoxia/ischemia. Noncardiogenic pulmonary edema also may result, manifesting as crackles on auscultation and pink, foamy secretions. Common cardiovascular effects include

Table 4. Select Symptoms and Signs Associated With Opioid Ingestion and Overdose

Nervous System

- Analgesia
- Depressed consciousness
  - –Light somnolence to coma
- Alteration of affect
  - –Euphoria to dysphoria
- Central respiratory depression
  - –Mild depression to apnea
- Miosis (mydriasis with cerebral ischemia)
- Generalized seizures
- Reflex suppression
  - –Impaired gag response (comatose states)
  - –Cough suppression
  - –Reduced deep tendon reflexes

Respiratory

- Noncardiogenic pulmonary edema
- Respiratory acidosis
- Bronchospasm
- Aspiration (comatose states)

Cardiovascular

- Bradycardia
- Arrhythmias
- Orthostatic hypotension

Gastrointestinal

- Nausea
- Emesis
- Ileus
- Constipation

Musculoskeletal

- Relaxed muscular tone to rigidity
- Rhabdomyolysis

Dermatologic

- Flushing
- Pruritus

Urinary

- Decreased urine formation
- Urinary retention

Endocrinologic

- Decreased catecholamine release
- Increased antidiuretic hormone secretion

Modified from Brunton (4) and Tobias. (16)

bradycardia and orthostatic hypotension, resulting from combined increased parasympathetic tone and histamine-related vasodilation. Arrhythmias may develop beyond bradycardia if an excitable automatic focus exists.

Prevention

Prevention of pediatric nonmedical opioid use encompasses both primary and secondary prevention strategies. Pediatricians are in a unique position to recognize substance abuse in their patients. A child's selection of drug use is related to its perceived risk, social approval, and availability. Accordingly, primary preventive strategies should focus on the following factors and be incorporated into anticipatory guidance.

Risk Education

The riskier a medication is perceived to be, the less likely it will be used nonmedically or abused. Children perceive prescription opioids to be safer than heroin and illicit/street drugs, despite the fact that their nonmedical use can pose equally dangerous consequences. As part of routine anticipatory education, clinicians should dispel any misperceptions to both patients and family members that prescription opioid medications are safer than other illicit drugs when taken at different dosages, frequencies, or intents than prescribed. Pediatricians must incorporate this same discussion into their opioid prescribing instructions because even medical opioid users demonstrate potential risk for nonmedical use. When prescribing opioids, pediatricians also should encourage patients to maintain open communication and return for re-evaluation if pain persists, rather than engage in self-medication for pain, medical misuse, or diversion behaviors.

Accessibility

In addition to risk education, pediatricians should incorporate accessibility issues into their guidance. Well-intended patients and family members must be reminded not to divert prescription opioids to each other or friends. Diversion discussions should take place when initially prescribing opioids and at subsequent visits during opioid use because this is a relatively high-risk period for nonmedical opioid use and diversion. Pediatricians should advocate and encourage parents to store and lock opioid medications securely to prevent easy access. Patients and families also should properly dispose of unused opioid prescriptions. Pediatricians can provide patients and families information about local community prescription medication disposal programs offered through police stations or hospitals at regular intervals. The Office of National Drug Control Policy website (see Resources) offers further guidelines and resources regarding prescription drug disposal because discarding medications in the toilet is no longer appropriate for most medications. (17)

Parental Factors

In coordination with clinician counseling, parental involvement serves as a protective factor preventing nonmedical opioid use. Parents may not perceive the prevalence and risks of prescription nonmedical opioid use. Pediatricians should educate parents regarding these risks and encourage parents to talk to their children about nonmedical prescription opioid use at an early age, before behaviors are less likely to have begun. This discussion should also occur during periods of prescription opioid medical use. Although not opioid-specific, children who report that their parents strongly disapprove of their using substances (alcohol, marijuana, or cigarettes) are less likely to use these substances than respondents who believe their parents would somewhat disapprove or neither approve nor disapprove. (1) Similarly, past-month illicit drug use is lower among children who report that their parents always or sometimes engage in monitoring behaviors (eg, inquiring of friends and activities) than among those whose parents seldom or never engage in such behaviors. (1) As part of this monitoring effort, parents should be encouraged to regulate proper prescription opioid use closely. Older children may be assumed to be independently taking medications correctly and may not always receive such oversight. Positive reinforcement is equally important in these discussions because perceived higher levels of parents offering positive feedback for desired behaviors correlate with decreased opioid misuse. The National Family Partnership (18) and The Partnership for a Drug-Free America® (19) are nonprofit organizations focused on youth drug prevention, education, and advocacy that offer educational resources, medication inventory cards, and drug abuse prevention pledges.

Schools

When prescription opioids must be taken at school, pediatricians should collaborate with their community's school districts to create policies directing how medication should be accessed, dispensed, and monitored to minimize potential nonmedical use and diversion at school. School environments significantly influence substance abuse behaviors. (20) Recommendations are available regarding medication administration at schools.

(21) Such policies should include and address the following: (21)

1. The requirement for a written medication form signed by the prescriber and parents that fully explains the medication's dosage and intent.

2. Maintenance of school medication dispensing records.

3. Prohibition of students self-carrying controlled substances.

4. Controlled substance storage in a double-locked, secure location.

In addition to participating in school medication administration policies, pediatricians may also collaborate with schools and community centers on community drug prevention programs. Effective programs are known to focus on problem-solving skills, self-esteem, media influences, stress issues, and "life skills training" (eg, teaching skills to confront specific problems/scenarios). (20) Pediatricians not only have familiarity with the social and developmental challenges that older children encounter, but they also have medical knowledge of opioid medications and their associated risks. Pediatrician participation in such programs as an expert resource is beneficial.

Screening

In conjunction with primary prevention strategies, clinicians must also be comfortable with secondary prevention measures. Secondary prevention involves early recognition and screening of problematic behaviors before they escalate. Most pediatric nonmedical prescription medication users (75%) do not inform their physicians of their nonmedical use. (14) Knowledge of nonmedical opioid use risks and demographics (eg, sex, age, race, health status, and known substance abuse history) assists clinicians in identifying potentially at-risk individuals and helps to focus screening efforts. Given the association between medical and nonmedical opioid use, it is important that pediatricians proactively question pediatric medical opioid users about potential nonmedical opioid misuse. Pediatricians similarly should specifically ask about nonmedical opioid use, prescription medication misuse, and pain self-medication practices as part of their more generalized drug screening efforts because these practices may not necessarily be considered risky or problematic by parents or patients.

Formalized clinical screening tools beyond clinician inquiry also may be employed. Several opioid-specific abuse screening tests have been tested among adults with promising validity, but none has been tested yet in the pediatric population. A CRAFFT screening test (Table 5) identifies teenage substance abuse beyond clinician inquiry alone. (22)(23) CRAFFT is a mnemonic representing key items in each question (Car, Relax, Alone, Forget, Friends, Trouble). Patients should be counseled that "drugs" in CRAFFT questioning refer to both prescription and illicit substances because they may interpret "drugs" as only illicit street drugs.

Table 5. CRAFFT Screen

During the past 12 months:

- *CAR*: Have you ever ridden in a car driven by someone (including yourself) who was "high" or has been using alcohol or drugs?
- *Relax*: Do you ever use alcohol or drugs to relax, feel better about yourself, or fit in?
- *Alone*: Do you ever use alcohol or drugs while you are by yourself, alone?
- *Forget*: Do you forget things you did while using alcohol or drugs?
- *Friends*: Do your family or friends ever tell you that you should cut down on your drinking or drug use?
- *Trouble*: Have you ever gotten into trouble while you were using alcohol or drugs?

Two or more "yes" answers indicate a positive screen and need for further assessment.

Modified from Knight et al. (22)

Because nonmedical opioid use is associated with substance abuse and dependency for a minority of nonmedical users, clinicians should be able to screen for these specific conditions when initial screening is positive. Further questioning should focus on identifying hazardous use, role interference, withdrawal, giving up activities, and continued opioid use despite having physical or psychological problems, all of which are significantly associated with opioid abuse and dependence (Table 3).

State prescription drug monitoring programs (24) have been shown to be beneficial in identifying patients who receive several opioid prescriptions from multiple HCPs. Most states offer this program; physician registration eligibility and information offered depend on individual programs. Further information regarding these programs, including state-specific programs and contact information, may be found on the Drug Enforcement Agency (24) and National Association of State Controlled Substances Authorities (25) websites.

Routine laboratory testing is not recommended to screen for unsuspected opioid use. (26) Drug testing is appropriate when increased clinical suspicion exists and should follow patient consent, confidentiality, and tamper-prevention recommendations. Because drug

screen testing does not detect all opioids and their metabolites, opioid use and overdose is predominantly a clinical diagnosis. However, screening may assist in detecting other abused substances requiring different management.

Management of Opioid Overdose

Identification of the overdosed opioid, when possible; its expected duration of action; associated risk factors; and the anticipated level of appropriate respiratory, cardiovascular, and neurologic care should be considered.

Primary management of opioid overdose should focus on respiratory, cardiac, and neurologic stabilization and reversal of signs. Any airway and breathing compromise should be assessed and treated appropriately with supplemental oxygen, pulse oximetry monitoring, arterial blood gas measurement, bag-mask ventilation, and tracheal intubation. Comatose patients who have impaired gag reflexes and are at risk for aspiration should be intubated and ventilated. Positive-pressure ventilation assists in reversing noncardiogenic pulmonary edema. Circulation generally improves after adequate ventilation restoration, but symptomatic hypotension, bradycardia, and arrhythmias require management found in resuscitation guidelines and resources. (27) An opioid antagonist, such as naloxone, should be administered soon after or during airway and circulation stabilization.

Naloxone is a derivative of oxymorphone and possesses a high binding affinity and antagonistic action at μ, κ, δ, and σ receptors. Naloxone is the preferred agent for pediatric opioid overdose and can be administered via various parenteral routes. Recommended naloxone dosing for acute opioid overdose in older children weighing 20 kg or greater is 2 mg intravenously every 2 to 5 minutes, as necessary, until symptom reversal (maximum cumulative dose, 10 mg). Dosing should be reduced to 0.2 to 0.4 mg in older children suspected of having opioid dependence or addiction to minimize withdrawal symptoms and seizures. The onset of action for naloxone is within 1 minute when administered intravenously and generally lasts for 1 hour. Naloxone possesses a shorter duration of action than most opioids, and additional doses may be required. Continuous naloxone infusions may also be administered in such circumstances, (28) with dosing recommendations extending beyond this review's scope.

Nalmefene is a secondary opioid antagonist option that possesses a longer duration of action than naloxone. Limited research demonstrates nalmefene to be a safe and effective opioid reversal agent specifically for controlled sedation procedures in children, (29) but it has a less well-established role for acute opioid overdose in the pediatric population. Most authorities, therefore, regard nalmefene as a secondary option to naloxone for acute opioid overdose.

Additional acute opioid overdose management may include activated charcoal (1 g/kg) and gastric lavage for acute opioid overdoses known to occur less than 2 hours before presentation. Urinary output should be monitored. If urinary retention is a concern, bladder ultrasonography and catheterization should be considered. Pruritus can be managed with histamine-1 blockers such as diphenhydramine. Nausea and emesis may be treated with antiemetics such as ondansetron or metoclopramide. Consultations with a pediatric psychiatrist as well as addiction, pain, and adolescent specialists are warranted.

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Summary

- Prescription opioids constitute most nonmedical opioid use and abuse in older children, and medical opioid use places pediatric users at increased risk for nonmedical use.
- Prevalence data demonstrate that pediatric nonmedical use increases over a person's lifetime, necessitating regular, ongoing prevention and screening measures.
- Pain control is the most common reason for nonmedical opioid use.
- Research data indicate friends and families are the most common sources for opioid diversion, with recent medical opioid users being at higher risk to divert opioids.
- Strong evidence correlates nonmedical opioid use with increased substance abuse, with a significant minority of users experiencing both opioid abuse and dependence.
- Central respiratory depression/apnea, severely depressed consciousness/coma, and pinpoint pupils are signs of opioid overdose.
- Pediatricians should incorporate prevention strategies into their anticipatory guidance and prescribing practices.
- Pediatricians must screen for nonmedical opioid use and associated substance abuse using a combination of clinical questioning and screening tools.
- Primary opioid overdose management includes appropriate airway and ventilation management, circulation support, and administration of an opioid antagonist.

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