

Youth and the Opioid Epidemic

Sharon Levy, MD, MPH

The current epidemic of opioid addiction has arguably been the most recalcitrant in the nation's history and the first to involve substantial numbers of adolescents. The country has embarked on a public health response, including increasing access to addiction treatment. However, the treatment infrastructure, which was initially created in the 1970s, is ill equipped for meeting the needs of adolescents and young adults, who are often cared for in pediatric primary care. In this article, I review the development of the current treatment system, examine shortfalls in regard to youth-specific needs, and propose suggestions for addressing the current crisis while simultaneously preparing to address future epidemics of addiction by enabling pediatricians to better manage substance use disorders in primary care.

Opioid epidemics are a feature of life in the United States, with waves of morphine overuse dating back to before the Revolutionary War.¹ The current epidemic has arguably been the most recalcitrant in the nation's history and was recently declared a public health emergency.² Although the initiation of substance use most often occurs during adolescence, opioid addiction has been largely restricted to adults in previous generations. The conditions that led to the current epidemic entangled adolescents in substantial numbers for the first time.

An evolution in our understanding of opioid addiction, from bad behavior to medical disorder, began in the 1970s and accelerated in the 2000s. Over the past several decades, US policy has been increasingly centered on disseminating evidence-based treatment. Nonetheless, the treatment infrastructure remains insufficient to provide care for affected adults,³ and programs designed for adolescents and young adults are almost entirely absent. My intention in this article is to review the historical context of previous opioid epidemics, the factors that resulted in adolescent involvement in the current epidemic,

and the evolving treatment infrastructure. I conclude with the specific needs of adolescents and young adults, patients who are often cared for in pediatric primary care, and suggested roles for pediatricians in combatting the current opioid epidemic while simultaneously preparing for the rise in use of other drugs in the future.

BRIEF HISTORY OF OPIOID EPIDEMICS

Opioid epidemics have recurred cyclically throughout the history of the United States. Opioid solutions extracted from poppy flowers were first brought to the United States with European settlers, who used them to treat diarrhea and pain associated with common illnesses. Although opioids were effective for these purposes, opioid addiction was both common and poorly understood in the American colonies.¹ Around the time of the Civil War, the invention of the hypodermic needle, combined with the miraculous pain relief for injured soldiers, ignited a morphine epidemic.¹ In the context of the understanding of physiology of the day, morphine became a "cure all," and its use was not restricted to the military. Opioids

abstract

Adolescent Substance Use and Addiction Program, Division of Developmental Medicine, Boston Children's Hospital, Boston, Massachusetts; and Department of Pediatrics, Harvard Medical School, Harvard University, Boston, Massachusetts

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Address correspondence to Sharon Levy, MD, MPH, Adolescent Substance Use and Addiction Program, Boston Children's Hospital, 300 Longwood Ave, Boston, MA 02115. E-mail: sharon.levy@childrens.harvard.edu

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were mixed into many “patented medications,” which were used to treat everything from toothaches to menstrual cramps, making them 1 of the most common active ingredients found in these concoctions. Children were not spared from exposure. Morphine was famously added to Mrs Winslow’s Soothing Syrup, which was marketed to quiet fussy infants.⁴ Infant overdose deaths were frequently reported in the newspapers of the time, ultimately helping to prompt the passage of the Pure Food and Drug Act of 1906, which for the first time mandated federal oversight and labeling of the contents of medications.⁵ Rates of indiscriminate opioid use began to decline, although physicians continued to prescribe it liberally, including for relatively minor pain, such as “female problems.”⁶ The Harrison Drug Act of 1914 limited physicians’ ability to prescribe opioids and ultimately curtailed this practice, finally ending the epidemic.⁷

More than 50 years after the Harrison Drug Act, the subsequent wave of opioid addiction had its epicenter among armed forces fighting abroad during the Vietnam War. The easy availability of heroin combined with poor morale and increasing acceptability of drug use associated with the countercultural movement in the United States led to large numbers of soldiers using opioids. On May 16, 1971, the *New York Times* announced that the use of heroin by US troops in Vietnam had reached epidemic proportions.⁸ By 1973, nearly 1 in 5 soldiers was a regular heroin user.⁹ The impending crisis of large numbers of soldiers with opioid addiction returning from Vietnam, in combination with public sympathy for veterans, sparked a reconceptualization of opioid addiction as a treatable medical disorder, which made possible the creation of the system of methadone clinics that still exists today. Fortunately, many soldiers

who became addicted to heroin while fighting abroad had spontaneous remission with the reduction in stress and substantially lower supply on returning home.¹⁰ The less-than-anticipated demand combined with the availability of a burgeoning treatment structure suppressed the epidemic, and opioid use largely subsided for several decades.

Twenty years after the Vietnam War, powerful oral opioid pain medications entered the market, simplifying outpatient pain treatment. Around the same time, a National Academy of Medicine (formerly Institute of Medicine) report encouraged physicians to more aggressively treat pain,¹¹ and the Joint Commission on Hospital Accreditation asked patients to rate physicians on the basis of how well they addressed pain. Opioids were marketed to both medical professionals and patients as safe and nonaddictive¹² and were heralded for improving quality of life in patients who suffered from painful conditions. A cultural movement that demanded that all aspects of life be “pain free” put tremendous pressure on medical professionals. Patients were willing to consume a lot of opioid pills, and nonpatients, including adolescents and often their parents, believed these medications to be safe.¹³ Between 1999 and 2014, the number of opioids prescribed increased by threefold,¹⁴ creating a reservoir distributed among medicine cabinets throughout the country. The oral formulation that averted the need for intravenous injection lowered the bar for initiating opioid use and helped to ignite the current epidemic.

TREATMENT INFRASTRUCTURE

In the 1960s, methadone was developed as a treatment for opioid dependence, and the 1970s heralded a perceptible shift in federal policy on drug addiction. In 1971, President Richard Nixon ordered the creation

of the first federal methadone program for the treatment of opioid addiction.¹⁵ This new type of institution, which was primarily established to provide care for veterans, was in direct violation of the Harrison Drug Act of 1914 and its prohibition on opioid prescribing. To surmount the conflict, a new set of rules known as the Narcotic Addict Treatment Act was passed in 1974. The act created a set of ground rules that allowed for medical treatment with opioid agonists under close federal supervision and required methadone clinics to be geographically dispersed, or not housed within medical facilities.¹⁶ Although the introduction of medication treatment for opioid addiction was a significant positive step toward the recognition of addiction as a medical disorder, the policy ultimately created a parallel system for treating 1 single medical condition, addiction, outside of the mainstream medical institutions that treated all other conditions. This substantially separate system remains in place today. Although methadone clinics provide treatment and support recovery for large numbers of patients with opioid addiction, the separation of 1 type of medical service from all others continues to serve as a barrier to the dissemination of effective treatment of opioid addiction, stigmatizing patients and also the health care providers who treat them. With few exceptions, federal regulations essentially prohibit adolescents under the age of 18 from accessing treatment in methadone programs, leaving fewer options for adolescents.

ADOLESCENTS AND THE CURRENT EPIDEMIC OF OPIOID ADDICTION

Adolescence is a critical at-risk period for substance use. The brain’s reward center, matures rapidly during the years preceding adolescence.¹⁷ During this period, children begin to discriminate more

carefully between less and more meaningful rewards, a capacity that underlies internal motivation and goal-driven behavior. Although young children are easily rewarded, even by abstract tokens, as children enter adolescence, they become increasingly selective regarding goals and rewards worth pursuing. The phenomenon peaks during adolescence, at which time the presentation of small or meaningless rewards results in the deactivation of the brain's reward center.¹⁸ Thus, adolescents are developmentally wired to pursue highly stimulating behaviors to garner a large neurologic reward, a trait that is recognizable in the risk-taking behavior often associated with this stage of life. Unlike natural rewards, psychoactive substances trigger signaling in the reward center through direct receptor binding. Although unhealthy, substance use fills a developmental drive for stimulation in this area of the brain effectively. Predictably, the peak ages of substance use initiation occur during adolescence and early adulthood.¹⁹

At the other end of the behavioral control hardware, the prefrontal cortex, which is responsible for executive functions that underpin decision-making (such as self-monitoring, error correction, and impulse control) and thus serves as a behavioral brake system, does not mature to full proficiency until the middle of the third decade of life. As a result, adolescents are relatively unskilled at performing these executive functions and less deterred by risk than adults. Additionally, immaturity of the prefrontal cortex during this developmental period appears to leave the brain's reward center vulnerable to developing the changes that result in the neurologic disorder of addiction.²⁰ Relatively fewer exposures result in substance use disorder (SUD) symptoms among teenagers compared with adults,²¹

and the risk of developing an SUD is linearly correlated with age of initiation. For example, children who initiate drinking before age 14 are ~5 times more likely to develop an alcohol use disorder compared with those who initiate at age 19.²² A similar pattern is seen with both marijuana²³ and the misuse of prescription opioid medication.²⁴ Indeed, delayed substance use initiation into adulthood is associated with a substantially reduced risk of ever developing an SUD, underscoring the importance of prevention and early intervention strategies designed to delay initiation and reduce substance use in this group.

Physiologic vulnerability to substance use is aggravated by environmental factors, including the availability, promotion, and modeling of substance use behaviors. Science reveals that teenagers are particularly sensitive to the influence of cultural messaging.²⁵ Alcohol, marijuana, and tobacco are the 3 substances most commonly used by adolescents; these choices are driven by availability and cultural acceptability, including perceived risk of harm. Starting in the late 1990s, the availability, pharmacologic properties, and cultural accessibility of prescription pain medication served as a perfect invitation for adolescents to misuse opioids and develop opioid addiction. The combination of the promotion of opioid medications as safe with easy access through diverted prescriptions (often found in the family medicine cabinet) served as an invitation to adolescents. Unlike heroin in the 1970s, which had to be injected intravenously, opioid pills could be swallowed or nasally insufflated ("snorted"), further lowering the bar for initiation. By the 2000s, the purity of heroin had also increased, allowing users to smoke or snort it. These more accessible ingestion options may have further paved the way for

crossover from pain medications to heroin among even young users.²⁶ Nonmedical use of narcotic medications rose steadily from the early 1990s through the 2000s and then began to decline sharply after 2009 as the public perception of opioids began to change. Similarly, heroin use peaked among high school students in the late 1990s and early 2000s and then declined.²⁷ According to the national Monitoring the Future study, in 2017, the rate of heroin use by high school students was at a 25-year low, whereas the rate of past-year Vicodin use plummeted from 10.5% in 2003 to an all-time low (since data collection began in 2002) of 2% in 2017.²⁷ However, overdose death rates continue to rise because adolescents who do develop opioid use disorders (OUDs) face a landscape of more dangerous drugs, including fentanyl contamination.²⁸

ADOLESCENT TREATMENT

Medication for addiction treatment (MAT) for OUD is the clear standard of care for adults, and the American Academy of Pediatrics recommends MAT for youth (including adolescents and young adults, who are typically cared for in pediatric primary care) with OUD²⁹ because it effectively reduces opioid use.^{30,31} In 2002, the partial opioid agonist buprenorphine was approved as the first new medication for the treatment of opioid addiction in several decades.³² Buprenorphine is a Schedule III, synthetic, partial μ -opioid receptor agonist that has been approved for the treatment of OUD in patients 16 years and older. Its pharmacological profile offers several advantages over full μ -opioid agonist treatments, including a greater margin of safety, less intense withdrawal syndrome for patients who stop taking medication, lower abuse potential, and improved safety profile with limited potential for overdose.³² Because of its high affinity for the

receptor, buprenorphine provides a μ -opioid blockade relative to full agonists that diminishes a patient's ability to become intoxicated with other opioids.³³ Its relatively long half-life of 24 to 60 hours allows for single or divided daily doses.

In 2000, the US Congress passed the Drug Addiction Treatment Act, allowing physicians who receive 8 hours of specialized training to apply to the Drug Enforcement Administration for a waiver to prescribe buprenorphine, thus allowing patients to receive agonist treatment of OUD in general medical settings for the first time in US history. Prescribing in general office settings has the potential to reduce stigma and expand treatment access, particularly for adolescents.³⁰ To date, shortages of buprenorphine prescribers exist; 43% of counties in the United States do not have a single waived physician.³⁴ The problem of access is exaggerated for adolescents; of the 38 000 physicians who are trained and waived to prescribe buprenorphine nationwide, only ~1% are pediatricians.^{35,36}

Currently, <25% of adolescents and young adults (herein, "youth") identified as having OUD are prescribed medications; for those younger than 18, <2% receive MAT.^{37,38} These low rates of MAT for youth are driven in part by a dearth of providers who are trained and waived to manage OUD among youth and in part by an underdeveloped infrastructure for case identification and referral. Few SUD specialty programs provide youth-specific programming; overall, youth fare worse in treatment compared with adults, in large part because of the need for developmentally appropriate care.³⁹ Among the small number of available youth-specific SUD programs, most do not offer medications for OUD.⁴⁰ Adult programs often fail to address critical developmental vulnerability in youth. For example, managing

relationships with parents can be challenging because a growing drive for independence is a normal developmental trope, although patients in treatment for SUDs often benefit from heightened structure, which may limit social activity. A specially trained workforce can help patients and families negotiate these typical challenges. Integration of youth-specific treatment of OUD into youth-serving primary care presents an opportunity to benefit from fundamental core competencies in developmentally informed care for this population. Preparing primary care practices to provide care for adolescents with opioid addiction has the potential to vastly expand acceptable access for this population and also offers benefits for both patients and providers. For example, to date, most physician training in managing substance use is focused on positive reinforcement and brief advice. These activities bring tremendous value to primary care. However, more intensive training and support that prepare physicians to care for youth with more severe SUDs better align addiction medicine with traditional physician training, in which extensive time and energy are devoted to caring for patients with advanced diseases. This more typical model helps physicians gain confidence and competence in clinical decision-making. In preparing physicians, particularly pediatricians, to care for adolescents with OUDs, they may also gain confidence in managing less stigmatized behaviors, such as alcohol, marijuana, and tobacco use. Finally, building a treatment infrastructure for treating SUDs in primary care can help to prepare these offices for epidemics involving other substances in the future.

THE ROLE OF THE PRIMARY CARE PEDIATRICIAN

Substance use accounts for the vast majority of life-years lost due to

disease, disability, and premature death among those aged 15 to 24 and is arguably the most important modifiable health risk behavior impacting adolescents. Youth today face a vast landscape of more potent products, synthetic alternatives, and new delivery methods (such as electronic cigarettes, potent cannabinoids, and fentanyl) that are far more addictive than psychoactive substances that were available to teenagers in the past. Alcohol, marijuana, and tobacco products are the most common substances used by high school students and almost always precede opioid and other drug use; thus, secondary prevention (ie, initiating treatment of other substance use before opioid use ever begins) is a logical strategy. The American Academy of Pediatrics has called on pediatricians to screen all adolescents and young adults for substance use and manage the entire spectrum, from preinitiation to SUD.⁴¹ Integrating SUD treatment within pediatric primary care, and engaging primary care providers in managing substance use as they do other disorders, has the potential to radically revise and dramatically increase access to SUD treatment for youth.

Among adolescents, OUDs are much less common than alcohol, marijuana, and tobacco use disorders, but the death rate among patients with untreated OUD is high.⁴² Treatment of OUD, including prescription medications, using a model that combines primary care management with an integrated behavioral health specialist and expert backup has been demonstrated to be acceptable in pediatric primary care and feasible with subspecialist support.⁴³ Identifying youth with OUDs and attracting them to treatment is likely to require targeted efforts, just as identifying patients with HIV and engaging them in treatment in the 1990s was a challenge that was addressed with the strategy of "seek,

test, treat, retain.”⁴⁴ It is possible that as primary care integration programs become more common, adolescents and parents will recognize their primary care provider as a resource for this type of service.

Primary care physicians will need backup from specialists to support new services and provide consultation for managing complex cases, as occurs in other disciplines. The Prescriber’s Clinical Support System is a national resource funded by the Substance Abuse and Mental Health Services Association that provides educational materials, webinars, and individual mentors to support clinicians caring for patients with OUD. With the recent recognition of addiction medicine as a subspecialty by the American Board of Medical Specialties in 2016,⁴⁵ the field is finally gaining the momentum needed to face the growing burden of addiction in the United States. There are currently 49 addiction psychiatry programs and 52 accredited addiction medicine programs nationwide,⁴⁶ including a pediatric addiction medicine program at Boston Children’s Hospital that is accredited by the American Council on Graduate Medical Education, and several more programs are in development. The addiction medicine multispecialty subspecialty is perfectly situated under the umbrella of preventive medicine, highlighting the importance of prevention and presenting substance use as a modifiable health behavior. Addiction medicine firmly pushes SUDs and related conditions into the realm of medical problems. The nascent field of pediatric addiction medicine, which emphasizes primary and secondary prevention and evidence-based, developmentally appropriate, family-centered early treatment, offers a unique perspective and can serve as a bridge between pediatrics and addiction medicine. Exposing pediatric residents to addiction medicine during training both

introduces knowledge and skills in this area and serves to promote the field as a career option. Policies that incentivize institutions to develop new training programs can ultimately have a multiplier effect because a small group of subspecialists have the capacity to support large numbers of primary care providers.

CONCLUSIONS

New strategies for prevention and treatment are required to reverse the current epidemic of opioid addiction. Substance use initiation most often occurs during childhood or adolescence; hence, prevention efforts are well within the purview of primary care pediatricians. Furthermore, providing interventions for substance use, including OUD treatment that incorporates MAT within primary care pediatrics, is a logical strategy for creating developmentally appropriate access for youth with opioid addiction. In addition to helping bring the current epidemic to an end, the integration of SUD treatment into primary care offers the additional benefits of extending treatment for the more common alcohol, marijuana, and tobacco use disorders and also builds an infrastructure that helps to prepare us for the next epidemic of drug addiction.

ABBREVIATIONS

MAT: medication for addiction treatment
OUD: opioid use disorder
SUD: substance use disorder

REFERENCES

1. Trickey E. Inside the story of America’s 19th-century opiate addiction. *Smithsonian Magazine*. January 4, 2018. Available at: <https://www.smithsonianmag.com/history/inside-story-americas-19th-century-opiate->

[addiction-180967673/](https://www.smithsonianmag.com/history/inside-story-americas-19th-century-opiate-addiction-180967673/). Accessed August 13, 2018

2. US Department of Health and Human Services. HHS acting secretary declares public health emergency to address national opioid crisis. 2017. Available at: <https://www.hhs.gov/about/news/2017/10/26/hhs-acting-secretary-declares-public-health-emergency-address-national-opioid-crisis.html>. Accessed February 20, 2018
3. Substance Abuse and Mental Health Services Administration. Medication-assisted treatment for opioid addiction in opioid treatment programs. TIP 43. 2005. Available at: <https://www.ohsu.edu/xd/health/for-healthcare-professionals/telemedicine-network/for-healthcare-providers/ohsu-echo/addiction-medicine/upload/Medication-Assisted-Treatment-for-Opioid-Addiction.pdf>. Accessed December 6, 2018
4. Albert MR. Nineteenth-century patent medicines for the skin and hair. *J Am Acad Dermatol*. 2000;43(3):519–526
5. Barkan ID. Industry invites regulation: the passage of the Pure Food and Drug Act of 1906. *Am J Public Health*. 1985;75(1):18–26
6. Kandall SR. Women and drug addiction: a historical perspective. *J Addict Dis*. 2010;29(2):117–126
7. Musto DF. Opium, cocaine and marijuana in American history. *Sci Am*. 1991;265(1):40–47
8. Shuster AM. G.I. heroin addiction epidemic in Vietnam. *The New York Times*. May 16, 1971. Available at: <https://www.nytimes.com/1971/05/16/archives/gi-heroin-addiction-epidemic-in-vietnam-gi-heroin-addiction-is.html>. Accessed August 14, 2018
9. Janos A. G.I. drug use in Vietnam soared—with their commanders’ help. *History*. April 18, 2018. Available at: <https://www.history.com/news/drug-use-in-vietnam>. Accessed August 14, 2018
10. Gupta S. Vietnam, heroin and the lesson of disrupting addiction. *CNN*. December 22, 2015. Available at: <https://www.cnn.com/2015/12/21/health/vietnam-heroin->

- disrupting-addiction/index.html. Accessed August 14, 2018
11. Simon LS. Relieving pain in America: a blueprint for transforming prevention, care, education, and research. *J Pain Palliat Care Pharmacother.* 2012;26(2):197–198
 12. Porter J, Jick H. Addiction rare in patients treated with narcotics. *N Engl J Med.* 1980;302(2):123
 13. Partnership for a Drug-Free America. The partnership attitude tracking study (PATS): teens 2007 report. 2008. Available at <https://drugfree.org/wp-content/uploads/2011/04/PATS-Teens-2007-Full-Report.pdf>. Accessed December 7, 2018
 14. Guy Gery P Jr, Zhang Kun, Bohm MK, et al. Vital Signs: Changes in Opioid Prescribing in the United States, 2006–2015. *MMWR Morb Mortal Wkly Rep.* 2017;66:697–704
 15. Besteman KJ. In: Gerstein DR, Harwood HJ, eds. *Treating Drug Problems: Volume 2: Commissioned Papers on Historical, Institutional, and Economic Contexts of Drug Treatment.* Washington, DC: National Academies Press; 1992:63–88
 16. Rettig RA, Yarmolinsky A, eds; Institute of Medicine (US) Committee on Federal Regulation of Methadone Treatment. *Federal Regulation of Methadone Treatment.* Washington, DC: National Academies Press; 1995
 17. Arain M, Haque M, Johal L, et al. Maturation of the adolescent brain. *Neuropsychiatr Dis Treat.* 2013;9:449–461
 18. Galvan A. Adolescent development of the reward system. *Front Hum Neurosci.* 2010;4:6
 19. Center for Behavioral Health Statistics and Quality. *Results From the 2013 National Survey on Drug Use and Health: Detailed Tables.* Rockville, MD: Substance Abuse and Mental Health Services Administration; 2014
 20. Casey BJ, Jones RM, Hare TA. The adolescent brain. *Ann N Y Acad Sci.* 2008;1124:111–126
 21. Benowitz NL. Nicotine addiction. *N Engl J Med.* 2010;362(24):2295–2303
 22. Hingson RW, Heeren T, Winter MR. Age at drinking onset and alcohol dependence: age at onset, duration, and severity. *Arch Pediatr Adolesc Med.* 2006;160(7):739–746
 23. Le Strat Y, Dubertret C, Le Foll B. Impact of age at onset of cannabis use on cannabis dependence and driving under the influence in the United States. *Accid Anal Prev.* 2015;76:1–5
 24. McCabe SE, West BT, Morales M, Cranford JA, Boyd CJ. Does early onset of non-medical use of prescription drugs predict subsequent prescription drug abuse and dependence? Results from a national study. *Addiction.* 2007;102(12):1920–1930
 25. Strasburger VC; Committee on Communications, American Academy of Pediatrics. Children, adolescents, and advertising. *Pediatrics.* 2006;118(6):2563–2569
 26. Hopfer CJ, Khuri E, Crowley TJ. Treating adolescent heroin use. *J Am Acad Child Adolesc Psychiatry.* 2003;42(5):609–611
 27. Johnston LD, Miech RA, O'Malley PM, Bachman JG, Schulenberg JE, Patrick ME. *Monitoring the Future National Survey Results on Drug Use, 1975-2016: Overview, Key Findings on Adolescent Drug Use.* Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2018
 28. Curtin SC, Tejada-Vera B, Warner M. *Drug Overdose Deaths Among Adolescents Aged 15–19 in the United States: 1999–2015. NCHS data brief, no 282.* Hyattsville, MD: National Center for Health Statistics; 2017
 29. Committee on Substance Use and Prevention. Medication-assisted treatment of adolescents with opioid use disorders. *Pediatrics.* 2016;138(3):e20161893
 30. Woody GE, Poole SA, Subramaniam G, et al. Extended vs short-term buprenorphine-naloxone for treatment of opioid-addicted youth: a randomized trial. *JAMA.* 2008;300(17):2003–2011
 31. Marsch LA, Moore SK, Borodovsky JT, et al. A randomized controlled trial of buprenorphine taper duration among opioid-dependent adolescents and young adults. *Addiction.* 2016;111(8):1406–1415
 32. Substance Abuse and Mental Health Services Administration (SAMHSA). Buprenorphine. Available at: <https://www.samhsa.gov/medication-assisted-treatment/treatment/buprenorphine>. Accessed August 15, 2018
 33. Colson J, Helm S, Silverman SM. Office-based opioid dependence treatment. *Pain Physician.* 2012;15(suppl 3):ES231–ES236
 34. Huhn AS, Dunn KE. Why aren't physicians prescribing more buprenorphine? *J Subst Abuse Treat.* 2017;78:1–7
 35. SAMHSA. Medication-assisted treatment: physician and program data. Available at: <https://www.samhsa.gov/programs-campaigns/medication-assisted-treatment/training-materials-resources/physician-program-data>. Accessed August 17, 2018
 36. Hadland SE, Wood E, Levy S. How the paediatric workforce can address the opioid crisis. *Lancet.* 2016;388(10051):1260–1261
 37. Hadland SE, Wharam JF, Schuster MA, Zhang F, Samet JH, Larochelle MR. Trends in receipt of buprenorphine and naltrexone for opioid use disorder among adolescents and young adults, 2001-2014. *JAMA Pediatr.* 2017;171(8):747–755
 38. Feder KA, Krawczyk N, Saloner B. Medication-assisted treatment for adolescents in specialty treatment for opioid use disorder. *J Adolesc Health.* 2017;60(6):747–750
 39. Schuman-Olivier Z, Weiss RD, Hoepfner BB, Borodovsky J, Albanese MJ. Emerging adult age status predicts poor buprenorphine treatment retention. *J Subst Abuse Treat.* 2014;47(3):202–212
 40. Saloner B, Feder KA, Krawczyk N. Closing the medication-assisted treatment gap for youth with opioid use disorder. *JAMA Pediatr.* 2017;171(8):729–731
 41. Committee on Substance Use and Prevention. Substance use screening, brief intervention, and referral to treatment. *Pediatrics.* 2016;138(1):e20161210
 42. Sordo L, Barrio G, Bravo MJ, et al. Mortality risk during and after opioid substitution treatment: systematic review and meta-analysis of cohort studies. *BMJ.* 2017;357:j1550

43. Levy S, Mountain-Ray S, Reynolds J, Mendes SJ, Bromberg J. A novel approach to treating adolescents with opioid use disorder in pediatric primary care [published online ahead of print March 29, 2018]. *Subst Abus*. doi:10.1080/08897077.2018.1455165
44. Chandler RK, Kahana SY, Fletcher B, et al. Data collection and harmonization in HIV research: the seek, test, treat, and retain initiative at the national institute on drug abuse. *Am J Public Health*. 2015;105(12):2416–2422
45. Davis B; ASAM. ASAM celebrates as addiction medicine is recognized as new medical subspecialty. 2016. Available at: <https://www.asam.org/resources/publications/magazine/read/article/2016/03/14/asam-celebrates-as-addiction-medicine-is-recognized-as-new-medical-subspecialty>. Accessed August 15, 2018
46. Debaeky ME, Asghar-Ali AA, Stanton LA, Guthrie TM, Strauss JB. Addiction psychiatry programs. 2018. Available at: <https://apps.acgme.org/ads/Public/Reports/ReportRun?ReportId=1&CurrentYear=2018&SpecialtyCode=401&IncludePreAccreditation=false>. Accessed August 15, 2018

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