

## Heroin use in adolescents and young adults admitted for drug detoxification<sup>☆</sup>

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### Abstract

**Purpose:** To examine heroin use and associated morbidity in young adults undergoing drug detoxification. **Methods:** A retrospective chart review of all persons (ages 18–25) admitted to either of the two state-funded detoxification facilities in Rhode Island was conducted between June 1998 and June 1999. Only those reporting heroin as a primary drug were included in this study ( $N=201$ ). **Results:** Clients were largely male (64%), and white (79%), with a mean age of 22. Of those that reported heroin as their primary drug, 62% used primarily by injection. Mean age of initiation for heroin use was 18.3 years. Twenty-two percent reported a psychiatric diagnosis, and 80% reported a substance-abusing family member. Injection, previous overdose, and a mother with a history of substance use were associated with early initiation of heroin use. **Conclusions:** The majority of young adults with heroin addiction undergoing detoxification began using heroin during late adolescence. Cooccurrence of psychiatric and medical diagnoses with heroin addiction was common, and may contribute to the severity of drug use. Efforts to identify risk factors for heroin and other injection drug use in adolescents and young adults will be critical for the design of effective interventions to prevent injection drug use and its associated morbidities. © 2001 Elsevier Science Inc. All rights reserved.

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## 1. Introduction

The percentage of adolescents and young adults who use heroin in the United States has gradually increased in the past decade (Johnston, O'Malley, & Bachman, 2001; Substance Abuse and Mental Health Services Administration (SAMHSA), 1999). Between 1990 and 2000, the prevalence of heroin use among high school seniors as measured by the Monitoring the Future survey tripled from 0.5% to 1.5%, bringing the prevalence rate to the highest it has been since 1975 when the survey began (Johnston et al., 2001). Since 1992, heroin-related visits to emergency departments have increased 158% among the 18–25-year-old age group, suggesting not only an increase in heroin use, but also in heroin abuse among adolescents and young adults (NIDA, 2000).

Progression from substance use to abuse and dependence may develop more rapidly among adolescents than adults, and often interferes with cognitive, social, and emotional development (Bruner & Fishman, 1998). Previous research has identified the early onset of drug use to be a significant predictor of long-term substance abuse patterns (Weinberg, Rahdert, Colliver, et al., 1998). In particular, it has been observed that youth with an earlier age of onset for drugs such as tobacco, alcohol, and marijuana are more likely to progress to illicit drugs such as heroin and cocaine (Kandel & Yamaguchi, 1993; Yamaguchi & Kandel, 1984). It has also been observed that among adult users of heroin and other illicit drugs, there is a high prevalence of polydrug use, indicating that as drug users progress from one drug to the next, they are likely to maintain use of previous drugs (Carpenter, Chutuape, & Stitzer, 1998; Clayton, 1986; Darke & Hall, 1995).

Substance abuse, and, in particular, polysubstance use, in adolescents and young adults may be suggestive of cooccurring behavioral, medical, social, and/or emotional difficulties (Darke & Ross, 1997; Weinberg et al., 1998). Adolescent and young adult substance abusers are also at elevated risk for acquiring infectious diseases, particularly sexually transmitted infections and viral pathogens such as HIV, hepatitis B, and hepatitis C due to their involvement in such high-risk behaviors as injection drug use, sharing injection equipment, inconsistent condom use, commercial sex work, and having multiple sexual partners (Kipke, Unger, Palmer, et al., 1996; Rotheram-Borus, Gillis, Reid, et al., 1997).

Little is known about heroin-using adolescents and young adults who have progressed to heroin abuse and dependence (Hopfer, Mikulich, & Crowley, 2000; Schwartz, 1998). The objective of this study was to characterize patterns of heroin use and its concomitant morbidities in a population of adolescent and young adult substance abusers (ages 18–25) entering two drug detoxification facilities in Rhode Island.

## 2. Methods

### 2.1. Data collection

A retrospective review was conducted of all available and complete medical charts of adolescent and young adult substance abusers (ages 18–25) who entered the only two state-

funded detoxification facilities in Rhode Island between June 1, 1998 and May 31, 1999. The age range of 18–25 years was chosen because persons younger than 18 years are rarely admitted to these facilities, and whenever possible are referred to other programs. A data collection form was used to record information regarding patients' demographics, current drug use, prior drug treatment, psychiatric diagnoses and comorbidities, and medical history from the facility's standardized clinical admission form. The age of initiation was available only for clients' current drugs of addiction. For clients with multiple admissions, information was abstracted only from the most recent admission. The data collection form was assigned an anonymous code that reflected the site at which the chart was read and the order in which it was reviewed. A small proportion of charts were not reviewed because the admission forms were incomplete (this occurred due to some clients' short duration of stay), or because the clients' charts were not available. Only those 201 charts that revealed heroin as the primary drug are included in this analysis. This study was approved by the Institutional Review Board of the Miriam Hospital.

## *2.2. Facility*

The two state-funded detoxification facilities together have approximately 3800 admissions each year. The program offers both medical and counseling services over a period of up to 7 days. In general, about 76% of patients are male, 80% are white, 8% black, and 9% Hispanic or Latino. Only 47% of patients complete the program with an aftercare referral plan, and 29% leave the program prior to completing their medical protocol (Emsellem, 1999).

## *2.3. Statistical analyses*

Chi-squared and independent samples *t* tests were used to examine the relationships between demographic and substance use variables. As stated previously, the age of onset represents the age at which clients initiated drugs that they are currently using, including heroin. Analyses were performed using Stata statistical software (Stata, 2001).

# **3. Results**

## *3.1. Demographics and drug use patterns*

Between June 1, 1998 and May 31, 1999, 326 individuals 18–25 years of age were admitted to the detoxification centers. The charts of 261 clients (80%) were reviewed. Of those, 201 clients (77%) reported heroin as their primary drug of addiction; alcohol and cocaine/crack were reported as a primary drug by 16.1% and 4.2% of the population, respectively. Females were significantly more likely than males to report heroin as their drug of choice (90.0% vs. 71.3%;  $\chi^2 = 10.9$ ;  $P = .009$ ). This paper focuses on the 201 clients that reported heroin as their primary drug.

Demographic information for the population of heroin users is described in Table 1. The mean age of the population was 22 years (range 18–25). The majority of the individuals were male (64.2%), white (79.4%), and uninsured (93.5%). The greatest proportion of clients, 56.2%, lived with their parents and 15.4% reported being homeless. Of the 158 clients for whom data are available, 20.9% reported living with someone who currently has a substance abuse problem. Clients reported completing an average of 11.4 years of education.

Substance use characteristics among those reporting heroin as their primary drug of addiction are also presented in Table 1. Sixty-two percent of current heroin users reported injection drug use, while 37.8% reported sniffing or inhaling it. The primary route of drug administration did not differ by gender, however it did differ by the age at which heroin use was initiated (age of onset). Injectors reported an earlier age of heroin initiation than sniffers (17.7 vs. 19.3;  $P = .0002$ ). In addition, among primary heroin users currently using more than one substance, injectors reported an earlier age of initial substance use than sniffers (16.0 vs. 17.4;  $P = .004$ ).

Approximately two-thirds (62.7%) of clients admitted for heroin use reported currently using (daily to 1 time/month) more than one substance. The most commonly reported

Table 1

Demographic and reported drug use characteristics of adolescent and young adult heroin users in RI state-funded detoxification facilities ( $N = 201$  unless otherwise stated)

	<i>N</i>	Percentage (%)
<i>Demographic variable</i>		
Male	129	64.2
Female	72	35.8
Race/ethnicity ( $N = 199$ )		
White	158	79.4
Hispanic	30	15.1
Black	3	1.5
Other	8	4.0
Age		
18–21	111	42.5
22–25	150	57.5
<i>Drug use</i>		
Route of administration		
Inject	125	62.2
Sniff/inhale	76	37.8
Secondary drug use (in past month) $N = 126$		
Cocaine/crack	68	54.0
Marijuana	65	51.6
Alcohol	41	32.5
Sedatives <sup>a</sup>	32	25.4
Opiates <sup>b</sup>	12	9.5
Hallucinogens <sup>c</sup>	3	2.4

<sup>a</sup> Benzodiazepines including Ativan, Xanax, Valium, Klonopin, Sleep meds.

<sup>b</sup> Morphine, Vicodin.

<sup>c</sup> Acid, Mescaline, LSD, Mushrooms.

secondary drugs were cocaine (54%), marijuana (51.6%), alcohol (32.5%), sedatives (25.4%), and opiates (morphine, Vicodin) (9.5%). Heroin users reporting current use of additional substances reported an earlier age of substance use than those that reported only current heroin use (15.8 vs. 18.0;  $P < .0001$ ). Polysubstance use was not significantly associated with gender, route (injection vs. sniffing), or age of onset of heroin use.

The mean age of initiation for heroin users was 18.2 years. Among the 200 heroin users who reported their age of first heroin use, 55.5% initiated use at 18 years or younger. Among clients currently using drugs in addition to heroin who reported ages of onset for those drugs, the mean age of initiation for alcohol ( $N=40$ ), marijuana ( $N=57$ ), and cocaine ( $N=65$ ) was 13.8, 14.6, and 18.1 years, respectively.

### 3.2. Family history

The majority (79.6%) of clients whose primary drug was heroin reported current substance abuse by an immediate family member. Females were significantly more likely than males to report a father (54.2% vs. 35.7%;  $\chi^2 = 6.5$ ;  $P = .01$ ) or mother (30.6% vs. 13.2%;  $\chi^2 = 8.9$ ;  $P = .003$ ) with a substance abuse problem. Those patients reporting a mother with a current substance abuse problem reported a younger age of onset of heroin use, compared to those who did not report a mother with a current substance abuse problem (17.4 vs. 18.6 years;  $P = .02$ ). Individuals who reported a father with a current substance abuse problem were not significantly more likely to report a younger age of initiation of drug use, however.

### 3.3. Psychiatric history

Of the 200 heroin using patients for whom data are available, 44 (22.0%) reported a history of psychiatric diagnoses, including depression (16.0%), bipolar disorder (3.5%), and ADD/ADHD (2.5%). Females were significantly more likely than males to report a psychiatric illness (34.7% vs. 14.8%;  $\chi^2 = 10.6$ ;  $P = .001$ ). There was a trend for polysubstance abusers to be more likely than abusers of a single substance to report a psychiatric illness (28.2% vs. 14.9%;  $P = .06$ ). The age of heroin initiation was not significantly younger for clients who reported a previous diagnosis of a psychiatric illness. However, among the heroin patients currently using additional substances, those reporting a previous diagnosis of a psychiatric illness reported an earlier first age of drug initiation than those who did not report a previous psychiatric diagnosis (15.6 vs. 16.8;  $P = .03$ ). Of the 200 clients for whom data are available, 43 clients (21.5%) reported a suicide attempt in the past. Sixty-eight of the 200 clients (34.0%) reported a prior overdose. Individuals who had overdosed reported a lower age of heroin onset than those who had not (17.4 vs. 18.8;  $P < .001$ ).

### 3.4. Medical history

Ninety-eight clients (48.8%) reported current or past medical diagnoses (Table 2), among which asthma was the most commonly reported. Hepatitis B and C were reported by only 6.0% and 7.0% of clients, respectively. Prevalence rates reported among IDUs were 9.6% and

Table 2  
Reported medical diagnoses

Medical diagnoses ( <i>N</i> = 201)	<i>N</i>	Percentage (%)
No reported diagnoses	103	51.2
Asthma	27	13.4
Hepatitis C	14	7.0
IDUs ( <i>N</i> = 125)	14	11.2
Hepatitis B	12	6.0
IDUs ( <i>N</i> = 125)	12	9.6
Urinary tract infection	10	5.0
Seizures	10	5.0
Peptic ulcer disease	7	3.5
Peripheral neuropathy	4	2.0
Pancreatitis	3	1.5
Endocarditis	3	1.5
Sexually transmitted disease	3	1.5
Hypertension	1	0.5
Scoliosis	1	0.5

11.2% for hepatitis B and C, respectively. Three clients reported a previous sexually transmitted disease, and three reported a history of endocarditis. Females were more likely than males to report being diagnosed with a medical condition (65.3% vs. 39.5%;  $\chi^2 = 12.3$ ;  $P < .001$ ). Seven female substance abusers (9.7%) were pregnant at the time of their admission to the detoxification facility.

#### 4. Discussion

This study describes the drug use patterns and related medical, family, and psychiatric histories of a population of adolescent and young adult heroin users undergoing detoxification. Recent studies have noted an increasing trend in heroin use since the early 1990s, particularly among late adolescents (Johnston et al., 2001; SAMHSA, 1999; Schwartz, 1998). Reasons for this rise in heroin use are unclear, but may be attributed to several factors. Heroin has become less costly, thus increasing its availability to teenagers (Bruner & Fishman, 1998). Heroin has also become available in more potent forms, allowing the drug to be snorted or sniffed to achieve its psychotropic effects (Bruner & Fishman, 1998; Fishman, Bruner, & Hoover, 1997; Schwartz, 1998).

Previous research has identified early age of onset into drug use to be an important predictor of subsequent drug use disorders (Kandel & Yamaguchi, 1993; Weinberg et al., 1998). Surveys of drug use among teenagers, such as Monitoring the Future, have traditionally shown rates of heroin use to be low. However, our data from this heroin-addicted young adult population reveal that late adolescence is when heroin use commonly begins. We found that the mean age of initiation among heroin users was 18.3 years. Most notably, over half of the heroin users in this study began using heroin at age 18 or younger,

and this young age of heroin onset was significantly associated with increased risk of overdosing.

Among clients who reported heroin as their primary drug, polysubstance abuse was also common, with nearly two-thirds having used more than one drug in the month prior to admission. The secondary drugs most commonly reported, cocaine, marijuana, alcohol, and benzodiazepines, are similar to those reported in previous studies among polysubstance heroin users (Dinwiddie, Cottler, Compton, & Abdallah, 1996; Kidorf, Brooner, King, et al., 1996). Among heroin users who reported current use of multiple drugs, we found that the mean age of initiation was youngest for alcohol (13.8 years) followed by marijuana (14.6 years), cocaine/crack (18.1 years), and heroin (18.3 years). In previous studies, a common progression from legal drugs (alcohol and/or cigarettes) to marijuana to other illicit drugs has been demonstrated among high school students (Kandel & Yamaguchi, 1993; Yamaguchi & Kandel, 1984). Whether drug progression generally follows the same sequence for our population is an important question because elucidating the sequence of drug use in young heroin users has important implications for the design of effective interventions to prevent heroin abuse. However, this retrospective chart review focused only on age of first use for currently used drugs, and did not include a comprehensive history of drugs used by all participants. Thus, our study is unable to assess the sequence of drugs used by young heroin users, and, therefore, this remains an important unanswered question for future work.

Injection drug use was also common in our study cohort, with nearly two-thirds of heroin users reporting recently injecting. This proportion is high given the recent trend towards sniffing or inhaling heroin, particularly in younger populations (Johnston et al., 2001). However, it may be that injectors of heroin are more likely than sniffers to seek detoxification at state funded facilities. We found that the mean age among both groups was the same (22 years); yet, the age of onset for heroin use was significantly younger for injectors as compared to sniffers. It may be that those who started using heroin at an earlier age were more likely to report being current injectors simply because they had been using heroin for a longer time, and thus had a longer opportunity to progress to injecting the drug.

There have been few studies examining the transition from sniffing or inhaling heroin to injecting and the variables involved. It may be that adolescents and young adults who initiate heroin use through sniffing are at high risk for progression to injection use. However, due to the increased purity of heroin in recent years, it is now possible to achieve pharmacological effects through sniffing or inhaling similar to those achieved through injection (Bowersox, 1995). This may mean that heroin sniffers have less reason to progress to heroin injection. Because of the increase in heroin sniffing in recent years, better understanding of these issues will be important, particularly in designing interventions to prevent injection use among adolescents and young adults. Further prospective studies are needed to elucidate risks and patterns of progression to injection drug use.

Few studies have reported on the health conditions of heroin users, particularly among adolescents and young adults. Medical complications of heroin use can be wide ranging and often extend beyond the disease of addiction. A surprisingly small proportion of individuals reported hepatitis C and hepatitis B infection. Other studies have shown prevalence rates of recent-onset IDUs to be particularly high; Garfein, Vlahov, Galai, et al., 1996 found that

76.9% and 65.7% of IDUs who had injected for 1 year or less tested positive for hepatitis C virus and hepatitis B virus, respectively. The prevalence reported here is likely an underestimate given that many individuals with hepatitis C and B do not know that they are infected, largely because hepatitis B and hepatitis C testing is not routinely offered and can be difficult to obtain among those without health insurance. A number of the reported diagnoses were uncommon and presumably consequences of drug use, such as endocarditis, a condition often associated with injection drug use, and peripheral neuropathy, commonly seen with alcohol withdrawal and HIV infection.

Only a very small percentage of clients reported a prior STD (1.5%). Clients may have been hesitant to disclose that information to the staff nurse. Alternatively, they may have been unaware of having had a STD. Data from a small study of STD prevalence among the women at this facility using ligase chain reaction testing for gonorrhea and chlamydia, and cultures for trichomonas found an overall STD prevalence of 35.5% (11/31) for young women ages 19–25 (Lally, 2000). While these numbers are small and include women with primary drugs of addiction other than heroin, the fact that these were current infections indicates that STDs may be more prevalent in this population than suggested by our self-reported data and suggests the need for routine STD testing. As stated in the Methods, we were unable to assess the prevalence of HIV in this population because the facility does not record that information in patients' charts. Finally, seven women reported being pregnant upon their admission to the detoxification center. While it is unclear whether these women were receiving antenatal care, this finding underscores the need to ensure efficient linkages to prenatal counseling and care for pregnant adolescents with substance abuse.

Our findings uphold reports that substance abuse is often concomitant with psychiatric disorders, such as depression and ADHD, in adolescents and young adults (Weinberg et al., 1998; Whitmore, Mikulich, Thompson, et al., 1997). We also found that clients with a previous psychiatric diagnosis began using drugs at a younger age. In addition, polysubstance abusers were more likely to report a psychiatric diagnosis than those reporting only one drug of addiction. While these correlations do not imply causality, they are suggestive of an important relationship between mental illness and substance abuse disorders. Increased identification and treatment of psychiatric disorders among adolescents may help to prevent substance abuse, as well as improve treatment outcomes in this population.

The majority of heroin addicted young adults in this study reported living with one or more parent (56.2%). There have been relatively few studies on the effects of parental substance use on the use of drugs in their children (Johnson & Leff, 1999). However, the data from our study suggest that substance use by a parent may be a factor in the early initiation of heroin use in teens. Not only did the majority of clients in this study report current substance abuse by a family member, but having a mother with a current substance abuse problem was significantly associated with a younger age of heroin initiation. Female heroin users were significantly more likely to report having a parent with a current substance abuse problem, indicating that parental drug use may affect the early use of heroin more for adolescent girls than boys. Such associations will need to be elucidated by further careful study.

Several limitations of our study should be acknowledged. First, since this research involved a retrospective chart review, our data collection was restricted to the information

that was recorded in patients' charts. Second, much of the data, including polydrug use and medical history, was based on clients' self-report. The validity of this information is limited due to the possibility of inaccurate reporting. However, data abstracted from the medical records regarding primary drug use were validated by the withdrawal symptoms witnessed and recorded by nurses and counselors. In addition, because polysubstance data was only recorded for clients reporting current polysubstance use, we were not able to obtain polysubstance history or drug sequencing information for those clients no longer using multiple drugs. Finally, because the participants in this study were seeking treatment for their addiction, this population only included those young heroin users in detoxification facilities and may not be generalizable to all adolescent and young adult heroin abusers.

In conclusion, our data indicates that the initial use of heroin in this population often occurs during the teenage years. It should be kept in mind that this study describes only the fraction of the young heroin-using population in Rhode Island seeking admission to publicly funded acute drug treatment facilities. Undoubtedly, the population described here is only the "tip of the iceberg," since the potentially large number of young heroin users not receiving acute care are not included in this study. Our findings underscore that providers of adolescent health care must be cognizant of heroin abuse among youth, its initiation at young age, its cooccurrence with other drug use, its cooccurrence with psychiatric disorders, and the impact of family drug use history on teenagers' heroin initiation patterns. Such heightened awareness hopefully can result in increased diagnoses of adolescents with heroin addiction, allowing for their referral to substance abuse treatment and/or counseling. Further research is needed to delineate the precursors to adolescent heroin use so that effective measures may be developed to prevent its first use and the progression to dependence.

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