

Characteristics of Patients Presenting at an Emergency Department for a Heroin Overdose vs Detoxification

Kenneth E Leonard ¹, Joshua J Lynch ², Florence W Leong³, Daniel J Kruger ², Brian M Clemency²

¹Department of Psychiatry and Clinical and Research Institute on Addiction, University at Buffalo, The State University of New York, Buffalo, NY, USA; ²Department of Emergency Medicine and Clinical and Research Institute on Addiction, University at Buffalo, The State University of New York, Buffalo, NY, USA; ³Clinical and Research Institute on Addiction, University at Buffalo, The State University of New York, Buffalo, NY, USA

Correspondence: Kenneth E Leonard, Clinical and Research Institute on Addictions, University at Buffalo, 1021 Main Street, Buffalo, NY, 14203, USA, Email Kleonard@buffalo.edu

Purpose: This study compares substance use, treatment histories, and sociodemographic characteristics of patients presenting to an emergency department (ED) following a heroin overdose or seeking detoxification services for heroin and examines risk factors for a subsequent return to the ED for a substance-related problem.

Methods: A convenience sample of patients presenting for an overdose or detoxification at an urban teaching ED was recruited for this study. During their ED visit, patients were interviewed regarding demographics, substance use experiences, and treatment history. Subsequently, a review of patient records for past and subsequent ED use was performed.

Results: Patients requesting detox and those with an overdose were similar in terms of prior treatment. Both groups had similar extensive polysubstance histories. As a group, however, patients presenting for detox were more likely to report use of each of three substances (benzodiazepines, opioid pain medications, and heroin) more than three times per week, compared to those presenting for overdose. Detox patients had higher scores on the 3-item Alcohol Use Disorder Identification Test-C and the drug problems scale compared to overdose patients. Overall, 28% of the patients returned to the ED within 90 days for a drug-related issue, including 8% that returned for an overdose. Factors predictive of a return ED visit included ED visits for substance use in the previous year and recent frequent heroin use.

Conclusion: Patients requesting detox were similar in most domains to those presenting following an overdose. Notably, overdose patients were less likely to use heroin more than three times per week compared to detox patients. Both groups were equally likely to return for an SUD reason within 3-months, however for both groups, previous ED visits and recent frequent heroin use predicted a return visit.

Keywords: heroin, overdose, recidivism, detoxification

Introduction

Emergency departments (ED) are a primary contact point for patients with an opioid overdose or for other opioid-related services. These facilities also encounter patients experiencing withdrawal symptoms, which, when severe, require hospitalization for detoxification. In New York, for example, almost all medical detoxification occurs in hospitals and medical centers, often with access through the Emergency Department. From 2000 to 2011, there were nearly 3 million visits to an ED for opioid overdose, abuse, or dependence in the United States.¹ The rate of ED visits increased nearly 30% from 2015 to 2016, and by nearly 30% again from 2016 to 2017.² During the COVID-19 pandemic, visits for substance use disorder (SUD) in the US became a larger proportion of overall ED volume.³ Although deaths due to fentanyl have eclipsed deaths from heroin in recent years, heroin is still reported as the reason for an ER visit more often than fentanyl,⁴ although even in 2018, many heroin overdoses may have also involved fentanyl.⁵ Individuals addicted to opioids are routinely seen for services in hospital EDs, but little is known regarding the drug use and treatment histories of these patients. Research has shown that a non-fatal overdose is a substantial risk factor for a subsequent fatal overdose and that the risk for a fatal overdose increases among individuals with multiple episodes of non-fatal

overdoses.⁶ Studies in other countries report that many of these patients had previous ED visits or treatment for substance use and that a sizeable minority returned to the ED for a subsequent opioid problem.⁷⁻⁹ For example, Friebe and Maynou reported a 30-day readmission rate of 17.9% in 2018. We were able to find one study that reported on the likelihood of a repeat non-fatal overdose following a non-fatal overdose in the United States.¹⁰ This study examined nearly 4000 patients in an integrated healthcare system who had experienced a non-fatal overdose between 2008 and 2016. They reported that 7% experienced a repeat overdose within one year of the index visit. There is little information in the US regarding the short-term prevalence of subsequent ED visits, or whether there are differences between patients presenting with an overdose versus patients seeking treatment (detoxification). The purpose of this study was to examine the substance use, treatment histories, and prevalence of prior and subsequent utilization of the ER for an overdose or detoxification among patients presenting for heroin detoxification or overdose. Although there was little empirical literature, we hypothesized that those presenting for detoxification would have indications of greater severity (eg, more previous ER visits for overdoses, more substance use) leading them to seek further treatment.

Materials and Methods

Method

This study focused on patients presenting to an ED for SUD care for either an overdose or requesting crisis/detoxification services. In New York State, nearly all the medically managed detoxification services occur within a medical center or hospital. The study involved a 25-minute interview with trained students volunteering in the ED during the index visit. A list of ID numbers and identifying information was maintained by ED staff. Three months after all participants were recruited, an ED staff researcher collected the medical records for ED use for the year prior to the interview and the 3 months following the interview. Data from the interview and the medical records were matched by the ID number, and no identifying information was retained. This study was approved by the University at Buffalo Institutional Review Board and complies with the Declaration of Helsinki.

Participants

A convenience sample of patients presenting to the ED of an urban tertiary care teaching hospital in Western New York who indicated that they had overdosed on heroin or were requesting detoxification service for heroin use was eligible to participate. The focus on the study was on predictors of receiving treatment after a visit to the ED for a heroin overdose or detoxification. Patients were recruited and interviewed by data collectors blinded to the study hypotheses regarding differences between overdose and detoxification patients and specific predictors of post ED treatment. Participants were offered a \$20 gift card for participation in the study.

Interview and Chart Review

Patients were asked about demographic and social determinant of health characteristics. Substance use history was obtained and lifetime use, use in the last three months, and use on more than three days per week were determined. Experience with different types of SUD treatment for alcohol or drugs was obtained, as was information about methadone and suboxone use as part of treatment (detox, inpatient, outpatient, self-help, methadone, suboxone). The 3-item Audit Screen (AUDIT-C)¹¹ was used to assess for possible Alcohol Use Disorder. A score of 4 or greater is a predictor of an alcohol use disorder. Finally, a drug problems scale based on items from the Semi-Structured Assessment for the Genetics of Alcoholism¹² was administered. This Likert scale asked how frequently each of the 11 problems had been experienced due to drug use, including items such as “been arrested or had any other trouble with the police”, “failed to do what is expected”, and “lost interest in activities and hobbies” (alpha = 0.82). Participants consented to a review of their medical records at the study hospital to determine ED use for SUD in the preceding year and in the three months following the index visit. In addition, we collected information regarding the presence of psychiatric diagnoses in the medical records.

Analysis

Descriptive statistics were generated based on data from both the interview and chart review. Participants were grouped by the reason for the index visit (overdose versus detox). Group characteristics and SUD history, prior SUD treatment,

and number of return visits were compared. Most variables were categorical and were analyzed with chi-square analyses. For analysis of the AUDIT-C and the drug problems scale, we utilized *t*-tests. Logistic regression was also used to predict return to the ED.

Results

Patient Characteristics

Between May 2016 and March 2017, 197 patients, 47 (24%) with an overdose and 153 (76%) requesting detoxification services, were recruited for the study. The majority were male, and male patients were more likely to present for overdose than for detox (72% of overdose vs 55% of detox, $p < 0.05$) (see Table 1). The mean age was 33.7 (SD = 11.15). Most patients in both groups were white, unemployed, had at least a high-school education, and were never married, but did not live alone.

Substance Use History

Patients presenting for opioid overdose or detox reported an extensive history of polysubstance use (Table 1). According to the medical records, more than half (57%) did not visit this specific ED in the preceding year and 21% reported a single visit in the preceding year. However, according to self-report, only about one-third reported no previous visit to

Table 1 Patient Characteristics, Substance Use and Treatment History (n = 197)

		Detox	Overdose	p value
		n (%) ^a	n (%)	
Total		150	47	
Age		33.8 (12.0)	32.1 (9.6)	p = 0.38
Male		82 (55%)	34 (72%)	p < 0.03
Female		68 (45%)	13 (28%)	
Race				
	White	117 (78%)	42 (89%)	p = 0.085
	Black	15 (10%)	1 (2%)	
	Native American	4 (3%)	0 (0%)	
	Mixed or other	14 (9%)	4 (9%)	
Hispanic Ethnicity		13 (9%)	5 (11%)	p = 0.69
Employed		36 (24%)	17 (36%)	p = 0.10
High school or less education		90 (60%)	30 (64%)	p = 0.64
Lives alone		47 (32%)	11 (23%)	p = 0.63
Any Psychiatric Diagnosis		51 (34%)	17 (36%)	p = 0.92
Use in last 3 month				
	Marijuana	93 (62%)	31 (66%)	p = 0.62
	Cocaine	102 (68%)	23 (49%)	p = 0.02
	Benzodiazepine	96 (64%)	22 (47%)	p = 0.04
	Opiate Pills	73 (49%)	16 (34%)	p = 0.08
	Heroin	148 (99%)	45 (96%)	P = 0.22

(Continued)

Table 1 (Continued).

		Detox	Overdose	p value
		n (%) ^a	n (%)	
Use more than 3 time per week				
	Marijuana	37 (25%)	11 (23%)	p = 0.86
	Cocaine	43 (29%)	7 (15%)	p = 0.06
	Benzodiazepine	47 (31%)	7 (15%)	p = 0.03
	Opiate Pills	38 (25%)	4 (8%)	P = 0.01
	Heroin	123 (82%)	20 (43%)	p < 0.001
Past year treatment				
	Detox	47 (33%)	13 (30%)	p = 0.70
	Inpatient	39 (27%)	13 (28%)	p = 0.88
	Outpatient	53 (44%)	19 (49%)	p = 0.62
	Self Help	60 (43%)	20 (49%)	p = 0.48
	Methadone	13 (9%)	1 (2%)	p = 0.13
	Buprenorphine	47 (35%)	15(35%)	p = 0.97
3 Item Audit Screen (AUDIT-C)		4.04 (4.42)	2.34 (3.14)	p < 0.01
Drug problems Score		41.7 (9.16)	38.2 (11.96)	p < 0.05

Notes: a. Values for age, Audit and Drug problems are means with standard deviation, and were tested with t-tests corrected for unequal variances. All other variables are n and %, and were tested with Chi-square tests.

an ED for an alcohol or drug problem or overdose (35%), with one-third reporting one previous visit (33%). This difference may have occurred because patients visited this ED before the prior year or may have visited another ED. There were no gender differences with respect to lifetime prevalence of the specific drugs. Recent use of most drugs did not differ by gender; however, women were more likely to have used benzodiazepines in the preceding 90 days than men (71.6% vs 51.7%, $p < 0.01$).

In both groups, lifetime prevalence of cannabis, benzodiazepines, cocaine, and opioid pill use was very high (78% to 93%), as was three-month prevalence (45% to 63%). Patients presenting for detox were more likely to use heroin more than three times per week (82% vs 43%, $p < 0.001$) and daily (63% vs 26%, $p < 0.001$) than those presenting with an overdose. Patients presenting for detox also reported more frequent use of benzazepines and opioid pills and higher scores on the AUDIT-C ($p < 0.001$, Cohen's $d = 0.41$) and the drug problems scale ($p = 0.01$, Cohen's $d = 0.36$).

Treatment History

Most patients reported lifetime treatment across all treatment modalities except for methadone. Overall, 86% had at least one treatment experience. Approximately 50% or more reported use of each of the treatment modalities except methadone. In the previous year, approximately one-third or more reported using each of the treatment modalities, again except for methadone. Sixty percent of the sample had tried buprenorphine, with nearly one-third using it in the last year and 14% using it in the last three months. At the time of their appearance at the ED, 27.2% indicated that they were currently in treatment. Overdose and detoxification patients did not differ from each other in endorsing each of the treatment modalities in their lifetime, last year, or last three months.

Return Visits to ED

In the three months following the index event, 15 patients (7.6%) returned to the ED with an overdose and 40 (20.3%) returned requesting admission for detox, for a total of 27.9% returning for a drug-related issue. There was a significant relationship between previous and subsequent medical record ED visits ($p < 0.01$) (The findings with respect to self-

report of previous ED visits were similar). Of those patients who had no previous ED visits for a drug issue, excluding the index visit, 16% returned to the ED within three months for an overdose or detox. Among those with one ED visit in the past year, 28% returned within three months, but among those with two or more ED visits, 41% returned within three months. There were no differences in gender, race/ethnicity, education, or marital status between those who returned within three months and those who did not. However, those who returned were significantly older ($M = 37.8$ years, $SD = 12.26$, vs $M = 31.7$ years, $SD = 10.67$, $p < 0.001$). There were no differences between those who returned to the ED and those who did not with respect to lifetime substance use. However, those who used heroin three or more times per week were more likely to return (33.6%) than those who used it less frequently (13.0%) (Chi-square (1) = 7.28, $p < 0.01$). There were also few differences with respect to lifetime or recent substance use treatment. Although few of the patients had experience with methadone (20.5%), those with previous methadone treatment were more likely to return (45%) than those with no methadone experience (23.2%) (Chi square (1) = 7.53, $p < 0.01$). Patients who had received methadone in the previous year were also more likely to return to the ED (50%) than were patients who had not received methadone in the past year (25.6%) (Chi-square (1) = 3.88, $p < 0.05$). Those who returned to the ED scored higher on the drug problems scale ($M = 43.6$, $SD = 7.50$) than those who did not ($M = 39.8$, $SD = 10.60$) ($t = 2.42$, $df = 196$, $p < 0.05$). Participants with an AUDIT-C score above 4, suggestive of an alcohol use disorder, were significantly more likely to return to the ED within three months (38%) (Chi-square (1) = 4.20, $p < 0.05$) than participants with a score below this threshold (23%).

To examine this more fully, we conducted a logistic regression analysis using the variables that were identified as significant in the bivariate analyses. In the first step, socio-demographic variables that predicted return to the ER were examined (see Table 2). As can be seen in Table 2, both age and recent heroin use remain predictive of return to the ED. However, the number of previous visits to the ED was also significantly associated with return to the ED. Those patients with one previous visit had twice the likelihood of returning, while those with 2 or more previous visits had four times the likelihood.

Discussion

Mirroring research in other countries,⁷⁻⁹ the patients who participated in this study had extensive previous treatment experiences, with only about one-fourth of them actively engaged in treatment at the time of their visit to the ED. More than 40% had visited the same ER in the past year, and nearly 30% returned to the ER within three months.

Table 2 Logistic Regression Predictors of Return to the Emergency Room Within 3 Months

Variables	Wald	Odds Ratio	p value
Age	8.87	1.05	$P < 0.01$
Recent Heroin Use	4.62	2.97	$P < 0.05$
Past year Methadone Treatment ^a	0.49	0.73	$P = 0.74$
AUDIT score	2.70	1.07	$P = 0.10$
Drug problem score	3.17	1.04	$P < 0.10$
Any Psychiatric Diagnosis	0.04	1.08	$P = 0.84$
Previous ED visits			
One in last year	2.15	1.97	$p = 0.14$
2 or more in last year	10.38	4.06	$P < 0.01$
Overdose vs Detox	0.66	0.68	$P = 0.42$

Notes: ^aMethadone treatment was coded as 1=yes, 2=no. Although not significant, the direction of the OR was that not having previous methadone treatment was protective.

Because patients presenting for detox are voluntarily seeking treatment, there may be a tendency to view them as less severe than patients with an overdose. Although there were no differences between these groups with respect to socio-demographic variables or lifetime substance use or treatment experiences, patients presenting for detox used opioids more frequently and had more drug use problems than those presenting with an overdose. This is an important and perhaps initially counterintuitive finding. It may be partially explained by the fact that detox patients, with more frequent use of opioids, may have developed a somewhat higher tolerance, which reduced the likelihood of overdose in the time around the index ED visit. Often these patients are not admitted but may be particularly well suited for initiation of buprenorphine and a warm handoff to a treatment center. Conversely, patients who overdosed may have viewed their risk of overdose as lower given the less frequent usage, even though this pattern may have reduced their tolerance. For both groups, the increasing prevalence of potent fentanyl and xylazine presents a higher risk for adverse outcomes^{13,14} and necessitates rapid linkage to treatment.

Our findings with respect to predictors of return to the ED within three months are not unexpected. For example, Brady and colleagues⁶ reported that any substance use disorder, including both alcohol and opioid abuse, predicted an overdose death after an emergency room visit for an overdose. In Karmali et al's study,¹⁰ most substance use disorders predicted return to the ED after a non-fatal overdose, but alcohol use disorder did not. In our study, we found that the number of drug problems and recent very frequent heroin use were bivariately associated with return to the ED for an overdose or detox, although only recent heroin use remained significant in the multivariate analysis. Our analyses also suggested that hazardous alcohol use was predictive in the bivariate but not the multivariate analysis. Given the equivocal results regarding the predictive value of hazardous drinking and AUD, more research is needed. Similar, to our findings, Brady et al also found that the number of ED visits in the previous year was predictive of a subsequent overdose death. Clearly, the number of previous ED visits is a strong risk factor for continued and severe opioid use.

It is important to recognize several limitations. This study used a convenience sample of patients at a single hospital, recruited mainly during day and evening shifts. Self-reported interview data, by their nature, are subject to recall and social desirability bias. These factors may limit the generalizability of these data. The data were collected in 2016 and 2017, and although the participants in this study indicated to the hospital staff that they were using heroin, many may have had fentanyl contamination. The CDC reported that fentanyl was found in more than half of the opioid-related overdose deaths from July to December 2016.¹³ Interviews with regular heroin users during the same time frame indicated that while many believed they had been exposed to fentanyl and viewed fentanyl as "highly undesirable", they could not reliably identify fentanyl in the heroin.¹⁴ Our finding that patients seeking detox services had some indications of greater severity than overdose patients is necessarily preliminary, and we could find no other published study comparing these two groups. Finally, although the ED for this study has the only formal detox program and is recognized as the primary ED for substance use issues, it is possible that some patients may have experienced an overdose and were treated at another hospital. Thus, the estimates of the percentage of patients returning to the ED in the ensuing 3 months may be a conservative estimate.

Conclusion

Patients presenting to the ED requesting detox were similar in most domains to those presenting following an overdose. Notably, patients who presented for detox were more likely to use substances more than three times per week compared to those who had overdosed. This suggests that the risk of overdose is not linearly related to the frequency of substance use and may be influenced by individual changes in substance use frequency over time, possibly by impacting tolerance. Nearly 30% of both groups returned to the ED within 90 days for either an overdose or another detox request. Emergency department visits in the preceding year according to either self-report or medical records, and recent frequent heroin use were predictive of returning to the ED within 90 days.

Acknowledgments

Preparation of this manuscript was supported by an award from the New York State Office of Addiction Services and Supports.

Disclosure

The author(s) report no conflicts of interest in this work. No author has professional or financial relationships with any companies that are relevant to this study.

References

1. Frank JW, Levy C, Calcaterra SL, Hoppe JA, Binswanger IA. Naloxone administration in US emergency departments, 2000-2011. *J Med Toxicol.* 2016;12(2):148. 10.1007/s13181-015-0525-5
2. Vivolo-Kantor AM, Seth P, Gladden RM, et al. Vital signs: trends in emergency department visits for suspected opioid overdoses—United States, July 2016–September 2017. *MMWR Morb Mortal Wkly Rep.* 2018;67(9):279.
3. Venkatesh AK, Janke AT, Kinsman J, et al. (2022) Emergency department utilization for substance use disorders and mental health conditions during COVID-19. *PLoS One* 17(1): e0262136. 10.1371/journal.pone.0262136.
4. Substance Abuse and Mental Health Services Administration. 2022. Preliminary findings from drug-related emergency department visits, 2021; Drug Abuse Warning Network. HHS Publication No. PEP22-07-03-001. Rockville, MD. Center for Behavioral Health Statistics and Quality. *Substance Abuse and Mental Health Services Administration*. Retrieved from. <https://www.samhsa.gov/data/>.
5. Dezman ZD, Felemban W, Bontempo LJ, Wish ED. Evidence of fentanyl use is common and frequently missed in a cross-sectional study of emergency department patients in Baltimore, Maryland. *Clin Toxicol.*;58(1):59–61. 10.1080/15563650.2019.1605078
6. Brady, J.E., DiMaggio, C.J., Keyes, K.M., Doyle, J.J., Richardson, L.D. and Li, G., 2015. Emergency department utilization and subsequent prescription drug overdose death. *Annals of Epidemiology*, 25(8), pp.613–619. 10.1016/j.annepidem.2015.03.018
7. Fatovich DM, Bartu A, Daly FF. A prospective study of non-fatal heroin overdose. *J Subst Use.*;13(5):299–307. 10.1080/14659890802040773
8. Hansagi H, Engdahl B, Romelsjö A. Predictors of repeated emergency department visits among persons treated for addiction. *Eur Addict Res.* 2012;18(2):47–53. 10.1159/000331016
9. Friebe R, Maynou L. Trends and characteristics of hospitalisations from the harmful use of opioids in England between 2008 and 2018: population-based retrospective cohort study. *J R Soc Med.* 2022;115(5):173–185.
10. Karmali, R.N., Ray, G.T., Rubinstein, A.L., Sterling, S.A., Weisner, C.M. and Campbell, C.I., 2020. The role of substance use disorders in experiencing a repeat opioid overdose, and substance use treatment patterns among patients with a non-fatal opioid overdose. *Drug and Alcohol Dependence*, 209, p.107923. 10.1016/j.drugalcdep.2020.107923
11. Bush, K., Kivlahan, D.R., McDonnell, M.B., Fihn, S.D., Bradley, K.A. The AUDIT Alcohol Consumption Questions (AUDIT-C) an effective brief screening test for problem drinking. *Archives of Internal Medicine*, 158(16), pp.1789–1795. 1998 10.1001/archinte.158.16.1789
12. Buchholz, K.K., Cadoret, R., Cloninger, C.R., et al. A new semi-structured psychiatric interview for use in genetic linkage studies: a report on the reliability of the SSAGA. *J. Stud. Alcohol.* 1994;55, 149–158. 2 10.15288/jsa.1994.55.149
13. O'Donnell JK, Halpin J, Mattson CL, Goldberger BA, Gladden RM. Deaths involving fentanyl, fentanyl analogs, and U-47700—10 states, July–December 2016. *MMWR morb mortal wkly rep.*;66(43):1197. *MMWR. Morbidity and Mortality Weekly Report* 10.15585/mmwr.mm6643e1
14. Carroll JJ, Marshall BD, Rich JD, Green TC. Exposure to fentanyl-contaminated heroin and overdose risk among illicit opioid users in Rhode Island: a mixed methods study. *Int J Drug Policy.*;46:136. 10.1016/j.drugpo.2017.05.023

Substance Abuse and Rehabilitation

Dovepress

Publish your work in this journal

Substance Abuse and Rehabilitation is an international, peer-reviewed, open access journal publishing original research, case reports, editorials, reviews and commentaries on all areas of addiction and substance abuse and options for treatment and rehabilitation. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <http://www.dovepress.com/substance-abuse-and-rehabilitation-journal>