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Injection of Methamphetamine Has Increased in Boston Massachusetts: 5 Waves of CDC State Surveillance Data

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Abstract

Objectives: In the US, the number of overdose deaths related to opioids in combination with stimulants has increased, however the Northeast has typically been less impacted by stimulant overdose. Injection drug use (IDU) results in high mortality from overdose and infectious disease and there are racial disparities observed in overdose death rates. We examined trends in stimulant and opioid IDU, including trends stratified by race, using five waves of cross-sectional state surveillance data.

Methods: Data came from the CDC's National HIV Behavioral Surveillance system Boston, Massachusetts site which includes five waves of data (2005–2018) among adults in the Boston metropolitan area reporting IDU (N=2,550). Outcome measures were type of substance injected in the past 12 months (heroin, prescription opioids, "speedball", cocaine, crack, and/or methamphetamine).

Results: Participants were 70% male, 58% non-Hispanic white, and injected a mean of 3 different drugs in the past 12 months. From 2015–2018 there was an over 2-fold increase in injection of methamphetamine (15% vs. 38%; $p<0.001$), a pattern which held across racial groups. Combination heroin and methamphetamine injection increased from 2015 (15%) to 2018 (35%) ($p<0.001$). Multiple drug injection (injecting >1 drug) increased significantly across years compared to single drug injection ($p=0.03$).

Conclusions: Findings suggest that increased use of methamphetamine and opioids extends to Boston. There is an urgent need for enhanced screening of methamphetamine use among those using opioids and increased access and payor coverage of efficacious treatments for stimulant and opioid use disorders (e.g., contingency management and medication treatment for opioid use disorder).

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Conflicts of Interest: None.

Introduction

In the United States (US), overdose deaths related to opioids in combination with psychostimulants have increased.[1] There is evidence of geographic disparities in stimulant overdose deaths with overdose rates quadrupling in the Western US, while the Northeast has predominantly been affected by opioid-related deaths.[1] However, Wakeman and colleagues[2] recently reported increases in methamphetamine positive oral fluid toxicology tests from 2014–2019 among outpatients receiving healthcare in Boston, Massachusetts.

Injection drug use (IDU) places individuals at high risk for mortality from overdose and infectious disease (e.g., HIV).[3] Further, drug use and injection-related harms disproportionally affect racial and ethnic minority groups,[1,4] with larger increases in opioid-related mortality observed among Black people vs. other races[5,6] and evidence of a higher HIV prevalence among Black people who inject drugs (PWID) vs. Hispanic or white PWID.[7]

There are calls for increased surveillance on IDU and poly-IDU trends to track threats, guide treatment response,[8] and better understand and respond to alarming racial disparities in use.[5,9] However, to our knowledge, no work has quantified stimulant and opioid injection in Boston Massachusetts, nor investigated trends by race. It is critical to determine if the trends observed in the Western US may persist in Boston Massachusetts and to assess potential racial disparities in patterns of IDU. In response, we examined trends in stimulant and opioid IDU using Boston Massachusetts state surveillance data and trends stratified by race.

Methods

Study Design & Setting

Data came from the Center for Disease Control and Prevention's National HIV Behavioral Surveillance (NHBS)[10–12] system, a collaboration with 25 state and local health departments focused on conducting behavioral surveillance among representative groups of people at high risk for HIV infection in the US. Details of the NHBS and methodology are available elsewhere.[10,11] Briefly, NHBS uses a standardized protocol and core survey instruments to survey persons at risk for HIV[10,11] and rotates data collection between three populations at highest risk for HIV including PWID. The NHBS surveys participants from major metropolitan areas that experience the highest burden of HIV including Boston, Massachusetts.

The present investigation uses data from the Boston NHBS site and includes five waves of cross-sectional data collection (2005–2018) among adults in the metro Boston area reporting IDU (N=2,550). IDU cycle data collection ended in Massachusetts in 2018, thus 2018 represents the most recent data wave available.

This study was exempt from Mass General Brigham Institutional Review Board review given the data were not obtained through interaction and because data collection was completely anonymous. The Massachusetts Department of Public Health IRB reviewed and approved the survey annually.[12]

Outcome

The outcome was type of substance injected in the past 12 months. Participants were asked how often they injected each of the following substances in the past 12 months: heroin, prescription opioids, “speedball” (heroin and cocaine), cocaine (powder), crack cocaine, and/or methamphetamine. Those who endorsed injecting once or more in the past 12 months were coded as injecting that substance (inclusive of endorsing injecting once a week or less, more than once a week, once/day, or more than once a day).

Demographic characteristics

Demographic data were collected on age, gender, race (check all that apply: American Indian/Alaskan native, Asian, Black/African American, Native Hawaiian/Other Pacific Islander, white, other), ethnicity (yes/no to Hispanic/Latina), and education level (< a high school degree, high school degree/equivalent, > high school).

Statistical Methods

Descriptive statistics were used to characterize the sample on demographic characteristics. Cochran–Armitage tests examined trends in IDU across the five data waves and trends stratified by race, and this analysis included a test for departure from trend. When there was a departure from trend based on this additional test, the data was examined in exploratory post hoc testing using a Cochran-Armitage trend test (limited to waves 1–3) or chi squared tests (to compare waves 4 vs. 5). This analytic approach was applied across all substances and all racial subgroups. Given we conducted multiple trend analyses, all analyses were adjusted using the Bonferroni correction.

For analyses, race was categorized as non-Hispanic (NH) white, NH Black, Hispanic, or other race (inclusive of American Indian/Alaskan Native, Asian, and Native Hawaiian/other Pacific Islander and multiple races) based on the distributions and recommendations in the literature.[13] All analyses were conducted using StataSE 16 (College Station, TX) with significance set at $p<0.05$.

Results

Participant Characteristics

Participants were 70% male, 58% non-Hispanic white, a mean age of 39 years (standard deviation [SD] 10.9), 47% had a high school degree or equivalent, and participants reported injecting a mean of 3 drugs in the past 12 months (SD 1.5).

Trends in Injection Drug Use

From 2005–2018 (across all waves), there were changes in past 12-month injection of prescription opioids, “speedball,” crack cocaine, and methamphetamine (Table 1; Figure 1). In post hoc testing, while no changes were observed in methamphetamine injection from 2005–2012 ($p =0.90$), there was an over 2-fold increase in injection of methamphetamine from 2015 (15%) to 2018 (38%) ($p<0.001$), a pattern which held across racial groups examined (Table 1).

Although most participants across waves reported injecting multiple drugs in the past 12 months vs. single drug injection, poly injection increased significantly across years (Table 1). In post hoc testing, reporting injection of both heroin and methamphetamine in the past 12 months did not change from 2005–2012 (p=0.67), but increased from 2015 (15%) to 2018 (35%) (p<0.001) (data not pictured).

Discussion

In this cross-sectional study of the most recent five waves of CDC data from Boston Massachusetts adults, we found that methamphetamine injection increased from 2015 to 2018, a pattern which held across all racial groups examined.

Given Black PWID are more likely to die of overdose and less likely to use resources such as syringe service programs (SSP)[7] it is critical to provide low barrier access to SSP and to increase public awareness campaigns about opioid misuse within Black communities, including campaigns focused on harm reduction strategies (e.g., SSP, naloxone education/distribution).

Our findings are limited to Boston Massachusetts and data are not available beyond 2018 to determine persistence of trends and impact of the COVID-19 pandemic. However, our data represent an important first step towards quantifying the methamphetamine IDU problem in Boston Massachusetts. Additionally, we assessed past year injection use of substances and were unable to examine more recent use. Finally, the NHBS did not collect data on "goofball" injection (combined heroin and methamphetamine), though we were able to create a variable examining IDU of both substances in the past 12 months (but could not determine if the substances were used during the same injection episode) nor on fentanyl injection. The lack of data available on fentanyl injection is a substantial limitation as the drug supply landscape has shifted and fentanyl is reported to be related to >90% of fatal overdoses in Massachusetts.[14] It is critical for future state and national surveillance efforts to assess fentanyl injection.

Findings suggest that increased use of methamphetamine and methamphetamine with opioids extends to Boston Massachusetts. There is an urgent need for enhanced screening of methamphetamine use among those using heroin (and fentanyl) and increased access to efficacious treatments for stimulant and opioid use disorders (e.g., contingency management, medication treatments for OUD).

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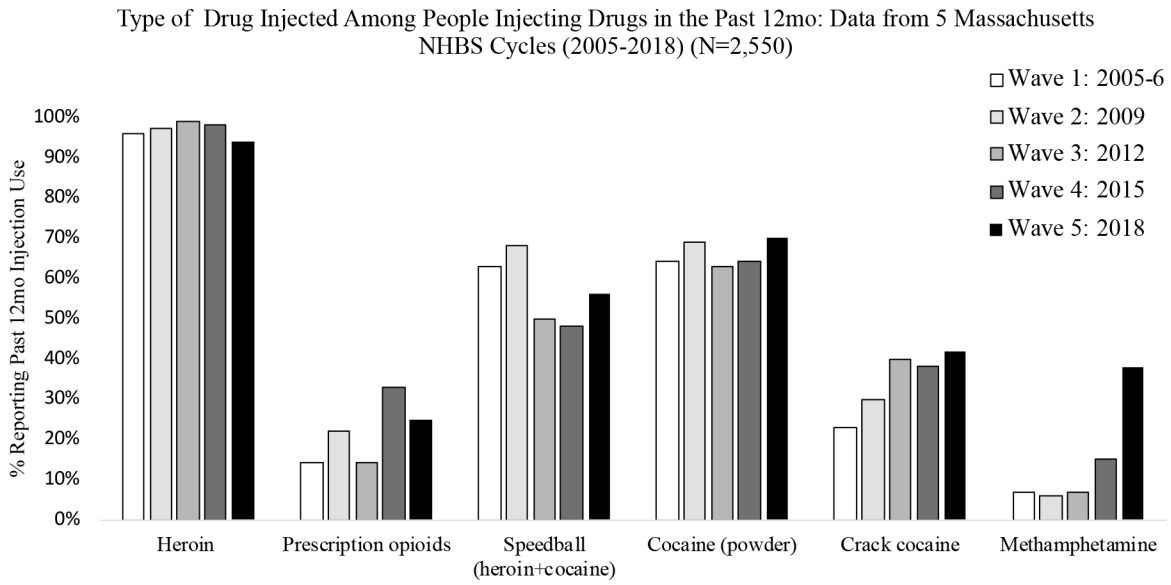

Figure 1.

Type of drug injected among people injecting drugs in the past 12 months: data from 5

Table 1.

Prevalence and trends in injection drug use: Data from 5 Boston Massachusetts Injection Drug Use NHBS cycles (N=2,550)

	Wave 1: 2005–2006 (N=450) n (%), 95%CI	**Wave 2: 2009 (N=626) n (%), 95%CI**	**Wave 3: 2012 (N=511) n (%), 95%CI**	**Wave 4: 2015 (N=515) n (%), 95%CI**	**Wave 5: 2018 (N=448) n (%), 95%CI**	**Overall Trend Test: Z score, Bonferroni adjusted p value**
Any IDU in Past 12mo: All (N=2550)						
Heroin	430 (96%), 0.93–0.97	611 (98%), 0.96–0.99	508 (99%), 0.98–1.00	509 (98%), 0.97–1.0	420 (94%), 0.91–0.96	−0.90, p>0.50
Prescription opioids [a]	63 (14%), 0.11–0.18	139 (22%), 0.19–0.26	74 (14%), 0.12–0.18	168 (33%), 0.29–0.39 *	114 (25%), 0.22–0.30 *	**5.5, p<0.001**
Cocaine [b]	287 (64%), 0.59–0.68	432 (69%), 0.53–0.73	322 (63%), 0.59–0.67	330 (64%), 0.60–0.68	311 (70%), 0.65–0.74	0.71 p>0.50
Crack [c]	102 (23%), 0.19–0.27	190 (30%), 0.27–0.34	203 (40%), 0.36–0.44	198 (38%), 0.34–0.43	187 (42%), 0.37–0.46	**6.7, p<0.001**
Speedball	283 (63%), 0.58–0.67	423 (68%), 0.64–0.71	258 (50%), 0.46–0.55	248 (48%), 0.44–0.53 *	252 (56%), 0.52–0.61 *	**−5.0, p<0.001**
Methamphetamine	31 (7%), 0.05–0.10	38 (6%),0.04–0.8	34 (7%), 0.048–0.092	78 (15%), 0.12–0.19 *	168 (38%), 0.33–0.42 *	**14.0, p<0.001**
Any IDU in Past 12mo: Hispanic (n=385) [d]						
Heroin	60 (100%)	114 (96%), 0.90–0.98	81 (100%)	55 (100%)	65 (93%), 0.84–0.97	−1.47, p>0.50
Prescription opioids [a]	10 (17%), 0.09–0.27	19 (16%), 0.10–0.24	12 (15%), 0.09–0.25	12 (22%), 0.13–0.35	21 (30%), 0.20–0.42	2.27, p>0.50
Cocaine [b]	35 (58%), 0.45–0.70	74 (62%), 0.53–0.71	43 (53%), 0.42–0.64	38 (69%), 0.56–0.80	54 (78%), 0.67−	2.48, p=0.31
Crack [c]	18 (30%), 0.20–0.43	27 (23%), 0.16–0.31	18 (22%), 0.14–0.33	19 (35%), 0.23–0.48	31 (44%)	2.59, p=0.23
Speedball	39 (65%), 0.52–0.76	82 (69%), 0.60–0.77	43 (53%), 0.42–0.64	30 (55%), 0.41–0.67	51 (73%), 0.61–0.82	−0.00, p>0.50
Methamphetamine	4 (7%), 0.03–0.17	7 (6%), 0.03–0.12	3 (4%), 0.01–0.11	4 (7%), 0.03–0.18 *	21 (30%) *	**4.48, p<.001**
Any IDU in Past 12mo: non-Hispanic Black (n=465) [d]						
Heroin	228 (95%), 0.91–0.97	111 (97%), 0.91–0.99	26 (96%), 0.76–1.00	37 (97%), 0.83–1.00	41 (91%), 0.78–0.97	−0.51, p>0.50
Prescription opioids [a]	23 (10%), 0.06–0.14	11 (10%), 0.05–0.17	3 (11%), 0.03–0.31)	6 (16%), 0.07–0.32	13 (29%), 0.17–0.44	**3.34, p=0.02**
Cocaine [b]	154 (64%), 0.58–0.70	67 (58%), 0.50–0.67	15 (56%), 0.36–0.74	17 (45%), 0.30–0.61	27 (60%), 0.45–0.74	−1.62, p>0.50
Crack [c]	54 (23%), 0.18–0.28	23 (20%), 0.14–0.28	8 (30%), 0.15–0.50	10 (26%), 0.15–0.43	14 (31%), 0.19–0.46	1.35, p>0.50
Speedball	163 (68%), 0.62–0.74	85 (74%), 0.65–0.81	17 (63%), 0.43–0.79	16 (42%), 0.27–0.57	29 (64%), 0.49–0.77	−1.90, p>0.50
Methamphetamine	12 (5%), 0.03–0.09	2 (2%), 0.00–0.07	0 (0)	3 (8%), 0.03–0.23	10 (22%), 0.12–0.37	**3.59, p=0.007**
Any IDU in Past 12mo: non-Hispanic white (n=1,466) [d]						

	Wave 1: 2005–2006 (N=450) n (%), 95%CI	**Wave 2: 2009 (N=626) n (%), 95%CI**	**Wave 3: 2012 (N=511) n (%), 95%CI**	**Wave 4: 2015 (N=515) n (%), 95%CI**	**Wave 5: 2018 (N=448) n (%), 95%CI**	**Overall Trend Test: Z score, Bonferroni adjusted p value**
Heroin	126 (95%), 0.89–0.98	341 (99%), 0.97–1.00	340 (99%), 0.98–1.00	372 (99%), 0.01–0.03	254 (94%), 0.91–0.96	−1.85, p>0.50
Prescription opioids [a]	29 (22%), 0.16–0.30	102 (30%), 0.25–0.35	49 (4%), 0.11–0.19	135 (36%), 0.31–0.41	60 (22%), 0.18–0.28)	0.77, p>0.50
Cocaine[b]	85 (64%), 0.55–0.72	255 (74%), 0.69–0.79	232 (68%), 0.63–0.73	248 (66%), 0.61–0.70	188 (69%), 0.64–0.75	−0.55, p>0.50
Crack[c]	27 (20%), 0.14–0.28	130 (38%), 0.33–0.43	154 (45%). 0.40–0.51	158 (42%), 0.37–0.47	113 (42%), 0.36–0.48	**3.35, p=0.02**
Speedball	67 (50%), 0.42–0.59	221 (64%), 0.60–0.69	168 (49%), 0.44–0.54	175 (46%), 0.41–0.52	139 (51%), 0.46–0.57	−2.66, p=0.19
Methamphetamine	13 (10%), 0.06–0.16	25 (7%), 0.05–0.11	25 (7%), 0.10–0.11	63 (17%). 0.13–0.21 *	112 (41%), 0.36–0.46 *	**10.60, p<0.001**
Any IDU in Past 12mo: Other races including Asian, American Indian, Hawaiian and those endorsing multiple races[d] (n=220)						
Heroin	10 (91%), 0.49–1.00	41 (98%), 0.84–1.00	60 (100%)	44 (100%)	60 (95%), 0.86–0.99	−0.22, p>0.50
Prescription opioids [a]	1 (9%), 0.01–0.51	7 (17%), 0.08–0.32	10 (17%), 0.09–0.29	15 (34%), 0.21–0.50	20 (32%), 0.21–0.44	2.63, p=0.20
Cocaine[b]	9 (82%), 0.44–0.96	31 (74%), 0.58–0.85	31 (52%), 0.39–0.64	26 (59%), 0.44–0.73	42 (67%), 0.54–0.77	−0.68, p>0.50
Crack[c]	2 (18%), 0.04–0.56	10 (24%), 0.13–0.39	22 (37%), 0.25–0.50	11 (25%), 0.14–0.40	29 (46%), 0.34–0.59	2.25, p>0.50
Speedball	10 (91%), 0.49–1.00	31 (74%), 0.58–0.85	29 (48%), 0.36–0.61	26 (59%), 0.44–0.73	33 (52%), 0.40–0.65	−2.36, p=0.44
Methamphetamine	2 (18%), 0.04–0.56	4 (10%), 0.04–0.23	6 (10%), 0.05–0.21	8 (18%), 0.09–0.33 *	25 (40%), 0.28–0.52 *	**3.86, p=0.002**
Single vs. Poly Drug (>1) Injection						
1 drug injected	110 (24%)	113 (18%)	128 (25%)	102 (19%)	73 (16%)	**2.20, p=0.03** [e]
>1 drug injected	340 (75%)	513 (82%)	383 (75%)	413 (80%)	375 (84%)	

Note. Bolded values denote p<0.05. The trend test displayed in the last column of the table refers to results from the overall Cochran-Armitage test probing trends across all 5 data waves. The Bonferonni adjusted p value in this column corrects the p value from this overall Cochran-Armitage test for multiple comparisons, unless otherwise noted.

[a] one participant did not complete the prescription opioids IDU question

[b] one participant did not complete the cocaine IDU question

[c] one participant did not complete the crack cocaine IDU question

[d] 14 participants did not have data on race available

[e] This p value did not adjust for multiple comparisons as only one comparison was examined.

* Asterisks represent significant differences (p<0.05) between waves (2015 vs. 2018) in exploratory post hoc testing using chi squared tests

+ represents significant trend across first three data waves (2005–2012) in exploratory post hoc testing using Cochran-Armitage tests.

Key: CI, confidence interval; IDU, injection drug use; Mo, month