The *Care*ZONE mobile outreach initiative:

Pilot evaluation, 01/16/2018 – 11/16/2018

January 31, 2019

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Background

Each day, 91 people die of opioid overdose in the US,[1] including 6 individuals daily in Massachusetts.[2] No group has been more impacted by this crisis than homeless and vulnerably housed people, whose rates of drug overdose death are 20 times higher than those in the general population.[3]

In response to this public health crisis, the Massachusetts General Hospital Kraft Center for Community Health, working in collaboration with Boston Health Care for the Homeless Program (BHCHP) and the Boston Public Health Commission (BPHC), began piloting an innovative mobile medical initiative at opioid overdose "hotspots" in greater Boston in January 2018. This initiative, known as *Care*ZONE, aimed to deliver harm reduction services, addiction treatment, and primary care directly to marginalized individuals at very high risk for drug overdose and death.

Description of the model

The *Care*ZONE model consists of two intertwined components: harm reduction services and clinical care, both of which are provided via street outreach and inside the *Care*ZONE van.

The harm reduction component is led by BPHC Access, Harm Reduction, Overdose Prevention and Education (AHOPE) staff. The goal of this component is to focus on *safer* drug use by engaging with people who use drugs directly on the street and providing non-judgmental support based on their needs. AHOPE staff offer anonymous risk reduction options to people actively using drugs, including supplies such as unused syringes, hand-held personal biohazard boxes for used syringes, and naloxone kits for overdose reversal. Harm reduction activities also include disposal of used syringes, education around safer injection practices, naloxone training, HIV and HCV testing, and referrals to all types of substance use treatment. Engagement with people who use drugs by AHOPE staff typically occurs via street outreach, with BHCHP health care providers often accompanying them. Aggregate outreach data were collected by

AHOPE staff and reported weekly to the BHCHP Institute for Research, Quality & Policy in Homeless Health Care.

The clinical care component is led by BHCHP primary care physicians, each of whom has additional training in addiction medicine and is certified to prescribe buprenorphine for patients with opioid use disorder. The goal of the clinical component is to provide ultra-low threshold addiction treatment services coupled with primary and preventive care focused on the health needs of people who use drugs. Most clinical encounters take place in a custom-built mobile medical van containing a small reception and triage area in addition to a single exam room with an exam table, a medical refrigerator, a sink, and cabinets stocked with medical supplies.

*Care*ZONE activities initially took place in two locations: Downtown Boston and Dudley Square. In March 2018, an emerging need for services in the Fenway area was identified, and beginning in May 2018, the van started making regular stops in the Fenway area. Clinical encounters were charted in the BHCHP electronic health record (Epic) using a standardized template. Coded encounter data were extracted from Epic and compiled for analysis. The following sections summarize the quantitative findings of this analysis. A concurrent qualitative study of selected *Care*ZONE patients elicited perceptions of the services they received through the initiative and provided additional context for the quantitative findings. All evaluation procedures were approved by the Partners Health Care Human Research Committee.

Outreach & harm reduction services

Over the course of 180 service days between January 16 – November 16, *Care*ZONE staff logged more than 3,800 outreach encounters across all service sites, averaging 21 contacts per service day (Exhibit A). The majority of these contacts (nearly 2,500) occurred in the downtown area. During these encounters, almost 41,000 syringes (228 per day; Exhibit B) and over 1,400 naloxone kits (8 per day; Exhibit C) were distributed to individuals at high risk for injection drug-related complications and drug overdose.

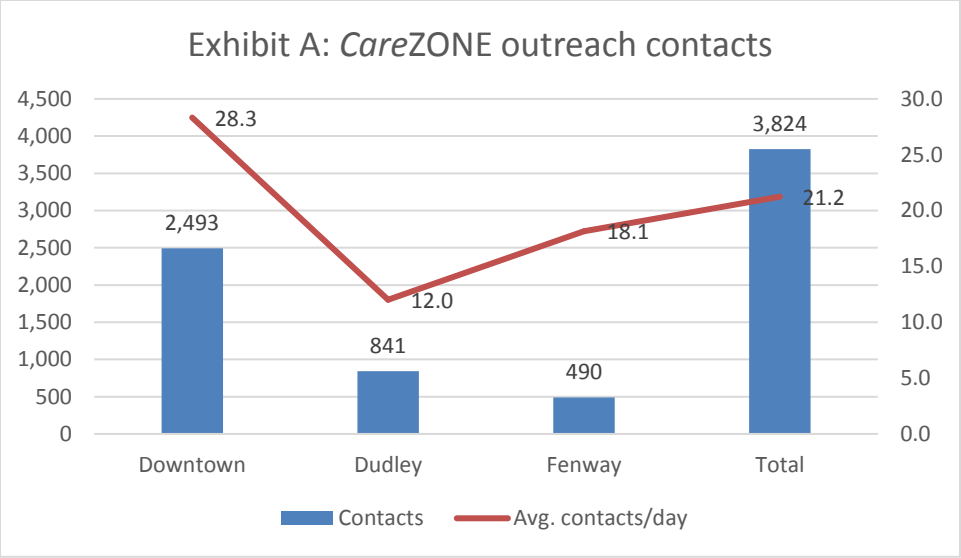


Exhibit A: CareZONE outreach contacts
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
28.3
12.0
18.1
21.2
2,493
841
490
3,824
Downtown
Dudley
Fenway
Total
Contacts
Avg. contacts/day

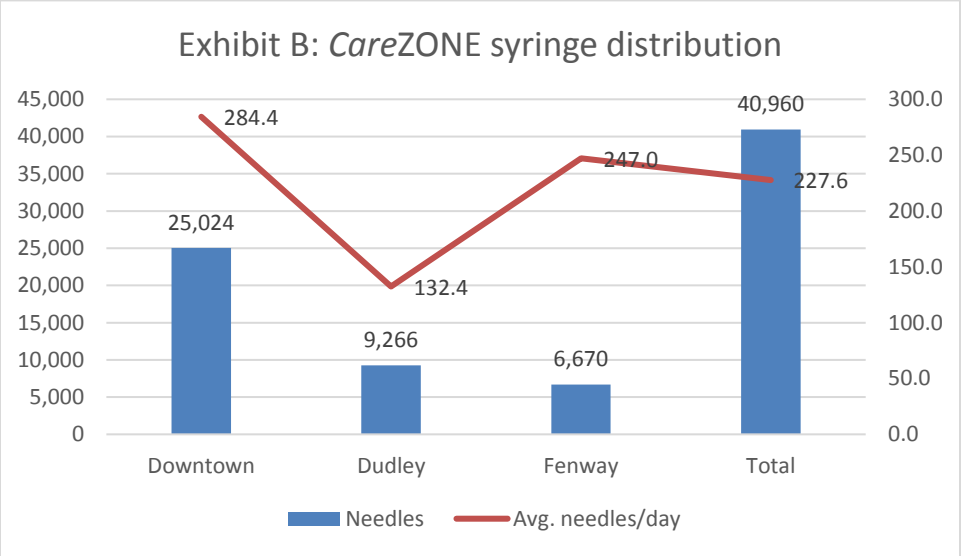


Exhibit B: CareZONE syringe distribution
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
284.4
132.4
247.0
227.6
25,024
9,266
6,670
40,960
Downtown
Dudley
Fenway
Total
Needles
Avg. needles/day

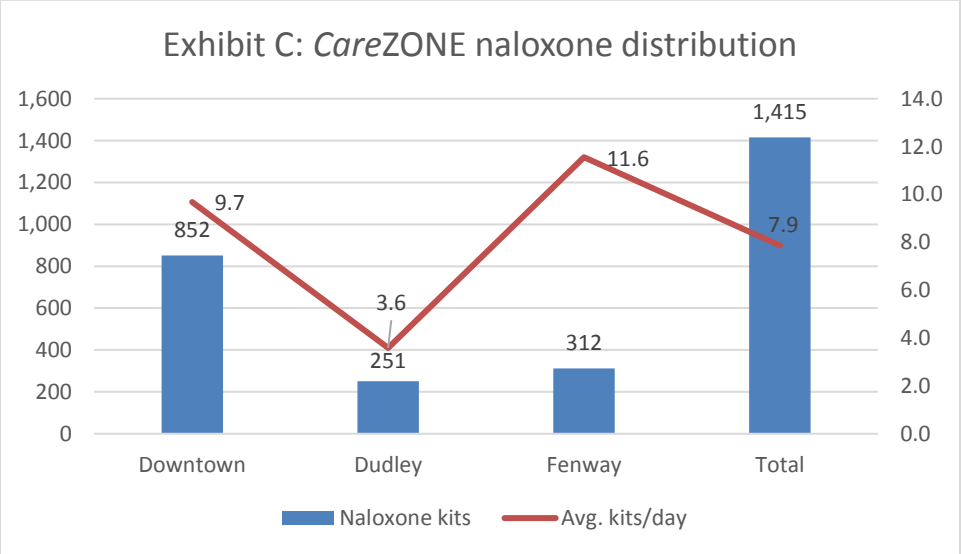
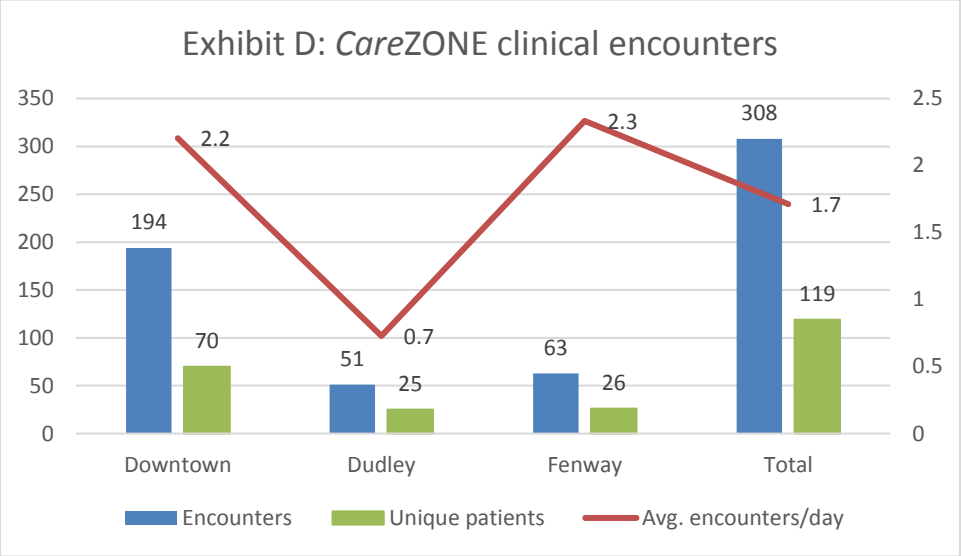
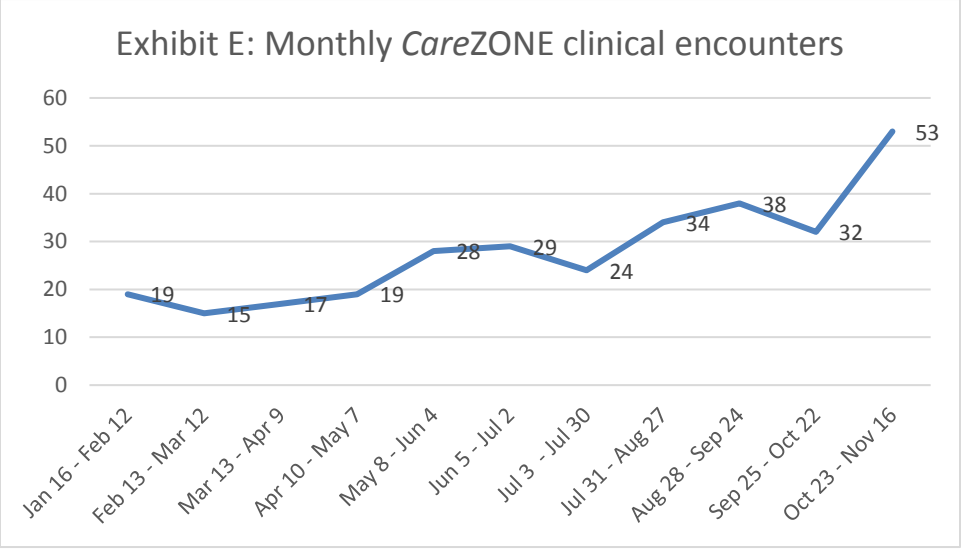


Exhibit C: CareZONE naloxone distribution
1,600
1,400
1,200
1,000
800
600
400
200
0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
9.7
3.6
11.6
7.9
852
251
312
1,415
Downtown
Dudley
Fenway
Total
Naloxone kits
Avg. kits/day

Clinical encounters

Over the course of 180 service days, 119 unique patients made 308 clinical visits with *Care*ZONE medical staff, for an average of 1.7 clinical encounters per day (Exhibit D). Most clinical encounters occurred in the Downtown area. The Downtown and Fenway sites each averaged more than 2 patient encounters per service day, while the Dudley site averaged fewer than 1 per day.





As shown in Exhibit E, the monthly volume of *Care*ZONE clinical encounters was initially low but increased steadily throughout the evaluation period. Fifty-three clinical encounters occurred during the final month of the evaluation period, as compared to 15 to 19 per month during the initial four months.

*Care*ZONE patient characteristics

The baseline demographic and health characteristics of the 119 patients seen by *Care*ZONE medical staff are shown in Exhibit F.

Exhibit F: Baseline characteristics of *Care*ZONE patients.

	Overall	**Site of initial visit**			**P value**
	N=119	Downtown N=69	Dudley N=25	Fenway N=25	
Demographics					
Age, years, mean (SD)	38.4 (12.0)	37.6 (11.4)	44.7 (14.9)	34.6 (8.3)	0.01
Gender, male, N (%)	79 (66.4)	40 (58.0)	19 (76.0)	20 (80.0)	0.03
Race/ethnicity, N (%)					0.01
Hispanic	12 (10.1)	--	--	--	
Non-Hispanic white	63 (52.9)	35 (50.7)	11 (44.0)	17 (68.0)	
Non-Hispanic black	11 (9.2)	--	--	--	
Other/unknown	33 (27.7)	--	--	--	
Housing status, N (%)					<0.001
Street	81 (68.1)	47 (68.1)	9 (36.0)	25 (100.0)	
Shelter	12 (10.1)	--	--	--	
Doubled up	10 (8.4)	--	--	--	
Housed	8 (6.7)	--	--	--	
Other	8 (6.7)	--	--	--	
Medical conditions					
Hepatitis C, N (%)	50 (42.0)	28 (40.6)	12 (48.0)	10 (40.0)	0.82
HIV, N (%)	7 (5.9)	--	--	--	0.03
Psychiatric conditions					
Depression, N (%)	22 (18.5)	--	--	--	0.59
Anxiety, N (%)	10 (8.4)	--	--	--	0.90
PTSD, N (%)	17 (14.3)	--	--	--	0.27
Bipolar disorder, N (%)	12 (10.1)	--	--	--	0.70
Substance use disorders					
Alcohol use disorder, N (%)	7 (5.9)	--	--	--	0.87
Drug use disorders, N (%)					
Opioid	89 (74.8)	50 (72.5)	22 (88.0)	17 (68.0)	0.22
Cocaine	17 (14.3)	--	--	--	0.10
Marijuana	9 (7.6)	--	--	--	0.71
Sedative/hypnotic	7 (5.9)	--	--	--	0.33
Stimulant	6 (5.0)	--	--	--	0.003

Note: Site-specific values of selected measures are suppressed to ensure patient confidentiality.

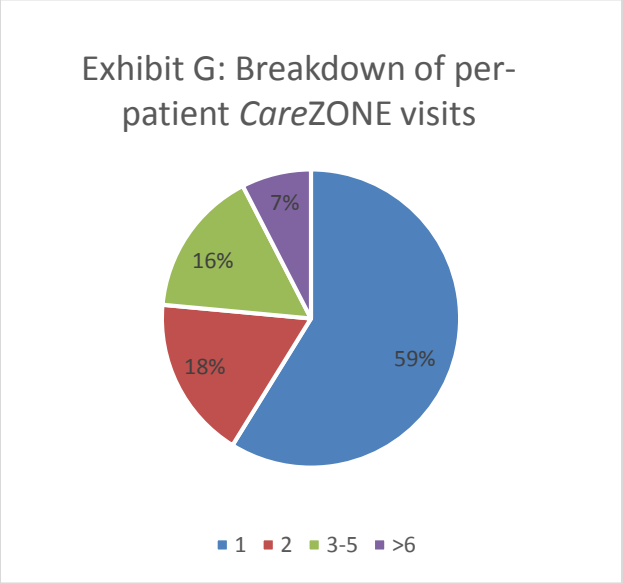
Across all sites, the average age was 38 years, two-thirds of patients were male, and

slightly more than half were non-Hispanic white, although race and ethnicity were unknown or not recorded for a large percentage of patients. More than two-thirds were living and sleeping rough on the street (i.e. unsheltered) at the time of the initial evaluation. Notably, these demographic characteristics differed significantly by service site. Downtown-area patients were more likely to be female. Dudley-area patients were older, more heavily male and non-Hispanic black, and had a more diverse mix of living situations. Fenway-area patients were heavily male, predominantly white, and exclusively rough sleepers.

*Care*ZONE patients had a high burden of hepatitis C (42%) and HIV (6%) infection, with HIV being more prevalent at among those seen at the Dudley and Fenway sites. Depression (19%), anxiety (8%), post-traumatic stress disorder (PTSD, 14%), and bipolar disorder (10%) were all relatively common and did not vary significantly by clinical site. As expected, drug use disorders were highly prevalent, with three-quarters having opioid use disorder. Fenway-area patients had a higher prevalence of stimulant use disorder than patients at other sites. All of these prevalence estimates are likely conservative since they are based solely on provider-coded encounter data.

Patient engagement

*Care*ZONE patients made a median of 1 (mean 2.6) clinical visits to the van. The breakdown of per-patients clinical visits is shown in Exhibit G. About 41% (N=49) patients made at least one return visit (i.e. two or more visits total). Those who returned did not differ significantly from non-returners with respect to demographic or health characteristics.



Over half (55%, N=66) of *Care*ZONE patients were new to BHCHP services. Of these, 30% went on to have clinical encounters at other BHCHP service sites, suggesting that

*Care*ZONE may have been a portal of entry to more conventional “brick and mortar” services for these individuals.

Content of clinical encounters

A list of selected health conditions coded and assessed by BHCHP providers during *Care*ZONE clinical encounters is shown in Exhibit H.

Exhibit H: Diagnostic codes assessed during *Care*ZONE clinical encounters.

Substance use disorders		***Neurologic disorders***	
Alcohol use disorder	21	Epilepsy	3
Opioid use disorder	259	Other neurologic conditions	4
Cocaine use disorder	14	Chronic pain	3
Stimulant use disorder	5		
Tobacco use disorder	4	***Gastrointestinal disorders***	
Other drug use disorders	13	Liver disorders	3
		Other digestive system disorders	6
Infectious diseases			
Hepatitis C infection	28	***Skin conditions***	
HIV infection	8	Rash	6
Skin and soft tissue infections	26	Other skin disorders	16
Mycoses	8		
Sexually transmitted infections	5	***Miscellaneous***	
Other infectious diseases	11	Musculoskeletal disorders	4
		Endocrine disorders	3
Psychiatric disorders		Neoplasms	2
Depression	5	Blood disorders	2
Anxiety	9	Ill-defined symptoms	10
Delusional disorder	3	Bone fracture	3
Obsessive compulsive disorders	2	Other injuries	7
PTSD	2		
Bipolar disorder	2	***Preventive care***	
Other psychiatric disorders	2	General medical exam	19
		Vaccination	24
Cardiopulmonary disorders			
Chronic lower respiratory diseases	7		
Circulatory disorders	8		

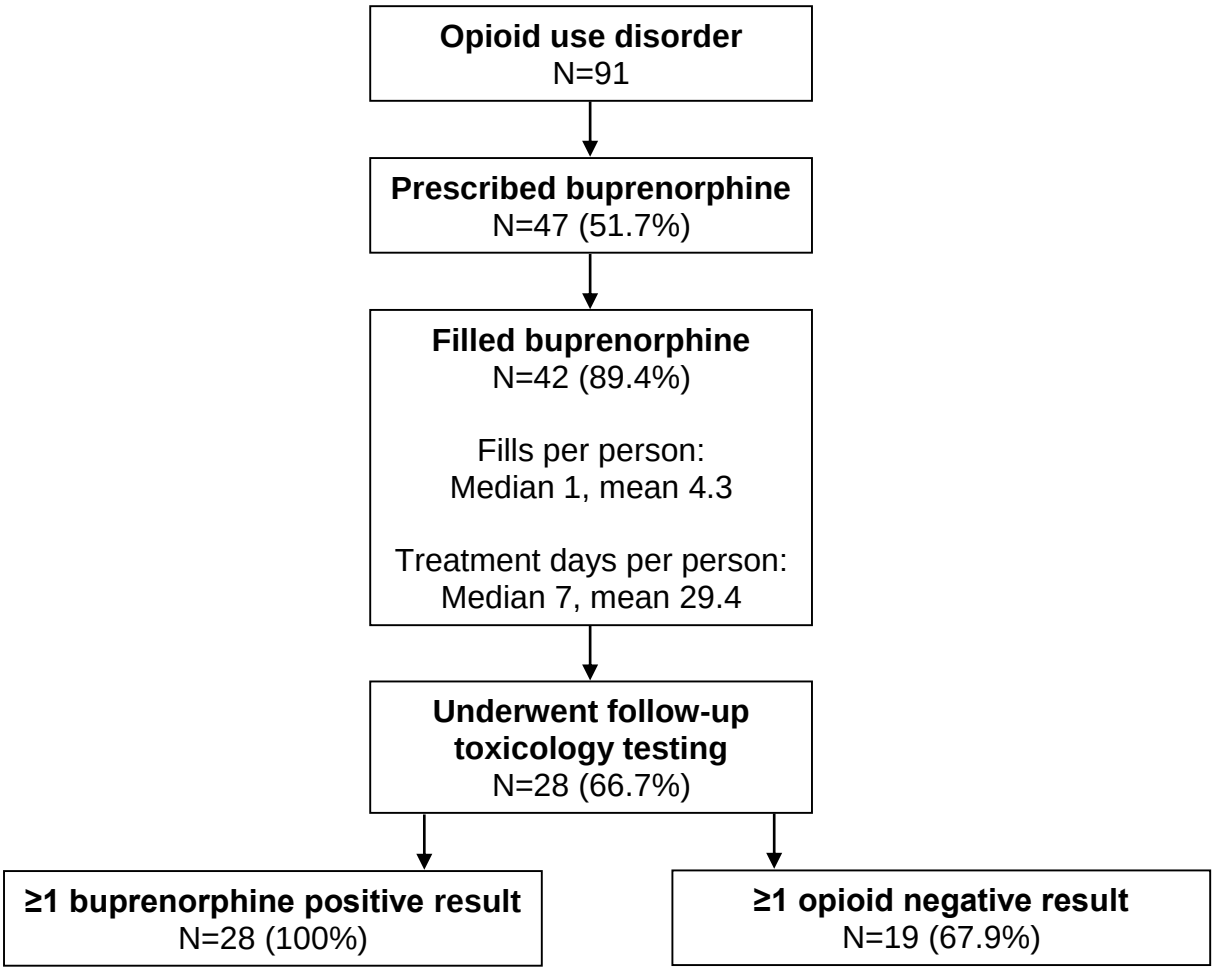
Substance use disorders constituted the bulk of coded diagnoses, with opioid use disorder being far and away most common. Various infectious diseases, many representing complications of substance use disorder, were also common. Other frequently coded conditions included psychiatric disorders and skin disorders. Despite the level of patient complexity reflected in these diagnostic codes, providers were still

able to embark on preventive care measures such as general medical exams and vaccinations.

Buprenorphine treatment cascade

The buprenorphine treatment cascade for *Care*ZONE patients with opioid use disorder is displayed in Exhibit I.

Exhibit I: Buprenorphine treatment cascade among *Care*ZONE patients



Of 91 *Care*ZONE patients with opioid use disorder identified at an initial or follow-up visit, 47 (52%) were prescribed buprenorphine. Patients who received buprenorphine prescriptions did not differ significantly from those who were not prescribed

buprenorphine with respect to demographic, health, or substance use characteristics. Buprenorphine prescribing for patients with opioid use disorder was more common at the Fenway (94%) and Dudley (63%) service sites than at the Downtown site (32%).

Of the 47 *Care*ZONE patients who received a buprenorphine prescription, 42 patients (89%) filled at least one based on Massachusetts prescription monitoring program data. These individuals filled a median of 1 (mean 4.3) buprenorphine prescriptions for a median of 7 (mean 29.4) days of buprenorphine treatment. Notably, considerable proportions of these individuals appeared to make interspersed or subsequent connections with either non-*Care*ZONE BHCHP providers (38%) or non-BHCHP providers (26%) for buprenorphine treatment.

Of the 42 *Care*ZONE patients who filled at least one buprenorphine prescription, 28 (67%) underwent follow-up toxicology testing. Of these, 100% had at least one positive result for buprenorphine (indicating that they took the medication at least once), and 68% had at least one test that was negative for all non-buprenorphine opioids (indicating abstinence at that time point).

Patient experiences with *Care*ZONE

> "As far as I see it, it's a damn good thing. I would recommend it to anybody. And I'm gonna keep coming as long as I can and get the help I need." – Stephen, *Care*ZONE patient

To better understand patients' experiences with *Care*ZONE services, BHCHP Institute staff conducted semi-structured qualitative interviews with 7 patients across the three service sites between September and December, 2018. All had received services from the *Care*ZONE van and ranged in age from 26 to 61. Five of the 7 patients were receiving addiction treatment through a *Care*ZONE medical provider, and 4 of the 7 were rough sleepers. We begin with a brief profile of these patients to shed light on their lived experiences. Names and identifying information have been altered to protect

their confidentiality. We then present key themes and lessons learned from these patient interviews.

Patient profiles

Celeste, a woman in her forties, has been sleeping near Downtown Crossing for the past four years. She reports that she usually goes to the ER when she has a pressing health issue and has been purchasing Suboxone (buprenorphine) on the street to self-manage her addiction. She was approached by AHOPE staff to see if she needed anything and to let her know about medical services on the van. Interested in getting safer, legal treatment for her addiction, Celeste met with the *Care*ZONE doctor to discuss options. Celeste reported being relieved to be able to meet with a doctor and get a prescription for buprenorphine as a safer and more secure way to get back on a treatment regimen. She now meets the *Care*ZONE van every week around the same time to check in with the doctor and refill her prescription.

Thomas, a man in his thirties, initially heard about the *Care*ZONE van through his primary care doctor. He wanted treatment for his addiction but living on the streets made it very challenging to make or keep appointments. Moreover, negative experiences with doctors and staff at other health care facilities in the past often prevented him from setting or keeping appointments. In addition to getting treatment for his addiction, Thomas regularly gets food and treatment for his asthma through *Care*ZONE. Thomas refers to the van as a “one-stop-shop” and appreciates not having to fight his way around the city to different appointments and facilities, given his current living situation and limited resources for travel. He reports being very relieved knowing the van will be there each and every week to check up on his asthma, refill his prescription, and go over any health or other concerns he may have.

Jason, a man in his mid-thirties, sleeps outside in the Fens and has worked with the AHOPE staff for several months to exchange syringes and pick-up additional supplies. But, Jason explained, when he sought treatment for a medical condition in the past, he normally faced a lengthy wait, and often they didn’t treat the condition he had come for.

Jason visited the *Care*ZONE van for a leg fracture. Later, when a facial wound became more painful, he returned to the van for additional treatment. The provider was able to clean his wound and prescribe an antibiotic to help it heal. Having access to a medical provider who is compassionate, caring, and “vouched for” by AHOPE staff has made all the difference in Jason’s overall health and outlook towards medical care.

Angela, a woman in her thirties, first learned about the *Care*ZONE van through AHOPE’s outreach efforts in the Downtown area and was eager to connect with the medical provider due to the disrespectful treatment she had faced when trying to get care at other more traditional health care facilities. She has visited the van almost weekly since she first learned about it and picks up supplies from the AHOPE team and often has a medical issue for the doctor to look at. She reports being very grateful for the van’s non-judgmental approach to medical care and substance use disorders.

Stephen, a man in his sixties, has been using heroin on and off for over 40 years. He learned about the *Care*ZONE van through a friend who was getting addiction treatment through the van and decided to give it a try. He had tried methadone in the past but was unable to stop using heroin. He was started on buprenorphine through *Care*ZONE. After about a month, Stephen feels that the treatment is helping and expects to return to the van each week for his prescription refill. Today he is committed to not using heroin and is hopeful the *Care*ZONE van services will continue to support him in his recovery.

Carlos, a man in his early thirties, sleeps primarily outside and has been using heroin and methamphetamines for over 10 years while also struggling with attention deficit hyperactivity disorder, social anxiety, and PTSD. The AHOPE outreach team found him sleeping in a tent and approached him about *Care*ZONE services. He met with a *Care*ZONE provider and started on medication treatment for his addiction. Carlos returns to the van each week for his buprenorphine prescription and to get naloxone and other harm reduction supplies from AHOPE staff. He has found it challenging to work with traditional medical facilities because he can’t make appointments due to his

current living situation and lifestyle, so the drop-in nature of the van has been particularly helpful for him.

David, a man in his twenties, was introduced to the *Care*ZONE staff through a local outreach program and began receiving both primary care and addiction treatment services on the van. After three months, with help from *Care*ZONE staff, David transitioned his care to a BHCHP brick and mortar site to continue addiction treatment. The consistent schedule of the van and the compassionate approach of the staff made receiving care more comforting than through the hospitals he was used to visiting when he had a serious health issue. David is now working with the office-based addiction treatment team at his health center and is grateful for the introduction and transition of care the van staff helped him with. The van has changed David's views on getting medical care for addiction-related issues. He credits *Care*ZONE for making it possible, no matter what barriers came up along the way.

Key themes

Several key themes emerged from the *Care*ZONE patient interviews.

Substance use disorders. All of the respondents reported a history of substance use, ranging in length from 10 to 40 years. Everyone described multiple experiences with various detoxification and treatment facilities as well as experiences of overdose, both personally and involving others. Many indicated that their experience with overdose dampened their desire to use drugs; however, due to the nature of their addiction, they were unable to stop using despite wanting to and despite recognizing the dangers of drug use. All were familiar with naloxone and had used it before on friends who had overdosed. They typically relied on *Care*ZONE to replenish their naloxone supply.

> "Yeah, I've had a lot of people overdose. Actually, what changed it, I've had so many people overdose, and people I liked, but they came back. In the last three years, my best friend he was like my brother passed away from an overdose, and then when my brother overdosed with me there and being in that with somebody so close to

> me and feeling responsible, that made me see it differently. And experiencing an overdose myself when a loved one had to be there for me, and I didn't realize their perspective, and realizing their perspective it's a lot more serious than you think it is, it's scary. It's very scary." – Carlos, *Care*ZONE patient

> "The last time that I used wasn't fun at all. Like I said, I've wanted to stop using and…I had a lot of issues going on. I was homeless, I was living couch to couch, my mother is in the hospital, I gotta support my dope habit. So, it was becoming a snow ball effect, things were just coming at me left and right. It's almost like it was breaking me down. Let me get some dope, at least for this hour or two I don't got to worry about any of that. Sit here and get my high on, but the problems never go away. As soon as the high comes down you're back to square one again." – Stephen, *Care*ZONE patient

Mental health conditions. Patients reported histories of depression, anxiety, schizophrenia, PTSD, reflecting the compassionate, stigma-free care needed to effectively work with this hard to reach population.

Physical health conditions. A variety of physical health conditions were reported, including acute issues such as abscesses, fractures, and wounds, as well as chronic conditions like hepatitis C and chronic obstructive pulmonary disease (COPD), highlighting the vast and complex physical health issues of *Care*ZONE patients. Despite the multitude of medical centers in the Boston area, patients reported being either unable to access mainstream care or feeling uncomfortable in doing so.

Safe and legal buprenorphine prescriptions. Most patients identified obtaining a buprenorphine prescription as their reason for both initial and subsequent visits to the *Care*ZONE van. Safety concerns were cited as reasons for not wanting to continue buying and using buprenorphine illegally. Having a provider explain the correct treatment regimen and in some cases go to the pharmacy with the patient to pick up the prescription were crucial steps in the process.

> "To get suboxone. It's safer, legal. Health-wise, I feel so much better. I feel more secure, I feel more stable, getting back on a regimen, luckily given by a doctor, better than buying them on the street and maybe not taking them properly. Safety wise it's so much better." – Celeste, *Care*ZONE patient

Compassionate, non-judgmental medical care. All of the patients we spoke with described very positive experiences with *Care*ZONE, including the compassionate and non-judgmental approach taken by everyone on the van, often emphasizing the difference in approach from other medical facilities where they felt stigmatized due to their addiction, mental health issues, or physical state. Trust was established as *Care*ZONE providers worked with patients to build a relationship, usually after an introduction from the AHOPE staffperson who initiated the engagement efforts.

> "I would describe them as pleasant, helpful, and compassionate… It's a good thing, it shows people do care, when you are hopeless and down and out and you feel like no one cares and you can come here, and you realize people do care." – Carlos, *Care*ZONE patient

> "How nice the people are. Some doctors' offices aren't very nice." – Thomas, *Care*ZONE patient

> "The doctor, she's great, she really is. She's a sweet heart. I gotta say, not just her personality, her demeanor, everything. Very proper, very respectful and I trust her, I really do." – Celeste, *Care*ZONE patient

> "Much, much better. Because they understand more of the addiction part of my lifestyle and how important to have clean needles and the hygiene, the way I have been living. I know it's wrong, but they teach me how to continue to be more clean." – Jason, *Care*ZONE patient

> "Because I feel comfortable, everybody on there, they are non-judgmental, they give you that warm comfortable feeling. I don't feel any weirdness." – Angela, *Care*ZONE patient

Accessible, reliable, and convenient medical care. Many respondents mentioned both the enhanced accessibility and convenience of accessing services on the *Care*ZONE van, whether for primary care or addiction treatment. Not having to make appointments was seen by many as an important facilitator of access to medical care. The various service locations, the predictable schedule, and the knowledge that the van would show up when it was supposed to were identified by many as reasons for preferring care from *Care*ZONE, allowing individuals who have limited ability to travel or unpredictable schedules to access care when they need it.

> "I don't have access to my own [medication] at this time because I'm homeless so it's in storage so to be able to come here and not have to show up at the emergency room for breathing treatment is really nice." – Thomas, *Care*ZONE patient

> "That it wasn't like… that it didn't have specific timed appointments, just go and show up. The people that work on the van were all cool." – David, *Care*ZONE patient

> "Yeah, I can walk here, and they show up when they say they are going to be here. I like the crew; the crew is good. The van is proper, its clean. But its more economical, more convenient for me, because I'm having trouble with T-passes and trying to get to any other doctor, or proper facility is challenging. Money-wise isn't is great right now so it helps out, it's very convenient." – Celeste, *Care*ZONE patient

> "I let them know there's a van that comes on Monday, there's a good doctor in there, he'll sit you down and he'll talk to you and he'll see what we can do as far as what you need. And you don't even have to go to BMC, you don't have to go to Brigham and Women's, you don't have to go to Mass General. You can walk right down the street, ten steps, and the van is right there." – Stephen, *Care*ZONE patient

Negative experiences with traditional medical care. The positive experiences described on the *Care*ZONE van were contrasted by many respondents with negative experiences at traditional medical facilities, characterized by a lack of trust and respect, poor treatment, geographical and transportation barriers, and long wait times.

> "Yeah and they have always been very negative about what my problems are or about what my issues are. They just don't let me, they just want to do what they think is what I need. And I have problems that I want to talk about and they just don't want to listen. And these people on the van are willing to listen and give me the time get help." – Jason, *Care*ZONE patient

> "It's like as soon as they turn their back, let's say in a hospital, they could be talking about your socks smelling. Whereas here, I can be like dude my [expletive] feet smell, do you know what I mean?" – Angela, *Care*ZONE patient

> "I've gotten new works, like needles, and it's mainly every time I go to the van it's for the doctor because I don't like to go to the hospital. I feel more comfortable here… I hate [the hospital]... They weren't willing to work with me just because I was a drug addict, so they didn't know how to understand what I was struggling with or what is the help that I needed." – Jason, *Care*ZONE patient

> "Yeah it was a little hard. The wait was long, the wait was really long. It was like a three month wait, I didn't have three months to get on Suboxone. So, it kept me buying them on the street and stuff until I met the van." – Celeste, *Care*ZONE patient

> "Oh yeah, I'd get stuck walking to [Boston-area hospital] or [Boston-area hospital] or something like that and wait there for three hours. It's awful…. I don't know I just feel like they don't take the homeless population seriously, they don't care, they just don't care…. Just the way that they treat you as a person. They just talk down to me and I don't like it." – Thomas, *Care*ZONE patient

> Because I'm a drug addict and they don't like giving addicts any sort of care there… Well you go in there, they ask you if you're homeless and if you're drug addicted and if the answer to either of those statements in yes then they say alright let me get your discharge paperwork ready... Everything to [Boston-area hospital] is always going to come back to your drug problem. If I have a runny nose they are like 'yup you are dopesick'. Everything has to do with your addiction to them. And the CareZONE isn't like that." – David, *Care*ZONE patient

Relationship building is key. All but one participant reported engaging with AHOPE prior to working with the *Care*ZONE medical staff on the van. The partnership with AHOPE, a community provider of harm reduction services with extensive in-roads among people who use drugs, proved critical to earning the trust of potential patients. Indeed, when one patient was asked whether she would have sought services on the *Care*ZONE van without the preceding link to AHOPE staff, she responded:

> "No. It was good that they walked around and let everyone know they were here and what their abilities were, you know, like what their reason was for being out here." – Celeste, *Care*ZONE patient

Suggested improvements. The overall feedback about *Care*ZONE was resoundingly positive, with all patients stating that the van met their needs. However, there were a few suggestions that might help enhance the lives of *Care*ZONE patients and expand access to care. Every respondent suggested that the *Care*ZONE van have longer hours of operation and visit their location more frequently. The ease of access to care due to the van's physical location came up as one of the main facilitators to care. One respondent suggested adding the Engagement Center as a service site. Another patient suggested advertising *Care*ZONE services with flyers in areas of high drug use rather than relying on worth of mouth or AHOPE staff recommendations. Public transportation passes also came up frequently as a potentially useful resource for van patients.

> "I know if you were closer to up here [Massachusetts Avenue and Melnea Cass Boulevard intersection] you would get more people. If you were to get the van right outside the Engagement Center you would have more people than you would know what do to with." – David, *Care*ZONE patient

> "Well maybe, um, they should put out some flyers. Because I heard it word of mouth. I don't see anything around Dudley station saying well we have a van…" – Stephen, *Care*ZONE patient

Summary and implications

During 180 days of operation, the *Care*ZONE initiative successfully distributed nearly 41,000 syringes, issued more than 1,400 naloxone kits, and provided medical care to 119 individuals at high risk for life-threatening and costly drug-related complications. Our evaluation highlighted several important findings and implications for future work.

- ***Low-threshold mobile medical initiatives targeting people who use drugs should be paired with proactive street outreach.*** Partnering with an experienced community provider of outreach and harm reduction services was critical to earning the trust and confidence of highly marginalized patients and to encouraging them to engage in medical services. Even if individuals are not ready to engage in medical care, street outreach provides a vehicle for the widespread delivery of harm reduction supplies (e.g. syringes and naloxone) in a way that appears highly acceptable to the target population.
- ***Mobile medical initiatives take time to ramp up.*** Even with a trusted community partner, launching a new clinical initiative for a highly marginalized population requires time to gain traction and patience to allow individuals to become familiar with services and engage with them on their own terms. By conventional standards, *Care*ZONE clinical services were initially slow but showed a steady increase over the evaluation period, particularly in the final month. This underscores that clinical outcomes, and eventually financial returns on investment, are not likely to be seen immediately but rather more likely to accrue over longer periods of observation.

- ***Mobile medical initiatives can be a valuable tool for engaging new patients into care and serve as portal of entry to brick and mortar services.*** Over half of individuals seen for *Care*ZONE clinical encounters were new to BHCHP services. Of these, one-third went on to receive other BHCHP services. Even with initially low clinical volume, bringing these highest-risk patients into care could have a substantial downstream impact on clinical outcomes and cost.
- ***Integrated mobile hepatitis C and HIV treatment should be a future consideration.*** The relatively high baseline prevalence of both hepatitis C and HIV infection among *Care*ZONE patients, coupled with the later emergence of an HIV outbreak in a group of patients served by *Care*ZONE, suggests a potentially important role for van-based clinical efforts directed toward hepatitis C and HIV treatment for individuals unable or unwilling to pursue such care in more conventional settings.
- ***Buprenorphine treatment can be delivered in a mobile outreach unit but efforts at promoting continuity of care may be needed.*** Over half of *Care*ZONE patients with opioid use disorder were issued prescriptions for buprenorphine and most of these were filled. Of those who underwent follow-up toxicology testing, all demonstrated evidence of taking buprenorphine, suggesting high rates of acceptability and potentially adherence among the majority of patients started on buprenorphine. Although many patients were successfully maintained on buprenorphine either through BHCHP or non-BHCHP providers, a sizable proportion were lost to follow-up. While even brief periods of buprenorphine treatment might lower overdose death risk, efforts at promoting longer-term engagement may be needed for selected individuals.
- ***Mobile medical services can provide a more acceptable health care experience for stigmatized individuals.*** In qualitative interviews, patients universally reported negative experiences with conventional medical facilities, prompting them to avoid care for potentially important or treatable issues. Patients appreciated the convenience of mobile services and the non-judgmental approach of *Care*ZONE staff. This paved the way for establishing trusting

relationships with health care providers in a way most had not previously experienced in other settings.

- ***Mobile medical initiatives efforts should combine flexibility with predictability.*** Patients appreciated the convenience and flexibility of the *Care*ZONE model while also emphasizing that having a predictable schedule of hours and locations was reassuring. Indeed, patients' principal suggestions for improvement were to expand the number of service sites and the hours of operation at each site, highlighting the high level of acceptability and demand for services like *Care*ZONE.

Conclusions

*Care*ZONE delivered harm reduction services to a diverse group of high-risk communities in Boston and engaged many marginalized individuals into primary care and addiction treatment services in a manner that patients found both helpful and humanizing. Future efforts should focus on expanding sites and hours of operation, coupled with efforts to systematically assess both clinical and cost outcomes that may accrue over a longer period of deployment.

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