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Stakeholder perspectives on implementing fentanyl drug checking: Results from a multi-site study

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ABSTRACT

Background: The opioid epidemic is one of the greatest public health crises of our times, driven increasingly by synthetic opioids such as fentanyl in the heroin supply. The implementation of drug checking in community settings has the potential to reduce the burden of fatal overdose, provide harm reduction education around safer drug consumption, and increase health access among people who use drugs (PWUD). To inform program development, we explored stakeholder opinions on drug checking technologies and implementation considerations.

Methods: This study, from the larger FORECAST study, utilized semi-structured in-depth interviews (n = 32) with a range of stakeholders in Baltimore, Boston, and Providence, many of whom were service providers. Stakeholders represented various roles and levels in organization types including harm reduction, public health, peer groups, and advocates. Interviews were audio recorded and transcribed. Data were coded using *a priori* codes; the coded text was analyzed for key themes.

Results: Stakeholders responded positively to drug checking technology, though they shared apprehensions regarding service implementation. Primary topics requiring consideration included: utility in fentanyl endemic areas, trust and rapport between providers and PWUD, legality and policy concerns. Additional considerations included: technology accuracy, cost, ease of distribution, and service delivery setting.

Conclusions: Stakeholders overwhelmingly supported the concept of drug checking with the goals of providing needed risk reduction information and resources to PWUD and serving as a point for greater engagement in services. Programs need to be tailored to local circumstances. Law enforcement buy-in and policy change will be critical aspects of providing drug checking services.

1. Introduction

Fentanyl-related overdoses are an urgent public health concern in many communities in the U.S. (Ciccarone, 2017; Frank and Pollack, 2017). Fentanyl, a synthetic opioid 50–100 times more potent than morphine, is clinically used in anesthesia and for chronic pain management (Higashikawa and Suzuki, 2008; Volpe et al., 2011). In many cases, people who use drugs (PWUD) are unknowingly ingesting fentanyl. In a study among people who use drugs across British Columbia, Canada, 29% of respondents tested positive for fentanyl, 73% of whom reported not knowingly using fentanyl (Amlani et al., 2015). Further, 86% of drugs checked during a pilot program in Vancouver, BC, tested

positive for fentanyl (Vancouver Coastal Health, 2016).

Fentanyl-related overdoses and fatalities have increased rapidly over the past several years, especially in the Eastern United States (Ciccarone, 2017; Frank and Pollack, 2017). In Maryland, 1119 overdose deaths were attributable to fentanyl in 2016, compared to 340 in 2015, (Maryland Dept. of Health and Mental Hygiene, 2017) with over one-third occurring in Baltimore City. Similarly, in Massachusetts, fatal opioid overdoses increased by 22% from 2015 to 2016, with fentanyl present in over 75% of opioid overdose cases from the first three quarters of 2016 (Massachusetts Department of Public Health, 2018). In Rhode Island, in 2017, over 60% of overdose deaths were fentanyl-involved (Rhode Island Department of Health, 2018).

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Drug checking services enable people who use drugs to have the content of their drugs chemically analyzed and make informed decisions about use (Harper et al., 2017). Preliminary research shows positive attitudes about drug checking from PWUD and that knowledge of fentanyl presence may modify drug use behaviors; in a study of young adults in Rhode Island, 92% of participants wanted to know if there was fentanyl in their drug supply prior to use (Krieger et al., 2018). In addition to conveying potentially life-saving information, drug checking services are an opportunity to engage with PWUD and provide counseling, harm reduction education, and referrals to necessary services (e.g., drug treatment), as well as to monitor and alert PWUD about the presence of dangerous drugs on the market.

Examples of long-term, coordinated drug checking efforts throughout Europe and North America (Brunt, 2017) include mobile testing at clubs and raves and stationary laboratories. Emerging drug checking technologies include test strips and machines that detect fentanyl and its analogues. The Rapid Response Fentanyl Test Strip, which detects norfentanyl in urine, was recently validated in drug samples dissolved in water (Sherman et al., 2018). It is a user-driven technology utilized in a growing number of studies (Amlani et al., 2015; Krieger et al., 2018) and harm reduction programs (Marshall, 2018). The strip, while not 100% accurate, is specific for fentanyl screening with no significant cross-reactivity to other opiates, such as morphine and heroin, and according to the manufacturer, is able to detect fentanyl and over 10-fentanyl analogs in urinalysis (BTNX, Inc., 2018), however, no studies have validated this finding in street drug samples. Drug checking machines, including the TruNarc or Bruker Alpha, can detect whether drug samples contain fentanyl, other drugs, or cutting agents and would likely require PWUD to share a small amount of their drugs with trained staff to check drugs using machines. The sensitivity and specificity of these technologies were lower than the test strips (Sherman et al., 2018). Results for all technologies would be available in about 5 min.

Little is known about the context of providing drug checking in a public health setting, including providers' and other stakeholders' thoughts about implementation. The objective of this study is to explore stakeholder perspectives surrounding drug checking and programmatic considerations in implementing drug checking services utilizing two separate technologies. This is the first study, to our knowledge, to assess these concerns.

2. Material and methods

The Fentanyl Overdose Reduction Checking Analysis Study (FOR-ECAST) is a multi-phase study that occurred in three US cities: Baltimore Maryland, Boston Massachusetts, and Providence Rhode Island, evaluating drug checking technologies, surveying PWUD, and interviewing respondents from organizations that work with PWUD. Three drug checking technologies were evaluated, the Rapid Response Fentanyl Test Strip, the TruNarc machine, and the Bruker Alpha machine. This final study phase, reported here, utilized in-depth interviews with stakeholders between September and November 2017. A semi-structured field guide was developed for individual interviews, consisting of four sections: 1) experiences with clients around drug use and fentanyl, 2) general opinions on drug checking; 3) general and technology-specific implementation considerations; 4) accompanying information and services. Drug checking strip distribution had already been implemented in Boston on a pilot basis.

2.1. Respondent eligibility and recruitment

Eligible participants included individuals employed at organizations in the three cities who worked with or advocated for PWUD, including former and current PWUD. Participants were purposively sampled; the research team contacted potential participants based on the anticipated perspectives they could provide- including a range of professional roles

and organization type. All participants (N = 32) provided informed consent. Financial incentives of \$40 were provided to thirteen respondents whose professional positions allowed acceptance.

2.2. Data collection and analysis

Research assistants in the three cities conducted interviews—primarily in-person. Interviews took approximately one hour and were audio-recorded and transcribed. Debrief forms, completed after each interview, informed changes to the guide and preliminary analysis. Completed transcripts and notes were coded using NVIVO Version 11. Codes were developed *a priori* based on the research aims. Interviews were coded as one data set, and not analyzed by city or organization type. Coded text was analyzed and summarized for key themes, particularly around points that reached saturation, (e.g., redundancy of responses) and distinct deviating viewpoints. Memos written throughout this process facilitated synthesis of findings. Common response themes and illustrative quotes are included where relevant. When participant organizations' work crossed organization type, (i.e., organizations made up of volunteer peers may also do advocacy or harm reduction work), the research team came to consensus on which group type best fit. The Johns Hopkins University Institutional Review Board and the Rhode Island Hospital Review Board approved the study.

3. Results

The sample included 32 stakeholders across Baltimore (n = 12), Boston (n = 9), and Providence (n = 11). Respondents worked in the following organization types: harm reduction, including needle exchange (n = 11), public health (n = 9), general health care (n = 3), drug treatment (n = 2), peer groups (e.g., drug user advocacy groups) (n = 4), and family advocates (n = 3). The professional roles of respondents ranged from high-level leadership (e.g., Executive Director) to frontline staff (e.g., advocate, organizer, outreach worker). Respondents reported being in their current role from 2 months to 34 years.

Respondents discussed their experiences of providing services or interacting with PWUD, including conversations about fentanyl and overdose. When presented with the concept of drug checking, respondents shared general reactions and questions, then explored technology-specific considerations primarily related to program implementation. Key implementation considerations discussed below include: utility in fentanyl endemic areas; trust and rapport between providers and PWUD; and legality and policy concerns.

3.1. Interactions with PWUD/ conversations about fentanyl and overdose

Stakeholders across all cities discussed the pervasiveness of fentanyl in heroin and other street drug supplies in their geographic areas.

No matter what you're getting, whether it's marijuana or a pill that you think might be Percocet or heroin, you can assume that there's fentanyl in it, or that it's all fentanyl.

-Regional Manager- Family Advocate/Peer Group Organization

According to stakeholders, most PWUD believed fentanyl was pervasive in the drug supply, though only a minority preferred fentanyl to heroin. Perceived appeals included an initial novelty, a developed tolerance or affinity, and the cost savings of the elevated potency.

Stakeholders reported that the nature of overdoses had changed since fentanyl pervaded the drug supply; their clients discussed overdoses occurring with faster onset, more intensity, from smaller drug amounts, and with more non-opioid drugs. As a result, overdoses were more common, even among long-term PWUD. While clients were reportedly more fearful of overdose, having experienced and witnessed

fatal and non-fatal overdose, the fear did not deter ongoing drug use.

It's almost a common thing. I think every single one of my opioid users has experienced overdose. Their friends have experienced overdose. They've seen someone overdose. It's a given risk. It's part of the lifestyle especially the intravenous users. They just know that it's going to happen. Yet, it doesn't deter them.

- Drop-In Center Manager- Harm Reduction Organization

It was widely perceived that fentanyl has changed how drugs were consumed. While a fentanyl high was reportedly "higher" (more intense) it also lasted a shorter duration compared to other opioids. While some reported that PWUD were titrating their doses and using less at a time, others reported PWUD were injecting more frequently which means more opportunities for overdose and increased risk-taking to fund the next high.

The economics of drug use, the economic landscape has kind of shifted because of the fentanyl duration. They cop[buy] more often, and then they're needing to use more often, which means they need to have more money, which means they need to do more things to get that money.

- Organizer, Harm Reduction Organization

The emergence and pervasiveness of fentanyl have also changed education and service provision for PWUD. Service providers reported clients increasingly initiating conversations about fentanyl and overdose, leading to more opportunities for education, counseling and, when applicable, harm reduction supply distribution (e.g., needle exchange, naloxone distribution).

3.2. Overall attitudes toward drug checking

Stakeholders responded positively to the concept of drug checking, though they shared apprehensions regarding service implementation. Given fentanyl's pervasiveness in the heroin supply, some questioned the utility of checking heroin. However, some considered it useful for drugs perceived as less likely to contain fentanyl, such as pressed pills and cocaine. Others felt that drug checking could offer an entry point for harm reduction activities like information sharing and counseling on a range of topics from drug treatment to specific harm reduction practices. A few respondents expressed concern that providing drug checking services could be a liability to conservative funders who are unsupportive of harm reduction strategies or could be construed as promoting drug use.

3.3. Drug checking strips

Stakeholders were overwhelmingly enthusiastic about the ease of distributing drug checking strips and the empowerment potential of a self-administered technology.

So, this one [strips] really appeals to me because it's something that is readily able to be deployed to the population that needs it the most without outside influence... So that they could safely, anonymously use, and detect, and choose. And autonomy, even in your addiction, is hugely powerful. Being able to feel like you have a semblance of control over what happens is really important.

-Executive Director, Harm Reduction Organization

Hesitations to employing strips focused on the utility of knowing only the presence or absence of fentanyl in areas where fentanyl is endemic. Without information of potency, most respondents did not think that a positive fentanyl test would deter PWUD from continuing to use that supply. Nevertheless, many felt that the strips would be a way to initiate harm reduction conversations and education, and may plant the seeds for future behavior change.

Does it make sense to even be doing this anymore if it's all positive?

In my opinion, yes, it does. Any education is education and just the fact that people who use drugs are able to use a strip by themselves...is empowering and I think that's really a lot of what we were trying to do. And it's humanizing. So yeah I think it's a great stop-gap measure before other, more accurate [testing] options are available.

-Executive Director, Harm Reduction Organization

Respondents generally felt the mobility of strips made them an easy tool to integrate into existing harm reduction supply distribution programs. A variety of settings were frequently named including mobile outreach, needle exchange and naloxone distribution programs, methadone clinics, prisons, and community-based organizations. Some respondents mentioned mobile outreach targeting those in close contact with PWUD, such as friends and family.

I think that the cool thing about the strips is that they're more mobile, so you can hand them out in street outreach or from a center. But that people are using them elsewhere so as long as you can train them within a couple of minutes and have that make sense and be clear, then I think it can be used in a more broad set of settings.

-Executive Director, Harm Reduction Organization

Stakeholders across organizational type felt that a take-home self-testing distribution model, accompanied by health education would alleviate barriers related to stigma and promote rapport between PWUD and staff. Furthermore, clients would not have to transport drugs to the service point or share drugs with a service provider for drug checking.

I think it's almost like "okay, I'm going to give you this because I care about you". So, I think it would go towards furthering the development of rapport between people and showing, "I'm not judging you, you can do this on your own. I'm not going to take it from you and test it. You can do it if you want to".

-Project Director, Public Health Organization

3.4. Drug checking machines

Respondents expressed enthusiasm and positivity about the machines discussed (TruNarc and Bruker Alpha), especially the range of information provided.

If it could tell the percentage of each substance that is in the drug, that makes the big difference. Just knowing what is in there is important. But being able to see the percentage of the cutting agent, the percentage of fentanyl, the percentage of heroin, I think that makes a huge difference in how much you're putting into your body. If it could tell the percentage that would be really helpful.

- Overdose Prevention Coordinator, Public Health Organization

Respondents raised potential concerns among PWUD about having enough trust and rapport established with agencies and staff to cede even a small amount of their drug.

Their first question would be if they get the pin-size piece back, that would be a real question- because, your whole life is in a bag, so to give a portion of that up- that would be everyone's question: 'well, do I get it back?'

-Manager, Peer Group

Concerns about who would staff a drug checking machine came up quite frequently across all respondents, acknowledging that staff was already stretched and that such work could have a negative impact on staff in recovery. Respondents also raised concerns about the safety risk of operating a drug checking program.

I could imagine that if you had a machine, and told everybody they could come and figure out what's in their drugs, you'd have a line around the corner, which is great. You would need to be very

thoughtful about how to manage crowds and how to manage the neighborhood and how to manage people who are selling the drugs. And protect people from various predatory agents such as police and maybe drug sellers or whatever. I think it would be wildly popular and wildly suspicious at the same time.

-Associate Director of Harm Reduction, Public Health Organization

Several qualities were noted as important when selecting an appropriate setting: accessibility; being judgment free; security; privacy; and confidentiality. Respondents discussed the benefits of solely providing drug checking or co-locating it with other services, such as needle exchange, safe consumption spaces, Federally Qualified Health Centers, drop-in centers, and shelters. The importance of providing services in locations that were close to drug use activities was discussed; many supported testing in mobile sites, such as RVs, so that the service could be responsive to trends in locations and timing. Respondents were pleased with the size of the machines, both being relatively small and potentially mobile.

I think transient locations because we're dealing with a transient community....Like on a mobile van, where you can park and have a schedule that's passed around to let folks know on this date at this time. It would also be very, very effective if there's a night aspect... so that's something else to take into account- non-traditional hours. Program Manager, Public Health

3.5. Broad implementation considerations

Respondents raised broad drug checking program implementation considerations that were not linked to a specific technology type, including: accuracy of drug checking; drug checking program costs; liability; and legality and law enforcement.

3.5.1. Accuracy of drug checking

As is the case with any test, there is some margin of error. Respondents mostly agreed that the margin of error must be low, with concern expressed more about false negatives than false positives, because those errors could be deadly or create organizational liability. Further, drug checking technology is unable to detect all fentanyl analogs. While less of a concern, false positives could still be an issue because the test could lose meaning and erode the general feeling of trust service providers have created with their clients.

It would have to be pretty low on both ends for it to be worth investing in. If you have too many false negatives well, that's too dangerous we wouldn't want to put that out. If you have too many false positives, then it's not really useful so sort of either way you don't want too much. So, I don't know how to say a number other than it has to be pretty low.

- Assistant Director, Public Health Organization

Others brought up the distinction between real-world drug checking accuracy and accuracy in a laboratory setting. This point was especially relevant to drug checking strips, which are frequently conceived of as a user-administered technology. User error concerns for the strips included strip storage, solution preparation, and reading the results within the valid time period. Client education about error was also raised as an important piece of implementing all technologies.

3.5.2. Program costs

Respondents were informed of the estimated costs for the drug checking technologies; \$1 for a single-use strip and approximately \$20,000 for the machines. While many of the stakeholders were not financial decision makers, they reflected on their organization's ability to fund drug checking technologies; most agreed that purchasing the strips would be a more acceptable proposal than the machines. There was interest in pilot programs to garner client feedback before investing

in drug checking services. A few noted that the price of the strips could add up if they are encouraging PWUD to check frequently.

While many were surprised by the up-front machine costs, respondents posited that procuring might be feasible if grant funds were available, Medicaid could be billed, or if drug checking services were incorporated into larger service packages. Respondents noted that a machine program would result in additional costs for staffing, security, etc.

Respondents discussed the possibility of having PWUD or their loved ones cover the costs, though some stated that charging for life-saving services was unethical. They nearly unanimously agreed that street-based PWUD would not be willing to pay any amount for drug checking services, but those from wealthier income brackets may.

Would a drug user pay to have their drugs tested? Certain drug users, yes. Would that be the majority of the drug users? Some work and use more recreationally. The street-based drug user, he's not going to pay. There are different classes of drug users

- Drop-In Center Manager, Harm Reduction

3.5.3. Law enforcement and legality

Most respondents acknowledged that local law enforcement opinions would vary by jurisdiction and individuals. Those already engaged with harm reduction organizations or arrest diversion programs would be more likely to support drug checking. Some respondents expected initial pushback but thought partnerships and education could help assuage law enforcement concerns noting larger law enforcement trends of including more social services and diversion programs.

The legality of on-site drug checking services was raised by virtually all respondents, including handling illegal substances and how police would react to testing. Legal concerns for the strips centered only on the potential that possession of the strips could be associated with the intent to use drugs. Many respondents discussed needing to change policy and law to allow for such a program, and the importance of building a relationship with local law enforcement around drug checking.

4. Discussion

This is the first study to examine key stakeholder perspectives on drug checking program implementation, a novel piece of the public health response to the fentanyl crisis. Across all types of organizations and roles included in this study, stakeholders overwhelmingly felt favorable about drug checking. As drug checking interventions are rapidly employed in a range of settings, this thoughtful examination of implementation considerations contributes important programmatic support to intervention roll-out and scale-up. Many key themes emerged regarding how best to implement drug checking services, and each individual entity that chooses to engage in drug checking may have to tailor their program uniquely to their needs. This study can serve as a guide of factors to consider in determining the best drug checking program for a particular situation, given the capacity of the implementer, political environment, fentanyl pervasiveness, PWUD trends, and financial resources.

Concerns and questions were raised regarding whether technologies could quantify fentanyl amounts and detect the presence of substances other than fentanyl, indicating a knowledge gap between technology developments and stakeholder awareness. In the larger FORECAST study, fentanyl testing strips had the lowest detection limit and the highest sensitivity and specificity for fentanyl, compared to the machines. Emerging reports and forthcoming manuscripts clarifying the detection capacity of the various technologies should help to fill that gap (Sherman et al., 2018). Future implementation studies should evaluate whether risk compensation behaviors are observed among users of fentanyl test strips. Further, the limitations of drug testing technology underscore the potential need for complementary harm reduction resources, such as naloxone distribution and safer

consumption spaces. It is the work of public health entities and harm-reduction advocates to ensure this information is disseminated to those who need it and incorporated into harm reduction interventions and strategies.

The importance of trust and rapport building between service providers and PWUD came up several times when considering the potential success of drug checking programs. In the case of machines, stakeholders underscored that without pre-existing trust, PWUD would be unlikely to share a portion of their drugs for checking. Respondents highlighted that less trust would be necessary to distribute and educate on the strips, and the strips were seen as empowering to PWUD. Similar to syringe exchange programs (Macneil and Pauly, 2011; Treloar et al., 2016), the strips could be an opportunity to develop trust and rapport with new and existing clients, which could then open the door for a range of harm reduction and drug treatment education and service provision. Even in known fentanyl endemic areas, the merit of drug checking strips in fostering relationships is important and could play a role in harm reduction activities by providing an entry point for information sharing and counseling on a range of topics. Stakeholders also raised the potential for drug checking to spark behavior change over time among PWUD. In the Boston area, where a short strip distribution pilot program had occurred, high demand among PWUD was reported, and organizations did not have major implementation issues. The strips reportedly served as a conversation starter for providing harm reduction education to PWUD.

Many of the stakeholder concerns centered around the legality of drug checking services- including drug possession charges for providers operating machines, and the potential for the strips to be used in paraphernalia possession charges against providers and PWUD. These concerns may be best addressed with policy changes. Immunity policies could ameliorate concerns of providers operating machines and provide protection for PWUD who provide some of their drug for checking. Decriminalization of drug checking tools could be necessary to encourage dissemination, such as in Maryland and Rhode Island where various bills have legalized the distribution and utilization of narcotic testing products (Criminal Law, 2018; Relating To Food and Drugs, 2018).

The results from the current study should be viewed in light of several limitations. While respondents from multiple organizational types and roles were included, the primary organization categorization process masked some nuances in the range of experiences and perspectives represented from each participant, as organizations work across type, and individuals have varied experiences. By only asking about the respondent's current position and time in that capacity, past experiences were missed. Law enforcement perspectives were not included in this study, which may have provided a helpful context in understanding the above-mentioned legality and law enforcement considerations. Further, while a range of stakeholder perspectives was included, with generally affirming thoughts, some more likely to hold negative views of drug checking were not included. While the overall sample size of the study allowed for saturation around themes, perspectives from specific stakeholder groups with fewer participants, such as general healthcare, drug treatment, peer and family advocates, may be under-represented. This limits the ability to make conclusions by organization and role.

4.1. Conclusions

While there are no simple solutions to the current fentanyl crisis, drug checking is one tool in a larger array of options. The implementation of drug checking programs requires thoughtful consideration of best practices to promote safety and reduce unintended consequences. This article offers a thoughtful discussion of factors to consider. Complementary to other academic (McGowan et al., 2018) and programmatic resources, considering pragmatic and ethical debates, we hope this paper can meaningfully contribute to the public

health opioid crisis response. Future studies should examine program implementation successes and lessons learned, evaluate whether risk compensation behaviors are observed among users of fentanyl test strips, as well as investigating law enforcement perspectives and interventions to develop collaborations with key stakeholders who do not yet see drug checking favorably.

Conflict of interest

No conflict declared.

Role of funding source

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Contributors

SS and TG designed the Fentanyl Overdose Reduction Checking Analysis Study (FORECAST) Study. JP provided overall study coordination across sites. JG oversaw the qualitative data collection and analysis across sites. JP and MM managed the study sights. JG and TC acquired the data and conducted the coding, along with other research assistants. JG and TC conducted the analyses. JG drafted the manuscript, and incorporated suggestions from all co-authors. TC, JP, MM, TG, and SS critically revised the manuscript and contributed important intellectual content. All authors reviewed and approved the final version of the manuscript.

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