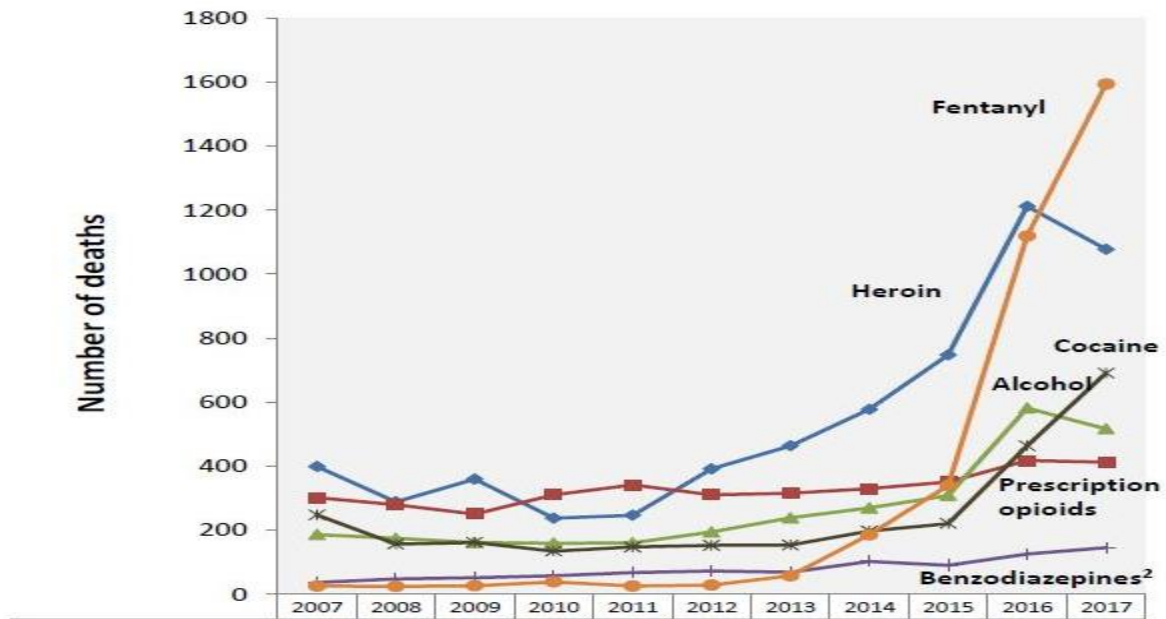


Data from the Maryland Department of Health Behavioral Health Administration show that fentanyl has overtaken heroin to become the leading cause of overdose death in Maryland: [https://bha.health.maryland.gov/OVERDOSE\\_PREVENTION/Pages/Data-and-Reports.aspx](https://bha.health.maryland.gov/OVERDOSE_PREVENTION/Pages/Data-and-Reports.aspx)

**Figure 5. Total Number of Drug- and Alcohol-Related Intoxication Deaths by Selected Substances<sup>1</sup>, Maryland, 2007-2017.**



Providing tools for people who use drugs to screen for the presence of fentanyl offers a promising opportunity to prevent overdose. A positive test provides critical knowledge to an individual who may then change their behavior in ways that reduce overdose risk, such as using less drugs, injecting more slowly, changing the route of administration (from injecting to inhaling), using in the presence of someone with Naloxone, or, not using at all. The strips are manufactured to test urine but are effective at identifying fentanyl in a small sample of powder drug mixed with water. They cost \$1/strip.<sup>1</sup> They have a high sensitivity and specificity for fentanyl and four of its analogs as compared to other testing devices. A few studies indicate that they are effective and safe to use. This document summarizes the published literature about the validity and effectiveness of fentanyl test strips as a harm reduction strategy, describes recent fentanyl test strips (FTS) pilots, and identifies policy considerations.

<sup>1</sup> Available through BTNX: <https://www.btnx.com/Product?id=16940>.

**Johns Hopkins Bloomberg School of Public Health** published its *Fentanyl Overdose Reduction Checking Analysis Study (FORECAST)* on February 6, 2018<sup>2</sup>, based on work conducted between April and November 2017. FORECAST had three phases: 1) evaluating drug checking technologies; 2) interviewing people who use drugs; and 3) interviewing key informants from organizations that work with people who use drugs. In phase 1, the researchers tested three technologies to identify fentanyl in street drug samples, compared to a gold standard for this analysis, a Gas Chromatograph/Mass Spectrometer. The technologies were: 1) BTNX<sup>3</sup> fentanyl testing strips; 2) the TruNarc machine, which detects molecular vibrations to determine the chemical makeup of a substance; and 3) the Bruker Alpha machine, which uses infrared light to determine the properties of a substance. The Baltimore, MD and Providence, RI Police Departments provided street drug samples for the study. For each technology, the researchers determined the ability to detect the presence (sensitivity) or absence (specificity) of fentanyl and the lowest concentration that could be detected, on 54 known fentanyl-positive and 52 known fentanyl-negative drug samples. Researchers found that fentanyl testing strips had the lowest (better) detection limit and the highest sensitivity and specificity for detecting fentanyl of the technologies assessed:

TECHNOLOGY	DETECTION LIMIT	SENSITIVITY		SPECIFICITY	
		Rhode Island Lab	Baltimore Lab	Rhode Island Lab	Baltimore Lab
BTNX Fentanyl Testing Strips (immunoassay)	0.13 micrograms/ml	96%	100%	90%	98%
TruNarc (Raman Spectroscopy)	25 micrograms/ml	4% (61% with SERS kit)	4% (39% with SERS kit)	100% (92% with SERS kit)	98% (92% with SERS kit)
Bruker Alpha (FTIR Spectroscopy)	3-4% weight, which is comparable to TruNarc	83%		90%	

In phase 2, the researchers recruited 335 people who use drugs in Baltimore, Boston, and Providence, who completed an anonymous survey of their histories of drug use, fentanyl, and overdose, and harm reduction practices. The sample was 59% male, 43% white, and 41%

<sup>2</sup> [https://americanhealth.jhu.edu/sites/default/files/inline-files/Fentanyl\\_Executive\\_Summary\\_032018.pdf](https://americanhealth.jhu.edu/sites/default/files/inline-files/Fentanyl_Executive_Summary_032018.pdf)

<sup>3</sup> BTNX Inc. is a biotechnology company which produces rapid, point-of-care diagnostics.

African American, with a median age of 43 years. 64% had overdosed themselves, and 42% had witnessed a fatal overdose. There were three main findings from phase 2:

1. The vast majority of people sampled had a high degree of concern about fentanyl in the drug supply. 84% of respondents were concerned about fentanyl in their drugs. Only 26% expressed a preference for drugs with fentanyl. Of the 256 respondents who thought they had consumed fentanyl, 85% said they wished they had known beforehand.
2. The vast majority of people sampled are interested in fentanyl checking as a product safety measure. 85% of respondents desired to know about the presence of fentanyl before using drugs, with 73% expressing moderate to high interest. Drug checking was viewed as an important means of overdose prevention, with 89% agreeing that it would make them feel better about protecting themselves against overdose. Interest in drug checking was associated with having witnessed an overdose and recently using a drug thought to have fentanyl in it. Additionally, 86% of respondents wanted to know the amount of fentanyl in their drugs and 87% wanted to know what else was in them.
3. The majority of people sampled would modify their drug use behaviors if their drugs tested positive for fentanyl. Across all sites, 70% of respondents reported that knowing that their drugs contained fentanyl would lead them to modify their behavior, which could include: 1) not using the drugs at all; 2) using the drugs more slowly; 3) using the drugs with others who have naloxone; and 4) changing their purchasing behaviors.

In phase 3, researchers interviewed 32 key informants from organizations that serve people who use drugs—such as health departments, treatment facilities, and community-based organizations—and leaders of peer groups and family advocacy organizations. There were two findings from phase 3:

1. Service providers interviewed supported drug checking as a way to connect to people who use drugs. Some also expressed interest in knowing the other substances in street drugs and in what quantities, information which could be provided by the Bruker Alpha.
2. Key informants expressed interest in the potential legal liability and security risks of doing drug checking.<sup>4</sup>

**Brown University School of Public Health** Department of Epidemiology published *High willingness to use rapid fentanyl test strips among young adults who use drugs* in the Harm Reduction Journal on February 8, 2018<sup>5</sup>, based on work conducted between May and

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<sup>4</sup> FTS are legal in Maryland. Senate Bill 1137 – Criminal Law - Prohibitions, Prosecutions, and Corrections <http://mgaleg.maryland.gov/2018RS/bills/sb/sb1137E.pdf> was passed during the 2018 session of the Maryland General Assembly. An amendment to the bill removed testing equipment from the drug paraphernalia law, decriminalizing it, so people will be able to use fentanyl testing strips to learn if the substance they have contains fentanyl.

<sup>5</sup> <https://harmreductionjournal.biomedcentral.com/articles/10.1186/s12954-018-0213-2>

September 2017. The study assumed that there are three necessary ingredients to behavior change: knowledge, motivation, and skills. Researchers recruited a convenience sample of young adults who use drugs in Rhode Island. Eligible participants were between 18 and 35 years old and had used drugs within the past 30 days; they were participants in a previous study of young drug users who agreed to participate in future research. Additional participants were recruited through internet ads, public canvassing, and word of mouth. The sample size was 93, the mean age was 27 years, 56% were white, 30% were mixed race, and 14% were black. 34 (37%) of respondents reported having survived an overdose.

Researchers administered a survey of respondents assessing their knowledge about fentanyl and overdose prevention, concern about overdose and desire to learn more about fentanyl, and overdose prevention skills. They also assessed willingness to use take-home rapid test strips to detect fentanyl contamination in their drugs (prior to use) or urine (after use.) Following completion of the interview, participants were trained on using fentanyl test strips to test urine, powdered drugs, and pills. Key findings from the Brown study include:

1. 70% of respondents were concerned about their drugs being contaminated with fentanyl.
2. 93% of respondents wanted to know if fentanyl was in their drugs before taking them.
3. After the training, overall willingness to use fentanyl test strips was high among participants regardless of whether they had previously overdosed: 95% agreed or strongly agreed that they planned to use the provided rapid fentanyl take-home test strips.
4. 99% reported that it would be easy to use the fentanyl test strips.
5. 71% responded “Yes” when asked “Do you think your friends would be interested in using the fentanyl testing strips.”

The researchers are currently following up to determine whether, how, and under what circumstances study participants used the test strips and if positive test results contribute to positive changes in overdose risk behavior.

**RTI International** partnered with the Urban Survivors Union and the University of California-San Francisco to conduct *Fentanyl test strips as an opioid overdose prevention strategy: Findings from a syringe services program in the Southeastern United States*. The research was published in the International Journal of Drug Policy on August 9, 2018<sup>6</sup>, based on data collected between September-October 2017. The sample was recruited from the Urban Survivors Union (UHU), a community-based organization in Greensboro, North Carolina, which provides syringe services including Naloxone distribution. UHU had begun distributing BTNX test strips and training clients to use them in the spring of 2017, so the study population was already experienced in

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<sup>6</sup> <https://www.ncbi.nlm.nih.gov/pubmed/30292493>

using them when the study began August 31, 2017. Initial study recruitment involved direct intercept with people receiving services at UHU, and publicizing the study among UHU clients' social networks. Eligible participants were at least 18 years old, had injected illicit drugs within the last 24 hours, and reported ever having used fentanyl test strips to test street drugs. The sample size was 125, 56% of whom were male, 77% were white, and 12% were black. 48% had overdosed. Participants completed an online survey about their most recent use of fentanyl test strips.

Researchers wanted to know if people who inject drugs engaged in any of the following changes in drug use behavior after using fentanyl test strips: used less than usual, administered tester shot, pushed syringe plunger slower than usual, and snorted instead of injected. They also wanted to know if PWID felt that FTS use made them feel better able to protect themselves from overdose. Researchers conducted bivariate and multivariate analyses to determine the association between FTS use and these two outcomes. Key findings from the RTI study include:

1. 81% reported using fentanyl test strips prior to consuming their drugs. (63% of the sample reported a positive FTS test result.)
2. 43% reported a change in drug use behavior and 77% indicated increased perceived overdose safety by using FTS. In response to a fentanyl test strip testing positive, participants reported:
  - a. 32% used less drug than usual;
  - b. 17% performed a tester shot;
  - c. 10% snorted rather than injected; and
  - d. 9% pushed the plunger more slowly.
3. In multivariable models adjusting for demographic and FTS correlates, PWID with a positive FTS test result had five times the odds of reporting changes in drug use behavior compared to those with a negative result.

RTI also found that unemployed people who inject drugs had lower odds ratio of reporting changes in drug use behavior compared with employed people who inject drugs.

**Fentanyl Test Strip Pilot: Vancouver**, British Columbia July 2016 – March 2017

Dr. Mark Lysyshyn works both with Vancouver Coastal Health and the University of British Columbia School of Population and Public Health. Lysyshyn and others evaluated a drug checking program at Insite, North America's first approved supervised injection facility. *Drug checking at Insite shows potential for preventing fentanyl-related overdoses* was published by Vancouver Coastal Health on May 15, 2017<sup>7</sup>.

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<sup>7</sup><http://www.vch.ca/about-us/news/news-releases/drug-checking-at-insite-shows-potential-for-preventing-fentanyl-related-overdoses>

Clients of Insite were offered an opportunity to check a sample of their drugs for fentanyl using a test strip designed to test urine for fentanyl. The client diluted their drugs with a few drops of water and then dipped the test strip in the liquid; a positive or negative result was revealed within seconds. Results of the drug check were recorded by Insite staff along with the substance checked, whether the client disposed of the drug or reduced the dose, experienced an overdose, or required treatment with naloxone. During the pilot period, over 1,000 fentanyl checks were performed. Overall, 79% of drugs checked were positive for fentanyl, including 83% of heroin samples, 82% of crystal meth, and 40% of cocaine.

Clients who checked their drugs prior to consumption, and got a positive result, were 10 times more likely to reduce their dose. Clients who reduced their dose were 25% less likely to overdose.

After their drugs tested positive for fentanyl, 9% threw them away. The authors speculated that this per cent might be higher in a community setting: at Insite, there are trained staff ready with Naloxone to reverse an overdose if it occurs.

#### **Fentanyl Test Strip Pilot: Rural British Columbia March – May 2017**

The Canadian Interior Health Authority partnered with the University of British Columbia School of Population and Public Health and authored *Expanding harm reduction to include fentanyl urine testing: results from a pilot in rural British Columbia*. The article was published in the Harm Reduction Journal on April 6, 2018<sup>8</sup>. The researchers wanted to evaluate the acceptability of fentanyl test strips among people who use drugs, and whether receiving a positive fentanyl result yielded any changes in attitudes and behaviors toward illicit drug use 2-4 weeks after testing.

A pilot of fentanyl urine testing was promoted via word of mouth and attracted mainly long-term clients of mobile and fixed-site harm reduction programs offered in six rural communities in British Columbia. Eligible participants were 19 years of age or older, self-identified as people who use drugs, and had consumed within the last 3 days prior to the test. Participants filled out a semi-structured questionnaire at the time of the test and were invited for a follow-up interview 2 to 4 weeks after the test. Urine samples were tested with BNTX Rapid Response™ fentanyl urine strip test at a detection level of 20 ng/ml norfentanyl.

Of the 24 participants who completed the urine test and first interview, 4 had a positive fentanyl urine test. Fifteen clients completed the second questionnaire, 10 of whom reported introducing a behavior change after testing and the remaining 5 indicated being already engaged in harm reduction practices. In other words, 100% of participants who completed the second questionnaire reported utilizing harm reduction methods to reduce their risk of

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<sup>8</sup> <https://harmreductionjournal.biomedcentral.com/articles/10.1186/s12954-018-0224-z>

overdose. Two of the clients with positive test results got scared and stopped using altogether. Participants expressed concern that the test not become part of their medical record; either conducting the test anonymously, or giving people the strips to test themselves, were important to participants.

#### **Fentanyl Test Strip Pilot: San Francisco 2017-2018**

The Drug Overdose Prevention and Education (DOPE) Project is a Naloxone distribution program in San Francisco funded by the California Department of Health. DOPE partnered with a coalition of harm reduction providers—the Syringe Access Collaborative—to pilot a fentanyl test strip monitoring survey beginning in August 2017<sup>9</sup>. SAC providers worked in close partnership with syringe services program participants to test samples of drugs and complete a brief survey regarding the findings, including the participant’s behavior upon learning if their sample tested positive or negative. The surveys were voluntary, anonymous, and asked participants what drug they tested, where they purchased it (neighborhood, cross streets, etc.), what the result of the test was, whether the test was performed before or after they used the drug, the method they used to take the drug, and what – if any – actions did they take upon learning the results. The DOPE Project received a total of 242 surveys between August 2017 to January 2018 from all 5 Collaborative partners.

During the first two months of data collection, surveys indicated that 78.8% of drugs tested were positive for fentanyl, which was much higher than the prevailing understanding of how contaminated the drug supply is in San Francisco. Researchers encouraged participants to return surveys regardless of result, not just if they found fentanyl in their drugs. By the end of the study the positive response had fallen to 68.2%.

Program participants reported an almost even split between testing their products before they used, or after (51.8 percent and 48.2 percent, respectively). Respondents reported utilizing a number of harm reduction strategies to keep themselves safe after learning the results of the test. Over half (58.8 percent) reported that they shared the results of the test with their community, and this seemed to be regardless of whether the result was positive or negative. The authors observed that that people who use drugs do a large amount of on-the-ground work of disseminating information among their peers and sources, as well as relying on harm reduction strategies to use and prevent overdose – using less, doing test shots, having a friend monitor them while they used, and/or changing their mode of use, i.e. smoking instead of injecting.

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<sup>9</sup> <https://harmreduction.org/issue-area/overdose-prevention-issue-area/fentanyl-test-strip-pilot/>



## Fentanyl Test Strip Pilot: Vancouver, BC 2017 – 2018

The British Columbia Centre on Substance Use partnered with local government and academic partners to study the use of fentanyl test strips in two Supervised Consumption Facilities in Vancouver. *Initial results of a drug checking pilot program to detect fentanyl adulteration in a Canadian setting* was published in Drug and Alcohol Dependence online on July 24, 2018<sup>10</sup>. This study used both the Fourier transform infrared (FTIR) spectrometer and fentanyl test strips. Between November 2017 and April 2018, a total of 1,714 drug samples were tested. The BTNX test strips can detect concentrations of fentanyl below the Fourier's limit of detection, so the test strips were used to confirm the presence of fentanyl.

90.6% of the samples clients believed were heroin tested positive for fentanyl.

Clients reported interest in knowing the more detailed information the Fourier spectrometer can provide about what's in their drugs, beyond the simple absence v. presence of fentanyl yielded by the test strips. The study authors concluded that the findings provide valuable point-of-care information that can help people make more informed decisions about their drugs, and that the information also provides public health with important information about the extreme adulteration of street drugs.

Another study in British Columbia

[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4650899/pdf/12954\\_2015\\_Article\\_88.pdf](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4650899/pdf/12954_2015_Article_88.pdf) similarly found huge discrepancies between the drug they had and the drug they thought they had. 29% of study participants' drugs tested positive for fentanyl, 73% of whom said they did not use fentanyl.

## Policy Considerations

While DanceSafe and other community based organizations have tested ecstasy and other club drugs at raves and circuit parties for many years, the topic of using fentanyl test strips to try and help people who inject drugs avoid fentanyl is very new: all of these studies were conducted in the last two years. The studies and pilots are consistent with one another: people who inject drugs across North America are surprised to learn fentanyl is in their drugs, and many expressed willingness to take steps to reduce harms to themselves, or reported taking steps to reduce harm to themselves, based on when data were collected. Policy considerations related to expanding Maryland's harm reduction toolkit to include fentanyl test strips include: test strips are legal in Maryland; federal support for FTS is weak; FTS build rapport with a marginalized population; FTS build our public health understanding of the drug supply; FTS provide valuable information to people who use drugs, and users respond to the information; MDH is ready to roll out FTS; and training is an important component for success.

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<sup>10</sup> <https://www.sciencedirect.com/science/article/pii/S0376871618303818?via%3Dihub>



## Fentanyl Test Strips are Legal in Maryland

Through Chapter 145 of the 2018 Laws of Maryland (SB1137), the Maryland General Assembly amended the Criminal Law Article with the intent to remove the threat of criminal sanctions for possession or distribution of testing equipment for the purpose of identifying a controlled dangerous substance. This was achieved through changes to the definition of “drug paraphernalia” and specific sections enumerating crimes and penalties associated with possession or distribution of drug paraphernalia. These changes to Maryland statute remove significant legal barriers to the distribution of fentanyl test strips for public health purposes.

## Federal Support for FTS is Weak

The Substance Abuse and Mental Health Services Administration (SAMHSA) seems to lack enthusiasm for harm reduction approaches. Of the three HHS agencies which issued Guidance regarding the use of federal funds to support syringe services programs (CDC, HRSA, and SAMHSA), SAMHSA’s creates the most difficult pathway to using federal funds for SSP. SAMHSA’s Assistant Secretary for Mental Health and Substance Abuse recently published a blog post<sup>11</sup> arguing that drug checking would lead drug users toward, rather than away from, fentanyl. This claim is contradicted by the published literature summarized in this report. The Centers for Disease Control and Prevention (CDC) has demonstrated greater willingness to at least discuss the use of CDC funds for FTS. At this time, Maryland would need to utilize state— or leverage private—funding to support FTS.

## FTS Build Rapport with Drug Users, and FTS Build Public Health Awareness of the Drug Supply

FTS distribution and education are an opportunity to build rapport with drug users by offering them relevant information and another tool to reduce their risk of death. On May 18, 2017, the International Journal of Drug Policy published Gine et al. *The utility of drug checking services as monitoring tools and more: A response to Pirona et al*<sup>12</sup>. The authors wrote about the challenges that new psychoactive substances pose to established drug-checking efforts at raves and nightclubs. They described the following advantages of drug checking services:

“Gathering extended information directly from users (e.g., on patterns of use, effects, negative consequences, harm reduction practices, etc.) for facilitating contact of new psychoactive substance users with harm reduction services, and for delivering health warnings and advice in a rapid way, sometimes faster than those coming from Health Authorities. Drug checking services come across as trustworthy to young drug users: the drug checking service, comprised of individually tailored harm reduction coupled to scientifically sound test results, serves the needs of this group better than other

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<sup>11</sup> <https://blog.samhsa.gov/2018/10/03/for-beating-the-opioid-crisis-america-has-better-weapons-than-fentanyl-test-strips/#.W8dd3e4vyUJ>

<sup>12</sup> [https://www.ijdp.org/article/S0955-3959\(17\)30122-6/fulltext](https://www.ijdp.org/article/S0955-3959(17)30122-6/fulltext)

policy measures, like governmental scare tactics that promote abstention (Fernandez-Calderon et., 2014; Gamma Jerome, Liechti, & Summall, 2005).” and

“...recent data from The Loop show that 18% of UK service users disposed of their drugs in the bins provided after receiving their test results.”

#### FTS Provide Valuable Information to Users, and Users Respond to the Information

Every article and pilot summarized in this report found surprise and concern about fentanyl among drug users, and many took steps to reduce their risk of overdose after learning that their drugs contained fentanyl. *Exposure to fentanyl-contaminated heroin and overdose risk among illicit opioid users in Rhode Island: A mixed methods study* was not highlighted in this report because it did not ask about fentanyl test strips as a harm reduction strategy. However, it is mentioned here to counter the mythology that drug users might seek, rather than avoid, fentanyl. Carroll, J., et al.<sup>13</sup> gathered data from 149 people who use drugs in Rhode Island from January to November 2016, using written surveys and qualitative interviews. Users described fentanyl as unpleasant, potentially deadly, and to be avoided. “...a general consensus emerged that the effects of fentanyl are distinctly uncomfortable or distressing...”. “Some explicitly described a frightening encounter with fentanyl as directly responsible for their treatment seeking behaviors.” Participants utilized a variety of strategies to protect themselves from fentanyl exposure and overdose, including beginning use by taking a small sample of the drug, seeking prescription opioids in lieu of heroin, and seeking treatment with combination buprenorphine/naloxone.

#### MDH is Ready to Disseminate Fentanyl Test Strips

Within MDH, at least two sections stand ready to roll out fentanyl test strips. The Behavioral Health Administration’s Office of Prevention’s Overdose Response Program would train Overdose Education and Naloxone Distribution programs to distribute FTS and train clients to use them. The Prevention and Health Promotion Administration’s Center for HIV/STI Integration and Capacity would train Syringe Services Program staff to distribute FTS and train clients to use them. Behavioral Health Systems Baltimore’s Harm Reduction Training Institute is ready to provide training on FTS. As with existing harm reduction interventions, FTS would not be a stand-alone intervention, rather they would be offered in a context of health education, harm reduction counseling, and offers of other services such as Hepatitis C testing and referrals to substance abuse treatment.

#### Timing is Key: Training People Who Use Drugs to Test Before—Rather Than After—Consumption

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<sup>13</sup> Carroll, J. et al. Exposure to fentanyl-contaminated heroin and overdose risk among illicit opioid users in Rhode Island: A mixed methods study. *International Journal of Drug Policy*: Issue 46, pages 136-145. <https://www.ncbi.nlm.nih.gov/pubmed/28578864>.

It is conceivable that users who urine-test themselves after they use, receive frequent positive test results, and perceive no associated ill-effects, could develop a false sense of security or immunity to fentanyl and other contaminants. This could lead them to limit harm-reduction measures. In the RTI International study in Greensboro, NC, participants who used the FTS after drug consumption were 70% less likely to report behavioral changes at subsequent drug consumption compared to those who used it before consumption. So it is critical that we train users to pre- rather than post-test their drugs.

Other important aspects of training include that the FTS do not indicate the quantity of fentanyl in the drug (so it could be incredibly high), nor do they identify every other dangerous analog, so even a negative result is not cause for complacency.

In conclusion, many people who inject drugs are concerned about the presence of fentanyl in the drug supply, are aware of its consequences, and already take steps to reduce their risk of overdose. FTS are legal, inexpensive, and easy to use. Fentanyl test strips would add to Maryland's toolkit for reducing the number of overdose deaths related to fentanyl.

*While this report focused on fentanyl test strips, there are other technologies which test for fentanyl and other drug supply contaminants, including the percentages these substances are present in. Appended to this report is an excerpt from **Harper, Lane, Powell, Jeff, and Piji, Em, An overview of forensic drug testing methods and their suitability for harm reduction point-of-care services**, published in the Harm Reduction Journal in 2017, to provide a wider look at drug testing options, their approximate costs and benefits.*