Setting Up a Drug-Checking Program

A Comprehensive Guide to Implementation

NYC Health

Acknowledgments

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Glossary of Common Terms and Acronyms

Acetyl codeine: Opioid synthesized from morphine.

Adulterant: A pharmacologically active substance added into a drug to give either synergistic or antagonistic effects (e.g., fentanyl is adulterated with xylazine).

ACDC: Alliance for Collaborative Drug Checking.

ATR: Attenuated total reflection is a technique used in conjunction with infrared spectroscopy that enables samples to be analyzed in a solid or liquid state without further preparation.

BCCSU: British Columbia Centre on Substance Use.

BTS: Benzodiazepine test strips.

Buff: A pharmacologically inactive substance added into a drug to dilute the potency, or to bulk out the drug.

Byproduct: Contaminants left over from the synthesis process that impact the purity of the drug.

Chocolate chip cookie effect: A phrase used to explain the concept of uneven representation of an active drug across the entirety of a drug sample.

Concordance rate: The agreement between FTIR results and secondary testing results; used to assess technician proficiency.

Contaminant: An undesired adulterant.

Cut: Substances, both active and inactive, added to a drug. Often used to enhance or mimic the desired effect, or to facilitate the administration of a substance.

Drop box: A locked, tamper-proof box that can be used to collect drug samples.

Filler: Inactive substance(s) added to a drug to increase weight and mass.

FTIR: Fourier transform infrared spectrometer.

FTS: Fentanyl test strips.

GC-MS: Gas chromatography-mass spectrometry.

HPLC: High performance liquid chromatography.

HIV: Human Immunodeficiency Virus.

HCV: Hepatitis C Virus.

Inositol: A simple carbohydrate (sugar) which occurs naturally in the body.

ITS: Immunoassay test strips.

Lactose: An inactive sugar used as a filler in some drugs.

LC/MS: Liquid chromatography mass spectrometer.

LOD: Limit of detection. Refers to the FTIR's limit to reliably detect compounds present below a certain threshold.

LSD: Lysergic acid diethylamide.

Mannitol: An inactive sugar alcohol used as a filler in some drugs.

MCC: Microcrystalline cellulose, often used as a thickener, stabilizer, or emulsifier in the food and pharmaceutical industries.

MDMA: 3,4-Methylenedioxy methamphetamine, commonly found in ecstasy.

Ng/ML: nanograms per milliliter.

OPC: Overdose Prevention Center. This is a facility where someone can take pre-obtained drugs to use under supervision.

OPUS: Drug checking software that comes with the Bruker Alpha II FTIR spectrometer.

Point-of-care drug checking: A service where participants can bring in drug samples for analysis and receive results and tailored harm reduction education in real-time.

PQ test: The performance qualification test, used to validate and calibrate the FTIR before normal use.

Purity: A measurement of the impurities or byproducts resulting from the synthesis of a drug.

PWUD: People who use drugs.

qNMR: Quantitative nuclear magnetic resonance. Used to determine concentration/ purity of a substance.

Reagent testing or colorimetric testing: The use of combinations of chemicals to analyze drug samples. The resulting chemical reaction creates a color change that is assessed by a drug checking technician.

Reference library: Collections of the spectra of known substances. Used to compare to the sample spectrum.

Secondary verification testing: Testing of drug samples at a laboratory that utilizes highly specialized equipment. Used to corroborate FTIR results and to identify any components not identified by FTIR.

Spectrum/Spectra: The readout generated by the FTIR.

SSP: Syringe service program.

STI: Sexually transmitted infection.

XTS: Xylazine test strips.

4-ANPP: 4-anilino-N-phenethylpiperidine, a fentanyl precursor.

Introduction

The overdose crisis in the United States (U.S.) has taken an unprecedented number of lives and continues to be a major public health crisis. In 2022, over 100,0000 people in the U.S. lost their lives to overdose, the highest number of overdose deaths ever recorded. This epidemic is fueled by an unregulated drug supply, predominantly an increase in highly potent, synthetic opioids such as fentanyl, and amplified by the war on drugs. More recently, an influx of xylazine into the market has further exacerbated overdose risk and the number of xylazine-involved deaths in many jurisdictions has risen sharply.

The intersection of criminalization and prohibition has led to the presence of new, increasingly potent, and potentially unsafe compounds, and it is likely that waves of rapidly spreading novel psychoactive substances will continue to emerge in the unregulated market. Most recently, novel fentanyl analogs, benzodiazepine analogs, and nitazines have been identified in several jurisdictions, the effects of which are being monitored closely by harm reduction and public health organizations nationally.

In response to an unpredictable and volatile supply, drug checking has emerged as a viable and effective way to provide information about compounds in the unregulated drug supply. Drug checking provides people who use drugs (PWUD) with fact-based information that enables them to make more informed decisions about what they consume, along with practical strategies to reduce potential harms.

While several styles and models of drug checking exist, the basic components are similar across different technologies and settings. Individuals submit a drug sample for analysis and the composition of the major cuts and active compounds are identified. Based on the results, drug-checking technicians provide fact-based information to the person intending to consume the drugs. Direct service drug checking can be implemented in settings such as music festivals, nightlife locations, and harm reduction programs (e.g., syringe service programs (SSPs) and overdose prevention centers (OPCs)). Regardless of the venue or technology, drug checking provides a window into the makeup and trends of a local drug supply that can help inform communities of PWUD, public health organizations, service providers, and the public.

A Brief Overview of Drug Checking

PWUD have long employed various strategies to check the composition of the substances they plan to consume, including visual inspection and taste, among other methods. More formalized point-of-care drug-checking began in the nightlife and rave scene, predominantly with colorimetric reagent testing. Organizations working within these settings have since expanded to other drug-checking technologies, such as Fourier transform infrared spectroscopy (FTIR), and drug checking has broadened to encompass different venues. In the U.S., the historically high number of overdose deaths has led to an accelerated interest in drug checking as one strategy to address the overdose crisis and the recent government support for drug-checking programs has resulted in their proliferation.

The use of FTIR spectroscopy in community-based settings was led by organizations in Canada such as the British Columbia Centre on Substance Use (BCCSU) and the Substance Drug-Checking program at the University of Victoria. Training from experts at BCCSU to a collective of Canadian and U.S. harm reductionists interested in learning the technology and best practices led to the formation of the Alliance for Collaborative Drug Checking (ACDC), a learning community that has supported the implementation of drug-checking programs nationally. The first community-based, point-of-care drug-checking programs in the US were based on the BCCSU model and began in 2019 in Chicago and then Boston, with NYC following in 2021.

Who This Handbook Is For

This handbook provides a comprehensive overview of drug checking for people who are considering implementing their own drug-checking service. While information is provided on a range of different settings, populations, and technologies, the focus of the handbook is on establishing drug-checking services at harm reduction programs that primarily serve people who use opioids and the primary technologies discussed are infrared spectroscopy and immunoassay test strips.

Examples and materials from the implementation of the drug-checking initiative at the NYC Health Department will be used throughout the handbook to illustrate the steps involved in establishing drug-checking services in collaboration with SSPs, and to highlight potential challenges. This handbook is **not** a substitute for in-person training with a trained drug-checking technician and is not sufficient to achieve the level of technical specialization needed to implement a drug-checking service.

Chapter 1

Drug-Checking Settings and Models

The first step for programs that are considering implementing a drug-checking program is in-depth planning. There are many aspects to think through, and while there is no one correct path, it is important to be intentional to ensure the service best matches the needs of the populations engaged. Drug checking can take place in a variety of settings. Understanding and building the service for a specific environment is an important first step to ensure it will be appropriately integrated by and acceptable to the community. Below, we consider the implementation of drug checking in three different contexts: community-based programs, festivals, and nightlife settings.

Drug-checking services advertised outside a community-based program (photo courtesy of the NYC Department of Health and Mental Hygiene's [NYC Health Department] drug-checking team)

Community-Based Drug Checking

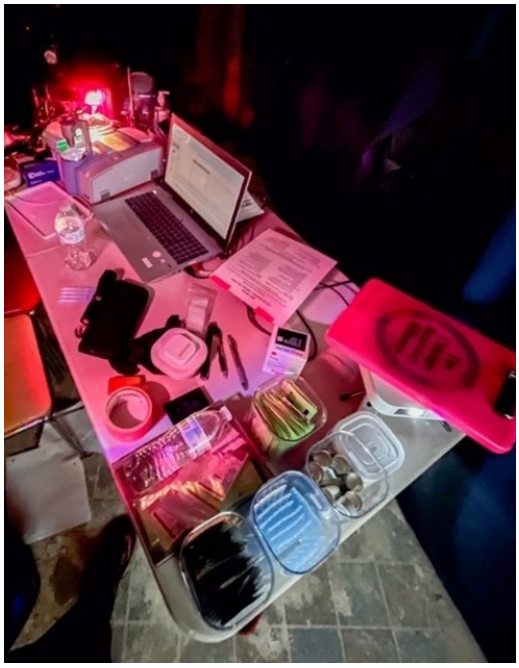
Community-based drug checking is typically a point-of-care service provided at a harm reduction or other social service program that intersects with PWUD. In these settings, it is critical to integrate drug checking into other harm reduction services or supports to build trust with and help participants respond to the complex and evolving unregulated drug supply. Community-based drug checking often serves people who are under-resourced and may be experiencing homelessness, criminalization, substance use disorder, and high levels of stigma. The drug supply in these settings tends to be more volatile than in either festival or nightlife settings and a high level of technical expertise is required to detect substances such as fentanyl and xylazine. Overdoses frequently occur in these communities, and drug checking can provide PWUD with important information to mitigate the risk of the unregulated drug supply.

Festival Drug Checking

Drug checking at festivals is usually provided as a point-of-care service for people who have used or are intending to use drugs during an event, which may span several days. Festival drug checking typically focuses on populations that are engaged in substance use for entertainment and pleasure, and people who attend these events are often reasonably well-resourced (as indicated by the costly ticket prices). PWUD for recreational purposes may still have risky or chaotic patterns of use, so providing drug-checking services can help alleviate the strain on medical personnel by reducing drug-involved emergencies. The service, if utilized to its full potential, can also act as an early warning system for problematic substances that might be present within the festival's drug supply.

Depending on logistics, drug checking is typically offered within the venue grounds. The types of drugs consumed in festival settings are usually more straightforward to analyze than those typically used by people engaged with harm reduction programs. However, the volume of samples brought in for testing tends to be greater in festival settings, so time spent with each participant is generally shorter. The large number of samples, along with other factors such as the high level of stimulation (e.g., lights, noise),

should be considered when assigning staff to work in these types of venues, and additional equipment (e.g., earplugs) may be needed.



Nightlife Drug Checking

Drug checking in nightlife settings usually involves a point-of-care service provided at raves, bars, and nightclubs. Services can be offered either within the venue itself, or via a mobile facility (usually van-based) located outside. Much like festival drug checking, the populations that utilize drug-checking services in these settings typically are using drugs for entertainment and pleasure and are better-resourced than those utilizing services in other community-based settings. Drug checking in nightlife settings necessarily involves late-night work and consideration should be given to staff stamina.

Population Needs Within Settings

It is important to identify the needs of the population(s) who will utilize drug-checking services in a particular context. Different populations have distinctive drug-use patterns that likely will result in them engaging with drug checking in unique ways. While people of all ages, backgrounds, and life experiences use drugs, their experiences will be different. What follows are some broad considerations for drug checking in specific contexts.

Top: Chicago Recovery Alliance drug checking using FTIR and immunoassay test strips in a nightlife venue (photo courtesy of Taylor Wood)

Bottom: Outreach worker providing naloxone and sterile syringes to a community member (photo courtesy of OnPoint NYC)

Community-Based Settings

PWUD who access harm reduction programs typically have a different risk profile than PWUD at festivals or in nightlife settings. For example, harm reduction participants may use drugs regularly and therefore be more likely to have a substance use disorder; they also may lack the resources to make informed choices about the drugs they use. The drug supply among communities of PWUD who access harm reduction programs also tends to be more volatile and unpredictable, increasing their risk. Finally, people who access harm reduction programs often have high rates of opioid use and therefore are at high risk of exposure to fentanyl, fentanyl analogs, xylazine, and other novel opioids or opioid-like substances.

Festival and Nightlife Settings

The diversity of PWUD who attend festivals and visit nightlife settings varies considerably, and the music scene within the setting can influence the type of drugs that are consumed. For example, electronic dance music is often associated with stimulants such as MDMA/ecstasy and dissociatives such as ketamine. Polysubstance use (i.e., using more than one substance at a time) is common in these settings, so it is beneficial for drug-checking technicians to understand how various drugs interact with one another.

Choosing the Right Drug-Checking Model

There are several models to consider when implementing a drug-checking service, and the type of initiative you choose will be dependent on the setting, the needs of the populations served, and the available resources. Regardless of the model, drug-checking services should strive to respect an individual's autonomy and anonymity and be as low barrier as possible. Harm reduction education and/or messaging should be provided with drug-checking results, and whenever possible, should be tailored to the individual. Sufficient planning and training are needed to ensure meaningful education is provided about results to participants. Additionally, participants value knowing that a service will be available at an expected time and place, and ensuring consistent service delivery is an important component of building rapport and trust.

Fixed Site Model

This model of drug checking is integrated within a fixed site, often a harm reduction or other program that serves PWUD. In this model, the machines and equipment used for drug checking have a permanent home and do not need to be moved frequently. Ideally, drug checking should be set up in a designated room where privacy and confidentiality can be maintained. The room will need power outlets, internet access, and enough counter space to comfortably fit the drug-checking technology and supplies, a laptop, two to three chairs, and space for a technician and at least one participant. A place to securely store the drug-checking equipment and supplies when not in use is also essential. Community-based programs (e.g., SSPs) often have a physical location, regular hours, and a consistent participant base. The program also may provide outreach services but in this model, drug checking remains located at a physical site.

Point-of-care drug-checking program in a community- based setting, set beneath the NYC Health Department's campaign posters (photo courtesy of OnPoint NYC)

Harm reduction programs that want to establish drug checking should integrate the service into existing programming. A comprehensive community-based drug-checking service will include linkage to substance use treatment, HIV and HCV testing and care, the provision of sterile injection supplies, naloxone, smoking supplies, safe sex supplies, and other key services.

In summary, a fixed location model is an appropriate option for sites with adequate physical space and the infrastructure to accommodate drug checking. This model facilitates the provision of drug-checking results in real time, enables easy access to other wrap around services, and requires minimal set up and take down of drug-checking equipment. However, because the services are embedded within an established community-based program, engagement with PWUD who are unwilling or unable to travel to the site may be limited.

Mobile Model

This model brings drug checking directly to participants in the community and is typically provided out of a van or other type of vehicle. The vehicle will need a sufficient power supply, or portable batteries will need to be purchased at additional cost to power drug-checking equipment. Batteries must also be charged frequently to ensure adequate power during service provision. In this model, equipment is set up and taken down for every shift and will need to be safely secured (away from the vehicle) when not in use.

Mobile drug-checking delivered from a van in the south Bronx (photo courtesy of the NYC Health Department's drug-checking team)

Additionally, there should be enough space for the technician and at least one participant to sit comfortably in the vehicle. Ideally, to protect privacy and confidentiality, the number of participants in the vehicle at one time should be limited; given this, planning should include how to manage people who are waiting outside to use the service. Other set-up requirements include a sturdy flat surface for the drug-checking equipment and space to prepare drug samples and run immunoassay test strips.

The mobile model of drug checking can be integrated into existing outreach services. For example, outreach workers who canvass the area on foot can refer PWUD to the vehicle for drug-checking services. Ideally, vehicles should stay parked in a specific location for the entirety of a drug-checking shift to minimize the number of times equipment is moved and to maximize opportunities to engage with participants in the area. A key component of this model is identifying how best to provide or connect participants to additional wrap around services. While the availability of additional services at the mobile site may be limited, at minimum there should be access to basic harm reduction supplies and referrals upon request. Additional services that could be paired with mobile drug checking include basic wound care, HIV/HCV/STI testing, naloxone and immunoassay test strip distribution, and other medical services. It is recommended that mobile drug-checking services have consistent locations and hours to build relationships and trust within the community. Programs may want to consider scheduling multiple shifts at the same outreach site that span different periods of time on different days. This will maximize engagement with diverse communities that may have varying routines.

In summary, the mobile drug-checking model brings the service to the community, potentially reducing barriers for PWUD who do not traditionally access harm

Left: Disassembled Bruker Alpha II FTIR in protective carrying case (photo courtesy of the NYC Health Department's drug-checking team)

Right: A drop box used by Chicago Recovery Alliance to collect drug samples (photo courtesy of Taylor Wood)

reduction programs. In addition, this model can more easily adapt to transitory shifts in communities of PWUD and respond in real time to offer drug checking in communities that may have experienced clusters of adverse events. For this model, thoughtful community engagement is needed to build trust and rapport. Depending on the location, consideration should be given to whether the site will receive attention from law enforcement. Inclement weather also may be a factor, especially for people waiting to use the service outside the vehicle. Lastly, the mobile model requires routine set up and takedown of equipment, which should be factored into the timing of drug-checking shifts.

Hybrid Model

A hybrid model of drug checking brings together components of both fixed location and mobile drug checking. For example, harm reduction programs that have a well-utilized physical location (e.g., a drop-in center) as well as a regular and consistent outreach schedule could provide both fixed site and mobile drug-checking services. With a hybrid model, considerations for both fixed location and mobile drug-checking services apply. In addition, hybrid drug-checking models require a high level of coordination to ensure that the service runs consistently and smoothly and that available days and times for each type of service are clear to participants. Programs that have access to more than one drug-checking machine should consider assigning one for mobile use and one for use in a fixed location.

Drop Box Model

A drop box model involves participants depositing a sample in a locked, tamper-proof drop box located at a harm reduction organization, nightlife venue, or other setting. In this model, participants may submit details about their sample using a standard intake form (e.g., what the sample was sold as, drug effect, location where the sample was obtained, contact information). Following sample analysis, drug-checking technicians relay results to participants directly via phone, text, email, or a program staff member. Sample results are typically returned to participants of the drug-checking service within a designated time period.

For this model, a comprehensive workflow is needed to coordinate the routine collection, analysis, and return of the samples. In addition, having a good working relationship with staff at drop box location venues is important to facilitate sample collection. This model provides greater anonymity and/or flexibility to people interested in drug checking but forgoes the potential for real-time harm reduction education. Keep in mind that technicians will have only the contextual information that is submitted alongside the sample to assist with their analysis. As with other drug-checking models, organizations will need to work within local laws and regulations to determine feasibility.

Building Trust in the Community

Site A is an SSP located in Manhattan's East Village. The program has a small area where participants can collect harm reduction supplies but does not have a drop-in space. As a result, participants do not tend to congregate at the site, and visits are typically brief. Due to the lack of space to engage people, the first few weeks following the implementation of drug-checking services at Site A were dedicated to conducting outreach in the local community to inform them about the availability of this new service.

The drug-checking technician assigned to Site A accompanied SSP staff during outreach to promote the service and encourage people to bring in samples to be tested. To help build interest, the technician collected samples from people at a nearby park, took them back to Site A to analyze, and returned with the results. Over time, the technician was able to build trust and rapport with the local community, and people started to come to the program to get their samples checked.

Chapter 2

An Introduction To Drug-Checking Technologies

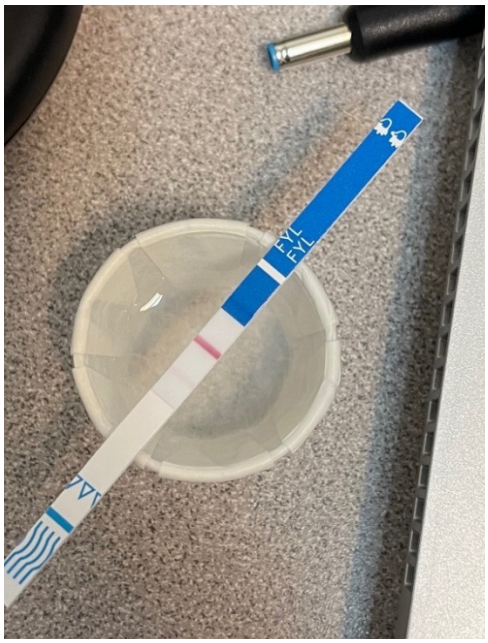
A growing number of technologies exist to analyze drug samples. This section presents a brief overview of the most common tools that are currently utilized in the U.S. However, because the technology is rapidly evolving, it is crucial for technicians to establish relationships with organizations of drug-checking professionals to keep abreast of new innovations. Two groups that are worthy of note include the Alliance for Collaborative Drug Checking (ACDC) and the British Columbia Centre on Substance Use (BCCSU). It is important to remember that no drug-checking technology is perfect. Additionally, understanding the limitations of the tools you are using is critical to providing a responsible service. Ultimately, people who engage with drug checking should know that results will always come with a level of uncertainty.

Immunoassay Test Strips

Immunoassay test strips (ITS) are a screening test developed to confirm the absence or presence of a particular compound in a drug sample and provide a binary (yes/no) result. ITS use specific antibodies that bind to the compound of interest, altering how the flow of liquid progresses along the strip. The on-label use for many ITS brands is urine testing for drug compounds and any use of ITS to check drugs prior to consumption is considered as off-label. Because of their on-label use, ITS are highly sensitive and able to pick up very small amounts of a drug. On the other hand, some ITS are known to cause false positives (incorrectly indicate fentanyl is in the sample when it is not present at improper dilutions) and may be cross-reactive with some substances (for example, diphenhydramine).

Below, left: Fentanyl immunoassay test strip analysis in process (photo courtesy of the NYC Health Department's drug-checking team)

Below, right: A faint second line indicates a negative fentanyl test strip result (photo courtesy of the NYC Health Department's drug-checking team)



ITS require minimal training to use and interpret, and are inexpensive compared to technology-based drug-checking tools. ITS can be distributed to participants for personal use, and test results are available within minutes. It is important to keep in mind the limitations of ITS: they cannot give any information about the quantity of a compound, nor any other active compounds, cuts, or buffs that might be present. They also cannot distinguish between fentanyl analog(s). False positive results are a possibility due to cross-reactivity with other substances. For more information about cross-reactivity with other substances, visit the manufacturer's website and be sure to follow the instructions of the specific ITS selected for use. Given these considerations, it is recommended that ITS are used alongside other drug-checking technologies.

***A note about analogs*:** In general, ITS will be able to identify a much wider variety of analogs than are listed on the product information material. ITS companies typically validate their strips against the most common analogs and assess the limit of detection (LOD) for each. For example, the LOD for fentanyl is 20 ng/mL while the LOD of carfentanil is 50 times higher (1000 ng/mL). This variation in the chemistry means that different levels of dilution may be required to identify different compounds. When possible, test strips should be used in parallel with other drug-checking technologies and, as always, the level of uncertainty in drug-checking results is never zero.

Fourier Transform Infrared Spectrometer (FTIR)

FTIRs are a type of spectrometer that use infrared light to analyze the different compounds in a sample. A broad-spectrum infrared light is directed at a sample, and the absorption (how much infrared light is absorbed by the compounds in a sample), transmittance (the infrared light that passes through a sample) and the frequency (the wavelengths of infrared light that are being absorbed or transmitted) are measured, creating a spectrum, or a unique fingerprint. The absorption and frequency patterns of a particular compound are determined by bonds between molecules, so each unique compound (e.g., lactose, methamphetamine, or fentanyl) will consistently generate the same spectra. Spectra generated by a sample with multiple components can be thought of as an overlay of all the signals generated by each component. Specialized software is used to tease apart the signal generated by the different components to identify what is in a sample. For practical tips on using FTIR technology for drug checking, see Appendix A.

Bruker Alpha II FTIR (photo courtesy of the NYC Health Department's drug-checking team)

FTIRs use libraries of spectra to compare a drug sample to known references. The libraries encompass hundreds of different drugs, cuts, buffs, and adulterants, and an FTIR can detect inactive as well as active components and adulterants. Samples used for testing on an FTIR are not destroyed and can be given back to the participant, which can reduce barriers to engagement with the drug-checking service.

While quantification (how much of a particular component is in a sample) with FTIR has many limitations, it can provide a rough approximation (see Appendix B for more information on quantification). FTIR has a limit of detection of approximately 5%, which means that technicians may not be able to identify a particular component if it is present in a concentration of less than 5%. This is a major limitation when analyzing samples that have drugs that are very potent but typically found in small amounts (e.g., fentanyl, benzodiazepines, and nitazenes). It is important, therefore, to pair FTIR with ITS and/or other complementary testing technologies, particularly when working with opioids.

In summary, while FTIR spectrometers can identify many compounds, cuts, and buffs, there is a detection limit, and the technology cannot systematically identify analogs. Although a rough approximation of quantification is possible, there are important limitations to this analytic tool. Extensive training is needed to operate an FTIR reliably and accurately. Additionally, FTIR is an expensive technology, and the cost may be prohibitive for some organizations.

Colorimetric Reagent Testing

Colorimetric reagent testing uses chemicals in liquid form (reagents) to provide presumptive identification of the presence of specific active compounds within a drug sample (i.e., the presence or absence of the substance of interest). The reagent is mixed with a small amount of the drug sample and observed for a reaction (i.e., a change in color). Different colors indicate the presence of different drugs. The color is then visually compared with a reference color chart to determine if the drug is present in a sample. Color results may vary depending on the concentration of the substance being tested, its form (e.g., free base, salt), and any adulterants or other substances present in the sample.

Testing substances in cookers with colorimetric reagents (photo courtesy of Taylor Wood)

A single reagent can only test for the presence or absence of one specific substance or class of substances. Because of this, reagent testing is a suitable option for drug checking in festival/nightlife settings, as the substances used at these venues tend to be "club" drugs (e.g., MDMA, cocaine, LSD, and ketamine) with fewer cuts or adulterants. Other drug-checking technologies are better suited to analyze samples containing, or suspected to contain, a mixture of substances.

Reagent testing is inexpensive, relatively easy, and can be performed with minimal training. Tests provide quick results, making them particularly useful in high-volume settings such as festivals/events. While more advanced drug-checking technology is needed to analyze samples that contain more than one reactive compound, reagent testing can complement other technologies by assisting with the detection of certain cuts added to drugs, such as levamisole in cocaine. However, several limitations should be noted. Reagents can only confirm the presence or absence of the compound for which they are indicated and cannot provide information about the purity of a drug, nor identify potential adulterants (unless explicitly testing for that substance). Darker colored reactions, due to either the reaction produced by the substance being tested or dye in the sample, can obscure lighter reactions, which makes accurate interpretation of results challenging. Given that the reaction produced by most opioids can be concealed by nonreactive compounds such as lactose and other cuts, utilizing reagent testing for the unregulated opioid supply is not recommended. Lastly, reagent testing destroys drug samples (i.e., the part of the sample being tested cannot subsequently be used by participants), though only a small amount of a drug is needed to run a test.

Secondary Testing

In the context of drug checking, secondary testing uses advanced, lab-grade analytic equipment to perform a more comprehensive analysis of the components of a drug sample. Secondary testing can detect trace amounts of a compound, identify specific analogs and novel psychoactive substances that are not found in traditional drug-checking libraries, and quantify how much of a particular substance is in a sample. Secondary testing is a necessary component for organizations interested in providing drug-checking services and should not be considered optional. Some examples of secondary testing

technologies include mass spectrometers (including gas chromatography mass spectrometers (GC/MS), liquid chromatography mass spectrometers (LC/MS)), high performance liquid chromatography (HPLC), and quantitative nuclear magnetic resonance (qNMR). We expand on secondary testing in Chapter Three.

Considerations and Cautions When Purchasing Drug-Checking Technologies

Drug-checking technologies used for point-of-care services must balance accuracy, sensitivity, ease of use, and cost. Currently, there is no single technology that strikes this balance perfectly, but new technologies are starting to emerge, driven by burgeoning interest and new investment. Companies manufacturing these technologies often reach out to harm reduction programs as part of their marketing strategy; however, it is important to remember that the technology they are touting may not be validated for point-of-care use in community settings or optimized for use with the local drug supply.

"Technology should be validated for accuracy, consistency, and detection limits in both lab and real-world settings, with actual street drug samples."

Before purchasing a product, ensure it has been properly vetted. Technology should be validated for accuracy, consistency, and detection limits in both lab and real-world settings, with actual street drug samples. Ideally, there should also be evidence demonstrating that the technology is practical to use in a point-of-care setting, durable for long-term use, and capable of being operated by a trained drug-checking technician. Additionally, it is recommended that organizations connect with others engaging in drug-checking services to learn about their experience with the technology they are considering. **Toronto's Drug Checking Service** offers considerations and key questions to ask when purchasing drug-checking technology. It is worth noting that after an order is placed, it could take up to six months to receive the machine from the manufacturer, depending on demand.

Chapter 3

Starting a Drug-Checking Program

Institutional and Stakeholder Support

The first step to successfully implementing a drug-checking service is to ensure sufficient institutional support. Drug checking comes with baseline and ongoing costs, and in some jurisdictions, continues to operate in a legal grey area. Having strong institutional support is critical to the success and sustainability of these services. Organizations that plan to implement a drug-checking service should consult with their legal department to ensure necessary protections for drug-checking staff and participants.

"The first step to successfully implementing a drug-checking service is to ensure sufficient institutional support."

After institutional support has been obtained, it is important to begin building relationships and obtaining stakeholder approval. If the intention is to partner with a community-based organization to deliver drug-checking services, it is essential to engage program staff from the project's inception. Other stakeholders will vary depending on the context but may include a local or state health department, an academic partner, and local law enforcement.

Once institutional and stakeholder support has been obtained, the next step is to develop a proposal. This document should provide a rationale for and expected benefits of drug-checking, citing literature and evidence from programs that have successfully implemented these services. It should also include a description of the funding source, policies and procedures guiding implementation, a program budget, and a data collection and monitoring plan.

Funding a Drug-Checking Program

Point-of-care drug-checking services are often situated within harm reduction programs that are typically under resourced. As a result, establishing a drug-checking service in these settings will often require alternative financial support. Some drug-checking programs (e.g., the AHOPE program in Boston, MA) have been funded through private grants, while others are under the umbrella of research studies through academic institutions (e.g., the Addictions Drug and Alcohol Institute at the University of Washington in Seattle, WA). The NYC Health Department's drug-checking initiative is funded through a combination of city and federal funds. Regardless of the funding source, it is important for harm reduction programs planning to implement a drug-checking service to have enough funding to support the hiring of a dedicated technician.

Laying the Groundwork

Before initiating drug-checking at Site B, the drug-checking team met with program leadership to discuss how best to implement the service. In addition to providing an overview of drug checking, staff collaboratively considered logistics such as timing of the launch, where the drug-checking service would be located, how the equipment would securely be stored, and the best day and time of service provision. Together, staff planned an intake process that would work best for Site B's participants, staff, and building layout, and adjusted existing protocols to best suit the setting. Staff also agreed to review drug-checking processes on a regular basis to ensure that any necessary changes could be made after the program had launched.

Following this meeting, the drug-checking team presented the initiative to the rest of Site B's staff. This included providing detailed information about the technology used, the limitations of the service, training procedures, and long-term plans for service sustainability. The meeting was also an opportunity for staff to ask and have their questions answered. After this meeting, the drug-checking team provided Site B with flyers announcing the service and encouraged staff to spread the word.

This planning work was crucial to ensure that the drug-checking initiative would be integrated as smoothly as possible into the organizational workflow. Collaborating with program leadership enabled the drug-checking team to be responsive to Site B's specific context and, presenting to staff with adequate time for questions, assured staff buy-in.

In addition to a drug-checking technician, a comprehensive budget should include equipment and supplies, training costs, and ongoing secondary testing by a partner laboratory (see Appendix C for an essential supplies guide). Depending on funding, it may also be beneficial to consult with a medical toxicologist to learn more about the clinical implications of drugs found in the local supply.

Policies and Procedures

A comprehensive proposal should include policies and procedures that will guide the implementation of drug-checking services. These may differ depending on local laws and regulations but should include consideration of the following: service operations and workflow, safety for both staff and participants, and protocols for storage, shipping, and the destruction of drug samples. See Appendices D and E for examples of policies and procedures developed by the NYC Health Department.

Administrative Considerations

There are several administrative components to setting up and running a drug-checking service, including contracting with vendors, content experts, and/or consultants. It is important to implement a system for managing and processing invoices and tracking spending and if funds permit, a project coordinator might be a helpful addition. Key contracts should include:

- Drug-checking technology manufacturer(s)
- ITS manufacturer or distributor
- Laboratory for secondary testing
- Consultant for drug-checking technician training

Other potential contracts could include:

- Part-time/contractor drug-checking technicians
- Medical toxicologist
- Data analysts, writers, and/or graphic designers to support information dissemination (if not already available)

Data Collection

Prior to implementing a drug-checking service, plans for data monitoring and tracking should be considered. Data obtained from drug-checking services can be used to inform programming, provide real-time insights into the local drug supply, alert PWUD and the public health community to novel substances, and be used to disseminate accurate, unbiased, and fact-based information.

Because of the legal grey area surrounding drug-checking services, some data collection elements could be contentious. Programs should critically assess their needs, including any funder reporting requirements, and ensure that data collection procedures strike a balance between protecting a participant's privacy and gathering enough information to assess drug trends in ways that are accurate, timely, and specific (see Appendix F for the data collection form used by the NYC Health Department's drug-checking initiative). Commonly collected data points include:

Participant code or unique identifier. Political climate permitting, implementing a method that identifies unique individuals while maintaining their anonymity allows programs to retroactively look up a participant's past results and track patterns of service use over time. An example of a participant code is to use the first and third letter of their first name, the first and third letter of their last name, and a portion of their date of birth (e.g., day and year). If the drug-checking program is operating in a politically hostile environment, it may be safer for programs not to collect this information.

What the sample was sold as. To determine whether the drug-checking results align with what the substance was sold as on the street.

What the participant believes the sample to be. The participant may have reason to believe that the sample is not what it was sold as. This information can be used to better assess the drug's characteristics and alerts technicians to check for specific substances.

If the participant has used the drug. If the participant has used the drug, they may have experienced an effect that prompted them to bring it to be checked. Their experience using the drug may also inform the drug-checking process.

User experience. Gathering information about the participant's experience using the drug can help identify the effects of novel substances or analogs and can give the technician additional context clues when analyzing the sample. It is also important to identify substances that are associated with adverse events such as seizures or overdose. All these factors can help inform harm reduction education.

Appearance and physical characteristics of the sample. Noting qualities of the sample makes it easier to track specific batches or identify and communicate information about a particular product.

Where the sample was obtained. Asking where a participant acquired the drug can help to track hyper-local trends in overdose or other adverse events. The benefits of collecting location information should be weighed against possible risks, especially in areas with hostile political environments.

Whether or not the person achieved their goal of use. Asking someone to reflect on their goals for their drug use and whether the effect from using the product they submitted for checking helped achieve those goals may move them toward a pattern of use that minimizes undesired harms.

Identifying a Laboratory Partner for Secondary Testing

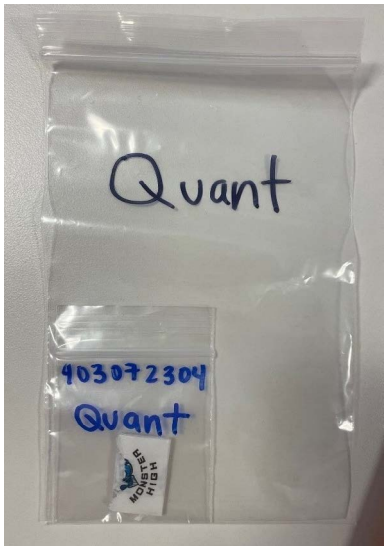
An essential part of any drug-checking service is identifying and securing funding for a secondary testing partner. Secondary testing is a necessary training component and provides ongoing quality assurance of point-of-care results. The turnaround time for secondary testing results is two weeks to two months, so programs should plan accordingly. There are several options to consider when choosing a lab partner for secondary testing.

"Secondary testing provides the ongoing quality assurance of point-of-care results."

Universities

Some drug-checking services may be funded and run by researchers at an academic institution, in which case partnering with a university lab may be the most efficient and convenient option. For harm reduction programs partnering with academic institutions, there is typically an expectation that drug-checking service data will be provided in exchange for free or discounted secondary testing. For this reason, it is important to partner with universities or researchers with a strong harm reduction record, and those that have previously served as advocates for communities experiencing structural oppression and marginalization.

Packaged sample to be sent to a secondary testing partner for quantitative analysis (photo courtesy of the NYC Health Department's drug-checking team)



Forensic Laboratories

Forensic labs typically provide drug analysis services to law enforcement, medical examiners' offices, and for other forensic applications. Forensic labs have extensive experience analyzing complex samples and identifying novel compounds. However, they may be less familiar with secondary testing in the harm reduction sphere. Another important consideration is that forensic labs can provide quantification services to research partners, while other types of secondary testing partners may not.

Private Drug-Checking Laboratories

Lastly, there are several labs that provide fee-for-service drug-checking for anyone who mails in samples (e.g., the Drugs Data lab run by Erowid). These labs often partner with harm reduction programs to provide secondary testing. Typically, private drug-checking labs are not allowed to provide quantification to the public, but they can identify and distinguish between major and trace components and may post limited quantification results as ratios.

How the NYC Health Department Uses Secondary Testing

Secondary testing during training

During a technician's training phase, every sample tested with FTIR is sent for secondary lab testing and results are then assessed for concordance. This process allows technicians to check the accuracy of their drug-checking results, including what compounds, if any, were missed and whether any substances were incorrectly identified. Testing every sample while the technician is in training also facilitates a better understanding of the local drug supply—critical for any burgeoning drug-checking service.

Secondary testing for quality assurance

Once the training phase is complete, technicians send every 10th sample to the secondary testing lab for ongoing quality assurance. Additionally, samples that: 1) technicians could not confidently identify; 2) caused adverse reactions in participants (e.g., overdoses); and 3) were not identified by FTIR's drug reference libraries are also sent for lab testing.

Secondary testing for quantitative analysis

Once fully trained, technicians receive additional instruction on more advanced drug-checking procedures, such as approximating the proportion of fentanyl in a fentanyl-positive sample. To provide a cross-check for this rough approximation and ensure quality assurance, these samples are then sent to the lab for quantitative analysis. Providing a range of fentanyl approximations to participants using drug-checking services at NYC's two overdose prevention center sites has been particularly important, as this information can inform how a participant decides to use their sample. Quantification can also help elucidate what may have contributed to an adverse reaction, including overdose. Lastly, quantification gives drug-checking technicians a better sense of what is considered typical in a local area.

Chapter 4

Technician Training and Ongoing Technical Assistance

Robust drug-checking training and ongoing technical assistance are vital to operating an effective and responsible drug-checking service. Training requires a substantial commitment on both the part of the organization offering the service and the technicians conducting the drug checking, particularly when working with an unregulated opioid supply. It is recommended that training be provided using an apprenticeship model, whereby an experienced drug-checking technician (with extensive experience utilizing the drug-checking technology, assessing concordance with secondary testing results, and running a drug-checking service) provides ongoing support to novice technicians or trainees. If feasible, it is also highly recommended that new technicians shadow an experienced technician conducting point-of-care drug-checking before operating their own site. The remainder of this chapter describes the NYC Health Department's training program for drug-checking technicians.

What Makes a Successful Drug-Checking Technician?

Ideally, drug-checking technicians should have a background in harm reduction and be knowledgeable about the unregulated drug supply in the U.S. The following factors are helpful to consider when hiring for this position:

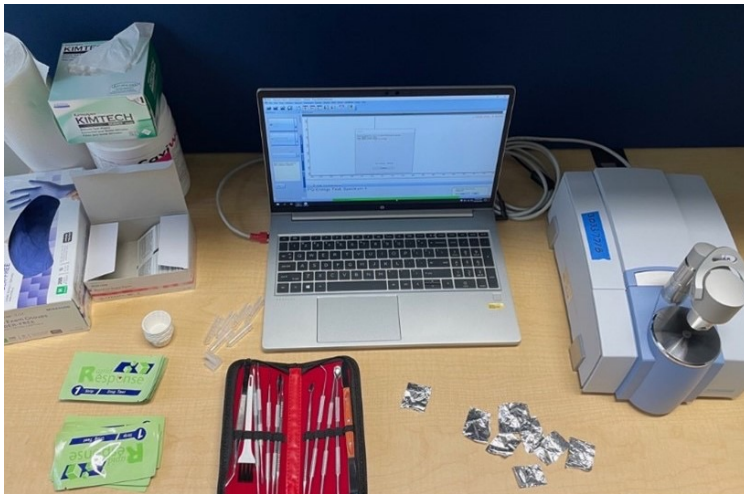
- Uses drugs or has lived experience with drug use
- Is interested in behavioral health
- Is part of the local harm reduction community
- Is personable, relatable, and engaging
- Has a clear communication style and is comfortable explaining technology
- Has strong attention to detail and excellent organizational skills
- Has a background in or knowledge of chemistry (not required, but helpful)

The NYC Health Department's Approach To Drug-Checking Training

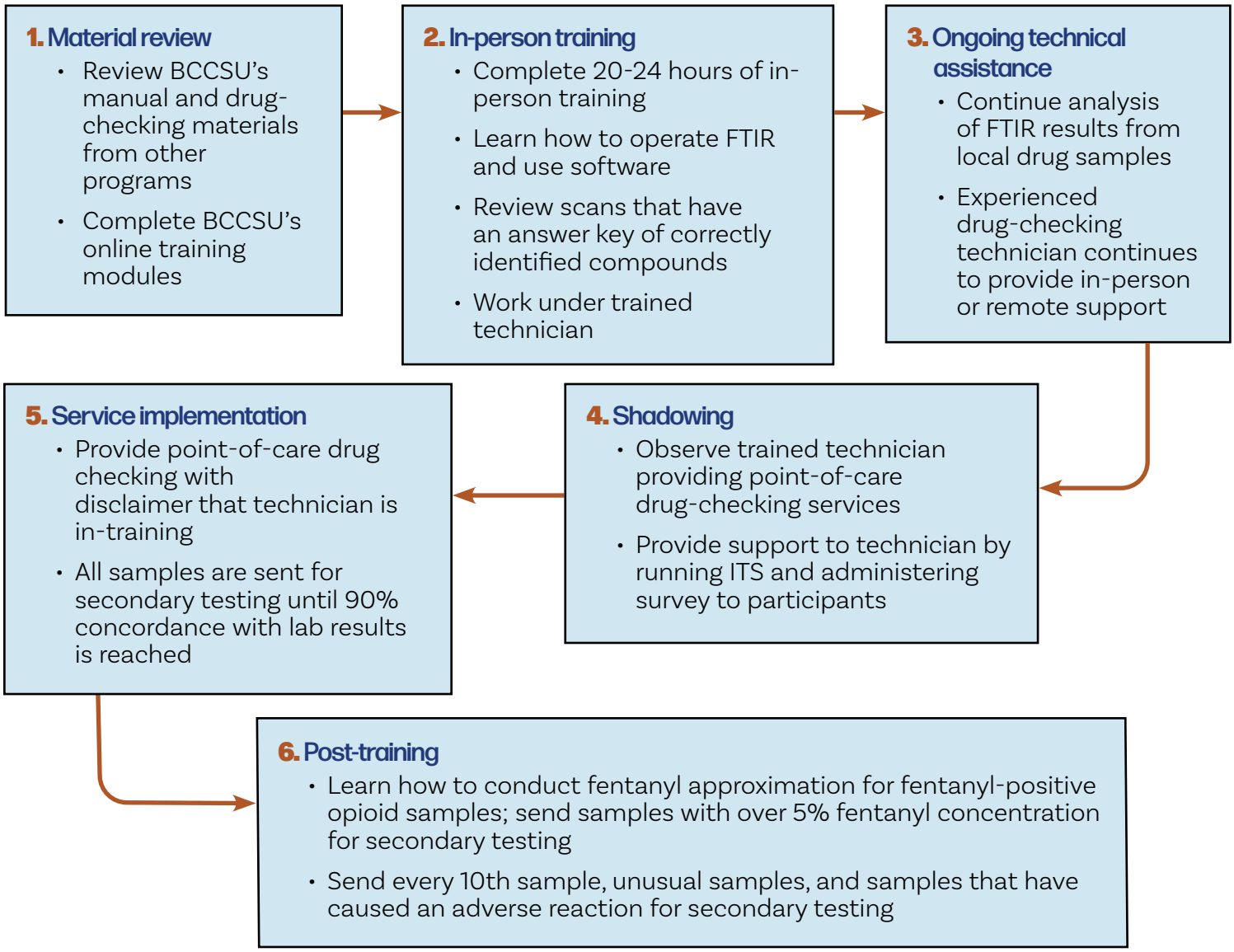
The NYC Health Department's drug-checking initiative was established in November 2021 under a research study protocol approved by the NYC Health Department's Institutional Review Board. Using Bruker's Alpha II FTIR along with ITS (predominantly, fentanyl, xylazine, and benzodiazepine strips), the drug-checking initiative was first implemented at one

Below, left: The initial training phase includes technical guidance for FTIR operation (photo courtesy of the NYC Health Department's drug-checking team)

Below, right: Tools, materials, and equipment used for point-of-care drug-checking (photo courtesy of the NYC Health Department's drug-checking team)



NYC Health Department Training Workflow



of the city's SSPs and has since expanded to five SSP locations, including two sites that offer overdose prevention services. The NYC Health Department's training protocols were informed by guidance and standards put forth by BCCSU and other established drug-checking programs.

In NYC, in-training technicians begin by familiarizing themselves with the current drug-checking literature, including handbooks, operation manuals, tutorials, and online modules developed by existing drug-checking programs. This encompasses general information about drugs, their effects, and harm reduction recommendations, as well as materials about the FTIR. Once trainees have reviewed this material, they receive approximately 20-24 hours of direct training from an experienced drug-checking technician to learn how to operate the FTIR and use the accompanying software. During this time, trainees are in a controlled environment, such as a quiet office, where they can work at their own pace. Scans previously generated from the local drug supply or scans with an attendant answer key are used to practice analyzing and interpreting results. The delivery and communication of the results to participants, including harm reduction education, is also practiced through role play.

Once a trainee has become proficient at scanning, analyzing, interpreting, and conveying drug-checking results, they shadow a trained technician, playing a supportive role in a setting with an established

drug-checking service. This allows the trainee to experience the pace and workflow of drug checking in a dynamic environment, as well as the provision of harm reduction education to participants who use the service. A trainee will typically shadow an experienced technician for approximately 50 hours before they start implementing services at a new site. Additionally, during the first 50 hours that a new site is operational, an experienced technician accompanies the trainee to monitor their work and provide support if needed. Depending on program location and prior experience with drug checking, it may be necessary to contract with an experienced trainer in another jurisdiction to implement training and provide technical assistance.

Participants accessing a new drug-checking service with a trainee technician should be advised that the technician is still in training and that results may therefore be incomplete or contain inaccuracies (secondary testing results are available in approximately 3-6 weeks). Technicians also provide general caveats regarding the technological limitations of the FTIR and ITS. During the trainee phase, every sample checked by a trainee is sent for secondary testing.

Once participants have received the preliminary results of the scan, their sample is packaged to send to the lab. Participants are also provided with a gift card as an honorarium for their time. This incentive has been critical to attaining the 100 to 150 samples needed for a technician to develop their skills and reach the required level of concordance with secondary testing results within a reasonable timeframe.

Lab ID	Sample ID	FTIR Results	Confirmatory Testing Results	Analysis notes
27	012022103	Xylazine	Xylazine (8.2p)	Missed heroin, though could be under 5%. Go back and review spectra
		Fentanyl	Fentanyl (1p)	Characteristic heroin "crab claw" not strong enough to see on spectra
			Heroin (0.1p)	likely under 5%
			Para-Fluorofentanyl (0.53p)	
			Diphenhydramine (trace)	
			Cyclobenzaprine (trace)	
28	012022104	Heroin	Heroin (1p)	
		Fentanyl	Caffeine (trace)	
			Fentnayl (trace)	
29	012022105	Methamphetamine	Metamphetamine	
30	012022106	Fentanyl	Fentanyl (1p)	
			Quetiapine (0.42p)	Missed quetiapine; substance newly identified by the NYC drug checking service (90th result on the list in OPUS after third subtraction)
			Para-fluorofentanyl (trace)	Will need to look at top 100 of list to identify smaller quantities of substances
31	012092101	Fentanyl	Fentanyl (1p)	
		Quinine	Quinine (0.7p)	
32	012092102	Quinine	Heroin (1p)	Missed heroin, seen in top 100 when reviewing scan with trainer
		Fentanyl	Caffeine (0.53p)	Missed caffeine, seen in top 100 when reviewing scan with trainer
			Fentanyl (0.15p)	
			Quinine (0.5p)	
33	012092103	Cocaine	Cocaine	

This table provides a snapshot of how concordance is tracked between FTIR results and secondary testing results at the NYC Health Department. When samples are concordant, the sample ID is marked green. When a compound is missed, the sample ID is marked red.

Establishing Concordance

Once secondary lab testing results are available, they are compared to the FTIR output. In the event that a compound was missed or misidentified, trainees revisit the scan to reassess their analysis. This iterative process serves to improve a trainee's interpretation and better understand the substances typically found in the local drug market. Within the context of the NYC Health Department's drug-checking initiative, a technician is considered proficient once they have achieved a 90% concordance rate

between the FTIR and secondary testing results. FTIR results are considered to be concordant if all the components that reasonably could be expected to be identified on the spectra align with the lab results. Technicians are not expected to be able to identify components present in less than 5% concentration, such as compounds in trace amounts, or biproducts such as 4-ANPP and acetyl codeine. Additionally, secondary testing results only identify active psychoactive compounds, so inactive buffs and fillers such as mannitol, inositol, or lactose will not be included in lab reports and are therefore excluded from concordance assessment.

During the review process, samples for which the technician missed a substance that was clearly identifiable should be noted. Discordant samples are then reviewed with the experienced technician for any indication of the missed substance. If the experienced technician concludes that the missed substance was identifiable, the sample remains discordant. If they conclude that there was no indication of the missed substance in the FTIR scan, the sample is not considered discordant. The concordance rate is calculated by dividing the number of correctly identified samples by the total number of samples and multiplying by 100.

Once a 90% concordance rate has been reached, the technician's training phase is considered complete. From this point onwards, technicians send every tenth sample they analyze for secondary testing for quality assurance purposes. Additionally, unusual samples or those that have resulted in an adverse reaction are also sent for secondary testing. Assessing concordance is an ongoing process that technicians who provide drug-checking services will continue throughout the period of service provision.

The Importance of a Community of Learning and Practice

Because drug-checking is still in its infancy in the US, it can sometimes be difficult to find evidence-based information about different drugs, adulterants, and buffs. Connecting with others who have expertise in drug-checking is critical to staying up to date with the latest information and literature. National networks of drug-checking technicians, and other drug experts, such as the Alliance for Collaborative Drug Checking and Remedy Alliance for the People, are invaluable resources for continuing education and training. In the US, regional drug-checking networks are slowly starting to develop. These groups can be a great resource for keeping abreast of technology developments and sharing drug-checking tips.

Chapter 5

Point-Of-Care Drug-Checking Service Workflow

There are several types of drug-checking services, some of which do not involve face-to-face contact between a participant and drug-checking technician. One of the strengths of a point-of-care drug-checking service is being able to provide people with information about their drugs in real time so they can make more informed choices about their use. This chapter describes the workflow of a point-of-care drug-checking service based at an SSP in NYC.

Top: Technicians from the NYC Health Department's drug-checking initiative (photo courtesy of the NYC Health Department's drug-checking team)

Bottom: Drug-checking technician loading sample to prepare for testing (photo courtesy of OnPoint NYC)

Checking In

When a person brings in a drug sample to be checked, the technician introduces themselves, provides an overview of what will happen during the session, and shares basic information about the technology used. Verbal consent is obtained; the technician then asks a few questions about the sample, and answers are recorded electronically (see Chapter 3 and Appendix F for more details on data collection).

Preparing a Sample

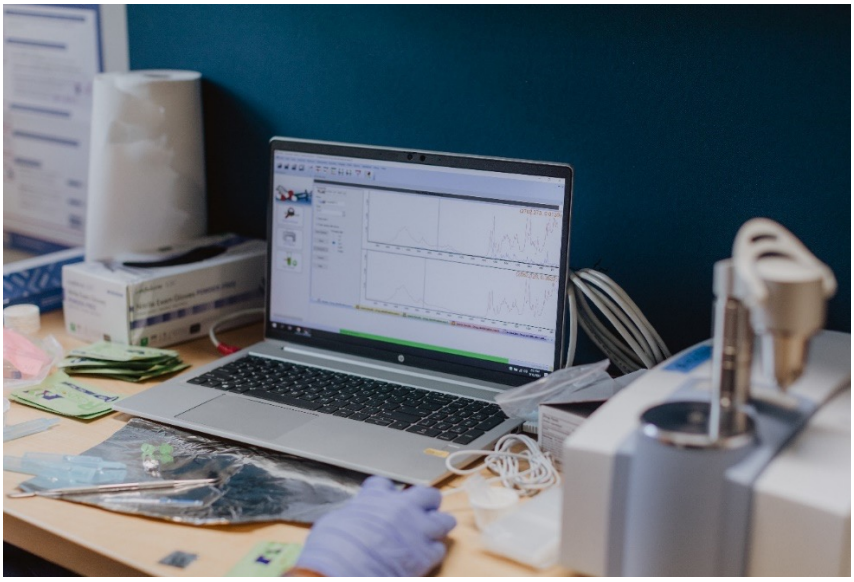
With the equipment ready to go, the technician prepares the sample to maximize the likelihood that what is tested by the FTIR is representative of the drugs that a person plans to consume. For example, if there is powder in a small bag, the technician may ask the participant to shake it multiple times before removing a few grains, so the components are distributed more evenly. If testing a pill, a technician will typically cut the pill in half, and scrape an appropriate amount of sample from the middle. In the case that someone wants to test residue from a used filter or cooker, the technician will use a tool to scrape out the residue. A good rule of thumb is that the amount of sample needed to generate a sufficient scan on the FTIR is approximately equal to the size of half a grain of rice.

Data Collection Should Never Be Prioritized Over Service Provision

Data collection is an important component of drug checking, as it can help to inform collective knowledge about the local drug supply. However, as drug checking is first and foremost a direct service, the need for data must be weighed against quality service provision. Data collection should never take priority, and services should never be withheld in the interest of eliciting more or better data. Drug checking should always be performed for a participant even if they do not want to share any information about themselves or the sample they are submitting to be checked. Broadly speaking, data collection works best when framed as a conversation rooted in curiosity rather than a didactic set of questions. This approach can also help the technician to both build rapport and gain a deeper understanding of the participant, their drug use behaviors, and the sample that is being analyzed.

Qualitative Analysis

Once the sample has been collected, the technician prepares the FTIR to begin a new scan. First, a background scan is conducted to produce a baseline against which the drug sample will be compared. Then, the technician uses stainless steel tools to manipulate the sample and place it on the machine. A small piece of aluminum foil can be placed on top of the sample to keep it in place before conducting the scan.



Drug-checking technician performing spectrum subtraction (photo courtesy of OnPoint NYC)

The FTIR scans the sample and generates a unique spectrum based on the type and quantity of each component in the sample. The sample's spectrum is then compared to different reference libraries, or collections of spectra from a wide variety of substances, adulterants, and buffs, and the technician assesses which components are present. After the technician has identified the substances that are visible in the scan, they may conduct additional checks with ITS (described below). After a drug check is complete, the FTIR, tools, and work area are cleaned thoroughly to avoid cross-contamination.

Quantitative Analysis

Following qualitative analysis, a technician may also perform quantitative analysis on the FTIR. Importantly, FTIR technology cannot precisely evaluate how much of a particular compound is in a sample. At best, it can give a rough approximation, but there are several limitations, and quantification approximations gleaned from an FTIR should be interpreted with caution (see Appendix B for more information on quantification).

Using Immunoassay Test Strips

In addition to the FTIR, each sample brought into a point-of-care drug-checking service is tested with a fentanyl test strip (FTS), and depending on the context, a xylazine test strip (XTS) and/or a benzodiazepine test strip (BTS). Programs may also utilize additional test strips depending on the local supply.

There are multiple methods for preparing samples for testing with ITS. Some methods are designed for best case scenarios and may not be easily applicable or realistic

A Note About Benzodiazepine Analogs

While BTS are effective at identifying pharmaceutical benzos, there are a plethora of novel "designer" analogs against which they have not been validated. For example, in research from BCCSU, etizolam was significantly more likely to be missed with a BTS than other benzo analogs. It is important to be able to accurately explain the limitations of BTS to participants and to take those limitations into consideration when interpreting test strip results. If a technician tests a sample expected to be a benzo that produces benzo-like effects, but the strip does not indicate a positive result, this could mean the presence of an analog such as etizolam. In these cases, it is helpful to submit a sample for further testing with a drug-checking machine or laboratory.

for real-world settings. However, it is important to understand the rationale behind these different methods and to identify ways to optimize immunoassay testing whenever possible (see Appendix G for more details).

FTS are used to detect the presence of fentanyl in a sample. Currently, these are the most widely used ITS, and there has been much debate about the best procedures to ensure the most accurate results. FTS are known to give false positives when exposed to diphenhydramine (an antihistamine, the active ingredient in Benadryl), which makes them difficult to interpret if the local opioid supply regularly includes diphenhydramine. Some FTS brands have also been known to indicate a false positive when exposed to high concentrations of methamphetamine and MDMA. Additionally, manufacturing issues have resulted in batches of strips that indicate false positives in response to other compounds. For more information on using FTS, go to: **NYC fentanyl test strip instructions**.

BTS work similarly to FTS and are designed to identify drugs within the benzodiazepine class, such as alprazolam, lorazepam, and clonazepam. One important difference between testing for benzodiazepines and testing for fentanyl is that benzodiazepines are less water soluble and therefore do not dissolve as easily as other substances. To compensate for this, consider putting the solution into a snap-top 2 mL tube or other lidded container and shaking it or rubbing it between your hands for 30 seconds prior to testing.

XTS have been developed by several immunoassay test strip manufacturers in response to the growing prevalence of xylazine in the drug supply. XTS generally are only recommended for testing samples suspected to contain opioids, as they have not yet been validated for efficacy and accuracy in stimulant drug samples. Depending on the brand, XTS can produce false positive results if the drugs being tested contain lidocaine. For more information on using XTS, go to: **NYC xylazine test strip instructions**.

Immunoassay test strips indicating that a drug sample is negative for xylazine (red) and benzodiazepine (blue), and positive for fentanyl (purple) (photo courtesy of the NYC Health Department's drug-checking team)

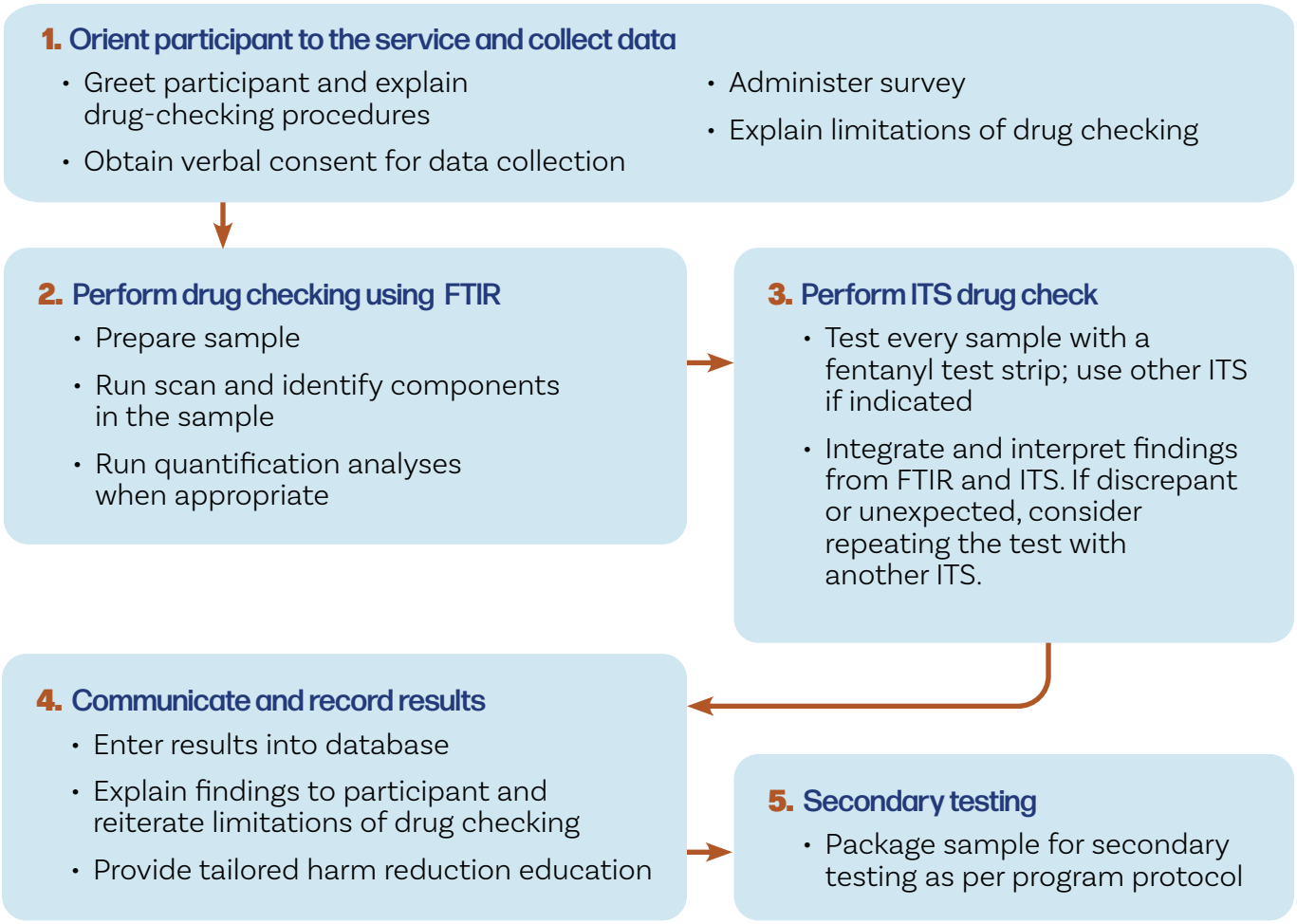
Interpreting ITS Results

All ITS used for drug checking are read the same way. The presence of one line at "control" indicates the substance tested positive for the substance of interest while the presence of two lines (at "control" and "test") indicates a negative test and the absence of the substance of interest. If no lines appear, or if there is a line at "test" but not at "control," the test should be considered invalid and a second test using a new strip should be performed.

Recording Results and Cleaning the Workspace

Once results have been recorded and conveyed to the participant along with harm reduction education, samples are then packaged for secondary testing (see Appendix E) or discarded as appropriate. To minimize the risk of cross-contamination, the FTIR and any tools used to manipulate drug samples should be cleaned three times with isopropyl alcohol, and the worksurfaces thoroughly wiped down. Used test strips, wrappers, and other supplies should be safely discarded. Finally, a new background scan should be performed to prepare the FTIR for the next sample.

NYC Health Department Point-Of-Care Drug-Checking Service Workflow



Drug Checking in an OPC Setting

Once a technician is fully trained and proficient in providing quantification estimates, they can begin providing drug-checking services at an OPC. In NYC, OnPoint NYC operates two sites located in East Harlem and Washington Heights. OPCs offer supervised, hygienic spaces in which people can safely use their pre-obtained drugs with sterile equipment while also gaining access (on-site or by referral) to routine health, mental health, drug treatment and other social services. The NYC Health Department began drug checking at OnPoint NYC in East Harlem in July 2022 and expanded services to the Washington Heights site in May 2023.

The benefit of incorporating drug-checking services into OPC settings is that results can be immediately applied. When participants check their drugs before they go into the OPC, the results they receive typically influence how they will use the drug and/or how OPC staff will support or monitor them. For example, if a sample is estimated to contain a high percentage of fentanyl, participants often break up their doses, using less at a time than they might otherwise. Additionally, if someone uses a drug in the OPC that results in an adverse reaction such as an overdose, a sample of that drug can be tested by the resident technician. Continuous communication and coordination between OPC staff and the drug-checking technician ensures that people accessing both services are given the support they need to minimize their risk.

Chapter 6

Communicating Results to Participants

Drug checking is both an art and a science as it combines the use of advanced lab equipment with harm reduction practice. Interacting and engaging respectfully and productively with people using the service is a key component of point-of-care drug checking and imperative to the success of the service.

Drug checking is both an art and a science. Interacting and engaging respectfully and productively with people using the service is imperative to its success."

As trust is established, technicians can expand conversations to include questions related to tolerance, amount and frequency of use, overdose experiences, and other health concerns that can help them deliver harm reduction messaging that is relevant to the participant's life experience. It is also important to make sure that participants understand that results and information presented do not constitute medical advice. Technicians should ask the participant what their goals are for their substance use. Making space for people to reflect on aspects of their use can create a moment of mindfulness that can help people think more intentionally about what they are using and why.

Examples of questions to ask participants about their substance use goals:

"How do the drug-checking results compare to your experience of using the drug? Did you get the effect that you wanted from this sample?"

"What are your goals for your use?"

"Are there any substances you want to avoid that we can look out for the next time you come in for a drug check?"

Another important consideration is for technicians to be careful about what they say while analyzing the scan. Technicians should try not to think out loud as participants may consider what they hear to be definitive rather than speculative. Similarly, technicians should exercise caution in allowing participants to view the scan as they may misinterpret what they see.

Effectively communicating drug-checking results is a key component of any drug-checking service. Misinformation about drugs and the unregulated drug supply is rampant and often fueled by stigma, fear of the unknown, and the media. The following sections elaborate on different aspects to consider when communicating drug-checking results to participants and the broader community.

Drug-checking technician providing harm reduction education to a participant (photo courtesy of the NYC Health Department's drug-checking team)

Communicating Individual-Level Drug-Checking Results

Messaging and communication around drug-checking begins the first time a potential participant hears about the service and continues until an individual has received their results and harm reduction education. Knowing how to communicate with people from a variety of backgrounds and with different life experiences is one of the most important skills a technician can have. While technicians will learn strategies that work best for them and develop their style over time, what follows are some considerations to keep in mind.

Practice Curiosity

The best drug-checking technicians engage with curiosity. In most other settings, sharing one's drug use experience is not encouraged and may be stigmatized or even result in punitive consequences. Asking questions with respect will help participants feel safe while accessing the service and build trust with the technician. Practicing curiosity will also assist drug-checking staff to gather information about the sample and ask helpful follow-up questions to inform the drug-checking process. Participants who see that a technician has genuine concern for them, their experience, and their drug use are more willing to take the time to answer questions, share information, and engage in conversations around harm reduction.

"Asking questions with respect will help participants feel safe while accessing the service and build trust with the technician."

Examples of questions to ask participants about their drug use and health:

- **"Tell me a little bit about your tolerance. How much have you been using recently? How many times a day are you using? Are you comfortable using that amount, or are you experiencing withdrawal symptoms? Have you taken any breaks recently? Has your body felt different because of the amount that you're using?"**
- **"Are you on methadone or buprenorphine? If so, what dose are you currently taking?"**
- **"Do you have any health conditions you feel comfortable sharing? Anything that affects your liver or kidneys such as Hepatitis C?"**
- **"Are you on any medications that could interact with the drugs you use?"**

Remain Neutral

When communicating with a person accessing drug-checking services, and especially when discussing sample results, technicians should be non-judgmental and adopt a neutral tone. In harm reduction practice, drugs are neither "good" or "bad," and technicians should be vigilant to ensure that stigma about a particular substance does not seep into the language used to communicate results. Technicians do not know what a person is hoping to find in their drugs; some people like xylazine because it extends the effects of fentanyl, others look for fentanyl because they prefer how it feels. If participants feel judged because of the drugs they use, they may not return to access the service. A technician's job is to communicate the results, give fact-based information about the substances that are identified, and provide harm reduction education, while eliminating any moral judgement regarding a particular substance or finding.

Provide Evidence-Based Messaging

When giving results to a participant, drug-checking technicians should be prepared to communicate evidence-based information about the substances they have identified. Misinformation about a particular drug or the unregulated drug supply often gets amplified in the media due to fear and a lack of understanding, which contributes to increased stigma. Part of the value of drug checking is to correct misperceptions, and to provide accurate information. Technicians should be familiar with different substances commonly found in their local drug supply and be comfortable explaining what they are and how they may or may not impact the participant. Technicians should also be prepared to research new compounds, critically engage with scientific literature or other resources, and translate what they learn directly to the participant. There is always a degree of uncertainty with drug-checking so technicians should be comfortable saying "I don't know, let me find out for you" rather than guessing or providing information about which they are unsure.

Be Person-Centered

Another critical element of communicating drug-checking results is being person-centered, or ensuring that the language and timing of the conversation matches the participant's needs. Harm reductionists often engage people in settings where they must quickly understand a person's context, identify what will be most helpful, and effectively relay this information within a short yet impactful conversation. The same is true of drug checking. People access drug checking with differing levels of knowledge about drugs. Some participants will have an extensive understanding of drugs and their effects or have a science or pharmacology background. Others may not be as familiar with the different components identified in their samples. Some participants will be really interested in drug checking and want to have long conversations about their results, while others will prefer a shorter interaction. It is the technician's job to read the situation, communicate results accurately, prioritize the participant's identified goals, and skillfully integrate information around risk.

Communicating Limitations of Drug-Checking Technologies

When talking to participants about drug checking, it is important to be able to accurately describe the limitations of the technologies being used (e.g., LOD), while emphasizing that some substances still pose risks even in small amounts. Technicians should also feel comfortable explaining that the results obtained through drug checking are only reflective of the small portion of the drug being tested and may not be representative of the entire sample (i.e., the chocolate chip cookie effect). The limitations of both ITS and the FTIR to detect specific analogs should also be communicated.

While some participants may want to know what type of fentanyl was found in their sample, this typically cannot be determined without secondary lab testing. Participants may also ask if the FTIR can "see" everything. In these cases, it is important for technicians to explain that the FTIR can only identify compounds that are in the reference libraries, and therefore might miss novel or very uncommon compounds. Finally, technicians should be comfortable explaining the limitations around quantification with the FTIR. Let participants know that you can give them a rough quantification estimate but cannot provide specific percentages.

Many programs also include a disclaimer that is relayed to participants prior to having their drugs checked. Disclaimers typically include statements to ensure that they are aware that drug checking cannot provide definitive results and information provided does not constitute medical advice (see Appendix H for an example flyer with disclaimer language).

Communicating Uncertainty About Results

Beyond communicating the limitations of the technology, technicians also should be able to effectively communicate the degree of uncertainty inherent to drug checking and convey that the FTIR can confirm the presence of a compound but cannot definitively confirm the absence of a compound. An effective way of conveying this could be:

"I see lactose, mannitol, and fentanyl in your sample. There's always the possibility that there's something else that I didn't see but, based on the scan, that's what I'm able to determine".

Sometimes participants will be searching for more certainty about a sample than a technician can provide. For example, by asking for confirmation that a sample is free of fentanyl or is "safe" to use. Technicians should remain grounded, rely on their expertise, and remind the participant that drug-checking results can never guarantee that a drug is safe to use. In general, results derived from a drug check are presumptive based on limited data. Given this uncertainty, it is the job of the technician to redirect participants to the information the data do support and away from what cannot be definitively stated.

Levels of confidence among technicians may also be different depending on the context and setting. Technicians who are in or have recently completed training will likely have a higher level of uncertainty than technicians who have years of experience. Additionally, technicians who were trained predominantly in festival settings and analyze more stimulants or psychedelics may not be as practiced in community-based settings with opioid-dominant drug supplies. It is important for technicians to recognize the limitations of their own expertise and take that into consideration when communicating results to participants. The key is for the technician to accurately portray any uncertainty they might have and know when to ask for support.

Communicating Unexpected Results

Sometimes drug-checking technicians will come across results that are unexpected or do not make sense within a given context. In these cases, it is important to rely objectively on the scan and think through the limitations and caveats of the different technologies being used. Technicians should also draw on their knowledge of the drug supply as well as their drug-checking experience, to think critically about why they may be seeing certain results. Ultimately, when faced with unexpected results, the best option is to send the sample for secondary testing. In the moment, however, it is important that technicians not ignore the scan or test strip result because they do not follow the local trend or align with the participant's experience.

If unexpected results arise, explain to the participant what is typically seen in the local drug supply and how the results differ from the norm. Unexpected results can occur for a variety of reasons, such as human error or misinterpretation, faulty technology, the limitations of the technology, and/or a substance not being within the reference library. Below are some scenarios to consider, and potential steps to take.

Scenario 1: The test strip results are unexpected, such as a positive FTS for a non-opioid sample or a negative FTS for an opioid sample.

Remember that sometimes FTS produce false positives with non-opioids. Re-test the sample. If the FTS continues to produce a positive result, ask the participant whether they or someone else has used the drug. If the participant responds in the affirmative, and does not report any adverse reaction, let the participant know that you cannot exclude the possibility that fentanyl is present. If the participant has not yet used the drug, emphasize that it could contain fentanyl and reaffirm harm reduction messaging (if the participant chooses to use the drug, they should carry naloxone, not use alone, etc.) Additionally, encourage the participant to return to the service when the secondary testing results are available.

Conversely, if a test strip is fentanyl negative when you would expect it to be positive (e.g., a participant has used the drug and experienced an overdose), another synthetic opioid could be present below the detection limit, such as a nitazene. In this case, communicate the results and send the sample for secondary testing for further assessment.

Scenario 2: An unfamiliar compound is coming up as present in a sample.

Search the internet to get information about the substance and assess the likelihood that it could be in the sample. Reference other secondary laboratory results, such as Drugs Data, to see if it is a substance that has been previously found in the category of drug that you are testing.

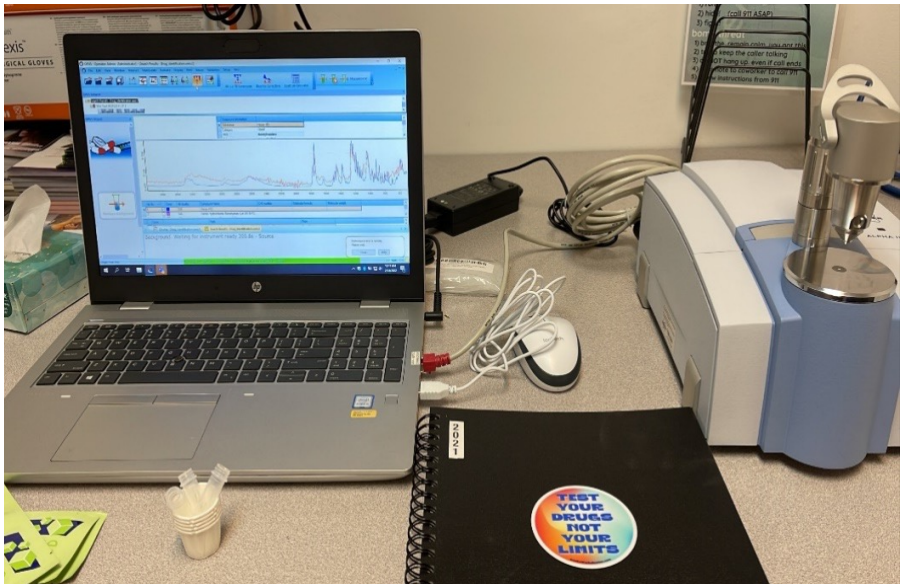
Scenario 3: The closest drug match does not make sense.

Ask the participant about their experience using the sample, as well as what they expected the sample to be. Check other reference libraries to see if the substance may be present. If the substance cannot be found in a reference library, the sample should be sent for secondary testing to identify the compound.

Communicating Quantification

Knowing how much of a particular compound is in a sample is a strong motivator for people to engage with drug-checking services and is crucial to providing useful and tailored harm reduction messaging. However, FTIR has significant limitations around its ability to accurately quantify compounds and the challenge becomes how to communicate this information clearly. There are several strategies that may be helpful when framing quantification results, and which one a technician utilizes will be dependent on their experience, training, and skill, as well as their ability to obtain secondary quantification testing from a laboratory.

An experienced technician may be able to use FTIR technology to provide quantification estimates of a compound within a given sample (see Appendix B for an overview of these techniques). However, it is important to keep in mind that **numbers don't mean anything without context.** For example, telling someone that their drug sample contains 5-10% fentanyl does not mean much if the participant does not know what 5% fentanyl feels like, or how it compares to what they usually use. Additionally, with potent compounds such as fentanyl, the difference in effect between the low and high end of the range can be substantial.



Computer using OPUS software showing spectral analysis (photo courtesy of the NYC Health Department's drug-checking team)

Providing a frame of reference so a participant can situate their drug-checking results within their own experience can be helpful. For example, describing what is "typical" or "average" in the local drug supply by letting a participant know if the sample has more/less/or a comparable amount of fentanyl typically seen in the area can help someone understand the range they are given. To do this, the technician will need to have extensive experience working with the local drug supply to know what is considered typical. There also may be regions where there is wide variety in the concentration of fentanyl, which makes establishing a norm more difficult. Less experienced technicians should not give quantification estimates to participants until they have practiced using the technology and verified

Percentage Versus Purity

Often technicians will get questions from participants about whether they can determine the purity of a particular compound. The FTIR can only determine if components have been added to a compound (e.g., fillers or cuts such as lactose, phenacetin, dimethyl sulfone); it cannot determine anything about the purity of the original active component. Many drugs contain byproducts or contaminants left over from the synthesis process that impact the purity of the drug. For example, 6-monoacetyl morphine (6MAM), tropacocaine, and 4-ANPP are byproducts or contaminants that remain in the sample following the synthesis of heroin, cocaine, and fentanyl, respectively. Sometimes the FTIR can detect these byproducts; however, even if a technician sees byproducts on a scan, they cannot make any assumptions about the purity of a compound. It can be helpful to message this concept to participants as "I can see things that have been added to the original active substance, but I can't tell how well that original active substance was made".

their estimates with secondary lab testing. Whatever their level of experience, technicians who are newly engaged with drug checking in a particular setting should wait until they are more familiar with the local supply before providing quantification estimates.

Tailored Harm-Reduction Education

Harm reduction education is a key component of drug-checking services. Using the strategies described in this handbook, technicians can provide contextualized information based on drug-checking results. These conversations can help participants develop greater agency around their drug use goals and encourage a more holistic approach that is inclusive of considerations about pleasure, health, and well-being. The following examples from the NYC Health Department's drug-checking initiative illustrate this process.

Case study 1:

In 2023, drug-checking technicians saw an increase in the number of people who brought in methamphetamine samples to be checked. Several of these participants reported they had experienced what they termed "sleepy meth"—meth that after consecutive days of use, no longer produced a stimulant effect, and in some cases, resulted in people falling asleep while smoking. These participants expressed concern about the possibility that their meth was contaminated with fentanyl, particularly given the proliferation of messaging on this topic. The FTIR results from these samples indicated methamphetamine as the only active compound, and FTS did not indicate the presence of fentanyl.

While engaging with the technician, these participants described using meth daily for three or more days straight during which time they had little sleep, food, or hydration. This additional context led to conversations about how they could improve their well-being. Harm reduction strategies suggested by the technician included having access to more easily consumable snacks and beverages, allowing for more time to "come down" and rest, taking breaks, and reducing the amount used.

Case study 2:

Participant X had been a regular drug-checking participant for the previous 18 months. Initially, he was curious about the content of the drugs he consumed and why his drug use experience varied so widely, despite buying from the same source. Because he works from nine-to-five, Participant X was looking for opioids with enough fentanyl to alleviate his withdrawal symptoms, but not so much that he ended up heavily sedated. Having accessed the drug-checking service multiple times, Participant X figured out that drugs containing somewhere between 5-10% fentanyl achieved his desired effect.

"Providing a frame of reference so a participant can situate their drug-checking results within their own experience can be helpful."

When he became aware of the increased presence of xylazine in the local drug supply, Participant X decided that, in addition to staying within his preferred fentanyl range, he wanted to avoid using xylazine. Initially, he discarded any drugs that tested positive for xylazine (though it should be noted that because he was employed and stably housed, Participant X had the resources to make this choice in ways that others who are less well-resourced may not have done). However, in response to the increased volatility of the local drug market and the ongoing challenge of finding fentanyl without xylazine, Participant X also decided to decrease the amount of street opioids he used while increasing

his methadone dose. Moreover, he started limiting his use only to his prescribed methadone for several days at a time to reduce his exposure to new and potentially risky substances in the unregulated supply. Participant X has continued to get his drug checked on a regular basis and engage in discussions with the technician about changes to his drug use.

Consistency

Results and harm reduction messaging should be delivered consistently. Messaging that differs depending on who the technician is can quickly undermine the legitimacy of drug checking, and a bad experience with one technician reflects on the service as a whole. Be sure to have regular check-ins (for example, standing technician meetings) with all technicians on the team about findings and how best to communicate them, and allow technicians to observe each other interacting with participants so communication styles can be aligned.

Using Intentional Language

In drug checking, as with harm reduction, language has a considerable impact on how participants receive messaging. Technicians should make intentional choices about language and be deliberate with the words they use. For example, rather than telling a participant, "Your sample has lactose, mannitol and fentanyl" technicians should phrase results as, "What I'm able to see based on these technologies is lactose, mannitol, and fentanyl, and there's always the possibility that something else is in here that I can't see." In the first example, the implication is that the sample **only** contains lactose, mannitol and fentanyl and removes the possibility of the presence of other compounds not identified by FTIR. The uncertainty of drug checking should be discussed ahead of time but should also be communicated when results are provided.

"Have regular check-ins with all technicians on the team, and allow technicians to observe each other interacting with participants so communication styles can be aligned."

Synthesizing and Reporting Aggregate Data

Beyond communicating drug-checking results to participants in point-of-care settings, programs should think about how the data can be aggregated, interpreted, and disseminated to the larger community of PWUD and other stakeholders. For programs affiliated with a local or state health department, aggregate data should be shared with partnering harm reduction programs hosting the drug-checking service. Aggregate data give insight into the local drug supply that can benefit all PWUD, even those who do not directly utilize drug-checking services. In addition, routine review of aggregate data can help improve the quality of drug-checking services, as well as the interpretation of results, and can identify emerging trends in the local drug supply (for a sample data summary shared with programs partnering with the NYC Health Department, see Appendix I). Below are suggested guidelines for reporting aggregate data:

1) Programs should not report results that were obtained only using ITS. There are too many limitations, cross reactive compounds, and user errors to characterize the drug landscape on test strip results alone. If test strips are the only option for drug checking, they should be implemented in a controlled, systematic, and consistent manner, ideally as part of a scientific study that recognizes their limitations and reduces possible errors.

2) Programs should not report unusual or unexpected results that have not been confirmed by secondary testing.

3) Reports should include context and information about specific compounds. For example, if 4-ANPP is

found in the drug supply, the report should include that 4-ANPP is a precursor and metabolite of fentanyl that is commonly found with fentanyl, and is biologically inactive. Disseminating drug-checking results without contextual information can lead to fear and misinformation about uncommon or unrecognized compounds.

4) Results should report both what the drug was sold as and the compounds identified through drug checking. What the drug was expected to be is important when contextualizing the results. For example, reporting that stimulants and opioids were found together in 10% of samples is not nearly as informative as saying, "Of 50 samples expected to be cocaine, five also contained fentanyl," or, "Of 100 samples reported to be fentanyl, 10 also contained cocaine."

5) Reports should include information about where the sample was obtained. Location information should be vague to avoid undue scrutiny on a particular area, but specific enough to help inform participants who reside in the area or purchase their drugs there. If legal risk is deemed to be too high to include location information, do not include it. Community safety should always be prioritized over data and including the location could put communities at risk of increased surveillance and targeted prosecutions.

6) Perhaps most importantly, reports about the drug supply should always include a "so what," or implications for the community. For example, only reporting that xylazine has been found in the drug supply without any additional context is not helpful for people who might be exposed to it. Including information about what xylazine is, what it may feel like, the negative health effects, and strategies to reduce or manage those effects helps people incorporate this knowledge.

7) It is recommended that partner harm reduction programs be engaged to identify the information that is most useful to their participants, the ideal format to effectively communicate aggregate results to participants, and how often they want to receive this information. This will help ensure that what is shared is relevant, clear, and accessible to PWUD.

Drug Alerts

Several different entities publish drug alerts or notices to the public about the presence of risky compounds that have been found in the drug supply. While well-intentioned, drug alerts are often poorly thought through and the lack of context can sometimes result in unintended consequences. Drug alerts can feed hysteria or misinformation about specific drugs and the intention is often to incite public panic rather than to provide practical information to people who might be impacted. On the other hand, it is important for people who use drugs to get access to information about the drug supply, regardless of whether they utilize a drug-checking service. The challenge then is to develop drug alerts that disseminate unbiased, fact-based information. Regardless of the circumstances, drug alerts should:

- Be clear, easy to understand, and written for the intended audience. Overly academic or sensational language may not be an effective method of communication.
- Include unbiased, fact-based information specific to the substance of concern.
- Offer relevant harm reduction strategies.

"While well-intentioned, drug alerts are often poorly thought through, and the lack of context can sometimes result in unintended consequences."

In some situations, it might be helpful to include information about when and where the sample of concern was identified. However, disclosing these details should be balanced with the need to protect participant confidentiality and community safety.

Summary

Point-of-care drug-checking is a multilayered and complex intervention that takes substantial time and training to develop. If implemented thoughtfully and with intention, drug checking can provide an invaluable service to PWUD and their communities. An unregulated and volatile drug supply cannot be remediated by drug checking, but giving people information about the drugs that they use and engaging in conversation about their needs and goals may help them reduce potential harms. Over time, engagement with drug-checking services may create greater intention and mindfulness around drug use, including moving toward better health and wellness, and facilitating greater personal autonomy and pleasure.

Appendix A

Practical Tips for Drug Checking Using FTIR Technology (Bruker Alpha II)

These practical tips are for the Bruker Alpha II FTIR spectrometer, the technology used by the NYC Health Department's drug-checking initiative. While some basic instructions are included below, the information provided is **not** sufficient to substitute rigorous training from an experienced drug-checking technician.

Setting up the Machine

1. Remove the two machine components of the FTIR from the carrying case. Slide the front half together with the back, being sure to avoid touching the inside contact points between the two halves.
2. Press the gray button down past the first resistance point and release to secure the two halves of the FTIR.
3. Connect the FTIR to a power source using the metal clamp to secure the power cord to the machine.
4. Connect the laptop containing the OPUS software to the FTIR using the ethernet cable.
5. Press the green power button on. The indicator light on the top of the machine should turn on.
6. Turn on laptop and open OPUS. Allow OPUS to run the automatic performance test.
    a. Click "OPUS DrugID Wizard" Icon on desktop screen of laptop.
    b. User ID: Admin Password: OPUS
7. Run a PQ test.
    a. Click on the indicator light in the bottom right corner of the OPUS window.
    b. Click on the box that says "ATR Diamond."
    c. Check the box beside "PQ Test" and click "Run now". This will require approximately 10 minutes and will generate a PDF report of the test when it is complete. Exit out of this PDF to proceed. Remember to run a PQ test every time that you put the FTIR together, especially when setting up in a new environment. If the FTIR remains set up in the same environment, run a PQ test a minimum of once per week.
8. Check the color of the indicator light on top of the FTIR. This will match with the indicator circle at the bottom right of OPUS screen.
    a. If GREEN: The FTIR is in working order and drug-checking can proceed.
    b. If YELLOW: Click on the indicator circle to identify why there is an error signal.
        i. A common reason for a yellow light is that the FTIR is due for a PQ test, meaning that the PQ test has expired. Click on the ATR Diamond box, select "Run PQ Test" and click "Run test".
        ii. High humidity levels could also be the cause of a yellow indicator light. To check humidity: Click on "Inferometer" box and select "Service Info". The "Relative Humidity" metric should be less than 40.
        iii. If a yellow light continues to display, reach out to an experienced drug-checking colleague, or call a Bruker rep for support.

Preparing a Sample

1. When preparing a sample, try to reduce the impact of the chocolate chip cookie effect. This is when compounds cluster in one spot rather than being evenly distributed throughout a substance. When extracting a small sample to check (which could be as little as a few grains), a compound could be missed if the drugs are not well integrated. Below are some suggestions for minimizing the potential

of the chocolate chip effect.

a. Powdered substances: Thoroughly mix or shake the baggie or container holding the substance.
b. Rocks or crystals: Crush the substance and, if possible, take small amounts from multiple pieces.
c. Pills: Cut the pill in half using a clean razor. Scrape a small amount from the middle of the pill. This will help access the psychoactive portion of the pill rather than the non-psychoactive binders often used in the coating.
d. Cookers: Use a metal tool to scrape residue from around the inside of the cooker.
e. Cottons/filters: Hold with tweezers and use a metal instrument to scrape residue out of the cotton or filter. If possible, avoid collecting fibers.

2. A background scan must be taken prior to every sample. The plate and crystal should be clean, dry, and free from any substances to ensure that the scan is taken correctly.
3. When entering the sample name, ensure it is formatted to reflect the information you need such as site name, date, and sample number.
   a. The sample description should also include basic information such as the color and type of the substance (e.g., "white powder," "pink crystal," "blue pill").
4. When you load the sample onto the machine, be sure to use clean metal instruments. The amount of sample should be approximately equivalent to half of a grain of rice.
   a. Manipulate the sample so as much of it is stacked on top of the crystal as possible. Stack loose pieces on top of compressed pieces to create a tiered "cake."
   b. Use a square of tin foil to cover the sample.

Spectrum Analysis

1. Always begin the spectrum analysis from the original window displaying the full scan.
2. Click on "Evaluate" in the upper toolbar and then select "Spectrum Search."
   a. Always check the following settings before running the search:
      i. In the "Spectrum Search" tab, ensure the box next to "Use File Limits" is checked.
      ii. In the "Search Parameters" tab, select the radio button next to "Spectrum Correlation". From the drop-down menu select "Vector Normalization" and "First Derivative."
      iii. In the "Select Libraries" tab, select the BCCSU, SWGDRUG, and TICTAC drug-checking libraries.
         - If checking novel psychoactive substances or if checking drugs in a rave or nightlife setting, the BCCSU tryptamine library may also be used.
3. After ensuring the correct parameters, click "Search Library" to generate a list of potential matches.
4. OPUS will compare spectra from the reference library to the spectra generated from the drug sample to identify potential matching compounds. The spectra from the drug sample will always be shown in **red** and the reference spectra are available in different colors that can be changed according to the technician's preference.
   a. OPUS will generate a list of potential matches ordered by "Hit Quality." Hit quality refers to how well OPUS thinks a compound matches the sample, but this metric is generally not used in the spectrum analysis process as the algorithm does not take mismatching peaks or characteristic peaks of notable compounds into consideration. A technician should always critically analyze the sample spectra and not rely solely on the software for a positive identification.
5. To assess whether the reference spectra is a match for the sample spectra, right click in the spectra window and select "Shift Curve" and "Top." Move the reference and the sample spectra to evaluate

how well they match. To make a positive identification, the entirety of the reference spectra must be found within the sample spectrum.

6. To remove the signal due to a particular compound from the sample spectra, right click on the reference entry in the potential matches list and click "Autosubtract and New Search." This will remove the signal due to a particular compound, allowing the technician to see the remaining signal and identify other components present in the sample.

Things to take into consideration when analyzing spectra:

- Intensity of signal: If there is only a small amount of a substance, you may only see a small hint of their tallest peaks.
- Constructive interference: If two compounds share a peak, the signal of that shared peak will be boosted.
- Many street samples are mostly made up of cuts. It may be difficult to identify characteristic peaks of active compounds before subtracting these cuts.

7. Continue this process until no further compounds can be identified. Generally, no further information can be obtained from a sample when there are no identifiable peaks remaining, and when there is approximately an equal amount of signal above the baseline as there is below the baseline.

Remember that all these techniques will be covered in greater detail during the training phase and through ongoing technical assistance with an experienced drug-checking technician.

Spectrum Subtraction

1. From the full scan, proceed to run a normal spectrum analysis following the steps above. Ensure that the reference you want to subtract is in the list of OPUS generated results. If the desired reference spectra do not show up, try turning off file limits and searching just the region of the spectrum where the compound of interest is visible.
2. Put the desired reference spectra into the OPUS window.
3. From the toolbar at the top of the OPUS window, click on "Manipulation" and select "Spectrum Subtraction."
4. Right click on the spectra you want to select and select "crosshair," then "cursor" to select the spectra. Drag the reference spectra to be subtracted into the white box. Click "Start Interactive Mode."
5. Set the "Times" box to zero and the decimal to 0.01, as the spectrum will be subtracted by one hundredth or 1% at a time.
6. Click the up arrow near the "Times" box to subtract the reference spectrum from the sample scan, one percentage point at a time. In the bottom box on the right-hand side of the screen, identify the characteristic peak that will be used as a benchmark to measure the subtraction. As the amount of signal is subtracted, watch the identified characteristic peak and mark where it hits the baseline. Once the peak hits the baseline or dips below, stop subtracting the signal. The number in the "Times" box represents the percentage of the compound of interest in the sample spectrum.
7. This number is a rough approximation and should always be framed as a range of percentages. Ongoing training will be needed to learn more about spectrum subtraction and identify the range that can be used to approximate percentages.

Questions To Ask When Conducting a Sample Analysis

1. Is there anything in this reference spectrum that **is not** in the sample spectrum?
   a. If yes, the reference is not a good match for your sample.
   Note that all signal in a reference spectrum **must** be accounted for in your sample for it to be a match.
2. Are there peaks or signal in your sample **not** accounted for in the reference spectrum?
   a. This indicates the presence of additional compounds in your sample beyond the current reference you are analyzing.
3. Do two components share peaks, boosting the signal (for example, xylazine and fentanyl)?
   a. If two components share peaks, what does it look like when you subtract one of those components?
4. How will subtracting the signal from one component impact the scan and how it matches to the next round of reference spectra?
5. What do we see in the "fentanyl region?" (Look for tiny peak at 1640-1650, and short, wide "m" shape at 2400 -> will **rarely if ever** see the "m")
   a. Is the reason this peak does not match because of a messy subtraction? Or was that peak missing in the original scan?

Tips

Mannitol and microcrystalline cellulose (MCC) are difficult to tell apart. Mannitol is much more likely to appear as a cut in powdered drugs, microcrystalline cellulose is more likely to be found in pressed pills. Look at the overall shape of the peaks and look for the characteristic spikey bat ears as well as boosted signal in the 1000-1400 range. Shoulder peaks will likely be smoothed out. Additionally, mannitol has a baby "m" shape around 2950 that is not found in microcrystalline cellulose, as well as a characteristic peak around 3500, on the left side of the sugar hump. MCC also does not dissolve in water very well, so if someone reports difficulty cooking/dissolving a sample, it could be a clue that MCC is present.

6. Once you have identified two or more potential components in a sample, try overlaying all potential reference spectra on top of your original scan (pre-subtractions). Do the overlapping reference spectra fill in all the signal of your scan?
    a. To do this, right click on the spectra -> cursor.
    b. Click on reference spectra you want to compare and drag it into your original spectrum search window.
7. If you want to find references that match a specific piece of your spectrum (e.g., you are trying to identify specific peaks), you can turn off file limits and highlight the part of the spectrum you want to search.
    a. Evaluate -> Spectrum Search -> deselect "Use File Limits"
    b. Drag and resize box to highlight desired area.
    c. Continue with spectrum evaluation as normal.

Make sure that whichever references fit your selected peaks also fit in with the rest of your spectrum. It is important to balance matching characteristic peaks with the holistic evaluation of the spectrum.

Appendix B

An Overview of Quantification Techniques Using the Bruker Alpha II

While rough approximations are possible and will improve once the technician becomes familiar with the local drug supply and skilled using the methods described below, it is important to remember that these methods have limitations, and results should always be analyzed critically. Moreover, without secondary testing, it is impossible to determine true quantification or verify the accuracy of FTIR quantification estimates. As a best practice, if there are any doubts about the technician's capacity to perform this analysis or about the ensuing quantification results, do **not** report them to participants. For more information about communicating quantification results to participants see "Communicating Quantification" in Chapter 6.

Within OPUS, there are two methods that can estimate how much of a component is in a sample.

1. Mixture analysis is a function of OPUS that can generate an estimate of the components in a sample, as well as the percent make-up of each. Samples with only a few components that do not have overlapping peaks tend to yield the best results with this technique. For samples that contain several compounds or have multiple components that share overlapping peaks (e.g., fentanyl and caffeine, fentanyl and procaine), this technique may be less accurate. Mixture analysis should only be run after a scan has been thoroughly analyzed by a technician and its components have been identified. If mixture analysis results include a substance that a technician did not identify, do not change the original determined components without appropriately analyzing the new results. Mixture analysis percentages are more likely to be inaccurate when the computer-generated compounds are not in agreement with the technician-determined compounds.

Even if the mixture analysis appears to be a good fit, results should always be considered a rough approximation and framed as a range of percentages on either side of the estimated value (e.g., plus and minus 5 percentage points).

2. Manual spectrum subtraction allows a technician to remove the signal generated by a particular compound from the sample spectrum one percentage point at a time. This technique can be useful to assess the amount of a specific component within a sample. Manual subtraction works best for components that have an easily identifiable and characteristic peak, such as fentanyl, and with samples where the characteristic peak is isolated and not concealed by signal from other components in the same region of the spectrum.

Appendix C

Recommended Supplies for a Point-Of-Care Drug-Checking Program

Alcohol pads

Used to clean the FTIR plate, crystal, and anvil head, as well as any tools that come in contact with the drug sample.

Containers to organize drug-checking supplies

Items such as a small travel bag or a beauty product organization case can help keep drug-checking tools better organized, support the workflow of your drug-checking service, and allow for easy transport to different locations if needed.

Gloves

Used whenever technicians are handling substances and operating the FTIR. Gloves should be changed after the testing of each sample to avoid cross-contamination.

Razor blades

Used to cut pills in half. Using a new razor blade for each sample is recommended rather than using a pill cutter, as pill cutters are difficult to clean and may cross-contaminate samples.

Water ampules

Used for testing with ITS. They come in pre-measured amounts and can be helpful to standardize measurement.

Wash bottle

As an alternative to water ampules, lab-style wash bottles can be filled with water and used for ITS. Wash bottles can also be filled with isopropyl alcohol and used with KimWipes to clean the FTIR and tools.

Isopropyl Alcohol

Used to clean the FTIR, tools, and any other surfaces or objects that have come into contact with drug samples.

Fentanyl test strips

Used to identify the presence of fentanyl or fentanyl analogs in a sample. They should be used in conjunction with the FTIR to detect the presence of fentanyl below the 5% detection limit.

Benzodiazepine test strips

Used to identify the presence of a benzodiazepine in a drug sample. They should be used in conjunction with the FTIR to detect the presence of benzodiazepines below the 5% detection limit.

Xylazine test strips

Used to identify the presence of xylazine in a drug sample. They should be used in conjunction with the FTIR to detect the presence of xylazine below the 5% detection limit.

2mL snap-top microtubes

Used when testing drugs with benzodiazepine test strips. Benzodiazepines do not dissolve easily in water and need to be agitated in a solution before they can be tested with a test strip. The sample is placed inside the tube with approximately 2mL of water, and then shaken well prior to testing.

Small paper cups (also known as ketchup cups)

Useful when using immunoassay test strips. A preferred alternative to plastic cups which can sometimes produce static electricity that makes powders stick to the surface.

KimWipes

Dust-free tissues used to safely clean lab equipment. Used in conjunction with isopropyl alcohol to clean the FTIR plate, crystal, and anvil head.

Sanitizing wipes

Helps with quick and efficient clean-up of the workstation.

2”x2” plastic Ziploc bags (sometimes known as jewelry bags)

Used to place samples in prior to mailing to the lab for secondary testing.

Small glassine envelope bags (optional)

Sometimes plastic baggies can produce static making them unsuitable for drug samples. Glassine envelopes do not generate static so samples should first be placed within an envelope, which is then folded and placed into a small plastic bag.

Small paper plates (optional)

Can be used as small, self-contained, single-use workstations. This strategy can help organize samples, decrease the risk of cross-contamination, and keep the workstation clean.

Wax carving tools

Kits of stainless-steel instruments containing a variety of tools that are helpful for manipulating drug samples. They are also easily cleaned with isopropyl alcohol and reduce the risk of cross-contamination between samples.

Appendix D

NYC Health Department's Checklist for Point-Of-Care Drug Checking at Community-Based Programs

- ✓ Drug-checking participants must have an SSP ID. If an individual does not have a program ID, one can be assigned to them.
- ✓ As you wait for participants to arrive, start OPUS, let it load and start a PQ test (takes about 10 minutes). Wait to see green bubble at bottom right of OPUS.
- ✓ When new participants arrive, confirm they have a powder or pill sample (not liquid, plant matter, or paper) and check if there is enough quantity to perform drug-checking analysis. We don't want participants to wait unnecessarily. Communicate when you're not sure if there's enough substance to test.
- ✓ Explain the process to the participant, including the limitations of drug checking.
- ✓ Ask the participant about their drug sample.
- ✓ Document the correct sample ID: site number_date_sample number.
- ✓ Complete the survey with the participant. Any important details that aren't covered in the questions should be written in the notes section (any odd signals you see on OPUS, signals that might be there, but you don't feel comfortable relaying, other sensory experiences the participant had, ease of manipulating the sample, anything that feels important/relevant to the participant's use, etc.)
- ✓ Collect the sample from the participant and prepare if needed.
- ✓ Measure background and immediately load the sample, place the piece of foil on top, and click measure sample in the middle of the screen.
- ✓ Analyze the results. Look at the top 80, auto subtract, and perform new search until there is no signal left.
- ✓ Conduct immunoassay tests using tube for non-meth and non-MDMA samples or a ketchup cup for meth/MDMA. Use sterile water vials for dilutions.
- ✓ Review the results, input results into the survey and convey results to participant (explain what each drug is, their effects, and any relevant harm reduction tips that are appropriate). Ask if they have any questions.
- ✓ Label a small plastic bag with the sample ID using a permanent marker. Pack the sample from the FTIR machine into the labeled baggie to be mailed to the lab.
- ✓ In your notebook, write the sample ID, what the sample was sold as, the results from the FTIR, and any notes that are relevant to share with the team.
- ✓ Clean the machine 3 times, wipe down tools, throw away any extra trash that has been accumulated from the test.
- ✓ Use the sample field log Excel file to record how many samples were collected that day.
- ✓ Write down any relevant notes from the day in the field log notes document.
- ✓ Mail samples to the lab. Email lab contact to let them know how many samples were mailed.
- ✓ Go to the secondary testing sample log (in the second tab of the field log Excel file) and note how many samples were mailed that day.
- ✓ When results are received, note the date the results came in.

Checklist for Advanced Techniques for Estimating Quantification

✓ If the sample has a noticeable fentanyl peak at ~1645, click on "Manipulate," and then "Spectrum Subtraction" to subtract the fentanyl signal from the original scan and approximate the percentage of fentanyl in the sample. One of the following will occur:

- The peak disappears
- The subtraction begins to compromise the integrity of signal coming from other substances like caffeine
- The bottom of the fentanyl signal begins to move into the negative.

✓ Complete a mixture analysis. The number of samples should be the same number of drugs that you identified in the qualitative analysis. For example, if you found 3 substances in your analysis, you will search for 3 substances.

- De-select all libraries except the BCCSU library.
- If the results match those you initially found in your qualitative analysis, and the fentanyl percentage is not way off, provide all non-fentanyl substances as a percentage with +/- 5 as the range to the participant. Provide the fentanyl approximation percentage that you found in spectrum subtraction.

✓ Review the results, input results into the survey, and explain results to participant (explain what each drug is, their effects, and any relevant harm reduction tips that are appropriate). Ask if they have any questions.

✓ If the sample cannot be identified or caused an adverse reaction or overdose, ask participant if it is OK to send it for secondary testing. When an adequate amount of sample is available, and if a fentanyl approximation was completed, samples should be sent to the secondary testing lab for quantification.

✓ Label a small plastic bag with the sample ID using a permanent marker. Pack the sample from the FTIR machine into the package to be mailed to the secondary testing lab.

- For samples sent for quantification, place them in a larger baggie labeled "quant."

Appendix E

Drug Sample Handling and Shipping Policies and Procedures

Any samples that will not be sent for secondary testing must be returned to the participant or destroyed. Remaining samples should be neutralized by placing in Dispose Rx packets which can then be disposed of in the trash.

Technicians are responsible for labeling, photographing, sorting, and mailing out their samples at the end of each drug-checking session. When technicians are in training, every sample collected should be sent to the lab for qualitative secondary testing. Once technicians are in the post-training phase, every 10th sample should be sent for qualitative secondary testing, along with any unusual samples or those that have caused adverse reactions. Samples that fit these criteria and include a sufficient amount of the substance, and samples for which technicians have been able to approximate some of the compounds present (fentanyl, heroin, cocaine, etc.) can be sent for quantification testing.

1. First, place samples in a small Ziploc bag and label the samples with a permanent marker. For participant point-of-care samples, the label begins with the site ID number. For non-human samples, or samples left for analysis by participants/staff, the label begins with "99." After the site ID number/99, include the two-digit month, two-digit day, two-digit year, and two-digit sample number of the day (e.g., 508142301, 9908142301).
2. Next, take photos of each sample that will be sent for secondary testing. Save photos in the appropriate secured folder.
3. Samples then should be sorted into larger Ziploc bags and labeled with a permanent marker for either qualitative or quantitative analysis.
    a. Qualitative analysis provides an assessment of what compounds/substance the lab identifies in the sample.
    b. Quantitative analysis tells us how much of each substance is present in the sample.
4. Samples should be mailed out at the end of each drug-checking session. Place samples in a large, padded envelope and seal shut. Drop off the envelope at the FedEx drop off location closest to your drug checking site. You will need to bring the pre-filled FedEx mailing slips with you and remember to include your name and the office address on the slip.
5. If you cannot mail samples at end of your shift, they should be correctly labeled, placed in Ziploc bags which are then placed inside a Fitpack container. Store the Fitpack container in the site lockbox and mail the samples to the lab at the next available opportunity. Prior to mailing, follow the same process listed in steps #2 and 3 above.
6. After you have completed a FedEx drop off, email the lab contact with the following information the total # of samples mailed, number of qualitative samples, number of quantitative samples, and a description of any unusual items in the package (e.g., plant matter).

Drug-Checking Data Collection Form [Data typically collected in REDCap]

Date:	Time of testing the drug sample:
Technician status: ❑ In training ❑ Fully trained	Drug checking site:
Participant or no end user: ☐ Participant sample ☐ No end user	Sample ID: First one or two digits: site # or 99 if non-participant Middle six digits: Date in mmddyy format Final two digits: # tested that day

1. If this is a participant sample at an Overdose Prevention Center, will participant use the OPC portion of this site today?
   ❑ Yes ❑ No ❑ Unsure

2. Do you have a participant ID with the Syringe Service Program?
   ❑ Yes ❑ No (If no, please ask participant to see staff to get a participant ID)

3. What is your SSP participant ID?: _____

4. Have you used drug-checking services at this site before?
   ❑ Yes ❑ No ❑ Unsure

5. In the last 30 days, where have you spent the majority of your nights?
   ❑ My own home (apartment/room etc.)❑ Home of friend, family member, partner (permanent)
   ❑ Home of friend, family member, partner (because I don't have a home of my own)
   ❑ On the streets or in a park ❑ Bus, subway, or train
   ❑ Car or other vehicle ❑ Building stairwell or roof
   ❑ Shelter ❑ SRO/hotel
   ❑ Other, please specify: _____ ❑ Chose not to respond

6. What is your age? _____

If new to drug checking, please fill out demographics below (questions 7-9). If repeat participant, continue to question 10.

7. How do you currently identify your gender? Please select the one that best describes you.
   ❑ Woman ❑ Gender non-conforming ❑ Chose not to respond
   ❑ Man ❑ Not sure/questioning
   ❑ Non-binary ❑ Other, please specify: _____

8. What is your sexual orientation?
   ❑ Gay ❑ Lesbian ❑ Bisexual ❑ Pansexual ❑ Questioning ❑ Queer ❑ Straight ❑ Asexual
   ❑ Other (specify_____) ❑ Chose not to respond

9. What is your race and/or ethnicity? Please check all that apply.
   ❑ Asian ❑ Native Hawaiian or other Pacific Islander ❑ Black or African American
   ❑ American Indian/Native/First Nations or Alaskan Native ❑ Hispanic or Latino/a/x
   ❑ Indigenous people of Mexico, Central, and/or South America ❑ Middle Eastern or North African
   ❑ Other, please specify: _____ ❑ White ❑ Chose not to respond

10. Why are you testing this drug sample today? Please check all that apply.
    - ❑ I am preparing to use the drug and would like to know what's in it
    - ❑ I had an unusual or severe response after using this drug
    - ❑ Someone else had an unusual or severe response after using this drug
    - ❑ I want to know what's in it because I plan to share the drug with others
    - ❑ I want to know what's in it because I plan to sell the drug
11. Has the composition of the sample been modified? (e.g., dope and coke mixed for a speedball)

    ❑ Yes ❑ No ❑ Unsure

12. Has any of this drug sample already been used (e.g., injected, snorted, etc.)?

    ❑ Yes, by me ❑ Yes, by someone else ❑ No (Go to Q18)

13. **If participant selected Yes, by me or Yes, by someone else, ASK:**
    By what route of administration was it used? Please check all that apply.

    ❑ Injection ❑ Smoking ❑ Intra-nasal ❑ Oral ❑ Other (specify) ❑ Unsure

14. **If participant selected Yes, by me or Yes, by someone else ASK:**
    What do you think the drug sample contained? Please select all that apply.

    ❑ Benzodiazepine ❑ Cocaine ❑ Crack ❑ Fentanyl
    ❑ Heroin ❑ Ketamine ❑ MDMA, Ecstasy, Molly ❑ Methamphetamine
    ❑ PC ❑ Tramadol ❑ Xylazine ❑ Psychedelics (specify)
    ❑ Dope ❑ Other (specify) ❑ Chose not to respond
    ❑ Pressed opioid pill (specify)

15. **If participant selected Yes, by me or Yes, by someone else, ASK:**
    Did you/someone else experience an unusual or adverse reaction after using the drug sample?

    ❑ Yes, I did ❑ Yes, someone else did ❑ No ❑ Chose not to respond

16. **If yes to Q15 ask:**
    Describe the adverse/unusual event related to the drug sample? Please select all that apply.

    ❑ Overdose ❑ Injection site swelling ❑ Unexpected sedative effect
    ❑ Spasming ❑ Seizure-like symptoms ❑ Unexpected stimulant effect
    ❑ Chest rigidity ❑ Jerky movements ❑ Other, please specify _____

17. **Ask only if drug was used by participant:**
    Did you get the experience that you wanted from using this sample?

    ❑ Yes ❑ No [Note other information related to desired drug effect]

18. Provided harm reduction education after sample analysis?

    ❑ Yes ❑ No

<u>Checklist of talking points/reminders for technician:</u>

❑ Tolerance ❑ Frequency of use/amount used ❑ Xylazine
❑ MOUD treatment ❑ Underlying health issues

19. How do you plan to use the information you received about your drug sample?

    ❑ Reduce dose ❑ Dispose of drug ❑ Use as previously planned
    ❑ Talk to my dealer ❑ Change the way I cut the drug ❑ Other, please specify
    ❑ Let people know what's in the drug before they use it ❑ Chose not to respond

SAMPLE WITH NO END USER

1. Why is the sample being checked?
   - ❑ Someone had an unusual response (other than OD)
   - ❑ Someone had a fatal overdose
   - ❑ No other information on the sample has been provided
   - ❑ Someone had a non-fatal overdose
   - ❑ Someone is planning to sell it
   - ❑ Other, please specify:_____

   [Add additional notes as needed]

2. How was the sample obtained? (Choose the best option)
   - ❑ Sample was found (e.g., discarded paraphernalia)
   - ❑ No information on sample is available
   - ❑ Sample was submitted by venue staff
   - ❑ Other (specify)

SAMPLE DESCRIPTION (Participant and non-end user samples)

1. Was the drug sample obtained online?

   ❑ Yes ❑ No ❑ Unsure

2. Neighborhood where drug sample was acquired (specify) _____

3. What was the drug sample sold as? **If sold as pressed pill, specify engravings/markings/shape**

❑ Benzodiazepines	❑ Cocaine	❑ Dope	❑ Fentanyl
❑ Heroin	❑ MDMA/Ecstasy/Molly	❑ Ketamine	❑ PCP
❑ Methamphetamine	❑ Psychedelics (specify)	❑ Other stimulants (specify)	❑ Crack
❑ Pressed opioid pill	❑ Xylazine	❑ Tramadol	
❑ Other (specify)	❑ Not sure	❑ Chose not to respond	

4. Description of bag, color

   ❑ White ❑ Yellow ❑ Grey ❑ Brown ❑ Beige ❑ Black ❑ Red
   ❑ Orange ❑ Green ❑ Blue ❑ Pink ❑ Purple ❑ Other (specify)

5. Description of stamp, color/text/image

   ❑ White ❑ Yellow ❑ Grey ❑ Brown ❑ Beige ❑ Black ❑ Red
   ❑ Orange ❑ Green ❑ Blue ❑ Pink ❑ Purple ❑ Other (specify)
   Text _____ Image _____

6. Drug texture **(as per technician)**

   ❑ Fine powder ❑ Coarse powder ❑ Sticky tar ❑ Rock/solid chunk ❑ Glassy shards
   ❑ Clear/transparent ❑ Pressed pill ❑ Other (specify): _____

7. Color of drug sample

   ❑ White ❑ Yellow ❑ Grey ❑ Brown ❑ Beige ❑ Black ❑ Red
   ❑ Orange ❑ Green ❑ Blue ❑ Pink ❑ Purple ❑ Other (specify): _____

8. Fentanyl test strip result
   - ❑ Positive (one line)
   - ❑ Negative (two lines, even if faint)
   - ❑ Uncertain/invalid
   - ❑ FTS not used

9. Benzodiazepine test strip result
   - ❑ Positive (one line)
   - ❑ Negative (two lines, even if faint)
   - ❑ Uncertain/invalid
   - ❑ FTS not used

10. Xylazine test strip result
    - ❑ Positive (one line)
    - ❑ Negative (two lines, even if faint)
    - ❑ Uncertain/invalid
    - ❑ FTS not used

11. Results of FTIR scan ❑ No FTIR library detected

❑ Acetaminophen	❑ Heroin HCl	❑ Monosodium glutamate	❑ 2C-B
❑ Ascorbic acid	❑ Heroin HCl (Standard)	❑ N-ethylheptedrone	❑ 2-Fluorodeschloroketamine
❑ Benzocaine	❑ Inositol	❑ N-ethylpentylone	❑ 3-Methylfentanyl
❑ Bromantane	❑ Isopropylbenzylamine	❑ Para-fluoro fentanyl	❑ 3-MMC (Metaphedrone)
❑ Caffeine	❑ Isonitazene*	❑ Parexyl	❑ 4-Anilino-boc-pileridine
❑ Cocaine freebase	❑ Ketamine HCl	❑ PCP	❑ 4-ANPP
❑ Cocaine HCl	❑ Lactose	❑ Pentobarbital	❑ 4-AcO-DET
❑ Creatine	❑ Levamisole	❑ Phenacetin	❑ 4-AcO-DPT
❑ Dextromethorphan	❑ Lidocaine	❑ Polyethylene glycol (PEG-4000)	❑ 4-AcO-EPT
❑ Dicalcium phosphate	❑ LSD	❑ Potassium bitartrate	❑ 4-AcO-MET
❑ DiPT	❑ Magnesium sulfate	❑ Pregabalin	❑ 4-AcO-MiPT
❑ DMT	❑ MALT	❑ Procaine HCl	❑ 4-HO-DiPT
❑ DPT	❑ MiPT	❑ Quinine	❑ 4-HO-MALT
❑ Ephinazone	❑ MPT	❑ Sodium bicarbonate	❑ 4-HO-MET
❑ Erythritol	❑ Mannitol	❑ Starch (corn)	❑ 4-HO-MiPT
❑ Etodesnitazene	❑ MDA	❑ Sucrose	❑ 4-HO-MPT
❑ Etizolam	❑ MDMA	❑ Talc	❑ 4-MeO-MiPT
❑ Eutylone	❑ Metamizole	❑ THC	❑ 4-MMC (Mephedrone)
❑ Fentanyl Citrate	❑ Mescaline	❑ Tramadol	❑ 5-MeO-DiPT
❑ Fentanyl HCl	❑ Methamphetamine HCl	❑ Tryptamine	❑ 5-MeO-DMT
❑ Flour	❑ Methallyescaline (Fumarate)	❑ U-47700	❑ 5-MeO-MALT
❑ Fructose	❑ Methylamine HCl	❑ Water	❑ Other (specify): _____
❑ Furanylfentanyl	❑ Metonitazene	❑ 4-Monoacetylmorphine HCl	
❑ Furanyl UF-17	❑ 5-MeO-MiPT (Moxie)	❑ W-19	
❑ 5-MeO-MET	❑ Microcrystalline cellulose	❑ Xylazine	
❑ Glutamine	❑ Modafinil	❑ Xylitol	

12. For trained technicians, enter fentanyl approximation here. If confidence of approximation is one number (i.e., exactly 10%), put the same number in both the lower bound and upper bound. If approximation is less than 5%, put the lower bound as 0.1 and the upper bound as 5. We will use 0.1 as the proxy for a trace amount.

    Fentanyl approximation (lower bound): _____ Fentanyl approximation (upper bound): _____

    [Additional notes on fentanyl approximations]
    [Approximation of other substances (name and approximation)]

13. Will this sample be sent for secondary lab testing?

    ❑ Yes ❑ No

How To Test Drugs Using Immunoassay Test Strips

The primary challenge of testing drugs with immunoassay test strips (ITS) is to ensure that the sample tested with the strip is representative of the entire drug that a person plans to consume. These preparation methods can be used for all brands of test strips and are the same for different compounds (i.e., preparing a sample for a fentanyl test is the same as preparing a sample for a xylazine test).

Method One: Test the whole drug sample that a person plans to consume. This is the most accurate way to use ITS and has the least risk of missing the substance of interest.

- Dissolve the entirety of the substance a person is planning to consume in a clean container and dilute appropriately depending on the substance that is being tested.
  - Stir drugs until fully dissolved.
  - After testing, the participant can still consume the sample by drinking it, placing the sample in a clean nasal spray device to snort, or injecting the solution.

A note on dilution: A dilution of 5mL of water for every 10mg of sample for both fentanyl and xylazine test strips is generally used. However, for regions that frequently see diphenhydramine in the unregulated drug supply, the dilution may need to be adjusted to avoid the potential for false positives.

Method Two: Test the drug residue from the sample a person plans to consume. This method gives a fairly representative result, but it is still possible to miss the substance of interest because of the chocolate chip cookie effect.

- On a clean surface, finely crush all of the drug someone is planning to consume.
- Place all the crushed substance into a small, clean plastic bag and shake to mix.
- Empty the bag and put the drugs to one side.
- Add the appropriate amount of water to the bag depending on the substance you are testing.
- Stir the solution in the bag until completely dissolved.

Method Three: This method only tests one small portion of the drug being consumed and carries the highest risk that the substance of interest in the sample will be missed because of the chocolate chip cookie effect.

Put a small amount of the drug into a cooker or cup.

- If there is not enough for 10mg (per dilutions recommended by the Health Department's drug-checking program), use at least a few grains.
- If the sample is in pill or crystal form, finely crush prior to testing. If the participant does not want to test the entire pill, cut it in half and scrape approximately 10mg from the middle.
  - Add the appropriate amount of water depending on the substance you are testing.

Additional resources for using immunoassay test strips can be found below:

How To Test Your Drugs Using Fentanyl Test Strips: Visit **nyc.gov/health/fentanyl** and search for **fentanyl test strip instructional brochure**.

How To Test Your Drugs Using Xylazine Test Strips: Visit **nyc.gov/alcoholanddrugs** and search for **drug checking**.

Drug Checking
FTIR Spectrometer and Fentanyl Test Strips

Drugs may not be what you think!

Even if you know your source, your drugs may contain unexpected or risky substances

Drug checking can help **reduce risk** by providing information about what is actually in a substance, allowing you to make **better informed decisions about your use**

Note: Drug checking results and harm reduction education are not considered medical advice.

What we **can** tell you about your sample

FTIR:

- Can identify up to 5 different substances present in a drug sample
- Can identify cutting agents that may be mixed in or used as a filler
- May be able to estimate how much of a sample is present in a sample

Fentanyl test strips:

- Can identify whether the sample contains fentanyl and some fentanyl analogs

What we **cannot** tell you about your sample:

FTIR:

- Cannot detect substances present in small amounts (less than about 5%)
- Cannot tell you exactly how much of a substance is present in a sample
- Cannot identify new or rare substances that are not in the drug reference library
- Cannot typically tell the difference between substances with similar chemical make-up (e.g., 2C-family, fentanyl analogs)

Fentanyl test strips:

- Cannot tell you the type or strength of fentanyl in the sample
- Cannot detect some fentanyl analogs

Checking your drugs cannot guarantee that they are safe to use

Remember: The information provided only applies to the tested sample

Even after checking your drugs, we recommend you:

- Never use alone
- Know the signs and symptoms of overdose and call medical aid if you think someone needs help
- If you choose to use, start with a small amount
- Carry naloxone and know how to use it
- Avoid mixing substances (especially alcohol with depressants) which increases your risk of overdose

Appendix I

NYC Health Department's Data for Programs

Date drug checking performed	27 Oct 23	27 Oct 23
Name of site	[site name]	[site name]
New participant	Yes	No
Drug sold as	Heroin	Dope
Summary of drug sample	Heroin, mannitol, fentanyl	Caffeine, mannitol, fentanyl, xylazine
Test strip results		
Fentanyl	Yes	Yes
Benzodiazepines	No	No
Xylazine	No	Yes
FTIR results		
First substance	Heroin	Caffeine
Second substance	Mannitol	Mannitol
Third substance		Fentanyl
Fourth substance (if applicable)		
Fifth substance (if applicable)		
Approximate fentanyl percentage	n/a	5 to 8%
Drug color	White	Beige
Drug texture	Fine powder	Fine powder
Stamp color	Purple	n/a
Stamp text	Good Choice	n/a
Stamp image	n/a	n/a
Pill engraving	n/a	n/a

nyc.gov/health

nyc.gov/alcoholanddrugs