

# EQUIPMENT AND METHOD PROFILES

DRUG CHECKING PROJECT  
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SCOTTISH  
DRUG DEATHS  
TASKFORCE

This briefing sets out equipment and method profiles for three drug checking services:

1. Drugs Information and Monitoring System (DIMS), The Netherlands
2. Toronto Drug Checking Service, Canada
3. Vancouver Island Drug Checking Service, Canada

This briefing provides examples of the equipment and methods which are used in services, to help inform decision making in a Scottish context. The briefing also presents some information on the data collected by services, how results are communicated to clients, and how the collected data is utilised.

## Abbreviations

- **FTIR:** Fourier Transform Infrared Spectroscopy
- **GC:** Gas Chromatography
- **MS:** Mass Spectrometry
- **LC:** Liquid Chromatography
- **SERS:** Surface-Enhanced Raman Spectroscopy
- **POC:** Point Of Care

## TRANS EUROPEAN DRUG INFORMATION (TEDI) NETWORK

- The [Trans-European Drug Information project](#) is a network of European fieldwork drug checking services that share their expertise and data within a European monitoring and information system.
- The aim of this monitoring and information system is to help to optimize public health, prevention and harm reduction intervention strategies/programs. It serves as an early warning system and a tool for monitoring the evolution of drug markets in Europe.

## TEDI GUIDELINES



TEDI have produced a document guiding organisations that are new to drug checking about the considerations that they would need to make about the following:

- Who the target audience should be
- How to reach the target audience
- What the goals of the service are
- Which equipment and staffing would be needed to achieve the goals, considering how the service is set up, cost and location

- These [guidelines](#) provide give essential information and considerations, and make important reading for members of the Scottish Drug Checking Project (alongside the profiles below).

## SUMMARY

Service features	<u>DIMS</u> (Jellinek, Amsterdam*)	<u>Toronto Service</u>	<u>Vancouver Island Service</u>
Equipment utilised	FTIR (POC), Marquis re-agents (POC) and GC-MS (lab)	GC/LC-MS, benzo test strips	FTIR, Raman SERS, Paper Spray-MS, fentanyl test strips, benzo test strips
Point of care and lab-based testing?	Both	Lab based testing only. Some limited benzo test strip use at POC	Point of care only. Paper Spray-MS is located at POC and provides confirmatory testing.
Waiting times for results	Some results available within 15 minutes. If lab testing required, results available within 1 week.	Results available within 1-2 days	Results available within 30 minutes
Information type and detail	Quant information available at POC for 90% of powder ketamine, amphetamine and MDMA samples using FTIR. All other samples tested with Marquis reagent (basic screening method). Quant information available for 11 most commonly tested substances through lab-based testing.	Quantitative information available regarding the psychoactive compounds in the sample. Quant information not available for cutting agents	Quantitative information available for majority of samples

\*The information about testing provided here relates to the Jellinek service in Amsterdam. Other DIMS sites only have capacity for sample collection and not POC testing, for example.

# 1. DRUGS INFORMATION AND MONITORING SYSTEM THE NETHERLANDS

The Drugs Information and Monitoring System (DIMS) consists of a network of office-based drug checking facilities across the country, coordinated by the DIMS-bureau, which is embedded within the Trimbos Institute in Utrecht and funded by the Ministry of Health.

As of spring 2019, the network consists of 31 drug checking facilities in 29 cities, hosted usually by institutions for addiction care and drug prevention.



## SERVICE OVERVIEW

- The service is fully funded by the Dutch Ministry of Health.
- DIMS operates through 33 sites, or partner agencies, which are most commonly substance use services. Many of these sites only collect samples for lab-based analysis – whilst a number also have capacity to test some samples at POC.
- In 2019, across all services it was not uncommon for 400-600 samples to be submitted per week.
- In 2020:
  - 8,087 samples were submitted (lower number than normal because of pandemic).
  - Pressed ecstasy pills or MDMA, cocaine, 2C-B, speed, ketamine and LSD accounted for approximately 91% of samples submitted to DIMS services.
  - Pressed ecstasy pills accounted for the largest proportion of total submitted samples (48%).
  - Only 5% of substances were categorised as 'other' – highlighting the relatively small number of both benzodiazepines, crack cocaine and heroin submitted.

## EQUIPMENT AND METHODS

### Ketamine, amphetamine and MDMA

- In 90% of cases, these substances can be tested at POC using FTIR and results are then provided to the service user without the need for lab-based testing, typically providing quantitative information.
- In some cases, the sample will be sent for testing. However, although 90% of these substances can be tested sufficiently at POC this accounts for a relatively small proportion of total samples (probably less than 30% of total samples).
- Pressed MDMA pills cannot be tested with FTIR as colouring, filling and binding agents interfere with the results. Pressed pills are compared against a database of known pills and compared against various characteristics. If the pill can't be recognised through this method, it is sent to a lab for testing.

### Other substances

- All other substances (substances which aren't powder MDMA, ketamine and amphetamine are sent to the lab for confirmatory testing).

- Before being sent substances are analysed using marquis reagent test kits. However, limited weight is put on this result due to limitations and service users are advised to wait for the lab-based results before taking substance.
- Lab-results take up to one week to be returned to service user. The lab quantifies the 10 most commonly submitted substances. Other substances receive only qualitative testing.
- According to DIMS contacts, they are having some difficulties using GC-MS to test benzodiazepines.

Person brings sample into DIMS	Expected drug type	POC equipment and method used	Is the sample sent for lab-based testing?
	MDMA (powder), amphetamine, ketamine	Reagent and FTIR	In approx. 10% of cases
	MDMA pills (ecstasy)	Compared by eye to database of known drugs	If the pill does match any pill on the database
	Any other substance	Reagent test kit	Always sent for lab-based testing

*This table relates to the DIMS site in Amsterdam only. Other DIMS sites differ in relation to POC testing methods. This is a simplified explanation of the testing process and there are exceptions. For example, the service may also test methamphetamine with the FTIR time permitting and is looking to develop a method of GHB quantification using the FTIR.*

## WHAT DATA IS COLLECTED FROM CLIENTS?

- Data is collected through an online survey, which the DIMS worker goes through with the client. The online form is then sent immediately to the DIMS central office.
- The system was expensive to set up, but the EMCDDA are in the process of setting up a system which could help smaller and newer testing services.
- There are a few notable things which are not asked. Clients are not asked about their intentions after receiving a result. This is because DIMS is framed as a market monitoring service, therefore data collection is centred on where and how the drug was bought, and what kind of scene is associated with its use.
- Additionally, the service does not ask whether the person is testing for themselves or someone else as they only accept samples which the person reports to be for themselves. It will not test for parents, outreach workers (submitting on behalf of a client) or friends of people who bought the drug. This is because they are framed as a market monitoring service – and therefore when someone who didn't buy the drug submits it, they receive too little information about where the drug was purchased, what it was bought as etc. This is, again, in distinction to other services who will test for wider groups.

Data type	Question	Reason for data collection
Demographic information	Age, gender, ethnicity, employment status	To build a profile of drug checking clients.
	First time using the service?	To track new vs returning clients of the service.
	Is the client taking prescribed medication?	Interesting information from a harm reduction perspective, can open up harm reduction conversations.
Purchase information and context	Where did they buy the drug (city, online)?	DIMS is a market monitoring service. This information helps in the event that a substance of concern is detected through testing. The service is able to direct warnings through the correct channels. For example, if something of concern is detected which was bought online, the service is able to warn people through relevant channels/platforms.
	Price of the drug	To track fluctuations in the market over time.
	Date of purchase	Again, related to the market monitoring function of DIMS. If something of concern is detected it is important to know if it is a current hazard which can be addressed, or something which was purchased a long time ago.
	What type of supplier was the purchase made from (friend, small scale seller, large scale seller, WhatsApp)?	Understanding of the market and how people purchase their substances.
	Context of planned future drug use? Is the drug to be taken in a particular 'scene' (nightclub, sex related environment)?	Related to warnings, it helps the service target warnings at the relevant target audiences. It also helps open up harm reduction conversations about specific, contextual risks (for example, if used in a sex related environment a staff member can also discuss safe sex).
	Have they taken the drug before? If so, what effects did they experience?	Helps understand how people are using the service and can link certain substances with physiological experiences.
	What drugs does the client plan to take with the submitted sample?	Helps gain an understanding of level of poly-drug use and can open up harm reduction conversations.
	Reasons for testing drug	Helps to gain a better understanding of people's motivation for testing.
Sample characteristics	Form (liquid, powder, blotter, pill)	Typically filled out by DIMS worker to catalogue important features of the submitted sample.



## WHAT IS DONE WITH THE TEST RESULTS AND DATA COLLECTED?

- The test results are provided back directly to clients.
- Clients have to phone in to receive their results. All results are delivered through this method.
- If something concerning is found to be in circulation, DIMS will put out alerts/early warnings through a range of channels including social media, nightclubs, and other services.
- Often, the data collected about where the drug was purchased is very useful. For example, if it was bought online, DIMS can direct their harm reduction efforts towards the site and its users.
- The data is also used for publications and learning, and feeds into monitoring networks such as the European Monitoring Centre for Drugs and Drug Addiction and TEDI, and
- Unlike many other services, DIMS do not routinely make aggregated data from testing available to the public. This data is presented in the form of annual reports and academic publications, but it is not available on a public facing 'dashboard' as with other services.

## APPLICABILITY OF DIMS METHODS TO A SCOTTISH CONTEXT

- The DIMS testing method has a limited level of transferability to the Scottish context. However, there is learning which can be used to consider some key dimensions of setting up drug checking services in Scotland.
- As noted, a large percentage of substances handed in are MDMA, amphetamine, cocaine and ketamine. These substances tend to be relatively pure compared to substances such as etizolam (see national briefing 001). The FTIR not well suited to testing drugs which contain compounds active in very low concentrations. TEDI guidelines note that the: "Limit of detection is quite high, so trace components are not detectable (3-20% depending on substance mixture)".
- Additionally, a significant percentage of samples are only tested with marquis reagent before being sent to a lab for testing. As noted, results from the lab testing are returned to service users in one week. There are three important learning points here:
  1. This highlights the significant limitations of POC testing even in a service which has been operating for a number of decades (est. 92). Although in a Scottish context there will be a need for POC to engage those at highest risk – we should be mindful of these limitations and that POC may not be able to provide the level of detail needed or desired by clients.
  2. If we are using lab based testing, a faster turnaround time would be better for Scotland – particularly if we are providing results to clients. People may be put off if they need to wait a week for more comprehensive results. There is precedent of faster lab based testing. The Toronto model relies only on lab based testing and aims to provide results within 1-2 days.
  3. Even sophisticated lab equipment and methods can struggle in relation to certain substances. As noted above, DIMS are facing some challenges testing benzos through GC-MS. Therefore, there is a need to ensure that Scotland has equipment and means to test benzodiazepines in the lab at a reasonable cost.

## FURTHER CONSIDERATIONS

- A stipulation of the service is that they won't test for anyone suspected to be a dealer. If someone is found to have more than half a gram or a couple of pills the service will not test for them. This is in contrast to most Canadian services, which actively seek to engage those selling drugs as an upstream market intervention.

## 2. TORONTO DRUG CHECKING SERVICE CANADA

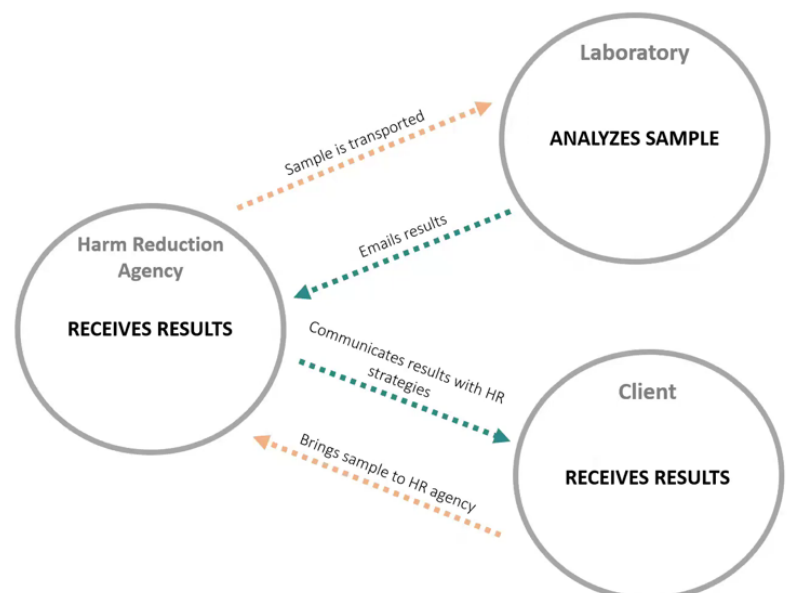
Launched in October 2019, Toronto's drug checking service offers people who use drugs timely and detailed information on the contents of their drugs, helping them to make more informed decisions.

The drug checking service also helps to uncover the makeup of Toronto's unregulated drug supply, and information on Toronto's unregulated drug supply is made publicly available.

The service is free, anonymous, and available to everyone. Accepted samples include a substance (10 mg of a powder, crystals, rocks, or a pill, blotter, or a small amount of liquid) and paraphernalia after it's been used (a used cooker or filter, or leftover liquid from a syringe).

### SERVICE OVERVIEW

- 5,209 samples were submitted between Oct 2019 and March 2022.
- The service is situated at 5 harm reduction agencies which offer Supervised Consumption Sites (SCS).
- The majority of substances tested are expected to be opioid-down (49%).
- Other expected substances included: cocaine (10%); methamphetamine (8%), MDMA (6%) and ketamine (4%).
- The service is funded by Health Canada as a 5 year pilot.



### EQUIPMENT AND METHODS

- There is no POC testing capacity within this service.
- Samples are collected at these sites and transported to a local hospital lab and testing is conducted using GC-MS and LC-MS.
- Whilst the service utilizes 'gold standard' testing techniques – there are some limitations. The service provides quantitative information on psychoactive substances, but not on the non-psychoactive fillers/cutting agents. Whilst this is possible using this technology, it is not possible within a 1-2 day turnaround time. They are currently working on methods to provide quantitative information about fillers/cutting agents, but this information won't be made available directly to the client.
- The service is introducing the use of benzo-test strips (BTS) at POC due to recent issues with adulteration of opioids with street benzos.

## WHAT DATA IS COLLECTED FROM CLIENTS?

- Clients are given choices around what kind of data is collected.
- Firstly, they are asked whether or not they consent to being part of a research study.
- Secondly, they are asked whether they would like to create a unique user ID or not. Having a client ID is a way to monitor a client overtime, thus being able to monitor the number of unique users vs returning users. It also means that clients don't have to answer as many demographic questions every-time they access the service.
- We don't have a comprehensive list of the data they collect.

## WHAT IS DONE WITH THE TEST RESULTS AND DATA COLLECTED?

- Results take 1-2 days to be returned to service users.
- The service has a [website](#) which produces various reports and blog pieces and communicates drug checking trends in the form of a dashboard.

## EVALUATION

- [Evaluation information for this service is available here: Evaluating networked drug checking services in Toronto, Ontario: study protocol and rationale](#)

**Table 1** Measures, outcomes, and data sources

Measures and outcomes	Data sources
Aim 1: Evaluate the impact of DCS access on changes in and factors influencing overdose and related risk behaviors	
Self-reported overdose among those that access DCS and those that do not	– Quantitative survey data (intake) – SCS client data
Proportion of participants reporting increase in protective behaviors (not using alone, carrying naloxone, use of SCS, consultation with staff, smaller/ "tester" dosage, discarding toxic substances)	– Quantitative survey data (intake/post-test) – SCS client data
Proportion of participants reporting they gained, intend to use, and/or used knowledge and skills	– Quantitative survey data (post-test) – Qualitative interviews
Aim 2: Investigate the perceived capacity of DCS to prevent overdose	
Characterize participant perceptions on the capacity of DCS to alter the risk of overdose	– Qualitative interviews
Identify participant perceptions of contexts, facilitators, and barriers to the use of DCS	– Qualitative interviews
Aim 3: Identify trends in the composition (qualitative and quantitative) of the unregulated drug supply in Toronto	
Number of analysis results detecting composition different from participant expectations	– Quantitative survey data (intake) – Drug sample analysis data
Increase in accuracy and timeliness of alerts in response to dangerous drug trends	– Drug sample analysis data – Qualitative interviews
Spatial association between frontline harm reduction agencies with DCS and fatal overdose, and changes over time	– First responder and coroner data (from OCC and TPAS)

## APPLICABILITY OF TORONTO METHODS TO A SCOTTISH CONTEXT

- The Toronto drug checking service presents an interesting case study. There is a well-known trade-off between being able to provide fast results at point of care and more detailed comprehensive results from confirmatory testing, which often takes much longer. In light of this, the Toronto service decided to only provide lab-based testing, but to focus on the provision of these results within 1-2 days (significantly shorter than most services offering lab-based checking). There is limited information yet about the extent to which such waiting times constitute a barrier to potential clients.
- It has been established that Scotland will utilise POC testing, making the Toronto approach less applicable to a Scottish context. However, it highlights that, given the right conditions, lab based testing results can be provided relatively quickly.



### 3. VANCOUVER ISLAND DRUG CHECKING SERVICE CANADA

The Vancouver Island Drug Checking Project delivers drug checking services in Victoria, British Columbia.

This free and confidential service provides information on composition of substances and harm reduction information.

They tested 935 substances in 2019, 1288 in 2020 and 2556 in 2021.



#### SERVICE OVERVIEW

- The service has its own storefront, which is co-located with a trusted harm reduction organisation.
- They are developing a 'hub and spoke' model, where workers test or collect samples from a number of locations in order to increase access amongst those who may not travel to the service.
- People can also send samples through the mail.
- The service is part of a 5-year pilot project funded by Health Canada to assess drug checking as an overdose response.
- The service receives 2000+ samples per year for testing.
- The most commonly submitted expect substance to the service is opioid-down (opioid mixed with a benzodiazepine, followed by stimulants.
- However, the service receives quite a wide range of expected substances including psychedelics, dissociatives and benzodiazepines.

#### EQUIPMENT AND METHODS

- The service utilises a multi-technology approach using:
  - Raman SERS
  - FTIR
  - Benzo and fentanyl test strips
  - Paper Spray-MS
- All testing is performed at POC, although it is worth noting that for confirmatory testing it utilises Paper Spray-MS at POC which is generally a lab-based technology.
- Benzo test strips are utilised only for suspected benzos, opioids and samples submitted as unknown.
- The service can typically provide quantitative results, though there may be instances where this is not possible (for example, where a substance is submitted which is not in the reference library).
- The service aims to provide results to people within 30 minutes.

## WHAT DATA IS COLLECTED FROM CLIENTS?

- Clients are asked to fill out a survey when they submit their sample.
- The short survey only comprises of a few basic questions. This was done as the service aims to be low-threshold and doesn't want to present a barrier by making people fill out too many questions unless they are willing to do so.
- They are given the option to fill out an extended survey with more data on it, which takes longer to complete (shown below).

Extended questions	Reason for data collection
1. Have you used drug checking before?  Options given for frequency of use	Establish frequency of drug checking use among clients
2. What is the sample supposed to be?	What are people buying the samples as which they are submitting for testing?
3. Have you or someone you know tried the sample?	Establishing pre consumption vs post consumption use of drug checking
4. Was the sample stronger or weaker than expected?	Help build of reasons for use of drug checking service
5. Did the drug have any unexpected effects?	Help build picture of reasons for use of drug checking service. Can help inform testing.
6. Why do you want to have these drugs tested?  Several options provided: For the safety of myself and/or others; To check the drug to sell; To check for notable adulterants, or contaminants (for example, benzos or fentanyl); To confirm the active ingredient (to make sure it is what you think it is); Someone overdosed on it; Curious about drug checking; Wanted harm reduction advice; Other; Don't know; Skip	Establish motivations for use of service.
7. Who are you doing this drug check for?  To sell, self, friends, family, clients, others, skip	Establish the prevalence of people using drug checking for others
8. How useful are these drug testing results for you?	Better picture of extent to which results provided are meeting people's needs
9. Overall how useful is this service for you?	Better picture of extent to which overall service is meeting people's needs
10. Now that you have seen your results, do you think you will do anything different?  Take as originally intended, no modification; buy more from the same dealer; Buy from a different dealer next time; dispose of drug; re-sell; take more; take less; use with a friend; use at a supervised consumption/overdose prevention site (SCS/OPS); use with naloxone handy; other; don't know; skip	Evaluate intended behaviour change and link with extent to which result was as expected

Extended questions	Reason for data collection
11. Were your drug checking results presented in a way that is understandable and accessible?	Establish the appropriateness of the methods of presenting and communicating results
12. How could these results be more understandable?	Inform improvements to communication and presentation of results
13. What is your age?	Demographic information
14. How often do you use illicit drugs?	Drug use/pattern information
15. Do you have a drug of choice?	See above
16. Where do you usually use drugs?  Own home; dealer's place; someone else's place; vehicle; parties; musical festivals/concerts; public places; at work; supervised consumption sites; other; don't know; skip	See above
17. How often do you use alone?	See above
18. Have you used any of these in the past 12 months?  Needle distribution program; methadone, suboxone or other OST; supervised consumption site; treatment services for drug or alcohol use; other; don't know; skip	Engagement with services and supports
19. How often do you do these things when using drugs?  Use in a supervised consumption site or overdose prevention site; Use where naloxone and a person to help is nearby; Carry naloxone yourself; Test dose before using, or use less, when unsure; Switch to different drug choice or method you feel is safer for you; Use a drug checking service before using; Checking for Drug alerts	Engagement with harm reduction practices
20. Have you had an overdose in the past 6 months?	Self-explanatory
21. What drugs were you on when you overdosed?	See above
22. Where were you when you overdosed?	See above
23. Why do you think you overdosed?	See above
24. What gender do you identify with?	Demographic features
25. What ethnic group of family background do you identify with?	Demographic features
26. Do you consider yourself to be...?  Various options regarding sexuality	Demographic features

Extended questions	Reason for data collection
<p>27. Have you completed any of these?</p> <p>Various options relating to educational qualifications</p>	Demographic features
<p>28. What community are you living in?</p>	Demographic features
<p>29. What best describes where you live?</p> <p>Various options relating to accommodation/living arrangements</p>	Demographic features
<p>30. What is your main source of income?</p> <p>Various options including informal sources of income</p>	Demographic features
<p>31. What was your personal income last year?</p>	Demographic features
<p>32. Where should drug checking take place?</p> <p>Needle exchanges; Supervised consumption sites; events; pharmacies; social services; shelters; housing; health centres; mobile van; other; don't know; skip</p>	Ascertain preferences for drug checking locations
<p>33. Who should work there?</p> <p>People testing the drugs (technicians); Peers; harm reduction workers; nurses; counsellors; social workers; other; don't know; skip</p>	Ascertain staffing preferences
<p>34. What sort of security is needed?</p> <p>Security guards; security camera; none; other don't know; skip</p>	Ascertain security preferences
<p>35. This drug checking service and staff:</p> <p>Respects you and your rights Works with you to meet your needs Doesn't judge you or your choices Listens to and includes people who use (d) drugs Helps make your life and community better Helps lower the chance of overdose overall Helps you lower the chance of overdose for yourself and others Understands there are ways to use drugs safely Understands the harms or dangers your and others may face Helps you lower these harms and dangers for yourself and others Understands how hard it can be to cope with things like pain, poverty, Trauma, racism or a lack of housing</p> <p>Participants asked to tick an option from strongly agree to strongly disagree for each option</p>	Evaluate client satisfaction with service
<p>36. Has the service met your expectations?</p>	See above
<p>37. Overall, how effective do you think drug checking services are for lowering harms from drugs?</p>	See above
<p>38. Do you have any other feedback or suggestions you would like to share?</p>	See above

## WHAT IS DONE WITH THE TEST RESULTS AND DATA COLLECTED?

- The service has a [website](#) that produces various reports and blog pieces, and communicates drug checking trends and other important harm reduction information.
- Clients have a number of options around how their results are returned. They can receive results in person, by text, by email or by inputting a 9-digit code into the website.
- The service is also part of a pilot evaluation, so the collected data is used for research purposes.

## APPLICABILITY OF VANCOUVER ISLAND METHODS TO A SCOTTISH CONTEXT

- As the service operates in the context of an overdose crisis, caters to a client group who often use daily, and many of whom are marginalized, the service faces a number of challenges which will be similar to a Scottish context.
- Testing and interpretation of results is often more challenging and complex than in contexts where a high percentage of samples received are drugs such as ecstasy.
- The service needs to be able to detect fentanyl and benzos in small quantities, which is something Scottish services will need to be able to do (albeit more focused on detection of benzos).
- The service utilizes a number of technologies, including Paper Spray-MS (approx. cost CAD \$300,000 or GBP £185,000). The cost of the equipment is probably not feasible for Scottish services at the moment.
- Although much of the equipment and method development has been geared towards fentanyl and fentanyl analogues, the service has a significant deal of expertise in drug checking equipment and methods, which can be drawn on to inform the development of Scottish services.