Recommendations for the Future of Fentanyl Quantification

As outlined in the report "An Assessment of the Accuracy of Fentanyl Quantification Results Reported by Drug Checking Technicians", quantifying fentanyl in samples using the mixture analysis with the Bruker FTIR has limitations that are important to note. Although data for the study were collected primarily from drug checking sites in Vancouver, the following list of recommendations will be helpful for technicians in all regions to consider when using mixture analysis and knowledge of the local drug supply to provide accurate estimates of fentanyl for services users.

While technicians want to give service users as much information as possible, it is also important to recognize the limitations of the technologies we currently have access to. It is the responsibility of technicians to know when and how to convey what we *don't* know as much as it is to convey what we *do* know.

1. **Remember that a technician can only work with what the FTIR is reporting.**
   Drug checking with FTIR is not a perfect science so there are times when the results generated by the FTIR are not going to align perfectly with the confirmatory testing results. This is not the fault of the technician or the person who analyzed the sample. Technicians can only interpret what information is generated by the FTIR and there are times when the spectrum generated may not be representative of the rest of the sample—the problem is, nobody knows when this is happening. Even if the results seem straightforward and clear-cut, we benefit people by always being careful and transparent with the limitations of FTIR analysis and not unknowingly giving misleading information.

2. **Recognize the uncertainty in point-of-care drug checking.**
   Point-of-care drug checking with FTIR tells us more about what is present in a drug sample but not everything. For example, it is well-recognized that the detection limit of FTIR means components may be missed by the technology when present below about 5% of the mixture.

   FTIR is not a quantitative technology by nature. There are limitations inherent in the FTIR technology and software that, no matter how knowledgeable and experienced a technician is, will affect their ability to determine a precise quantification. But there exist ways to estimate concentration of components thereby making it "quasi-quantitative." Finding out the concentration of fentanyl is a major driver for utilization of drug checking services, but there still remains an ethical imperative to do no harm when providing drug checking results. By not conveying the inherent limitations of our technology, we may unintentionally mislead service users to feel more confident in our results than is true and overlook possible risks, such as discrepancies in the true concentration of fentanyl in their sample.

3. **Continue to provide estimations of fentanyl concentration to service users in a range.**
   There were several instances in the study where estimates of fentanyl concentrations were given with exact values or ranges narrower than 5%. In none of these instances was the true

value of fentanyl within what was reported. However, if a range of 5% was provided, in some instances, the true value would likely have been captured. Additionally, ranges help convey to the person that the information is an estimate and not an exact quantification result.

4. **Rethink what a 'range' is.**
   Instead of thinking as an estimation range of as a set of concentrations where the true value falls in, think of it as a confidence interval. In that sense, not only can you narrow or widen the range, but you can also state how confident you are that the true value falls within the range provided. This comes with challenges of relaying your confidence in estimation, but even the most experienced drug checking technicians can never be fully confident in their quantification results. Don't be shy to relay that the technology isn't cooperating for this sample and the typical methods for estimating fentanyl concentration aren't working.

5. **Some ways to explain quantified results:**

   "After analyzing your sample, I feel pretty confident that the concentration of fentanyl is somewhere between 10 and 15%."

   "I've taken some time to analyze your sample but our normal methods for estimating how much fentanyl is present aren't providing reasonable results. For that reason, all I can say is that there appears to be an above-normal amount of fentanyl present. It seems this is being caused by the fact that there are fentanyl precursors present that complicate the ability to quantify the fentanyl."

6. **Estimates depend on number of substances identified in subtraction analysis**.
   While the Bruker FTIR OPUS software provides a 'quantified' estimate, BCCSU has recommended that technicians use this function as only part of the analysis, and not as the definitive answer. For more information on best practices recommended for estimating fentanyl concentration using the FTIR, please refer to the Standards of Practice listed below.

Recommended procedures for quantifying fentanyl with FTIR:

Standard Operating Practice on Fentanyl Concentration Procedures
Standard Operating Practice on Fentanyl Concentration and Messaging

For more information, please contact:
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