0447/16/SSM

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Re: Response to Report to Prevent Future Deaths concerning Nature Barr (also known as Howard Jeffers) (deceased)

Tox Ref: 0354/16

Qualifications and experience
I have a BSc degree in Physiology & Biochemistry, an MSc degree in Forensic Science and a PhD degree in Pharmacology. I am Head of the Toxicology Unit at Imperial College London, a position I have held since 1994. I have over 30 years' experience of analysing samples from Coroners' post-mortem cases and interpreting the results.

I received a Report to Prevent Future Deaths concerning Nature Barr (also known as Howard Jeffers) from R Brittan, Assistant Coroner for Inner London North dated 15 May 2017.

Coroner's concerns
Evidence was heard stating that the analysis of NPSs is difficult owing to frequent changes in their components and structure. The concern was that Mr Barr may have used NPSs during his admission to hospital which may have caused or contributed to his death. However, this could not be substantiated in the available evidence.

The concern is that there is a risk that future deaths may occur unless NPS can be more accurately analysed and detected by toxicological testing.

The concern is that at the inquest in to Mr Barr there was no specific evidence adduced which reassured that steps are being taken to address the risk of death from NPSs.

NPSs
The major classes of NPS available for purchase on the streets or via the internet include β-phenethylamines, cathinones and piperazines, which were the first NPSs to make an appearance in the early 2000s. "Spice" or synthetic cannabinoids started to appear around the same time and the first one was identified in 2008. Within the last year another group of compounds have started to appear, synthetic fentanyls.

For each of these classes of NPSs a starter compound has been identified, phenylethylamine ($C_8H_{11}N$) for phenylethylamines, cathinone ($C_9H_{11}NO$) for cathinones, piperazine ($C_4H_{10}N_2$) for piperazines, tetrahydrocannaibinol ($C_{21}H_{30}O_2$) for synthetic cannabinoids and fentanyl ($C_{22}H_{28}N_{20}$) for synthetic fentanyls. These starter compounds are then structurally modified eg a hydroxyl group is removed, a

methyl group added etc. to produce compounds which mimic the effects of the common drugs of abuse. Phenylethylamines, cathinones and piperazines give effects very broadly similar to amphetamine; synthetic cannabinoids, similar to smoking cannabis; synthetic fentanyls can be substitutes for heroin. Looking at the empirical formula for the starter compounds (shown in parentheses) shows that the number of possible synthetic compounds is massive. For example, it is estimated that the are over 100 synthetic cannabinoids available.

Instrumentation for Analysis

Many of the NPS can be detected in post-mortem blood if advanced technology is used. The instrument of choice is one that is capable of giving the accurate mass of a compound and therefore a presumptive identification without a standard. These instruments cost in excess of £250,000. Ideally all screening for coroners' work should be carried out using such instrumentation but this is not the case in many laboratories. This maybe because of the cost of the instrumentation. Funding for Coroners' toxicology which is paid by local authorities has been severely cut back in recent years. Highly trained staff are also necessary if such instrumentation is used.

Potency of NPSs

Some of these compounds are extremely potent, for example one fentanyl analogue is estimated to have 10,000 times the potency of morphine. This makes the analysis technically very challenging and even with the most advanced technology as described above the concentration present in blood consistent with ingestion of a fatal dose would be below the limit of detection.

Drug Standards

In order to positively identify a drug and to measure the amount present, a standard of that drug is required. For most NPSs no drug standard is available; it is not cost effective for anyone to manufacture them. It is possible to make a presumptive identification only without a drug standard.

Availability of NPS types

The NPSs available on the market are continually changing. Once one has been identified and possibly a standard becomes available then the suppliers of these compounds tweak the structure of the compound and produce a new modified compound.

Interpretation

No pharmacological testing, clinical trials etc. have been performed on the novel compounds available for sale on the street/internet. Even if the NPS is identified it is difficult to predict the pharmacological effects the drug will have. Also even if a standard is available and the concentration measured interpretation is not possible because no reference ranges for these drugs are available.

Conclusion

Analysis of NPSs is limited and challenging because of the number of compounds available, their potency, lack of funding, lack of standards and lack of pharmacological data. Therefore no action is proposed

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