K18 LGC Quartz Forensic Blood Toxicology Proficiency Testing Scheme: A Review

Carrie Mullen, MSc, University of Glasgow, Dept of Forensic Medicine & Science, University Avenue, Glasgow G12 8QQ, UNITED KINGDOM; and Robert A. Anderson, PhD, Forensic Medicine and Science, University of Glasgow, Glasgow G12 8QQ, UNITED KINGDOM*

After attending this presentation, attendees will appreciate the value and utility of proficiency tests within forensic toxicology. Attendees will also be encouraged to perform in-depth review of their proficiency test results.

This presentation will impact the forensic science community by improving laboratory operation and providing laboratories with greater awareness of what constitutes an appropriate test protocol and the significance of performance scores.

Proficiency testing should guard against laboratories having undetected errors and may additionally provide educational benefits. LGC Standards® is an international, United Kingdom Accreditation Service-(UKAS) accredited provider of commercial Proficiency Testing Schemes (PTS). Their scheme relevant to forensic toxicology is the Forensic Blood Toxicology (QUARTZ) PTS, in operation for more than ten years. This presentation provides a long-term review of QUARTZ to evaluate the effectiveness of the scheme for detecting analytical bias and for improving laboratory performance, its overall fitness-for-purpose. Review of a fitness-for-purpose scheme should establish an indication of the level at which participants are performing.

Method: Results of the PTS from round 30 in 2007 to round 48 in 2012 were provided by the coordinators in the form of the summary reports provided to participants. In each round, there were both qualitative and quantitative assessments. The results from both were collated in spreadsheets for data grouping and trend analysis. Quantifications did not have a consistent scoring system across all rounds. Scoring methods were investigated and all participant results were awarded a z-score using a provided assigned value and a percentage of this value as acceptable deviation.

Results: Nineteen rounds of QUARTZ spanning six years were summarized. There was a regular group of participants, with minor fluctuations, averaging 18 per round, range 16-21. Gas Chromatography-Mass Spectrometry (GC/MS) was the most-used analytical method. Detailed trend analysis was not possible with the QUARTZ scheme due to the extensive analyte menu and wide variety of analytes tested. There was some repetition of morphine analysis which indicated difficulties requiring further investigation. It was not possible to determine the level at which participants generally perform.

Conclusion: QUARTZ is a good educational resource. Laboratories that establish proficiency in their validated methods elsewhere can benefit from the varied nature of this scheme to gain experience with analytes which are not encountered often or which are emerging substances of abuse. However, in order to provide a safeguard against bias, this scheme requires more repetitive testing, which would assist in providing an effective means of monitoring routine laboratory performance. It is recommended that a selection of the most commonly encountered analytes in forensic toxicology (e.g., morphine, codeine, diazepam, cannabis, amphetamine, cocaine, and methadone) be included at least once per annum.

Proficiency Scoring, Proficiency Testing, Forensic Toxicology

 ** Presenting Author*