H164 Validation of a Urine Drug Screen Assay in the Postmortem Setting

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Learning Overview: This goal of this presentation is to review the utility of a Urine Drug Screen (UDS) for the purposes of triaging autopsies, discussing if this method is a valid substitution for blood testing, and if it has potential to maximize operational efficiency. As advised by National Association of Medical Examiners (NAME) guidelines, individuals should undergo a complete autopsy when "death is by apparent intoxication." Consequently, the high number of drug-related deaths across the country adds financial burden to many offices. There may be a place for point-of-care UDS assays in the postmortem setting where they can serve as a source of preliminary information regarding the presence of potentially fatal substances. In this way, the assay can guide further testing and management of the case. If a urine assay is found to be a valid and inexpensive substitute for blood testing in the postmortem setting, the operational efficiency implications are significant.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a framework for the use of a UDS assay as a potential substitute for blood testing in certain cases.

Methods: This study tested the performance of a UDS assay compared with toxicological analysis of postmortem blood as the gold standard for 87 cases requiring full autopsy at the New Mexico Office of the Medical Investigator. Ten common drug classes of abuse were analyzed: methamphetamine, amphetamine, cocaine, opioids, barbiturates, Tricyclic Antidepressants (TCAs), methadone, Tetrahydrocannabinol (THC), benzodiazepines, and Phencyclidine (PCP). Blood toxicology was tested through National Medical Services (NMS). The case pathologist interpreted the results of the UDS, and these interpretations and photographs of the card were documented. Once the toxicology reports from NMS were complete, the final interpretation of the urine screen by the case pathologist was compared to the NMS blood toxicology results. For each of the ten classes of drugs tested for by the UDS, the numbers of concordant and discordant pairs were calculated. McNemar's test for correlated proportions was used, with a *p*-value of 0.05 or less considered statistically significant. Sensitivity and specificity were also calculated.

Results: For the 87 cases tested, the postmortem blood was analyzed with either the NMS basic toxicology panel (68 cases) or an expanded panel (19 cases). Discrepancies between the UDS and blood Gas Chromatography/Mass Spectrometry (GC/MS) were classified as either "triage-relevant" or "triage-irrelevant" for purposes of cause and manner of death investigation. For example, false negative cocaine on the UDS was considered triage-relevant, whereas false negative THC was considered triage-irrelevant. All false positives were considered to be triage-irrelevant. Three decedents had partial results due to assay error (failure of urine to move up the well), and so data was only included for those drug classes with results present. By McNemar's test, only the opioid drug category had a statistically significant difference in results discordance between the UDS and NMS blood toxicology results. The remaining nine classes of drugs showed no statistically significant difference between NMS and UDS results. Forty-six of 87 cases (53%) had a discordance of some type between the UDS and NMS results; however, 16 of those (35%) were "excused" due to testing differences, or if the drug was present in the urine only (and not in the blood). Nineteen of the 87 cases (22%) had a triage-relevant discordance, such as a false negative detection of a potentially fatal drug.

Conclusion: Of the ten classes of drugs analyzed, only opioids showed a statistically significant discordance. For this study's purposes, this is a triage-relevant discrepancy as opioid false negatives can inaccurately alter the course of the death investigation. However, it should be noted that this discrepancy was not due to assay error, because the majority of false negative opioids on the urine screen were due to fentanyl, which is not detected by this assay. Most importantly, a lack of statistical significance does not necessarily imply clinical irrelevance, if even a small number of false negative results could adversely impact downstream clinical decision making. It was concluded that while the UDS screen is consistent with blood GC/MS findings for most classes of drugs, it is at the discretion of the forensic pathologist to incorporate all investigative information when utilizing the UDS as a potential triage tool.

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Assay, Drug Screen, Autopsy