Development of North American Consensus Guidelines for Toxicological Investigation of Impaired Driving and Traffic Fatalities Cases

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Abstract

Context
The purpose of the project was to identify best practices among laboratories performing drug impaired driving testing and to recommend a uniform set of guidelines to improve the quality of the laboratory data for both epidemiological and criminal justice purposes.

Objectives
The objective of the project was to develop a set of guidelines that laboratories could follow to ensure uniformity of practice, relevant testing parameters, and create comparable datasets for epidemiological study and forensically defensible toxicology results for use in criminal cases.

Key Outcomes
In November 2012, a set of recommendations were finalized based on consideration of analytical capabilities of most laboratories, toxicologically relevant concentrations, and prevalence data from the participating laboratories. Specific recommendations for the analytical approach were made based on the principle of an initial immunological screen of defined scope to include opiates, oxycodone, benzodiazepines (plus lorazepam, clonazepam), cannabinoids, amphetamine, methamphetamine, cocaine metabolite, methadone, carisoprodol, barbiturates, PCP, and zolpidem with quantitative confirmation by gas or liquid chromatography with mass spectrometry.

Discussion and Conclusions
The Panel also considered and established screening and confirmation thresholds for urine and oral fluid. Urine was generally seen as a less preferable sample, and while very few laboratories currently test for drugs in oral fluid, its value as a specimen in DUID casework was recognized. The laboratory recommendations will be published in early 2013.
Initiatives are in place to present these guidelines to stakeholder groups in traffic safety and public policy organizations to ensure resources are made available to laboratories to implement and observe the guidelines.

**Introduction**

The National Safety Council’s Alcohol, Drugs and Impairment Division has a long history (as the Committee on Alcohol and Other Drugs, or CAOD) of promoting research policy and practice recommendations for blood and breath alcohol testing. This has included recommendations for duplicate breath testing, use of contemporaneous controls, and reporting practices. The Division has also issued some recommendations on the necessity of using confirmatory testing methods for forensic identification of drugs in biological fluids and tissues, and recently on the use of hair as a toxicological specimen for drug detection. In 2011, the Division initiated a project to collect data concerning the practices in laboratories performing drug testing for investigation of drug impaired driving cases, and motor vehicle fatalities. The purpose of the initiative was to update a set of recommendations for this testing, first published in 2007 (Farrell et al, 2007), taking account of changes in laboratory standards, practices and resources, and the changes in the illicit drug market. The complete results of the survey are published on the web site of the Center for Forensic Science Research and Education (Lowrie et al, 2013) and the methods, results summaries and recommendations described below are abstracted from that report, and other summary documents prepared for the National Safety Council, and the Transportation Research Board of the National Academies (TRB).

**Methods**

Toxicology laboratory directors or employees were contacted via email to initiate communication, confirm contact information, and verify their eligibility to participate in a survey regarding laboratory services in DUID cases. To create the survey, SurveyMonkey™, an online web survey instrument, was utilized. The survey questions focused on gathering information regarding current drugs being tested for, factors that affect drug collecting or analysis and ability to meet previous recommendations. The NSC CAOD committee expanded upon and amended the survey questions to increase their scope and clarity. The final revised survey was prepared for submission to confirmed participants via SurveyMonkey. The initial contact list included three hundred and seventy six toxicology laboratory directors or employees. These individuals were contacted via telephone and asked to participate in the survey if their laboratories conducted DUID/DRE casework. One hundred and twenty three individuals agreed to participate in the survey. These individuals were sent an initial contact email explaining the survey in more details and confirming their email addresses. Follow-up emails were sent to those who did not respond to the initial email. Telephone calls were also made to those who did not respond to the second email. Following these efforts, a total of ninety nine individuals confirmed their email addresses and their participation. The survey was then emailed to these individuals to complete. The survey responses were collected and analyzed. Follow-up emails were sent to participants who did not answer every question in an effort to obtain as much information as possible. As a disclaimer, in spite of efforts to collect data, some participants did not respond to all questions, therefore, the data represents ninety-six reasonably completed surveys to the point where the survey was rendered suitable to be included in the data analysis.
Results

A summary of the results of the project were presented to the Transportation Research Board of the National Academies, and described in their recent report (Logan, 2013). The principal findings described included the following: the most frequently encountered drugs in impaired driver casework included marijuana, benzodiazepines, cocaine and amphetamines, opiates, muscle relaxants, and sleep aids. For screening purposes, the majority of laboratories reported meeting or exceeding the 2007 guideline recommendations for drugs of abuse, including carboxy-THC, benzoylecgonine, benzodiazepines, MDA, barbiturates, methadone, opiates and PCP, but not for amphetamines. The greatest degree of variability in whether recommended cut-offs were complied with was for therapeutic drugs including trazodone, nortriptyline, carisoprodol, zolpidem, topiramate and methadone, all of which can have significant impairing properties. Survey participants were asked about emerging recreational drugs showing up in casework beyond the scope of the 2007 recommendations, and those responses included the synthetic stimulants and hallucinogens mephedrone, methylone, benzylpiperazine, trifluromethylphenylpiperazine, dimethyltryptamine, and MDPV; the synthetic cannabinoids (JWH-073, JWH-250, JWH-081, JWH-122, JWH-210, JWH-019, JWH-200, AM-2201); and the therapeutic drugs modafinil, quetiapine, zopiclone, buprenorphine, and zaleplon, although with much lower frequency that the currently recommended drugs. The committee ultimately created a recommended scope and analytical cut-offs for a panel of 33 drugs (Table 1). Full details of the recommendations, including cut-offs for screening and confirmation in blood, urine and oral fluid are found in the committee’s report (Logan et al, 2013).

Table 1. Priority Drugs for inclusion in testing for suspected DUID and motor vehicle fatalities.

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Analytes including metabolites</th>
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<tbody>
<tr>
<td>Marijuana</td>
<td>THC</td>
</tr>
<tr>
<td></td>
<td>Carboxy-THC</td>
</tr>
<tr>
<td></td>
<td>11-Hydroxy-THC</td>
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<tr>
<td>CNS Stimulants</td>
<td>Methamphetamine</td>
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<tr>
<td></td>
<td>Amphetamine</td>
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<tr>
<td></td>
<td>MDMA</td>
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<tr>
<td></td>
<td>MDA</td>
</tr>
<tr>
<td></td>
<td>Cocaine</td>
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<tr>
<td></td>
<td>Benzoylecgonine</td>
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<tr>
<td></td>
<td>Cocaethylene</td>
</tr>
<tr>
<td>CNS Depressants</td>
<td>Alprazolam</td>
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<tr>
<td></td>
<td>α-Hydroxyalprazolam</td>
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<tr>
<td></td>
<td>Clonazepam</td>
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<tr>
<td></td>
<td>7-Aminoclonazepam</td>
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<td></td>
<td>Diazepam</td>
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<tr>
<td></td>
<td>Nordiazepam</td>
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<td></td>
<td>Lorazepam</td>
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<td>Oxazepam</td>
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<td></td>
<td>Temazepam</td>
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<tr>
<td></td>
<td>Carisoprodol</td>
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<td>Meprobamate</td>
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</table>
Zolpidem
Butalbital
Phenobarbital

**Narcotic analgesics**

Codeine
6-Acetylmorphine
Hydrocodone
Hydromorphone
Methadone
Morphine
Oxycodone
Oxymorphone

**Dissociative drugs**

Phencyclidine

**Discussion**

This consultative approach was designed to build consensus and help to create a document that thought leaders and prominent laboratories in the United States would adopt to achieve the goal of more standardized testing in these important categories of investigations. In addition to the core drugs identified in table 1 as being prevalent and indispensable for a minimum scope, the committee also made recommendations about a second tier scope to include some of the more difficult to detect drugs, and newly emerging drugs whose capabilities may be beyond those of some state and local government laboratories. The expectation is that some better resourced laboratories will include some of these more esoteric tier 2 compounds in their scope of analysis to provide a rich data set for subsequent updates to the recommendations.

**References**


