Field Test of On-Site
Drug Detection Devices
Final Report -- October 2000

V. Discussion and Conclusions

The overall purpose of the study was to conduct a field assessment of the on-site drug detection devices to evaluate their performance as potentially useful tools for law enforcement. The study provided a number of substantive results in terms of the devices' technical performance, the reactions of law enforcement officers to conducting the tests, the additional information the devices can provide a DRE assessment, and the differences in performance of the devices when conducted by research analysts and law enforcement officers. In addition, an unexpected finding was the high percentage of drug positive samples among individuals suspected of driving under the influence. The drug positive rate found in this study was alarming and substantially higher than rates found in a study of drug use by fatally injured drivers (Terhune, 1992), though the two studies were evaluating entirely different samples.

Although the on-site devices were evaluated on several criteria, the primary evaluation was based on a comparison of the on-site device results with MS results. For each device and each drug, false positive and false negative rates were calculated. *False Positive* results were defined as cases in which the device indicated a positive result, but no drug(s) or metabolites were detected by MS. *False Negative* results were defined as cases where the devices tested negative but measurable concentrations of the drug analyte(s) were present in excess of the screening MS cutoff. In addition, we compared the results of the on-site kits to MS confirmations using the widely accepted confirmation guidelines for cutoff concentrations and target drugs. *Unconfirmed Positive* results were defined as those cases in which the devices tested positive, but would not have been confirmed as positive using the DOT/DHHS guidelines because either: 1) drugs other than the target analyte(s) for the devices were present or 2) the target analytes were present but at concentrations lower than the DOT/DHHS MS confirmation cutoffs.

A number of patterns emerged from the comparisons between the results of the on-site devices and MS confirmations. First, the devices generated relatively few false positive results, particularly for THC-COOH, PCP, and cocaine/BZE. However, the unconfirmed positive rates were higher for amphetamines and opiates, attributable largely to the presence of drugs other than the target analyte(s) that had similar chemical structures. Rates for THC-COOH, cocaine/BZE and PCP were consistent with those expected using instrumented immunoassay screening. However, when testing for amphetamines, there were seventeen cases in which all five devices tested positive, but no amphetamine or methamphetamine was found by MS. The unconfirmed positive rates varied from 2.12 to 3.75%. A similar pattern was seen with the opiates where rates varied from 2.25% to 2.37%. When the data from these two drug classes were adjusted for the presence of MDMA, hydromorphone, and hydrocodone, the false positive rates for amphetamines and opiates fell to less than 2% and less than 0.3%, respectively. These lower rates are consistent with those anticipated using instrumented immunoassays. However, the unconfirmed positive rates for target drugs clearly indicate that the confirmation battery for opiates and amphetamines needs to be expanded to include additional drugs to be useful in detecting drugs in arrested drivers.

The unconfirmed positive rates based on drug concentration, were less than 1.37%. Rates between devices were essentially equal for THC-COOH, amphetamines, opiates and PCP. When testing for BZE, however, AccuSign® and Rapid Drug Screen® had higher rates than the other devices. Reducing the DOT/DHHS confirmation cutoff by one half reduces the unconfirmed positive rates for THC-COOH to less than 0.25% for all devices. For BZE testing, decreasing the confirmation cutoff reduced the rate to 0.0% for three of the five devices and to 0.75% for AccuSign® and Rapid Drug Screen®.

False negative results were rare and the devices compared favorably across drug classes. When the false negative rates were calculated based on the immunoassay screening cutoff, only the false negative results for THC-COOH testing with Rapid Drug Screen exceeded 0.25%. The devices also compared favorably across drug classes when the false negative rates were calculated based on the DOT/DHHS confirmation cutoffs. Only the false negative results for THC-COOH testing exceeded 0.50% and then only for TesTcup and TesTstik. All of the devices for all of the drug classes had false negative rates less than 0.87%.

The data from the devices and the MS testing clearly indicate that, when cutoff concentrations and additional drugs are taken into consideration, the devices were accurate in identifying positive samples and rarely failed to identify a driver who had the target drugs in his/her urine.

The officers who participated in the study generally favored the use of on-site devices in the enforcement of impaired driving laws. However, they cautioned that the use of these devices should not supplant the officer's judgment regarding impairment. Subjectively, officers rated the AccuSign device to be the most favorable. From the DRE analyses, it is clear that the devices can provide law enforcement officers with information that may supplement the DRE evaluation. It should be remembered that test results from the devices can indicate only the presence or absence of drugs in the urine and not the extent of impairment caused by the drugs.

One of the key features of this study was that it was a field test, whereas previous studies of the on-site devices have been primarily laboratory based. Moreover, the current study provided the opportunity to examine the performance of the devices when used by law enforcement personnel as opposed to trained laboratory technicians. The overall error rates, as indicated when one of the devices on any given sample resulted in an erroneous finding compared to the other four devices, were generally low -- .8% for research analysts and 2.5% for officers. Although the rates were low, the error rates for the officers were higher than those for the research analysts in total and for every device except TesTcup. This finding suggests that additional training and experience is needed if the on-site devices are to be used routinely by law enforcement officers.

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