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Roadside drug testing: Comparison of two legal approaches in Belgium

T. Van der Linden [a,b,*], S.M.R. Wille [a], M. Ramírez-Fernandez [a], A.G. Verstraete [b,c], N. Samyn [a]

[a] National Institute of Criminalistics and Criminology, Vilvoordsesteenweg 100, 1120 Brussels, Belgium
[b] Department of Clinical Chemistry, Microbiology and Immunology, Ghent University, De Pintelaan 185, 9000 Ghent, Belgium
[c] Department of Laboratory Medicine, Ghent University Hospital, De Pintelaan 185, 9000 Ghent, Belgium

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ABSTRACT

Background: Internationally, urine on-site testing has been used for detecting drivers under the influence of drugs (DUID) but more and more countries, such as Belgium, are switching to oral fluid screening.
Objective: To compare the previous (published in 1999) and current (published 2009) enforcement procedures of DUID in Belgium. The two evaluated procedures differ in the way the drivers are screened by the police (signs of impairment versus signs of recent drug use), the matrix for screening (urine versus oral fluid) and the analytical cut-off concentrations in plasma.
Methods: Data on positive screening and confirmation results were gathered from 1st April 2008 to 30th September 2010, when urine screening (Dipro Druglab panels test) was performed; and from 1st October 2010 to 31st March 2013, when an on-site oral fluid test (Securetec Drugwipe 5$^+$) was used.
Results: Approximately 4100 data sets related to urine screening and 3900 data sets related to oral fluid screening were studied. Eighty-eight percent of positive urine on-site tests yielded positive results in plasma for cannabis, 21% for cocaine, 20% for amphetamines and 7% for opiates. Sixty-six percent of the positive oral fluid on-site tests yielded positive results in plasma for cannabis, 30% for cocaine, 28% for amphetamines and 8% for opiates. For cannabis, opiates and amphetamines more negative results in plasma were observed in the period of urine screening.
Conclusions: The percentage of plasma samples of tested drivers, in which none of the positive screened target drugs were present in a concentration above the legal cut-off value, has decreased from 17% to 8% since the introduction of the current legislation involving oral fluid screening.

1. Introduction

Worldwide, the problem of driving under the influence of (il)legal substances is gaining wider attention. The EU funded project DRUID (Driving Under the Influence of Drugs Alcohol and Medicines) has shown that approximately 2% of the European drivers had recently used recreational drugs [1]. Between 28% and 53% of seriously injured drivers tested positive for at least one psychoactive substance (alcohol, recreational or medicinal drugs) [2]. In Belgium almost 5% of seriously injured drivers had used a single illicit drug with the highest prevalence for Δ9-tetrahydrocannabinol (THC) (2.5%) whilst 1.5% had combined cannabis use with alcohol. [3]

As a result, driving under the influence of drugs (DUID) has increasingly become a focus for law enforcement. Action against DUID often starts with on-site screening where urine and oral fluid are two matrices that can be used for the on-site tests. With urine, large sample volumes can be obtained and furthermore this body fluid contains large amounts of drug metabolites. Nevertheless, oral fluid has many advantages for on-site testing with no requirement for a restroom whilst same-sex collectors can be used. Furthermore, the collection of oral fluid can be observed and thereby there is a low risk of accidental contamination or deliberate adulteration. In addition, oral fluid better reflects recent drug use in comparison to the drug metabolites in urine (e.g. 11-nor-9-carboxy-Δ9-tetraydrocannabinol, THC-COOH) that can be detected for days or even weeks after the drug was last used [4,5].

In Belgium, the national institute for road safety (BIVV) reported that the number of roadside DUID controls should increase drastically to create a deterrent effect for drugged drivers [6]. However, the use of a comprehensive test battery including four psychomotor tests followed by the application of a screening test based on urine was considered to be too long and thereby impractical [7]. Furthermore, scientific observations suggest that oral fluid results are superior when compared to urine in

* Corresponding author at: National Institute of Criminalistics and Criminology, Vilvoordsesteenweg 100, 1120 Brussels, Belgium. Tel.: +32 2 243 46 79; fax: +32 2 243 46 08; mobile: +32 496 02 99 15.
E-mail address: trudyvdlinden@gmail.com (T. Van der Linden).

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correlating with impairment symptoms. These factors led to a change in legislation in Belgium with a new law becoming effective in October 2010 [8]. After an initial selection on the basis of a limited field sobriety test (checklist for external signs of recent use), screening is performed on oral fluid and then positives can be confirmed using plasma or oral fluid, with lower cut-off values for plasma in comparison to the previous legislation. In practice, since the oral fluid collection system is not yet specified, the confirmation analysis has been performed on plasma since the change in legislation [9].

Fig. 1 describes the enforcement procedures under both legal approaches.

The objective of this publication is to compare both legal approaches in terms of the percentages of 'false positives'. A false positive result is defined as a positive roadside screening test that is not confirmed by a positive plasma analysis for the target drugs, taking the legal cut-off values into account. In addition, the paper includes an overview of screening tests not confirmed by plasma analysis using both sets of cut-offs (previous versus current legislation).

2. Methods

Analysis data were gathered within two adjacent periods of time (2.5 year each): (a) from 1st April 2008 to 30th September 2010, during which urine screening was performed; (b) from 1st October 2010 to 31st March 2013, during which an on-site oral fluid test was used. This comparison was not based on paired samples of urine, oral fluid and blood.

2.1. Test battery

The standardized test battery used in the legal approach of 1999 consisted of two parts, namely observation of physical signs and 'attention distributive tests' [10]. The most important physical signs were the appearance of the eyes (e.g. shiny glow, irregular reaction of the pupils, blurred eyes) and trembling/shivering of body parts. The 'attention distributive tests' comprised of four tests: 'Romberg's test', 'one leg stand', 'walk and turn' and 'finger-to-nose', The result of the test battery was positive when at least one physical sign and at least one erratically performed attention distributive test could be noted.

A new standardized checklist to determine indications of signs of recent drug use in traffic was published in a royal decree on 17th September 2010 [11]. At least 3 signs, divided over at least 2 different categories, must be identified to obtain a positive result. The categories are: eyes (e.g. shiny, weepy, blurred, bloodshot, narrow pupils), face (e.g. dry lips, grinding teeth, repeated snorting), behavior (e.g. nervous/agitated, aggressiveness, mental confusion), state of mind (e.g. euphoria, unstable mood), language (e.g. stammering, repeating words, verbosity), walk (e.g. disturbance of equilibrium) and others (e.g. trembling limbs, sweating, fast or slow reflexes).

2.2. On-site screening devices

Under the previous legislation the Dipro Druglab® panel test (DiproMed, Weigelsdorf, Germany), an immunological assay which detects the presence of metabolites of cannabinoids, amphetamines, cocaine and opiates in urine, was used. It consists of a test element and a urine recipient. The absorbing strips of the test kit are dipped in the sample until a pink color is visible in the test windows (this takes ±30 s at ambient temperature). The test is then placed on a flat surface. Results can be read after 3–8 min. A test is valid when a red line is visible in the control zone. The absence of a red line in the test zone indicates a positive result.

With the current legislation the Securetec Drugwipe-5+® device (Securetec, Munich, Germany), an immunoassay which screens for cannabinoids, amphetamines, cocaine and opiates in oral fluid, was used. The sample applicator of the device consists of two small pads that collect oral fluid (about 10–20 μL) by wiping the tongue and cheeks. Once the sample applicator is fixed onto the test strip, the test is held vertically and an integrated buffer ampoule is broken. After 15 s, the test is placed horizontally and the results are

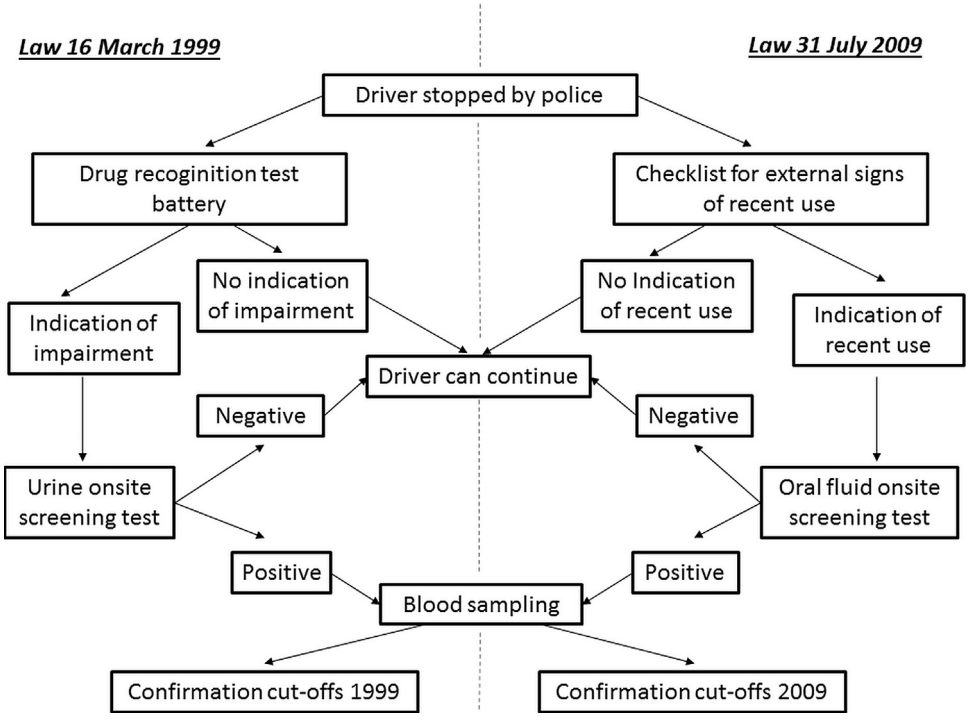

Fig. 1. Flow chart of both legal procedures on DUID.