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Trends in drug use of Scottish drivers arrested under Section 4 of the Road Traffic Act — A 10 year review

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ABSTRACT

A study of Section 4 RTOA cases submitted to the SPSA forensic science laboratory in Edinburgh over a 12 year period was carried out. The main aims of the study were to identify the most frequently encountered drugs and to determine if there were any major drugs trends from the data collected. Three groups of cases from 1996 to 2000 (102 cases), 2003 (26 cases) and 2008 (295 cases) were examined. The large increase in submissions was mainly due to the introduction of SPSA, whereby the laboratory began to carry out the analysis for all criminal and RTOA cases in Scotland. The preliminary results for the 8 drug groups (amphetamine and related compounds, benzodiazepines, cannabinoids, cocaine, methadone, methylamphetamine and related compounds, morphine and opiates) identified a number of major trends: cannabinoids were consistently present in 40–50% of cases; benzodiazepines more than doubled in frequency to over 80%; there has been a significant increase in cases positive for morphine and methadone — up from less than 2% each to 31% and 23% respectively; there has been an increase in the number of cases screening positive for opiates (19% to 29%); and the frequency of positive cases for cocaine, amphetamine and methylamphetamine remained unchanged (approximately 22%, 6% and 5% respectively). A significant finding was the huge increase in polydrug use. The number of cases positive for 4 or more drug groups has increased from 4% in 1996–2000 to 25% in 2008. In comparison, in the 1996–2000 group 72% of cases were only positive for one drug group compared to 17% in 2008. For those cases which were negative for all 8 drug groups, a screen for potentially impairing prescription and over the counter medicines was carried out. The most frequently encountered medicines were sedatives, sedative antidepressants, sedative antihistamines and antiemetics. These were often found in conjunction with alcohol below the legal limit for driving.

1. Introduction

In 2000, a report was prepared detailing the incidence of drug-impaired drivers wrongly identified by the Police as driving whilst impaired through alcohol between 1996 and 2000. In the intervening years several changes have taken place which might be expected to have altered the number of drivers impaired through drug use and the prevalence of different drug groups. These include the introduction of Field Impairment Testing (FIT testing) in Scotland, a hard hitting drug-driving public awareness campaign and increased training for police officers in recognising drivers who might be drug-impaired. In 2007, the introduction of the Scottish Police Services Authority (SPSA) was brought about to manage the provisions of forensic science (among other disciplines) throughout the country. The Police Forensic Science laboratory in Edinburgh was designated the National Centre of Excellence for Toxicology and, from that point onwards, all criminal and road traffic offence cases from Scotland were submitted to the Edinburgh laboratory. A second smaller study was carried out in 2003 to identify the impact of FIT testing and it was decided we should carry out a full retrospective study to identify any major drugs trends over the past 10 years within cases submitted under Section 4 of the Road Traffic Offenders Act (RTOA), 1988. Similar studies have been undertaken in other countries. In 2003, Drummer et al. published data gathered in Australia over a period from 1990 to 1999 using fatally injured drivers [1]. This demonstrated a high proportion of drivers where cannabis was present. Opioids, stimulants and benzodiazepines were prevalent in similar numbers and, overall, there was an increasing number of drivers where drugs were present over the years studied. A second study carried out by Scheilke et al. [2] showed the changing patterns of drug use in fatally injured drivers in Washington State between 1992 and 2002. Cannabis was, as in the Australian study, by far the most prevalent drug found, followed by benzodiazepines, amphetamine and cocaine. Conversely, a more recent paper details the high incidence of amphetamine-positive (55–60%) cases of drivers under the influence of drugs in Sweden [6]. This far outweighed the percentage of cases positive for other drug groups — cannabinoids (9–11%), opiates (3–6%) and prescription drugs (5–7%). The authors examined cases submitted over a 4 year period following the introduction of a zero-tolerance law. They noted a large increase

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in the number of cases being submitted for drugs analysis, however there was little change in the percentages of cases positive for each drug group over the time studied. There are several published studies where the authors have identified the number of road traffic offenders using different drug groups, however none of these compare the results over a period of several years [3–8]. A previous paper published by Seymour and Oliver in 1999 [9] discussed the role of drugs and alcohol in impaired drivers from the Strathclyde region of Scotland over the previous 5 years. Their study observed a high incidence of benzodiazepine use where at least one member of this drug group was found in 82% of cases. Cannabinoids were detected in 39% of cases and the number of cases where morphine was present increased over the years. Amphetamine, cocaine and methylenedioxymethylamphetamine were rarely detected in any of the years during the study.

1.1. The legislation — Road Traffic Offenders Act, 1988

UK law states that a person can be prosecuted under Section 4 if they drive or attempt to drive whilst unfit through drink or drugs. A person is guilty of an offence under Section 5 if they attempt to drive or are in charge of a motor vehicle after consuming so much alcohol that the proportion of it in his/her breath, blood or urine exceeds the prescribed limit — 25 μg/100 ml, 80 mg/100 ml and 107 mg/100 ml respectively.

1.2. Field impairment testing

In 2001, a 1 year pilot study for FIT testing was carried out in Scotland. The success of the study saw the testing being implemented nationwide with the aim to improve the detection of drivers impaired through the use of drugs. All Road Policing Officers were trained to carry out 5 tests based on the standardised field sobriety tests that have been validated in the USA: pupillary comparison, Romberg test (balance and judgement of 30 s), walk and turn test, one leg stand test and finger to nose test. Initially, there was an increase in the number of Section 4 cases being submitted for analysis. However, the number of FIT tests being carried out has dropped and arrests have tailed off. Discussions with the Police revealed that many Police Officers lack the confidence to carry out the tests and a lack of regular training may be partly to blame.

2. Materials and methods

Over a 5 year period (1996–2000), 102 Section 5 cases were retained for full toxicology analysis. Of these cases, 67 (65%) had a blood or urine alcohol concentration below the legal limit for driving. Subsequent analysis revealed that 27 of these cases (40%) contained at least one drug that was capable of causing impairment. In July 2002 FIT testing was introduced throughout Scotland and it was of interest to repeat the study to reveal whether this had impacted on the number of Section 5 cases where the impairment may not have been solely due to alcohol. The work was carried out in 2003 on a smaller group ($n = 26$) and, when examined for drugs capable of impairment, the number of cases that were positive had decreased to 30%. Interestingly, the later study had a higher number of cases (84%) where the alcohol concentration was just below the legal limit (BAC 60–80 mg/100 ml or UAC 80–107 mg/100 ml) compared to 71% in 1996–2000. If there had been any delay in the blood or urine specimen being collected in these cases it is possible that they may well have been over the limit at the time of the incident. From these studies it appears that there has been a decrease in the number of drivers being wrongly identified as driving under the influence of alcohol and there are less cases where the impairment cannot be explained through either drink or drugs. Whether or not this is due directly to the introduction of FIT testing is more difficult to determine.

The current study collated and compared data from each data set (1996–2000 and 2003) as well as 2008. The main aims were to identify the number of Section 4 and Section 5 cases submitted in these years; identify the sex of the driver; identify any drugs present in each Section 4 cases; compare results of data from each time period; identify the most frequently encountered drugs; and identify any major drugs trends in RTOA cases in Scotland.

The laboratory Case Management System was utilised to obtain general case statistics such as the date of incident, name of accused and case number. It was then necessary to access case reports to record alcohol concentrations and drugs identified. When reporting Section 4 cases, there is presently a local agreement that this can be done once one significant impairing drug in blood, or two in urine, has been confirmed. A significant drug can be described as an illicit drug such as cocaine or amphetamine or a commonly abused drug such as diazepam or methadone at a concentration above the therapeutic range. The fact that case reports sometimes do not show a full picture of the drugs involved, supported the use of the results of screening tests for the purposes of this study. This allowed a direct comparison between cases where it was possible to identify the presence or absence of 8 drug groups. ELISA was used to identify the presence or absence of amphetamine and related compounds, benzodiazepines, cannabinoids, cocaine, methadone specific, methylamphetamine and related compounds, morphine specific and opiates. In addition to this, if no drug of abuse was detected, a full toxicology screen was conducted to identify if there were any prescription or over the counter drugs present which could have caused impairment. This was carried out using a Solid Phase extraction method followed by GCMS. Drugs were confirmed and quantified using methods which were well established in the laboratory, either by GCMS or LCMS.

3. Results and discussion

3.1. General case statistics

The number of cases submitted for analysis under Section 4 of the RTOA is detailed in Table 1. It should be noted that the significantly larger data set for both Section 5 and Section 4 cases in 2008 is due to the introduction of SPSA and the subsequent receipt of RTOA samples for the whole of Scotland. The proportion of Section 5:Section 4 cases has decreased significantly between 2003 and 2008. For each year the vast majority of accused are male (1996 = 95%; 2000 = 94%; 2003 = 79%; 2008 = 86%). However, there does appear to be an increased proportion of female offenders between the years 2000 and 2003. The data collated by Drummer et al. [1] and Schwilke et al. [2] both demonstrated that approximately one quarter of fatally injured drivers were female.

3.2. Results of ELISA

The results of the initial study using samples retained from 1996 to 2000, detailed in Fig. 1, showed that nearly half of all cases (47.6%) contained cannabinoids. The next most common drug group was benzodiazepines (39.1%) followed by cocaine (23.9%) and opiates (19.6%). The presence of ecstasy type drugs, amphetamine, morphine and methadone were much rarer, only being present in 8.7%, 6.5%, 2.2% and 2.2% respectively.

Table 1
The number of Road Traffic Act cases submitted for toxicological analysis in 1996, 2000, 2003 and 2008, showing the ratio of Section 5: Section 4 cases each year.

	1996	2000	2003	2008
Section 5 cases	214	178	187	1148
Section 4 cases	44	33	40	295
Sec 5:Sec 4	4.8:1	5.3:1	4.6:1	3.8:1

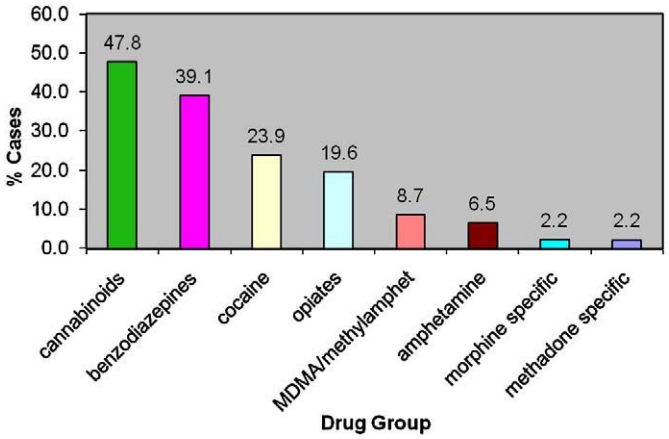

Fig. 1. The percentage of cases submitted between 1996 and 2000 positive for each drug group after ELISA screening.

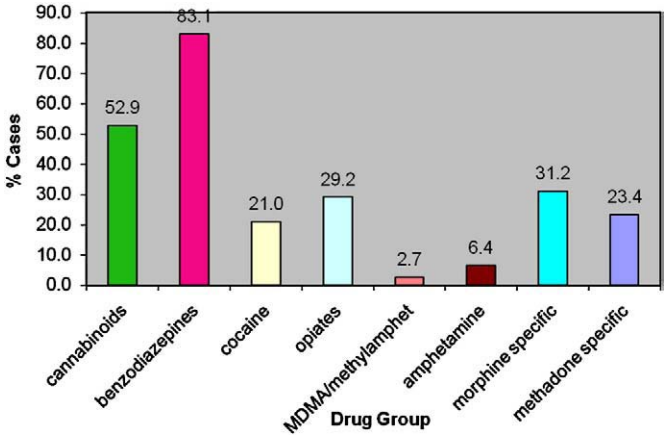

Fig. 3. The percentage of cases submitted in 2008 positive for each drug group after ELISA screening.

A study carried out in 2003 showed quite a different picture (Fig. 2).

Benzodiazepines were found in 84.8% of cases. The next most common drugs were opiates (39.4%), cannabinoids (36.4%), methadone (36.4%) and morphine (33.3%). Stimulant drugs were far less common — cocaine, amphetamine and ecstasy type drugs detected in 15.2%, 6.1% and 3.0% of cases respectively.

The picture in 2008 follows closely those results found in 2003 (Fig. 3) with benzodiazepines being the most prevalent drug group detected.

A comparison of all 3 sets of data can be seen in Fig. 4. This clearly identifies the main changes over the time period studied. Cannabinoids are consistently present in 40–50% of cases over the years. Benzodiazepines have more than doubled in frequency since 1996–2000 and have overtaken cannabinoids as the most frequently encountered drug group. The number of cases positive for cocaine has remained relatively constant with 15–20% of cases positive. There has been a slight increase in the number of cases positive for opiates. Cases that are positive for methylamphetamine and related compounds and amphetamine have remained relatively infrequent. Since the initial study there has been a significant increase in the presence of morphine and methadone in cases samples.

These results mirror those from other countries, in particular, the continually high incidence of cases containing cannabinoids. Few countries appeared to have the same quantity of cases where benzodiazepines were detected. However the study carried out in the 1990s by Seymour and Oliver [9] demonstrated 82% samples submitted from the Strathclyde region were positive for at least one member of this drug group. The Strathclyde region is the largest police force in Scotland and includes the city of Glasgow. Crime trends, including drug use, often begin in the large cities and then filter out to surrounding areas. Perhaps it is only in the last few years that the rest of Scotland has experienced this growing trend towards benzodiazepine use and our figures merely reflect this.

Several differences are also notable between countries, in particular the incidence of stimulant drugs. The Netherlands [8] and Scandinavian countries [3,5,6], in particular Sweden, report a high incidence of amphetamine use among drivers. This is opposite to what is apparent from our study. The study by Smink et al. [8] demonstrated a very high incidence of cocaine in impaired drivers. Also, the data from Washington State [2], has shown a 200% rise in cases where methamphetamine was present between 1992 and 2002. The growing problem of methamphetamine popularity in the USA is well publicised but, to date, there have been few seizures within Scotland.

3.3. Prescribed medications

Case samples analysed under RTOA Section 4 that did not yield a significant result from ELISA and subsequent confirmations and quantitations were subject to a full toxicological screen for prescription and over the counter medicines. The data for cases submitted between 1996 and 2000 was unavailable for interpretation. However, in 2003 6% of cases contained at least one medicine that is capable of

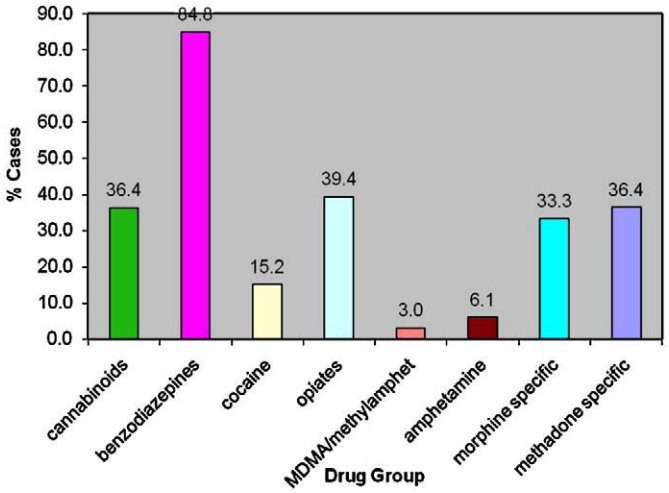

Fig. 2. The percentage of cases submitted in 2003 positive for each drug group after ELISA screening.

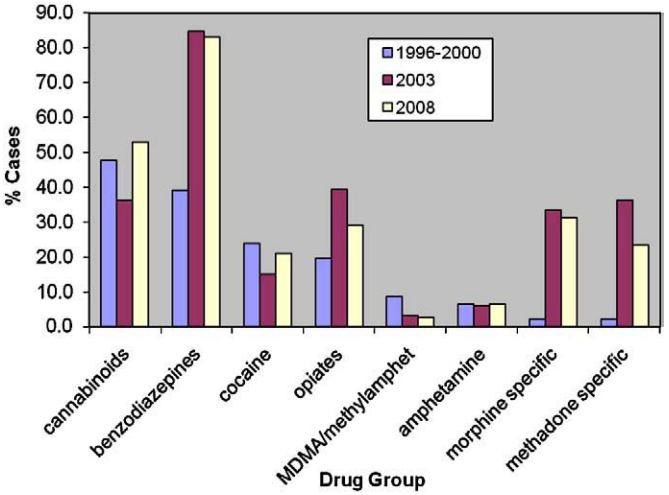

Fig. 4. Comparison of prevalence of drug groups found in cases between 1996 and 2000, 2003 and 2008 data.

causing impairment. In 2008 this figure was relatively unchanged (5%). The prescribed drugs detected were hypnotics (nitrazepam, zopiclone and zolpidem), sedative antidepressants (trazodone, amitriptyline, venlafaxine and mirtazepine), sedative antihistamines (chlorpheniramine and diphenhydramine) and antiemetics (cyclizine and metoclopramide). These cases where only legal medicines were detected often presented in a combination with either other licit drugs or with therapeutic concentrations of commonly abused drugs such as methadone, diazepam or dihydrocodeine. The occurrence of medicinal drugs found in drug-impaired drivers in Sweden (7%) was remarkably similar to our study [6].

3.4. GHB and GBL

GHB has only been detected in one of the cases (submitted in 2003) examined during the three studies. A number of cases were submitted to the laboratory with information to suggest recent GHB/GBL exposure. However, it is widely recognised that the half-life for GHB in blood is extremely short at 0.3–1 h [11] and it is suspected that the delay in processing the suspect and obtaining the relevant blood or urine sample may be sufficient for any GHB present to reduce to a concentration below our limit of detection.

3.5. Polydrug use

During the gathering of cases results, it was obvious that there was a high incidence of polydrug use among impaired drivers, as demonstrated in Fig. 5.

Again the picture has changed a great deal since the first study. In the 1996–2000 data set, 28% of cases were positive for two or more drug groups compared to 85% in 2003 and 83% in 2008. These figures correlate with those found in other countries in recent years. An Australian study reported that 82% of drivers were guilty of polydrug use [4]. Holmgren et al. also report a predominance of polydrug use among drivers in Sweden [6] as do Smink et al. for the Netherlands [8]. More worryingly, the number of cases with multiple drugs present in Scotland has increased dramatically from 4% of cases positive for 4 or more drug groups to 24% and 25% in 2003 and 2008 respectively. In all years, the most commonly encountered combination was benzodiazepines with cannabinoids. This was often in addition to an opiate type drug such as morphine and methadone. Less frequently, a driver presented with a combination of prescribed medications that were capable of impairment.

3.6. Interpretation of results

The significant increase in the presence of benzodiazepines in Section 4 cases appears to mirror a huge rise in the number of seizures of diazepam tablets in the Lothian and Borders Police Force area — a rise from 6072 tablets to 115,180 tablets over the last 5 years [10]. Similarly, the increased prevalence of Section 4 cases testing positive for morphine follows the increased number of seizures of heroin from 4157 g in 2003 to 11,139 g in 2008. Methadone seizures also increased year on year, going from 4855 ml in 2003 to 12,342 ml in 2008. The parallel patterns between the number of seizures and the case results are not surprising and perhaps merely reflect the patterns of drug use in the general population.

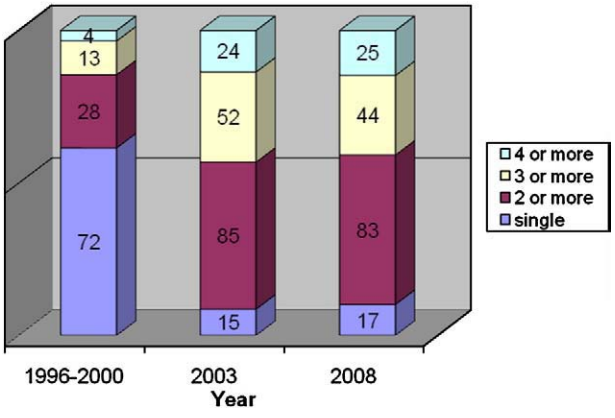

Fig. 5. The percentage of cases positive for 1 drug group, 2 or more drug groups, 3 or more drug groups and 4 or more drug groups in each data set.

The presence of prescription drugs in Section 4 cases is more difficult to interpret. Education plays a major role in preventing a person driving whilst impaired through a prescription drug. The general practitioner and pharmacist should make the patient aware of the potential side effects and most of these pharmaceutical drugs have labels which clearly state they may be dangerous to take before driving. Residual effects of a single dose of some hypnotics may still be apparent the following morning [12] and can increase the risk of an accident. It is more difficult to interpret the presence of prescribed drugs when a case presents with only therapeutic levels of a commonly abused drug such as diazepam and methadone. The issue of tolerance becomes critical and toxicology results must be considered in conjunction with the Forensic Medical Examiners testimony and Police witness statements. An accused should not be prosecuted with only the toxicology report as evidence.

3.7. UK Government proposals

In November 2008, the UK Government began a road safety consultation process. This included proposals on how to tackle the problem of drug driving including £2 million for the 2009/2010 THINK! campaign to educate the public on the dangers of drugs and driving. Another suggestion is the introduction of a new offence with a zero-tolerance level for driving whilst under the influence of illegal drugs such as cocaine, MDMA and amphetamine. A similar law was introduced in Sweden in 1999. This has greatly simplified the prosecution case, negating the need to prove that a person's ability to drive safely was impaired through drugs. The Government agreed that it was necessary to support Field Impairment Testing and that the introduction of a roadside screening device would greatly aid the Police in detecting drivers who are impaired through drugs. Three other proposals which would aid in attacking the problem of drug driving were the improved provision of information for 'traffic dangerous medicines'; drug rehabilitation courses to include the dangers of drugs and driving; and the ability to obtain a blood sample by a nurse prior to the arrival of a forensic medical examiner.

4. Conclusions

This paper presents a detailed overview of the changing picture of drug use amongst drivers in Scotland over the last 10 years. It has identified the worrying problem of impairment as a result of polydrug use and the huge increase in the predominance of cases containing benzodiazepines. Methadone, opiates and morphine have also increased in significant numbers since the 1996–2000 study whilst cannabis use has remained relatively constant. As described, the results closely mirror the trends seen in drug seizures so, in itself, is no surprise. To be able to fully comprehend the changing trends in drug-impaired drivers, the confirmation and quantitation of all drugs identified in the screening test would have to be carried out. The implications on workload to do this would be far-reaching and it is unlikely that the resources will be available for a full analysis. It would be interesting to have had more data available regarding the accused, such as criminal history to identify the number of repeat offenders and age. One group of authors have had access to this information and were able to identify the substantial number of repeat offenders [5]. The time of the incident would also be of interest to determine any

delay between the offence and when the blood/urine sample was obtained. This might go some way to explain why those cases submitted where GHB/GBL was suspected were negative following a full toxicological analysis. In conclusion, it is apparent that the problem of driving under the influence of drugs is a major problem in Scotland and the introduction of Field Impairment Testing and public awareness campaigns have done little to reduce the number of offenders. Having studied the results from other countries, whilst it is clear that the introduction of a zero-tolerance law might help the authorities in prosecuting drivers successfully, it is unlikely to deter the hardened drug users from getting behind the wheel of a car. Rehabilitation and treatment for drug addiction may be the only way to reduce re-offending and the introduction of a urine screening programme can be introduced to check for drug abstinence prior to re-issuing the drivers licence. Certainly, the UK Government consider the problem of driving under the influence of drugs very seriously and have suggested a number of proposals to improve the detection of offenders and supporting the education of the public of the dangers involved in driving under the influence of drugs.

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