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Non-prescribed use of psychoactive prescription drugs among drug-impaired drivers in Sweden

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ABSTRACT

Aims: To determine the prevalence of non-prescribed drug use among subjects suspected of drug-impaired driving with a psychoactive prescription drug, and to identify associated factors.
Methods: Subjects investigated for drug-impaired driving in Sweden during 2006–2009 with a confirmed intake of diazepam, flunitrazepam, tramadol, zolpidem or zopiclone were identified using the Swedish Forensic Toxicology Database. Information on dispensed prescription drugs was retrieved from the Swedish Prescribed Drug Register. Non-prescribed use was our outcome, defined as a psychoactive prescription drug intake confirmed by toxicological analysis in a subject by whom it was not dispensed in the 12 months preceding the sampling. Prevalence proportions were calculated for each drug and logistic regression was used to identify associated factors.
Results: In total, 2225 subjects were included. The median age (range) was 34 (15–80) years and 1864 (83.8%) subjects were male. Non-prescribed use was found in 1513 subjects (58.7%); for flunitrazepam 103 (76.3%), diazepam 1098 (74.1%), tramadol 192 (40.3%), zopiclone 60 (29.7%), and zolpidem 60 (21.2%) subjects, respectively. Younger age and multiple-substance use were associated with non-prescribed use, whereas ongoing treatment with other psychoactive drugs was negatively associated with non-prescribed use.
Conclusions: Non-prescribed use of psychoactive prescription drugs was common in subjects suspected of drug-impaired driving and was more frequent for benzodiazepines and tramadol compared to zolpidem and zopiclone. The young and multi-substance users were more likely, whereas subjects with ongoing prescribed treatment with other psychoactive drugs were less likely, to use non-prescribed drugs.

1. Introduction

Psychoactive drugs are widely used in the treatment of common medical conditions such as pain, anxiety and sleep disorders (WHO, 2006), but are also associated with substance use disorders and drug diversion (Casati et al., 2012; Fischer and Rehm, 2007; Griffiths et al., 2014; UN, 2014; WHO, 2006). Drug diversion, broadly defined, is the medically unintended or unauthorized use and/or distribution of prescription drugs (Centers for Medicare and Medicaid Services (CMS), 2015). Opioid analgesics, benzodiazepines and benzodiazepine-like hypnotics are among the drug classes most frequently diverted (Fischer et al., 2014; Griffiths et al., 2014; UN, 2014; WHO, 2006). Prescription drug abuse and diversion is associated with serious medical, social and other short- and long-term outcomes (Hall et al., 2008; Häkkinen et al., 2014; Rudisill et al., 2014; Rönkä et al., 2015; Zamparutti et al., 2011) and is a recognized global public health concern (WHO, 2006; UN, 2014; Griffiths et al., 2014). Still, established, effective methods that evaluate their occurrence are missing (Secora et al., 2014).

Psychoactive prescription drugs are commonly and increasingly identified in the blood and urine samples of drug-impaired drivers (Bezemer et al., 2014; Burch et al., 2013; Christophersen and Mørland, 2008; Jones et al., 2009; Karjalainen et al., 2015; Wilson et al., 2014). Because psychoactive drugs may impair driving ability, their users are at increased risk of traffic accidents (Dassanayake et al., 2011; Gustavsen et al., 2008; Hetland and

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Carr, 2014). Moreover, mental health problems as well as substance use disorders are more common (Freeman et al., 2011; Karjalainen et al., 2012; Lapham et al., 2001) and psychoactive drugs are more commonly prescribed (Karjalainen et al., 2015) among drug-impaired drivers than in the general population. Thus, investigations of drug-impaired driving are primarily conducted in individuals with a history of substance use problems.

The prevalence of psychoactive prescription drug diversion and the extent to which prescribed vs. non-prescribed drugs are involved, is largely unknown. It is well known that diversion of psychoactive prescription drugs involves original as well as falsified products and that diverted drugs have diverse origins, including personal prescriptions, drug theft, illegal Internet shopping as well as smuggling (Fischer et al., 2010; Fittler et al., 2013; Fountain et al., 2000; Inciardi et al., 2007; Lapeyre-Mestre et al., 2014; Peirce et al., 2012; UN, 2014). Little is also known about the factors associated with diversion of psychoactive prescription drugs, although the established risk factors for substance use disorders, including young age (Hall et al., 2008; Rönkä et al., 2015), mental health problems and previous treatment with psychoactive drugs (Buurma et al., 2008; Cepeda et al., 2012; Bodén et al., 2014) are likely to be important. As opposed to other substance use disorders, however, prescription drug abuse has reported as equal in both sexes (Cepeda et al., 2012; Hall et al., 2008; Han et al., 2014; Rönkä et al., 2015) or greater in women (Buurma et al., 2008; Worley and Thomas, 2014).

Finally, although it is well known that different psychoactive prescription drugs are diverted to different degrees (UN, 1971, 1975, 2004, 2014; WHO, 2006), published comparative research is sparse. Previous studies have primarily investigated psychoactive prescription drugs as a group (Hall et al., 2008; Rönkä et al., 2015), or focused on a separate drug class, such as opioids (Fischer et al., 2014; Häkkinen et al., 2014; Paulozzi et al., 2009; Wikner et al., 2014).

The confirmed intake of a psychoactive prescription drug in an individual for whom it was prescribed would be expected, whereas in a subject without such prescribed treatment could indicate drug diversion. The aim of this study was to determine the prevalence of non-prescribed use for five psychoactive prescription drugs with different degrees of previously documented abuse potential (diazepam, flunitrazepam, tramadol, zolpidem and zopiclone) among subjects suspected of drug-impaired driving, and to identify associated factors.

2. Material and methods

2.1. Drug-impaired driving in Sweden

Since 1999, Sweden has had a zero tolerance law for driving under the influence of scheduled psychoactive prescription drugs. Driving under the influence of such drugs that are used without a prescription, or in contravention of the prescribed instructions or product recommendations, is a crime (Jones, 2005). When an individual is suspected of driving under the influence of drugs (DUID), on account of a traffic accident, inappropriate driving behavior, DUID history or a known history of abuse, and at random stop-checks, the Swedish police is authorized to perform a field breath test and collect a blood sample from the driver. A positive blood sample is required to prosecute a driver suspected of DUID. Samples are sent to a national accredited laboratory at the National Board of Forensic Medicine in Linköping where the toxicological analyses are performed according to standardized screening and verification procedures to determine the presence and concentrations of alcohol and illicit as well as prescription drugs that may affect driving ability (Jones, 2005; Ahlner et al., 2014). These include amphetamines, cannabis, ecstasy, opioids (opiates as well as synthetic and semi-synthetic opioids), cocaine and benzodiazepines, although the verification analyses depends on the specific substance or substances present at screening (i.e., if alcohol is identified at the field breath test or an illicit drug is identified upon screening, prescription drugs may not be further determined). Since 1992, the results of all forensic toxicology investigations are registered in a national database, ToxBase. In Sweden, all citizens receive a unique personal identification (ID), number which is included in national registers held by authorities to enable individual-based research and register-linkage.

2.2. Study population

The study population was identified in the Swedish national forensic toxicology database, ToxBase (National Board of Forensic Medicine, Sweden), and comprised Swedish citizens who were investigated for suspected DUID in Sweden between 1/7/2006 and 30/6/2009 and for whom toxicology analysis of blood confirmed intake of any of the following five drugs (and their Anatomical Therapeutic Classification (ATC) codes (WHO, 2008): the benzodiazepines diazepam (N05BA01) and flunitrazepam (N05CD03), the opioid analgesic tramadol (N02AX02), or the benzodiazepine-like hypnotics zopiclone (N05CF01) and zolpidem (N05CF02). These drugs were selected because of their different degrees of previously documented abuse potential (Medical Products Agency (MPA), 2009), and because of their relevance in the Swedish and international drug scene as well as in the forensic DUID population (Ahlner et al., 2014) at the time for the study. The Swedish classification of drugs corresponds with international classifications (UN, 1971, 1975, 2004) and, as in some other countries (U.S. Food and Drug Administration (FDA), 1970;U.K. Parliament, 1971), the Swedish classification comprises some additional drugs. Thus, the study drugs are scheduled in Sweden as class II (flunitrazepam), class III (tramadol), class IV (diazepam and zolpidem) and class V (zopiclone) narcotic drugs, involving restrictions in prescribing, dispensing, import, disposal and distribution of these drugs.

2.3. Data collection

This epidemiological study utilized information on toxicology results, dispensed prescription drugs, socioeconomy and registered residency from four national registers. For each driver the date of the first DUID investigation in the inclusion period was identified as the index date. When the intake of more than one of the study drugs was confirmed in a driver, an index date was set for each identified drug. Information from the National Forensic Toxicology database (ToxBase) comprising subject data (age at index, sex, personal identification number, previous DUID offences the five years preceding the investigation) and toxicological analysis results (identified drugs and their concentrations, and alcohol) were included, as well as some administrative data. Information on prescription drugs dispensed during the 12 month period preceding the index date (dispense date and drug substance by ATC level 5 (WHO, 2008)) was obtained from the Swedish Prescribed Drug Register (SPDR, National Board of Health and Welfare (Wettermark et al., 2007)). This register covers reimbursed and non-reimbursed outpatient dispensing of prescribed medicines in Sweden and includes personal identifiers. The Swedish LISA database (Longitudinal Integration Database for studies of health insurance and labour market, Statistics Sweden) was used to collect socioeconomic data (highest attained educational level, marital status, individual disposable income and individual country of birth) for the half calendar-year of the index date. Low, middle and high income levels were defined as the 25, 25–75 and 75 percentiles for the Swedish general population >15 years in the year 2008 as follows: 25%: 107.436 SEK, 25–75%: 107.437–303.958 SEK, 75%: 303.959 SEK, where 1 SEK = €