Prevalence of Non-Prescribed Drug Use in Hospital Patients Assessed by Urine Toxicology Testing

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To analyse the results of a survey for non-prescribed drug use in selected patient populations in Tallaght University Hospital to determine the patterns of drug use by urine toxicology testing.Urine toxicology screening results done by the Alere Triage® TOX Drug Screen Meter were extracted from the Clinical Chemistry Lab database from the 5th of March to the 23rd of March at Tallaght University Hospital. Results were analysed to determine which drug tested positive most commonly. Benzodiazepines were the most prevalent drugs of abuse in urine toxicology, accounting for 25.62% of all positive results, this was followed by Cannabis and Amphetamines with 21.67% and 20.20% respectively. The largest age group that presented was between 30-39 inclusive. Benzodiazepines are the most prevalent positive result in drug of abuse screens in Tallaght University Hospital and the 30-39 age group contained the most positives and number of samples sent for toxicology analysis, supporting the claims of recent literature.

Introduction

According to the All-Ireland Drug Use Survey (National Advisory Committee on Drugs and Alcohol (NACDA), 2016), the levels of illegal drug use in Ireland have risen over the past decade and those aged between 15 and 24 have the highest use of non-prescribed drugs. The percentage of Irish people aged 15-64 saying that they had used an illegal drug at least once in their life rose from 18.5% in 2002/03 to 30.7% in 2014/15, with increases reported at each intervening survey (McKinney, 2017). Cannabis has been reported to be the most commonly used drug, with 27.9% of respondents between the same age group having reported use in 2016 (Brennan, 2016). This study aims to analyse the results of a survey for non-prescribed drug use in selected patient populations in Tallaght Hospital to determine the patterns of drug use by urine toxicology testing. Urine drug screen (UDS) immunoassays are a quick and inexpensive method for determining the presence of drugs of abuse (DOA). Therefore, testing will be performed by the Alere Triage® TOX Drug Screen Meter, which provides rapid and sensitive urine screening of up to 11 drug classes at once (Table 1). The results of a toxicology screen include a "POS" or "NEG" reading for Paracetamol (APAP), Amphetamines (AMP), Methamphetamines (mAMP), Barbiturates (BAR), Benzodiazepines (BZO), Cocaine (COC), Methadone (MTD), Opiates (OPI), Phencyclidine (PCP), Tetrahydrocannabinol (THC) and Tri-cyclic Antidepressants (TCA).

Methods

The primary investigation undertaken involved a comprehensive review of urine
toxicology samples received into the department of Clinical Chemistry at Tallaght University Hospital. Samples were collected over a 19 day period from the 5th of March to the 23rd of March and screened in the lab for a panel of 11 drugs of abuse (Table 1) using the Alere Triage® TOX Drug Screen. Initially there were forms distributed to the Emergency Department and Department of Psychiatry that were to be filled out for each sample sent to the lab by clinical staff, this form contained basic patient information along with known drug use and the reason for their toxicology screen request. The form also contained a tick box giving the option for the extended drug panel that would be conducted in Birmingham, this acted to gain consent and as a fail-safe to guarantee that samples would be available to send for further analysis as the study was pending ethical approval.

Ethical approval was granted by the SJH/AMNCH Research Ethics Committee and provided for submission of all samples received during the research period for extended DOA screening in Birmingham.

Over the course of the study we received a yield of 154 urine samples, 7 (4.54%) of which were unsuitable for analysis due to leakage in transit. Of these 7 spoiled samples, 4 were reordered soon after while the remaining 3 patients did not have a further sample submitted to the lab for analysis.
The Alere Triage® is very simple to use, a sample of urine is taken up by a small pipette with an overflow bulb to ensure the correct amount and no more is used. This sample is released into one end of a TOX Drug Screen cartridge that has just been removed from its packaging. The cartridge is then inserted into the device and the assay is run. This can take about 15 minutes from the moment the sample is placed in the cartridge, a significant amount of this time is taken up by the time it takes the sample to fully pass through the cartridge, therefore preparing a few samples simultaneously will allow quicker analysis following completion of the first screening. The device produces a printout for each sample that details the 11 drug panel and a positive/negative reading for each. The threshold values are also listed, however the result does not give a quantitative value for each sample.

Each sample received was also aliquoted twice, both aliquots into a 10mL sealed tube and labelled with the lab number as a unique patient identifier. One set of these aliquots was to be sent to a laboratory in Birmingham where an extended drug panel was offered. The second set of aliquots was frozen and stored, for potential future analysis should it be required.
Clinical data for selected patients was also extracted from the Emergency Department database Symphony, this allowed for the correlation of history, symptoms and diagnoses with the toxicology data returned from that patient's sample.

Results

A total of 154 urine samples were received mainly from the Adult Emergency Department and the Paediatric Emergency Department with some samples also collected from Psychiatry and from various wards around the hospital. Upon analysis using the Alere Triage® TOX Drug Screen results were tabulated and key data was extracted that can be seen in Figures 2-4. It can be noted that Paracetamol (APAP) is the most commonly returned positive from ages 10-29, thereafter, Benzodiazepines (BZO) become the most prevalent (with the exception of the 60-69 bracket where THC was equally prevalent) (Figure 2). Examining drug prevalence, without the age breakdowns, it can be seen that Benzodiazepines remain the most prevalent across all positive samples with a total of 52 (25.62%) (Figure 2). THC was the second most prevalent, followed by Paracetamol with 44 (21.67%) and 41 (20.20%) positives, respectively. There were no samples that tested positive for Phencyclidine (PCP) and very few that returned positive results for Amphetamine (AMP) 1, Barbiturates (BAR) 1, Tricyclic Antidepressants (TCA) 2, or Methamphetamine (MAMP) 2. Overall there was quite a diverse breakdown in the return of positive results.

Analysing the gender breakdown, it is indicated that any given male sample is more likely to be positive for at least one DOA than a female sample. Analysis of multiple positive results for a single sample was also undertaken. 27 (34.62%) of the 78 male

samples were positive for one drug only, this number was 13 and 14 for 2 positives and 3 in a given sample respectively. It is also of note to see that two samples returned a positive result for 5 DOA, one of these samples was from a patient on 50mg of Methadone weekly with a Methadone overdose listed as the likely diagnosis on sample's request form. The female samples returned a slightly different data set; while there were no patients with a positive for 5 DOA, there were 4 samples that presented with a positive result for 4 DOA (2 of these were from the same patient), while no males presented with 4 positive DOA readings. One of these patients was noted to have been brought in by ambulance after collapse with a suspected overdose of 6 tablets of Lyrica and Diazepam, and 90 mL of Methadone. She was known to be on Methadone therapy.

Discussion

The 2016 Report of Tallaght Drug & Alcohol Task Force to the Drug Programmes Unit, Department of Health (Tallaght Drug & Alcohol Task Force (TDATF), 2016) gives a further insight into some of these trends and is the most recent version available. Data suggests that throughout the period of 2016 as a whole Tallaght had the second highest number of people using methadone treatment services in the country at 731 individuals (6.4%), with 676 undergoing treatment at the end of year (8.8%). These figures were second only to North Inner City Dublin at 982 (8.6%) for the year in total and 889 (8.8%) at the close of the year. The same report also details information gathered from the

National Drug Treatment Reporting System (NDTRS) in 2015 where outcomes from patients (268) attending any form of drug rehabilitation services were analysed. The predominant positive outcomes were: "Treatment Completed" and "Transferred Stable" with 61 and 24 patients respectively. The most prevalent negative outcomes were "Client did not wish to attend further treatment sessions" at 54, "Client refused to have further sessions (or did not return for subsequent appointments)" at 92, and "Premature exit from treatment for non-compliance" at 11, totalling off at 157, significantly higher than the cumulative positive outcomes. Only a single patient received rehabilitation treatment for the use of benzodiazepines in 2015, this result comes as a surprise based on its growing prevalence and the findings of this paper's findings. The National Advisory Committee on Drugs and Alcohol published their most recent drug prevalence report in 2016 (National Advisory Committee on Drugs and Alcohol (NACDA), 2016) detailing cannabis as the most prevalent illegal drug in Ireland with increases in lifetime prevalence (25.3% to 27.9%), last year prevalence (6% to 7.7%) and last month prevalence (2.8% to 4.4%) since its previous report in 2012 (National Advisory Committee on Drugs and

Alcohol (NACDA), 2012). These results are the nationwide figures, however in the regional reports contained within, the South West Regional Drug Task Force, of which Tallaght is within its catchment area, showed similar trends. This differs from the results detailed figure 1.1 of this report, which suggests benzodiazepines to be the most prevalent drug, with cannabis coming second, narrowly followed by amphetamines. This could indicate that there has been a significant shift in drug prevalence since the 2012 publication. Internationally however cannabis remains as the leading illicit drug internationally with an approximated 162 million adult users in 2004 (Hall & Degenhardt, 2007).

Conclusion

154 urine samples were collected over a 19-day period in Tallaght University Hospital for toxicology screening. The most prevalent drug of abuse class was found to be benzodiazepines, with 25.62% of samples testing positive; this was followed by THC (21.67%) and paracetamol (20.20%). No samples during this period tested positive for phencyclidine (PCP). Drug abuse in the age group of 30 – 39 years old was ascertained to be most prevalent, with 66 positives recorded from 35 samples. Patterns of drug use varied between age ranges, with paracetamol (APAP) most common in 10 – 29 year olds and with THC equal in prevalence to benzodiazepines between the ages of 60 and 69, with benzodiazepines the most prevalent overall. Gender analysis found a higher percentage (71.79%) of males than females (61.84%) tested positive for at least one drug. The majority (34.62%) of male samples were positive for one drug only as opposed to females, where two positives were most commonly observed (26.32%). The highest number of positive results from a single sample was observed to be 5 among males and 4 among females. These findings give an overview as to current patterns of drug abuse in Tallaght and the surrounding area, and patterns of prevalence can be seen to be similar to those observed in a similar study (Rajasingam & Gallagher, 2015).

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Drug	Drug Code	Threshold Concentration
Acetaminophen/Paracetamol	APAP	5 µg/mL
Amphetamines	AMP	1000 ng/mL
Methamphetamines	mAMP	1000 ng/mL
Barbiturates	BAR	300 ng/mL
Benzodiazepines	BZO	300 ng/mL
Cocaine	COC	300 ng/mL
Methadone	MTD	300 ng/mL
Opiates	OPI	300 ng/mL
Phencyclidine	PCP	25 ng/mL
THC	THC	50 ng/mL
Tricyclic Antidepressants	TCA	1000 ng/mL

Table 1. Threshold concentrations for the 11 DOA classes tested for by Alere Triage Tox Drug Screen

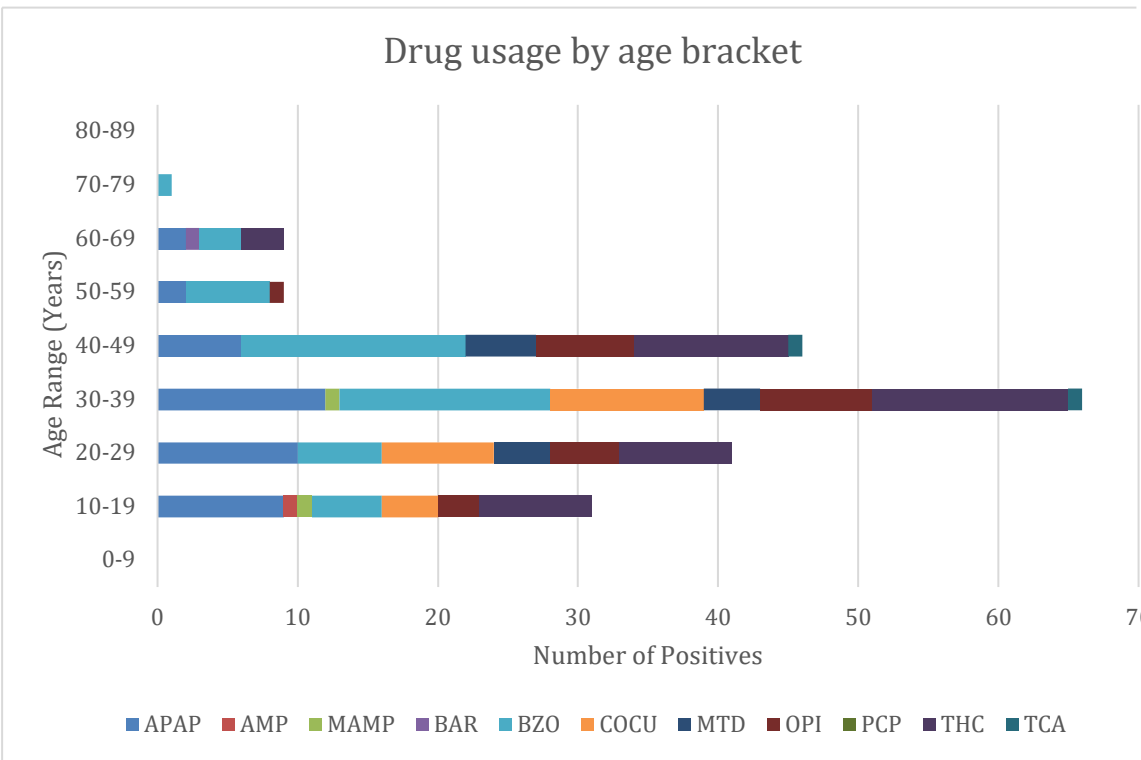

Figure 2. Drug useage by age bracket

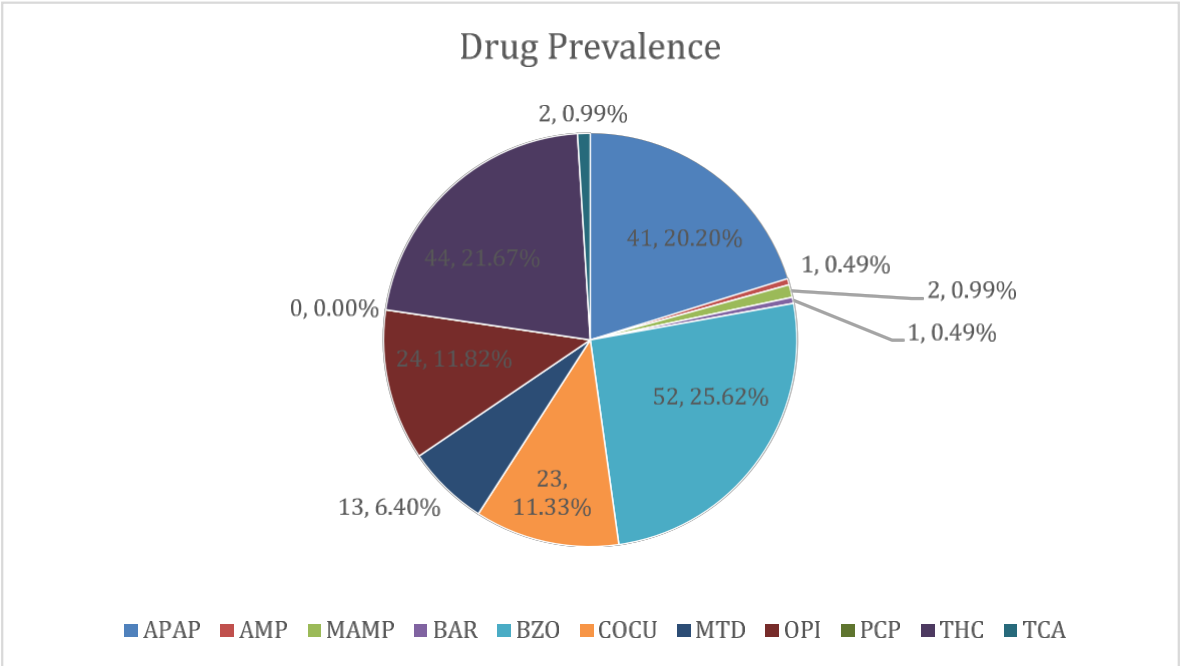

Figure 3. Drug prevalence of 11 DOA classes tested in 154 patient samples.

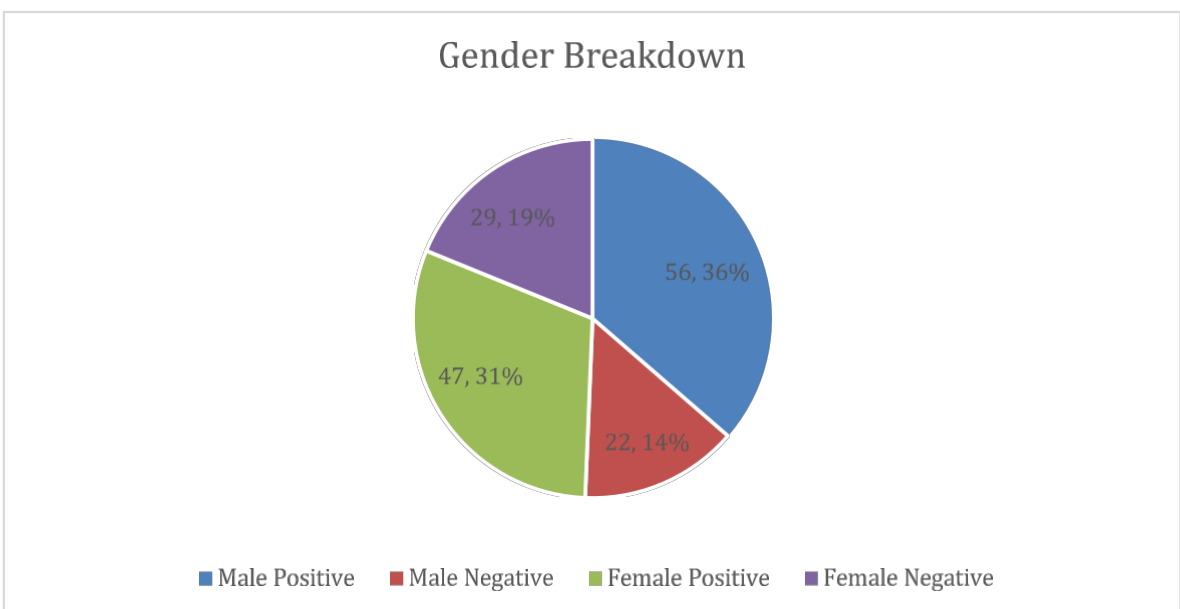

Figure 4. Percentage of males and females testing positive and negative for one or more DOAs