EMCDDA DRD expert meeting 12-13 November 2012, Lisbon

Deaths from Novel Psychoactive Substances (NPS) in the UK

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Introduction

This presentation focuses on deaths notified to the National Programme on Substance Abuse Deaths (np-SAD) by the end of August 2012. There are other cases for which the formal legal investigations have yet to be concluded, as well as other cases to be reported.

What is a Novel Psychoactive Substance (NPS?)

The UK Advisory Council on the Misuse of Drugs (ACMD) uses the following approach:

"*psychoactive drugs which are not prohibited by the United Nations Single Convention on Narcotic Drugs or by the Misuse of Drugs Act 1971, and which people in the UK are seeking for intoxicant use*'.

This presentation considers substances brought under control by legislation after being examined by the ACMD, being considered for control/regulation, or still legal. This presentation makes no distinctions. However, changes in legal status may affect availability – and thus use.

Sources of information on UK drug deaths

General Mortality Registers:
Office for National Statistics (England & Wales)
National Records of Scotland
Northern Ireland Statistics & Research Agency

- Source – death registrations & information from coroners inquisition forms, but not toxicology
- Deaths registered in year
- ONS have a special database covering drug poisoning death registrations since 1993. There are similar ones in Scotland (1994 onwards) and Northern Ireland (1997 onwards).

Sources of information on UK drug deaths

General Mortality Registers:

Published data – only limited breakdowns available:

- Any mention
- Sole mention
- Any mention with one or more other drugs and alcohol drug-related deaths

And on a limited range of substances

National Programme on Substance Abuse Deaths (np-SAD)

np-SAD gets information from coroners (England, Wales, Northern Ireland, Channel Islands, Isle of Man) and the Scottish Crime & Drug Enforcement Agency on a voluntary basis on drug-related deaths and deaths of addicts.

Since 1997 details of more than 25,000 deaths have been received.

The average annual response rate is up to 95% (Ghodse et al., 2012).

Case definition - at least one of the following: (a) presence of one or more psychoactive substances directly implicated in death; (b) history of dependence or abuse of drugs; (c) presence of controlled drugs at post-mortem.

np-SAD

np-SAD often receives autopsy & PM toxicology reports

A range of documents are contained in coronial inquest files, although the variety differs from case to case. Typically, the coroner has access to:

- statements from witnesses,
- family & friends;
- General Practitioner records;
- reports from ambulance, police or other emergency services;
- hospital Emergency Department & clinical ward reports;
- psychiatric & substance abuse team reports;
- autopsy & PM toxicology reports.

np-SAD

Case identification and verification

A range of sources is used to identify cases, including:

- Routine surveillance activities – submission of forms by coroners, data collection by np-SAD staff
- Notifications by police contacts, including national agencies
- Individual forensic toxicology labs, national Forensic Science Service, and networks build up by the Programme Manager
- Drug & Alcohol Action Teams
- Regular Internet searches of toxicological as well as newspaper and other media websites

Media & other reports available for some cases are used to supplement the information provided on the np-SAD data collection form, especially where access to the full coronial files is not possible.

np-SAD

Caveats

- Not all suspected cases may have been identified
- Remaining 'positive' cases are awaiting further inquiries or inquest.
- The fact that a substance may have been involved in death cannot be confirmed until the relevant coroner or Procurator Fiscal has concluded her/his inquest or other formal inquiry.
- The presence of a substance in post mortem toxicology does not necessarily imply that it caused or contributed to a death.

Trends in UK ‘traditional’ stimulant deaths – GMR data

Mentions of ‘traditional’ stimulant drugs on death certificates, UK, 2001-11

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Drug											
Cocaine	117	161	161	192	221	224	246	325	238	180	152
Amphetamine	29	55	41	47	57	55	62	68	46	50	66
Ecstasy-type	77	79	66	61	73	62	64	55	32	9	24
All ONS definition deaths	3679	3461	3168	3378	3305	3235	3352	3754	3673	3517	3503

Notes: Year of registration of death, not year death occurred.
Sources: ONS, (2012), NRS (2011); NISRA (2012).

Trends in UK 'traditional' & 'new' stimulant deaths – np-SAD data

Deaths involving stimulants on np-SAD database, UK, 2005-10						
Year	2005	2006	2007	2008	2009	2010
Drug						
Cocaine	221	207	322	261	210	118
Amphetamine	58	61	78	70	50	37
Ecstasy-type	57	64	71	44	9	5
GHB/GBL	5	10	13	18	22	14
Ketamine	2	7	7	20	16	9
Piperazines	0	1	5	13	17	7
Note: figures for later years may increase as inquests are completed.						

np-SAD trends in ‘stimulant’ deaths

Cocaine, amphetamine & Ecstasy deaths peaked in 2007

GHB/GBL & Piperazines deaths peaked in 2009

Ketamine deaths peaked in 2008

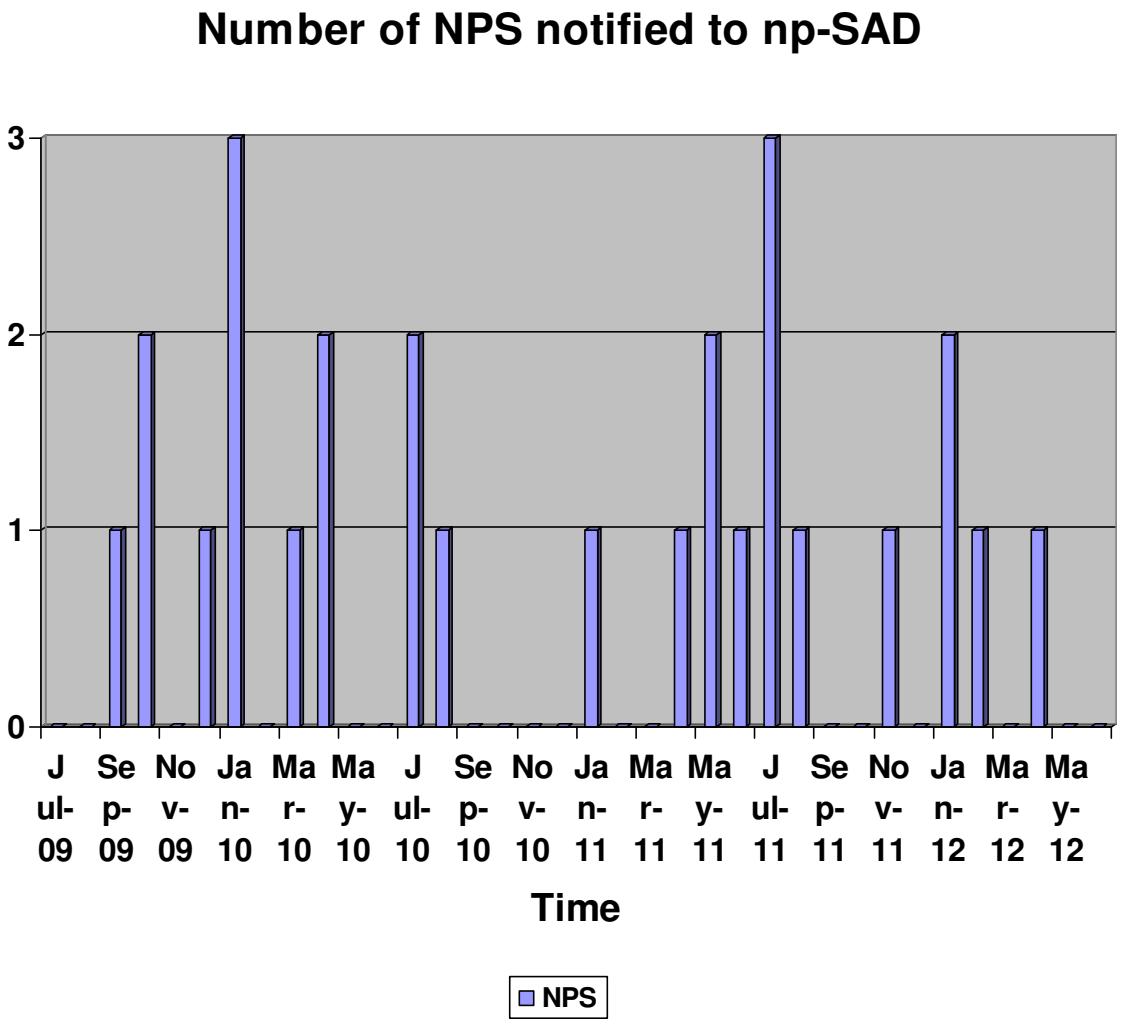
Trends in UK NPS deaths 2009 onwards

27 NPS (excluding piperazines) were mentioned in the PM toxicology of cases (n=124) notified between September 2009 and April 2012, 24 of which were also implicated in the causing or contributing to deaths (n=81).

These substances can be grouped in the following way:

Aminoindanes (2)
Amphetamine-type substances (ATS) (5)
Benzofurans (1)
Methoxetamine
Methcathinones (11)
Natural products (Datura, Salvia)
Phenazepam
Piperidines (1)
Synthetic cannabinoids (1)
Tryptamines (3)

Trends in UK NPS 2009 onwards



Trends in UK NPS deaths 2009 onwards

Of these substances, 3 were already controlled under UK legislation before the start of the period considered.

Many came under control/regulation during the period since December 2009.

4 remain uncontrolled – but the ACMD Working Group on NPS is keeping a “watching brief”

Trends in UK NPS deaths

Substance	PM toxicology					Cause of Death				
Year	2009	2010	2011	2012	total	2009	2010	2011	2012	total
Aminoindanes										
5-IAI	0	0	0	1	1	0	0	0	1	1
MDAI	0	0	2	1	3	0	0	2	1	3
ATS										
4-MA	0	0	0	1	1	0	0	0	1	1
Fluoroamphetamine	1	0	0	0	1	1	0	0	0	1
MPA	0	0	0	1	1	0	0	0	1	1
PMA	0	1	2	4	7	0	0	2	4	6
PMMA	0	0	2	2	4	0	0	2	2	4
Benzofurans										
APB	0	0	1	0	1	0	0	1	0	1
Benzodiazepines										
Phenazepam	0	0	11	1	12	0	0	6	1	7
Ketamine derivatives										
Methoxetamine	0	0	1	0	1	0	0	1	0	1
Natural products										
Datura products	1	0	0	0	1	1	0	0	0	1
Salvia	0	0	0	0	0	0	0	1	0	1
Piperidines										
Desoxypipradrol	0	3	0	0	3	0	3	0	0	3

Trends in UK NPS deaths

Substance	PM toxicology					Cause of Death				
Year	2009	2010	2011	2012	total	2009	2010	2011	2012	total
Methcathinones										
4-MEC	0	0	4	2	6	0	0	3	1	4
Flephedrone	0	2	1	1	4	0	2	1	1	4
MDPBP	0	0	1	0	1	0	0	1	0	1
MDPV	0	9	3	0	12	0	6	2	0	8
Mephedrone	8	46	18	2	74	5	29	8	0	42
Methedrone	0	2	0	0	2	0	1	0	0	1
Methylone	0	2	0	0	2	0	2	0	0	2
N-desakyl-4-methylmethcathinone	0	1	0	0	1	0	0	0	0	0
Naphyrone	0	2	0	0	2	0	2	0	0	2
Pentylone	0	0	1	0	1	0	0	1	0	1
Pyrovalerone	0	1	0	0	1	0	1	0	0	1
Synthetic cannabinoids										
AM2201	0	0	0	1	1	0	0	0	1	1
Tryptamines										
5-MeO-DALT	0	1	0	0	1	0	1	0	0	1
AMT	0	0	1	0	1	0	0	1	0	1
Tryptamine	1	0	0	0	1	0	0	0	0	0

Characteristics of UK NPS deaths

Variable	Aminoindanes	ATS	Benzofurans	Methoxetamine	Methcathinones	Natural Products	Phenazepam	Piperidines	Synthetic cannabinoids	Tryptamines
N	4	7	1	1	53	2	6	3	1	3
Male	2	4	1	1	37	2	5	2	1	3
Mean age	25.8	29.2	35.1	29.6	29.3	28.9	38.3	31.5	18.5	34.0
White ethnicity, where known	4	6	1	1	43	2	5	3	1	3
Employed	2	2	0	1	23	2	1	2	0	2
Unemployed	2	2	1	0	12	0	0	1	0	1
Living alone	0	2	0	1	12	2	1	0	0	0
Living with others	4	3	1	0	31	0	1	3	1	2
Drug use history	1	3	0	1	26	2	3	2	0	2
Died in residence	3	5	1	1	27	1	2	0	0	0
Died in hospital	1	1	0	0	16	1	0	1	1	1

Characteristics of UK NPS deaths

Variable	Aminoindanes	ATS	Benzofurans	Methoxetamine	Methcathinones	Natural Products	Phenazepam	Piperidines	Synthetic cannabinoids	Tryptamines
Accident	2	3	1	1	33	1	6	1	1	2
Suicide/intent not known	0	0	0	0	11	0	0	2	0	0
Drug abuse	2	4	0	0	6	1	0	0	0	1
Accidental poisoning	4	7	1	1	37	1	6	1		1
Intentional poisoning	0	0	0	0	0	0	0	0	0	0
Poisoning, intent unknown	0	0	0	0	2	0	0	0	0	0
Hanging	0	0	0	0	6	0	0	0	0	0
Other	0	0	0	0	8	1	0	2	1	2
Mean no PM drugs	2.3	4.9	9.0	3.0	3.3	4.5	2.8	2.3	1.0	3.0

Characteristics of UK NPS deaths

Main findings:

- Gender – even split for Aminoindanes, ATS,to lesser extent for Methcathinones, rest typically male – as we would expect
- Age – mean age ranges from 18.5 to 38.5 years, lower than typical np-SAD case (mid-40s)
- Ethnicity – where known, mostly White - typical of np-SAD
- Employment and living arrangements similar to np-SAD cases
- Addiction – most had a history of previous drug use; higher than most np-SAD cases
- Place of death – More than half in residential premises, but significant proportions in hospital

Characteristics of UK NPS deaths

Main findings:

- Manner of death – most attributed to accidents or drug abuse, but for methcathinones (typically mephedrone) large number of suicides/open verdicts
- Reflected in underlying cause – mostly accidental poisonings but many traumatic deaths, especially hangings for mephedrone
- The mean number of PM drugs ranges from 1-9, but typically 3 or 4
- This is in line with findings for other UK stimulant deaths, reflecting polysubstance use
- From the research we have recently published on mephedrone and other NPS, we know that NPS can kill of their own accord

Characteristics of UK NPS deaths

Drug combinations:

- Salvia Divinorum, synthetic cannabinoids (AM2201), and Methoxetamine deaths had no other substances involved
- Datura case had mephedrone present (and medications)
- Benzofuran (APB) – with aminoindanes, ecstasy, piperazines, etc.
- Desoxypipradrol: 2 with alcohol, 1 with anti-depressant & anti-psychotic
- ATS – typically with alcohol, ecstasy, cannabis
- Aminoindanes – 1 with alcohol; 1 – alcohol, ecstasy, piperazines, APB (see above); 1 – alcohol, lignocaine, MPA, medications
- Tryptamines – 5-MeO-DALT + alcohol; AMT + cocaine + amphetamine; unspecified tryptamine + ibogaine + noribogaine
- Phenazepam – typically diazepam + methadone + others
- Methcathinones – often several types + alcohol + stimulant + piperazines, sometimes GBL, ketamine, opioids, medications

Discussion

The UK experience is a lack of documented cases in the literature, as well as nothing by way of quantitative data.

These gaps in knowledge need to be filled. np-SAD has tried to fill some of them, e.g. mephedrone, 5-Meo-DALT, Desoxypipradrol, Phenazepam.

Filling gaps should lead to a much better understanding of the potential risks of death associated with NPS use, based on empirical observation.

Need to identify and map sources of information on NPS-related mortality, collate what is currently known in terms of statistics, and identify what gaps exist and how they might be filled.

An improved information-base enable the estimation of the possible numbers at risk of dying from these substances.

Discussion

What are the implications of gaps in knowledge about these drugs?

- The last 4 years have seen unprecedented rapid changes in drug supply and consumption patterns
- The contents of branded products such as “Ivory Wave” have changed over this time, and there may be other unlisted psychoactive ingredients, including controlled drugs
- Products are coming on the market that have not been tested in vitro or in vivo (even on animals)
- Pharmacological effects, metabolism, toxicity, etc remain largely unquantified

Discussion

- Patterns of drug use in PM toxicology results for mephedrone & similar methcathinone cases similar to those reported by surveys & online users' fora (Corkery et al. 2012; Schifano et al., 2012).

- Polysubstance use is common, especially the co-ingestion of alcohol, stimulants and other 'legal highs'.

- Pathologies (including psychopathologies) exhibited in many of these cases exhibit close similarities to those previous noted for amphetamine, cocaine, MDMA and khat (see Bibilography).

- Implications - similar advice to that given for adverse events caused by other stimulants should be provided to clinicians, emergency services & first-aiders.

Discussion

- Treatment for more life-threatening conditions might be broadly similar to that for amphetamine poisoning.

- Individuals with less severe symptoms should be assessed and managed as for any psychoactive drug user; they may simply need reassurance, support and observation.

- People with underlying cardiac, neurological and psychiatric conditions, especially those on medication, are likely to be at greatest risk of serious adverse events.

Discussion

- Although our knowledge of methcathinones' potential neurotoxicity or long-term consequences of use is still very limited, it is sensible to offer the following advice:
- Avoiding regular use to avoid developing tolerance
- Do not use the drug in combination with other stimulants or large amounts of alcohol and other depressants;
- Do not inject the drug;
- Remain well hydrated when using the drug
- Avoid becoming overheated

Comparison with other substances

These cases need to be related to other factors in order to assess risk(s) of morbidity and mortality.

This will facilitate the comparisons with the risks associated with other substances, particularly those which are chemically related such as methcathinones and amphetamine.

It might be possible to derive a lethality index value as calculated for other substances of mis(use) by King and Corkery (2010). This was based on drug availability indicators, number of users, and number of fatalities.

Comparison with other substances

An alternative approach might be to relate the number of fatalities where index substance constituents are found in post mortem samples to the number of fatalities where these constituents and/or the index substances caused or contributed to death. This should be done for index drugs on their own and with other substances.

These measures would assist in informing the approach to assessing the need for regulation/control.

Key messages

The rate at which NPS are entering the European and international recreational drug scenes is increasing.

Furthermore, the range of substances being used is diversifying and it is difficult for forensic toxicologists, epidemiologists, law-makers, and health professionals to keep up to date.

Monitoring drug-related deaths can help to identify emerging NPS through their presence in PM toxicology, but also their role(s), if any, in causing or contributing to death.

Key messages

There are physiological and mental health risks associated with NPS consumption. We do not know what long-term use of such substances can lead to in terms of morbidities.

Anecdotal stories and information from coroners point to there being other UK deaths that need to be documented and understood. The international situation is even less understood.

This is something for epidemiologists, policy-makers, service providers, etc. to investigate. The facts need to be established, digested and discussed. Only by doing that will we be able to deepen our knowledge of the phenomenon.

Thank you for your attention

Where is the coffee?

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SMAIL IS:

A multiregional automated E-mail/SMS designed for both young people and health professionals working in the field of substance misuse.

Using SMAIL is easy and free

1. Text the drug name to the SMAIL number 0044-7781482595 or e-mail the drug name to drugs@tmcmedical1.co.uk
2. Within 10 seconds, you will receive a SMS alert as well as an e-mail with information about the requested substance.

At the 1st month

- 100 users
- 14 countries
- 300 sms searches
- 50 e-mail searches

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Acknowledgements

The National Programme on Substance Abuse Deaths would like to thank the coroners, Scottish Crime and Drug Enforcement Agency, and the General Register Office for Northern Ireland who regularly supply data to the Programme

Funding

The surveillance work of the np-SAD was funded by the Department of Health (England) from 1 January 2004 until 31 July 2010.

The National Treatment Agency have provided funding to facilitate the production and publication of reports on deaths occurring in 2010 and 2011.

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