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Review Article

Development of legal highs

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Abstract

New psychoactive substances (NPS) or 'legal highs' are defined as unregulated psychoactive substances including synthetic and/or plant derived substances (marketed as research chemicals, party pills and herbal highs) that are intended to mimic the effects of controlled drugs. Psychiatric services around the country are seeing a rise in the use of NPS complicating mental health presentations. The challenge surrounding these substances is the fact that they are not under the international drug control system and are proving to have a detrimental health effect on users. This article reviews the current literature on this subject and discusses some of the most common examples of NPS and their potential effects on mental health.

Keywords

New psychoactive substances; legal highs; schizophrenia; NPS

INTRODUCTION

New psychoactive substances (NPS) or 'legal highs' are defined as unregulated psychoactive substances including synthetic and/or plant derived substances marketed as research chemicals, party pills and herbal highs, that are intended to mimic the effects of controlled drugs (EMCDDA, 2012). Substances are only classed as such in the UK once they have not demonstrated a clear medical benefit. Individuals use these by choice for pleasure; that is to obtain a 'high'. The use of 'legal highs' has seen a rapid rise over the past decade (INCB, 2013). The challenge surrounding these substances is the fact that they are 'legal' meaning that they have not been classed as Controlled Drugs under the Misuse of Drugs Act (1971), which would regulate their supply and make them illegal to possess and sell. These restrictions occur on substances where their danger to society is clearly demonstrated regardless of whether or not they have a medicinal purpose. Although they are widespread in Europe and America, NPS are reported to originate primarily from Asia (UNODOC, 2013).

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DESIGN AND DISTRIBUTION

According to the International Narcotics Control Board (INCB, 2013) and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, 2013), legal highs are mainly manufactured in chemical laboratories in Asia. Production and distribution of these substances is deemed lucrative as it promises high returns without implications of the law. Once produced, these substances are transferred to other countries usually by sale on the internet or from specific

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shops. Indeed, these substances can easily be obtained from shops in the middle of busy town centres in the UK that sell them as 'research products, bought at your own risk'.

Once on the market, countries aim to control these substances or their analogues by imposing bans. When the substance has been banned the manufacturers modify their chemical structure slightly thus making it possible to market them without restriction. This vicious cycle of producing a drug that is sold legally until it is banned and then replaced with another drug is spiralling out of control. The success of this market is largely due to the speed at which manufacturers develop new analogues and then use sophisticated marketing strategies e.g. as bath salts, plant fertilisers, etc. to sell them (EMCDDA, 2012). The internet aids this by providing suppliers with easy access to distribution channels. To couple this, the general perception of the term 'legal highs' is a powerful marketing tool in itself as people believe the fact that it is 'legal' means that it is not as dangerous as banned or controlled drugs. The reality of this is that because these substances are in purer forms and there is little evidence-based information about the effects, particularly in the longer term, they are potentially more dangerous than controlled drugs.

Amendments in 2010 in the UK to the Misuse of Drugs Act (1971), allow substances to become temporarily controlled in an attempt to address this issue. This still takes time and has to come to the attention of the authorities, which by its nature indicates that the drug has already gained a user base. The Act also deals with derivatives or analogues but this part is vague and a question will always arise as to whether a substance is similar or not, as demonstrated in the US following the introduction of the Federal Analog Act in 1986.

Looking at the history of drug use, banning substances does not make them go away – it just changes the distribution method. This should not stop the authorities attempting to ban legal highs but there needs to be a degree of realism. There needs to be acceptance that these drugs and their effects on people are an on-going clinical dilemma regardless of whether they are classed as legal or illegal highs. This is particularly true as we see more patients present to mental health services with these substances complicating their symptomatology presentations and subsequent management. The focus should therefore be on strategies that can be adopted by clinicians to aid in unravelling some of the complexities and ambiguities associated with NPS.

PHYSICAL DESCRIPTION AND PSYCHOACTIVE EFFECTS

Most of the well-known NPS identified by the European Monitoring Centre for Drug and Drug Addiction (EMCDDA, 2012) can be placed in the following groups.

Synthetic versions of cannabinoids

These were first seen on the market in 2004 and are functionally similar to 9-tetrahydrocannabinol (THC), the active compound of cannabis. They are most commonly smoked and sold as potpourri, incense or herbal blends. Street names include *K2, spice, kronic, magic dragon, skunk* and *moon rock*.

Synthetic cannabinoids currently available to buy are much stronger agonists than THC. Some may contain more than one type of synthetic cannabinoid but do not exert the same pharmacodynamics as the natural cannabinoid such as its anxiolytic and antipsychotic properties (Luft, 2013). This however makes the risk of palpitations, anxiety attacks and transient psychosis far more likely.

Synthetic cathinones

These are analogues of cathinone and their mode of action is believed to involve varying degrees of release and blockade reuptake of dopamine, noradrenaline and serotonin. Examples are the well-reported NPS mephedrone and methylenedioxypyrovalerone (MDPV). Mephedrone was first seen on the market as an NPS in 2005. It is usually purchased in powder or capsule form and usually taken via snorting or ingestion of the capsules. Users can also dissolve the powder in liquid or 'bomb' by wrapping the powder in cigarette paper and swallowing. Street names include *m-cat, mph* and *miaow miaow*. They are marketed as 'bath salts' or 'research chemicals'.

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Synthetic cathinones are derived from the cathinone molecule, which is found naturally occurring in the leaves of the Catha edulis (khat) plant, which as of June 2014 is illegal in the UK. Khat is popularly utilised for its stimulant effect in the Middle East (Toennes et al. 2003).

Users of mephedrone subjectively report increased stimulant effects after using the substance; particularly enhancing 'self-confidence' and buzzing. Users were also noted when intoxicated to have impaired prose recall, higher scores in schizotypy and depression (Freeman et al. 2012).

In a large user survey, canvassing 947 mephedrone users who had also previously used cocaine, 20.4% felt the 'high' from mephedrone was as rewarding as cocaine; 54.6% reported the experience was better (Winstock et al. 2011).

Ketamine

This is an arylcycloalkylamine that was originally developed as a derivative of phencyclidine (PCP). It was first used in the 1960s and is licensed as an anaesthetic in the UK. It is a non-competitive N-methyl-D-aspartate (NMDA) receptor antagonist. Ketamine is available medically in liquid form as an injection. Recreationally, it is sold in powder form and is typically used by nasal insufflation. Some users also inject ketamine. Street names include *special K, kit kat kat*, *super K* and *ket*.

Given in sub-anaesthetic doses ketamine causes a dissociative state and feelings ranging from euphoria to detachment. This is due to a reduced activation in the thalamocortical structures and increased activity in the limbic system (Wood & Dargan, 2012).

Piperazine derivatives

These derivatives have an aromatic group attached to the piperizine moiety. They were first used as recreational drugs in the 1990s and act by increasing the dopamine and noradrenaline concentrations via reuptake inhibition. They increase serotonin concentrations by stimulation of release and inhibition of reuptake. Frequently sold as 'ecstasy' as they act by stimulating the central nervous system and presented in powder form. Examples are benzylpiperazines (BZP), 1-(3-chlorophenyl) piperizine (mcPP) and trifluoromethylphenylpiperizine (TFMPP). BZP gained popularity within the rave (dance party) community, and amongst shift workers and truck drivers to increase alertness and overcome tiredness (Rose et al. 2013). It is taken in capsule or tablet form with a typical dosage between 50 and 200 mg per tablet. It can also be snorted, injected or taken wrapped in cigarette paper, in this case referred to as 'hammer' (Luft, 2013). Street names include *A2, jax* and *nemesis*.

BZP produces a stimulant effect milder than methamphetamine but when combined with TFMPP it reportedly produces euphoria similar to ecstasy (MDMA).

Tryptamines

These can occur naturally (e.g. serotonin and melatonin) or can be synthetic hallucinogens that act as serotonin receptor agonists and reuptake inhibitors. Lysergic acid diethylamide (LSD) is the best known synthetic tryptamine which is illegal in the UK. Recreational NPS from this group that have emerged recently can be perceived as LSD despite being longer acting hallucinogens (Luft, 2013). Examples of synthetic unsubstituted simple tryptamines include diethyltryptamine, alpha-ethyltryptamine and dipropyltryptamine. They are sold on blotter paper and ingested by smoking, nasal insufflation and injection. Street names include *foxy* and *alpha-O*.

Plant based substances

These are plants with psychoactive properties. The most common ones include khat and Salvia divinorum which has the active hallucinogenic ingredient salvinorin A. Chewing is the most common form of ingesting khat but can also be smoked, drunk as tea or inhaled. Salvia divinorum is normally ingested as an infusion, smoked or the fresh leaves chewed. Street names for Salvia divinorum include *salvia, ska maria* and *psychedelic sage*.

AVAILABILITY TO THE CONSUMER

An internet search on legal highs demonstrates just how easy it is to get hold of these substances.

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Websites market these psychoactive substances as 'research chemicals' and they are also sold in 'head shops' on the high street.

One such website (Global Weekends, 2014) sells 13 different types of substance which vary in price from £5 to £20, sold in quantities varying from 0.2 g to 1 g. The substances marketed include *blizzard, charley sheen, ching, columbiana, gogaine, mind charge ultra, mind melt, psyclone, quick silver, race, synthacaine* and *white MM.*

These products are available in a variety of formulations such as powder, crystals, tablets, capsules and liquids. They are often sold for purposes other than human ingestion (Global Weekends, 2014).

Users can rate the products and tell of their experience with the 'product'. White MM seems to be one of the more popular ones with a number of reviews and 5/5 rating. It is amphetamine based and described as: 'You get out what you put in, and with this powder there is no pause for effect... The Superman Effect! Power and focus both come promptly with a talkative feel and a superb clarity of thought. This is an experience best shared with other headshoppers. All on the same plane, all tip top from your favourite head shop'.

Some of the user reviews include comments like 'Closest 'feel' to the real thing I've found yet. Bit back at me once for doing too much – treat it like skunks when deciding on the amount to smoke'. Another reviewer states 'It's amazing!! Loved this, feels like a pure clear high, works quick and lasts and lasts! Great price'.

Given this easy platform to vocalise and share experiences users can be persuaded by the highly emotive recommendations to try these substances. Indeed, in our experience it is not uncommon to have one user bring or talk about them on the ward and within a short period of time recruited other patients to sample them. This further complicates psychiatric presentations that will be discussed later in this review.

The home office released guidance on 'head shops' after local authorities expressed concern over an increase in anti-social behaviour and health problems as a result of them being in the area. It is thought that they mostly sell legal products and so this 'prevents law enforcement or local authorities from being able to minimise the disruption they can potentially cause' (Home Office, 2013). Head shops may commit offences by selling controlled drugs mixed with NPS and thereby breach Misuse of Drugs Act (1971).

The ease with which these substances are available is part of what makes them so dangerous to users. It is not legally possible to criminalise the unauthorised distribution of all psychoactive substances and so legislation, rather than being proactive, can only react as they appear (EMCDDA, 2011).

In addition, legislation can often take a year or more to bring a substance under control of drug law and it may have unintended consequences – namely stimulating further distribution of a non-controlled replacement which may be more harmful than the one that has gone before (EMCDDA, 2012).

NEW PSYCHOACTIVE SUBSTANCES AND MENTAL HEALTH

To highlight the effects of legal highs on mental health and implications for psychiatric presentations in practice we report the case of a 26-year-old male who has had multiple admissions to a psychiatric intensive care unit in the UK, over the past year and a half. These admissions have been complicated by his use of legal highs.

He presented to mental health services with a deterioration in his mental health on a background of paranoid schizophrenia. He was a known user of amphetamines and cannabis in the community. Initially he presented as very disturbed with evidence of psychosis and poor insight.

On one occasion this patient reported that he had been at his friend's house 'doing drugs' and when asked what drugs he had taken, he reported that he had used 'everything' including 'ketamine that was interesting, a little bit of m-cat and some cannabis'.

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He has admitted that he gets bad 'comedowns' after utilising these substances and suicidal thoughts were more prominent.

After a settled period he began utilising unescorted leave, and on several occasions was found to be in possession of new psychoactive substances: mindmelt, charley sheen and mr white. Subsequently, 24–48 hours after using these substances he had been noted to be brittle, self- isolating, upset and having decreased engagement with staff. He did partially acknowledge that his mental state deteriorated when using these substances. Prior to discharge he was jovial and keen to discuss these 'legal highs'. He described them giving him an increase in heart rate and a 'better connection with his voices'.

We anticipate on going use of these substances in the community given his prolific use and denial history. This is unfortunately facilitated by the ease with which these substances can be obtained and have the sequelae of perpetuating his mental health problems.

The scientific evidence-base on the potential harms of NPS remains small and therefore it is currently 'the general public who act as guinea pigs until an effective system of control can be established' (Dargan & Wood, 2013).

A review of the available literature on the various sub-groups of NPS and their effect on mental health including possible dependence is discussed below.

Synthetic cannabinoid receptor agonists

The evidence for the acute toxicity of synthetic cannabinoids is based on internet-based user reports and surveys as well as case reports without specific confirmation of the synthetic cannabinoid receptor agonist used (Wood & Dargan, 2012).

An anonymous internet-based survey of 168 people from 13 countries (Vandrey et al. 2012) found that people reported a large number of psychiatric side effects related to 'Spice' products including nervousness or anxiety (54%), paranoia (54%), hallucinations (28%).

The 2011–12 Global Drug Survey (Winstock & Barratt, 2013) compared natural cannabis with synthetic cannabis. Interestingly, the survey found that there were more positive effects with 'natural cannabis'. More so, in regard to negative symptoms, sedation, impaired memory and addictiveness were more pronounced in 'natural cannabis' where as paranoia and more hangover effects were noted in 'synthetic cannabis' use.

'Spice' products used concomitantly with alcohol and cannabis have been reported in case records of teenagers in an addiction treatment centre to cause anxiety, anger, memory changes, paranoid thoughts and visual as well as auditory perceptual changes (Castellanos et al. 2011).

Although there are no published data describing the long-term effects of cannabinoids on human health, there is some evidence of dependence when using synthetic cannabinoid receptor analogues. An internet survey of 168 users (Vandrey et al. 2012) found that 37% of 'Spice' users met the DSM IV criteria for abuse while 12% met the dependence criteria. On further analysis of dependence criteria, 38% were unable to cut down or stop, 36% showed signs of tolerance, 28% used it for longer than intended and 18% reported it to interfere with other activities.

Synthetic cathinones

There have been some user reports as well as case reports and series illustrating the acute toxic effects of mephedrone, which is the most common synthetic cathinone, on mental health. Following the 2009 MixMag survey of UK clubbers (Winstock, 2011), 100 of those that self-reported mephedrone use were qualitatively surveyed regarding positive and negative symptoms after mephedrone use. The neuropsychiatric effects noted included forgetfulness, anxiety, panic, agitation, aggression and visual as well as auditory hallucinations. Furthermore, the most commonly reported mental health adverse effects from the UK National Poisons Information Service of 131 calls in 2009 were agitation/aggression (24%), anxiety (15%) and confusion or psychosis (14%). This case series found that the duration of unwanted effects was prolonged with 45% of people having symptoms that lasted for

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more than 24 hours and 30% for more than 48 hours.

A case series of 57 patients in Scotland who had taken mephedrone or mephedrone with alcohol presenting to an emergency department showed 40.4% having anxiety or aggression and 17.5% confusion in addition to physical health complications (Regan et al. 2011).

There is no published data on the chronic effects of long-term use of mephedrone. There is anecdotal evidence that it is associated with post-use 'depression' although experimental or clinical data to support the psychopathological processes involved is lacking (Dargan & Wood, 2013).

There is also anecdotal evidence of dependence like symptoms related to mephedrone (Dargan & Wood, 2013). There is one published case of formally diagnosed mephedrone related dependence in Scotland. In this case, the patient used 4–5 g of mephedrone twice a week over an 18 month period and fulfilled the ICD-10 criteria for dependence syndrome. He was managed by changing his fluoxetine to olanzapine and was discharged after four weeks of inpatient care (Bajaj et al. 2010).

Ketamine

Ketamine use has been shown to have neuropsychiatric effects including hallucinations, dissociative states described by some users as 'falling into a K-hole', aggression, agitation and paranoia (Kalsi et al. 2011; Morgan & Curran, 2011). One of the main risks associated with ketamine use is that of a decreased awareness of surrounding combined with reduced pain perception, hallucinations, paranoia, reduced co-ordination, temporary paralysis and inability to speak, there is the potential for increased physical harm and indeed death by misadventure (Jansen, 2000; Stewart, 2001; Dillon et al. 2003).

A number of volunteer studies have illustrated that ketamine use can result in schizophrenia-like positive and negative symptoms (Krystal et al. 1994; Driesen et al. 2013). Patients with schizophrenia have shown that ketamine can induce psychotic symptoms for those on antipsychotics and those not who have stabilised off antipsychotic treatment (Lahti et al. 1995; Malhotra et al. 1997; Olney et al. 1999).

A longitudinal study of 150 ketamine users showed that the level of delusional and dissociated symptoms was dose dependent in frequent users (Morgan, Meutzelfeldt, & Curran, 2010). It also found an increase in the self-rated depression score using Beck Depression Inventory but not in clinical depression. However, in the case of reduced frequency of ketamine use, depression scores were not increased (Morgan et al. 2010).

A number of studies have shown that acute use of ketamine results in impairment of both working and episodic memory (Morgan & Curran, 2006; Morgan et al. 2006a, b). Prolonged and frequent use is also associated with reduction in both long and short-term memory.

Ketamine is generally associated with psychological rather than physical dependence (Kalsi et al. 2011). It has been reported that on ceasing ketamine use, the main symptom is craving. However, some physical symptoms shown to be associated with cessation include shaking, sweating and palpitations (Pal et al. 2002).

Of note, in a study of 90 people, 48 stated subjective concern about ketamine addiction. This was paralleled by many reporting that they continued to use ketamine until their supplies were exhausted (Winstock et al. 2012).

Piperizines

Three documented double blind and placebo controlled trials on BZP and TFMPP which used the addiction research centre inventory (ARCI), profile of mood state (POMS) and visual analogue scales (VAS) to measure changes in healthy subjects (Dargan & Wood, 2013). BZP showed increases in euphoria, dysphoria, anxious state and total mood disturbances (Lin et al. 2009) while TFMPP showed increases in dysphoria, tension and anxiety (Jan et al. 2010). There has been a case report of a first episode of mania precipitated in a patient with a background of schizophrenia using BZP (Mohandas & Vecchio, 2008). A potential risk following co-ingestion of BZP and TFMPP or sole ingestion of mCPP is

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serotonin syndrome, which is characterised by autonomic instability, hyperthermia and neuromuscular effects. (Klaassen et al. 1998; Gee et al. 2010).

Signs and symptoms of exposure to these derivatives are predominantly adrenergic, characteristic of sympathomimetic excess (Schep et al. 2011). Reported clinical effects of BZP on mental health include hallucinations, psychosis, anxiety, agitation and paranoia (Dargan & Wood, 2013). The relationship between dose and clinical effect seems to be limited with supply being in varying quantities (Wikström et al. 2004). It is important to highlight that the presentation of symptoms can be exacerbated by the concomitant use of alcohol, cannabis, MDMA and other stimulants (Dargan & Wood, 2013). Austin & Monasterio (2004) reported the case of a man with no prior psychiatric history exhibiting persecutory delusional beliefs with auditory and visual hallucinations following the concomitant use of BZP, TFMPP, cannabis and nitrous oxide. Individual response to the drug can vary widely due to individual pharmacokinetic variations.

Currently there are no data on the long-term human effects, including the likelihood of dependence and tolerance of BZP and other piperizine derivatives, which is an issue that would benefit from further research.

Tryptamines

There are only a few published case reports highlighting tryptamine-associated toxicity in humans. Following variable dose ingestion, individuals have presented to emergency departments displaying paranoia, sensory hallucinations (formication) and agitation in addition to physical health complications (Wilson et al. 2005; Alatrash et al. 2006). Although limited by user bias, amount of substance used and the possibility of polysubstance use, general user reports on internet forums have reported anxiety, restlessness, distressing hallucinations and overwhelming fear following ingestion of unsubstituted simple tryptamines (Dargan & Wood, 2013). Following ingestion of 4-substituted simple trypytamines, paranoia, visual disturbances, frightening hallucinations, anxiety and fear have been reported (Dargan & Wood, 2013). Again there are limited data exploring the chronic toxicity of tryptamine use. Furthermore, no published data or user reports exist that indicate dependence of tryptamine use.

Plant based substances

Plant based substances are difficult to analyse due to their inherent variability, and therefore deducing their pharmacological and toxicological effects is challenging. Recently becoming illegal to use in the UK, khat is the most common example of these substances. The use of khat, which is derived from a small tree that originally grows in East Africa and Southern Asia, has spread with immigration to other parts of the world including Europe and America. It is often referred to as a 'natural amphetamine' given its similar mechanism of action and effects in central and locomotor stimulation (Zelger et al. 1980; Patel, 2000; Feyissa & Kelly, 2010). An array of effects have been noted and published in different reports on khat chewers, with the main psychiatric ones including insomnia, anxiety, impairment of concentration and even paranoid psychosis (Feyissa & Kelly, 2010). Further research is needed to establish a better defined association between khat use and mental health disorders. Chronic khat consumption has been implicated in having effects on behavioural and cognitive function (Hoffman & Al'Absi, 2010).

Salva divinorum, which is still legal in the UK, is another example of a drug which is being sold on websites in the form of live plants, dried leaves and extracts called 'Salvia'. The active ingredient, salvinorin A, has been linked to observed cases of toxic psychosis following ingestion, which could put users at risk due to impaired judgement (Paulzen & Gründer, 2008; Ahern & Greenberg, 2011). Interestingly, this product does not seem to be addictive, with website users tending not to make repeat purchases (EMCDDA, 2011).

The 2013 annual report of the National Programme on Substance Abuse Deaths, based at St George's, University of London, states that the number of deaths in which legal highs have been directly implicated rose from 10 in 2009 to 68 in 2012. This is in context of the overall number of

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drug-related deaths falling from 2 000 to 1 613 in the same period (Corkery et al. 2013).

'Purity' of these substances is often used to justify their usage, which in reality means there is no governance or control processes in place. We are only able to appreciate the risks when looking at established drugs. Stimulants, for example, have well known risks of cardiac arrest and stroke. Potentially legal highs pose more risks to users but as we know so little about these substances and their chronic effects, it is difficult to attribute specific long-term health issues to legal highs.

CONCLUSIONS AND RECOMMENDATIONS FOR THE FUTURE

The legal status of psychoactive substances is ever changing. To this end, the key challenge that the government faces is to stay ahead of manufacturers who create new compounds to replace those that have been legislated against. According to the United Nations Office on Drugs and Crime's 2013 *World Drug Report*, 'No sooner is one substance scheduled, than another one replaces it, thus making it difficult to study the long-term impact of a substance on usage and its health effects' (UNODC, 2013).

In the day-to-day practice of mental health professionals, the legal status of the drug a patient has consumed is irrelevant to their treatment. Indeed, what matters are the symptoms they are presenting with and how best they can be managed. Whether we like it or not, NPS are here to stay regardless of their legal status. As the government bans these substances then two things are likely to happen: (1) a new 'legal' drug will take its place; and (2) the distribution of the now banned drug will be pushed underground but it will probably remain available. Therefore in practice, we will continue to see an influx of patients presenting with symptoms resulting from, or complicated by, NPS use.

For the health care practitioner, the challenge is how to deliver optimum care to patients in a situation where there are so many variables of drugs and resultant effects, which are compounded as these drugs keep evolving. It seems prudent to maintain a questioning attitude at all times, especially with regard to possible new presentations. Diagnoses should be evidence-based and caution should be taken until known territory is reached.

More importantly, as the psychiatric adverse effects are just beginning to emerge, little is known about their impact on pre-existing conditions or their propensity to trigger and perpetuate psychiatric symptoms in those without a previously disturbed mental state. Collecting data from observed cases such as the case illustrated in this review as well as the growing evidence in the literature, may prove to be our best weapon against these substances marketed as 'safe and legal', natural alternatives to conventional recreational substances. More so, web based discussion forums are a useful source of information on what is currently popular among users and may help identify trends developing locally.

A joint venture by the University of Hertfordshire, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), the University of Chieti-Pescara, Sapienza University of Rome, and Guglielmo Marconi University saw the development of an exciting programme for the International Conference on Novel Psychoactive Substances held in Rome in May 2014. This followed very successful events in Budapest and Swansea, Wales, in 2012 and 2013 respectively. These meetings give clinicians, legislators and any interested parties the chance to share evidence-based information, look at trends of misuse, assess the consequences and raise awareness of the use of NPS.

In addition, testing for new psychoactive substances is complex, time consuming and often less than fruitful when the substances may be unknown or unexpected (EMCDDA, 2011). Therefore it is important to ensure that health professionals are up-to-date with the risks, prolific usage, physical and psychiatric effects of these substances, allowing more vigilance as part of the assessment process for people entering our services. During consultation, clinicians gather more useful information by asking patients about their specific use of legal highs and associated

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symptoms rather than generalising to 'recreational drug use'. From our experience, we have noted that patients tend to admit to legal high use if specifically asked.

Going forward, there is an obvious need for more research to be carried out. Due to the sheer number of differing NPS and related symptomatology this needs to be done at a national level. Our recommendation is to collect and collate anonymous data from patients admitting to or known to use NPS that when combined will allow trends to be found and NPS to be classified into groups, informing best practice in treatment. In the longer-term, this will also help to inform local, national and international health policy on tackling the challenges that arise from these new psychoactive substances.

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