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New and emerging drugs

Not for human consumption: new and emerging drugs in Australia.

What do clinicians, allied health and youth workers, researchers and policy makers need to know?

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Key messages

1. **New drugs are emerging** at an unprecedented rate as manufacturers of legal high products use new chemicals to replace those that are banned. There are two primary categories of product available in Australia: powders/pills and synthetic cannabis. Both are being marketed and sold on the internet as well as in Australian tobacconists and adult stores.
2. **While it is unclear how many** Australians use new and emerging drugs due to limitations in monitoring, some indicators suggest that use is increasing. These drugs are highly accessible, touted as legal and perceived as safe. They may evade drug testing and are inadvertently promoted through media attention.
3. **Because there is little information** about the pharmacology and toxicity of new and emerging drugs, it is difficult to establish their harm potential, however:
   a. Some of the chemicals contained in the powder/pill products may increase the risk of psychosis, dependence and brain injury. It is unclear how these harms compare to traditional illicit drugs such as methamphetamine or cocaine.
   b. Synthetic cannabis may be more harmful than natural cannabis, and has been linked to psychosis, seizures and heart problems.
4. **Given the rapidly changing market,** a new drug could emerge that has the potential to cause widespread harm. Early monitoring systems are required to identify such drugs, and warn clinicians and AOD workers as well as individuals who use these drugs.
   a. The Psychonaut Web Mapping Project provides an exemplar of a monitoring system. It might be further enhanced by analysis of wastewater and of products available in Australian stores.
5. **Typically, individuals will not** spontaneously admit to using new and emerging drugs and traditional assessment tools do not elicit this information.
   a. Allied health and youth workers need to assess for the use of new and emerging drugs, and provide harm reduction and treatment where appropriate.
   b. Clinicians working in acute and treatment settings need to be aware that some presentations may relate to the use of new and emerging drugs. These patients should be treated similarly to presentations of the drug that the new substance is mimicking.
6. **Online user-driven forums and** educational resources such as Erowid can be used to gather useful information about new and emerging drugs.
7. **Banning individual chemicals** as they emerge does not appear to create any meaningful change in the availability of emerging drugs. It may also inadvertently increase harm by raising awareness of the products and by encouraging people to access newer and lesser-known chemicals. Innovative policy responses need to be implemented to address this challenging issue:
   a. A model that regulates the sale of new and emerging drugs is being implemented in New Zealand and may provide a useful template for Australia.
   b. At this time policy makers should focus on early monitoring systems and gathering toxicological data on new and emerging drugs.

Part of the prevention series

Keep an eye out for the *Prevention in Action* publication and the prevention seminar on new and emerging drugs.
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About the author

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Introduction

New recreational drugs are being developed at an unprecedented rate. In 2011, 49 new drugs were detected by the European Centre for Monitoring Drugs and Drug Abuse (ECMDDA); double the number of new drugs that the ECMDDA detected in 2009[1]. An interaction between the multi-million dollar international legal highs industry and policy makers appears to be fuelling this increase.

Each time an existing chemical is banned, a new drug enters the market to replace it.

Some of these emerging recreational drugs are professionally packaged and aggressively marketed on the internet. Online user-driven drug forums are also enabling the rapid dissemination of information about these new drugs.

New and emerging drugs are initially highly accessible. Overseas some have become as popular as more traditional illicit drugs [2]. The potential harms associated with these new drugs are difficult to quantify as there is virtually no human testing conducted prior to them being released into the market. There is therefore little information about whether the substances are toxic or even carcinogenic. We have no idea what the long-term effects might be. Most informants that contributed to the development of this paper were concerned that the next new drug might cause significant widespread harm. Is this a potential public health crisis waiting to happen?

Professor Farrell, Director of the National Drug and Alcohol Research Centre, stated that emerging drugs represent one of the biggest challenges in the alcohol and other drugs (AOD) field in 2013 [3]. This paper addresses what clinicians, allied health and youth workers, researchers and policy makers need to know about new and emerging drugs to make effective assessments and reduce harms. It will also discuss the need for early monitoring systems to detect the emergence of potentially dangerous new drugs, and recommend that policy makers consider innovative options to minimise harm.

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What are new and emerging drugs?

A range of terms have been used to describe new and emerging drugs, including legal highs, herbal highs, party pills, emerging psychoactive substances, novel psychoactive substances, or simply synthetics*. Products containing these new and emerging drugs have been available in some Australian adult stores and tobacconists, in addition to being sold from overseas and local websites, for the past two years. They are often professionally packaged and labelled 'not for human consumption' *(see Figure 1)*. Such pre-packaged products have been sold as nutritional supplements, herbal ecstasy, plant food, bath salts, party pills, room deodorisers, incense and synthetic cocaine. Some people have bought the active chemicals that these products have been speculated to contain from online vendors [4]. These are often sold as research chemicals.

Most new and emerging drug products are promoted as legal, however the complexity of Australian law means such claims are often tenuous *(see Box 1)*. Most reportedly produce marked psychoactive effects resulting from the various chemicals in them. However, when analysed, some products have been found to include only caffeine or no active ingredients at all [5,6].

There is a broad array of new and emerging drugs available in Australia, but they will be classified into two basic categories for the purposes of this paper:

- **powders/pills**
- **synthetic cannabis.**

* *The term 'synthetics' is problematic since many traditional drugs such as amphetamine, ecstasy and LSD are synthetic.*

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Products have been available in some Australian adult stores and tobacconists for the past two years.

BOX 1: IN DEPTH

The law

There is a complex relationship between state and federal laws in Australia. While importation falls under federal legislation, most drug laws are state-based and unique to each state. This means that although a chemical may be illegal to import under federal law, outside of federal jurisdictions (e.g. universities, airports, international mail and other border controls) it might be legal to possess in one state, yet illegal to possess in another.

Existing federal government laws

At the federal level, the Therapeutic Goods Administration (TGA) has a legislative document called the Poisons Standard. The Poisons Standard contains schedules that determine the degree of restriction that is placed on a substance. For example, Schedule 3 substances can only be purchased from a pharmacy (though don't require a prescription), while substances in Schedule 4 can only be accessed with a prescription.

Changes to the Poisons Standard occur four times each year following a public consultation process. In addition to making decisions about which schedule is most appropriate for any given medicine, the TGA can place a substance in Schedule 9, meaning that it is an illegal substance with no approved medical use.

While the relevant legislation in some states, such as Victoria, refers to the TGA's legislation [76], drug laws in other states, such as New South Wales, do not [77]. In these states, prosecution using the TGA's legislation can only occur in federal jurisdictions and requires the involvement of federal agents.

Federally, there is also the *Criminal Code Act 1995*, which includes an analogues clause. The clause bans chemicals based on their structural similarity to chemicals that are already scheduled. For example, mephedrone could be considered an analogue of the illegal drug methcathinone, or even amphetamine *(see Box 2)*. Individuals prosecuted for importing mephedrone have typically been convicted under this Act.

State government legislative response

Most states have banned a range of chemicals contained in synthetic cannabis and pills/powders. Some states have also added analogue clauses to their drug legislation. The Queensland Government has proposed banning any product that is intended to 'have a substantially similar pharmacological effect' to an illicit substance [78]. From a legal perspective, this means that selling a product containing only caffeine that is marketed as a substitute for ecstasy, could be treated in the same way as selling ecstasy. As such, an individual carrying a pill containing only caffeine could potentially be charged with possession of a dangerous drug.

Federal government legislative response

In May 2012, the TGA placed MDPV and eight broad synthetic cannabinoid agonist chemical groups in Schedule 9 [11]. This has effectively banned thousands of chemicals based on their chemical structure at the federal level, and in those states that refer to the TGA's legislation. Many chemicals that will be considered illegal under these changes have not yet been synthesised. In addition, the TGA scheduled synthetic cannabinomimetics, which means any synthetic product that has similar effects to cannabis, though no formal definition is provided in the legislation and it has not yet been tested in court.

Most recently, new laws have been introduced by the federal government to allow for emergency scheduling. Under this new law, the Attorney-General or Minister for Justice will not have to introduce legislation to amend the *Criminal Code Act*. Instead, a minister can simply issue an emergency determination that can last 18 months. Barrister Greg Barns has stated that this "will not curtail in any way the demand for drugs and the ability of the market to supply them to millions of Australians" [79]. Indeed, despite all of the aforementioned legislative changes, new and emerging drug products remain widely available in many Australian states.

Matthew Wielenga, owner of the company that manufactured Kronic, was arrested in Melbourne on 7 December 2012 after he was found with more than 100kg of Kronic and 1kg of white powder reported to be a synthetic cocaine [80]. It will be interesting to see how the case proceeds in this new legislative environment.

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What are new and emerging drugs?

Powders/pills

Party pills

In the early 2000s, the legal high/party pill industry emerged in the United Kingdom (UK) and New Zealand (NZ) where legal piperazines, such as benzylpiperazine (BZP), were professionally packaged and marketed as a harm reduction strategy by the industry. Following some health concerns, BZP was banned in NZ and the UK in 2008 and 2009 respectively. In an endeavour to continue selling party pills, the legal high manufacturers sought to develop new BZP-free products. Unlike BZP products, which were already prohibited in Australia, these new products were alleged to be legal and marketed to Australians.

BZP-free products were often mislabelled as plant food in an attempt to conceal the product's intended use.

For example, a London Underground packet stated that the pills are 'best suited for tropical plants. Use one … per square meter around garden beds. For potted plants less than one metre in height, half to a quarter... should be sufficient' *(see Figure 1)*. Such products contained a range of cathinone analogues such as mephedrone *(see Box 2)*.

Figure 1: Professionally packaged party pill product displaying information that obscures its intended use.

Bath salts/synthetic cocaine

In 2010, mephedrone was banned in both the UK and Australia. New products subsequently emerged containing a range of new chemicals, including naphyrone (naphthylpyrovalerone), MDPV (methylenedioxypyrovalerone) and flephedrone (fluromethcathinone) [7-10]. These new products have been sold as powders intended to be snorted. At first, they were imported from Europe and the USA where they were sold as bath salts. However, it appears that they are increasingly being manufactured in Australia and sold as synthetic cocaine in adult stores. Some popular overseas brand names include Ivory Wave, Bubble Bliss and Vanilla Sky. Local brands have included Sharman's Dust, White Bull and Smokin' Slurrie.

Because some of the chemicals contained in these new products, such as MDPV, are active at very low doses, the pre-packaged products are often cut with fillers to ensure that the dose is similar to that of the illicit substances that they mimic. Many also contain numbing agents to replicate the subjective experience of using cocaine [5].

In May 2012, MDPV was banned federally in Australia [11]. However, other synthetic cocaine products are currently available in Australia. These second generation bath salt products may contain the range of chemicals that were found in synthetic cocaine available in the USA after MDPV was banned. These new chemicals include α-pyrrolidinovalerophenone (α-PVP) and methyl-α-pyrrolidinopropiophenone [12]. Anecdotal evidence from a few presentations in Victorian acute settings indicates that some products might also contain methoxetamine – a ketamine analogue that has recently been banned in the UK.

Research chemicals

Once information about the active ingredient of a new drug becomes widely available, there have been anecdotal reports of people ordering the pure chemical directly from overseas online chemical vendors. For example, after mephedrone was identified as an active ingredient in a popular legal highs product, people began to seek the pure chemical [4]. Such demand for a specific new chemical in the recreational drug market has not been seen since MDMA (or ecstasy) emerged in the late 1980s.

Synthetic cannabis

Synthetic cannabis refers to products containing an herbal mixture that is laced with a range of synthetic chemicals to mimic tetrahydrocannabinol (THC), the primary psychoactive chemical contained in cannabis. Kronic is the most well-known brand of synthetic cannabis in Australia. Kronic has produced a range of blends, including Skunk, Purple Haze, Tropical, Pineapple Express and Black Label.

In April 2011, Western Australian (WA) media began reporting the use of Kronic by workers on mine sites to evade drug screening [13]. By June, the WA Government had banned seven chemicals that Kronic was thought to contain [14]. In the lead up to this ban, the manufacturer of Kronic endeavoured to sell its remaining stock [15]. Customers reportedly stockpiled Kronic after the company used social media, especially Facebook and Twitter, to engage its customers. The night before the bans took effect, a 'smoke 'em party' was organised in Perth for people to consume their remaining Kronic [16].

Facebook had never before been used to sell drugs so openly in Australia, nor had there been such organised efforts to use drugs in a social setting prior to a ban.

Other states, including Victoria, soon followed WA's lead. However, new synthetic cannabis blends have appeared that claim to contain new unscheduled chemicals. This is consistent with the UK experience where analysis of synthetic cannabis blends available after bans have found the presence of a new range of chemicals [17]. Even if these new synthetic cannabis products contain new chemicals, consumers could be charged with possessing prohibited drugs.

BOX 2: IN DEPTH

Cathinone analogues

After BZP was banned in the UK and NZ, legal high manufacturers began marketing new products. The first analysis of such products by Camilleri et al.[70] found a range of novel chemicals, including several cathinone analogues. Cathinone, a chemical contained in the khat tree which is native to North East Africa, is just one atom different to amphetamine. While the legal status of the khat tree is state-dependent in Australia *(see Box 1)*, cathinone is banned both federally and in all states and territories. Methcathinone is a synthetic cathinone analogue that has effects that are similar to methamphetamine and has been banned in most countries, including Australia, for many years.

One of the cathinone analogues identified by Camilleri et al. was phthalimidopropiophenone. This cathinone analogue is a pro-drug, which means it is an inactive, legal substance until it is broken down by stomach acids into cathinone which is an illegal and active compound.

In effect, this means the drug is legal outside of the body but becomes illegal once ingested.

Mephedrone, or 4-methylmethcathinone, was another cathinone analogue identified by Camilleri et al.[70]. Once identified, there was a rapid increase in its popularity. Mephedrone was dubbed miaow miaow by the media, and people began seeking out the raw chemical rather than products alleged to contain mephedrone. Significant media coverage quickly developed[74] with 52 mephedrone-related fatalities reported in the UK alone by July 2010. However, only two or three cases were ever confirmed, and it was discovered that 12 of these people had not consumed mephedrone[81]. Nonetheless, in the midst of this media coverage, governments worldwide moved to quickly ban mephedrone and other cathinone analogues. Unfortunately this has led to a range of new chemicals being used in legal high products, including naphyrone (naphthylpyrovalerone), MDPV (methylenedioxypyrovalerone), flephedrone (fluromethcathinone), α-pyrrolidinovalerophenone (α-PVP) and methyl-α-pyrrolidinopropiophenone.

How prevalent is the use of new and emerging drugs in Australia?

While the use of new and emerging drugs has been identified as significant in the USA and Europe [2], the exact degree to which these drugs are being used in Australia is unclear. Nonetheless, some indicators suggest an increasing trend. For example, the Australian Federal Police has noted a significant increase in the quantity of non-traditional drugs seized[18], and there have been numerous Australian media reports about new and emerging drugs[19-21].

In 2010, the Australian Ecstasy and Related Drugs Reporting System (EDRS), an annual national survey of regular ecstasy users, identified the use of mephedrone among a number of informants[22]. Between 2011 and 2012, there was an increase in the number of EDRS participants reporting use of other new and emerging substances. However, the people that the EDRS is sampling from (i.e. regular ecstasy users) are not necessarily representative of the population using new and emerging drugs and therefore cannot be used to estimate the prevalence of use among the general Australian population.

Analysis of wastewater provides more objective evidence for the use of emerging drugs. Chen et al. have shown a peak in the level of mephedrone detected in Adelaide wastewater during 2010, and an increasing trend in the level of MDPV detected between 2009 and 2011[23]. However, because there is little data on the metabolism of new drugs, there are no algorithms to determine the prevalence of use based on the amount of any chemical detected in samples. It is also unclear whether the chemicals identified in the waste analysis originated from pre-packaged products, were acquired as research chemicals, or were contained in products sold within the illicit market.

The Australian Federal Police has noted a significant increase in the quantity of non-traditional drugs seized.

How harmful are new and emerging drugs?

Powders/pills

The potential harms associated with powder/pill products are difficult to establish. Each product may contain different chemicals with varying toxicity profiles, and analyses of products have found that a product may also contain different chemicals at different points in time [5]. For example, the dose for MDPV is almost 100 times smaller than mephedrone, which means there is an increased risk of overdose. Like methamphetamine and cocaine, MDPV is also a potent dopaminergic agent, which means that there is an increased risk of psychosis and compulsive re-dosing [24, 25]. It is unclear how comparable these risks are to those associated with the use of methamphetamine/cocaine. Chemicals containing chlorine or fluorine atoms are called halogenated chemicals and are generally neurotoxic. Some powder/pill products have been found to contain halogenated chemicals [5, 7, 8, 26-29]. Such products might increase the risk of an individual experiencing a brain injury – particularly if the product is used frequently and in high doses.

Synthetic cannabis

The harm potential of a synthetic cannabis product will depend on the specific chemicals that it contains, and many products contain more than one chemical. Generally speaking, synthetic cannabis might be more harmful than cannabis for a range of reasons. THC, the primary psychoactive ingredient in cannabis, has a very low toxicity profile and does not tend to interact with many other drugs. There is very little data on the toxicity of the chemicals contained in synthetic cannabis and their metabolites. In addition to THC, cannabis contains a host of other chemicals, such as cannabidiol (CBD), which have antipsychotic and anticonvulsant properties. The absence of chemicals such as CBD in synthetic cannabis might increase the likelihood of psychotic symptoms or possibly seizures [30]. Finally, the effects of synthetic cannabis are shorter than those of natural cannabis, which may increase the likelihood of addiction through reinforcement of use from frequent dosing [31]. While there are anecdotal reports of people successfully using synthetic cannabis to reduce their dependence on cannabis, others have reported significant withdrawal symptoms.

Hospital presentations

It is unclear how many people have presented to Victorian hospitals with problems resulting from the use of new and emerging drugs as hospitals have no way of coding such presentations. At least two unverified Australian deaths associated with the these drugs have been reported by the media [21, 32]. The media has also reported on other Australian deaths that may have resulted from such drugs being sold as traditional drugs such as LSD [33].

Staff at call centres such as DirectLine and the Drug and Alcohol Clinical Advisory Service (DACAS), report that they have received calls about new substances. However, limitations in the amount of information that is recorded prevents any quantitative analysis. Nonetheless, 17 per cent of calls received by the Victorian Poisons Information Centre (VPIC) about 'street drugs' in 2012 were coded as 'other'. Jeff Robinson, Manager of VPIC, was able to confirm that a number of these calls concerned new and emerging drugs. These are the only indicators currently available about the incidence of new and emerging drug-related harms.

Why do people use new and emerging drugs?

Increased awareness and publicity

Unlike previously available legal high products, new and emerging drugs reportedly produce marked psychoactive effects. Greater awareness of this fact, disseminated through the media and online user forums *(see Box 3)*, is likely to have increased demand for the products. This was particularly evident with the emergence of synthetic cannabis in Australia during 2011. Bright et al. [19] have shown that there was a strong connection between the volume of media coverage and the number of internet searches for Kronic and synthetic cannabis. Many of the initial online newspaper articles about the ban on Kronic contained Google advertisements that linked directly to online vendors. A Queensland newspaper quoted one man as saying, "I saw Kronic on the news and thought... holy smoke, I'm going to order this" [34].

Legality

Some people are attracted by the alleged legal status of new and emerging drugs [35]. There may also be a perceived degree of safety attached to a product that is professionally packaged *(see Figure 1)* and apparently legal [36].

Avoidance of positive drug screens

Synthetic cannabis became widely known in Australia when the media reported that mine workers in WA and Queensland used the drug to avoid positive drug urine screening tests [37]. Perrone et al. have found similar motivation among users of synthetic cannabis in the USA [38]. Most of their sample of synthetic cannabis users were attending abstinence-only drug treatment programs under community corrections orders, or were seeking a career in the US military, and were therefore motivated to use synthetic cannabis to avoid positive drug tests.

Availability

Increased availability of any drug is positively associated with increased use, and emerging drug products are highly accessible in adult stores and online. This should be considered in the context of a reported worldwide decline in the purity of ecstasy tablets. As such, some people who are dissatisfied with the quality of ecstasy might be inclined to purchase legal highs [39, 40]. Finally, some people might consume new and emerging drugs unwittingly – there have been reports of the drugs being detected in samples of ecstasy and LSD (www.ecstasydata.org).

BOX 3

Online user forums

Social interactions involving drugs are increasingly occurring online. For over a decade, bulletin boards (or forums) such as Bluelight (www.bluelight.ru) and Drugs Forum (www.drugs-forum.com) have allowed people from around the world who use drugs to interact with one another with a degree of anonymity.

Social interactions on drug forums may involve:

- Requests for information about a drug or route of administration
- Posts that describe a person's experience with a particular drug or pill (i.e. a trip report or pill report)
- Instructional information, such as how to reduce the likelihood of experiencing drug-related harm (e.g. pill testing or bad drug use combinations)
- How to enhance the subjective drug use experience (e.g. a good setting for a trip) [82].

Online user forums have the potential to both reduce and increase drug-related harms:

- Information provided by peers is likely to be perceived as more credible than that obtained from government websites or the mainstream media [83]. However, the degree to which harm is reduced will depend on the information provided and the interpersonal dynamics that develop between participants. Fortunately, there are moderators that censor the content, provide additional information where appropriate, and remove posts that break forum rules.
- In her study of 837 online drug forum participants, Barratt found that 80 per cent of participants said that their drug use was influenced by information on forums[82]. The most common behavioural influence was the introduction of a new substance, followed by dosage information, and then information about content/purity.

Monitoring new drugs through forums

Interactions through online user forums provide allied health and youth workers, clinicians and researchers with an effective method for monitoring the emergence of drug use trends and accessing information about new and emerging drugs. This methodology comprised part of the Psychonaut Web Mapping Project, which led to a range of new drugs being identified [71], however it does require a healthy level of scepticism. Table 1 provides an example of a relatively recent thread on Bluelight, which suggests that a new legal high product called London Underground Dove Love contains a cocaine-like analogue, RTI-336. The fifth post from ludovelover appears to be somebody associated with the manufacture or distribution of the product. This participant has a history of three posts on the site promoting the product and is subsequently identified as a shill (i.e. a person who publicises or praises something or someone for reasons of self-interest).

TABLE 1

Example discussion from an online user forum

#1 Original Poster
Hi I received a sample yesterday of the latest LU 'Doves Love'. According to the packet it contains a compound "2β-(3-(4-Methylphenyl)isoxazol-5-yl)-3β-(4-chlorophenyl)tropane", allegedly a dopamine reuptake inhibitor. http://en.wikipedia.org/wiki/(-)-2%C...phenyl) tropane. Just wondered if anyone had tried these yet or had any other info on them, and if they could post a trip report. I will probably post one after this weekend.

#2 Person A
The Admin of the Aussie herbal incense forum imported some and said they were all right. He reviewed them.

#3 Person B
Interesting, might have to try some. The LU Doves ive tried have always tested up to be a Beta Ketone substance – My guess butylone or methylone. perhaps a mix.

#4 Person A
Does anyone know what the legality of this compound is? These are being imported.

#5 Person C
tried these three times. Im from the USA. These are the bomb. Honestly can say one of the best legal pills Ive tried. Started feeling full effects about an hour after taking it. So euphoric, Rushes, Very like MDMA. I took one and then two hours later took the Second. Total duration About 4-6 hours. But definately give them a try. I f***in love em. Ive ordered them three times already and Im waiting on a fourth order and I can't wait for them to come they are awesome.

#6 Person A
Most of the online reviews for these are glowing. Someone on the other forum last night posted that they had a bad experience though. It will be good to see more reviews so that we can get a better idea. Apparently the Phenyl Tropane alkaloids should test yellow with the Mandelin reagent also.

#10 Person D
(Originally posted by Person C)
tried these three times. Im from the USA. These are the bomb. Honestly can say one of the best legal pills Ive tried. Started feeling full effects about an hour after taking it. So euphoric, Rushes, Very like MDMA. I took one and then two hours later took the Second. Total duration About 4-6 hours. But definately give them a try. I f***in love em. Ive ordered them three times already and Im waiting on a fourth order and I can't wait for them to come they are awesome.
shill much?

#12 Person E (Senior Moderator)
Please do report if you have those suspicions. We always look into it, so it wont get anyone in trouble if it's unwarranted

*Excerpt taken from **Bluelight.ru**. Identifying user names and dates have been removed for anonymity.*

How can allied health and youth workers respond?

Most people who use emerging drugs will not experience harm [41, 42]. Indeed, Barratt et al. found that less than one per cent of participants experienced problems associated with their use of synthetic cannabis that were severe enough to seek assistance[35].

Allied health and youth workers are uniquely placed to identify this hidden population.

However, they will need to assess specifically for the use of new and emerging drugs *(see Box 4)* as people do not typically spontaneously admit to their use, and might not perceive these products to be drugs. If the use of new and emerging drugs is identified, workers can then provide education, harm reduction, brief intervention and referral to treatment if required.

Education about the potential harms associated with these drugs needs to be framed carefully and credibly as Australians can be sceptical of traditional drug education where harms are sometimes overstated. Workers must provide a balanced discussion that acknowledges the perceived reduction in harms associated with using these products in comparison to traditional illicit substances (e.g. reduced legal harms, not affiliating with illicit drug dealers), while also highlighting the potential harms that could arise from using products containing chemicals that we know little about.

BOX 4

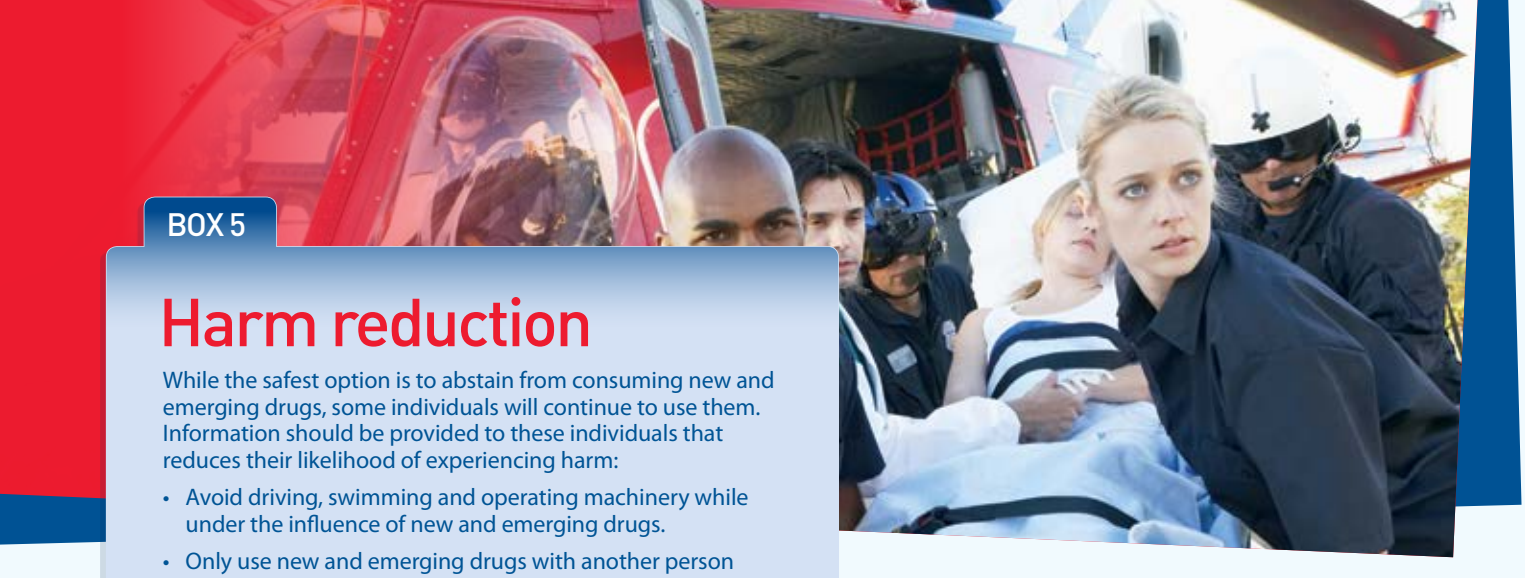
Assessment

Clinicians working in mental health, AOD services and acute settings, as well as allied health and youth workers, need to be aware that some of their clients may be using new and emerging drugs. Most traditional assessments do not ask about these drugs, and clients may not spontaneously admit to their use as they may not be perceived as drugs. It is therefore important to ask the following questions:

- Have you used anything that has been bought online or from adult stores?
- Have you taken any herbal supplements, legal highs, party pills, herbal highs, research chemicals, bath salts or incense?
- What chemical or brand have you used?
- What were the effects of it (e.g. stimulant, depressant or hallucinogen)?
- Was it like any other substance you have used?
- Did you experience any negative health effects?

This information must be collected sensitively to prevent the process from increasing awareness and subsequent use of new and emerging drug products. If use of these drugs is established, further information about the specific substance can be obtained from online user forums. *(An example of how forums can be used to obtain information is provided in Table 1.)* Educational websites, such as Erowid (www.erowid.org), may also be useful. However, with the ever increasing number of brands, many of which may now be made locally, this approach might be less helpful.

Lastly, provide the individual who is using, or is potentially going to use these drugs, with the intervention appropriate to the setting. *(For harm reduction see Box 5 and for acute settings see Box 6.)*



BOX 5

Harm reduction

While the safest option is to abstain from consuming new and emerging drugs, some individuals will continue to use them. Information should be provided to these individuals that reduces their likelihood of experiencing harm:

- Avoid driving, swimming and operating machinery while under the influence of new and emerging drugs.
- Only use new and emerging drugs with another person who is not using any AOD and who can call triple zero if things go wrong. If using alone, then at least tell somebody and write down the name of the product or chemical.
- Conduct a test to ensure that no allergy exists by ingesting a minute quantity an hour or more before using the product. Given that the chemicals contained in products can vary over time [5], this step is recommended even when a product has previously been used as there is no guarantee that the contents will be the same.
- People with pre-existing mental health conditions should not consume these products. Most deaths from new and emerging drug products, such as suicides, have involved poly-drug use or underlying mental health conditions [41]. As these drugs can lead to a reoccurrence of psychotic symptoms among people with a history of drug-induced psychosis, such individuals need to be given information about harms and dissuaded from use as the new drugs might be perceived as less problematic than the substance that originally caused the psychosis [30, 60]. Further, it is recommended that these products are not consumed with AOD, including caffeine. Given caffeine is contained in many products, sometimes in high quantities, additional caffeine consumption could lead to toxic effects [6].
- Older people and people with pre-existing cardiovascular conditions should avoid using new and emerging drugs. The chemicals contained in some products might be cardiotoxic, lead to hypertension, or cause fast/irregular heartbeats.
- Injection of pre-packaged products is highly discouraged given the unknown contents of the products. Not only are the active chemicals unknown, many products also contain a range of fillers and even numbing agents that could lead to health problems if injected. A number of needle and syringe program workers in Victoria have reported negative outcomes from attempts to inject pre-packaged powders/pills and this has reportedly led to at least one Australian death [21]. Dorairaj et al. reported a recent rise in soft tissue complications associated with injecting new and emerging drug products in Ireland, including extensive abscess formation [84].
- People using research chemicals must be aware that packaging can be misleading. A package stating that it contains chemical 'a' active at 250mg, may actually contain chemical 'b' active at 1mg and so ingesting 250mg will lead to an overdose. Use of scientific scales is encouraged as it is impossible to visually identify differences of 1mg or even 10mg.

How can clinicians in acute settings respond?

The clinical presentation in acute settings varies depending on the chemical that has been consumed. Presentations associated with the use of powders/pills have included symptoms such as ataxia (loss of co-ordination), sweating, tachycardia (fast heart rate), arrhythmia (irregular heart beat), hypertension (high blood pressure), hyperthermia (over-heating), rhabdomyolysis (breakdown of muscle tissue), kidney failure, seizures, bruxism (clenched jaw/teeth grinding), nausea, anxiety, agitation, confusion, paranoia and hallucinations [43-53]. The most severe symptoms reported include stroke, cerebral oedema (brain swelling), cardiorespiratory collapse and death [51, 54-57]. Synthetic cannabis presentations have included symptoms such as sweating, tachycardia, arrhythmia, hypertension, nausea, anxiety, agitation, seizures, confusion, paranoia and hallucinations [30, 31, 58-62].

Laboratory results are limited in identifying the contribution of new and emerging drugs to presentations.

Tests are not yet available for many of these substances as the drugs are emerging faster than tests can be developed.

In interpreting laboratory results, it is also important to note that many of these drugs can produce false positive results for other more traditional drugs. For example, mephedrone and MDPV can produce a false positive for amphetamine and/or cocaine use [63, 64]. Therefore, it is essential to determine whether the person presenting has consumed any new and emerging drugs through careful questioning *(see Box 4)*.

BOX 6

Acute clinical treatment of new and emerging drugs

When consumption of a new and emerging drug is suspected to have contributed to an acute medical presentation, most clinicians recommend that the patient be treated as though they have consumed the prototype drug that the new drug has been developed to mimic. For example, adverse symptoms from ingesting powders and pills can generally be treated in a similar fashion to those caused by amphetamine and cocaine intoxication since most have similar effects on the central nervous system[25, 85, 86].

Mas-Morey et al. recommend that acute severe medical complications arising from drug toxicity such as hyperthermia be treated through aggressive cooling using ice, while kidney injury and rhabdomyolysis should be treated with intravenous saline and other resuscitative measures. Psychosis, agitation, seizures and adverse cardiovascular effects associated with pills and powders should be treated with benzodiazepines[87]. Where psychotic symptoms and agitation do not diminish, Mas-Morey et al. recommend subsequently administering an antipsychotic agent. Oral therapy is preferred over intravenous or intramuscular administration of medications to manage acute symptoms. Castellanos and Thornton recommend similar intervention for individuals presenting with agitation and psychosis associated with acute synthetic cannabis intoxication[31].

How can clinicians and workers in AOD settings respond?

Presentations to AOD treatment services primarily for new and emerging drugs appear to be limited. For example, the Victorian Earlier Identification of Drug Harms Project (EIDHP), which interviews AOD workers from approximately 20 services six times a year to identify changing and/or emerging drug use patterns and behaviours, has not noted an increase in presentations related to these drugs. This might be because the use patterns for new and emerging drugs are similar to those for other party drugs such as ecstasy. Despite a higher incidence of ecstasy use than drugs such as heroin in Australia[65], relatively fewer individuals present to AOD services seeking treatment for ecstasy. Nonetheless, a number of people who present in an AOD setting have used ecstasy. This may also be the case for new and emerging drugs. Workers therefore need to ask whether these drugs are being used to get a more accurate understanding of the patient's drug use *(see Box 4)*.

Where use of new and emerging drugs is identified as the secondary cause of a patient's presentation, this drug use should also be addressed in the treatment plan. For example, education and harm reduction can be provided to some individuals, while for others, treatment might include abstaining from the use of new and emerging drugs. If the use of new and emerging powders/pills is the primary presenting problem, Winstock and colleagues advise that AOD workers should provide those evidence-based treatments that are recommended for amphetamine dependence[41]. Similarly, AOD workers can provide individuals presenting with concerns about their synthetic cannabis use with those evidence-based treatments that are recommended for cannabis dependence.

Workers need to ask whether these drugs are being used to get a more accurate understanding of the patient's drug use.

How can policy makers respond?

The emergence of new drugs has presented a significant challenge for policy makers worldwide. To date, the Australian policy response has primarily focused on supply control. Individual substances have been banned and analogue laws introduced *(see Box 1)*, however this approach has not been successful in reducing the availability of new and emerging drugs. Innovative approaches will be required to effectively reduce harm.

Banning individual chemicals

The legal appeal of new and emerging drugs is reduced by banning their component chemicals as they are identified. However, this approach renders legislators and service providers playing 'catch up' to an ever increasing array of new substances. It may also contribute to increased harm by driving newer and lesser known products onto the market. Further, the notoriety that some emerging substances gain by their prohibition, such as mephedrone, can prompt increased demand that is met by the illicit market – sold as either the chemical itself or used in other illicit drugs such as ecstasy [66].

Analogue laws

Analogue laws ban broad categories of substances. Chemicals have been banned based on their structural similarity to other prohibited drugs. Similarly, substances that activate the same brain systems as other prohibited drugs have been banned (e.g. cannabinomimetics). However, this assumes that drugs of a similar category, or that act on similar parts of the brain, have similar harm profiles, which is not necessarily the case. To date, many of these broader laws have not been successfully prosecuted, and the USA's Drug Enforcement Agency recently recommended that this approach be avoided [67]. Some researchers have also expressed concern that analogue laws might impede the development of medicines [68, 69].

Consumer/medicinal law

Current Australian laws for the regulation of consumer and medicinal products are unlikely to offer much control over new and emerging drugs. For example, the *Therapeutic Goods Act 1989* only applies to those chemicals already scheduled as medicines within the Poisons Standard *(see Box 1)* or to 'therapeutic' products. Either scenario would be difficult to establish when a product is labelled 'not for human consumption'. Similarly, prosecution under consumer law would be difficult as it would require that the product be demonstrated to fail to work for the purposes advertised (e.g. plant fertilisers, bath salts).

Regulation

New Zealand has established a specific regulatory regime for new psychoactive substances that will come into effect this year. Under this system, distributors will be required to determine the safety of their products at their own expense before they may legally be sold. This new regulatory regime offers an alternative policy response to mitigate the harmful cycle of new, untested drugs being sold as legal highs. This policy also restricts the sale and marketing of products to minors, and contains labelling requirements. A recent UK inquiry into new and emerging drugs recommended that this model be implemented [67].

While the efficacy of the NZ model is yet to be established, it might provide a good framework for developing Australian policy given the absence of evidence-based options.

Demand reduction

In addition to supply control, Australian policy must target a reduction in demand for new and emerging drugs. Campaigns to reduce demand for traditional drugs are not necessarily helpful as they may inadvertently raise awareness of new and emerging drugs. Hence, novel approaches must be considered.

In the case of synthetic cannabis, initial demand for the product was fuelled by efforts to avoid positive drug urine screening tests, which detect the presence of THC metabolites for up to three months after an individual's last use. The move to saliva screening, which has been designed to detect only recent cannabis use, may reduce demand for an undetectable synthetic substance over cannabis.

The aforementioned UK inquiry into new and emerging drugs also noted that they 'are substitutes for similar and possibly less dangerous traditional drugs'. The inquiry suggested that decriminalisation of these traditional drugs would reduce demand for new and emerging drugs [67, p. 9], and recommended a model similar to that which has been implemented in Portugal. Indeed, it would be interesting to compare the prevalence of new and emerging drug use in countries that have decriminalised or regulated the use of drugs, with countries that prohibit drug use through criminal sanctions. Such analysis might provide the impetus, both in Australia and internationally, to reconsider the current overarching legislative frameworks.

The need for early warning systems

Given how rapidly new drugs are entering the market, there is the potential for one to emerge that could cause significant harm. In this environment, early warning systems could prevent a potential public health crisis.

Survey-based systems such as the EDRS are responsive – researchers need to be aware of a new drug to be able to question participants about it – so they have limited use as an early warning system. For example, mephedrone use was occurring in Australia as early as 2007 yet the EDRS did not identify it until 2010. This was despite an Australian analysis of products containing mephedrone being published on Bluelight – an online forum for drug-related harm reduction – in 2007 [70]. This limitation of the EDRS has been addressed by including an open-ended question asking participants whether they have used any new drugs not included in the survey. However, the accuracy of the responses is questionable, particularly in relation to the contents of pre-packaged blends.

Monitoring of acute presentations, such as hospital emergency department presentations or ambulance statistics, could be helpful in providing early identification of potentially harmful new drugs. However, given the aforementioned limitations in coding procedures, trends are unlikely to be identified at an early stage unless large numbers present at one site. The use of biochemical testing, such as urine drug screens, by hospital emergency departments to identify types of drugs used is also inconsistent and limited by clinician awareness and laboratory capabilities.

As Australia's traditional monitoring systems struggle to detect the emergence of new and potentially dangerous drugs, there is a need to develop more effective early warning systems. One potential methodology is that used by the European Psychonaut Web Mapping Project [71-73] *(see Box 7)*.

Raimondo Bruno, Senior Lecturer at the University of Tasmania, proposes a combination of approaches to develop an effective early warning system in Australia. He recommends using the Psychonaut Web Mapping Project methodology to identify new trends that can be verified using surveys and wastewater analysis. In addition, samples of products from adult stores and Australian online vendors should be sought for analysis to provide further verification and to identify new substances as they emerge.

Communication of warnings

Once a drug has been identified, the dissemination of this information needs to be carefully managed. The Australian media has played a significant role over the past two years in framing the emergence of new drugs as problematic – sometimes fuelling a moral panic [19]. The information is often provided by experts who highlight the potential dangers of the new drug. While such assertions are presumably intended to reduce the likelihood of individuals using these substances, they may be inaccurate given an absence of toxicological data, and they do not appear to act as a deterrent. For example, Forsyth found that the most significant increases in interest in purchasing mephedrone occurred following each report of an alleged mephedrone-related death [74]. As such, it is important that information about potentially harmful products be targeted to specific networks, such as AOD and mental health services, emergency departments, outreach workers, peers and user-based forums.

BOX 7

An exemplar of monitoring: the Psychonaut Web Mapping Project

The Psychonaut Web Mapping Project provides a useful model for developing early warning systems. It involves monitoring the web for new and emerging drugs using scanning software. Key word searches are also monitored. Yin and Ho have identified a strong connection between specific search terms and the number of calls to a US poisons centre about new and emerging drug products [88].

Once a new drug is identified, further information about the drug is gathered through purposeful website sampling, including online user forums [71]. A technical report on the newly identified substance is then developed and passed on to the EMCDDA for validation.

Raimondo Bruno, Senior Lecturer at the University of Tasmania, and PhD candidate Rosalie Poesiat, are currently conducting an Australian replication of the Psychonaut Web Mapping Project.

Conclusion

There has recently been a significant increase in the availability of new drugs, including synthetic cannabis, a range of professionally packaged powders and pills, and drugs sold as research chemicals. Van Amsterdam et al. have stated that 'a strict ban on the use of and trade in conventional recreational drugs is one of the most important reasons for the popularity of [these new and emerging drugs]' [68, p.1]. Demand for drugs will always exist, and entrepreneurial individuals will develop innovative ways of meeting this demand. New drugs will become available in place of banned chemicals, which are potentially more harmful than the banned substances. In this environment, policy makers and service providers are constantly playing catch up, while individuals are exposed to potentially toxic new drugs.

While a dramatic change in global drug policy may provide some answers to supply and demand issues, in its absence, early warning systems must be developed and implemented. Such systems could detect the emergence of significantly harmful new drugs and alert key stakeholders to a potential public health crisis.

In the meantime, clinicians, and allied health and youth workers need to brace for new drugs and new methods of drug procurement. They need to be vigilant in ensuring that these trends are considered in assessment as well as treatment planning and delivery.

'Drug taking is here to stay and one way or another, we must all learn to live with drugs' [75, p. 207]

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Glossary

Analogue: A chemical that is similar in structure to another chemical.

Benzylpiperazine (BZP): A psychostimulant that was contained in many of the first generation legal highs.

Cathinone: A naturally occurring psychostimulant that is contained in the khat tree. Many of the second generation legal highs were cathinone analogues.

Dopaminergic agent: A chemical that leads to increased dopamine in the brain. Dopamine is implicated in reinforcing behaviour and also psychosis.

Legal highs: Psychoactive products that are sold as legal alternatives to illegal drugs. Unlike legal highs that were available in the past, many of today's legal highs are pre-packaged products containing novel psychoactive chemicals that produce pronounced effects. These chemicals might not necessarily be legal.

Metabolites: The chemicals that are produced as the body breaks down a drug that has been ingested.

Mephedrone (4-methyl-methcathinone): The most popular cathinone analogue that was contained in the second generation legal highs. Also called miaow miaow.

Research chemicals: Raw active chemicals, as opposed to those contained within pre-packaged products.

Synthetics: A term often used to describe new and emerging drugs. It is not very accurate as many traditional drugs, such as LSD and amphetamines, are also synthetic as opposed to naturally derived.

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