International Journal of Drug Policy 43 (2017) 74–82

Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Research paper

The impact of Australian legislative changes on synthetic cannabinoid exposures reported to the New South Wales Poisons Information Centre

Rose Cairns[a,b,*], Jared A. Brown[a], Naren Gunja[a,c], Nicholas A. Buckley[a,b]

[a] New South Wales Poisons Information Centre, The Children's Hospital at Westmead, Locked Bag 4001, Westmead, NSW, 2145, Australia
[b] Clinical Pharmacology and Toxicology Research Group, Discipline of Pharmacology, Sydney Medical School, Blackburn Building (DO6), The University of Sydney, NSW, 2006, Australia
[c] Discipline of Emergency Medicine, Sydney Medical School, The University of Sydney, NSW, 2006, Australia

ARTICLE INFO

Article history:
Received 5 July 2016
Received in revised form 6 January 2017
Accepted 26 February 2017

Keywords:
Synthetic cannabinoid
New psychoactive substances
Designer drugs
Legislative changes
Toxicology
Recreational poisoning

ABSTRACT

Background: The emergence of new psychoactive substances (NPS), including synthetic cannabinoid receptor agonists (SCRAs) poses novel challenges for drug regulation and public health. Misconceptions of safety and legality, coupled with the fact that NPS are undetectable on routine drugs screens contributes to their popularity. Concerns over the unpredictable toxicity and abuse potential of NPS has led to a variety of legislative responses worldwide. We wish to describe Australian trends in SCRA use, examining the effects of legislative changes on calls to Australia's largest poisons centre.
Methods: A retrospective review of calls to the New South Wales Poisons Information Centre (NSWPIC). Cases occurring between 1 January 2010 and 30 June 2015 with documented use of SCRAs were included.
Results: There were 146 exposures to SCRAs recorded in the NSWPIC database. Federal bans of specific SCRA compounds in 2011/2012 had little impact on call volumes. State-based legislation introduced in 2013 banning specific brand names of SCRA products was followed by a dramatic, sustained decrease in exposures. The most common symptoms reported with SCRA use were tachycardia, vomiting, drowsiness, anxiety/panic, decreased level of consciousness, chest pain, agitation, hallucinations, confusion, seizures and hypertension.
Conclusion: Banning of specific brand names of SCRA (timed with raids and social media campaigns) appears effective at reducing SCRA exposures. We postulate that this raised awareness within the community of the illegality of these substances while also reducing supply through bricks-and-mortar shops. These results could help inform future legislative responses.

Introduction

Synthetic cannabinoid receptor agonists (SCRAs) were first synthesised in the 1980s as laboratory research tools following the discovery of the structure of Δ^9-tetrahydrocannabinol (THC) (Trecki, Gerona, & Schwartz, 2015). In the 2000s, SCRAs started being illicitly manufactured and supplied, marketed under brand names such as "herbal highs", "Spice", "Kronic" and "K2". Typically SCRAs are dissolved in ethanol or acetone and then applied to plant material, allowed to dry and sold in ready to use drug formulations which are smoked, insufflated or ingested (Mills, Yepes, & Nugent, 2015). SCRAs are just one subset of 'new psychoactive substances' (NPS) or 'legal highs'. A wide variety of NPS are now available, with substances designed to mimic a range of other illicit drugs, including psychedelics, stimulants, hallucinogenics, dissociatives and sedatives (see Supplementary Table S1 in the online version at DOI: 10.1016/j.drugpo.2017.02.008) (Bleeker, 2013).

There is increasing concern over the abuse of SCRAs and other NPS in Australia and overseas (Dillon & Copeland, 2012; Gerostamoulos, Drummer, & Woodford, 2015; Law et al., 2015; Trecki et al., 2015; UNODC, 2015). SCRAs pose a public health problem for many reasons. The mixing of SCRAs with plant products leads to the misconception that they are 'natural' and therefore safe. The term 'legal high', often applied to SCRAs and other NPS results in a misguided perception that these agents are a 'legal' alternative to cannabis (Trecki et al., 2015). Further making SCRAs attractive is their relatively low cost, wide availability (sold online and in bricks-and-mortar stores such as tobacconists and sex stores, despite their illegal status) and the fact that they are

* Corresponding author at: NSW Poisons Information Centre, The Children's Hospital at Westmead, Locked Bag 4001, Westmead, NSW, 2145, Australia.
E-mail address: rose.cairns@health.nsw.gov.au (R. Cairns).

http://dx.doi.org/10.1016/j.drugpo.2017.02.008
0955-3959/

undetectable in routine drug screening tests (Barratt, Cakic, & Lenton, 2013; Bhanushali, Jain, Fatima, Leisch, & Thornley-Brown, 2013). Indeed, an Australian survey reported that the most common reasons of first use of synthetic cannabis products were: curiosity, perceived legality, availability, recreational effects, therapeutic effects, the fact that SCRAs are not detectable on routine drug screens, and to cease cannabis use (Barratt et al., 2013). The majority of Australian SCRA users also report using cannabis, and many prefer natural cannabis to SCRAs (Australian Institute of Health and Welfare, 2014; Winstock & Barratt, 2013a).

As of December 2015, the European Monitoring Centre for Drugs and Drug addiction (EMCDDA) has been notified about 160 distinct SCRAs, with the number of substances available likely to continue to grow (European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2016). The psychoactive properties of cannabis are primarily due to the actions of THC, which acts as a partial agonist at cannabinoid receptor type 1 (CB_1, in the brain) and cannabinoid receptor type 2 (CB_2, in the periphery). SCRAs are a diverse group of chemicals however many have been shown to act as potent full agonists at cannabinoid receptors (Fantegrossi, Moran, Radominska-Pandya, & Prather, 2014; Mills et al., 2015; Seely, Lapoint, Moran, & Fattore, 2012; Vardakou, Pistos, & Spiliopoulou, 2010) This may contribute the relative toxicity of SCRAs when compared to THC. This, coupled with batch-to-batch heterogeneity, inter-individual differences in metabolism, and the variety of effects between different SCRAs presents a toxicological challenge (Mills et al., 2015). The detection of non-SCRA substances (including other NPS such as novel benzodiazepines) in products sold as synthetic cannabis further complicates risk assessment (Couch & Madhavaram, 2012).

SCRAs lack a defined toxidrome and there is no antidote. Clinical effects of SCRA intoxication include hallucinations and drowsiness (which are potentially sought after effects), but also tachycardia, agitation, hypertension and vomiting. Serious adverse events reported include acute kidney injury, seizures, psychosis, cardiotoxicity, coma and death (Behonick et al., 2014; Every-Palmer, 2011; Hoyte et al., 2012; Hurst, Loeffler, & McLay, 2011; Law et al., 2015; McKeever et al., 2015; Mir, Obafemi, Young, & Kane, 2011; Tait, Caldicott, Mountain, Hill, & Lenton, 2015; Winstock & Barratt, 2013b). Clusters of severe illness have been reported, suggesting particular agents, contaminants, or dose variations (Bhanushali et al., 2013; Centers for Disease Control, 2013a; Gerostamoulos et al., 2015; Trecki et al., 2015).

Increasing use and associated harms has prompted regulatory action aimed at controlling SCRA use. In Australia, the use of SCRAs is illegal. In July 2011, 8 specific SCRAS were placed in Schedule 9 (Prohibited Substances). In May 2012, Australia's drug regulator, the Therapeutic Goods Administration (TGA) included a general entry in Schedule 9 for synthetic cannabinomimetics not otherwise specified (Hughes, 2015), in order to overcome scheduling issues surrounding new entries to the market. More recently, in 2015 a 'blanket' ban on importation of all substances with a psychoactive effect that are not otherwise regulated or exempt was introduced (The Crimes Legislation Amendment (Psychoactive Substances and Other Measures) Act 2015). Relevant legislation is detailed further in Box 1.

Further state-based legislation has been introduced in Australia. In New South Wales (NSW, Australia's most populous state) 45 NPS including SCRAs were listed as prohibited in the Drug Misuse and Trafficking Act in September 2013 (see Box 1 for individual agents) (Hughes, 2015; New South Wales Government, 2013a). In June 2013, the NSW Department of Fair Trading (hereafter referred to as Fair Trading) issued a ban of specific NPS products by brand name rather than chemical component, removing the need for testing (Product Safety Australia, 2013b). Banned brands are displayed in Box 1. In October 2013, NSW Fair Trading announced changes to the Drug Misuse and Trafficking Act making it an offence to possess, manufacture, supply or advertise psychoactive substances (New South Wales Government, 2013b; Product Safety Australia, 2013c). Undercover NSW Fair Trading operations and raids following these bans reported a reduction in traders stocking NPS (Product Safety Australia, 2013a).

This study aims to describe the epidemiology of NPS exposures (with a focus on SCRAs) reported to the New South Wales Poisons Information Centre (NSWPIC), and examine the impact of legislation and law enforcement strategies.

Methods

Data source

The NSW Poisons Information Centre (NSWPIC) is Australia's largest poisons information centre, taking approximately 50% of the nation's 200,000 poisons calls. Poisons Information Centres in Australia provide 24/7 poisoning advice to healthcare professionals and members of the public who call 13 11 26. The NSWPIC takes calls from NSW, the Australian Capital Territory and Tasmania for 147/168 h/week. Calls for other states are covered between 50–60 h/week as part of a national after-hours roster. Calls are taken by pharmacists and medical scientists with training in toxicology, with consultant medical toxicologists available for the handling of complex/life threatening cases.

Database search strategy

This study is a retrospective review of calls to the NSWPIC from 1 January 2010 to 30 June 2015 regarding SCRAs. Only calls originating from NSW were included, to enable evaluation of state based legislation. Records were extracted where the substance code was "cannabinoids: synthetic", "marijuana (cannabis)", "street drugs: other/unknown", "mephedrone" and "amphetamine: other", and calls were manually reviewed for inclusion. Cases were included if the substance was described as an NPS or as a brand name marketed as or linked to a known NPS (see Supplementary Table S1 in the online version at DOI: 10.1016/j.drugpo.2017.02.008). One poisoning event often prompts several calls to the PIC (e.g. a call from a member of the public, then from a triage nurse, then from a doctor), with these subsequent calls being termed 're-calls'. Re-calls were excluded for the purposes of this study, with the exception being caller background counts and symptom analysis, where re-calls were included (as calls from hospitals provide much more detail about symptoms and disposition). The free text substance field was examined to extract brand name, where recorded. The free text field for SCRA exposures was manually reviewed to examine symptoms present at the time of call.

Statistical analysis

Statistical analyses were performed with Microsoft Excel. Medians and interquartile ranges (IQR) were used to describe continuous data.

Mapping

Mapping of SCRA exposures was performed with Tableau Desktop Software Version 9.3. Where recorded, postcode (for calls originating from outside hospitals) and hospital location was used.

Google Trends analysis

Google Trends (https://www.google.com.au/trends/) was used to examine query volume for several search terms consumers could use to search for SCRAs. Google Trends has been used