Hospitalisation associated with use of the synthetic cannabinoid K2

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Abstract

Aims To evaluate the proportion of patients hospitalised in an acute psychiatric ward associated with use of the synthetic cannabinoid K2, along with their clinical features.

Methods Retrospective audit. K2 use was based on self-report.

Results Seventeen patients had a total of 21 admissions during between January and April 2013; this represented 13% of all admissions to the ward during this time. This was a first hospitalisation for 4 patients. Of the 13 patients with previous psychiatric hospitalisation, 9 patients had recurrences of pre-existing disorders, and 4 patients presented new psychotic symptoms. Presenting symptoms were variable, and included psychotic (paranoia, thought disorder, disorganised behaviour), affective (anxious, depressed) disturbances, and/or intense suicidal thinking/behaviour. Mean duration of admission was 8.5 days, with significantly longer durations for those presenting with psychotic symptoms (13.1 vs 4.4 days).

Conclusions In this case series, use of K2 was associated with significant psychotoxicity requiring hospitalisation, and indicates substantial risk associated with use of synthetic cannabinoids.

Synthetic cannabinoids describe a range of chemicals that bind to cannabinoid CB$_1$ and CB$_2$ receptors and mimic the effects of delta-9-tetrahydrocannabinol, though with greater efficacy. They are actively marketed to adolescents and young adults as a legal alternative to cannabis, and have been legally available in New Zealand for several years.

K2 is one of a number of marketed brands of synthetic cannabinoids that have been sold in corner shops in the last 18 months. The active substances in K2 can vary, but may include agonists similar to JWH-018 and JWH-073, which are potent full agonists at CB1 receptors.

Several case reports have described toxic psychological reactions after use of synthetic cannabinoids—including irritability, hallucinations, psychosis including psychotic relapse and development of intense mood symptoms, and suicidality. There is, to our knowledge, one case series of clinical presentations who report an increased irritability and a more intense high in people presenting to a substance research unit in the USA. There have not been any case series or clinical audits within New Zealand of the clinical presentation to psychiatric services.

We therefore performed a retrospective audit of recent hospitalisations to evaluate what proportion of these was associated with K2 use, what symptoms were reported, what treatment was administered, and outcome.
Methods
This was an audit of all admissions to an open (unlocked) adult inpatient psychiatric unit in Dunedin, New Zealand from January 1 2013 to April 15 2013, where self-reported use of K2 was associated with hospitalisation. This ward has 16 beds, and serves a mixed urban/rural catchment of 193,800 (2006 Census, Statistics New Zealand).

Patients are routinely questioned for use of legal highs at admission. The following data were obtained from hospital notes: demographics (age, gender); symptoms at admission; whether this was a first or repeat admission; past psychiatric history, duration of admission; treatment and follow-up arrangements. Data were analysed using summary statistics, and between-group comparisons made using unpaired t-tests.

Results
During the 3½-month period, 17 patients whose symptoms were associated with use of K2 had 21 hospital admissions, out of a total of 162 admissions (13%). There were 7 females and 10 males, with a mean (SD) age of 26.1 (10.0) years.

Patients reported or were noted to have psychotic symptoms (paranoia, thought disorder, disorganised behaviour), affective changes (anxious, depressive), and/or intense suicidal thinking/behaviour (Figure 1). One individual (M, 32y) also reported homicidal ideation.

Figure 1. Variability in the range of symptoms reported or noted at admission, associated with use of K2

This was the first hospitalisation for 4 patients (aged 16, 18, 20 and 24), who reported affective symptoms (n=3), psychotic symptoms (n=2) and suicidality (n=3). Of the 13 patients with previous psychiatric hospitalisations, 9 patients had recurrences of pre-existing, mainly affective disorders, and 4 patients presented new symptoms, all of which were psychotic.
Mean duration of admission was 8.5 days, with significantly longer durations for those presenting with psychotic symptoms compared with mood disturbance or suicidal thinking (13.1 vs 4.4 days, t=2.9, p=0.01).

Medications used during admission included antidepressants and antipsychotics. Following discharge, patients were generally referred for follow-up by community mental health teams.

Discussion

There are several key findings in this audit. Over a 3½ month period, use of K2 was associated with 13% of admissions to an inpatient psychiatric unit in Dunedin. Presenting symptoms were variable, and included psychotic and affective changes, with high levels of reported suicidality.

Most patients (13/17) had previous hospitalisations, and nine of these reported recurrences of symptoms. However four patients reported de novo psychotic symptoms. For four patients, use of K2 was associated with their first hospitalisation. Most symptoms resolved within one week, with symptomatic treatment.

As a group, the patients recently admitted after K2 use were younger than patients admitted for alcohol and drug dependence to the same unit in an audit of all admissions in 2010 (26.1 y vs 37.5 y, t=2.89, p=0.005), when K2 was not marketed.

The finding of a younger mean age would be consistent with the demographic group to which legal highs are marketed. However mean duration of admission was not different from alcohol and drug dependence patients admitted in 2010 (8.9 vs 7.3 days) and the gender balance (~60% male) was also not different.

The range of symptoms reported (affective, psychotic, suicidal) are consistent with some previous case reports and series, but may be more severe than those reported in the Gunderson case series. In another series of case reports of patients suffering psychotic episodes following exposure to synthetic cannabinoids, 10 patients without a previous history of psychosis were admitted to hospital and required psychiatric supportive care for 6–10 days.

Symptoms included disorganised speech and behaviour, hallucinations, thought blocking, paranoid delusions and suicidal ideations. These papers underscore the variability and intensity of clinical presentations associated with use of synthetic cannabinoids, similar to the present findings.

Additionally, of the 17 users in this audit, we identified four patients that suffered psychosis without a previous history of these symptoms. This study, and other case reports, demonstrates synthetic cannabinoids may act as a trigger to those having a history of psychosis or may precipitate these events in users de novo.

We also identified high rates of suicidal thinking and one instance of homicidal ideation in this case series. Identification of psychotic symptoms was important prognostically, as it was associated with almost 3-fold longer mean duration of admission than for patients presenting with mood disturbance or suicidal thinking.

This audit cannot assess how different K2-associated admission frequency or type of clinical presentation may be from that associated with cannabis use. Our earlier audit of hospital admissions did not identify any where cannabis use was considered to be
primarily responsible for hospitalisation, and contrasts with the high number of recent admissions associated with K2 use.

We noted high rates of affective symptoms in our cohort (in 14/21 admissions), whereas patients presenting with first episode psychosis associated with cannabis appear to have lower levels of depressive symptoms than first episode patients who have not used cannabis.\textsuperscript{15}

The literature on clinical symptoms associated with hospitalisation after use of cannabis is modest, and further research to compare its toxicity profile with that of K2 would be illuminating.

The potential shortcomings of this audit should be acknowledged. This was a retrospective audit, and cannot establish rates of psychosis or mood disturbance caused by K2. Use of K2 was established by self-report, and thus its role in hospitalisation could be an underestimate.

Symptoms at presentation were based on clinical interviews and not by structured interviews. We did not obtain blood or urine samples to establish what cannabinoids had been ingested (these may differ by marketed product\textsuperscript{2}). However it should be noted that there are no assays currently available locally for the multiple potential synthetic cannabinoids. We could also not objectively quantify the amount or duration of K2 use, which might also influence clinical presentation.

In conclusion, this retrospective audit has identified use of the synthetic cannabinoid K2 being associated with 13\% of admissions to an acute inpatient psychiatric unit over a 3½ month period, affecting a younger population. The clinical presentation was variable, and included psychotic and affective symptoms and suicidal thinking. Some of these symptoms may represent recurrence of an existing disorder, however some patients are presenting for the first time, or with new psychotic symptoms.

Use of K2 was associated with significant psychotoxicity requiring hospitalisation, and highlights an ongoing and substantial risk associated with use of synthetic cannabinoids. We suggest there is a clear need for further prospective research to quantify individual and population risks of these substances.

**Competing interests:** Nil.

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