

# Synthetic Cannabinoid Receptor Agonist-related Intoxication: Impact and Legislative Success

Getaw Worku Hassen<sup>1,\*</sup>, Andrew Eng<sup>2</sup>, Ioana Scherbakova<sup>3</sup>, Aida Eliza Abdul Majid<sup>3</sup>, Alessandra Renee Piscina<sup>3</sup>, Thara Amilineni<sup>2</sup>, Cynthia Francois<sup>2</sup>, Asha Roy<sup>1</sup>, Kevin Yiu<sup>1</sup>, Canny Li<sup>1</sup>, Michael Lyashenko<sup>1</sup>, Monica Diep<sup>1</sup>, Roger Chirugi<sup>1</sup>, Golnar Pashmforoosh<sup>1</sup>, Hossein Kalantari<sup>1</sup>

<sup>1</sup>Department of Emergency Medicine, Metropolitan Hospital Center, NYMC, New York, USA

<sup>2</sup>School of Medicine, New York Medical College, Valhalla, USA

<sup>3</sup>Premedical Postbaccalaureate Program, Columbia University, New York, USA

## Email address:

[getawworku.hassen@nychhc.org](mailto:getawworku.hassen@nychhc.org) (G. W. Hassen)

\*Corresponding author

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**Abstract:** Synthetic cannabinoids Receptor Agonist (SCRA) intoxication presents with various medical and psychiatric symptoms. The products are sold as K2 or Spice. The symptoms range from agitation, altered mental status (AMS), lethargy, paranoid behavior, psychosis and seizures. In some cases, brief psychiatric or inpatient medicine admission was required for stabilization. Some patients seem to stay longer for observation in the ED. These patients worsen the already problematic ED crowding. To assess K2-related ED presentation, length of stay in the ED and types of disposition over a 5 year period. A retrospective chart review of patients who presented with K2 intoxication. Charts were reviewed from January 1, 2012 until December 31<sup>st</sup>, 2016 excluding 2016. Demographics, age, gender, past psychiatric illness and other substance abuse history were reviewed. A total of 1405 patients were seen for K2-related ED visits from January 1, 2012 until December 31<sup>st</sup>, 2016 of which 1279 patients (91%) were male and 126 patients (9%) were female. One hundred thirty nine patients (9.9%) were hospitalized and 1266 patients (90.1%) were either discharged or left from the ED. Twenty-eight (2.0%) stayed more than 16 hours in the ED. Of the 53 patients, whose urine the showed benzodiazepine or opiates 36 patients stayed more than 6 hours in the ED. Most patients with K2 use were male (91%) between the ages of 19 and 50 years (76.4%). There was a surge in K2-related presentation in 2015, particularly in the months of April until November. In addition, K2-related intoxication led to prolonged ED stay, which could affect the ED crowding phenomenon. A concerted effort from public pressure and legislative measures led to a reduction of K2-related visits to the ED.

**Keywords:** SCRA, Intoxication, ED Crowding, Length of Stay

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## 1. Introduction

Synthetic cannabinoids Receptor Agonist (SCRA) intoxication presents with various medical and psychiatric symptoms. The symptoms of intoxication range from agitation, altered mental status (AMS), lethargy, paranoid behavior, psychosis and seizures [1-11]. These products, commonly known as K2 or Spice, come in different flavors

with different compounds. Common herbal plants are sprayed with chemical compounds that act of cannabinoid receptors (CBs) and are legally marketed as incense and potpourri [12]. It is believed that some of the herbal products have intrinsic psychotropic effects, and the combination produces different clinical and psychiatric symptoms even if they are sold as harmless agents [12, 13]. Our Emergency Department (ED) has experienced an increasing number of

young patients that have used K2 and present with different clinical symptom including violent behavior, sometimes requiring sedation [14-18]. In some cases, brief psychiatric or inpatient medicine admission was necessary for stabilization. Some patients seem to stay longer for observation in the ED leading to ED crowding, a well-known problem [16, 19, 20]. In other hospitals bleeding complications from use of SCRA that was laced with rat poison have been reported [21].

Given the fact that ED crowding affects patient flow, patient care and possibly mortality as reported in the literature, we aim to study the effects of K2-related ED presentation, length of stay in the ED and types of disposition over a 5 year period. Our hospital has seen a significant number of K2-related patients that came and stayed in the ED for an extended period, requiring at times sedation and monitoring. Some of them had to be admitted to the department of internal medicine or psychiatry. These patients may have severe intoxication. When they present with complications such as status epilepticus and hypotension, this utilizes many resources in the ED and can overwhelm its capacity, leading to overcrowding and compromised care.

## 2. Material and Methods

A retrospective chart review of patients who presented

with K2 intoxication. Charts were reviewed from January 1, 2012 until December 31<sup>st</sup>, 2016 excluding 2016. Demographics, age, gender, past psychiatric illness and other substance abuse history were reviewed. We used our daily census list to select patients by chief complaint that included K2. Descriptive statistic was performed. A waiver to review charts was granted by the Institutional Review Board (IRB).

## 3. Results

A total of 1405 patients were seen for K2-related ED visits from January 1, 2012 until December 31<sup>st</sup>, 2016 of which 1279 patients (91%) were male and 126 patients (9%) were female. One hundred thirty nine patients (9.9%) were hospitalized and 1266 patients (90.1%) were either discharged or left from the ED. Seven hundred sixty eight (54.7%) stayed in the ED between 4-16 hours. Twenty-eight (2.0%) stayed more than 16 hours in the ED. Six hundred and eight patients (43.3%) stayed less than 4 hours in the ED. Of the 53 patients, whose urine showed benzodiazepine or opiates 36 patients stayed more than 6 hours in the ED. It is not clear whether the benzodiazepines were given in the ED or whether the patients took it. Table 1 summarizes the demographics and clinical data.

Tables Demographics and Clinical Data.

**Table 1.** Distribution of visits by month and year.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2012	2	0	0	3	0	1	0	1	2	2	0	1	12
2013	1	1	0	1	2	4	5	6	6	6	10	6	48
2014	8	6	11	5	12	14	17	34	57	52	43	21	280
2015	24	18	23	130	94	93	121	129	97	74	59	24	886
2016	1	15	14	43	5	5	19	16	14	10	11	26	179

**Table 2.** Distribution by age and gender.

	M	F	Total
Age 18 or under	4	4	8
19-50	975	98	1073
Age >50	300	24	324
Total	1279	126	1405

**Table 3.** Disposition types.

Disposition	Number of Patients
Hospitalized	139
ED visit only	1266

**Table 4.** Length of stay by hours.

Length of Stay (Hours)	Number of Patients
<4	608
4-12	711
12-24	84
>24	2

## 4. Discussion

Substance abuse including synthetic drugs has gained national interest due to the increased ED visits and associated mortality. K2 or Spice is one of the synthetic drugs used by

young individuals. It became popular due to intense high and cheaper cost and easy online accessibility [22]. Despite being sold as harmless incenses, K2 had several side effects such as sedation, hypotension, bradycardia, rhabdomyolysis, renal failure and seizure [1, 15, 17, 18, 23]. Anecdotal cases of stroke, myocardial infarction (MI) and death have been reported [1, 2, 7, 24, 25]. Initial evaluation of a patient with K2-intoxication and altered mental status (AMS) is directed towards making sure that there are no life threatening injuries. Following the initial evaluation, based on the vital signs and general appearance, patients are observed and reassessed. Some may require hospital admission. The observation time varies depending on patients' level of consciousness and/or vital signs. Patients who have abnormal vital signs and AMS require monitoring devices and longer observation time including hospital admission. In addition, some of these patients are aggressive and agitated requiring sedation to prevent self-harm and harm to hospital employees, which further prolonged their ED stay due to additive/synergistic sedative effects of K2 and medications. Moreover, some abuse several other recreational drugs or prescription opioids at the same time that may affect their level of consciousness. These factors contribute to the well-recognized problem of ED overcrowding that can impacts

patient care and outcome. It was reported that ED overcrowding contributes or increased mortality [16, 26]. Our emergency room encountered a wave of intoxicated young adults from recreational drugs such as Molly, Ecstasy and Phencyclidine (PCP) during the famous annual Electric Zoo festival in New York City [27]. The festival occurs in close proximity to our ED. Starting 2012 we started seeing patients who present with K2 intoxication occasionally, but from 2014 onward, we have seen 20-30 patients during a 24 h shift until it started to decline. When several people overdoses in different areas law enforcement officials made an effort to curb the sale of K2 and raided the stores suspected of selling K2 [19, 20, 28, 29]. The decline in K2 intoxication coincided with the law enforcement action that led to raiding stores [28]. These measures led to a dramatic decrease in patients with K2 intoxication. Even though few individuals come to the ED with K2 intoxication, the high volume visits decreased. The results of this study are summarized in Tables 1-4).

The results of this study are limited by some factors. Our search was based on the chief complaint that included K2. Patients who were triaged with other chief complaints despite the use of K2 and K2-related symptoms will be missed. The patients K2 use is self-reported or reported by EMS, family members or friends. No test was performed to confirm the presence of components of SCRA in bodily fluids. Prolonged stay in the ED can have several factors such as medical restraints/ sedation and could not be solely attributed to the intoxication from K2.

## 5. Conclusions

Most patients with K2 use were male (91%) between the ages of 19 and 50 years (76.4%). There was a surge in K2-related presentation in 2015, particularly in the months of April until November. In addition, K2-related intoxication led to prolonged ED stay, which could affect the ED crowding phenomenon. A concerted effort from public pressure and legislative measures led to a reduction of K2-related visits to the ED.

Conclusively, substance abuse is a growing public health crisis and it requires educating and engaging the community. In addition, early involvement of law enforcement is of paramount importance as they can investigate and arrest the sources of distribution. Our institution holds information sessions with community leaders and law enforcement personnel to effectively educate the community and combat this public health problem. The next step may be to overcome the lag in changes in government policies, as manufacturers are constantly changing chemical compositions to avoid legislative restrictions.

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