MACS
Maryland Addiction Consultation Service

SYNTHETIC CANNABINOIDS
FACT SHEET

What are synthetic cannabinoids?

- Synthetic cannabinoids are laboratory-made chemicals designed to bind to the same brain receptors as delta-9-tetrahydrocannabinol (THC), the primary psychoactive component of cannabis, but they can produce dramatically different, and often far more dangerous, effects.
- **Over 330 specific synthetic cannabinoid compounds were reported across 84 countries between 2013 and 2023.**
- Synthetic cannabinoids are sold under many different names, including K2, Spice and synthetic marijuana.
- They are used in different ways, including smoking, oral consumption through liquids or paper strips, and inhaling in vaporized forms. It is important to note increased recent reports of poisonings in carceral settings through smoking by burning paper sprayed with mixed multiple substances that may include synthetic cannabinoids but also highly potent opioids, stimulants, tranquilizers and others.
- These products are rapidly evolving and may contain unknown toxic chemical compounds. Routine drug screens most often do not detect these compounds. This makes their detection difficult and treatment decisions based on toxicology tests challenging.

What does K2 intoxication look like?

The CDC reports highlight that the effects of synthetic cannabinoids can vary widely. This is explained by a range of factors, including the varying composition of specific cannabinoid compounds, the presence of other psychoactive substances and chemical compounds, and a person's pre-existing health issues, including psychiatric conditions.

A systematic review of 49 studies found that most reports on synthetic cannabinoids are case studies or case series (limited to small numbers of patients), suggesting they may overestimate the incidence of severe outcomes. In addition, very few studies included chemical confirmation, as toxicological testing of these substances remains extremely challenging and poorly standardized. Based on this literature base, the review noted that **major side effects of synthetic cannabinoid use** are:

- **Psychiatric:** severe anxiety, panic attacks, extreme agitation, paranoia, hallucinations, delusions, psychosis, violent behavior, and suicidal thoughts
- **Neurologic:** seizures, altered consciousness, sedation
- **Gastrointestinal:** nausea, vomiting
- **Cardiovascular:** alterations in heart rate and cardiac rhythm, including tachycardia, bradycardia, hypertension, and hypotension
- **Hematologic:** blood clots and low platelet count

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Supporting someone who might be experiencing the effects of synthetic cannabinoids:

- **Emergency care:** Focus on providing basic emergency response steps, such as checking breathing and calling 911. Do not leave the person alone; place them on their side to prevent choking and protect their airway. Given the unpredictable identity and rapidly changing profile of intoxicating substances (especially in carceral settings), priority should be given to rapid transport to higher emergency levels of care.
- **Poison Control:** Poison Control (1-800-222-1222) is a recommended resource for real-time guidance on suspected overdose or toxicity, including non-opioid exposures.
- **Preparation:** Ensure naloxone is widely accessible, given the risk of opioid contamination, and have clear plans to quickly transport people to medical care.
- **Medical care:**
  - There are currently no evidence-based, consensus clinical practice guidelines for synthetic cannabinoid treatment.
  - Treatment is generally supportive, including intravenous (IV) fluids, supplemental oxygen, airway protection, antiemetic medications, and benzodiazepines (such as oral or intramuscular lorazepam) to treat agitation or muscular hyperactivity and second-generation antipsychotics (such as or or intramuscular olanzapine) for agitation or acute psychosis
  - If naloxone is administered to a person dependent on opioids, they might also experience opioid withdrawal, which should be managed. Signs, symptoms, and withdrawal monitoring are described in this MACS fact sheet. Additionally, more details on withdrawal and transitioning a patient onto buprenorphine are available in this MACS fact sheet.
  - Longer-term care should emphasize behavioral strategies to handle ongoing use and dependence on synthetic cannabinoids, while closely managing co-occurring mental health issues.

Reminders about synthetic cannabinoids

- Rapidly evolving compounds (hundreds of variants)
- Unpredictable pharmacology and toxicity
- Limited clinical trials or systematic studies limit evidence-based guidance
- Poor detectability in standard toxicology screens