

SYNTHETIC DRUGS

Illinois Poison Center Reports



Overview

By Dave Reynolds

As a health benefits company, Humana’s mission is to help people achieve lifelong well-being. A person’s well-being can be impacted by several factors – personal safety, environmental stability, financial security, and of course, health. But what about emotional and mental health, or even substance abuse and addiction? Where do those fall in the well-being spectrum? Too often, health benefits providers and physicians tend to focus on the more well-known epidemics facing our country now, such as obesity and diabetes. However, it’s important for us not to forget or neglect another chronic condition that has plagued our nation’s adults and children for decades – substance abuse.

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Though drug abuse is certainly not a new phenomenon, what is interesting and challenging to health care providers, is how patterns of abuse and the types of drugs being abused change over time. While studies show alcohol use among teens may have declined in recent years, an alarming new trend is taking its place. Synthetic or designer drug use, including synthetic marijuana and “bath salts,” has skyrocketed among teens. According to the National Institute on Drug Abuse’s Monitoring the Future study, nearly one in every 10 high school seniors used synthetic marijuana in 2011.¹ The dramatic increase in use of these synthetic drugs has poison control centers and emergency departments around the country on alert as more and more people are suffering from the serious side effects of these drugs.

Humana believes that well-being encompasses all aspects of health and safety. Our partnership with the Metropolitan Chicago Healthcare Council (MCHC) and the Illinois Poison Center (IPC) enables us to help people learn more about their well-being, whether through medical research or advancements in health care delivery and innovations in treatments.

This white paper by the Illinois Poison Center, underwritten by Humana, will provide key insights into why these dangerous drugs, which were considered legal until recently, are increasing in popularity and what is being done to stop the trend. The paper also reviews key ways that poison control centers are successfully assisting other agencies in the fight against this growing epidemic.

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1. Monitoring the Future: National Results on Adolescent Drug Use, Overview of Key Findings in 2011; Sponsored by The National Institute of Drug Abuse, National Institutes of Health.

Synthetic Drugs

K2. Bath Salts. Spice. Kush. Mad Hatter. White Dove. Ivory Wave. Molly's Plant Food.

These aren't names of rock bands. These are brands of synthetic drugs that can be purchased at mainstream retailers in Illinois. Synthetic drugs have been sold at gas stations, convenience stores, head shops and even gardening centers throughout the Prairie State in the past few years.

The term synthetic drug (or designer drug) refers to a new type of drug on the market that has been created to skirt existing laws on illicit drugs. Thousands of psychoactive compounds are scheduled under the Federal Controlled Substances Act (meaning they are regulated by federal law). However, in creating synthetic drugs, manufacturers alter the chemical structure of a scheduled or illegal drug, modifying it to create an "analog" or derivative of that drug. If this new analog has not been specifically scheduled under the Controlled Substances Act, it may technically be legal to be sold to the general public as long as it is not intended for human consumption.

Synthetic drug manufacturers are devious in marketing their goods, putting them in flashy and often suggestive packaging that bears the label "not intended for human consumption." Despite the wording on the packages, the street knowledge of these drugs is that they are 'legal highs' and intended to be smoked or snorted.

The drugs have been rapidly adopted by teens and young adults because they are available for sale at reputable stores in their community and easy to purchase. Users often have a common misconception (and false sense of security), believing that if synthetic drugs are legal and available for sale, they must be safe. Unfortunately, this could not be further from the truth.

Synthetic drugs can cause users to experience very alarming symptoms, including extreme violent tendencies, paranoia, hallucinations, tremors, heart attacks and seizures, which can result in death. Media reports from around the country have highlighted the extremely vicious attacks carried out by synthetic drug users. Here in Illinois, first responders (including law enforcement and health care providers) have faced challenges in assisting people under the influence of synthetic drugs and often need additional personnel to subdue users.

The Illinois Poison Center (IPC) and its partners are dedicated to educating the public about the hazards of synthetic drug use and to reducing the availability of these dangerous chemicals in the state.

What are synthetic drugs?

There are two types of synthetic drugs that currently dominate the Illinois market; synthetic marijuana compounds that affect the cannabinoid receptors in the brain, and the cathinones, which work in the same areas of the brain as methamphetamine, Ecstasy and cocaine.

Synthetic Marijuana

Synthetic marijuana utilizes analogs of tetrahydrocannabinol (THC) which is the psychoactive ingredient in marijuana. This class of drugs is also sometimes referred to as THC homologs, synthetic cannabimimetics or herbal marijuana alternatives and is the most popular and easily available of the synthetic drugs. Sold under a multitude of brand names such as Spice or K2, they are often marketed as incense or potpourri and labeled as not for human consumption. The actual ingredients are rarely listed and the brand names and packaging can vary widely.

Since the 1960's, researchers and pharmaceutical companies have been experimenting with analogs of THC as ways to learn about cannabinol receptors and to try to develop medications with the analgesic, anti-inflammatory and anti-nausea effects of marijuana without the psychotropic side effects. There are literally hundreds of different THC analogs that have been created for research purposes, but many of them were not intended for human use or have not been tested in human clinical studies.

To create the product, distributors purchase research-grade THC analogs/derivatives from overseas sources. A diluent such as acetone or alcohol is used to create a solution that can be sprayed evenly over a mixture of herbal leaves. Once evenly spread on the leaves and dried, the adulterated leafy mixture is ready to be packaged and sold at retail outlets. A flavoring or scent is often applied to make it consistent with the marketing strategy that the product is for legal sale as incense or potpourri.



Photos of Klimax by Kush describing the product as use for incense purposes only and not for human consumption.



Wicked XXX brand of synthetic marijuana.

Cathinone Derivatives/ Bath Salts

The cathinone drugs affect the brain in ways very similar to methamphetamine, Ecstasy or cocaine. These drugs increase levels of the neurotransmitters dopamine and serotonin in the brain creating the stimulant effect desired by the user. The parent, naturally occurring compound cathinone, has been used for centuries and is the active ingredient in the Khat plant, which is chewed for its psychoactive effects in Middle East and East Africa (mainly Yemen, Somalia and Ethiopia).

The first synthetic cathinone, methcathinone, was created in 1928 and over the years many more have been developed. Since the structures of the compounds have not been scheduled by the FDA as a drug, they are potentially legal for sale as long as they are not intended for human consumption. The packaged products, much like the synthetic marijuana compounds, also lack an ingredients list; they are often sold as bath salts, plant food, screen cleaner or research chemicals and are clearly labeled as not for human consumption.

THC Homolog Brand Names	K2, Spice, Purple Haze, Kryptonite, Potpourri Silver, Happy Hour, Wicked XXX, Purple Magic, Klimax, Kush, Mr. Happy, Bliss, K3, K7, K9, Cloud Nine, Mad Hatter, Tsunami, Black Mamba, Crazy Kush, Posh
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Synthetic Cathinone Brand Names	Tranquility, Serenity, Eight Ballz, Ivory Wave, Charlie Sheen, Cloud Nine, White Lightning, Plant Food
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Synthetic Hallucinogens Brand Names*	Smiles, 2C-E, 2C-D, 2C-I, 2C-T-2, 2C-T-4, 2C-H, 2C-N, 2C-P
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**Side effects of synthetic hallucinogens are very similar to those caused by synthetic cathinones.*

What are the clinical effects of these drugs?

Synthetic Marijuana

The synthetic cannabinoids attach to the cannabinoid receptors in the brain, but in different ways than natural THC. The binding to the cannabinoid receptor is much stronger with synthetic marijuana derivatives. The activation of the cannabinoid receptor may also affect the activity of the NMDA receptor in the brain. As an aside, potent potential drugs of abuse that affect the NMDA receptor include PCP, Ketamine and Methadone. The firm binding of the cannabinoid receptor with possible subsequent effects on other receptors in the brain creates a myriad of psychological, behavioral and physical effects.

Many of the effects of THC homologs are from case reports, case series and aggregate data from poison centers. Psychiatric disturbances are commonly seen in users who present to the emergency departments and include anxiety, agitation, paranoia, paranoid delusions, psychosis and suicidal ideation. There are also several media and law enforcement reports of successful suicide after use of synthetic marijuana.

Physical signs and symptoms of the drug include: fast heart rate, high blood pressure, chest pain, shortness of breath, profuse sweating, tremor and seizures.

Cathinones

The synthetic cathinones increase the amount of the neurotransmitters dopamine and serotonin in the brain. The different cathinones very likely affect the amount and ratios of the neurotransmitters differently (i.e. some will have more effect on dopamine and others will have an increased serotonergic effect). Other drugs that also increase the levels of these neurotransmitters in similar ways include cocaine, methamphetamine and Ecstasy.

Similar to the THC homologs, the effects of the synthetic cathinones are derived from cases reports, case series and aggregate data from poison centers. Much like other drugs of abuse in this class, users may report being more alert, increased energy levels and a sense of euphoria.

However, too much of the drug can send people to the emergency department with psychological effects of agitation, severe aggressive behavior, paranoid delusions and acute psychosis. Some users have been noted to have exhibited increased strength when exhibiting psychotic behavior, much like PCP exposures. Multiple medical and media reports exist regarding users' homicidal behavior, self-harm and suicidal thoughts and attempts. Some users have reported longer-term effects psychiatric effects of persistent mood changes, depression and paranoia.

Physical signs and symptoms of cathinones include: high blood pressure, fast heart rate, palpitations, chest pain, tremors, extremely high temperatures and heart attacks. There have been several deaths reported across the nation from the use of these drugs.



Eight Ballz ultra-premium bath salts with contents of package on the side – a glass vial with a white powder that can be ingested, snorted, smoked or injected intravenously



Ivory Wave was one of the first identified brands of bath salts that caused harm in Europe, Australia and the US.

What is the historical time line of the current synthetic drugs epidemic?

The cathinones and THC homologs were first seen in Europe and Australia and appeared in the US in 2009-2010. The first poison center cases for synthetic marijuana were seen in 2009, but the first large scale outbreak was reported in March, 2010 by the Missouri Poison Center. The first large scale outbreak of synthetic cathinones was reported by the Louisiana Poison Center in November, 2010. Illinois did not receive substantial reports on patients with severe effects from either of these drugs until March, 2011.

When the calls did arrive at the Illinois Poison Center, they came quickly. During the six month peak of March to August, 2011, there were 5 percent more cases on synthetic cathinones and 33 percent more cases regarding synthetic marijuana products in Illinois when compared to the national average reported by other poison centers. Almost 85 percent of Illinois cases involved teens or adults under the age of 30. A bulk of these calls came from health care providers seeking advice on how to treat patients experiencing serious side effects from synthetic drug ingestion.

In less than a year of sale, according to the Substance Abuse and Mental Health Services Administration survey *Monitoring the Future*, more than 11 percent of high school seniors had abused a synthetic marijuana product and it was the second most abused substance after real marijuana, passing prescription drug abuse which had been second most abused class of drugs for several years.

American Association of Poison Control Centers Data on Synthetic Drugs:*

Year	Synthetic Marijuana Cases Reported By Year	Synthetic Cathinone Cases Reported by Year
2010	2,096	304
2011	6,959	6,138

* Includes 57 national poison centers reporting data, including the Illinois Poison Center.

Illinois Poison Center Data on Synthetic Drugs:

Year	Synthetic Marijuana Cases Reported By Year	Synthetic Cathinone Cases Reported by Year
2010	56	9
2011	368	236

Combating Synthetic Drug Use

The Illinois Poison Center has acted as a “canary in the coal mine” on the synthetic drug issue; first identifying the trend of synthetic drug use in Illinois and providing a majority of the surveillance and tracking data on these chemicals. This data played a key role in the State of Illinois’ major initiatives to combat the spread of these so-called “legal highs” through legislation and law enforcement partnerships. Between 2011 and 2012, the Illinois legislature placed nearly 20 compounds associated with synthetic drugs on the state’s Schedule 1 controlled substance list. (See Appendix A for a listing of the synthetic cannabinoids and cathinone structures now listed on state and federal controlled substances lists.)

The number of laws passed to ban drugs based on chemical structures in the past two years shows how quickly the market changes in response to legislation. Such legislation is a crucial step to ridding Illinois of dangerous synthetic drugs. However, drug manufacturers continue to elude the law by creating chemical compounds that are only slightly different from those that are banned, making their new compound technically legal. There are literally hundreds of synthetic cannabinoids and stimulants, such as cathinone derivatives, that have been developed or will be developed. As one compound is added to the controlled substance list, another (or more) may appear on the market.

According to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), there were 24 new psychoactive synthetic drugs identified by their early warning network in 2009. In 2010, 41 new psychoactive drugs were identified and in 2011, an additional 49 new synthetic drugs had come to market. A similar phenomenon is being seen here in the United States. Ongoing surveillance and monitoring is needed to track the current trends, outcomes of actions and resurgence of these drugs.



Second generation synthetic marijuana brand that purports not to contain any of the banned substances after the first DEA ban.



One of the first synthetic marijuana products to market was K2. After the ban of its ingredients, new brands called K3, K7 and K9 were sold with labeling of 'improved' or 'second generation' and were labeled not to contain banned substances.



After State and Federal legislation placed more of the chemicals on the controlled substances list, newer products have come to market with disclaimers that the product did not contain any of the banned substances in them.

IPC Partners with Law Enforcement Agencies to “Smoke Out” Synthetic Drugs

The IPC continues to work in collaboration with the Illinois Office of the Attorney General and local law enforcement agencies to remove these drugs from retail shelves in communities throughout Illinois. This collaboration is unique to Illinois and has proven to be very effective in identifying and regulating synthetic drug sales and use. The origins of this successful partnership started with the surveillance activities of the Illinois Poison Center as it tracked the emerging public health hazard of synthetic drugs in the state.

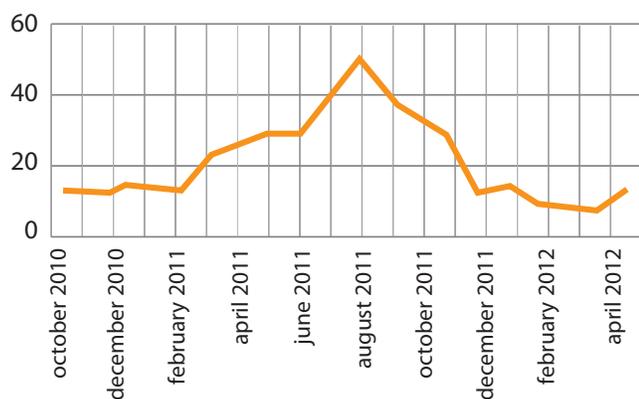
In the fall of 2011, the Illinois Attorney General asked the Illinois Poison Center to provide data on synthetic drug cases and when able, provide brand names of packages, clinical effects caused by the products, and the location of where the products were purchased. Similar information was also gathered by local law enforcement. Armed with this information, the Illinois Attorney General's Office and local police and sheriff departments launched Operation Smoked Out. In this program:

- Undercover buys are arranged in order to see what information is provided by the retail operation staff on how the product should be used.
- Testing is performed to identify which compounds are contained in the purchased product.
- Meetings are scheduled with the owners of these legitimate retail business establishments to provide information and education on the effects these products have on their customers and communities.

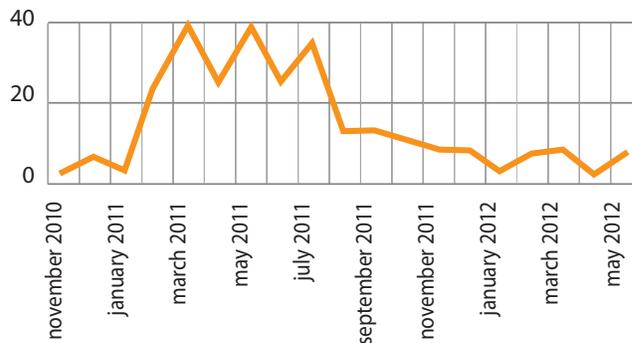
Through Operation Smoked Out, more than 80 retail stores to date have voluntarily relinquished possession of their entire inventory of synthetic drugs worth over \$500,000. These retailers have also signed letters committing not to re-enter the business of selling synthetic drugs.

The combined efforts of synthetic drug monitoring/tracking by the IPC, effective law enforcement collaborations and statewide legislation banning some synthetic drug compounds has resulted in a decrease in the availability of synthetic drugs in Illinois. Decreased availability in turn has led to a markedly decreased number of synthetic drug use reports to the Illinois Poison Center. The number of calls the Illinois Poison Center used to receive was up to 33 percent higher than then national average. However, in 2012, the number of reported cases is now almost 60 percent lower than the national average. While the number of reported cases has decreased significantly, synthetic drug use has not gone away and is still prevalent.

Synthetic THC calls to the Illinois Poison Center



Synthetic Cathinone calls to the Illinois Poison Center



Where do we go from here?

It is important that the public, health care providers and local leaders are aware of the ongoing threat of synthetic drugs in their communities. Additional regulations could further thwart the production and sale of “legal” synthetic drugs, but in the meantime, innovative education and enforcement initiatives will continue to be the most effective means to combating the scourge of synthetic drugs in Illinois.

The Illinois Poison Center is committed to continuing its partnership with the Illinois Attorney General and other stakeholders statewide to educate Illinoisans about the dangers of synthetic drugs and to remove these harmful chemicals from retail stores.

Appendix A

Legislation on Synthetic Cannabinoids and Cathinone Structures

In July, 2011, the Illinois Legislature added the following synthetic cathinones to the Illinois Schedule 1 list of the Controlled Substances Act:

- Mephedrone
- Methyldone
- MDPV

In October, 2011, the U.S. Drug Enforcement Agency (DEA) used its emergency powers to add the same 3 compounds to the Schedule 1 list.

On January 1, 2011, the Illinois Legislature added the THC homologs JWH-018 and JWH-073 to the list of scheduled drugs on the controlled substances list.

In March of 2011, the U.S. DEA used temporary scheduling authority and placed five of the most commonly seen synthetic marijuana compound on the list of controlled substances under Schedule 1 of the Controlled Substances Act. This list includes:

- JWH-018
- JWH-073
- JWH-200
- CP-47,497 and CP-47,497 C8 homologs

In the spring of 2012 the Illinois legislature placed additional THC homolog structures on the Illinois controlled substances list:

- JWH-018
- JWH-073
- AM-694
- JWH-015
- JWH-081
- JWH-122
- JWH-251
- CP 47, 497 and its C6, C8 and C9 homologs
- HU-210
- HU-211

Early in the summer of 2012, the federal government reconfirmed and added the following additional synthetic cannabinoid structures to the Schedule 1 list of the Controlled Substances Act.

- CP-47,497
- CP-47,497 C8-homolog
- JWH-018 and AM678;
- JWH-073
- JWH-019
- AM2201
- AM694
- SR-19 and RCS-4
- SR-18 and RCS-8
- JWH-203
- JWH-200
- JWH-250
- JWH-081
- JWH-122
- JWH-398

In July, 2012, the Congress re-approved keeping the cathinones on the controlled substances list and also added several hallucinogenic amines as controlled substances. The hallucinogenic amines are synthetic drugs that are structurally related to the cathinones and are reported to produce effect similar to Ecstasy and/or LSD.

The Value of the Illinois Poison Center

A poison center means different things to different people: For a caregiver, it is a place to call for treatment advice if their child eats, drinks, rubs onto their skin or breathes a potentially harmful substance. To a doctor or nurse, the IPC is the place to call for treatment recommendations for potentially poisoned patients in their care. For health educators, it is the leading organization for materials and assistance in providing poison prevention education in their communities. And for researchers, the IPC's database is the place to come for trends and analysis for potentially emerging outbreaks to hazardous substances.

The Illinois Poison Center provides a host of valuable services, and in today's environment, value is a key quality that all public health services must provide. The Illinois Poison Center saves more than \$13 in unnecessary health care costs for every \$1 spent by the IPC to provide its expert services.

What would the public do if there were no poison center available? They would most likely seek a higher level of care that is more labor intensive and expensive. IPC call center services prevent nearly 10,000 hospital admission days and 35,000 emergency department visits, saving an estimated \$50 million dollars in health care costs per year. You might say the Illinois Poison Center is the antidote to unnecessary health care costs. By reducing emergency department visits, decreasing hospital admissions, and decreasing patient length of stay in a hospital, IPC expertise leads to improved patient outcomes.

Financially supported by all acute care hospitals in Illinois, state and federal appropriations, the Metropolitan Chicago Healthcare Council (MCHC), private foundations and businesses and individual donors, the IPC serves as the single, trusted voice to provide expert, high-quality treatment advice, 24/7 to the general public. The IPC is staffed by physicians, pharmacists, nurses and other experts specially trained in toxicology. The IPC responds to more than 87,000 exposure calls a year; 27 percent of those calls coming from health care providers seeking assistance in treating a patient. The IPC has been providing this valuable service to all who live and work in Illinois since 1953.

The Illinois Poison Center is a program of MCHC.

About the author



Dr. Michael Wahl serves as the Medical Director of the Illinois Poison Center and the Metropolitan Chicago Healthcare Council. He is also a practicing emergency physician and primary faculty with the Toxikon Consortium.

Dr. Wahl has served as the President of the Board of Directors of the Illinois College of Emergency Physicians and is currently serves the Board of Directors of the American Association of Poison Control Centers.

Dr. Wahl has provided lectures to hospital and medical personnel on synthetic drugs throughout the state of Illinois. He has spoken about synthetic drugs at regional conferences with law enforcement and other partners as well as presented at a congressional briefing in Washington DC on this topic.



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Advice on poison prevention and treatment is available 24 hours a day,
365 days a year through our confidential hotline –1-800-222-1222.
For more information visit the Illinois Poison Center website.



To support the IPC, scan this code or go to:
<http://ow.ly/aukLG>



The IPC is a program of the Metropolitan Chicago Healthcare Council (MCHC). MCHC is a membership and service organization comprised of more than 150 hospitals and health care organizations working together since 1935 to improve the delivery of health care services in the Chicago area. To learn more about MCHC visit www.mchc.org.



This paper was made possible with the support of Humana. Humana is dedicated to making business decisions that reflect our commitment to improving the health and well-being of our members, our associates, the communities we serve, and our planet.