Bath Salts and Synthetic Marijuana: An Emerging Threat

BY ROMMIE L. DUCKWORTH

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April 5, 2011. Spanaway, Washington: Medic and Army Sergeant Dave Stewart, high on bath salts bought at a local pipe shop, killed himself and his wife during a police pursuit. Their five-year-old son was also found dead in the car.

August 21, 2011. Bowling Green, Kentucky: Teenager Ashley Stillwell became paralyzed while smoking 7H, a form of synthetic marijuana, with her friends. She lay on the floor, helpless, as her friends discussed what to do, including how to dispose of her body.

June 5, 2012. Austin, Texas: Eighteen-year-old Giovanni Leask was arrested for attacking and kicking a paramedic in the throat while he was being treated for injuries resulting from his jumping off a bridge. Leask was high on bath salts at the time.

A ROUND THE COUNTRY AND across the news, stories like these are playing out with alarming frequency. Emergency services are confronted by horrific events caused by a surge in the use of new types of designer drugs. This article discusses the upsurge in bath salts and synthetic marijuana: what they are, where they have been coming from, and what form they may take in the future; what regulators and law enforcement are doing to stop them; and what field providers can do to manage the fallout from this new wave of designer drugs.

DESIGNER DRUGS

Although abuse of prescription painkillers like oxycontin remains the largest drug problem in the United States (overdoses kill more than 15,000 people per year), designer drugs present an evolving problem for law enforcement, regulators, emergency responders, and healthcare providers. Designer drugs are chemical compounds that are newly created, modified, or repurposed to provide abusers with effects similar to currently illegal recreational drugs. They are often relatively easy to make and, because of their ever-changing ingredient list, are also extremely difficult to regulate.

The term “designer drugs” originated in the 1980s, but the idea of marketing legal chemical combinations related to regulated or banned drugs dates back to the 1920s. Such compounds, similar in structure or the effects produced by another chemical, are called “analogs.” When morphine, heroin, and other opiates were regulated by the International Opium Convention of 1925, dealers began to sell acetylmorphinone—a similar but as yet unregulated drug.\(^2\)

Most recently, emergency responders are confronting synthetic marijuana and bath salts across North America and Europe. According to the American Association of Poison Control Centers, calls regarding synthetic marijuana almost doubled from 2010 to 2011,\(^3\) and calls related to bath salts went up from 304 in 2010 to more than 6,000 in 2011.\(^4\) Not only are these drugs cheap and easy to obtain, but many users believe they are legal or, at least, that they are unlikely to get arrested for using or possessing them.

REGULATION

In the United States in 1986, the Controlled Substance Analog Enforcement Act was passed to control unregulated substances that mimic controlled substances. The loophole through which many designer drugs slip is the fact that, unless specifically banned, chemical substances labeled as “not for human consumption” are not considered drugs at all. As a

Educational Objectives

On completion of this course, students will

1) Define the term “Designer Drug”.
2) Learn how regulation is not inhibiting the production of designer drugs.
3) Determine what constitutes Bath Salts, and their effects.
4) Determine what constitutes Synthetic Marijuana, and its effects

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result, as soon as one “active ingredient” for a designer drug is banned, another analog or variant is substituted, continuing the game of catch-up for regulators, law enforcement, and other emergency responders.

One explanation for the popularity of these substances is the relative difficulty in testing for them in suspected abusers; synthetic marijuana is not detectable in standard urine drug screens. Still, determining what drugs were taken is less important for field providers than managing the signs and symptoms resulting from the abuse.

On a federal level on March 1, 2011, a ban on five of the main synthetic cannabinoids (JWH-018, JWH-073, JWH-200, CP 47,497, and CP 47,497 c8) was enacted, making all of them Schedule 1 Controlled Substances. On September 7, 2011, the United States Drug Enforcement Agency invoked “emergency scheduling” on the three primary active ingredients in bath salts to restrict sales from October 7, 2011, to October 7, 2012.6

Although federal bans help control large distributors and cross-state trafficking, state and local authorities must also act to affect individual users and local distributors. As of this writing, most states have banned at least some of the active ingredients in these designer drugs, but the degree to which these drugs are manufactured, distributed, sold, possessed, or used still varies widely.

BATH SALTS

What are they? Never intended for use as actual bath salts, these chemicals have virtually nothing in common with the Epsom salts you might use to relax in your tub after a long shift. These recreational drugs are marketed as products “not for human consumption” to avoid state and federal regulation as drugs or food substances. They are instead sold as plant fertilizers; insect repellants; pond cleaners; vacuum fresheners; and, of course, most popularly as bath salts, from which the slang for this category of drug is derived.

Where did they come from? Bath salts arrived in the United States around 2008, but both demand and availability of the product exploded in 2010. Typically supplied as a white, brown, or gray powder (depending on the manufacturing method), bath salts are packaged in small foil or plastic bags. The active ingredients in these formulations are analogs of cathinone, a derivative of the krat plant used as a stimulant for hundreds of years throughout the Middle East and Africa.7 Although cathinone itself is a federal Class I Controlled Substance (high potential for abuse, no medical uses), the cathinone analogs mephedrone (4-MMC), methylene, and methylenedioxyprovalerone (MDPV) are the primary active ingredients in most bath salt concoctions and are not yet permanently federally controlled. (5) Not only can a variety of these active ingredients be found in bath salt mixtures separately or in combinations, but they can also be mixed with a variety of “filler” components.

Common brand names of bath salts include “Vanilla Sky,” “Cloud Nine,” “Ivory Wave,” “Aura,” “Blizzard,” “Scarfase,” and “White Lightning.” The speed at which new products can be produced means that this list may be outdated by the time you finish reading this sentence. Despite ongoing regulatory efforts at the state and federal levels, bath salts can still be purchased through many convenience stores, gas stations, head shops, tattoo parlors, and the Internet.

Routes. Bath salts are typically snorted, but abusers may also ingest, inject, or smoke them; insert them rectally directly; or mix them with water and use them as eye drops.

Mechanism of action. The active ingredients in bath salts impact monamine neurotransmitters acting as dopamine-nor-epinephrine reuptake inhibitors (NDRI). This, in turn, leads to an increase in serotonin and, to a lesser extent, dopamine.9

Intended effects. The sensations abusers seek may either be those similar to MDMA (Ecstasy) such as increased arousal, sociability, and euphoria or those similar to cocaine and methamphetamine such as increased mental focus, stimulation, and physical energy. Bath salts are often used in combination with other recreational substances such as alcohol, marijuana, amphetamines, LSD, opiates, benzodiazepines, and other designer drugs for a combination of effects.

Unintended effects. The results can vary widely depending on product strength, active ingredients and fillers, dosing, route of administration, and individual physiology. Because of this, bath salts frequently produce undesired cardiac side effects including tachycardia, hypertension, hyperthermia, and peripheral vasoconstriction and neurological side effects including insomnia, depression, hallucinations, anxiety, psychosis, paranoia, confusion, and excited delirium.10 In addition, bath salts have been reported to produce a high craving for immediate re-dosing, leading to increases in the frequency and intensity of these undesired side effects.

Duration. The duration of effects varies greatly in the same way that the effects themselves can. Onset of action (the “come up” phase) is typically from 30 minutes to two hours, with the “peak” at approximately 90 minutes and the “come down” phase some time from two to four hours.

Why you might see them. Some patients, thinking that bath salts are legal products, may readily admit to their use and call for assistance if they begin to experience unpleasant side effects. You might also suspect bath salt abuse in patients found to be suddenly hyperactive, paranoid, aggressive, “fiendish” (compulsory drug seeking or re-dosing), suicidal, self-mutilating, or in excited delirium without other explanation.

SYNTHETIC MARIJUANA

What is it? In an effort to circumvent regulation, synthetic marijuana, like bath salts, is labeled “not for human consumption.” Most commonly marketed under the names of “Spice” and “K2” and labeled as incense, synthetic marijuana is typically sold as loose-leaf herbs in small prepackaged bags or prerolled cigarettes.11 Other common names for synthetic marijuana include “Genie,” “Yucatan Fire,” “Sence,” “Smoke,” “Skunk,” and “Zohai.” Like bath salts, new slang terms and brand names for synthetic marijuana continue to develop. Also like bath salts, various forms of synthetic marijuana can be obtained through local shops and the Internet.

Where did it come from? Trafficking of synthetic cannabinoids was first reported in the United States in December 2008, when a shipment was seized by U.S. Customs in Dayton, Ohio.12
These herbal concoctions list ingredients including plants thought to produce cannabis-like effects including Scutellaria nana, Nelumbo nucifera, Leonotis leonurus, Nymphaea caerulea, Canavalia maritima, Pedicularis densiflora, Zornia latifolia, and Leonurus sibiricus, but it is now understood that the herbal ingredients themselves serve primarily as fillers. The active ingredients in these products are typically powdered synthetic cannabinoids that contain no actual marijuana and are simply mixed or sprayed onto the herbs. Synthetic cannabinoids are a class of man-made substances that act as cannabinoid receptor agonists. This means that they are chemicals that bind with receptors (CB1 in the brain and CB2 in the spleen), producing a high similar to that of naturally occurring cannabinoids (marijuana, THC).

A number of active ingredients have been found in these mixtures, all variations and derivatives of pharmaceutical research going back 50 years. This research has long been in an effort to isolate the undesired psychoactive effects of cannabinoids from the therapeutically valuable ones, particularly for the treatment of nausea and loss of appetite from cancer chemotherapies.

Cannabinoid agonists fall into four major groups:

- Analogos of THC developed in the 1960s including HU-120 (HU stands for Hebrew University, where the chemical was synthesized).
- Nonclassical cannabinoids such as the cyclohexylphenol (CP) series developed by Pfizer in the 1970s.
- Aminoalkylindoles or JWH compounds, developed in the 1990s and named after their inventor, J. W. Huffman.
- Miscellaneous compounds including fatty acid amides such as oleamide.

These chemicals are all fairly volatile (vaporize readily) and, therefore, “smokeable,” and examples from all four groups have been reported to be in synthetic marijuana.

Although you probably will not know the specific underlying active ingredient affecting your patient, it is important that you recognize that, like bath salts, synthetic marijuana refers to not one single product but rather to a wide variety of products with varying active ingredients in varying combinations and with different fillers, which may produce drastic and sudden changes in patient condition.

The primary synthetic cannabinoid currently in use is JWH-018. Although JWH-018 is currently banned, more than 100 other synthetic cannabinoids that may lead to emergency services dealing with ever-changing forms of “legal highs” exist.

**Routes.** Synthetic marijuana is typically smoked or eaten in the same manner as natural marijuana.

**Mechanism of action.** Natural cannabinoids (such as THC) and synthetic cannabinoids (of which more than 100 compounds already exist) act by binding to CB1 and CB2 receptors. These receptors are linked to proteins that regulate neurotransmitters. Although, as with bath salts, the variety of active ingredients, fillers, doses, and dosing methods will impact the effect or “high” of synthetic marijuana, synthetic cannabinoids tend to bind better and longer to the CB receptors than natural THC, generally producing stronger effects.

Little scientific research has been done on the long-term effects of these drugs in humans, but it seems that tolerance may develop relatively quickly, leading to a great potential for dependence. Not only are the active ingredients in these products much stronger than most users expect, but it appears that unknown interactions are producing effects that are the opposite of what users and healthcare providers would expect to see with natural marijuana.

**Intended effects.** The effects that users typically seek to obtain through synthetic marijuana products are the same as those with natural marijuana including euphoria, relaxation, and sociability.

**Unintended effects.** As with bath salts, the effects of synthetic marijuana can vary widely depending on product strength, active ingredients and fillers, dosing, route of administration, and individual physiology. Undesired cardiac side effects of synthetic marijuana include tachycardia, hypertension, and chest pain or myocardial infarction. Neurological side effects including parasthesias, anxiety, psychosis, paranoia, confusion, tremors, seizures, hallucinations, and excited delirium. As a result of the psychological effects of synthetic marijuana, some users present with suicidal ideation, self-mutilation, and highly aggressive behavior.

Some users report such little effect from “normal” dosing that they may use larger quantities in subsequent doses, enhancing the undesired effects. Discussion of synthetic marijuana use on Internet discussion forums and comment threads illustrate the variety and unpredictability of the effects of these drugs. Comments range from “I tried the ‘legal’ K2 last night and was not impressed” to “I smoke weed and have for many years! My heartbeat started to get my attention. It started to beat harder and faster. I thought I was going to die or at the very least was having a heart attack. The pain was really bad, but the fear of dying was worse. This is just a warning. I am not trying to scare you.”

**Duration.** As with bath salts, the duration of the effects of synthetic marijuana can vary greatly. Onset of action (the “come up” phase) is typically from 15 to 30 minutes, with the “peak” at approximately 90 minutes and the “come down” phase extremely variable, from one to six hours.

**Why you might see them.** Like users of bath salts, many users of synthetic marijuana believe that they are using legal products, may admit to their use, and call 911 when they or someone else begins experiencing side effects. You may suspect synthetic marijuana abuse in patients found to be experiencing uncontrollable tremors, seizures, difficulty breathing, chest pain, or suddenly becoming anxious, paranoid, aggressive, suicidal, self-mutilating, or in excited delirium without other explanation.

**Management of Emergencies**

Although there is no “antidote” for either bath salt or synthetic marijuana intoxication, basic life support (BLS) and advanced life support (ALS) emergency responders can apply a number of very good general guidelines to manage suspected emergencies.
PREPARATION
Police, firefighters, emergency medical service (EMS), and in-hospital healthcare providers must work in close coordination to provide care for these patients, and this coordination must begin well before the call to 911. Law enforcement, EMS, and firefighters called to the scene must all have the same expectations as to what is going to happen as well as who will play what roles. Likewise in-hospital and prehospital healthcare providers must have an understanding of each other's protocols and capabilities.

MANAGE THE SCENE
• As always, first ensure safety for yourself, your fellow providers, and bystanders. Remember, patients abusing bath salt and synthetic marijuana are particularly prone to sudden and violent behavioral changes.
• The 911 calls for these patients may not include any information about drug use. Clues and cues to bath salt and synthetic marijuana use include drug paraphernalia or litter on scene, sudden onset tremors, seizures, difficulty breathing, chest pain, anxiety, paranoid, and aggressive or suicidal behavior without other explanation. Keep in mind that drugs might not be the patient’s only issue.
• Cofactors to bath salt and synthetic marijuana-related emergencies include police use of chemical (pepper spray) or electrical (Taser®) restraint prior to your arrival. Additionally, a patient history of mental illness, multiple types of drugs onboard, and patient comorbid factors such as diabetes or history of respiratory or cardiac problems may be obtainable only through evidence and bystanders on scene.

MANAGE THE PATIENT
• Attempt to establish a patient rapport, but always be prepared for sudden changes in patient behavior.
• Coordinate with other emergency responders to physically restrain the patient. You can use a variety of methods, but be sure to control all four extremities as well as the patient's head. Do not use chemical pepper spray, and do not place the patient in a prone or hog-tied position. Keep in mind that physical restraint may be particularly difficult in these patients because of increased strength, decreased pain sensitivity, and loss of rational thought.
• (ALS) If possible, pharmaceutical restraints should quickly follow or occur simultaneously with physical restraint. Administer benzodiazepines such as midazolam (Versed®) or lorazepam (Ativan®) per protocol preferably IN or IM.

MANAGE THE CARE
• As soon as possible, perform a full physical exam, triaging and treating signs and symptoms. As always, focus on the ABCs.
• Consider other causes of altered mental states including those listed in the AEIOU TIPS mnemonic:
  — Alcohol
  — Endocrine/Electrolytes/Encephalopathy
  — Insulin (hypoglycemia)
  — Oxygen (hypoxia)
  — Uremia
  — Shock/Stroke/Seizure
  — Psychiatric
  — Toxins/Trauma (CHI)
  — Infection

PITFALLS AND PRECAUTIONS
• Preparation for these calls begins with responder education and collaboration.
• Always keep safety in mind, as conditions can change rapidly on these calls.
• Coordinate physical restraint, and be prepared for a prolonged struggle.
• If at all possible, do not attempt physical restraint without chemical restraint.
• Do not attempt chemical restraint without physical restraint.
• Consider bath salts/synthetic marijuana/other designer drugs as an underlying cause of sudden patient changes, such as those listed above, without other explanation.
• Consider other causes of altered mental status (AEIOU-TIPS).

THE FUTURE
Bath Salts
More recently termed “research chemicals,” designer drugs continue to be created, modified, marketed, and abused at an alarming rate. Now that the primary active ingredients in bath salts, 4-MMC and MDPV, have been regulated, manufacturers are substituting analogs including α-PPP, MPPP, MDPPP, and other chemical cousins that produce similar intoxicating and toxic effects. And the ingredients aren’t the only thing evolving. In addition to marketing as bath salts, plant fertilizers, and insect repellents, bath salts are most recently being marketed under the description of electronic screen cleaners and jewelry cleaners with names like “M-Shine,” “Freebase,” and “Blast.”

Synthetic Marijuana
Likewise, synthetic marijuana is being updated and marketed on Web sites claiming, “There is a new generation of K2 products that are completely legal everywhere” or “Not covered by any ban, restriction, or regulation!” Despite state and federal bans, these new concoctions are likely to continue to progress through the more than 100 synthetic cannabinoids differentiated only by

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Despite ongoing efforts to control the distribution and use of these designer drugs, emergency responders must be prepared to deal with this problem as it evolves. Bath salts and synthetic marijuana aren’t going away any time soon, and the optimal way to prepare yourself is to know and understand what these substances are, how they work, and how best to manage patients who are users:

• Manage the scene.
• Manage the patient.
• Manage the care.

You may encounter abusers of bath salts or synthetic marijuana under a variety of circumstances. You may not know what they took, how much of it they took, or even what was in it. You may not know if your call is going to be fatal or just frightful. But you can know how to manage the scene, the patient, and the prehospital care that you will need to provide for the best possible patient outcome.

REFERENCES
Bath Salts and Synthetic Marijuana: An Emerging Threat

COURSE EXAMINATION INFORMATION
To receive credit and your certificate of completion for participation in this educational activity, you must complete the program post examination and receive a score of 70% or better. You have the following options for completion.

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You may fax or mail your answers with payment to PennWell (see Traditional Completion Information on following page). All information requested must be provided to process the program for certification and credit. Be sure to complete ALL “Payment,” “Personal Certification Information,” “Answers,” and “Evaluation” forms. Your exam will be graded within 72 hours of receipt. On successful completion of the posttest (70% or higher), a “Certificate of Completion” will be mailed to the address provided.

COURSE EXAMINATION

1) Which prescription painkiller remains the largest cause of overdose deaths in the United States?
   a. Vicodin
   b. Oxycontin
   c. Tylenol
   d. Morphine

2) Designer Drugs are __________ that are newly created, modified, or repurposed to provide abusers with effects similar to currently illegal recreational drugs.
   a. Chemical Compounds
   b. Store-bought drugs
   c. Combined drugs
   d. Single chemical drugs

3) Designer Drugs are harder to make than their real counterparts.
   a. True
   b. False

4) When did Designer Drugs make an appearance in the United States?
   a. 1960s
   b. 1970s
   c. 1980s
   d. 1990s

5) Chemical compounds used in Designer Drugs are similar in structure, or their effects produced by another chemical are called, “analogs”.
   a. True
   b. False

6) According to the American Association of Poison Control Centers, Calls regarding synthetic marijuana almost __________ from 2010 to 2011.
   a. Doubled
   b. Tripled
   c. Quadrupled
   d. Quintupled

7) Many users of Designer Drugs believe they are legal, and that they are unlikely to get arrested for using or possessing them.
   a. True
   b. False

8) What act was passed in 1986 to control unregulated substances that mimic controlled substances?
   a. Controlled Substance Enforcement Act
   b. Designer Drug Analog Enforcement Act
   c. Synthetic Drug and Substance Control Act
   d. Controlled Substance Analog Enforcement Act

9) The loophole through which many Designer Drugs slip is the fact that, unless specifically banned, chemical substances labeled as “not for human consumption” are not considered drugs at all.
   a. True
   b. False

10) Which drug is usually sold as plant fertilizers, insect repellents, pond cleaners, vacuum fresheners?
    a. Bath Salts
    b. Designer Oxycontin
    c. Synthetic Marijuana
    d. None of the above

11) How are Bath Salts packaged?
    a. In large bricks
    b. In large pails for wholesale
    c. In small foil or plastic bags
    d. In small landscape bags for long-term storage

12) Bath Salts are typically __________ when used as Designer Drugs.
    a. Snorted
    b. Smoked
    c. Injected
    d. Eaten

13) The mechanism of action for Bath Salts is __________.
    a. Decrease in Norepinephrine
    b. Increase in Serotonin
    c. Decrease in Serotonin
    d. Increase in Adrenaline

14) What Designer Drug is commonly marketed under such names as “Spice” and “K2”
    a. Bath Salts
    b. Oxycontin derivatives
    c. Synthetic Marijuana
    d. Synthetic Oxycontin
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15) How is Synthetic Marijuana used as a Designer Drug?
   a. Smoked or injected
   b. Smoked or eaten
   c. Eaten or ingested
   d. Only Smoked

16) Synthetic Marijuana can produce a stronger “high” than natural marijuana.
   a. True
   b. False

17) What are some signs and symptoms of Synthetic Marijuana use?
   a. Tremors
   b. Seizures
   c. Paranoia
   d. All of the above

18) Due to the state of euphoria that most Designer Drug users seek, they are less prone to be sudden and violent behavioral changes.
   a. True
   b. False

19) Also termed “research chemicals,” Designer Drugs are continuing to be created, modified, marketed and abused at an alarming rate.
   a. True
   b. False

20) The optimal way to prepare yourself against abusers of Designer Drugs is to:
   a. Manage the scene
   b. Manage the patient
   c. Manage the care
   d. All of the above

Notes

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PROGRAM COMPLETION INFORMATION
If you wish to purchase and complete this activity traditionally (mail or fax) rather than Online, you must provide the information requested below. Please be sure to select your answers carefully and complete the evaluation information. To receive credit, you must receive a score of 70% or better.

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Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 1.

1. To what extent were the course objectives accomplished overall? 5 4 3 2 1
2. Please rate your personal mastery of the course objectives. 5 4 3 2 1
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