



## Are “Bath Salts” the next generation of stimulant abuse?

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### ABSTRACT

“Bath salts” are stimulants with high abuse potential that are known to contain agents such as 3,4-methylenedioxypyrovalerone and 4-methylmethcathinone (mephedrone). They are marketed locally and through online retailers as legitimate products in order to evade legal control and facilitate widespread distribution. They have been present in Europe since 2007 but are now becoming a burgeoning presence in American hospitals. Though preliminary efforts are underway in the United States to restrict their usage and distribution, there remains a general unawareness on the part of physicians regarding the drugs' physiological effects. While they mimic the effects of other known stimulants, they are not detected on standard urine screens. We present a clinical case that illustrates a typical pattern of usage along with a description of their basic chemistry, appearance, methods of delivery, withdrawal and intoxication characteristics, treatment recommendations, and areas for further research.

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### 1. Introduction

3,4-methylenedioxypyrovalerone (MDPV) and 4-methylmethcathinone (mephedrone) are designer drugs, colloquially referred to as “bath salts,” among other names, that are becoming increasingly visible on the street and in retail environments along with a growing presence in emergency rooms, medical floors, and psychiatric units in the United States (AAPCC, 2011) and abroad (Dargan, Sedefov, Gallegos, & Wood, 2011; Krikkku, Wilhelm, Schwarz, & Rintatalo, 2011; Morris, 2010). Mephedrone appeared in Israel in the early 2000s and has been available in Europe since 2007 while its presence in the medical literature began largely in 2009. Increases in its usage among British citizens prompted its designation as a class B substance under the Misuse of Drugs Act (1971) in the United Kingdom along with widespread efforts to control the substance across the European Union as an action of the European Council (Dargan et al., 2011). Currently, the bulk of the available literature deals primarily with mephedrone because of its relative prevalence, though MDPV is a closely related compound of the same family that is a known ingredient in bath salts. Little has been written in the United States about the chemistry, physiological effects, and pattern of consumption of these agents given the relative novelty of their usage compared with the stimulants whose effects they are known to mimic. Given the

global extent of manufacture, distribution, availability through various outlets including head shops, convenience stores, and Internet retailers there is comparatively little medical literature informing professionals in the field of substance abuse treatment about how to recognize these drugs or treat those who use them. Our experience treating a patient using bath salts (both MDPV and mephedrone) was guided by European data and scant literature from the United States that related what little is known of the presentation, evaluation, and management of patients using bath salts and our information and treatment options were accordingly limited. We present the case here with a review of the corresponding literature with the aim of boosting awareness of these potent substances and their effects on our patients.

### 2. Case presentation

Mr. H is a 33 year-old male veteran with no prior VA affiliation and a history of longstanding drug use who was transferred to our facility from an outside hospital for further evaluation and management of withdrawal after 2 months of using bath salts. The patient had long been staying with friends or in his parents' house while they were away in an unpredictable fashion. He neither had the financial means to afford his own residence because of his drug habit nor the approval from family to stay with them. His lifestyle revolved primarily around obtaining and using drugs with concurrent use of opiates and methamphetamine being his preferred regimen immediately prior to his involvement with bath salts. Mr. H was first exposed to bath salts at a social gathering with his friends, all avid drug users, where

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the drug was being snorted in small amounts off the tips of keys and in short, thin lines cut onto a flat surface. Some of his friends, who preferred using opiates and cannabis, had read extensively on bath salts in online forums and were concerned that the high was too intense for a social setting if the drug was consumed in large doses. They were opposed to its use at the gathering and therefore abstained from using it. He insufflated a small amount and experienced a brief high he describes as being similar to crack cocaine. It was of little interest to him at the time.

Weeks later, as his other drug habits progressed, he became more curious about the effects he had experienced and the bath salts' potential of providing him a high. He purchased a 500 mg jar at a local convenience store for around \$25. The drug was openly available at all of the local head shops as well as two particular chains of gas stations. The bath salts were an ash-like, ivory powder. He used the glass from a light bulb to smoke it much the same way he had been smoking methamphetamine. Using this method, he was successful in achieving a rapid rush of euphoria accompanied by tachycardia, hyperthermia, tremulousness, and diaphoresis that he qualitatively compared with methamphetamine in both its effect and duration. Other brands of bath salts that he later sampled would instead only melt and burn thus preventing adequate vaporization and within a few days he moved to insufflation exclusively. With ongoing use and increasing appetite for the drug, Mr. H realized that there were different physiological effects and financial costs depending on whether the jar contained mephedrone or MDPV. Though he did not know the names of the chemicals themselves, he could discern variability in the high between the brand names that the products carried. An online search revealed that these substances actually contained different compounds. The products containing MDPV conferred realistic hallucinations (auditory and visual) and a more attenuated, subtle high as prominent features while products containing mephedrone were notable for their stimulant effects, as noted above. While each compound he sampled shared these features to some degree, the variation in effect between jars was reliable. Further, the jars containing MDPV were more expensive (\$45) than those of mephedrone (\$26). Although the effects of MDPV lasted longer and were more enjoyable, Mr. H could not sustain the higher cost. As such, his habit gravitated towards brands containing mephedrone, which provided a more intense initial euphoria which he preferred despite a more severe withdrawal syndrome.

He soon found that the desired high could be maintained through a full 24 hours with a single 500 mg jar. Initially, he snorted several short lines throughout the day (each only lasting a couple of hours) but later moved to large lines consisting of roughly 250 mg each consumed roughly 12 hours apart. This became his preferred method of delivery because of heightened psychological and autonomic effects akin to what he had experienced when he had first smoked it. The hours between use were characterized by paranoid ideation including a distinct impression that his neighbors were conspiring against him in some way. These preoccupations led him to spend large amounts of time looking out of the window in anticipation of catching them in the act. He often experienced vivid visual hallucinations primarily consisting of unfamiliar people standing in the yard whose likeness would evaporate if he approached them as he frequently did. From time to time, he perceived that trees were moving across his yard which he interpreted as part of his neighbors' conspiracy against him. Auditory hallucinations were also frequent occurrences: rap music sounded like it was being played on car stereos outside and he found himself hunting through the house for the sources of shouting voices. His sleep was markedly disrupted (less than 1 hour per night) as the drug effects removed his need for sleep for 15 days consecutively. His appetite was poor and it was not uncommon for him to only consume small amounts of water in a 24-hour period. During this period of use he developed profound apathy and lack of

motivation and did not attend to activities of daily living such as personal hygiene and grooming, housework, or grocery shopping. He did not experience homicidal or suicidal ideation as a result of his drug use but he reported that some of his acquaintances who had also used the drug had engaged in self-mutilation while intoxicated on bath salts.

As his habit progressed over these 2 months, he began using the drug more to avoid the withdrawal, which he reported as the most unpleasant drug withdrawal he had ever experienced, rather than to enjoy the high. Discontinuation of the mephedrone would result in an agitation and dysphoria within a few hours which was more severe than that of cocaine or methamphetamine and was accompanied by an increase in muscle tone which required constant movement to alleviate. It was common for him to spend hours pacing in his basement as a result of running out of the drug. Repeated attempts were made, to no avail, to mitigate the withdrawal symptoms with dextroamphetamine/amphetamine, benzodiazepines, and "speed-balls" composed of a concoction of an opiate and cocaine. In the end, it was only methamphetamine that relieved his withdrawal symptoms to any significant degree. His habit evolved to purchasing mephedrone multiple times per week, often daily, at local convenience stores depending on the state of his finances. It was soon apparent to him that no reliable restriction of the purchase of the drug at the counter existed, though clerks would become wary of selling the drug to individuals who were frequent customers or who were noticeably intoxicated or in overt withdrawal. He altered his trips to stores in the local area accordingly. His cravings compelled him to steal the drug when he could not buy it.

As his use of mephedrone escalated, he noticed his appearance was changing, specifically his skin and eyes. His friends, drug users themselves, also observed these changes and began to inquire about his habit. Many of them disliked the drug and disapprovingly noted his attitude, demeanor, and conversation content to be increasingly bizarre and paranoid. He was dishonest with them promising that he was not using bath salts. Subsequently, to conceal his use, he spent time openly smoking cannabis with them for the sake of appearances. Cannabis had no effect on him while he was actively using bath salts. His familial relationships had long been strained secondary to their disapproval of his lifestyle and he began to avoid family members completely.

His evaluation at the outside hospital was catalyzed by a particular telephone conversation with friends who at that time observed his sense of reality to be grossly distorted as he detailed events and conversations that had not taken place. His own suspicions of an inability to think clearly and take care of himself were confirmed. Further, in the latter weeks of his use, he had begun to develop a cough and periodic tightness in his chest which he saw as evidence that he needed help. These factors precipitated his voluntary presentation to the hospital where, in addition to his mental status changes, it was found that he had radiographic and clinical findings consistent with pneumonia which required oral antibiotics. He was subsequently transferred to our facility given his military affiliation though he had not previously received services from the VA.

Upon initial presentation to our hospital, the patient was observed to be a young, gaunt Caucasian male who was visibly tremulous and frightened and who complained of intermittent anxiety and paranoia. He reported previous episodes of mood instability, some directly related to his substance use, and had been on multiple trials of antidepressants in the past with no effect. He had no history of suicidal ideation or gestures. He denied any trauma exposure in his military or civilian life. Substance abuse had been a persistent problem for him since age 14 with his first exposure to cannabis. Past substances of abuse were notable for alcohol, cocaine, hallucinogens, insufflated heroin, and benzodiazepines. His longest period of sobriety had been for 1 year (9 years previous) in the context of the structured lifestyle of a soldier. No significant medical history was

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