

## **Selected Topics: Toxicology**

### **BATH SALTS INTOXICATION: A CASE SERIES**

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**Abstract—Background:** Bath salts commonly contain multiple synthetic drugs, and their toxic effects are largely the same as those seen in patients who have taken large doses of amphetamines. Bath salts can be ingested, smoked, or administered intravenously. Their use is on the rise and is responsible for a large number of emergency department visits. **Case Report:** Our case series involved five patients (six hospital courses) who presented after ingesting bath salts. The presentations involved signs and symptoms of intense sympathetic response. All patients had a history of drug abuse, and most had psychiatric disorders as well. Treatments included benzodiazepines, mechanical ventilation, and intravenous hydration. **Conclusion:** Bath salts are available for approximately \$20 (USD) in packets at truck stops and on the Internet, usually marketed with the disclaimer, “not for human consumption.” Their presentation mimics other sympathetic drugs and causes a significant amount of delirium, hallucinogenic-delusional symptoms, extreme agitation, combativeness, and rhabdomyolysis, often leading to hospitalizations and intensive care unit (ICU) stays. Management is largely supportive and includes aggressive intravenous hydration, dampening of the excessive sympathetic outflow with benzodiazepines, and close monitoring in the ICU setting. The U.S. Drug Enforcement Administration (DEA) recently invoked its emergency scheduling authority to control these synthetic stimulants. The DEA plans to make possessing and selling these chemicals, or products that contain them, illegal in the United States © 2013 Elsevier Inc.

**Keywords—**bath salts; mephedrone; stimulant overdoses; toxicology; agitated delirium; Ivory Wave; Vanilla Sky; Bliss

### **INTRODUCTION**

A new designer drug known as “bath salts” has become increasingly popular, in part because of their easy availability and previous legal status. Bath salts intoxication has led to a rise in emergency department (ED) visits throughout the country, especially the southern United States. Bath salts are similar to amphetamines, and patients who consume these agents may exhibit altered mental status, agitated delirium, and violent behavior. We present a case series involving five patients, compiling six separate ingestions of bath salts. The patients presented between the months of May and December 2011. They all admitted to using bath salts (or bath salts were found in their possession). This case series was approved by the institutional review board at Nashville General Hospital.

#### *Case 1*

A 39-year-old white man with history of bipolar disorder and drug abuse presented to the ED via police custody with altered mental status and violent behavior. He had been eluding police, behaving erratically, and running naked in the streets and through bushes. During the pursuit, use of a taser was required owing to his aggressive and violent behavior. Police found empty packages of bath salts at the patient’s place of residence, and it

was presumed he had ingested bath salts. In the ED, the patient was oriented to person, place, and time. Vital signs and relevant laboratory results are shown in Tables 1 and 2. Of note, creatine phosphokinase (CPK) peaked at more than 47,000 U/L and creatinine at 1.83 mg/dL. He was initially admitted to the general medical floor, but later he was noted to be confused and became agitated, requiring restraints. The patient was subsequently pepper sprayed by security for agitation combined with aggressive and threatening behavior. He was later found unresponsive and in respiratory arrest by his nurse. The patient was resuscitated, intubated, and transferred to the medical intensive care unit (MICU). The exact cause of his respiratory arrest was unknown, but severe bronchospasm due to a reaction to capsicum is a possibility (1). The patient had no complications while on mechanical ventilation but failed to regain consciousness after resuscitation. A computed tomography (CT) scan of the head showed anoxic brain injury. The patient remained in a persistent vegetative state for more than 2 weeks, at which point his family decided to pursue comfort care measures only. The patient was discharged to hospice care, where he eventually died.

### Case 2

**Hospital course 1.** A 42-year-old white man with a history of depression, anxiety, and alcohol dependence was brought by his family to an outside medical facility because of agitation. The patient was brought to the ED by the police after showing aggressive behavior at home. At the ED he was somnolent and hallucinating. The patient's vital signs showed a heart rate (HR) of 130 beats/min, respiration rate (RR) of 25 beats/min, temperature of 36.6°C, oxygen saturation of 94% (undocumented O<sub>2</sub> supplementation), and blood pressure measuring 91/62 mm Hg. He was intubated electively, as physicians foresaw an imminent cardiopulmonary collapse. An electrocardiogram (ECG) showed sinus

tachycardia. A CT scan of the head was negative for any acute findings. Lumbar puncture was performed, and cerebrospinal fluid was found to be unremarkable. The patient was transferred to our facility's MICU for further management. Creatine phosphokinase peaked at 21,155 U/L and creatinine at 1.70 mg/dL. The patient received aggressive intravenous fluid hydration, and CPK trended down to 4706 U/L. Renal indices improved to normal limits. Blood and urine cultures were negative. The patient recovered fully and later admitted to snorting bath salts.

**Hospital course 2.** The same 42-year-old white man was readmitted to an outside facility 1 month later with a similar presentation and subsequently was transferred to our hospital. The patient admitted to snorting two packs of bath salts. He was anxious and exhibited paranoid behavior. Vital signs and relevant laboratory results are shown in Tables 1 and 2. Creatine phosphokinase peaked at 57,200 U/L and creatinine at 2.7 mg/dL. Results from the physical examination were unremarkable. His electrocardiogram showed normal sinus rhythm. The patient was started on intravenous fluid hydration and was transferred to our facility's MICU for further management. He received aggressive intravenous fluid hydration of 11 L over 72 h, and CPK eventually trended down to 4747 U/L. Renal indices improved to normal limits. The patient made a full recovery again and was discharged in stable condition.

### Case 3

A 33-year-old white man with no significant medical history presented to the ED owing to a few hours' history of chest discomfort and muscle aches. The patient admitted to consuming 4 g of bath salts before presentation. He also ran from the police and sustained skin abrasions during the pursuit. On presentation to the ED, the patient

**Table 1. Patient Demographics and Presenting Vital Signs**

	Case 1		Case 2		Case 3	Case 4	Case 5
Age (y)	39	42			33	28	35
Gender	M	M			M	M	M
PMH	Bipolar	Depression, anxiety			None	Bipolar, ADHD	Bipolar
	Hospital Course 1		Hospital Course 2				
Route of Ingestion	Ingestion	Smoke	Smoke		Ingestion	Ingestion	Ingestion
Temp °C (°F)	36.8 (98.4)	36.6 (98)	36.9 (98.5)		36.8 (98.3)	37.4 (99.3)	36.8 (98.4)
BP (mm Hg)	159/105	125/82	138/82		92/56	142/84	133/94
HR (bpm)	120	130	105		132	108	104
RR (bpm)	20	25	22		28	20	18
O <sub>2</sub> Saturation (% RA)	100	97	98		97	99	98

PMH = past medical history; ADHD = attention-deficit/hyperactivity disorder; BP = blood pressure; HR = Heart rate; RR = respiration rate.

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