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Emergency Room Response to Bath Salts

A Review of Nine Case Studies from 2012

Key Words

Bath salts, cathinones, methylenedioxypropylamphetamine, responsive treatment

Abstract

Recently in medical history there has been a boom in the market concerning synthetic cathinones, socially known as bath salts. These designer drugs are legal, easily accessible, and highly dangerous due to a number of factors. Several case studies of individuals admitted into hospitals after using bath salts show similar symptoms and reactions to the drug. Although each person under the influence of these drugs will have a different dosage administered and diverse medical backgrounds, the fact that the symptoms are the same it is crucial to research how hospitals are responding to these users. A significant issue within hospitals, regarding patients influenced by bath salts, does not seem to be how to treat these substance abusers, but instead how to detect the drugs.

Introduction

Bath salts and their use have exploded in popularity over the past year. These designer drugs are substances containing synthetic cathinones, such as mephedrone, methylone, and methylenedioxypropylamphetamine (MDPV) (1). These chemical compounds

are similar to amphetamines and the effects are associated with hallucinations, paranoia, increased vitals, violent behavior, and can lead to permanent damage (1). In the 11 months prior to December 31, 2011, there had been 6138 calls made reporting difficulties from using these drugs (1). These compounds can be sold legally due to their deceptive labeling claiming that the product is "not for human consumption" (1).

Mephedrone is a stimulant compound that is synthetically derived from the khat plant found in east Africa (2). Similar to other abused drugs such as cocaine and amphetamines, those who use bath salts have severe toxidromes that require hospitalization for the recovery of a heavy dose (2). Due to their widespread availability, legality, and desired effects, these drugs have had a dramatic increase in sales over the past 2012-year (3). These drugs are sold in gas stations, tobacco shops, head shops, and the Internet under names such as Ivory Wave, Arctic Blast, Blue Magic, Scarface, Cloud Nine, Red Dove (2), Vanilla Sky, and White Lightning (4). These products are a white powder that is self administered through ingestion, injection, and inhalation (4). One of the main synthetic drugs in bath salts is known as MDPV and is sold as a plant fertilizer, and is the reason for the large caution labels on the sides of these designer drug packages warning against human use (4).

Bath salts present emergency staffs with a large range of difficulties including the variety of symptoms, not yet fully understanding the drug, and concerns that bath salts do not necessarily show up on normal drug tests. Due to this dilemma, they must respond without any protocol and to approach the situation as they seem fit. These drugs are not well understood since there is little information about their mechanisms of action or specific antidotes to respond with (3). Experts currently give sedation, supportive care, fluid administration, and temperature control as advice (3).

Demographics

The case studies examined various adults who used bath salts in 2012. Table 1 shows each case's name assignment, sex, and age.

Citation	Case	Gender	Age
Young (3)	A	Male	20
Young (3)	B	Female	48
Penders (1)	C	Male	31
Penders (1)	D	Male	30
Penders (1)	E	Male	26
Borek (4)	F	Male	25
Kasick (2)	G	Male	38
Kasick (2)	H	Male	26
Mugele (5)	I	Female	41

As seen in the table, the case studies represented both men and women from the age of 20 to 48 years old. Although each of the nine cases showcased an individual who was under the influence of bath salts, the prior medical history of the person could attribute to differences between the cases. Within each case there were similarities between vitals, but these could have been distorted due to past abuse or dosage levels.

Case I had previously, though not in recent months, abused alcohol and attempted suicide (5). After improving in the hospital she admitted to taking bath salts by insufflation and denied using alcohol during recent months (5). Case E was a repeat abuser of bath salts. He had been repeatedly administering bath salts into his system for three days prior to hospitalization and had been hospitalized in another state two months prior due to another overdose of benzodiazepines (1). Case H came to the hospital after insufflating four lines of bath salts (2). He had been repeatedly been using bath salts for a month and had developed a tolerance to low doses (2). Due to this, he decided to use a large amount and overdosed on the drug (2). In the two fatality cases, case A and B, it is unknown if the deceased were abusing any other substances or had a prior history of drug use.

Symptoms

Several case studies of individuals admitted into hospitals after using bath salts show similarities between symptoms. In Table 2 these symptoms are arranged by case:

<i>Table 2: Symptoms</i>				
Citation	Case	Symptoms Prior to Arrival	In Hospital Symptoms	Special Considerations
Young (3)	A	Seizing, unresponsive, narrow complex tachycardia	High HR, high respiratory rate, high BT, high BP, bilateral breath, bilateral epistaxis, pneumoni, hypothermia, guaiac-positive stool	Sniffed bath salts, fatal
Young (3)	B	Unresponsive, high HR, high BP, high respiratory rate, mottled skin, prolonged capillary refill, diaphoresis, constricted pupils	Alert, hostile, noncommunicative, high BT, sinus tachycardia, hypertensive, febrile, bloody diarrhea, no urine, small right renal perirenal fluid, rhabdomyolysis, DIC, anuric, bleeding from the mouth and vagina	History of ethanol abuse, depression, hepatitis C; ingested bath salts, fatal
Penders (1)	C	Wandering, fearful, confused, paranoid, diaphoretic	Combative, dehydrated, acute renal failure, hyperkalemia, rhabdomyolysis, inattentive, delusional, hallucinations	Had already been admitted to the hospital one week prior for using bath salts
Penders (1)	D	Paranoia, agitation, violent behavior, combative	Unresponsive, acute renal failure, rhabdomyolysis, multiple organ dysfunction, acute respiratory distress syndrome, lung and kidney injury, agitation	Repeatedly used bath salts for 2 days prior to hospitalization
Penders (1)	E	Fearful, confused, diaphoretic, combative	High HR, high BT, positive for benzodiazepines	Used bath salts repeatedly for 3 days prior to hospitalization; hospitalized 2 months prior for abusing bath salts
Borek (4)	F	Agitation, foaming at the mouth, not verbal, high HR, high respiratory rate, high BT	Mydriasis, rightward deviation of the eyes, calor, combativeness	Injected bath salts
Kasick (2)	G	Hallucinations, acting strangely	Tachycardic, high HR, premature ventricular contractions, high BT, specific hallucinations, agitation, elevated hemoglobin and hematocrit, positive for PCP, hyperalert, anxious, paranoid, physically combative, positive for benzodiazepines, irritable	Taking bath salts for 2 days prior to hospitalization by mixing with cola and ingesting
Kasick (2)	H	Auditory hallucinations, prominent illusions, feelings of detachment, paranoia, suicidal ideation, confusion, delirium, tremors, hyperreflexia, myoclonus, amnesic effect	Afebrile, hypertension, tachycardia, restless, paranoid, agitated, inattentive, hallucinations, positive for benzodiazepines	Using bath salts for over a month and developed a tolerance; nasally insufflated 2 g prior to hospitalization
Mugele (5)	I	Agitated, spontaneous myoclonus	Severely agitated, hallucination, high HR, high BT, high pulse rate, high BP, hyperreflexic, inducible clonus on dorsiflexion, serotonin syndrome, aspiration pneumonia, bacteremia, pneumothorax	Taking bath salts for 2 days prior to hospitalization; abusing bath salts for over 1 month, previously abused alcohol, previous suicide attempt

Using bath salts yield similar symptoms among abusers. Eight of the nine case studies explicitly mentioned the patient being agitated or combative. Also, almost all of

the cases were confused, paranoid, or acting severely different than normal before arriving at the hospital for treatment. Six cases specifically mentioned a dangerous increase in vital functions including HR, BT, BP, and respiratory rate. Four cases mentioned hallucinations, and six were either unresponsive or detached/inattentive. These nine cases illustrate the common symptoms of using MDPV or bath salts. Hallucinations, agitation, high HR, BP, temperature, and organ system difficulties appear to happen in many cases. Sometimes these effects are mild while other times they lead to death. MDPV is not regulated since bath salts are plant fertilizer and should not be used for human consumption, meaning that the user will not be certain of what he or she is ingesting (2). This unknown creates a wide array of effects from minor highs to dangerous activities.

Medical Treatment

When choosing how to treat a patient there is no set formula, but some treatment plans are more successful than others. With the cases examined, although each person had a different situation most of the symptoms were consistent enough to look for similarities between the responses of the medical staff. Table 3 shows the treatment of each case as well as the outcome:

Table 3: Treatment

Citation	Case	Medical Treatment Before Arrival	Hospital Medical Treatment	Length of Stay	Other Outcomes
Young (3)	A	Naloxone 0.4 mg IV, adenosine 6 mg IV	Succinylcholine 90 mg IV, midazolam 2 mg IV, rocuronium 50 mg IV, ceftriaxone 1 g IV, cardioversion 150 J, 2 L saline, acetaminophen 650 mg, diltiazem 10 mg IV, clindamycin, azithromycin, 2 ice packs, pantoprazole infusion, vancomycin 1 g IVPB, acyclovir 1 g IVPB, 2 units packed red blood cells, 1 unit fresh-frozen plasma, 10 packs cryoprecipitate, phytonadione 10 mg IVPB, 2 ampules sodium bicarbonate, vasopressin IV, epinephrine and dopamine infusions	8 hours	Fatal case: COD toxic effects of MDPV
Young (3)	B	Naloxone 2 mg IV	Lorazepam 6 mg IV, adenosine 18 mg IV, 2 L NS, esmolol 35 mg IV, fan and cooling blanket, dexmetomidine infusion, nicardipine infusion, neosynephrine infusion, 2 bicarbonate infusion, 2 units FFP, 2 units packed red blood cells, renal replacement therapy	4 days	Fatal case: COD toxic effects of MDPV
Penders (1)	C	Unknown	Hydration, haldol 5 mg	3 days	None
Penders (1)	D	Intubated	Unknown	Unknown	None
Penders (1)	E	Unknown	Unknown	Unknown	None
Borek (4)	F	Unknown	Midazolam 2 mg, tracheal intubation, etomidate 20 mg, succinylcholine 120 mg, ice packs, cooling blankets, fentanyl,	18 days	Required hemodialysis 1 month post arrival
Kasick (2)	G	2 Naloxone 2 mg	Lorazepam 3 mg IV, 2 L IV fluids, additional 10 mg lorazepam, IM haloperidol 5 mg	2 days	Stated he would not repeat use
Kasick (2)	H	Unknown	Lorazepam 5 mg IV, IV fluids, 2 oral does risperidone 0.5 mg	4 days	None
Mugele (5)	I	Lorazepam 2 mg	Lorazepam 13 mg, diazepam 5 mg, tracheal intubation, etomidate, succinylcholine, propofol, midazolam, fentanyl infusion, benzodiazepines, cyproheptadine 12 mg	12 days	None

With regard to treatment of the agitation associated with people who use bath salts, various sedatives were used. Four cases were given lorazepam as a benzodiazepine and three were given naloxone as a possible antidote. Three cases mentioned using either icepacks or a cooling blanket to try to lower the body temperature of the individual since so many cases had a dangerously elevated body temperature. Two cases used etomidate for sedation and many cases were given a variety of other drugs to try to counter the effects of the bath salts.

One difficulty concerning these case studies is that not every case provided a complete list of the treatment given to the patient. For example, only two cases state using IV fluids while it is likely that every patient had IV fluids at some point. Also,

since these patients were treated at different hospitals from various parts of the country there is not necessarily a way to see a true correlation between treatment plans.

Looking at the drugs that were used often between the different cases, there were a variety of dosages distributed. Lorazepam was administered in doses of 6 mg in case B, 5mg in case H, 3 mg in case G, and a total of 15 mg in case I. The data does not share the specific benefits of the use of this drug on the patients, so no inferences can be made. In all three cases where naloxone was administered it was given to the patient during the medical treatment before arrival. Again the dosage was not standard and 0.4 mg, 2 mg, and two doses of 2 mg were administered to cases A, B, and G respectively.

Although there are some similarities in drug use, there are no predominating trends when it comes to the length of stay for each patient. The amount of time per stay varies from 8 hours to 18 days in this set of nine studies. Even with different medications, the difference in recovery time has such a wide range that it brings up the question how can hospitals better treat patients under the influence of bath salts? Of the nine cases seven patients were given a drug test and most were negative, providing no further insight for a plan of action. Bath salts do not show up on normal drug tests and are therefore hard to detect in patients where the specific drugs taken are unknown.

A noticeable parallel in the cases was how the staff responded if they knew the patient had been using bath salts compared to cases where there was no certainty to what the user had administered to themselves. In the cases where the patient was known to have been using bath salts the medical staff appeared to not administer as many drugs. In cases where it was not clear what the patient had used there were more drugs administered. Although there were similar symptoms between all of the patients, some doctors took a very minimalistic approach. At the minimum, if the patient is agitated then a sedative should be used, the temperature of the body should be a concern, and the patient should stay hydrated. Depending on how poor the condition of the patient is besides these symptoms should help the doctors determine if other drugs should be administered.

Summary

When faced with patients under the influence of bath salts, the currently most significant issue for hospitals is detection. If a way to detect the presence of, and quantity of bath salts used is created then it will be easier for doctors to respond and treat patients. When treating users, the patient's vitals should be addressed, a sedative should be used if needed, administer a possible antidote drug, and focus on other serious developments concerning life-threatening issues. The symptom similarities are great and hospital staffs need to find the most direct treatment to help counteract these new designer drugs.

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