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Bath Salt-Induced Psychosis: Nursing Assessment, Diagnosis, Treatment, and Outcomes

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PURPOSE: To review what is known about the assessment, diagnosis, treatment, and outcomes of patients with bath salt-induced psychosis.
DESIGN AND METHODS: Comprehensive review and synthesis of research, case reports, and state-level data.
FINDINGS: Of the 42 case reports found, only 18 confirmed the presence of bath salts through laboratory testing. Twelve of the confirmed cases died. In most of the case reports, law enforcement was involved prior to hospitalization due to bizarre behaviors, delusions, and hallucinations.
PRACTICE IMPLICATIONS: Due to the severity of both physical and psychological symptoms in patients in bath salt-induced psychosis, nurses, other healthcare providers, police, and hospital security personnel must work collaboratively to provide safe care.

Bath salts are an emerging street drug that contains one or more synthetic chemicals related to cathinone, an amphetamine-like stimulant. Not to be confused with the legitimate product used for bathing, bath salts are an addictive synthetic street drug used to increase alertness and euphoria. It has gained worldwide attention due to its increasing use and life-threatening outcomes associated with psychosis (Kasick, McKnight, & Klisovic, 2012; Penders, 2012). Bath salt-induced psychosis is marked by extreme agitation and violence, is difficult to diagnose, is difficult to treat, and has significant negative consequences for patients, families, healthcare providers, and the public. Users who experience bath salt-induced psychosis exhibit extremely bizarre behavior that may lead them to harm themselves and/or others (Stoica & Felthous, 2013).

Not every person who uses bath salts experiences psychosis, but the psychosis can occur in first-time users (Penders, 2012; Prosser & Nelson, 2012). Because the widespread use of bath salts is a relatively recent phenomenon, research is only beginning to focus on their potential dangers and factors that predict increased risk of related psychosis. Although the amount of bath salts and the route of ingestion do not seem to be predictors (Prosser & Nelson, 2012), clinicians suspect that drug-taking behaviors contribute to the occurrence of bath salt-induced psychosis (Bonano, Glennon, De Felice, Banks, & Negus, 2014; Dargan, Sedefov, Gallegos, & Wood, 2011). These include (a) using bath salts that contain more than one bath salt chemical compound, (b) mixing bath salts with other street drugs or alcohol, or (c) mixing bath salts with prescription drugs, including benzodiazepines, to increase the high (Antonowicz, Metzger, & Ramanujam, 2011; Jerry, Collins, & Streem, 2012; Penders, 2012).

Healthcare providers around the world have reported difficulty diagnosing and treating bath salt-induced psychosis (Dargan et al., 2011). One contributing factor is that bath salts cannot be detected in the urine drug screen typically used in hospitals; therefore, signs and symptoms are the main diagnostic tool. Patients who present with bath salt-induced psychosis often are out of control, may injure themselves and others, and often cannot meet their own basic needs. It is not uncommon for them to require complete supportive care by health providers until the psychotic episode subsides. Clinicians have emphasized the need for more education on bath salt-induced psychosis, concurring that a lack of understanding about this relatively new phenomenon may serve as a barrier to achieving positive patient outcomes (Lancaster, Whittington, Lane, Riley, & Meehan, 2008; Stoica & Felthous, 2013).

Method

This review focuses on research, reviews of literature, individual case reports, case report summaries by state, and expert opinion. Comprehensive searching was done and a systematic review process was completed using the PRISMA checklist (The PRISMA Statement, 2014). The Cochrane Library, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Academic Search Complete, ProQuest, and PsycINFO were searched for articles published in English from 2009 to 2014. By reviewing the reference lists, several articles from 2007 were found. Inclusion criteria were studies in nursing, psychiatry, and medicine written in English and studies in humans. The keywords used were "nursing," "psychiatry," "bath salts," "synthetic cathinones," "substance use," "substance induced psychosis," "street drugs," "new designer drugs," "drug addiction," "treatment options for bath salts," "management of bath salt psychosis," "bath salt case reports," "case studies of synthetic cathinones," "state legislation of bath salts," "legal implications from bath salt use," and "history of bath salt use." Six review articles, 42 individual case reports, and 3 case report summaries by state were used. Studies were excluded if they focused solely on toxicology and neurophysiology, dopamine receptors, or comparison of bath salts to other drugs, or were brief, uninformative narrative reviews or brief case reports.

Description of Bath Salts

The primary chemical in bath salts is cathinone, an amphetamine analog with sympathomimetic effects that was originally derived from the Khat plant. Although it has been used recreationally for centuries to increase alertness and euphoria (James et al, 2011; Rosenbaum, Carreiro, & Babu, 2012), it is the newly emerging synthetic cathinone compound in the global drug market that is causing great concern. The three major types of synthetic compounds are mephedrone, methylone, and 3,4-methylenedioxypyrovalerone (MDPV). To date, there are over 30 different types of synthetic cathinones, with more being produced when laws prohibit the use of others (Sacco & Finklea, 2013).

Many routes of bath salt ingestion have been identified, including nasal insufflations, oral ingestion, rectal insertion, and intravenous or intramuscular injection. Bombing is a method of ingestion in which the bath salt powder is wrapped in cigarette paper and swallowed (Prosser & Nelson, 2012). The most common route is nasal insufflation, although there is an increasing trend toward intravenous use (Spiller, Ryan, Weston, & Jansen, 2011).

Because of its stimulant effect, bath salts are attractive to adolescents and college age students looking for a new high, and to truck drivers who need to be alert and awake (Al-Kholani, 2010; Vardakou, Pistos, & Spiliopoulou, 2011; Walsh, Verstraete, Huestis, & Morland, 2008; Winstock, Marsden, & Mitcheson, 2010). Approximately 80% of reported bath salt users have also used other illegal drugs recreationally, such as amphetamines and cocaine, and these users are often looking for a better and longer high (Vardakou et al., 2011; Walsh et al., 2008).

Recreational use of bath salts has far-reaching consequences, which must not be ignored. One such consequence is psychological and physical addiction, seen in over 80% of bath salt users (Kelly, 2011). Major ingredients in bath salts produce euphoria: Mephedrone and methylone cause the brain to release increased levels of dopamine, and MDPV works as a dopamine reuptake inhibitor (Boulanger-Gobeil, St.-Onge, Laliberte, & Auger, 2012). Reports in the literature verify that the need for the drug is so high that, in a single session, to enhance and sustain the intense euphoria, bath salt users dose and then keep redosing until their entire supply has run out (German, Fleckenstein, & Hanson, 2014; Valente, de Pinho, de Lourdes Bastos, Carvalho, & Carvalho, 2014).

Availability

Bath salts can be purchased in stores like gas stations, head shops, smoke shops, on the Internet, or on the streets. Bath salts are often disguised by their packaging and labeled as plant food, insecticides, novelty items, chicken feed additives, or research chemicals (Jordan & Harrison, 2013; Murray, Murphy, & Beuhler, 2012; Prosser & Nelson, 2012; Rosenbaum et al., 2012). Even though these products are marked *not for human consumption*, the warning does not deter users (Murray et al., 2012). Sellers around the world purposely vary the name of bath salts to confuse the authorities (Mansbacher, 2011). There are more than 20 popular street names for bath salts, such as powered rush, blizzard, white horse, ivory wave, and cloud 9. Mephedrone and MDPV are white powders that come in small packets, typically containing 500 mg each, and they sell for $25 apiece on the street (Penders, 2012).

Legal Implications

Bath salts have been associated with the term *legal high* because the substance was used as a legal energy stimulant in the United Kingdom and Europe until 2009 (Prosser & Nelson, 2012). By then, the United States was reporting an epidemic of bath salt use, especially in Louisiana, Michigan, and New Jersey. Two years later, Louisiana was the first state to classify six synthetic cathinones as Schedule I drugs, the same classification used for phencyclidine, heroin, and ecstasy. Within 3 months of this classification, 15 other states followed suit (Spiller et al., 2011). In September 2011, the U.S. Drug Enforcement Agency made possession and sale of mephedrone and MDPV illegal in all 50 states (Spiller et al.,

2011). Less than 1 year later, President Obama signed legislation permanently making mephedrone and MDPV illegal (Sacco & Finklea, 2013). However, while these regulations have made it difficult to obtain bath salts, they are still accessible and are in high demand.

Costs

Treating bath salt-induced psychosis is expensive, costing at least $3,000–$5,000 per hospital visit and, overall, millions of dollars annually in the United States (Penders, 2012). Many resources are expended to ensure the safety of these patients, including high nurse-to-patient ratios due to threatening and violent behaviors and support by hospital security personnel. Police, community emergency medical personnel, poison control centers, and foster care resources may also be utilized (Cherpitel & Ye, 2012). Because the vast majority of users become addicted to the drug, it results in a strain on already limited psychiatric resources, lost work productivity, and injury or death of victims in the path of violent users who are out of control (Penders, 2012). Further, the threat of violence has a psychological toll on healthcare providers and families (Bonner & McLaughlin, 2007). Hahn et al. (2012) found that violence or the threat of violence in hospital settings increased sick leave and turnover rates of staff and lowered job satisfaction.

The patient's behavior can be very frightening, and often family members do not know what to do or how to help the patient (Penders, 2012). Afterwards, patients often suffer periods of severe depression, with loss of motivation to seek treatment for the drug abuse, inability to maintain close relationships, isolation, and suicidal ideations (Prosser & Nelson, 2012). Family members worry about how patients will function in society and whether they can hold down a job, live in stable housing, and care for their children. Bath salt users often sever relationships and may be left without social support (Orford, Velleman, Copello, Templeton, & Ibanga, 2010).

Empirical Evidence

Bath salt-induced psychosis is a concept that is difficult to understand because of the lack of research on the topic, the lack of detailed published case reports, and the lack of statistics on its incidence and prevalence. Identifying the defining attributes of bath salt-induced psychosis is important because healthcare providers around the world are diagnosing and treating suspected bath salt users without adequate evidence to make sound practice decisions. Although many entries may be found about bath salt-induced psychosis on various Internet websites, the information is rarely referenced and therefore must be viewed with caution.

Symptoms of Bath Salt-Induced Psychosis

The signs and symptoms of bath salt-induced psychosis are extreme and more challenging to manage than other types of substance-induced psychotic disorders. The signs and symptoms associated with the drug's extensive psychostimulant effects include delusions, extreme paranoia, hallucinations, intense agitation, suicide attempts, and uncontrolled violent behavior toward others (Stoica & Felthous, 2013). While under the influence of bath salts, patients have been known to have severe delusions that last for 24–96 hr. Spiller et al. (2011) described some patients with delusions so severe that they jumped out of the windows to flee from nonexistent pursuers. For example, Benzer, Nejad, and Flood (2013) describe a 36-year-old male who shortly after snorting bath salts started running outside, unclothed, shouting that somebody was trying to strangle him. According to the case report, his girlfriend could not calm him down and police were called. Upon police arrival, the patient became even more combative and agitated and was then restrained and brought by emergency medical personnel to the hospital (Benzer et al., 2013). Extreme paranoia and hallucinations have been identified as primary symptoms of bath salt-induced psychosis (Winder, Stern, & Hosanagar, 2013). It is not uncommon for users to access weapons to "protect themselves" from perceived attackers, robbers, killers, and demons (Macher, 2011). Furthermore, the intense agitation found in bath salt-induced psychosis leads to impulsive behaviors such as suicide attempts and uncontrolled violent behaviors that have led to homicides (Penders, 2012). Violence occurs in patients with bath salt-induced psychosis because the drug mimics its psychostimulant effects like methamphetamines and cocaine, which also have been linked to violence and crime (Darke, Degenhardt, & Mattick, 2007; McKetin, McLaren, Lubman, & Hides, 2006). Patients with extreme symptomatology are considered dangerous and may be brought to emergency departments (EDs) by the police (Darke, Kaye, McKetin, & Duflou, 2008; Darke, Torok, Kaye, & Duflou, 2010).

Challenges in Clinical Diagnosis

Bath salts cannot be detected in the basic urine drug screens that are commonly used in hospitals. Therefore, diagnosis is challenging and, without an advanced test for specific cathinones readily available for healthcare providers to use, bath salt-induced psychosis may indeed be under diagnosed (Stoica & Felthous, 2013).

Newer techniques using gas chromatography, mass spectrometry, and liquid chromatography within a specific window of time, usually 48–72 hr after ingestion, have been developed to detect bath salts (Airuehia, Young-Walker, & Nittler, 2012). Yet these advanced tests are expensive, may not detect every bath salt compound, and are not routinely avail-

able in hospitals. Recently, a national laboratory chain has developed an even newer stimulant panel that tests for mephedrone, methylone, and MDPV (NMS Labs, 2014). While this test gives detailed information about bath salt use, it is also expensive and few hospitals do this newest kind of testing.

Typically, patients with bath salt-induced psychosis are dropped off by friends in the parking lots of EDs or brought in by ambulance due to their bizarre behavior (Jerry et al., 2012; Penders, 2012). When patients are unaccompanied and unknown, healthcare providers must diagnose and treat them without knowing their names, past medical and psychiatric history, or substances that have been ingested. Healthcare providers make the diagnosis by (a) ruling out use of alcohol or other drugs such as methamphetamines or cocaine using the basic urine screen, (b) ruling out other disorders that mimic bath salt-induced psychosis such as an acute episode of schizophrenia or the manic phase of bipolar disorder, and (c) assessing the presenting clinical signs and symptoms (Penders, 2012). Bath salt-induced psychosis is diagnosed largely because symptoms are not better explained by another psychotic disorder or because someone comes forward to divulge that the substance used was bath salts (Jordan & Harrison, 2013; Stoica & Felthous, 2013). Failure of ED treatments to reverse presenting signs and symptoms also suggests bath salt-induced psychosis (Stoica & Felthous, 2013).

Bath salt-induced psychosis meets the DSM-V (*Diagnostic and Statistical Manual of Mental Disorders*, 5th edition) criteria for substance-induced psychotic disorder (American Psychiatric Association, 2013). Because bath salts mimic the effects of stimulant and amphetamine abuse, some health providers in the United States might diagnose bath salt-induced psychosis as stimulant intoxication, amphetamine type. Along with the psychosis, individuals frequently have serious bath salt-related physical symptoms such as chest pain, cardiac arrhythmias, seizures, shortness of breath, high blood pressure, kidney failure, and muscle damage (Prosser & Nelson, 2012). The co-occurrence of serious physical and psychotic symptoms makes diagnosis even more challenging.

Treatment

While medications and physical restraints are often used to ensure the safety of psychotic patients, they must be used with caution in bath salt users. Benzodiazepines such as lorazepam and diazepam may help control agitation, and antipsychotics such as haloperidol or olanzapine may aid in treating hallucinations (Penders, 2012; Spiller et al., 2011). However, pharmacological interventions carry a high risk of treatment-related morbidity such as heart attacks in patients with repeated stimulant use (Penders, 2012). Even with medications, many patients still require physical restraints due to extreme behaviors during the psychotic episode (Penders & Gestring, 2011). When hospitals do not have inpatient psychiatric beds available, it must be determined whether ED personnel can manage a patient whose bath salt-induced psychotic episode may last as long as 48 hr, and if delirium is present, the symptoms may last up to 96 hr. In extreme cases when behaviors cannot be managed with psychiatric medications and/or physical restraints, the use of sedation, intubation, and placement on mechanical ventilation may be required (Kasick et al., 2012).

When patients with bath salt-induced psychosis also have physical ailments such as chest pain, cardiac arrhythmias, or seizures, treatment becomes even more complicated (Prosser & Nelson, 2012). For example, getting an electrocardiogram or having blood drawn can be especially challenging during acute psychotic episodes. Ultimately, a plan of care needs to be developed to determine whether patients should be transferred from the ED to intensive care, a medical unit, or a psychiatric unit.

Analysis and Synthesis of Case Reports

Individual Case Reports

Overall, 42 individual case reports involving the use of bath salts were reviewed. The case reports in the literature are from the following countries: United Kingdom, Netherlands, United States, Japan, Switzerland, and Canada (see Table 1). The clinical diagnosis of bath salt-induced psychosis was only stated in two cases, a more general psychiatric diagnosis related to bath salts was stated in three cases, and the vast majority (30) of case reports did not give a clinical diagnosis. The wording of the clinical diagnoses varies perhaps because practitioners in these countries use various diagnostic coding systems like the DSM, International Classification of Diseases (ICD), or other systems.

Of the 42 cases, 30 described bizarre behavior, auditory and visual hallucinations, extreme paranoia, agitation, and aggression so severe that police officers were called to the scene. These behaviors were seen both out in the community and in hospital settings. In six cases, the patients either died suddenly or alone, so it is unclear what symptoms they had. Regarding any history of mental illness or substance abuse, 13 cases did not report information regarding any prior psychiatric history, 9 cases reported only substance abuse, 11 cases reported mental illness and substance abuse, 3 cases reported only mental illness, and 6 cases reported no prior psychiatric history.

Confirmed by Laboratory Testing. Of the 18 case reports that confirmed the presence of bath salts by using laboratory testing, 12 resulted in death (see Table 1). Of the 12 cases, 6 people died in the intensive care unit (ICU), 3 in the ED, and 3 on the scene or were dead before the emergency medical

Table 1. Published Case Report Summary of Bath Salt Use Confirmed by Laboratory Testing, Reported by the Patient, or Reported by Family, Friends, and/or the Police (2007–2014)

Author/year/case/country	Pre-hospital psychiatric behaviors	In-hospital psychiatric behaviors	Stated past mental health history	Diagnosis and patient outcomes
Case reports in which bath salt use was confirmed by laboratory testing				
Maskell, DePaoli, Seneviratne, and Pounder (2011): Case 3, UK	Patient took mephedrone and alcohol one evening, collapsed in bed, and was found dead the next morning.	NA	Psychiatric problems, drug abuse, and overdose	No diagnosis reported. Found dead at home.
Maskell et al. (2011): Case 4, UK	Patient was driving with a friend, the car collided head-on with an oncoming car, and he was dead at the scene.	NA	Not reported	No diagnosis reported. Died in car accident.
Lusthof et al. (2011): Netherlands	Police were called because patient was naked walking through the street; his hands were covered in blood after smashing windows.	NA	Not reported	No diagnosis reported. Cardiac arrest, pronounced dead by EMS.
Maskell et al. (2011): Case 1, UK	Shortly after taking mephedrone, patient started having chest pain, vomited, and then collapsed.	Patient was unresponsive.	Not reported	No diagnosis reported. Cardiac arrest, died in the ED.
Maskell et al. (2011): Case 2, UK	Bystanders reported that patient was sweaty and acting strangely. Witnesses reported that "his eyes were rolling and he was choking."	Not reported.	Mephedrone use	No diagnosis reported. Cardiac arrest, died in the ED.
Pearson et al. (2012): Case 2, USA	Patient was witnessed taking a pill called "molly." Shortly after, patient started seizing and pronounced dead when EMS arrived.	NA	Not reported	No diagnosis reported. Cardiac arrest, died in the ED.
Pearson et al. (2012): Case 3, USA	Patient went out with friends. Witness reported that patient took LSD and then started having "a bad trip and freaking out."	Patient was unresponsive.	Not reported	No diagnosis reported. Cardiac arrest, died in the ED.
Kesha et al. (2013): USA	Patient was found talking to himself, delusional, and wandering around in inappropriate weather.	Not reported.	Depression, drug, and alcohol use	Diagnosis: MDPV-induced excited delirium state. Cardiac arrest, died in the ICU.
Pearson et al. (2012): Case 1, USA	Patient was walking in and out of traffic at a major intersection, banging on cars with fists, screaming profanities, and exhibiting bizarre behaviors.	Patient was unresponsive.	Not reported	Diagnoses: Probable drug overdose, rhabdomyolysis, acute renal failure, acute respiratory failure, fever, confusional state, and seizure. Cardiac arrest, died in the ICU.
Warrick et al. (2012): USA	Patient ingested a capsule containing methylone and butylone sold as "ecstasy" at a concert.	Patient presented to the ED in a comatose state.	Marijuana and cocaine use	Serotonin syndrome secondary to methylone and butylone. Cardiac arrest, died in the ICU.
Young, Schwarz, Vlez, and Gardner (2013): Case 1, USA	Patient was running from the police after sniffing bath salts and he started seizing.	Patient was unresponsive.	Not reported	No diagnosis reported. Cardiac arrest, died in a medical ICU.
Murray et al. (2012): USA	Patient became agitated, aggressive, and experienced a cardiac arrest.	Patient was initially aggressive, then unresponsive.	Bipolar disorder, cocaine use	Diagnosis: Excited delirium syndrome. Cardiac arrest, died in a medical ICU.
Young et al. (2013): Case 2, USA	Patient was found unresponsive by family.	Patient was unresponsive.	Depression, alcohol use	No diagnosis reported. Admitted to medical ICU, died on hospital day 4.
Boulanger-Gobeil et al. (2012): Canada	Patient came to the ED following vomiting and seizures.	Patient presented to the ED with disorientation and confusion.	Alcohol and marijuana use	Diagnosis: Acute "ecstasy like" intoxication. Intubation for 24 hr, discharged from a medical unit.
Shimizu et al. (2007): Japan	Patient started becoming sick to his stomach, agitated, fell down, and kicked aimlessly around in a prone position.	Upon arrival to the ED, patient was confused and incoherent.	No mental health history	Diagnosis: Substance intoxication with an unknown powder. Discharged from a medical unit on hospital, day 14.
Nicholson, Quinn, and Dodd (2010): Ireland	Not reported.	Patient presented to ED with "central crushing chest pain."	No mental health history	No diagnosis reported. Discharged home from a medical unit on hospital, day 5.
Mugele, Nañagas, and Tormoehlen (2012): USA	Patient was having altered mental status.	Upon arrival to the ED, patient was agitated and later started hallucinating.	Alcohol and bath salt use, previous suicide attempt	Diagnosis: Serotonin syndrome. Admitted to medical ICU, discharged home on day 2.
Thornton, Gerona, and Tomaszewski (2012): USA	Patient was having bizarre behavior and hallucinations, and feeling suicidal after reportedly insufflating a bath salt.	Patient required restraints due to agitation and complaints of visual, tactile, and auditory hallucinations.	Long psychiatric history	Diagnosis: Differential diagnosis of schizoaffective disorder, bipolar disorder, and psychosis secondary to bath salt use. Discharged from ED with a psychiatric follow-up plan.

Table 1. Continued

Author/year/case/country	Pre-hospital psychiatric behaviors	In-hospital psychiatric behaviors	Stated past mental health history	Diagnosis and patient outcomes
Derungs et al. (2011): Switzerland	Not reported.	In the ED, patient complained of having problems concentrating, blurred vision, and increasing restlessness.	Alcohol and polysubstance abuse	Diagnosis: Acute sympathomimetic toxidrome. Psych consult ordered, left AMA.
Case reports in which bath salt use was reported by the patient				
Imam et al. (2013): Case 3, USA	Not reported.	In the ED, patient had chest pain, visual hallucinations, and agitation.	Not reported	No diagnosis reported. Admitted to a medical unit, left AMA.
Imam et al. (2013): Case 5, USA	Police were called because patient was in an "acute delirious state."	On arrival to the ED, patient was agitated and exhibited violent behavior.	Bipolar disorder	No diagnosis reported. Admitted to a medical ICU, discharged home on hospital, day 3.
Imam et al. (2013): Case 4, USA	Not reported.	On arrival to the ED, patient was agitated, made inappropriate comments, and was alert and orientated to time and place only.	Bipolar disorder, ADHD	No diagnosis reported. Admitted to a medical ICU, discharged home.
Kasick et al. (2012): Case 2, USA	Patient reported having auditory hallucinations, paranoia, suicidal ideations, confusion, delirium, and tremors.	Not reported.	Not reported	No diagnosis reported. Admitted to a medical unit, discharged on hospital, day 4.
Stoica and Felthous (2013): USA	Police called due to patient threatening suicide and he put a knife to his throat.	Upon arrival to the ED, patient was having command hallucinations telling him to kill other people.	Bipolar affective disorder, schizophrenia, substance use	Diagnosis: Substance-induced (bath salts) psychotic disorder-resolved. Admitted to a medical unit, discharged home on hospital, day 3.
Khan, Shaheen, Sarwar, Molina, and Mushtag (2013): USA	Patient had not been eating for the past 2 days because she believed her family was poisoning her food and wanted to kill her.	In the ED, patient was yelling, using abusive language, and threatening staff.	No mental health history	No diagnosis reported. Admitted to a medical unit, discharged with close psychiatric follow-up.
Lajoie and Rich (2012): USA	Patient reported chest pain, "psychosis," self-mutilation, and suicidal thoughts.	Upon arrival to ED, patient stated that he was afraid of getting attacked by gangbangers.	Methamphetamine dependence	No diagnosis reported. Admitted to a medical unit, discharged to a treatment program for substance use disorder.
Winder et al. (2013): USA	Not reported.	Upon arrival to the ED, patient complained of intermittent anxiety and paranoia.	Polysubstance abuse, bath salt use	No diagnosis reported. Admitted to a medical unit, discharged to a psychiatric intensive outpatient program.
Striebel and Pierre (2011): USA	Patient reported that he was having "instant energy" followed by severe chest pain, a racing heart, nausea and vomiting, and hallucinations.	Not reported.	Marijuana use	No diagnosis reported. Admitted to a medical unit, several months follow-up phone call (was not using bath salts then).
Wong and Holt (2011) UK	Patient was admitted with ketoacidosis following self-reported mephedrone use.	Not reported.	Not reported	Diagnosis: Diabetic ketoacidosis. Admitted to a medical unit, discharged home.
Antonowicz et al. (2011): Case 1, USA	Police were called because patient and her boyfriend were hallucinating at home.	Patient's admission was uneventful.	Opiate use, Suboxone use	No diagnosis reported. Involuntarily admitted to a psychiatric unit, discharged with a psych consult on hospital, day 5.
Antonowicz et al. (2011): Case 2, USA	Police were called because patient and his girlfriend were hallucinating at home.	Patient's admission was uneventful.	Opiate use, Suboxone use	No diagnosis reported. Involuntarily admitted to a psychiatric unit, discharged with a psych consult on hospital, day 5.
Penders and Gestring (2011): Case 1, USA	Patient called 911 to report unidentified groups tapping on his window.	In the ED, patient was having paranoia.	No mental health history	No diagnosis reported. Admitted to a psychiatric unit, discharged with a psych consult on hospital, day 5.

Table 1. Continued

Author/year/case/ country	Pre-hospital psychiatric behaviors	In-hospital psychiatric behaviors	Stated past mental health history	Diagnosis and patient outcomes
Penders and Gestring (2011): Case 3, USA	Patient called the police and reported that people had entered his home and were shooting him with laser beams and applying a Taser to his body.	Not reported.	No mental health history	No diagnosis reported. Admitted to a psychiatric unit, discharged with a psych consult on hospital, day 4.
Penders and Gestring (2011): Case 2 USA	Patient brought to the hospital by husband because patient was having paranoid delusions.	In the ED, patient was having anxiety, anorexia, and sleeplessness.	No mental health history	No diagnosis reported. Admitted to a psychiatric unit, discharged with a psych consult on hospital, day 3.
Goshgarian, Benford, and Caplan (2011): USA	Patient called the police because he was thinking people were spying on him.	Upon arrival to the ED, patient was restless.	Depressive disorder, polysubstance abuse	No diagnosis reported. Discharged from the ED with referral for outpatient psychiatric treatment.
Case reports in which bath salt use was reported by family, friends, and/or the police				
Imam et al. (2013): Case 1, USA	Patient had altered mental status and violent behavior, including running through the streets naked.	In medical unit, patient became confused and combative and required restraints, transferred to medical ICU.	Not reported	No diagnosis reported. Admitted to a medical ICU, discharged to hospice care, died in hospice.
Borek and Holstege (2012): USA	Patient was "exhibiting unusual behavior."	In the ED, patient was nonverbal, unable to provide additional history.	Not reported	No diagnosis reported. Admitted to the ICU, discharged on hospital, day 8.
Regunath, Ariyamuthu, Dalal, and Misra (2012): USA	Police were called due to erratic and assaultive behavior noted by neighbors.	Patient required restraints due to combative behavior and confusion.	Alcohol and polysubstance abuse	No diagnosis reported. Admitted to a medical ICU, discharged with nephrology consult but did not follow up.
Benzer et al. (2013): USA	Patient ran outside naked, shouting in the streets that people were trying to strangle him.	In the ED, patient was uncooperative and required restraints by several security officers.	Alcohol and substance abuse, depression	Diagnosis: Cathinone-induced delirium and methcathinone (bath salts) intoxication. Admitted to a medical ICU, discharged with referral to primary care and mental health providers but did not follow up.
Imam et al. (2013): Case 2, USA	Patient was brought by his family to a medical facility due to agitation.	In the ED, patient was somnolent and hallucinating.	Depression, anxiety, alcohol dependence	No diagnosis reported. Admitted to a medical ICU, readmitted several times for bath salt-induced psychosis.
Kasick et al. (2012): Case 1, USA	Patient's significant other called to report that he was having visual hallucinations.	Not reported.	Not reported	No diagnosis reported. Admitted to a medical unit, discharged on hospital, day 2.
Falgiani, Desai, and Ryan (2012): USA	Patient brought to the ED by EMS for altered mental status.	Patient's admission was uneventful.	Bipolar disorder, polysubstance use	No diagnosis reported. Admitted to a medical unit, discharged with psychiatry follow-up.

ADHD, attention-deficit/hyperactivity disorder; AMA, against medical advice; ED, emergency department; EMS, emergency medical services; ICU, intensive care unit; LSD, lysergic acid diethylamide; MDPV, 3,4-methylenedioxypyrovalerone.

personnel arrived. Three cases reported that the patients were having pre-hospital psychiatric behaviors such as delusions, bizarre behaviors (walking in and out of traffic at a major intersection), and hallucinations. Of the six cases that survived, four required admission to a medical unit, with one resulting in a 14-day hospital stay.

Reported by the Patient. If laboratory confirmation of bath salts is not available, the next most accurate evidence is self-report. Of the 42 case reports, 16 involving bath salts were reported by the patient (see Table 1). None of these 16 cases died. Fifteen cases involved bizarre behavior, hallucinations, paranoia, agitation, and aggression. Of the 15 cases that required admission to the hospital, 2 required admission to a medical ICU, 8 to a medical unit, and 5 to a psychiatric unit.

Reported by Family, Friends, and/or Police. When the patient is unable to answer or there is no laboratory test available, all clinicians have to rely on is information from the family, friends, and/or police regarding bath salt use. Of the 42 case reports, 7 confirmed the use of bath salts from family, friends, and/or police (see Table 1). One death was reported among these seven cases, and four cases were admitted to a medical ICU, with one case staying in the hospital for 18 days.

Case Report Summaries by State

The state of Michigan released a report regarding the number of patients who went to the ED following bath salt use between November 13, 2010 and March 31, 2011. In this 5-month time span, 35 patients admitted to using bath salts. Among the 35 patients, 66% had agitation, 63% had tachycardia, and 40% had delusions and hallucinations. Seventeen of 35 patients required hospitalization, and 1 patient was dead upon arrival. Of the hospitalized patients, nine were admitted to the ICU, five to a medical floor, and 3 to a psychiatric unit directly (Benzie et al., 2011).

Forrester (2013) published a state report on adolescent cathinone exposure in Texas that was reported to the state's poison control system in 2010–2011. During the 1-year time span, there were 51 adolescent exposures, and 74.5% of the patient outcomes were determined to be serious. Consistent with other symptomatology reports, common symptoms that were seen clinically included agitation, irritability, and hallucinations (Forrester, 2013).

The symptoms of bath salt-induced psychosis have become increasingly common in Missouri due to their widespread availability, according to the Missouri Poison Center (Donnelly, 2011). Furthermore, several deaths have been reported to St. Louis medical examiner and these cases were given the diagnosis of excited delirium/cardiac arrest following bath salt use (Israel, 2011).

Implications for Nursing Practice

Bath salt-induced psychosis is a relatively new and complex condition. Evidence supports that despite legislation outlawing bath salts, its use is still on the rise (German et al., 2014; Penders, 2012). To assess, diagnose, and treat bath salt-induced psychosis effectively, advanced practice nurses need to know the standards for intervening with patients who are agitated, recognize the symptoms of bath salt-induced psychosis, and implement the use of brief substance abuse referral strategies.

Safety of the patient and the staff is the highest priority in cases of bath salt-induced psychosis. The agitation accompanying this condition is often extreme and difficult to manage. Healthcare staff must do all they can to diminish the agitation and thrashing out. Many hospitals use the nonviolent Crisis Intervention Program (CPI) to train staff to work with agitated or violent patients. This program utilizes verbal de-escalation, a supportive stance that helps avert direct face-to-face confrontation, and physical techniques that have proven to help maintain safety for the staff and the patient (Crisis Prevention Institute, 2014; Phillips, Stinson, & Strickler, 2014). Advance practice nurses need to ensure that safety training programs like CPI are in place because they have shown to be effective in reducing restraint and seclusion use, which The Joint Commission states should be the last resort to maintain safety (CPI, 2014; Rainier, 2014). An argument for staff in all areas of the hospital to have training like CPI is that patients with bath salt-induced psychosis also can have intense physical problems like extremely high blood pressure and may move, for example, from the ED or psychiatric unit to the ICU or medical units.

During the assessment process, it is imperative that the healthcare staff gather information from the family or friends about the type of drug or drugs ingested (Penders, 2012). When there is no information provided, nursing relies on symptom recognition. Advance practice nurses need to be able to recognize the symptoms most often seen in patients with bath salt-induced psychosis: delusions, extreme paranoia, hallucinations, intense agitation, suicide attempts, uncontrolled violent behavior toward others, and accompanying physical problems related to stimulant use (Stoica & Felthous, 2013). By quickly recognizing these symptoms, treatment will be instituted sooner to help achieve stability.

After synthesizing the case reports, we noticed that referral and follow-up care were almost never documented. One approach to providing adequate follow-up care is the Screening, Brief Intervention, and Referral to Treatment model (SBIRT; Young et al., 2014). SBIRT is a comprehensive, integrated public health approach to the delivery of early intervention and treatment services for patients experiencing substance abuse that was designed for patients who are at high risk of not seeking treatment following discharge. The protocol of SBIRT is to utilize brief interventions for the patients, such as one-on-one counseling that provides information or advice, efforts to increase motivation to avoid substance use, or to teach behavior change skills with the aim of reducing substance use (Young et al., 2014). A strong evidence base supports that the use of the SBIRT model is beneficial in psychoactive substance abuse (Martin & Copeland, 2010).

Conclusion

This review provides a starting point and some guidance for more effective assessment, diagnosis, treatment, and evaluation of outcomes of patients with bath salt-induced psychosis. Published individual case reports from across the globe would provide more beneficial evidence if more of them provided clinical diagnoses. Certainly, a more sophisticated and available drug panel for bath salts and other commonly used drugs would enhance diagnosis. Readily available spreadsheets at the bedside could be used to begin to collect important clinical data on bath salt users or those suspected of bath salt use. From these clinical data bases, research studies could be designed.

Future quantitative research might be conducted to determine long-term effects of bath salt use, both on physical and psychological health. Other research should focus on deter-

mining what type of bath salt, or combination of bath salts or other drug, increases the risk of developing bath salt-induced psychosis, as well as whether a history of mental illness, for example, increases the likelihood of a patient going into bath salt-induced psychosis. Qualitative studies might explore the experience of withdrawal symptoms and coping with these symptoms in patients after a bath salt-induced psychotic episode. Knowledge of bath salt use and gaining more awareness of bath salt-induced psychosis may give healthcare providers a better understanding of the condition and its dramatic impact on the patient, family, health care, and society.

References

Airuehia, E., Young-Walker, L., & Nittler, J. (2012). A review of "bath salts": Evolving designer drugs of abuse. *Journal of Clinical Toxicology*, *2*, 1–3. doi:10.4172/2161-0495.1000125

Al-Kholani, A. I. (2010). Influence of khat chewing on periodontal tissues and oral hygiene status among Yemenis. *Dental Research Journal*, *7*(1), 1–6.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Antonowicz, J. L., Metzger, A. K., & Ramanujam, S. L. (2011). Paranoid psychosis induced by consumption of methylenedioxypyrovalerone: Two cases. *General Hospital Psychiatry*, *33*, 640.e5–640.e6. doi:10.1016/j.genhosppsych.2011.04.010

Benzer, T. I., Nejad, S. H., & Flood, J. G. (2013). Case 40–2013: A 36-year-old man with agitation and paranoia. *New England Journal of Medicine*, *369*(26), 2536–2545. doi:10.1056/NEJMcpc1304051

Benzie, F., Hekman, K., Cameron, L., Wade, D. R., Miller, C., Smolinske, S., & Warrick, B. (2011). Emergency department visits after use of a drug sold as "bath salts"—Michigan, November 13, 2010-March 31, 2011. *Morbidity and Mortality Weekly Report*, *60*(19), 624–627.

Bonano, J. S., Glennon, R. A., De Felice, L. J., Banks, M. L., & Negus, S. S. (2014). Abuse-related and abuse-limiting effects of methcathinone and the synthetic "bath salts" cathinone analogs methylenedioxypyrovalerone (MDPV), methylone and mephedrone on intracranial self-stimulation in rats. *Psychopharmacology*, *231*, 199–207. doi:10.1007/s00213-013-3223-5

Bonner, G., & McLaughlin, S. (2007). The psychological impact of aggression on nursing staff. *British Journal of Nursing*, *16*, 810–814. doi:10.12968/bjon.2007.16.13.24248

Borek, H. A., & Holstege, C. P. (2012). Hyperthermia and multiorgan failure after abuse of "bath salts" containing 3,4 methylenedioxypyrovalerone. *Annals of Emergency Medicine*, *60*(1), 103–105. doi:10.1016/j.annemergmed.2012.01.005

Boulanger-Gobeil, C., St.-Onge, M., Laliberte, M., & Auger, P. L. (2012). Seizures and hyponatremia related ethcathinone and methylone poisoning. *Journal of Medical Toxicology*, *8*, 59–61. doi:10.1007/s13181-011-0159-1

Cherpitel, C. J., & Ye, Y. (2012). Trends in alcohol- and drug-related emergency department and primary care visits: Data from four U.S. national surveys (1995–2010). *Journal of Studies on Alcohol and Drugs*, *73*, 454–458.

Crisis Prevention Institute. (2014). *Nonviolent crisis intervention training program*. Retrieved from http://www.crisisprevention.com/About-CPI

Dargan, P. I., Sedefov, R., Gallegos, A., & Wood, D. M. (2011). The pharmacology and toxicology of the synthetic cathinone mephedrone (4-methylmethcathione). *Drug Testing and Analysis*, *3*, 454–463. doi:10.1002/dta.312

Darke, S., Degenhardt, L., & Mattick, R. (2007). *Mortality amongst illicit drug users: Epidemiology, causes and intervention*. Cambridge: Cambridge University Press.

Darke, S., Kaye, S., McKetin, R., & Duflou, J. (2008). Major physical and psychological harms of methamphetamine use. *Drug and Alcohol Review*, *27*, 253–262. doi:10.1080/09595230801923702

Darke, S., Torok, M., Kaye, S., & Duflou, J. (2010). Cardiovascular disease risk factors and symptoms among regular psychostimulant users. *Drug and Alcohol Review*, *29*, 371–377. doi:10.1111/j.1465-3362.2009.00158.x

Derungs, A., Schietzer, S., Meyer, M. R., Maurer, H. H., Krähenbühl, S., & Liechti, M. E. (2011). Sympathomimetic toxicity in a case of analytically confirmed recreational use of naphyrone (naphthylpyrovalerone). *Clinical Toxicology*, *49*, 691–693. doi:10.3109/15563650.2011.592838

Donnelly, M. T. (2011). *Acute toxicities in persons exposed to substances marketed as "bath salts."* Missouri DHSS, Health Advisory.

Falgiani, M., Desai, B., & Ryan, M. (2012). "Bath salts" intoxication: A case report. *Case Reports in Emergency Medicine*, *49*, 1–2. doi:10.1155/2012/976314

Forrester, M. B. (2013). Adolescent synthetic cathinone exposures reported to Texas poison centers. *Pediatric Emergency Care*, *29*(2), 151–155. doi:10.1097/PEC.0b013e3182808ae2

German, C. L., Fleckenstein, A. E., & Hanson, G. R. (2014). Bath salts and synthetic cathinones: An emerging designer drug phenomenon. *Life Sciences*, *97*(1), 2–8. doi:10.1016/j.lfs.2013.07.023

Goshgarian, A. M., Benford, D. M., & Caplan, J. P. (2011). Bath salt abuse: Neuropsychiatric effects of cathinone derivatives. *Psychosomatics*, *52*, 593–596. doi:10.1016/j.psym.2011.03.003

Hahn, S., Hantikainen, V., Needham, I., Kok, G., Dassen, T., & Halfens, R. J. G. (2012). Patient and visitor violence in the general hospital, occurrence, staff interventions and consequences: A cross-sectional survey. *Journal of Advanced Nursing*, *68*, 2685–2699. doi:10.1111/j.1365-2648.2012.05967.x

Imam, S. F., Patel, H., Mahmoud, M., Prakash, N. A., King, M. S., & Fremont, R. D. (2013). Bath salts intoxication: A case series. *Journal of Emergency Medicine*, *45*(3), 361–365. doi:10.1016/j.jemermed.2013.04.017

Israel, H. (2011). *Patterns and trends in drug abuse in St. Louis, Missouri: 2010*. Proceedings of the Community Epidemiology Work Group, 256–265.

James, D., Adams, R. D., Spears, R., Cooper, G., Lupton, D. J., Thompson, J. P., & National Poisons Information Service. (2011). Clinical characteristics of mephedrone toxicity reported to the U.K. National Poisons Information Service. *Emergency Medical Journal*, *28*, 686–689. doi:10.1136/emj.2010.096636

Jerry, J., Collins, G., & Streem, D. (2012). Synthetic legal intoxicating drugs: The emerging "incense" and "bath salt" phenomenon. *Cleveland Clinic Journal of Medicine*, *79*, 258–264. doi:10.3949/ccjm.79a.11147

Jordan, J., & Harrison, B. E. (2013). Bath salts ingestion: Diagnosis and treatment of substance-induced disorders. *Journal for Nurse Practitioners*, *9*(7), 403–410. doi:10.1016/j.nurpra.2013.04.018

Kasick, D. P., McKnight, C. A., & Klisovic, E. (2012). "Bath salt" ingestion leading to severe intoxication delirium: Two cases and a brief review of the emergence of mephedrone use. *American Journal of Drug and Alcohol Abuse*, *38*, 176–180. doi:10.3109/00952990.2011.643999

Kelly, J. P. (2011). Cathinone derivatives: A review of their chemistry, pharmacology and toxicology. *Drug Testing and Analysis*, *3*, 439–453. doi:10.1002/dta.313

Kesha, K., Boggs, C. L., Ripple, M. G., Allan, C. H., Levine, B., Jufer-Phipps, R., & Fowler, D. R. (2013). Methylenedioxypyrovalerone ("bath salts"), related death: Case report and review of the literature. *Journal of Forensic Sciences*, *58*(6), 1654–1659. doi:10.1111/1556-4029.12202

Khan, M. D., Shaheen, F., Sarwar, H., Molina, J., & Mushtag, S. (2013). "Bath salts"-induced psychosis in a young woman. *Primary Care Companion CNS Disorders*, *15*(1). doi:10.4088/PCC.12l01417

Lajoie, T. M., & Rich, A. (2012). "Bath salts": A new drug epidemic-a case report. *American Journal of Addictions*, *21*, 572–573. doi:10.1111/j.1521-0391.2012.00286.x

Lancaster, G. A., Whittington, R., Lane, S., Riley, D., & Meehan, C. (2008). Does the position of restraint of disturbed psychiatric patients have any association with staff and patient injuries? *Journal of Psychiatric and Mental Health Nursing*, *15*, 306–312. doi:10.1111/j.1365-2850.2007.01226.x

Lusthof, K. J., Oosting, R., Maes, A., Verschraagen, M., Dijkhuizen, A., & Sprong, A. G. A. (2011). A case of extreme agitation and death after the use of mephedrone in The Netherlands. *Forensic Science International*, *206*, e93–e95. doi:10.1016/j.forsciint.2010.12.014

Macher, A. (2011). Drug abuse: Methylenedioxypyrovalerone (MDPV) and toxic psychosis. *American Jails*, *25*(3), 63–66.

Mansbacher, J. (2011). Dangerous methods: New ways kids get high. *Pediatrics for Parents*, *27*, 25–27.

Martin, G., & Copeland, J. (2010). Brief intervention for regular ecstasy (MDMA) user: Pilot randomized trial of a Check-Up model. *Journal of Substance Use*, *15*, 131–142. doi:10.3109/14659890903075074

Maskell, P. D., DePaoli, G., Seneviratne, C., & Pounder, D. J. (2011). Mephedrone (4-methylmethcathinone)-related deaths. *Journal of Analytical Toxicology*, *35*, 188–191. doi:10.1093/anatox/35.3.188

McKetin, R., McLaren, J., Lubman, D. I., & Hides, L. (2006). The prevalence of psychotic symptoms among methamphetamine users. *Addiction (Abingdon, England)*, *101*, 1473–1478. doi:10.1111/j.1360-0443.2006.01496.x

Mugele, J., Nañagas, K. A., & Tormoehlen, L. M. (2012). Serotonin syndrome associated with MDPV use: A case report. *Annals of Emergency Medicine*, *60*(1), 100–102. doi:10.1016/j.annemergmed.2011.11.033

Murray, B. L., Murphy, C. M., & Beuhler, M. C. (2012). Death following recreational use of designer drug "bath salts" containing 3,4-methylenedioxypyrovalerone (MDPV). *Journal of Medical Toxicology*, *8*, 69–75. doi:10.1007/s13181-011-0196-9

Nicholson, P. J., Quinn, M. J., & Dodd, J. D. (2010). Headshop heartache: Acute mephedrone "meow" myocarditis. *Heart (British Cardiac Society)*, *96*(24), 2051–2052. doi:10.1136/hrt.2010.209338

NMS Labs. (2014). *Bath salts and stimulant designer drugs-expanded, urine test*. Retrieved from http://www.nmslabs.com

Orford, J., Velleman, R., Copello, A., Templeton, L., & Ibanga, A. (2010). The experiences of affected family members: A summary of two decades of qualitative research. *Drugs: Education, Prevention and Policy*, *17*(Suppl. 1), 44–62. doi:10.3109/09687637.2010.514192

Pearson, J. M., Hargraves, T. L., Hair, L. S., Massucci, C. J., Frazee, C. C., III, Garg, U., & Pietak, B. R. (2012). Three fatal intoxications due to methylone. *Journal of Analytical Toxicology*, *36*, 444–451. doi:10.1093/jat/bks043

Penders, T. M. (2012). How to recognize a patient who's high on bath salts. *Journal of Family Practice*, *61*, 210–212.

Penders, T. M., & Gestring, R. (2011). Hallucinatory delirium following use of MDPV ("bath salts"). *General Hospital Psychiatry*, *33*, 525–526. doi:10.1016/j.genhosppsych.2011.05.014

Phillips, J., Stinson, K., & Strickler, J. (2014). Avoiding eruptions: De-escalating agitated patients. *Nursing*, *44*(4), 60–63. doi:10.1097/01.NURSE.0000443316.43113.73

Prosser, J. M., & Nelson, L. S. (2012). The toxicology of bath salts: A review of synthetic cathinones. *Journal of Medical Toxicology*, *8*, 33–42. doi:10.1007/s13181-011-0193-z

Rainier, N. C. (2014). Reducing physical restraint use in alcohol withdrawal patients: A literature review. *Dimensions of Critical Care Nursing*, *33*(4), 201–206. doi:10.1097/DCC.0000000000000059

Regunath, H., Ariyamuthu, V. K., Dalal, P., & Misra, M. (2012). Bath salt intoxication causing acute kidney injury requiring hemodialysis. *Hemodialysis International*, *16*, S47–S49. doi:10.1111/j.1542-4758.2012.00750.x

Rosenbaum, C. D., Carreiro, S. P., & Babu, K. M. (2012). Here today, gone tomorrow . . . and back again? A review of herbal marijuana alternatives (K2, Spice), synthetic cathinones (bath salts), kratom, *Salvia divinorum*, methoxetamine, and piperazines. *Journal of Medical Toxicology*, *8*, 15–32. doi:10.1007/s13181-011-0202-2

Sacco, L., & Finklea, K. (2013). *Synthetic Drugs: Overview and Issues for Congress*, Congressional Research Service, Editor. 2011 CRS Report for Congress, pp. 1–18.

Shimizu, E., Watanabe, H., Kojima, T., Hagiwara, H., Fujisaki, M., Miyatake, R., & Iyo, M. (2007). Combined intoxication with methylone and 5-MeO-MIPT. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *31*, 288–291. doi:10.1016/j.pnpbp.2006.06.012

Spiller, H. A., Ryan, M. L., Weston, R. G., & Jansen, J. (2011). Clinical experience with analytical confirmation of "bath salts" and "legal highs" (synthetic cathinones) in the United States. *Clinical Toxicology*, *49*, 499–505. doi:10.3109/15563650.2011.590812

Stoica, M. V., & Felthous, A. R. (2013). Acute psychosis induced by bath salts: A case report with clinical and forensic implications. *Journal of Forensic Sciences*, *58*(2), 530–533. doi:10.1111/1556-4029.12038

Striebel, J. M., & Pierre, J. M. (2011). Acute psychotic sequelae of "bath salts. *Schizophrenia Research*, *133*, 259–260. doi:10.1016/j.schres.2011.09.001

The PRISMA Statement. (2014). *PRISMA: Transparent reporting of systemic reviews and meta-analyses*. Retrieved from http://www.prisma-statement.org/statement.htm

Thornton, S. L., Gerona, R. R., & Tomaszewski, C. A. (2012). Psychosis from a bath salt product containing flephedrone and MDPV with serum, urine, and product quantification. *Journal of Medical Toxicology*, *8*, 310–313. doi:10.1007/s13181-012-0232-4

Valente, M. J., de Pinho, P. G., de Lourdes Bastos, M., Carvalho, F., & Carvalho, M. (2014). Khat and synthetic cathinones: A review. *Archives of Toxicology*, *88*(1), 15–45. doi:10.1007/s00204-013-1163-9

Vardakou, I., Pistos, C., & Spiliopoulou, C. (2011). Drugs for youth via internet and the example of mephedrone. *Toxicology Letters*, *201*, 191–195. doi:10.1016/j.toxlet.2010.12.014

Walsh, J. M., Verstraete, A. G., Huestis, M. A., & Morland, J. (2008). Guidelines for research on drugged driving. *Addiction (Abingdon, England)*, *103*, 1258–1268. doi:10.1111/j.1360-0443.2008.02277.x

Warrick, B. J., Wilson, J., Hedge, M., Freeman, S., Leonard, K., & Aaron, C. (2012). Lethal serotonin syndrome after methylone and butylone ingestion. *Journal of Medical Toxicology*, *8*, 65–68. doi:10.1007/s13181-011-0199-6

Winder, G. S., Stern, B. A., & Hosanagar, A. (2013). Are "bath salts" the next generation of stimulant abuse? *Journal of Substance Abuse Treatment*, *44*, 42–45. doi:10.1016/j.jsat.2012.02.00

Winstock, A. R., Marsden, J., & Mitcheson, L. (2010). What should be done about mephedrone? *British Medical Journal*, *340*, c1605. doi:10.1136/bmj.c1605

Wong, M. L., & Holt, R. I. G. (2011). The potential dangers of mephedrone in people with diabetes: A case report. *Drug Testing and Analysis*, *3*, 464–465. doi:10.1002/dta.316

Young, A. C., Schwarz, E. S., Vlez, L. I., & Gardner, M. (2013). Two cases of disseminated intravascular coagulation due to "bath salts" resulting in fatalities, with laboratory confirmation. *American Journal of Emergency Medicine*, *31*, 445.e3–445.e5. doi:10.1016/j.ajem.2012.05.03

Young, M. M., Stevens, A., Galipeau, J., Pirie, T., Garritty, C., Singh, K., & Moher, D. (2014). Effectiveness of brief interventions as part of the Screening, Brief Intervention and Referral to Treatment (SBIRT) model for reducing the nonmedical use of psychoactive substances: A systematic review. *Systematic Reviews*, *3*(1), 1–18. doi:10.1186/2046-4053-3-50