



Department of  
**Mental Health &  
Substance Abuse Services**



8/15/2016

**Substance Use Best Practice Tool  
Guide**

**APPENDIX A: Caffeine Use**

Division of Clinical Leadership in Collaboration with the  
Division of Substance Abuse Services

## Issues around Caffeine Use

Hands down, caffeine is the most widely used drug in the world (Meredith, Juliano, Hughes, & Griffiths, 2013; Striley, Griffiths, & Cottler, 2011). It is a stimulant found in many foods and drinks as well as cold medicines and pain relievers, but most people do not think of caffeine as a drug (AMH/AHS, 2013; Encyclopedia of Mental Disorders, n.d.). Caffeine is a bitter, white crystalline alkaloid derived from tea or coffee that belongs to a class of compounds called xanthines. It is classified together with amphetamines and cocaine as an analeptic or central nervous system (CNS) stimulant (Encyclopedia of Mental Disorders (n.d.). Estimates show that caffeine is consumed regularly by 80 to 90 percent of youth and adults in the United States (Striley et al., 2011).

There is little to no data on caffeine's potential adverse effects on children and adolescents. Most research on the substance has been conducted with adults and demonstrates amounts as small as two to three cups of coffee can trigger withdrawal effect marked by tiredness or sleepiness (Branum, Rossen, & Schoendorf, 2014). Caffeine use disorder is only included in Section III of the Diagnostic and Statistical Manual (DSM)-5 and found under the heading "Conditions for Further Study". This category is reserved for conditions that seem to have some evidence of effects on psychological well-being, but lack a sufficient research base to warrant their inclusion in the list of classifiable disorders. It should be noted that caffeine withdrawal and caffeine intoxication are listed in the DSM-5 as disorders (American Psychiatric Association, 2013; Theravive, 2015).

The United States Food and Drug Administration (FDA) considers caffeine to be a safe substance (Branum et al., 2014). An amount of 400 mg of caffeine, about four to five cups of coffee, is indicated as a safe stimulant amount for a healthy adult (Hoeger & Hoeger, 2015). Caffeine can be found naturally in more than 60 plants, like coffee beans, cacao, and tea leaves. However, there is a powdered form of caffeine that is manmade and added to energy drinks and/or sold in its powdered form or as capsule supplements. As much as 100,000 mg of caffeine powder can be purchased online for about \$10.00. That amount is more than 1,000 Red Bulls' worth of caffeine in one package (Newman, 2014).

Customer reviews at the online sites are quick to point out how easy it is to mistakenly use too much of the caffeine powder. A serving size is 1/16 of a teaspoon. Mixing two regular teaspoons of the powder into a drink is equivalent to drinking 70 Red Bulls at once, which could be deadly. The pre-measured capsules of caffeine powder each contain 200 mg of caffeine. Experts say that the public is unaware regarding the caffeine content present in energy drinks, powder, and capsules, and in the risk associated with ingestion of even small quantities (Newman, 2014).

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**Manufacturers are not required to label caffeine amounts and products like energy drinks do not have regulated caffeine limits (American University, 2014).**

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Manufacturers are not required to label caffeine amounts and products like energy drinks do not have regulated caffeine limits (American University, 2014; Encyclopedia of Mental Disorders, n.d.). The FDA regulates dietary supplements but does so differently from the way it regulates conventional food and drug products (Newman, 2014). Neither does the Institute of Medicine (IOM) nor the Dietary Guidelines for Americans provide guidance for caffeine as a nutrient (Branum et al., 2014). The Nutrition Facts Panel on food labels is required to include recommended dietary information for nutrients and caffeine is not a nutrient. Caffeine is considered "safe" when

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used in cola-type drinks up to a level of 0.02 percent or 200 parts per million (FDA, 2016). Hence, manmade caffeine, including caffeine powder, does not need approval from the FDA before it can be marketed to the general public (Newman, 2014). However, reports of excessive caffeine consumption should be noted since results frequently show negative outcomes such as increased blood sugar concentrations, hyperactivity, hypertension, and arrhythmia, e.g. (Branum et al, 2014).

When caffeine reaches the brain, it increases secretion of norepinephrine, the neurotransmitter associated with the flight or fight stress response. These elevated norepinephrine levels and increased activity of neurons help to explain why symptoms of caffeine intoxication often resemble a panic attack. The Board of the American Medical Association acknowledged that energy drinks contained excessive and massive amounts of caffeine that might lead to an array of health issues in young people and has supported banning their marketing to youth younger than 18 years of age (FoxNews, 2013). It is reported that energy drinks contain anywhere from 50 mg to 505 mg of caffeine (Meredith et al., 2013; SAMHSA/CBHSQ, 2013), compared to 50 mg in a 12-ounce cola or around 100 mg in a 5-ounce cup of coffee (SAMHSA/CBHSQ, 2013). The American Academy of Pediatrics (AAP) took a similar position, contending that the stimulants in energy drinks have no place in the diets of youth (Branum et al., 2014).

A National Health and Nutrition Examination Survey (NHANES) involving a nationally representative sample was administered to examine trends in caffeine intake as well as energy drinks and other beverages among children, adolescents, and young adults in the United States. The study analyzed survey data from 1999-2000 to 2009-2010. Survey participants included persons as young as two years of age through 22 years. Results indicated that approximately 73 percent of young people consumed caffeine on a given day. Moreover, there were significant differences by age, race/ethnicity, and poverty-income ratio (PIR). Youth from higher income families were more

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**Tea overtook soda as the largest contributor of caffeine intake for two-to-five year olds in 2009-2010 from 1999-2000 (Branum et al., 2014).**

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likely to consume caffeine than youth from lower income families. White, non-Hispanic youth were more likely to consume caffeine than non-Hispanic, African American/Black or Mexican American youth. Soda was still the major contributor of caffeine intake, though its contribution

declined from 62 percent in 1999-2000 to 38 percent in 2009-2010. Tea maintained its standing as the second largest caffeine-intake contributor overall. However, tea overtook soda as the largest contributor of caffeine intake among two to five year olds by 2009-2010. Coffee increased as a caffeine-intake contributor, from 10 percent in 1999-2000 to 24 percent in 2009-2010. Energy drinks made up eight percent of the caffeine intake in young people in 2009-2010, a contribution category that did not exist in 1999-2000 (Branum et al., 2014).

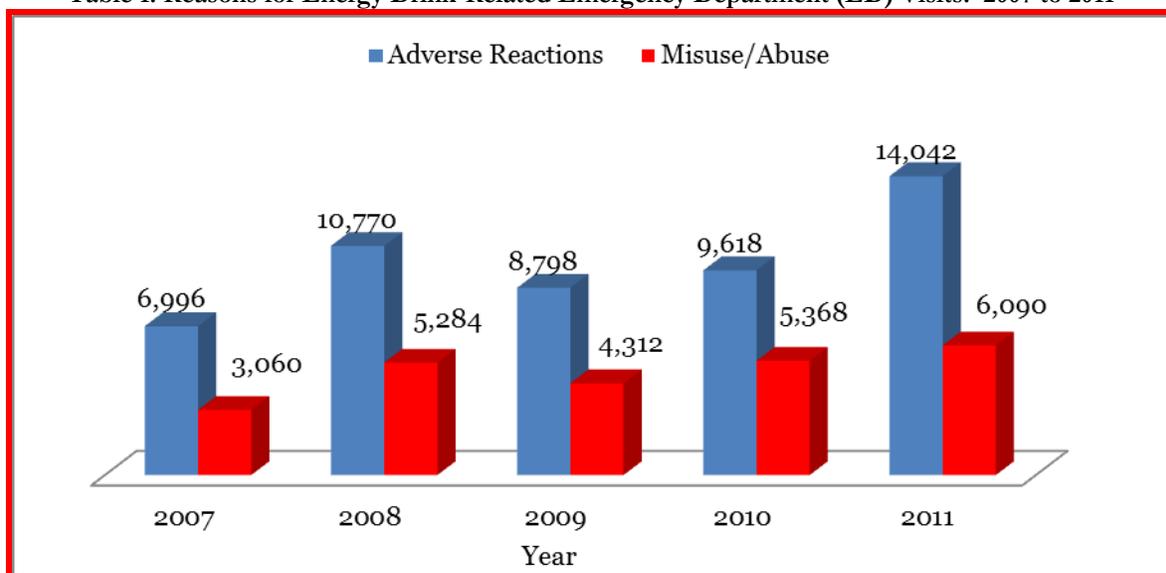
Energy drinks have become very popular among the younger crowd, especially 12 to 17 year olds and persons ages 18 to 24 (CDC, 2014). Energy shots, more concentrated forms of energy drinks like 5-Hour Energy, have become increasingly popular among diverse age groups, including older adults (SAMHSA/CBHSQ, 2013). Equally popular is the trend for these users to mix energy drinks with alcoholic beverages. Research has shown individuals that mix their alcohol and energy drinks were three times more likely to be binge drinkers (CDC, 2014). One study, for example, found that bar patrons who consumed alcohol mixed with energy drinks were three times more likely to leave the bar highly intoxicated and four times more likely to intend to drive under the influence than patrons who did not consume their alcohol with the energy drink mixture (SAMHSA/CBHSQ, 2013). They are further two times as likely to report taking advantage of someone else sexually,

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being taken advantage of sexually, and riding with a driver who was under the influence of alcohol (CDC, 2014).

Between 2007 and 2011, visits to emergency departments (EDs) increased by 106 percent. In 2007, there were 10,068 energy drink-related ED visits and 20,783 visits in 2011. Most of the visits involved either adverse reactions or misuse/abuse of drugs. (See Table 1 below.) ED visits involving energy drinks only and no other drug involvement tended to be classified as adverse reactions. In contrast, the misuse/abuse classification tended to capture visits involving energy drinks in combination with other drugs. In 2007, 99.9 percent of the energy drink-related ED visits were classified as either adverse reactions or misuse/abuse. In 2011, 96.9 percent of the visits were captured by those two categories. Each year from 2007 to 2011, most visits were classified as adverse reactions, ranging from 64 percent in 2010 to approximately 70 percent in 2007 and 2011 (SAMHSA/CBHSQ, 2013).

**Table 1. Reasons for Energy Drink-Related Emergency Department (ED) Visits: 2007 to 2011**



Source: SAMHSA/CBHSQ, 2013.

There have also been concerns around caffeinated alcoholic beverages (CABs). These are premixed beverages that combine caffeine, alcohol, and other stimulants. They may be malt- or distilled-spirits based and more often than not have higher alcohol content than beer. For example, the alcoholic content in beer is 4-5 percent, compared to 5-12 percent on average for CABs. Caffeine content for these beverages is typically not reported (CDC, 2014). On November 13, 2009, the FDA sent warning letters to almost 30 manufacturers of CABs indicating its intention to investigate the legality and safety of their products (FDA, 2013). On November 17, 2010, both the Federal Trade Commission (FTC) and FDA sent warning letters to four companies that marketed CBAs, citing unusual risks to health and safety and warning that marketing of such drinks may constitute deceptive or unfair practice in violation of the FTC Act (FTC, 2010). The CDC has created a fact sheet about caffeine and alcohol that can be accessed from <http://www.cdc.gov/alcohol/fact-sheets/caffeine-and-alcohol.htm>. There are reports of CABs being virtually nonexistent in the U.S. at this time, but the craze of mixing alcohol and caffeine and/or energy drinks still seems to be active, especially among young people and college students in particular (Hoeger & Hoeger, 2015).

## Additional Warnings

The United States Food and Drug Administration (FDA) has issued a warning about powdered pure caffeine. The product is being marketed directly to individuals. In particular, the agency is concerned about powdered pure caffeine that is sold in bulk bags over the Internet. These products are 100 percent caffeine, with a single teaspoon equivalent to the amount of caffeine in 25 cups of coffee. Pure caffeine is very powerful and even small amounts can cause accidental overdose. Parents should be aware that these products may be especially attractive to youth (RxList.com, 2014).

Symptoms of caffeine overdose can include seizures, rapid or dangerously erratic heartbeat, and death. Vomiting, stupor, disorientation, and diarrhea are also symptoms of caffeine toxicity. It is believed that the symptoms are much more severe than those resulting from drinking too much tea, coffee, or other caffeinated beverages. In particular, individuals with pre-existing heart conditions should avoid pure caffeine products (RxList.com, 2014).

Every effort should be made by individuals to avoid powdered pure caffeine. This product is 100 percent caffeine, with a teaspoon roughly equivalent to the amount in 25 cups of coffee (Landa, 2014). It is almost impossible to accurately measure the products with common kitchen measuring tools, thus making consumption of a lethal amount highly probable. In the event the products are used and there appears to be an adverse event, stop using the products immediately and seek immediate medical advice or care. The FDA wants to collect information on adverse events associated with powdered pure caffeine and/or other highly caffeinated products. Reports can be made to the FDA by contacting them at 240-402-2405 or via email at [CAERS@cfsan.fda.gov](mailto:CAERS@cfsan.fda.gov).

In addition, the FDA has announced it will begin investigating the trend of adding caffeine to a growing number of products, particularly food products that are marketed to children and adolescents (Taylor, 2013). As recent as December 2015, the FDA sent a letter to the makers of Steem Peanut Butter, a caffeinated peanut spread that contains 150 mg of caffeine per serving. The letter is a request for more information about the manufacturer's use of caffeine in peanut butter. It has been reported that a single serving of this peanut butter contains five times the caffeine of a can of Coca-Cola Classic (FoxNews.com, 2015).

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