Substance Abuse: Cocaine
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Acknowledgements
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Purpose and Objectives
The purpose of this course is to educate healthcare professionals about cocaine abuse and its effects on the human body.

After successful completion of this course, the participant will be able to:

1. Define the drug classification of cocaine.
2. Describe short and long term physiological effects of cocaine abuse.
3. Discuss increased health risks with cocaine use.
4. Identify clinical management of cocaine use.
Introduction
The use and abuse of cocaine has a long history in the United States (U.S.). A century ago, cocaine was a common ingredient found in numerous potions and remedies that promised to eliminate fatigue and restore health. It was also an active ingredient used in one of America’s all time favorite beverages, Coca-cola.

Over the years, cocaine abuse has waxed and waned. Although other types of illicit, illegal and mind altering substances have taken hold in America, the use of cocaine continues to flourish.

Cocaine abuse has resurfaced and it’s widely available on the streets.

Cocaine: The Drug
Cocaine is an extremely powerful and addictive euphoric stimulant that exerts its action directly on the brain. Dopamine is known for its reward or pleasure effect.

The effects of cocaine are believed to be a result of the drug’s ability to inhibit the reabsorption of the neurotransmitter dopamine by nerve cells.

In normal brain function, dopamine is released by neurons into the synapse where upon it binds with dopamine receptors on nearby neurons. The dopamine is then recycled back into the neuron that transmitted it by a specialized dopamine transport protein.

When cocaine is introduced, it attaches to the transporter and blocks the uptake of dopamine back into the neurons.

The resulting buildup of dopamine causes continuous stimulation of receiving neurons which is associated with the euphoria that is reported by cocaine abusers (National Institute on Drug Abuse [NIDA], 2010a).

On the street, cocaine is known under many slang names that include:
- Nose candy
- Blow
- C
- Coke
- Snow
- Crack (crack cocaine)
- Rock
- Bump
- Toot
(NIDA, 2011)

The History of Cocaine Use
Cocaine has been used by the Natives of the Andes Mountains for many centuries. According to historical accounts, the Inca’s chewed the leaves from cocaine plants to increase their productivity and mood.

The most common refined form of cocaine is cocaine hydrochloride. It was first processed by Albert Niemann of the University of Gottigen in Germany in 1859. European physicians quickly deemed it a wonder drug that would cure a number of health ailments that included headaches, toothaches and

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fatigue. Within years, cocaine was being used for morphine addiction and as a local anesthetic, in
Europe and in the United States.

In 1884, Sigmund Freud wrote a well known paper titled “On Coca” in which he recommended coca
extract or cocaine for a number of illnesses including nervousness, fatigue and minor physical
complaints, as well as for sexual potency.

After only three years Freud changed his position about the use of cocaine and stated that a cocaine
habit could be even more dangerous to an individual's health than a morphine addiction. After that time
Freud rarely referred to cocaine in any of his works (Foundation for a Drug Free World, 2013).

The History of Cocaine Use
The discovery of cocaine's local anesthetic properties in eye surgery by Karl Koller helped to bring
about the use of cocaine in many other types of surgery. At Johns Hopkins University, William Halsted
invented the nerve block (conduction anesthesia) by injecting cocaine into nerve trunks. Not long after
experimenting with cocaine injections, regional anesthesia and spinal anesthesia were also introduced.

During the early twentieth century, cocaine was present in many everyday commodities. It wasn’t long
after, however, that the symptoms of cocaine addiction began to surface. Addiction began to affect
members of the medical community and society as a whole. In 1910, cocaine addiction had become so
problematic that President William Taft declared that cocaine was a national threat.

In December of 1914, cocaine became federally regulated under the Harrison Act. The Act banned
importation of cocaine, prohibited non-medical use of the drug and required strict accounting of medical
prescriptions. The Act also created the same criminal penalties for cocaine users that were brought
against users of heroin, opium and morphine. As a consequence of the Harrison Act, and as cheaper
and more readily available drugs came to the market, the use of cocaine in the US declined. By the
1950’s, cocaine was no longer considered a problem for law enforcement.

Cocaine usage increased again during the 1960s. This prompted Congress to classify cocaine as a

A class II controlled substance is considered to be susceptible for abuse or can produce
dependency, but has legitimate medicinal uses.

Cocaine Usage
Cocaine use occurs among all ethnic groups and genders. Reports indicate that the overall use of
cocaine remains high but stable. In 2007 statistics indicated that approximately 8% of Americans age
12 and older have used cocaine once in their lifetime (CDC, 2010).

According to the Substance Abuse and Mental Health Services Administration (SAMHSA) the use of
cocaine has been reported across the country, with rates climbing since 2004. The Drug Abuse
Warning Network (DAWN) is a public health surveillance network that monitors drug-related incidents,
including emergency room visits and deaths. The 2010 DAWN Emergency Department statistics for
visits to emergency departments related to cocaine were 338.7/100,000 in 2004, and increased to
378.5/100,000 in 2010.
How Cocaine is Used
Cocaine is currently used for medicinal purposes as a topical anesthetic in nose, eye, ear and throat surgeries and procedures. It is also used in fiber tube optical examinations of the digestive and upper respiratory tracts. Cocaine has a combination of properties that cannot be duplicated by any of the synthetic local anesthetics.

These properties include:
- Intense constriction of blood vessels.
- Duration of anesthesia greater than one hour.
- Low toxicity.

Cocaine is no longer used in spinal anesthesia, subcutaneous injection (infiltration anesthesia), or in nerve block anesthesia (synthetic variations of the drug are now utilized). Studies using topical application of cocaine to the upper palate are being explored as a way of relieving the severe pain of cluster headaches (Mayo Clinic, 2012).

When cocaine is used illicitly, a powdered hydrochloride salt form of cocaine can be dissolved in water or liquid and injected. It can also be sniffed or snorted through the nose.

Forms of Cocaine
Crack comes as a rock crystal that can be heated up and once it’s heated, the resulting drug vapors can be inhaled.
The term crack refers to the cracking sound the rock of cocaine makes while it is being heated up (NIDA, 2010a).

**Crack cocaine is a chunk form of cocaine that has not been neutralized by an acid to make the salt form.**

![Tools used to prepare cocaine.](image)

*Image courtesy of the California Highway Patrol, 2010.*

**The Effects of Cocaine**

The effects of cocaine are directly related to the method of use. The faster the rate of absorption, the more intense the high will be.

Studies indicate that when cocaine is snorted, the effects of the drug will peak within 30 minutes and last one to three hours.

If cocaine is injected intravenously or smoked and inhaled, it can peak in just a few seconds but the effects usually only last approximately 15-30 minutes.

Cocaine is rarely swallowed; however, if it is combined with alcohol and swallowed, the effects will peak in about 30 minutes and last approximately three hours.

After the drug is metabolized the drug’s by-products will be excreted and can be detected in a user’s urine for approximately 24-72 hours.

Chronic users may test positive for up to two weeks after using cocaine.

In the brain, dopamine is released by a neuron into the synapse to bind with dopamine receptors. Normally, dopamine then recycles back into the transmitting neuron by the dopamine transporter protein. Cocaine will bind to the dopamine transporter and block the normal recycling process. This creates an accumulation of dopamine in the synapse, which contributes to the pleasurable effects of cocaine (NIDA, 2010b).
Test Yourself

True or False?
If cocaine is combined with alcohol and swallowed, the effects will peak in about 30 minutes and last approximately three hours.

The correct answer is: True.

Short Term Effects of Cocaine
When cocaine is taken in small amounts (up to approximately 100mg), the user will often experience feelings of euphoria. The drug usually makes the user energetic, talkative, mentally alert and sensitive to sensations of sound, sight and touch. Cocaine can also temporarily decrease the need for food and sleep.

The short term physiological effects from using cocaine include:

- Dilated pupils
- Increased temperature
- Increased heart rate
- Increased blood pressure
- Constricted blood vessels

Large amounts of cocaine (several hundred milligrams or more) will increase the drug’s effects but can also lead to erratic, violent or bizarre behavior.

Users that have taken large amounts can also have:

- Anxiety
- Irritability
- Restlessness
- Vertigo
- Paranoia

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- Paranoid psychosis
- Tremors
- Muscle twitches
- Seizures
- Auditory hallucinations
- Sudden death
- Cardiac or respiratory arrest

During periods of abstinence from cocaine use, abusers retain the memory of the euphoria associated with cocaine. Exposure to or memory cues may trigger a tremendous craving for and relapse to drug use, even after long periods of being drug-free (NIDA, 2010b).

**Long Term Effects of Cocaine**

Cocaine is a highly addictive drug. Long term users of cocaine can develop a tolerance to the drug.

Abusers have reported that after long term use they are unable to achieve as much pleasure from the drug as they did when they first started using.

To counteract the diminished pleasure effect, abusers will often increase the amount of the dose.

In addition, studies also have found that an increased tolerance to achieving euphoric effects coupled with long term use can decrease the threshold for seizures and the drug's anesthetic effects (NIDA, 2010b).

**Additional Adverse Effects**

Cocaine use ranges from occasional to repeated and/or compulsive use. Aside from medical uses, there is no safe way to use cocaine. Any administration route can lead to absorption of toxic amounts of cocaine, possible acute cardiovascular or cerebrovascular emergencies, and seizures, resulting in sudden death (NIDA, 2010b).

Users who inject cocaine have an increased risk of allergic reaction to the drug or a street additive. If needles are shared there is a potential of contracting infectious diseases such as HIV and hepatitis B and C (NIDA, 2010b).

**Test Yourself**

True or False?
If needles are shared there is a potential of contracting infectious diseases such as hepatitis A.

The correct answer is: False. If needles are shared there is a potential of contracting infectious diseases such as HIV and hepatitis B and C.

**Transmission of HIV and Hepatitis B and C**

Research indicates that cocaine interferes with judgment about risk taking. Reduced precautions concerning sharing needles and sexual behaviors can lead to the transmission of disease.
Sex may be traded for drugs by both women and men. Direct transmission of HIV and hepatitis B and C can be the result of drug abusers sharing contaminated paraphernalia and needles (NIDA, 2010b).

Transmission of HIV can also occur indirectly from an infected mother perinatally to her infant (The Panel on Treatment of HIV-Infected Pregnant Woman and Prevention of Perinatal Transmission, 2012).

**Maternal Cocaine Use**
NIDA reports that the effects of prenatal drug exposure on children are not completely known; however, many studies have indicated that infants born to mothers who abused cocaine during pregnancy were often premature with low birth weights, shorter in length and had smaller head circumference.

Many factors can contribute to the hazards of drugs on an unborn child. These include:

- Other health conditions
- Exposure to sexually transmitted disease
- Possible abuse or neglect
- Socioeconomic conditions
- Extent of prenatal care
- Amount of drugs abused

Exposure to cocaine during fetal development may lead to deficits now or in the future during later development. Deficits that have been noted include certain aspects of cognitive performance, attention to tasks and information processing (Organization of Teratology Information Specialists, 2010.).

**Signs and Symptoms of Cocaine Abuse**
Signs of cocaine use include constricted peripheral blood vessels, dilated pupils, increased temperature, heart rate and blood pressure, hyper-alertness, lack of fatigue/sleeplessness, panic, extremely talkative; fast speech, runny nose or bloody nose, seizures from high doses or bad reaction, white powder seen on face or clothes.

The duration of cocaine's immediate euphoric effects, which include hyper-stimulation, reduced fatigue, and mental clarity, depends on the route of administration. The faster the absorption, the more intense the high. On the other hand, the faster the absorption, the shorter the duration of action. Increased use can reduce the period of stimulation.

Some other signs of cocaine use are feelings of restlessness, irritability, and anxiety. An appreciable tolerance to the high may be developed, and many addicts report that they seek but fail to achieve as much pleasure as they did from their first exposure (NIDA, 2010b).

**Side Effects of Cocaine Abuse**
Permanent anosmia (absence of the sense of smell) usually results when the olfactory neuroepithelium or any part of the olfactory nerve is destroyed. Permanent or temporary anosmia can also result from inhaling irritants that paralyze nasal cilia, such as cocaine and acid fumes.

Regular chronic (daily or heavy weekly) cocaine use will gradually collapse the septum, the thin membrane which divides the nostrils. The damage is irreversible.
Chronic abuse of cocaine can lead to serious skin conditions, including acute multifocal skin necrosis or pathologic death of skin cells.

Blackened hyperkeratotic palms or “crack hands” are also a sign of cocaine abuse, where the horny layer of the skin is blackened. Chronic skin ulcers and scleroderma may also result.

With short-term use, cocaine users can experience anxiety, paranoia and disrupted sleep. The suppression of appetite can lead to weight loss, and users will experience exhaustion and fatigue. Rubbing cocaine into the gums can cause gum disease and cavities (NIDA, 2010b).

Medical Complications of Cocaine Abuse
Cocaine increases heart rate and blood pressure while constricting the arteries supplying blood to the heart. The result can be a heart attack, even in young people without heart disease. Cocaine can also trigger cardiac arrhythmias and myocardial infarctions.

Transient ischemic attacks, headaches, strokes, seizures, and bizarre and violent behavior can result from the effects of cocaine restricting blood vessels in the brain.

Regular abuse of cocaine can cause nasal perforation. Smoking crack cocaine irritates the lungs and can cause permanent lung damage. Crack smokers often experience bronchial problems, exhibited by coughing and black phlegm.
Cocaine constricts blood vessels supplying the gut. The resulting oxygen starvation can cause ulcers or even perforation of the stomach or intestines. Cocaine used in conjunction with alcohol forms a compound called cocaethylene; which increases the risk of liver damage. This mixture is known to be the most common combination that results in drug-related death (NIDA, 2010b).

Cocaine can cause sudden, overwhelming kidney failure through a process called rhabdomyolysis (the breakdown of muscle fibers resulting in the release of myoglobin into the bloodstream). In people with high blood pressure, regular cocaine use can accelerate long-term kidney damage.

Although cocaine has a reputation as an aphrodisiac, chronic cocaine use can impair sexual function in men and women.

Regular use can cause anxiety, depression and ultimately psychosis. In some instances, sudden death can occur on the first use of cocaine or at any point thereafter. Deaths from cocaine are often a result of cardiac arrest, seizures, strokes, or respiratory arrest.

Cocaine used in combination with other drugs that elevate blood pressure increases the risk of serious health problems. Some users end up using other drugs such as benzodiazepines to offset the come-down caused by excessive cocaine use (NIDA, 2010b).

**Cocaine is responsible for more U.S. emergency room visits than any other illegal drug.**

**Emergency Treatment**

Emergency treatment of cocaine abuse should focus on managing the presenting symptoms. Management is supportive and will depend on which clinical features are present.

Ensure adequate ventilation if patient is unconscious. Volume depletion, cardiac arrhythmias, seizures, hypertension, agitation, and hyperthermia should be managed symptomatically. Hyperthermia (temperature >39 °C/102.2 °F) is associated with poor outcome and should be treated promptly with sedation and external cooling. Ice water immersion produces more rapid cooling than evaporative methods (BMJ Evidence Centre, 2011). Your facility’s treatment protocols should be followed.

Patients that present with cardiovascular effects (such as symptomatic tachycardic arrhythmias, or myocardial infarction) related to cocaine abuse should be treated according to treatment protocols established at your facility. The American Heart Association (AHA) presented recommendations for management of patients with cocaine-associated chest pain and myocardial infarction, which differs in several important ways from treatment of non-cocaine-associated ischemia.

Aspirin and nitrates continue to be strongly recommended. Beta-blockers are considered contraindicated, as these might induce or worsen hypertension and vasospasm. If cocaine intoxication is suspected, benzodiazepines are recommended as the primary treatment for anxiety, tachycardia, and hypertension. Calcium channel blockers are not recommended, as they may increase mortality rates when used as a first-line agent for control of hypertension. Early percutaneous coronary intervention is particularly preferred over fibrinolysis in patients with cocaine-associated MI because of increased risk for intracranial hemorrhage after administration of fibrinolytic agents in cocaine users (McCord et al., 2008).

An accurate nursing assessment that identifies cocaine abuse as a potential source of the symptoms
plays an extremely important role.

Test Yourself
Cardiovascular effects related to cocaine abuse include:
A. PEA
B. Bradycardia
C. Sinus arrhythmias
D. Tachycardic arrhythmias
The correct answer is: D. Tachycardic arrhythmias

Nursing Assessment
Performing a thorough nursing assessment will help to identify a patient’s current health status, health problems, potential health problems and areas that may require teaching to promote good health (Jarvis, 2008). The patient’s account of their health history will provide subjective information about their health status. If they have a history of drug abuse, they may not share this information with you; you may have to rely on clues from the physical assessment (objective) findings to help you to identify drug abuse. During a physical assessment you may discover signs of cocaine abuse.

These signs may be obvious or more subtle and might include:
- Puncture wounds (track marks)
- Nasal irritation
- Nasal bleeding
- Cocaine residue in the nares

Subtle signs and symptoms of cocaine abuse may present as malnourishment, anxiety, paranoia, tremulousness with elevated heart rate, respiratory rate and blood pressure.

Assuring the individual that the disclosure of any personal information will be kept confidential will help to build trust. Explaining that the information will only be utilized to help them with their condition will also help to determine an appropriate plan of care.

Treatment for Cocaine Abusers
Treatment of cocaine addiction is complex and in order to be effective, should address a variety of problems.

Cocaine addiction can bring about social, environmental, familial and biological changes that can affect overall health. In addition, some individuals that abuse cocaine also have mental disorders.

Treatment strategies should assess social, pharmacological and psychobiological aspects of the individual's drug abuse.

Several medications marketed for other diseases that affect neurotransmitters, particularly dopamine receptors, show promise and have been reported to reduce cocaine use in controlled clinical trials (NIDA, 2010b).

Many behavioral treatments for cocaine addiction have been shown to be effective in both residential and outpatient settings. Behavioral therapy is often the only treatment available currently.
combination of pharmacological and behavioral interventions may be the future of effective approaches.

Organizations such as Narcotics Anonymous offer extensive worldwide programs that provide a recovery process and support network for treating drug addiction.

Test Yourself
Treatment strategies should assess ________, pharmacological and psychobiological aspects of the individual’s drug abuse.

The correct answer is: Social.

Medications to Fight Addiction
Recent research into drugs that might help alleviate the symptoms of addiction include:
- Topiramate (a headache and anti-seizure medication)
- Modafinil (a psychostimulant that affects dopamine release)
- Baclofen (a muscle relaxant)

Since mood changes often occur during the early stages of cocaine withdrawal, antidepressant drugs have also been shown to be of some benefit (NIDA, 2010b).

Healthcare Professionals and Social Perception
Society’s response to drug addiction and substance abuse is often negative and punitive in nature.

As healthcare professionals, it may be difficult at times to deliver care to individuals with substance abuse problems. Drug abusers may withhold medically necessary information due to the stigma of substance abuse. They do not understand or recognize the importance of honesty in the development of a therapeutic relationship with their caregiver. Caregivers may be suspicious of a patient’s drug use and become frustrated when the drug abuser is not honest with them. This can cause a caregiver to view the drug abuser as unreliable, dishonest and noncompliant.

Healthcare professionals may also feel uncomfortable talking to their patient’s about drug addiction because of their own feelings about the effectiveness of treatment plans.

Despite nondisclosure of their patient’s drug habits, caregivers should always strive to avoid allowing personal values and judgments to influence the type of care and therapeutic treatment that has been prescribed (CBHSQ et al., 2011).

Poor Health
Individuals who have chronic addiction problems to drugs such as cocaine are more likely to have poor health (CBHSQ et al., 2011). They may have inadequate nutrition and suffer from homelessness. Women may turn to prostitution to support their drug habit. Financial limitations and fears about being reported to law enforcement can prevent drug abusers from seeking regular health care.

Numerous inter-related health factors can contribute to the ability of healthcare professionals to care for individuals who abuse cocaine.

Women who use cocaine while they are pregnant may not seek healthcare due to the fear of...
discrimination, loss of housing or loss of other children in the home. They may be incarcerated for child abuse if they are using drugs while pregnant (CBHSQ et al., 2011).

Medical conditions and health concerns that might otherwise be easily alleviated may progress untreated; impacting not only the mother, but the developing fetus as well.

**Test Yourself**

**True or False?**
Fears about being reported to law enforcement do not affect drug abusers from seeking regular health care.

The correct answer is: False. Fears about being reported to law enforcement can prevent drug abusers from seeking regular health care.

**Conclusion**
Cocaine abuse has been documented within the United States for over a century.

Although other types of illicit, illegal, and mind-altering substances have taken hold in America, the use of cocaine continues to flourish.

Healthcare professionals will benefit from understanding the signs, symptoms and effects that cocaine may exert on the user.

Developing an awareness of the signs and symptoms and the risks involved with cocaine abuse will aid in teaching others about the potential for and dangers of addiction.

**Resources**

**NIDA Web Sites**
- drugabuse.gov
- backtoschool.drugabuse.gov
- teens.drugabuse.gov
- www.drugabuse.gov/nidamed

**Other Web Sites**
- Substance Abuse and Mental Health Services Administration Health Information Network: www.samhsa.gov/shin

**References**


Center for Behavioral Health Statistics and Quality (CBHSQ), Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services (HHS), and by


At the time this course was constructed all URL's in the reference list were current and accessible. rn.com. is committed to providing healthcare professionals with the most up to date information available.  
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