The Heroin Abuse Epidemic in America: Identification, Treatment and Prevention

2 CE

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Objectives

Upon completion of this course, the student will master the following objectives:

- Describe the composition and properties of three types of heroin and the effect of the drug on the brain.
- Identify three ways heroin is introduced into the body and compare and contrast the effects of the three types of transmission
- Describe two categories of signs and symptoms of heroin use and give four examples of each.
- Explain the differences between the psychological and physical effects of short-term and chronic heroin use, and give four examples of each.
- Compare immediate and long-term treatment methods and including three evidence-based therapies to treat heroin use.

Introduction

The purpose of this course is to familiarize professionals with basic information concerning heroin addiction, which has reached epidemic proportions in the United States and around the globe. This includes facts about heroin and addiction, effects on the brain, progression of the disease, psychological and physical effects of short-term and chronic use, screening, treatment, and prevention. The course covers background information and statistics on the escalation of heroin addiction in the United States from 1850 to 2014 including causative factors. The review includes evidence-based treatment and prevention programs, as well as the current trends in progress to advance prevention and treatment of the disease.

Background

Addiction to opiates, in the form of opium, became a significant problem in the United States during the 1850s. Morphine was introduced as a replacement because it was thought to be weaker and non-addictive. Soon, morphine addiction became an even larger problem, and the solution was the introduction of heroin. Heroin, also thought to be non-addictive, was developed in 1898 by the Bayer pharmaceutical company in Germany as a treatment for tuberculosis and to address morphine addiction [1]. The addiction cycle continued because heroin turned out to be even more addictive than morphine. Continuing the cycle, methadone was introduced to address heroin addiction. Methadone was also developed in Germany in 1937 as an anesthesia for surgery and was exported to the United States in 1947 under the name “Dolophine”[1]. Methadone was later used to treat heroin addiction but brought with it a new set of problems if not managed properly. Heroin rapidly became a significant health problem in the United States, and over the next 150 years, the death rate due to heroin addiction has soared to 20 times higher than the drug-free population.

What Is Heroin and How Does Addiction Happen?

Heroin is part of the class of drugs called opioids. The name relates to the heroin molecule that binds to the opioid receptors in the body. The term "opiates" refers to natural, or semi-natural opioids, and heroin has the chemical name diacetylmorphine. Heroin is derived from morphine which occurs naturally in the latex sap of the seed pod of opium poppy plants, which grow in Mexico, Columbia, Turkey, Asia, Afghanistan, and parts of Europe [2].

Heroin and morphine bind to the opioid receptors in the brain and body but heroin binds more effectively, enhancing pain relief and euphoria in the addict. Heroin and morphine, along with codeine, hydrocodone, oxycodone, and oxymorphone are similar in structure because they all bind to the opioid receptor. Many substances can be used to cut heroin, including sugar, caffeine, flour, baby powder, starch, powdered milk, quinine, strychnine, other poisons and drugs which increase the likelihood of death. Strychnine, rat poisoning, is deadly and if ingested, the person will show behavioral effects similar to other drug-induced behaviors, but marked physical symptoms include muscle tightness, pain, spasms in the muscles and jaw, rigidity of the arms and legs, and arching of the neck and back [2].

Heroin may be adulterated with compounds that are added to cheaply enhance the euphoric effects. Examples of adulterants are acetaminophen, opiate painkillers, or anesthesia-like xylocaine. Users think that their numbness and “high” is coming from high quality heroin, when in fact, it is due to the combination of an adulterant. Sometimes adulterants produce the opposite effects to heroin, such as cocaine or other stimulants, and this combination can cause lethal effects on the central nervous system. Other adulterants, such as fentanyl, can be lethal because it is 200 times more potent than heroin. In March 2014, 22 people in Pennsylvania died due to overdose, in which stamp-sized bags of heroin were mixed with prescription fentanyl [7]. Fentanyl is a synthetic opioid that binds to the opioid receptors in the brain, and when combined with heroin, produces a deadly high [3]. The danger is that users will take the same dose of heroin as usual, but the effects may be enough to stop their breathing or heart due to central nervous system depression. Other dangerous adulterants, such as levamisole accelerate the heart rate and destroy the immune system, which leads to life-threatening infections throughout the body [3].

Not only do the addicts buying heroin on the street not know what substances are used to cut the drug, they also do not know the potency of the drug. The purity or the heroin can increase the chance of overdose and death. Street heroin is sold in different forms including black tar, brown powder, and white powder heroin. The purest form is a white powder that may be rose or gray depending on which diluting substances are used to “cut” the heroin to increase the bulk, weight, and profit. Black tar heroin is identified as a ball or chunk of hard, sticky, black or brown material, which is the cheapest and easiest form to make because it is incompletely processed from opium [1]. The next level of processing uses lactose as a diluting agent, which produces brown powder heroin. Some darker colored heroin contains dirt, ground-up brown paper, and black shoe polish as fillers. Contaminants and bacteria in black tar heroin have been known to carry allergens, botulism spores, and necrotizing bacteria causing poisoning, tissue damage, toxic shock, and death [2]. Death may also occur because these contaminants may not dissolve, thus blocking arteries and veins, which cut off blood and oxygen supply causing a deadly aneurism, stroke, or heart attack. Decreased blood flow due to contaminants may also lead to damage,

infection, and ultimately failure of vital organs, as well as convulsions and death.

Street heroin can range from highly potent to forms that are mostly fillers, adulterants, and garden-variety contaminants, but all forms of heroin are dangerous, especially when injected. During the process of manufacturing heroin, a number of chemicals may be left behind, including calcium oxide, ammonia, chloroform, hydrochloric acid, and acetic anhydride, which are all lethal ingredients [2]. White powder heroin is a salt form knows as diacetylmorphine hydrochloride, and even though white heroin is the purest form, it will still contain lethal contaminants. The purer the heroin, the whiter and shiner it appears, while the more heavily cut heroin will appear duller in color [2].

When injected, heroin enters blood stream and the effects are felt within seconds, as opposed to snorting or smoking the drug, in which it may take the user ten to fifteen minutes to feel the effects. Immediately following the heroin injection, users often describe feeling a strong euphoric "rush" or a sensation of exhilaration, euphoria, extroversion, enhanced sensations, increased social and communication skills, heightened sexual performance, and a general feeling of well-being [1]. Less pleasant are the dry mouth; warm, flushed skin; heavy arms and legs; and confused mental state. After the euphoria, users experience feeling alternately drowsy and awake, often described as being "on the nod"[2]. When the drug is smoked or snorted the initial powerful rush of euphoria may absent but the later effects will be the same. Users often start by smoking or snorting heroin but progress to injecting to get the enhanced rush. When heroin enters the body and crosses the blood- brain barrier, it is changed to morphine and binds to opioid receptors that are located throughout the brain and body [3]. Opioid receptors transmit nerve signals in the brain centers involved in signaling pain/pleasure perception, motivation, and reward. Heroin initially increases pleasurable feelings, decreases pain, and motivates the user to seek the "reward" of another heroin high. Opioid receptors located in the brain stem control nervous system function that signal critical processes such as blood pressure and respiration [8]. Heroin overdose often involves a suppression of breathing, due to the effects of heroin that cancel the signal for the body to breathe, often with deadly results.

Tolerance and Dependence

Over time, with chronic heroin use the structure and function of the brain changes. These changes cause individuals to develop tolerance to the drug, requiring increasingly larger amounts to reach a high. The next progressive stage is physical heroin dependence and individuals need to use the drug to avoid withdrawal symptoms known as drug sickness. Psychological dependence follows in which users believe they cannot live without heroin and drug-seeking behaviors motivate their every action.

Withdrawal

Severe withdrawal symptoms occur if individuals try to taper or stop their heroin use. In a few hours after the last heroin dose, the person will begin to feel withdrawal symptoms which may include vomiting, anxiety, insomnia, diarrhea, chills, muscle spasms, panic, hyper movements, and severe drug cravings [8]. It is very difficult and medically dangerous for the individual to go through withdrawal without medical assistance, and individuals will likely relapse to avoid the sickness of withdrawal.

Definitions

The following definitions are included in the National Institute for Drug Addiction (NIDA) publication on the Science of Drug Abuse and Addiction [3].

Addiction: A chronic, relapsing disease, characterized by compulsive drug seeking and use accompanied by neurochemical and molecular changes in the brain. (See below.)

Agonist: A chemical compound that mimics the action of a natural neurotransmitter and binds to the same receptor on nerve cells to produce a biological response.

Antagonist: A drug that binds to the same nerve cell receptor as the natural neurotransmitter but does not activate the receptor, instead blocking the effects of another drug.

Anxiety Disorders: Varied disorders that involve excessive or inappropriate feelings of anxiety or worry. Examples are panic disorder, post-traumatic stress disorder, social phobia, and others.

Attention-Deficit Hyperactivity Disorder: (ADHD): A disorder that typically presents in early childhood, characterized by inattention, hyperactivity, and impulsivity.

Anxiety Disorders: Varied disorders that involve excessive or inappropriate feelings of anxiety or worry. Examples are panic disorder, post-traumatic stress disorder (PTSD), social phobia, and others.

Buprenorphine: A partial opioid agonist for the treatment of opioid addiction that relieves drug cravings without producing the "high" or dangerous side effects of other opioids.

Bipolar Disorder: A mood disorder characterized by alternating episodes of depression and mania or hypomania.

Co-morbidity: The occurrence of two disorders or illnesses in the same person, either at the same time (co-occurring co-morbid conditions) or with a time difference between the initial occurrence of one and the initial occurrence of the other (sequentially co-morbid conditions).

Conduct Disorder: A repetitive and persistent pattern of behavior in children or adolescents in which the basic rights of others or major age-appropriate societal norms or rules are violated.

Craving: A powerful, often uncontrollable desire for drugs.

Depression: A disorder marked by sadness, inactivity, difficulty with thinking and concentration, significant increase or decrease in appetite and time spent sleeping, feelings of dejection and hopelessness, and, sometimes, suicidal thoughts or an attempt to commit suicide.

Detoxification: A process of allowing the body to rid itself of a drug while managing the symptoms of withdrawal; often the first step in a drug treatment program.

Dopamine: A brain chemical classified as a neurotransmitter, found in regions of the brain that regulate movement, emotion, motivation, and pleasure.

Dual Diagnosis/Mentally Ill Chemical Abuser (MICA): Other terms used to describe the co-morbidity of a drug use disorder and another mental illness.

Major Depressive Disorder: A mood disorder having a clinical course of one or more serious depression episodes that last two or more weeks. Episodes are characterized by a loss of interest or pleasure in almost all activities; disturbances in appetite, sleep, or psychomotor functioning; a decrease in energy; difficulties in thinking or making decisions; loss of self-esteem or feelings of guilt; and suicidal thoughts or attempts.

Mania: A mood disorder characterized by abnormally and persistently elevated, expansive, or irritable mood; mental and physical hyperactivity; and/or disorganization of behavior.

Mental Disorder: A mental condition marked primarily by sufficient disorganization of personality, mind, and emotions to seriously impair the normal psychological or behavioral functioning of the individual. Addiction is a mental disorder.

Methadone: A long-acting opioid agonist medication shown to be effective in treating heroin

addiction.
Naloxone: An opioid receptor antagonist that rapidly binds to opioid receptors, blocking heroin from activating them. An appropriate dose of naloxone acts in less than two minutes and completely eliminates all signs of opioid intoxication to reverse an opioid overdose.
Naltrexone: An opioid antagonist medication that can only be used after a patient has completed detoxification. Naltrexone is not addictive or sedating and does not result in physical dependence; however, poor patient compliance limits effectiveness. A new, long-acting form of naltrexone called Vivitrol® is now available that is injected once per month, eliminating the need for daily dosing, improving patient compliance.
Neonatal Abstinence Syndrome (NAS): NAS occurs when heroin from the mother passes through the placenta into the baby's bloodstream during pregnancy, allowing the baby to become addicted along with the mother. NAS requires hospitalization and treatment with medication (often a morphine taper) to relieve symptoms until the baby adjusts to becoming opioid-free.
Neurotransmitter: A chemical produced by neurons to carry messages from one nerve cell to another.
Opioid: A natural or synthetic psychoactive chemical that binds to opioid receptors in the brain and body. Natural opioids include morphine and heroin (derived from the opium poppy) as well as opioids produced by the human body (e.g., endorphins); semi-synthetic or synthetic opioids include analgesics such as oxycodone, hydrocodone, and fentanyl.
Opioid Use Disorder: A problematic pattern of opioid drug use, leading to clinically significant impairment or distress that includes cognitive, behavioral, and physiological symptoms as defined by the new Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) criteria. Diagnosis of an opioid use disorder can be mild, moderate, or severe depending on the number of symptoms a person experiences. Tolerance or withdrawal symptoms that occur during medically supervised treatment are specifically excluded from an opioid use disorder diagnosis.
Partial Agonist: A substance that binds to and activates the same nerve cell receptor as a natural neurotransmitter but produces a diminished biological response.
Physical Dependence: An adaptive physiological state that occurs with regular drug use and results in a withdrawal syndrome when drug use stops.
Post-Traumatic Stress Disorder (PTSD): A disorder that develops after exposure to a highly stressful event (e.g., wartime combat, physical violence, or natural disaster). Symptoms include sleeping difficulties, hyper-vigilance, avoiding reminders of the event, and re-experiencing the trauma through flashbacks or recurrent nightmares.
Psychosis: A mental disorder (e.g., schizophrenia) characterized by delusional or disordered thinking detached from reality; symptoms often include hallucinations.
Schizophrenia: A psychotic disorder characterized by symptoms that fall into two categories: (1) positive symptoms, such as distortions in thoughts (delusions), perception (hallucinations), and language and thinking; and (2) negative symptoms, such as flattened emotional responses and decreased goal-directed behavior.
Self-Medication: The use of a substance to lessen the negative effects of stress, anxiety, or other mental disorders (or side effects of their pharmacotherapy). Self-medication may lead to addiction and other drug- or alcohol-related problems.
Rush: A surge of euphoric pleasure that rapidly follows administration of a drug.
Tolerance: A condition in which higher doses of a drug are required to produce the same effect as during initial use; often leads to physical dependence.
Withdrawal: A variety of symptoms that occur after use of an addictive drug is reduced or

stopped.

The Definition of Addiction

It is well documented that heroin is a highly addictive substance and addiction can occur with only one use. In order to fully understand the process of addiction, professionals must first understand heroin addiction, treatment, and prevention. The American Society for Addiction Medicine in their Public Policy Statement included the following short definition addiction [4]:

> Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors.
>
> Addiction is characterized by [4]:
> - Inability to consistently abstain.
> - Impairment in behavioral control.
> - Impairment in cognitive functioning.
> - Craving.
> - Diminished recognition of significant problems with one's behaviors and interpersonal relationships.
> - Dysfunctional emotional response.
> - Cycles of relapse and remission.
> - Progression that can result in disability or premature death.

As each stage of tolerance, dependence, and addiction progresses, the user requires increasing amounts of heroin to feel pleasure and combat the pain and sickness that now occurs as the body goes through withdrawal. This class of drugs is known by the name opioids or opiates. As defined by the DEA, heroin is a Schedule 1 substance under the Controlled Substances Act, which means it has high potential for abuse, no accepted medical use for treatment in the United States, and lacks accepted safety for use even under medical supervision [7].

Today's Heroin Epidemic

Heroin was formerly viewed as a drug only found in back alleys of large urban areas. Today heroin addiction is found in every corner of the country and affects people of all ages in every socio-economic group in epidemic proportions. Heroin addiction still carries the stigma that it is a behavior or character flaw, though it affects a wide cross-section of America. No one is spared, from movie stars, such as Philip Seymour Hoffman who died from a heroin overdose after 20 years, to teenagers in suburbia and the homeless on inner-city streets.

The most alarming statistics show heroin addiction among youth is increasing in children as young as nine [6]. A number of factors contribute to this epidemic by making the drug inexpensive and readily available. As the use of heroin became more widespread in contemporary culture, it became more accepted among certain segments of society. Rock stars, actors, fashion models, photographers, and other celebrities in popular culture abuse heroin, and their deaths are almost commonplace today. In fact, the "heroin look" became popular in the fashion world in the mid 90's and was characterized by a thin, pale, emaciated appearance, blank expression, dark

sunken eyes, dirty hair, and disheveled clothing. Popular music and advertising campaigns included references to heroin abuse and death had the effect of making the drug seem safe, exciting, glamorous, and mainstream in the eyes of impressionable youth. Young people who would never inject a drug can now find heroin that can be smoked or inhaled. This makes heroine seem easier, safer, and more desirable, thus increasing their willingness to try the drug [7]. Many youth have become addicted, comatose, or have died after only one dose of heroin. If individuals survive the first dose and continues to use heroin, they quickly develop a tolerance to the previous amount used and must have increasing amounts of the drug to replicate the high they experienced the first time. When the high from smoking and snorting is no longer enough, as tolerance develops, users may inject the drug to enhance the rush and get the most they can from the amount they have. As the amount used and the frequency of use escalates, so does the danger of overdose. Similarly, if drug use is curtailed through incarceration or time in rehabilitation, users may overdose and die when they return to using heroin at the pervious level. Sadly, another factor in the increasing number of deaths from heroin abuse is that those around them are unable or unwilling to summon help when problems occur. Death usually occurs due to the drug's suppressive effects on the automatic breathing response of the victim, which can be easily reversed through mechanical measures or medication to restore breathing [3].

Families, schools, health agencies, local, state and federal agencies across the country are now focused on addressing the epidemic rates of addiction and death caused by heroin. Heroin today is very different from the drug initially developed and can be found in many multiple drug combinations. With continued use, these euphoric feelings become more difficult for users to reach, and over time, the body tries to adjust to the damage caused by the drug. Individuals become addicted to heroin quickly and their immune and body systems are damaged, leaving the individual weak, sick, malnourished, thin, and if untreated, they will die. One addict reported from the time she started using heroin she never stopped, and in a week she went from snorting it to injecting and was addicted in a month [5]. To support her habit, she sold everything she had, stole all she could from her family, ran her credit cards to the limit, sold her car, lost her job and house and became homeless. While living on the street she was raped, robbed, beaten, sick, and in constant fear for her life and desperate for her next heroin hit. She realized she would die and felt that living as a junkie was worse than death, so she sought help from a local agency and continues to struggle to end her addiction.

Research into treatment and prevention programs around the world produced promising results, but it has not kept pace with the rampant addiction and death caused by heroin. The frequency of overdose among youth has increased so drastically that some states now allow family members to administer antidotal drugs in cases of near death that were previously only used by medical personnel.

Why Heroin, Why Today?

Heroin abuse and addiction has replaced other high-priced, commonly abused opiates and became the drug of choice in the United States, increasing rapidly since 2010 [6]. The general public was largely unaware of the epidemic until recent widespread media attention brought heroin addiction and death to the forefront and demands for solutions came from Vermont to California. The war against heroin must be fought on many fronts, and medical and mental health personnel must lead the charge.

Typically the drug is supplied by Mexican cartels, for just $10 a hit called a “stamp bag,” and has gone up 600 percent in the last 10 years across the country [7]. As the United States cracks down on the sale of opiates such as Oxycodone by closing down pill mills throughout the country, an 80 milligram Oxycontin dose now costs $100, which makes heroine cheaper and easier to obtain [7]. Manufacturers are also making opiates and other prescription drugs in formulas that are more difficult for users to snort or dissolve to inject. Another reason heroin use is thought to have doubled in five years relates to the high rate of addiction to prescription opiate painkillers now replaced by heroin, which is a natural opiate. Approximately 34,000 12-17-year-olds experiment with heroin each year due to lower costs of the drug and its availability [6].

Even though heroin abuse exists throughout the United States, large cities are reporting dramatic increases in the rates of heroin addiction and death. In large cities like Chicago, heroin can be found on the west side, often sold on the streets in plain sight. Addicts know where they can go to in any city, and with a phone call, they can receive the drug in a few minutes. Local police are aware of the problem but seem unable to get it under control. Addicts can be seen shooting up on the street, bleeding from their injuries as they attempt to find a vein. Special Agent Jack Riley, Regional Representative of the Drug Enforcement Agency (DEA) and Special Agent in charge of the DEA’s Chicago Field Division, is familiar with the addicts on Lower Wacker Drive, a notorious drug-infested part of the community. Many addicts congregate under the overpass, injecting drugs or sleeping them off. Riley reports that the Mexican cartels supply 70 percent of the drugs used on Chicago's streets and that statistic is mirrored nationwide [7]. One of the addicts he encountered first took heroin as young as eleven years old and now lives on the street with two young children. Riley states,” heroin addiction is probably at its all time high.” “Heroin is the drug of choice for street gangs,” says Riley, and he noted the increase started about three years ago, when Mexico’s Sinaloa Cartel began importing heroin through Chicago. “We are seeing it in places like Indianapolis, Madison, and Milwaukee, places where traditionally we really did not see an uptick in heroin [7].” “The ability to smoke and snort today’s pure form of heroine has made it accessible and acceptable to people who normally wouldn’t come near it for fear of the needle,” says Riley. “That’s why it is spreading.” Riley continues, “I've been doing this for 30 years in virtually every corner of this country and if anything can be likened to a weapon of mass destruction on a family, on a community, on society, it's heroin.” “I just don't understand why people across the board don't see its danger. Social services are overwhelmed, our healthcare services are overwhelmed, yet Mexican organized crime and street gangs make billions from it [7].”

Many youth come from suburban areas around Chicago and other large urban areas to buy the drug, and they may spend hundreds of dollars a day to feed their habit. The streets of Chicago are filled with stories of ruined lives caused by heroin addiction, including one from a college student who went from shooting up between classes to living homeless on the street, turning to prostitution to survive and stay high. In another tragic instance, a suburban high school girl tried it once, overdosed, and died. These stories are not unique to Chicago or large urban areas, but they are echoed through the farmlands of Wisconsin and Vermont.

Illinois is not alone in its fight against the heroin epidemic that has plagued that state. Over one weekend in February 2014, a drug raid in the New York City Bronx area resulted in seizure of $8 million worth of heroin. “Heroin is pummeling the northeast, leaving addiction, overdoses, and

fear in its wake," said James Hunt, acting special agent in charge of the DEA's New York office [7]. DEA heroin investigations in suburban Rockland County have doubled, and agents note that use is increasing in all age groups and across all socio-economic levels. The Long Island Council on Alcoholism and Drug Dependence found an increase in families seeking assistance over the last five years from 100 to 850, and 80 percent of those were due to heroin addiction [7].

Dr. Wilson Compton, deputy director of the National Institute on Drug Abuse (NIDA), described heroin addiction as consuming the user. "The most common and important outcome of using heroin is that it can cause an addiction where people organize their lives around the drug," Dr. Compton said. "They use it to the exclusion of all other aspects of their lives. It just becomes about scoring the next hit [8]."

The following NIDA statistics describe a nationwide problem [6]:

- In Maryland, state health officials believe that heroin combined with other drugs is responsible for 30 or more deaths in the six months prior to March of 2014. They also note the number of deaths attributed to heroin rose 54 percent from 2011 to 2012 totaling 378 deaths.
- The U.S. Drug Enforcement Agency (DEA) notes that Baltimore has the highest per capita heroin addiction rate in the country. In a city of 645,000, the Baltimore Department of Health estimates there are 60,000 drug addicts, with as many as 48,000 of them hooked on heroin. A federal report released last month puts the number of heroin addicts alone at 60,000 [7].
- Virginia officials note 91 heroin deaths in the first nine months of 2012, up from 90 for all of 2011 and 70 for 2010.
- Vermont Governor Peter Shumlin spent his entire 34-minute State of the State address this year discussing a "full-blown heroin crisis." Heroin-related deaths in Vermont doubled in 2013 according to the governor, and there were twice as many federal indictments against heroin dealers than in the prior two years. Per capita, the heroin use in Vermont is second in the nation.
- Heroin overdose deaths in the Minneapolis/St. Paul metro area nearly tripled from 2010 to 2011, increasing from 16 to 46 deaths, and these new heroin users were considerably younger. In Minneapolis, for example, arrestees testing positive for heroin were much younger: 19.8 percent were less than 21 years of age, which is much younder than those testing positive for cocaine and methamphetamine, according to the Arrestee Drug Abuse Monitoring Report.
- In March 2014, Maryland, Vermont, New York, and Florida each reported an unprecedented number of deaths, according to the National Institute on Drug Abuse, which is still determining the numbers. NIDA reports these numbers could be the highest ever.
- In 2012, New Jersey saw more than 800 opioid overdoses, and half involved heroin.
- The DEA reports that drug seizures in New York comprise 20 percent of the total heroin confiscated each year. The amount seized by the DEA in New York City has increased 67 percent over the past five years because heroin is now mass-produced in city apartments [7].
- The New York City Department of Health notes fatal heroin-related overdoses increased 84 percent between 2010 and 2012, and 2012 showed a higher rate of

heroin overdose deaths at 52 percent over deaths involving any other substance. The problem is particularly bad on Staten Island, where the death rate from overdoses is almost three times higher than the rest of New York City, according to the agency [7].

- Heroin is the most commonly found illicit substance in drug intoxication deaths in Philadelphia, PA. In 2011, 251 intoxication deaths involved heroin/morphine, a significant increase from 138 in 2010. Heroin is also the most commonly found substance in mortality cases where illicit drugs are present, with 32.4 percent in 2011.
- Dr. Karen Simone from the Northern New England Poison Center said the number of heroin-related calls doubled from 2007 to 2012.
- Only 20 percent of the estimated 810,000 heroin addicts seek or receive any form of treatment for their addiction.

Street Names for Heroin

It is important to know the street names of the drugs to help identify the user's drug of choice. There are many street names for heroin, including the following [7]:

- Big H, H.
- White, White Lady, China White.
- Mexican Mud.
- Scag, Skag.
- Black Tar, Tar.
- Brown Crystal, Brown Sugar.
- Nod.
- Negra.
- Chiba, Chiva.
- Snowball.
- Black Pearl.
- Junk.
- Smack.
- Hell dust.
- Nose drops.
- Thunder.
- Horse.
- Dragon (smoking heroin is called "Chasing the Dragon").
- Dope.

Heroin Combinations

Heroin is often used in combination with other drugs that are known by specific names as follows:

Heroin and Cocaine

- Speedball, Snowball.
- Belushi.

- Boy-Girl.
- H&C.
- Murder One, One and One.
- Smoking Gun.
- Whiz Bang.

Heroin and Methamphetamine:

- Meth Speedball.

Heroin and Marijuana

- Canade.
- Woolie.
- Woola.

Heroin, Cocaine, Methamphetamine, Rohypnol. and Alcohol:

- The Five Way.

Heroin and Fentanyl

- Theraflu.
- Bud Ice.

Heroin, Cocaine. and Tobacco:

- Flamethrowers.

Heroin and Cold Medicine

- Cheese.

Cheese heroin is a combination of Mexican black tar heroin and cold medicine obtained over the counter. It is a highly addictive substance, which is very inexpensive, only a few dollars, so it is often targeted at young people. Children as young as nine years old have been identified in emergency rooms with addiction, overdose, and withdrawal to this form of heroine which suppresses the central nervous system causing breathing and heartbeat to slow or stop. Since 2004, 40 deaths in North Texas are attributed to cheese heroin [7].

Facts and Figures of Increased Heroin Addiction, Overdose and Death

Statistics from the United States Government Substance Abuse and Mental Health Services Administration (SAMHSA) noted the following statistics [9]:

- Nearly a half million Americans are addicted to heroin, and this number is thought to be the highest in history.
- In 2011, 4.2 million Americans aged 12 or older (or 1.6 percent) had used heroin at least once in their lives. It is estimated that about 23 percent of individuals who use heroin become dependent.
- NSDUH reports the number of new heroin users increased from 142,000 in 2010 to 178,000 in 2011. Both numbers are a sizeable increase from the average annual estimates of 2002 to 2008 (ranging from 91,000 to 118,000).
- In 2012, there were 156,000 persons aged 12 or older who had used heroin for the first time within the past 12 months.
- A SAMHSA study from August of 2012 found that persons aged 12 to 49 who abused prescription pain killers were 19 times more likely to try heroin than those who abused pain killers in the previous year.
- In 2011, the average age at first use among heroin abusers aged 12 to 49 was 22.1 years and in 2010 it was 21.4 years, significantly lower than the 2009 estimate of 25.5 years.

- The 2012 average age at first use among recent heroin initiates aged 12 to 49 was 23.0 years, which was similar to the 2011 estimate (22.1 years).
- The annual Monitoring the Future survey of teens reported in 2012 that 20 percent of high school seniors felt that heroin was "easily available."
- From 2007 to 2012, the number of Americans using heroin nearly doubled, from 373,000 to 669,000, according to the federal government's most recent National Survey on Drug Use and Health, released fall 2013.
- One out of every four people who try heroin become addicted.
- The number of people meeting Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria for dependence or abuse of heroin doubled from 214,000 in 2002 to 467,000 in 2012 [10].
- When teens were surveyed to find out why they started using drugs in the first place, 55 percent replied that it was due to pressure from their friends. They wanted to be cool and popular.
- Heroin accounts for 18 percent of the admissions for drug and alcohol treatment in the United States.
- An estimated 9.2 million-use heroin worldwide.

The U.S. Drug Enforcement Agency (DEA) 2013 National Drug Threat Assessment Summary found that heroin smuggling is increasing across the United States border from Mexico and Mexican cartels, called Transnational Criminal Organizations (TCOs) by the DEA. [7]. The summary noted, "The availability of heroin continued to increase in 2012, likely due to high levels of heroin production in Mexico and Mexican traffickers expanding into white powder heroin markets in the eastern and Midwest United States." Previous to 2012, heroin from Mexico was predominantly west of the Mississippi River with heroin from Asia coming through the major airports east of the Mississippi River. Some heroin from South America is smuggled through Mexico to the United States. The DEA report noted a steady decrease in cocaine trafficking from Mexico to the U.S. during this time period and theorizes that the increase in heroin trafficking may be a push by the Mexican TCOs to make up for the loss of cocaine profits. The DEA 2013 National Drug Threat Assessment Report includes the following [7]:

- The availability of white powder heroin continued to increase in 2012 due to an increase in Mexican heroin production and trafficking which expanded into the Eastern and Midwest markets.
- There was an increased level of smuggling of both Mexican-produced heroin and South-American-produced heroin, which was smuggled through Mexico into the United States in 2012.
- According to National Seizure System (NSS) data from January 15, 2013, the amount of heroin seized each year at the Southwest Border increased 232 percent from 2008 (558.8 kilograms) to 2012 (1,855 kilograms).
- The increase in Southwest Border seizures appears to correspond with increasing levels of production of Mexican heroin and the expansion of Mexican heroin traffickers into new US markets.
- Heroin-related overdoses and deaths are increasing in certain areas, possibly due to high-purity heroin on the streets and increasing numbers of heroin abusers at a younger age because it can be smoked or inhaled. Inexperienced abusers, such as teens, college students, and those who would normally not inject a substance start by smoking or

inhaling. Law enforcement officials reported an increase of high-purity heroin available at the street level.

- People are switching from abusing prescription drugs to abusing heroin. Law enforcement and treatment officials throughout the country report that many heroin abusers began using the drug after having first abused prescription opioids. These abusers turned to heroin because it was cheaper and/or more easily obtained than prescription drugs and because heroin provides a high similar to that of prescription opioids.
- According to treatment providers, many opioid addicts will use whichever drug is cheaper and/or available to them at the time. Several treatment providers report the majority of opioid addicts will eventually end up abusing heroin and will not switch back to another drug, because heroin is highly addictive, relatively inexpensive, and more readily available. Those abusers who have recently switched to heroin are at higher risk for accidental overdose.
- Unlike prescription drugs, heroin purity and dosage amounts vary, and heroin is often cut with other substances, all of which could cause inexperienced abusers to accidentally overdose.

Etiology of Heroin Addiction:

Physical Effects on the Brain

The thorough study of the effects of heroin on the brain would require a separate course, but it is important to include an outline of the effects of heroin on the brain that lead to addiction. Whether heroine is smoked, snorted, or injected, it is rapidly absorbed and crosses the blood brain barrier. Addiction occurs due to specific effects on the brain caused by the drug that interfere with normal brain function in the following ways [4]:

- Addiction affects the transmission of neurons within the parts of the brain that control motivation and reward. These parts include the basal forebrain amygdala and the anterior cingulate cortex. This part of the brain affects the individual's ability to conduct routine behaviors related to healthcare, motivation, and normal reward-seeking behavior.
- Addiction interferes with cortical and hippocampal interactions that affect reward; memory of reward; and control of physical, mental, and behavioral response to stimuli that drives individuals' drug cravings and drug-related behaviors. These behaviors may include lack of judgment and impulse control, inability to delay gratification, poor decision-making and repeated inability to react appropriately despite patterns of repeated negative consequences.
- Addictive behaviors are exacerbated when younger individuals, whose brain systems have not fully matured, use heroin.
- Addiction causes changes in brain chemistry and function, which results in physical changes to the nerve cells that transmit messages in the brain. Damage to neuron transmission in the nerve cells may disrupt signals and cues that communicate a variety of messages affecting learning, perception, memory, impulse control, motivation, pleasure/pain sensations, and more critically, central nervous system function that controls breathing responses and heart rate.

Factors Influencing Addiction

Psychological Factors

Individuals may have psychological disorders or mental illness that interfere with their ability to function normally. They may use heroin and other substances to deal with their psychological issues, which may be the only coping mechanism they know. Their self-medication to escape their negative feelings turns to addiction, which may mask an undiagnosed mental disorder. As the heroin addiction progresses, the underlying issues will be complicated by increasing psychological and physical changes cause by the damaging effects of the drug.

Genetic Factors

Though genetic factors do not cause an addiction to heroin, they can indicate addictive behavior and were found to be significant in about 50 percent of addictions [8]. One or more immediate family members with an addictive disorder may be an indicator that the individual addicted to heroin has a genetic predisposition. Social and environmental influences may determine the impact of genetic factors on addiction. The individual's sense of security, stability, personality, motivation, emotional and mental well-being are influenced by their role models, early experiences, culture, health and behavior patterns as they mature. These factors can influence whether genetic indicators of addiction come into play.

Environmental Factors

Environmental factors include a complex set of interacting variables and may be difficult to measure initially. Issues related to the individual's upbringing, family dynamics, belief systems, educational level, peer group influences, cultural or religious beliefs, stress, trauma, community values, and group affiliations may influence an individual's decision to try heroin.

Screening

The two main ways to identify the presence of heroin is in either the blood or urine of a user. The analytical methods used are gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS) [11]. Both methods do the same thing, which is to separate a mixture of compounds present in the sample prepared from the urine or blood, followed by the detection of those compounds. The separation step allows for detection of any substance that has been used in combination with heroin. The urine is screened for 6-acetylmorphine (6-AM) by immunoassay and confirming the results by GC-MS analysis, which can take four to five days to complete. Heroin can be detected for one to two days after use. Heroin metabolizes into 6-AM, and this differentiates the use of heroin from other drugs such as codeine, morphine, and other prescription opiate drugs. Since October 1, 2010, the Substance Abuse and Mental Health Services Administration (SAMHSA) established mandatory guidelines that require 6-AM screening as part of the required screening for all federally mandated drug testing in the workplace [12]. The 6-AM screening can be done in house and one version can deliver results in 11 minutes with 98 percent accuracy when compared with GC-MS. The Supreme Court has approved this test as defensible technology [11].

In addition to the tests above, medical history, criminal records, and physical health/appearance typically identify chronic users. Chronic heroin abusers commonly have a lengthy arrest record

for drug possession or theft; they may have overdosed one or more times and were brought to the hospital; and they will typically have "track marks" over the veins in their arms, which are small areas of contusions from injecting the drugs; along with other indicators of chronic use. Track marks may be found on any part of the body if larger veins are destroyed by repeated injection. A very lengthy, expensive way to identify chronic users would be hair analysis for the accumulation of small amounts of the drug. Extracting drugs from hair is extremely expensive and time consuming. The low amounts of the drugs that are present in the hair require highly sensitive instrumentation, and those techniques would typically not be done by a lab [13].

Signs and Symptoms of Heroin Addiction

No two individuals who are addicted to heroin will present with the same signs and symptoms, which will vary due to the method of use, level of tolerance, dependency, addiction, frequency of use, form of the drug, and secondary illness and disease. HIV/AIDS is often the consequence of injecting heroin. Common signs and symptoms of heroin use can be divided into the following categories [8]:

Psychological Indicators

- Hallucinations, delusions.
- Paranoia.
- Depression.
- Disorientation.
- Sudden changes in behavior.
- Slurred, forced, or incoherent speech.
- Negative school or work performance.
- Distractibility.
- Frequent comments indicating low self-esteem, negativity.
- Insomnia or excessive sleep.
- Euphoria.
- Blaming others for their issues.
- Withdrawal from friends and family, association with new, unknown friends.
- Constant runny nose or bloody nose.
- Avoiding eye contact.
- Mood swings.
- Anxiety.
- Apathy, lack of motivation in interests and regular activities.
- Fatigue/exhaustion.
- Hostility toward others, agitation, and irritability.
- Lying about drug use.
- Stealing.
- Avoiding loved ones and others.

Physical Indicators

- Cuts, contusions, bruises, and needle marks on the body, not just arms
- Weight loss.
- Scabs or bruises as the result of picking at the skin.
- Decreased attention to personal hygiene and appearance.

- Shortness of breath.
- Frequent respiratory infections.
- Dry mouth, loss of teeth.
- Skin infections and abscesses.
- Warm, flushed skin.
- Drooping heavy extremities.
- Constricted pupils.
- Hyperactivity or hyper alertness followed by lethargy.
- Extreme itching.
- Loss of menstruation.
- Miscarriage.

Other Indicators [7]
- Possession of burned spoons.
- Needles or syringes.
- Items to use as tourniquet such as a shoelaces or rubber bands.
- Evidence of drug residue in baggies or foil.
- Foil, straws or gum wrappers with burn marks.
- Glass pipes or water pipes.
- Wearing long pants and shirts, even in warm weather.
- Repeated borrowing of money, missing valuable items.
- Criminal activity.

Short Term Effects of Heroin
Every addict will present with different side effects due to the type, amount, and frequency of heroin use, other substances used, co-existing physical and mental disorders , and pre-existing conditions. In addition to the initial "rush" or feeling of euphoria, short-term side effects of heroin use include [3]:
- Dry mouth.
- Flushed skin.
- Poisoning due to contaminants or adulterants.
- Vomiting.
- Itching externally and feeling itchy sensation internally, picking at skin.
- Nausea.
- Breathing that is slow, shallow or irregular.
- Slurred speech.
- "Nodding out," "crashing," lethargy, sleep/alert cycles.
- Confused cognition.
- Decreased sensations of pain, physical and emotional "numbness".
- Constipation.
- Stomach cramps.
- Overdose/death.

Long-Tem Effects of Heroin
Chronic abuse of heroin leads to severe medical complications, many irreversible, and may lead to death [3]:

- Heart problems such as infection of heart lining, infection of the heart's surface called endocarditis, valve prolapse, blockage, myocardial infarction and arrhythmia, congestive heart failure.
- Infectious diseases transmitted through needles (HIV/AIDS and Hepatitis B and C).
- Chronic pneumonia, pulmonary diseases.
- Collapsed veins, vascular blockages, clots, resulting tissue death due to lack of blood supply.
- Bacterial infections.
- Liver and kidney disease.
- Immune disorders.
- Pulmonary edema.
- Coma.
- Paralysis.
- Cognitive disorder.
- Seizures.
- Miscarriage.
- Birth defects *.
- Diseases and infections from sharing needles.
- Overdose/death.

In addition to miscarriage, babies born to mothers using heroin suffer problems associated with malnutrition, drug toxicity, infection. These problems include low birth weight, developmental delays, prematurity, birth defects, failure to thrive, drug dependence, or addiction known as neonatal abstinence syndrome (NAS). NAS is drug withdrawal that the baby must endure under strict medical care in the hospital. Studies have shown that pregnant mothers with heroin addiction can be treated in the hospital with the drug buprenorphine, which treats the mother and baby and reduces their withdrawal symptoms. Heroin addicted mothers will often lose custody of their baby and many are charged with child neglect or abuse. Addicted mothers often abandon their babies after birth.

Heroin Withdrawal

Heroin withdrawal symptoms can occur within an hour after the last drug dose, based on the level of abuse. Withdrawal symptoms may include [4]:

- Severe heroin cravings.
- Sweating.
- Severe muscle and bone aches.
- Nausea and vomiting.
- Heavy extremities.
- Muscle cramping.
- Crying.
- Insomnia.
- Edema.

- Chills.
- Runny nose.
- Diarrhea.
- Fever.
- Death.

Addicts facing withdrawal must receive medical care in a clinic, rehabilitation facility, or hospital from providers who are specifically trained to treat patients for heroin withdrawal. They should never attempt withdrawal alone.

Signs and Symptoms of Multiple Substance Abuse

Among persons with heroin addiction, multiple substance addiction is common. Cocaine and alcohol are the substances most often abused with heroin [14]. A trained professional should assess for abuse of other substances and determine the effects of the overlapping substances. The American Psychiatric Association (APA) suggests the following four approaches for assessing heroin dependent people for other substances:

- Screening instruments: MAST, DAST, CAGE-AID, AUDIT.
- Clinical assessments using interview with the patient, family of significant others.
- Structured interviews: DSM-5 SCID-1, Structured Clinical Interview for DSM-5 Axis 1 Disorders.
- Laboratory tests: Urine samples done onsite for immediate results that can be addressed with the patient.

Heroin Addiction and Co-Occurring Disorders

As with other substance abuse addictions, individuals with heroin addiction often have co-occurring mental disorders. Since psychological and emotional causative factors for heroin addiction exist, it may be critical to determine the primary and secondary disorder in planning a long-term treatment plan. Of course, chronic addiction to heroin and the physical ravages of the disease must be addressed immediately, which will require medical care and monitoring. Patients must be screened for suicide ideation and self-harm tendencies, which are often part of the heroin addict's coping or escape mechanism. The following co-occurring mental disorders are commonly seen among heroin addicts on the street and those in rehabilitation programs [4]:

- Depressive and/or anxiety disorder.
- Addiction to other drugs and/or alcohol.
- Personality disorder.
- Cutting, self-harm behaviors.
- Bipolar disorder.
- Eating disorders.
- Post traumatic stress disorder.
- Schizophrenia.
- Conduct disorder.
- Psychosis.

Treating Heroin Overdose

A new and controversial medication to reverse the effects of heroin overdose has been approved and released for sale by prescription by the Federal Food and Drug Administration (FDA) in April 2014 [15]. Naxalone comes in the form of a hand-held device, injection, or nasal spray, and is being hailed by government and health care leaders as a ground-breaking tool to address the epidemic of heroin overdoses across the nation. The states of New York and New Jersey are already mandating its use by first responders, and after training, the drug was saving lives in the first weeks of use.

The drug, also known as Narcan, is marketed under the name of Evzio [15]. A single dose of the drug, which acts as an antidote to heroin, has been successful in bringing back overdose victims from death due to respiratory failure and lack of blood pressure. Naloxone works by reversing the suppressive effects of heroin on the opioid receptors that signal respiration to bring back consciousness and normal breathing. The drug is not new and has been used by emergency medical personnel on the street and in the hospital for over 40 years in injectable form. The release of the drug is controversial, because some, like Maine Governor Paul LePage, believe it will give addicts a false sense of confidence that they can continue to use much heroin as they want and the drug will save them from death from overdose. Many also object on the grounds that it will drive up insurance costs. Proponents of the drug do not believe addicts will purposely take enough drugs to overdose just because the drug is available and feel the FDA has addressed a life threatening public health crisis that has reached epidemic proportions.

Evzio works like an Epipen, which counteracts anaphylactic shock, and can go into the muscle or the skin. New Jersey has approved the use of naloxone for law enforcement officers. “We think greater availability of immediate treatments like naloxone are important as New Jersey confronts this crisis in heroin and opioid overdoses,” said Aline Holmes, a registered nurse and senior vice president of clinical affairs at the New Jersey Hospital Association [16]. In May 2013, New Jersey signed the Overdose Protection Act, which gives legal immunity to anyone using the drug to save a life.

The state of New York has also approved the use of the drug by all law enforcements agents, and 17 other states have followed suit, with some allowing prescriptions to family and friends of the addict. It comes in a nasal spray or injectable form and can be used by anyone without advanced training in an emergency situation. It is suggested for use after calling 911 and checking for breathing, though additional training is advisable.

One drawback of the drug is that if the heroin is adulterated with fentanyl, patients will need a larger dose over a longer period of time to combat longer acting drug combinations, which may cause them to sink back into respiratory distress. Patients will also require emergency medical care and/or hospitalization despite receiving the drug and being revived.

The CDC reports local and state health departments fund the drug and provide it to hospitals and community-based clinics free of charge [22]. San Francisco's Drug Overdose Prevention and Education Project and Massachusetts' Overdose Education and Naloxone Distribution Program are examples of two community-based programs using the drug [15].

Moving from Withdrawal to Treatment

The American Society for Addiction Medicine (ASAM) provides a wealth of information about the changes faced by the person who is withdrawing or has withdrawn from addiction. Addiction by definition includes periods of withdrawal and relapse, and the journey will be different for each individual. It is important to remember that unlike the feelings of early heroin use, as time goes by, the euphoria, pleasure or "reward" felt when the individual gets high does not continue to escalate with each subsequent use. As outlined previously, users need more heroin to achieve the same high and actually builds tolerance to the "high." However, they continue to experience deeper and more painful "lows" as their addiction progresses. As explained by ASAM [4]:

> Persons with addiction compulsively use even though it may not make them feel good and in some cases long after the pursuit of "rewards" is not resulting in pleasurable feelings. Although people from any culture may choose to "get high" from one or another activity, it is important to appreciate that addiction is not solely a function of choice. Simply put, addiction is not a desired condition.

Addiction is classified as a chronic brain disorder or disease and not a behavioral one, which is important to remember when working with a person in recovery. As in any chronic disease there will be periods of relapse which will vary by frequency, duration or amount of use but ASAM points out that," the return to drug use or pathological pursuit of reward is not inevitable"[4]. They provide the following information about the recovery process:

- Clinical interventions can help to alter the course of addiction.
- Close monitoring of the behaviors of the individual and contingency management, sometimes including behavioral consequences for relapse behaviors, can contribute to positive clinical outcomes.
- Engagement in health promotion activities that encourage personal responsibility and accountability, connection with others, and personal growth also contribute to recovery.
- The patient must be monitored and managed over time to decrease the frequency and intensity of relapses, to sustain remission and optimize functioning, and to minimize episodes of relapse and their impact.
- Medication management can improve treatment outcomes. Integration of psychosocial rehabilitation and ongoing care with evidence-based pharmacological therapy provides the best results.
- Recovery is best achieved through a combination of self-management, mutual support, and professional care provided by trained and certified professionals.

Treatment and Recovery

The ultimate goal of treatment is recovery, because the person addicted to heroin has so many levels of life that have been damaged or destroyed. Some individuals have co-occurring mental disorders that may have preceded the addiction or occurred during drug use. Knowing that the

individual is ready to enter treatment to move toward recovery, and developing a treatment plan to support them in reaching their goal are the first steps in the process. The recovering patients may face unresolved issues that initially led to their drug use. Therefore, patients may need to make total life changes with the assistance from their treatment team. According to the Substance Abuse and Mental Health Services Administration (SAMHSA), "Recovery from Mental Disorders and Substance Use Disorders" is a process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential [17]. SAMHSA has delineated four major dimensions that support a life in recovery:

- Health: Overcoming or managing one's disease(s) as well as living in a physically and emotionally healthy way.
- Home: A stable and safe place to live.
- Purpose: Meaningful daily activities, such as a job, school, volunteerism, family caretaking, or creative endeavors, and the independence, income, and resources to participate in society.
- Community: Relationships and social networks that provide support, friendship, love, and hope.

Heroin addiction is a chronic disease that cannot be treated easily or quickly since it has been prevalent since the late 1880s. Scientific research and treatment trials conducted over decades have yielded the following guiding principals for treatment [18]:

- Addiction is a complex but treatable disease that affects brain function and behavior.
- No single treatment works for everyone.
- Treatment needs to be readily available.
- Effective treatment attends to multiple needs of patients, not just their drug abuse.
- Remaining in treatment for an adequate period of time is critical, sometimes continuing for years.
- Counseling, individual and/or group, along with behavioral therapies are the most commonly used forms of drug abuse treatment.
- Medications are an important element of treatment for many patients, especially when combined with counseling and other behavioral therapies.
- Patients' treatment and services plan must be assessed continually and modified as necessary to ensure that it meets their changing needs.
- Many drug-addicted individuals also have other mental disorders, which must be addressed.
- Medically assisted detoxification is only the first stage of addiction treatment and by itself does little to change long-term drug abuse.
- Treatment does not need to voluntary to be effective.
- Drug use during treatment must be monitored continuously, as lapses during treatment do occur.
- Treatment programs should assess patients for the presence of HIV/AIDS, hepatitis B and C, tuberculosis, and other infectious diseases, as well as provide targeted risk-reduction counseling to help patients modify or change behaviors that place them at risk for contracting or spreading infectious diseases.

After the patient is stabilized and makes the decision to enter treatment, a long-term treatment plan is developed. There is no single method that works for all individuals, but practitioners need to review a variety of programs available in the vicinity of the patient and match the program to the patient's needs. This course outlines some current programs and provides resources for free training materials and program guides.

Therapeutic Communities for Residential Treatment For individuals with severe drug and addiction problems, therapeutic communities (TC) are the next step after hospital or medical management of their withdrawal symptoms [18]. These programs provide a highly structured, strictly monitored program to meet the medical and psychological needs of patients. Patients may live in the facility for up to a year and receive treatment for their addiction as well as other therapy and services needed for recovery. They receive support and treatment to address behavior issues, including criminal behavior, social, communication and family issues. Specialized centers can accommodate pregnant women, children, and adolescents. The goal of the therapeutic community is to provide the treatment and skills necessary for individuals to return to the community as healthy, drug-free individuals who can successfully when re-enter society and live productive lives. After care will continue through outpatient or support services in the community, following successful release from residential care.

Pharmacological Treatment

Heroin addiction changes the structure and function of specific parts of the brain, so for medication to be effective, it must work despite changes that occur in the short and long term. In the beginning stages of withdrawal, medication must curb the strong cravings for heroin and lessen the painful side effects of withdrawal to avoid a relapse. In later stages of recovery, individuals need medication to help them think clearly, gain control, make decisions, and focus on goals and skills for a healthy new life.

Pharmacological treatment of heroin addiction has proven to be successful by increasing time in treatment, decreasing rates of relapse, and reducing rates of infectious disease and illegal drug-seeking behaviors. Medications such as buprenorphine, methadone, and naltrexone can help people to escape the grip of heroin, because it reduces their cravings by blocking the euphoric effect. The medications used in this treatment work in the same manner as heroin by impacting the opioid receptors, but they do not cause the dangerous side effects or lead to addiction. The three types of medications interact with the opioid receptors in different ways as follows [19]:

1. Agonist medication such as Methadone, also known as Dolophine and Methadose, activates receptors by gradually reaching the brain slowly, preventing the euphoric feeling, and preventing withdrawal symptoms. These drugs are appropriate for use by certified physicians in outpatient treatment programs and are given to the patient orally each day. An estimated 200,000 people in correctional facilities each year are addicted to heroin. Therapy such as methadone maintenance treatment has been effective in prison populations and shown to increase time in treatment and diminish criminal activity if continued in the community upon release, because it eliminates the need to commit crime to buy heroin.

2. Partial agonists, such as Buprenorphine, also called Subutex, product a small response in the brain, which relieves cravings with no euphoria or side effects when taken orally. The FDA approved buprenorphine in 2002 for prescription by certified physicians in their office, which extends the availability of this drug to a wider population of patients and makes it more accessible. Some critics theorize that the ease of obtaining this drug will encourage more individuals to enter and stay in pharmacologic treatment. In 2013, the FDA approved two generic

forms of Suboxone, which is buprenorphine that contains naloxone, in 2013 [15]. This drug prevents attempts to get high by causing severe withdrawal symptoms if injected but no negative effects when taken orally as directed. Buprenorphine can be used effectively with prisoners and could be implemented through collaboration with health professionals and the juvenile justice system.

Many governmental agencies are working together to address the heroin addiction epidemic. An example of one partnership, known as the Blending Initiative [20], combines the efforts of SAMHSA and NIDA to fund and conduct research and clinical trials on a variety of therapies that can effectively treat heroin addiction. Currently, they are developing and disseminating protocols to educate multidisciplinary treatment professionals about buprenorphine. Information can be found at (http://www.ctndisseminationlibrary.org/ display/85.htm). This information contains the following goals:

Blending teams of NIDA researchers, treatment practitioners, and trainers have completed two buprenorphine training packets [21]:

- To increase overall awareness of buprenorphine therapy.
- To instruct physicians and treatment practitioners in implementing a 13-day detoxification intervention for opiate-dependent patients.
- To change the mindset of many community treatment providers previously unwilling to consider the use of medications to treat drug addiction.
- To expand the programs now regularly use buprenorphine to assist in opiate detoxification and treatment maintenance.
- To work with SAMHSA's Addiction Technology Transfer Centers (ATTC), State Directors, and other stakeholders, to spread the word about buprenorphine to more proactively address the urgent needs of drug addiction.
- To continue clinical tests on the safety and efficacy of buprenorphine in other affected populations, including pregnant women, adolescents, and patients addicted to opiate analgesics.
- To increase the use of this and other addiction medications in different settings and locales, including in the U.S. criminal justice system and in countries where injection drug use is still a primary mode of HIV transmission. [21] Additional information on buprenorphine can be found at http://www.ctndisseminationlibrary.org/ display/85.htm.

3. Antagonists, such as Naltrexone, also known as Depade and Revia, block opioid receptors that send pleasure signals, thus blocking the "high." They doo not cause dependence, addiction, or sedation. Patients must take this drug daily, but the FDA recently approved a long-acting form called Vivitrol that can be administered once a month, which may increase compliance. Naltrexone does not suppress all drug craving, and many patients cannot remain abstinent and relapse in six months. According to Dr. George Woody, a professor of psychiatry at the University of Pennsylvania [22], "Drug abusers are notoriously ambivalent and just because they decide to quit using heroin one week doesn't mean they'll be motivated to quit a week later." Extended-release forms like Vivitrol can provide long-lasting protection over time, which can help patients in their resolve to stay drug-free. Patients taking a daily oral dose of naltrexone must make a daily decision to remain drug-free. Patients using Vivitrol will receive a sustained dose each month, so they have more time in

treatment and recovery between doses and do not face a daily decision to use heroin when the naltrexone tapers every 24 hours. Clinical trials are being conducted on patients in Russia with extended release implants that last up to two months and can be refilled without having to be removed [22]. Early trials of these implants are proving to be three times more effective in some patients than the daily dose pill in preventing relapse. Dr. Woody continues, "Methadone and buprenorphine have helped hundreds of thousands of people around the world who are drug dependent, and they have helped reduce the spread of HIV." "The new injectable and implantable naltrexone formulations are really the new kids on the block, but they're offering us more options in an area where we really need a lot of help."

Urine Testing for Compliance

Treatment programs that include medication are only effective if they include strict monitoring to make sure patients comply with the program and have not relapsed. This is done through urine testing, patient interview, observation, and input from family and other significant parties in the patient's life. Drug treatment programs that are administered through outpatient or doctor's office settings may have limited contact with the patient and must rely on tightly controlled drug monitoring protocols. These testing protocols must contain the following components [12]:

Location

A decision must be made about whether testing will be on site or off site. There are advantages to each setting, depending on the person's needs. On- site testing will give immediate, affirming results if positive. The sample will require less handling, and the patient may feel this testing is more confidential because it is kept on site. If the results are negative, the therapist can immediately address the issue with the person. In both cases, the samples may have to be confirmed off site depending on the lab, and additional tests may be required if the result is negative. Off-site testing allows for more comprehensive testing; a higher level of expertise among personnel, which may yield higher rates of accuracy; and admissibility in court.

Type of Test

Different types of tests provide different levels of information. Immunoassay can test for heroin and other natural opioids, and it provides almost immediate results. Methadone is a synthetic opioid but specific immunoassay tests have been developed for this drug. Immunoassay tests will not detect the presence of other synthetic opioids, like fentanyl and buprenorphine, so it is not as comprehensive as other tests. Laboratory tests such, as GS-MS, will detect all types of opioids but take four to five days [11].

Current Research in Pharmacology New Medications

NIDA is committed to new treatments for heroin addiction, which include improved medication and other forms of therapy. When combined, they have proven to raise recovery rates. The NIDA is working to improve treatment for heroin addiction that they can implement to large numbers of patients across the country. A new drug called Probuphine is producing positive results in clinical trials. It is a long-acting form of buprenorphine that is administered as an implant under the skin to provide medication over a six-month period [23]. This drug is more convenient for the patient and eliminates daily dosing which increases adherence to treatment goals.

The Heroin Vaccine

Another exciting NIDA clinical trial currently underway is vaccine research that can effectively block addiction to heroin and other drugs. Dr. Ronald Crystal and Dr. George Koob and Dr. Kim Janda are among the many researchers around the world conducting research and clinical trials to develop a vaccine to address heroin addiction [24]. The vaccine acts to combat the effects of heroin as it enters the bloodstream before it reaches the brain and the opioid receptors so the euphoric or reward sensation is not released. The medication would be part of a treatment plan that would increase the chance of recovery by lowering the risk of relapse. The vaccine works by interfering with the immune system's ability to conduct the action of heroin on the brain. The antibodies in the vaccine identify and attach to molecules of heroin and the together they are too big to cross the blood brain barrier to enter the brain. When the drug does not enter the brain, it cannot reach the opioid receptor and signal the pleasurable sensation that drivers the need for the drug.

Two parts must be present in the vaccine to accomplish this action [24]. The first is a protein that causes the immune system to produce sufficient antibodies to overtake the total molecules in the amount of heroin taken so they do not reach the brain. The second part of the drug, hapten, has molecules that are similar to heroin in structure. Hapten serves as the schematic for the development of the antibodies that identify and combine with the heroin molecules. Each person's immune system responds differently, and the system is often compromised from heroin addiction. The drug trials focus on identifying the effective combinations of the parts of the vaccine to illicit the immune response necessary to block the action of the heroin in the bloodstream.

Several concurrent trials are underway for the vaccine, which are in the early stages of development and have not yet been tested on humans. Researchers agree that vaccine treatment should be part of a comprehensive therapy plan [24]. Dr. Janda and Dr. Crystal note, "People have the misconception that a single vaccine can protect patients from substance abuse, that's not true." Dr. Crystal states, "A patient who has attained abstinence could be vaccinated to block the effects of the drug, thereby preventing relapse. Dr. Janda notes, "Our vaccine will not alleviate craving, but it could help patients maintain abstinence in weak moments." "The vaccine approach provides an alternative strategy for treating drug addiction," says Dr. Nora Chiang of NIDA's Division of Pharmacotherapies and Medical Consequences of Drug Abuse. "There is much more work to be done on these vaccines, but the results so far are promising."[25].

Treatment for Adolescents

Many biological factors, such as immature brain development in the frontal cortex, social and environmental factors, influence drug abuse and addiction in adolescents. Government health agencies, through their initiatives to blend the fields of study that research addiction, have combined neurobiology and social sciences to develop prevention and treatment programs that address the multiple and overlapping factors that influence heroin addiction in adolescents. NIDA explains this process as follows:

> The resulting social neuroscience initiative will help us better understand how neurobiological mechanisms and responses, genetic, hormonal, and physiological, underlie, motivate, and guide social behaviors related to abuse and addiction. This perspective may help us understand adolescents' heightened sensitivity to social influences

and decreased sensitivity to negative consequences for example, that make them particularly vulnerable to drug abuse [20].

Pharmacology
None of the medications used with adults to treat addiction have been approved by the FDA for use with children and adolescents. At this time, clinical trials for additional medications are in development.

Behavioral Treatment
Behavioral therapies are effective with children and adolescents and follow the same procedures noted in the section on therapy for adults. Contingencies and incentives help to motivate youth, and cognitive behavioral strategies work effectively when they are structured to meet the child's needs, age, developmental and maturity level. Any healthcare provider trained and certified to provide services to young clients can deliver behavioral treatment.

Family Therapy
Children and adolescents can benefit from treatment using family therapy approaches, which include all significant people in their lives, including parents, guardians, mentors, siblings, and peers. Family therapy can address all areas of children's lives and increase communication and address problems in family dynamics, which may add to the stress of recovery. Therapy can build a wide circle of support for adolescents and help them gain confidence and self-esteem as they fight their addiction. Involving the family is a critical part of adolescent substance abuse treatment.

The following evidence-based family treatments programs work effectively to treat adolescent substance abuse [26].

Brief Strategic Family Therapy (BSFT)
BSFT focuses on unhealthy family interactions that contribute to the young person's drug problem. The therapist works to establish rapport with each family member, while observing how each member interacts, to identify problem areas and strategies. During the course of 12–16 sessions, the therapist will work to address problems and guide the family members to work together to resolve them. This approach can target any family issue and can be conducted in any setting.

Family Behavior Therapy (FBT)
FBT includes strategies from behavioral therapy, including behavior contracts that include contingencies to motivate the young person, and build impulse control and appropriate behaviors. The therapist works with the adolescent and parent to develop behavior goals, treatment plans, behavior strategies, and treatment interventions. The therapist writes a contact based on the goals and treatment plan, with contingencies based on measurable behaviors. The adolescent and parent work together to practice new behaviors and skills in the home, school, and community. Therapists and adolescents review the contract on a schedule that is appropriate for the child's age and maturity level to motivate and reinforce behavior. Professionals should reinforce appropriate behavior and goal mastery frequently in order for the program to work effectively.

Functional Family Therapy (FFT)
FFT is based on the premise that problem behaviors stem from dysfunctional family interactions. Therapy uses behavioral strategies to resolve conflict by improving skills for parenting, communication, and problem solving within the family involving all family members. Program goals include engaging and motivating all family members to work together to change their patterns of interaction through techniques of behavior therapy.

Multidimensional Family Therapy (MDFT)
The MDFT approach combines treatment components from all programs addicted youths encounters as a result of their addiction or conduct. At-risk or addicted youths can benefit from techniques of family therapy combined with treatment at school, juvenile justice, child protective services, clinics, family court, or other community agencies involved in their treatment plans. Often adolescents abusing drugs exhibited at-risk behavior, conduct disorder, family problems, or illegal behavior in the past that brought them in contact with special services in a number of organizations. MDFT goals work toward pooling resources and developing consistency and collaboration among all agencies involved in the child's care. Representatives from these agencies meet together with the adolescent and family to plan and implement goals and strategies consistently and hold the young person accountable on all fronts. According to NIDA, the MDFT program has been effective with severe substance-use disorders and can facilitate the reintegration of juvenile detainees into the community.

Multisystemic Therapy (MST)
Similar to MDFT, this therapy uses a multidimensional approach that combines family therapy approaches with treatment strategies from a variety of treatment programs in the community. This approach is a natural out-growth of treatment for adolescents involved in severe drug addictions, violent behavior, and illegal activity. MST focuses on adolescents' personality, attitude, behavior, emotions, and peer influences related to their addiction and behavior. The second component includes a review of family interactions such as discipline, parenting skills, communication, and history of substance abuse among family members, and attitudes and values that influence them. The last variable looks to adolescents' performance and attitudes in the community at school, on the street, and membership in gangs or other groups in the community. The therapist works with the youth individually, with the family and youth together, and they coordinate and lead meetings with community agencies to coordinate services and build program consistency.

Recovery Support for Adolescents
If addiction treatment and recovery programs work effectively, there must be support services for aftercare to avoid relapse and support adolescents as they develop and apply skills to maintain a healthy, drug-free lifestyle. NIDA notes the following programs in clinical trials show promise in supporting recovery and lowering relapse among adolescent addicts [26].

Assertive Continuing Care (ACC). ACC is a home-based continuing-care approach delivered by trained clinicians to prevent relapse, and is typically used after an adolescent completes therapy utilizing the Adolescent Community Reinforcement Approach (A-CRA). ACC combines A-CRA, behavior therapy, and assertive case management services using a multidisciplinary team of professionals, round-the-clock coverage, and assertive outreach to help adolescents and their caregivers acquire the skills needed to engage in positive social activities.

Peer Recovery Support Services. Peer recovery support services connect youth with groups and individuals who have experienced addiction and recovery and act as peer mentors. They help individuals, based on their specific needs, support and coach the individual through treatment, and help them connect with community support groups and resources. More importantly, these services can provide new social connections so the adolescent can build positive social interactions with sober peers.

Recovery High Schools, Recovery high schools can take different forms, but they are designed to meet the specific needs of students recovering from drug abuse. Students may attend a separate school or be part of a community school, but initially, they attend classes in a separate area with students who share their specific experiences and needs. The high school program may run concurrently with other treatment programs. Students benefit from specially trained teachers and counselors who support their treatment plan, which may address mental disorders as well as substance abuse. Students participate with peers who have experienced similar issues in a structured setting that promotes recovery.

Behavioral Therapies

Outpatient behavioral treatment provides therapy through individual and group settings based on the program that best meets the needs of the person. It can be designed to meet the needs of youth and adults and is often combines with pharmacological treatment to increase efficacy. The NIDA outlines the following types of outpatient behavioral treatment programs [27].

- Cognitive–behavioral therapy aims to help patients recognize, avoid, and cope with the situations in which they are most likely to abuse drugs.
- Motivational interviewing capitalizes on the readiness of individuals to change their behavior and enter treatment.
- Motivational incentives and contingency management uses positive reinforcement to encourage abstinence from drugs.

Contingency programs and cognitive-behavioral therapy are commonly used forms of therapy to help patients take control and responsibility for their behavior and build coping and life skills to move toward long-term recovery and health. Behavior therapy uses strategies to address unwanted behaviors using learning theory, conditioning, and reinforcement with the focus on the present and addicts' ownership and responsibility for their behavior. Therapy focuses on targeted behaviors to change and strategies to identify the triggers, or antecedents, and consequences of the behavior. The addict identifies behavior patterns to change and works toward healthy replacement behaviors. The therapist and client work to identify goals and barriers to those goals that may include habits, obsessions, compulsions, denial, procrastination, fear, depression, anxiety, dysfunctional inter-personal relationships, communication issues, and any other negative thought and behavior patterns. They work through these barriers together to build the client's awareness of the former thoughts, feelings, and behaviors that have a negative impact on recovery and must be changed. Behavior therapy has been around for decades, and many forms have proven effective with addiction. In the case of heroin addiction, this therapy works best when combined with pharmacological therapy.

Motivational Incentives for Enhanced Drug Abuse Recovery: Promoting Awareness of Motivational Incentives

The National Institute on Drug Abuse (NIDA) a division of the Substance Abuse and Mental Health Services Administration (SAMHSA) noted the challenge of helping patients avoid relapse while in a treatment program. They conducted research and clinical trials to develop an evidence-based approach called Promoting Awareness of Motivational Incentives (PAMI) to train other organizations to use incentive techniques, sometimes called contingencies, in programs to maintain abstinence from drug and alcohol use [30]. After testing the program, they developed a package of tools and training resources to replicate the program and share evidence-based research data behind the clinical use of motivational incentives. The strategies of the approach used low-cost incentives with patients that were successful in maintaining abstinence and program compliance to avoid relapse during treatment. PAMI is based on positive research outcomes from the NIDA Clinical Trials Network (CTN) study, Motivational Incentives for Enhanced Drug Abuse Recovery (MIEDAR), and uses strategies from Dr. Nancy Petry's Fishbowl Method of incentives [31]. "We use rewards as a clinical tool not as by bribery but for recognition; the really profound will come later."

The researchers used motivational incentives because they lead to higher rates of retention in treatment and abstinence from drug abuse. They found incentives that were motivating, low cost, and supported the patient's treatment plan included prices, vouchers, and clinic privileges. The patients earned reinforcers on the results of their on-site urine screening and completion of treatment goals. The study noted that patients who participated in incentive programs were more likely to submit urine samples that were negative than patients not receiving incentives. The average cost of incentives was $120 per patient [32]. PAMI is designed to build awareness of motivational incentives as a research-based therapeutic strategy for addiction treatment. The package, which is free of charge, reviews the research, provides support materials and resources along with suggestions for implementation, data collection, training and replication of the program and includes a video, *Successful Treatment Outcomes Using Motivational Incentives.* The NIDA [31] reported data showing that approximately 25 percent of samples from both study groups tested negative for stimulants and alcohol at the first study visit. Overall, participants in the incentive group (54.4 percent) were significantly more likely to submit target drug-negative samples than were participants in the usual care group (38.7 percent).

The motivational incentives and interviewing techniques address patients' feelings and barriers about stopping drug use. Motivational interviewing is a therapeutic approach to help patients in recovery, and the incentives help patients modify and change specific behaviors. The incentives acted as a supplement to therapy were effective in the treatment of substance-use disorders. The study noted that the incentives improved therapeutic climate because they were based on positive, affirming, and celebratory strategies. Positive reinforcement incentives will be effective if they are valuable to the person and motivate them to work to change target behaviors. Patients received a menu of incentives to choose from, and therapists were consistent in the distribution of the incentives earned. Intermittent schedules of reinforcement were the most powerful, and the Fishbowl Method used this schedule to deliver low or no-cost incentives, such as coupons, vouchers, and privileges. Patients had a chance to earn and win prizes when they drew from the fishbowl. Target behaviors must be observable and measurable, and they should include abstinence and the successful completion of goals from the patient's treatment plan. The PAMI

program outlines seven core principles of motivational incentive programs. [30]

Seven Core Principles of Motivational Incentive Programs:
1. Identification of target behavior.
2. Choice of target population.
3. Choice of reinforcer.
4. Incentive magnitude.
5. Frequency of incentive distribution.
6. Timing of the incentive.
7. Duration of the incentive.

The PAMI program materials include all the information needed to replicate the program and include supplemental software to track information about patients' participation and progress in the program. Information on these programs, and others to address the heroin addiction epidemic, can be obtained from the Motivational Incentives Web-Portal: www.bettertxoutcomes.org; National Institute on Drug Abuse: http://www.drugabuse.gov/blending-initiative; and SAMHSA ATTC: http://www.attcnetwork.org/blendinginitiative

Prevention

Prevention programs to address heroin addiction have been researched for over 20 years, which is not very long, considering the heroin addiction goes back to the late 1800s. To find a solution to the complex, epidemic disease of heroin addiction, the process must include the following components:

- Identification and definition of heroin addiction.
- Determine the scope of the problem, sequence of events and factors that lead to addiction.
- Review evidence-based programs proven to effectively break the cycle of addiction including prevention and treatment.
- Matching prevention and treatment programs to the individual needs of the individual and community.

There is a rush to implement these steps because of the public's awareness of the problem of heroin addiction and the number of overdose deaths in every community, large or small. For those in the field of medical and mental health, the work to eradicate this complex problem has been in progress for decades. It is clear to all who work in this field that there is no easy and quick solution because the predictors or heroin addiction are varied and there is no definitive "test" to determine who will become addicted. Instead, many factors overlap to increase the chance that a person will become addicted. Biology, genetics, age at onset of use, environment, personality, and social influences are a few of the factors that contribute to addiction but are impossible to unravel or measure. Researchers, therapists, medical personnel, school staff, and families know that addiction to the substance may take hold quickly, but addiction is a developmental disease that begins long before the person becomes addicted to heroin. NIDA research shows that in some cases, the signs were there in childhood and adolescence while the brain is rapidly developing and changing. Brain research shows that the prefrontal cortex develops last, and that is the part of the brain that controls decisions and judgments, which explains why adolescents often engage in at-risk behaviors. These factors correlate with statistics that show heroin addiction is rising among young people because they are open to experimentation with drugs, and therefore, vulnerable to

heroin addiction.

These facts, established from evidence-based research, conclude that for prevention programs to work, they must begin early in order to address all the factors that lead to addiction, which often begin in childhood. NIDA identifies the following factors that can be addresses to prevent addiction at an early age [33]:

- Mental illness.
- Neurobiology.
- Physical or sexual abuse.
- Aggressive behavior.
- Academic problems.
- Poor social skills.
- Lack of motivation.
- Peer influences.
- Poor parent-child relations.

Effective prevention programs must have a multidimensional approach involving family, school staff, community health agencies, media, and other social and cultural modes of communicating prevention education, information, and early intervention. Because heroin addiction crosses all boundaries and excludes no one, community prevention outreach programs must speak directly to the intended audience in a way they can understand; therefore, the programs must encompass all languages, cultures, and educational levels. Community education for prevention must also address the relationship between at-risk behavior, addiction and the spread of HIV/AIDS, which is part of the heroin addiction epidemic.

The NIDA and other federal research organizations have included prevention as a primary goal. The principles outlined in this section focus on numerous, long-term, evidence-based studies of addiction behavior and combined concepts from many successful prevention programs. The prevention principles target children through young adults across the country with the goal of implementation at the community level. Prevention programs are geared to specific settings and specific needs of the participants and address the needs of all youth, whether they are drug-free, at-risk, or already experimenting with drugs. These principles can be implemented at home, school, community or all three.

The entire list and specific details on each principle, including research information, can be obtained on the NIDA website Prevention section at http://www.drugabuse.gov/publications/preventing-drug-use-among-children-adolescents. The following information and principles can guide the development of prevention programs for children and youth [35]:

> NIDA's prevention research program focuses on risks for drug abuse and other problem behaviors that occur throughout a child's development, from pregnancy through young adulthood. Research funded by NIDA and other federal research organizations—such as the National Institute of Mental Health and the Centers for Disease Control and Prevention—shows that early intervention can prevent many adolescent risk behaviors.

Principle 1 - Prevention programs should enhance protective factors and reverse or reduce risk factors. The risk of becoming a drug abuser involves the relationship among the number and type of risk factors, deviant attitudes and behaviors, and protective factors. Specific risk and protective factors change with age and stage of development. For example, risk factors within the family have greater impact on a younger child, while association with drug-abusing peers may be a more significant risk factor for an adolescent. Early intervention with risk factors, such as aggressive behavior and poor self-control, often has a greater impact than later intervention by changing a child's life path away from problems and toward positive behaviors. These factors can have a different effect depending on a person's age, gender, ethnicity, culture, and environment.
Principle 2 - Prevention programs should address all forms of drug abuse, alone or in combination, including the underage use of legal drugs and substances and the use of illegal drugs.
Principle 3 - Prevention programs should address the type of drug abuse problem in the local community, target modifiable risk factors, and strengthen identified protective factors.
Principle 4 - Prevention programs should address risks specific to population or audience characteristics, such as age, gender, and ethnicity, to improve program effectiveness.
Principle 5 - Family-based prevention programs should enhance family bonding and relationships including parenting skills and training in drug education and information. Family bonding is the bedrock of the relationship between parents and children. Family bonding can strengthen through skills training on parent supportiveness of children, parent-child communication, and parental involvement. Parental monitoring and supervision are critical for drug abuse prevention. Training on rule-setting; techniques for monitoring activities; praise for appropriate behavior; and moderate, consistent discipline that enforces defined family rules should be included. Drug education and information for parents or caregivers reinforces what children learn about the effects of drugs and opens opportunities for family discussions about the abuse of legal and illegal substances. Brief, family-focused interventions for the general population can positively change specific parenting behavior and reduce children's later risks of drug abuse.
Principle 6 – Prevention programs can be designed to intervene as early as infancy to address risk factors for drug abuse, such as aggressive behavior, poor social skills, and academic difficulties.
Principle 7 - Prevention programs for elementary school children should target academic and social-emotional skills to address risk factors for drug abuse. Education should focus on the following skills:

- Self-control.
- Emotional awareness.
- Communication.
- Social problem solving.
- Academic support, especially in reading.

Principle 8 - Prevention programs for middle or junior high and high school students should increase academic and social competence with the following skills:

- Study habits and academic support.
- Communication.
- Peer relationships.
- Self-efficacy and assertiveness.
- Drug resistance skills.
- Reinforcement of anti-drug attitudes.
- Strengthening of personal commitments against drug abuse.

Principle 9 - Prevention programs aimed at general populations at key transition points, such as the transition to middle school, can produce beneficial effects even among high-risk families and children.
Principle 10 - Community prevention programs that combine two or more effective programs, such as family-based and school-based programs, can be more effective than a single program.
Principle 11 - Community prevention programs reaching populations in multiple settings such as schools, clubs, faith-based organizations, and the media, are most effective when they present consistent, community-wide messages in each setting.
Principle 12 - When communities adapt intervention programs to match their needs, community norms, or differing cultural requirements, they should retain core elements, which include the structure, content, and delivery of the program.
Principle 13 - Prevention programs should be long-term with repeated interventions to reinforce the original prevention goals. Benefits from middle school prevention programs diminish without follow-up programs in high school.
Principle 14 - Prevention programs should include teacher training on good classroom management practices, such as rewarding appropriate student behavior to foster students' positive behavior, achievement, academic motivation, and school bonding.
Principle 15 - Prevention programs work most effectively when they use interactive techniques, such as peer discussion groups and parent role-playing.
Principle 16 - Research-based prevention programs can be cost-effective. Research shows that for each dollar invested in prevention, a savings of up to $10 in treatment for alcohol or other substance abuse [28].

The Community Youth Development Study
This NIDA program offers assessment tools and technical trainings to communities so they can more accurately identify risk and protective factors for youth drug use and related behavior problems. This system allows communities to select appropriate evidence-based prevention programs based on their particular needs [29].

Future Trends
In addition to the pharmacological and therapeutic models in clinical trials previously reviewed, additional research studies may prove effective in the identification, prevention, and treatment of heroin addiction.

High-Resolution Mapping of Targeted Brain Areas.
Research is currently underway that will increase knowledge of the brain systems and pathways taken by drugs and their effects on centers of the brain that influence drug-related behaviors involved in motivation, impulse control, pleasure, reward, compulsions, addiction, and relapse [34]. With this information, advances can be made to identify medications that interfere and block these drug behaviors to prevent drug addiction in persons at risk or assist in recovery and relapse prevention.

Blending Initiative
Research and clinical trials are of no use if the results languish in a government publication and remain unused. The goal of the Blending Initiative of 2001[20] was to address this problem of disseminating research-based addiction treatment information so that it could be implemented in

clinical practice. NIDA explains the process as follow:

> NIDA and the Substance Abuse and Mental Health Services Administration (SAMHSA) joined together to create the Blending Initiative in 2001 to reduce the gap that exists between the publication of research results and impact on treatment delivery. This initiative incorporates collaboration between clinicians, scientists, and experienced trainers to catalyze the creation of user-friendly treatment tools and products and facilitate the adoption of research-based interventions into front-line clinical settings. Through this initiative, NIDA and SAMHSA's Addiction Technology Transfer Centers (ATTC) disseminate treatment and training products based on results from studies conducted by the National Drug Abuse Clinical Trials Network (CTN) as well as other NIDA-supported research.

Conclusion

It is the responsibility of all health care professional to advocate for their clients and promote access to health care for everyone. The disease of heroin addiction impacts all ages in all communities, so health professionals today must work to bring heroin addiction out of the shadows. They must educate others to remove the stigma and address heroin addiction as a brain disease that can affect anyone. As with many diseases, such as HIV/AIDS, heroin addiction causes fear and is widely misunderstood in the community. Scientists and researchers are collaborating on better screening, treatment, and prevention techniques, health professionals and the general public should be educated about what they can do in their daily lives to prevent heroin addiction from spreading. This course points to the need for a multiple disciplinary approach that must start early in life to address the complex factors that lead to at-risk behaviors that may lead to drug experimentation. Environmental, social, genetic, physical, and mental health factors that contribute to addiction have been identified and are critical in developing effective treatment and prevention programs. Addressing these factors among youth at an early age may be the only way to control the epidemic, while law enforcement tries to eradicate the source of the drug from Mexico, South America, and Asia.

Prevention begins by educating parents, teachers, and healthcare staff about early identification of risk factors in childhood as well as the early the signs and symptoms of drug use. Health care professionals, school staff, and community resource agencies can identify and refer at-risk individuals and struggling families to social services for prevention and treatment programs. Once identified, these families can benefit from early intervention programs, including, health care, counseling, assistance with parenting, and discipline to support healthy family interaction. Health care professionals must participate in prevention and treatment programs in the community through fundraising activities, lobbying local officials and state legislators, conducting community outreach activities to identify and offer services to young people and adults at risk, educating the public about the disease, and working with the media to develop effective campaigns to combat negative cultural influences.

By moving forward through a multi-disciplinary approach, health care professionals can close the heroin treatment gap and increase prevention efforts. As advocates, health professionals, government agencies, and politicians must collaborate to write policies and increase funding for heroin addiction prevention and treatment to stop the escalating cycle of addiction and relapse. NIDA research has demonstrated that prevention is cost effective in lowering expenditure in areas

such as residential treatment, hospital and health care, incarceration, crime, and the justice system. Funds are necessary to increase the accessibility and ease of treatment to encourage families and individuals to seek help to stop the cycle of addiction and prevent it in the future. There is no way to put a price on the mounting death toll from this epidemic, and health care professionals are the front line of defense. The epidemic of heroin addiction is a massive problem that requires effort on the part of every health care professional to identify what they can do today to break the cycle of addiction in their community.

Resources

- Addiction Severity Index. Provides a structured clinical interview designed to collect information about substance use and functioning in life areas from adult clients seeking drug abuse treatment. triweb.tresearch.org/index.php/tools/download-asiinstruments-manuals

- Blending Teams Web site at nida.nih.gov/blending. drugabuse.gov/blending-initiative

- Center for Substance Abuse Treatment (CSAT), Substance Abuse and Mental Health Services (SAMHSA)

- Center for Substance Abuse Treatment; Substance Abuse and Mental Health Services Administration(SAMHSA). www.samhsa.gov/about/csat.aspx. http://www.samhsa.gov/data/NSDUH/2012SummNatFindDetTables/NationalFindings/NSDUHresults2012.htm. Treatment Locator: 1-800-662-HELP or search www.findtreatment.samhsa.gov SAMHSA's Store has a wide range of products Web site: store.samhsa.gov

- Clinical Trials. For more information on federally and privately supported clinical trials, please visit clinicaltrials.gov.

- Drugs, Brains, and Behavior: The Science of Addiction (Reprinted 2010). This publication provides an overview of the science behind the disease of addiction. Publication #NIH 10-5605. Available online at drugabuse.gov/publications/science-addiction

- Complete NSDUH findings are available at National Institute for Drug Addiction drugabuse.gov

- National Institute of Drug Addiction Web site: www.drugabuse.gov

- NIDA Public Information Office: 301–443–1124

- The National Institute of Justice. The research agency of the Department of Justice. For information contact the National Criminal Justice Reference Service at 800-851-3420 or 301-519-5500; or visit nij.gov.

- National Institute of Mental Health nimh.nih.gov

- The National Registry of Evidence-Based Programs and Practices. This database of interventions for the prevention and treatment of mental and substance use disorders is maintained by SAMHSA and can be accessed at nrepp.samhsa.gov.

- NIDA DrugFacts: Treatment Approaches for Drug Addiction (Revised 2009). This is a fact sheet covering research findings on effective treatment approaches for drug abuse and addiction. Available online at drugabuse.gov/publications/drugfacts/treatment-approaches-drugaddiction.

- NIDA DrugPubs Research Dissemination Center. NIDA publications and treatment materials are available from this information source. Staff provide assistance in English and Spanish, and have TTY/TDD capability. Phone: 877-NIDA-NIH (877-643-2644); TTY/TDD: 240-645-0228; fax: 240-645-0227; e-mail: drugpubs@nida.nih.gov; Web site: drugpubs.drugabuse.gov.

- Preventing Drug Use among Children and Adolescents: A Research-Based Guide for Parents, Educators, and Community Leaders– Second Edition. This booklet lists over 20 examples of effective research-based drug abuse prevention programs and is available free on NIDA's website.

- Principles of Drug Abuse Treatment for Criminal Justice Populations: A Research-Based Guide .NIH Publication No.: 11-5316. Available online at nida.nih.gov/PODAT_CJ

- Research Report Series: Therapeutic Community This report provides information on the role of residential drug-free settings and their role in the treatment process. NIH Publication #02-4877. Available online at NIDA's National Drug Abuse Treatment Clinical Trials Network (CTN) drugabuse.gov/CTN/Index.htm.

- Seeking Drug Abuse Treatment: Know What To Ask NIDA Publication #12-7764. Available online at drugabuse.gov/publications/seeking-drug-abuse-treatment

- The "Find A Physician" feature on the American Society of Addiction Medicine (ASAM) Web site: http://community.asam.org/search/default.asp?m=basic Patient Referral Program on the American Academy of Addiction Psychiatry Web site: http://www.aaap.org/patient-referral-program

- The Child and Adolescent Psychiatrist Finder on the American Academy of Child and Adolescent Psychiatry Web site: http://www.aacap.org/cs/root/child_and_adolescent_psychiatrist_finder/child_and_adolescent_psychiatrist_finder

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The Heroin Abuse Epidemic in America: Identification, Treatment and Prevention

(2 Hours)

Final Examination

Choose the correct answer from the multiple choice questions from 1-25 and submit your answers online at www.elitecme.com or by mail or fax along with evaluation.

1. Heroin and morphine, along with codeine, hydrocodone, oxycodone, and oxymorphone are similar in structure because of the following:
   a. They all bind to the opioid receptor.
   b. They are all benzodiazepines.
   c. They are inexpensive.
   d. They are easily accessible

2. White powder heroin is a salt form known as diacetylmorphine hydrochloride, and even though white heroin is the purest form the following statement is correct.
   a. It cannot be cut.
   b. It will still contain lethal contaminants.
   c. It is not very powerful.
   d. It is 12 times as powerful as brown heroin.

3. A chronic, relapsing disease, characterized by compulsive drug seeking and use accompanied by neurochemical and molecular changes in the brain is the definition of which term below?
   a. Dependence.
   b. Tolerance.
   c. Addiction.
   d. Drug abuse

4. An opioid receptor antagonist that rapidly binds to opioid, blocking heroin from activating them is which of the following?

a. Morphine.
b. Methadone.
c. Naloxone.
d. Oxycodone

5. When heroin from the mother passes through the placenta into the baby's bloodstream during pregnancy it is called_____.

a. Infant addiction.
b. Maternal addiction.
c. Neonatal Addiction Symptoms.
d. Neonatal Abstinence Syndrome.

6. Young people who would never inject a drug can now find heroin that can be smoked or inhaled. As a result which of the following occurs?

a. Heroin seems easier, safer, and more desirable, thus increasing their willingness to try the drug.
b. Young people will not try the drug because of anti smoking campaigns.
c. There is no difference in the use of the drug.
d. Youth will only inject the drug as a last resort.

7. A combination of Mexican black tar heroin and cold medicine obtained over the counter is called which of the following?

a. Cold tar
b. Cheese heroin.
c. Brown heroin.
d. China jade.

8. Those abusers who have recently switched to heroin are at higher risk for which of the following?

a. Accidental overdose.
b. Sudden death.
c. Blood diseases.
d. Chronic renal failure.

9. Choose the correct statement.

a. Addiction causes changes in brain blood volume.
b. Addiction causes changes in brain mass.
c. Addiction causes changes in brain chemistry and function. d. Addiction causes changes in brain stabilization.

10. Though genetics factors do not cause an addiction to heroin, they can indicate which of the following?
    a. The person is prone to alcoholism.
    b. Addictive behavior and were found to be significant in about 50 percent of addictions.
    c. Addiction is 85% likely to occur.
    d. Addiction occurs more often in certain minority groups.

11. Negative school or work performance is which of the following?
    a. A common denominator.
    b. A psychological factor.
    c. A coincidence.
    d. An insignificant sign.

12. Breathing that is slow, shallow or irregular may be_____.
    a. A short term side effect.
    b. A long term side effect.
    c. Insignificant to note.
    d. Easily treatable.

13. Severe muscle and bone aches may indicate which of the following?
    a. Over exertion.
    b. A withdrawal symptom.
    c. Hepatitis.
    d. An elderly client and not related to drug use.

14. The state of New York has also approved the use of the drug Naloxone by all law enforcement agents. Which of the following statements are correct about the use of Naloxone?
    a. New York is the only state using the drug.
    b. Seventeen other states have followed suit, with some allowing prescriptions to family and friends of the addict.
    c. Only law enforcement agents can use it in the United States.
    d. All states use it now.

15. Choose the correct statement.
    a. Addiction is a behavioral disorder.
    b. Addiction is a culture driven disorder.
    c. Addiction is classified as a chronic brain disorder or disease and not a behavioral one.
    d. Addiction is a genetic disorder.

16. Which is correct about treatment of heroine addiction?
    a. Medication does not work in these cases for long term positive outcomes.
    b. Only behavioral therapy will work to provide lasting results.
    c. There is no effective treatment known.
    d. Integration of psychosocial rehabilitation and ongoing care with evidence-based pharmacological therapy provides the best results.

17. When treating a client_____.
    a. Treatment must be voluntary to work.
    b. Treatment does not have to be voluntary to be effective.
    c. Treatment must be court ordered.
    d. Treatment must include electro shock.

18. Agonist medication such as Methadone, also known as Dolophine and Methadose work in what way?
    a. They activate receptors quickly and stop cravings.
    b. They over enhance euphoria which causes sickness.
    c. They activate receptors by gradually reaching the brain slowly, preventing the euphoric feeling.
    d. They de-activate receptors to stop the euphoria.

19. Partial agonists, such as Buprenorphine, also called Subutex, produce which of the following?
    a. A large response in the brain to stop cravings when injected.
    b. A small response in the brain, which relieves cravings with no euphoria or side effects when taken orally.
    c. A slow response that causes minimal euphoria that can be diminished over time.
    d. A quick response that is unpleasant but stops cravings.

20. Which type of therapy uses positive reinforcement?
    a. Contingency management uses positive reinforcement to encourage abstinence from drugs.
    b. Pharmacological therapy with reality therapy.
    c. All forms of therapy.
    d. Cultural/Social therapy.

21. Brain research shows that the prefrontal cortex develops last, and that is the part of the brain that controls what functions?
    a. Breathing and heartbeats.
    b. Blood flow.
    c. Decisions and judgments.
    d. Circulation

22. NIDA identifies the following factors that can be addresses to prevent addiction at an early age.
    a. Neurobiology.
    b. Culture.
    c. IQ.
    d. Ethnicity.

23. Which is correct about prevention programs?
    a. There are no prevention programs that are effective.
    b. Prevention programs can be designed to intervene as early as infancy to address risk factors for drug abuse.
    c. Prevention programs should start with the parents before they have children.
    d. Prevention with drugs and behavior therapy work for those children at risk by age four.

24. This NIDA program offers assessment tools and technical trainings to communities so they can more accurately identify risk and protective factors for youth drug use and related behavior problems.
    a. The Teacher Training for Youth Safety Program.
    b. The Youth at Risk Program.
    c. The Community Youth Development Study.
    d. Stop Addiction Now!

25. The Blending Initiative of 2001 was developed to _____.
    a. Blend all therapeutic efforts together in therapy.
    b. Educate the public to work together to stop addiction.
    c. Reduce the gap that exists between the publication of research results and impact on treatment delivery.
    d. To blend mental health and law enforcement efforts to stop addiction.