HEROIN ADDICTION AND THE OPIOID PANDEMIC

Introduction

With alarming frequency, the newspaper and public media reports on the accelerating heroin epidemic, which is destroying lives in greater numbers than ever before. Not all the tragedies relate to users of heroin; family and friends are often the silent sufferers and are impacted tremendously as well. Very frequently, heroin is misused along with other drugs, especially cocaine and opioid analgesics. An individual addicted to alcohol is twice as likely to become addicted to heroin as a nonuser of alcohol. Marijuana users are three times as likely, cocaine users 15 times as likely and opioid users are forty times as likely to become addicted to heroin as nonusers. Along with the increase in heroin use is an increase in the number of heroin-related deaths. These alarming circumstances are initially addressed in this study to better understand the huge impact heroin has on society and the health system as a whole.3,4

Overview Of Addiction

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) that was published in 2013 uses the term Substance Use Disorder to describe the inappropriate use of drugs. It does not rely on the term ‘dependence’ or ‘abuse’ as previously referenced in DSM-IV.5 Any discussion of heroin addiction requires a general understanding of addiction and its complexities.

The current American Society of Addiction Medicine (ASAM) definition of addiction states:1,49
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 inability to consistently abstain, in behavioral control, craving, diminished recognition of significant problems with one’s behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.

Moreover, ASAM provides an expanded or ‘longer’ definition of addiction that includes an emphasis of how substances alter chemical responses in the brain creating the pattern of addiction:\textsuperscript{1,49}

Addiction affects neurotransmission and interactions within reward structures of the brain, including the nucleus accumbens, anterior cingulate cortex, basal forebrain and amygdala, such that motivational hierarchies are altered and addictive behaviors, which may or may not include alcohol and other drug use, supplant healthy, self-care related behaviors. Addiction also affects neurotransmission and interactions between cortical and hippocampal circuits and brain reward structures, such that the memory of previous exposures to rewards (such as food, sex, alcohol and other drugs) leads to a biological and behavioral response to external cues, in turn triggering craving and/or engagement
Addiction is characterized by the following traits:

- Inability to consistently abstain from the addictive substance or behavior
- Impairment in behavioral control
- Craving a drug or rewarding entity
- Suppressed recognition of problems in behavior and relationships
- Dysfunctional emotional responses
- External cues with the power to trigger craving and use
- Increasing sense of motivation to repeat behaviors associated with past reward(s)
- Impulsive or compulsive pursuit of a reward despite accumulation of adverse consequences
- Persistent risk and/or recurrence of relapse, after periods of abstinence

Some believe it is the quantity or frequency of use of a substance (i.e., drug, food) or addictive behavior (i.e., spending, gambling) that is the determinant of the development of addiction. Others believe that it is the quality of the responses to the addictive substance or behavior which is the determinant of the development of addiction.

Relapse can be triggered by exposure to rewarding substances and behaviors, by exposure to environmental cues, and by exposure to emotional stressors that trigger heightened activity in brain stress circuits. In addition, significant impairment in executive functioning occurs, which manifests as problems with perception, learning, impulse control, compulsivity and judgment.
People with addictions often lack readiness or the interest to change their dysfunctional way of life despite mounting concerns expressed by significant others in their lives and in the workplace. A person’s lack of interest and inability to begin changing behavior exemplifies the avolitional aspect of this disease. There is also an apparent lack of insight and sense of appreciation of the magnitude of cumulative problems and escalating complications. Parenthetically, the immature, yet developing frontal lobes of adolescents magnify the deficits in executive functioning in this age-group, already prone to engage in high-risk behaviors, including ingestion of alcohol and/or other drug use. The result is a profound drive or craving to use substances or engage in temporarily rewarding behaviors, despite adverse consequences. It is consistent with the powerlessness of addiction described in Step 1 of the 12-Step program of Alcoholics Anonymous (AA); We admitted we were powerless over alcohol, and our lives had become unmanageable.  

**Developmental Factors**

A neurologic locus within the frontal cortex is associated with deferring gratification. In adolescence and young adulthood that locus is not fully mature, making early exposure to substance use more likely to develop into addiction.

Genetic factors determine about half of the likelihood that an individual will become an addict. Environment, biology, and culture together influence the extent to which genetic factors affect development of addiction. Learning resilience skills can also modify the genetic contribution. Additional factors that contribute to the development of addiction include:

- Biologic deficits in the brain’s reward circuits can enhance the reward
response, increasing the drive to repeat the behaviors which generated the sensation of reward.

- Repetition of drug use or addictive behaviors influence motivational circuitry, increasing impairment of control over additional drug use or addictive behaviors.
- Cognitive or affective distortions impair perceptions of feelings, resulting in significant self-deception.
- Disruption of positive social supports and problems in interpersonal relationships.
- Exposure to stressors that overwhelm coping abilities.
- Distortions in purpose, values, and meaning adversely affecting thinking and behavior.
- Distorted connections to others, self, and a spiritual entity.
- Presence of other psychiatric disorders.

Addiction is more than a behavioral disorder. It also affects cognition, emotions, and interactions with others, including a person’s ability to relate to members of their family. It affects relationships with members of the community, and a person’s psychological state. Behavioral manifestations and complications of addiction include those outlined below.\textsuperscript{2,6,7}

- Excessive use and/or engagement in addictive behaviors, more often and/or in quantities greater than the person intended despite a persistent desire for behavioral control; attempts at control fail
- Excessive time lost in substance use or addictive behaviors, or recovering from the short-term effects of substance use and/or addictive behaviors, with significant adverse impact on social and occupational functioning (\textit{i.e.,} the development of interpersonal
relationship problems or the neglect of responsibilities at home, school or work)

- Continued use and/or engagement in addictive behaviors, despite persistent or recurrent physical and psychological problems, caused or exacerbated by substance use and addictive behavior
- Restrictions of the behavioral repertoire, with focus on rewards that are part of the addiction
- Lack of ability, willingness and/or readiness for change

*Cognitive features* of addiction include: 1) Preoccupation with substance use, 2) Altered evaluations of the relative benefits and detriments associated with drugs and/or addictive behaviors, and 3) The inaccurate belief that problems experienced in one’s life are attributable to causes other than the predictable consequences of addiction. *Emotional features* of addiction include
1) Increased anxiety, dysphoria and emotional pain, 2) Increased sensitivity to stressors associated with the recruitment of brain stress systems, and 3) Difficulty in identifying feelings, distinguishing between feelings and the bodily sensations of emotional arousal, and describing feelings to other people (sometimes referred to as alexithymia).

The emotional aspects of addiction are quite complex. Some persons use alcohol or other drugs, or pathologically pursue other rewards because they are seeking positive reinforcement or the creation of a positive emotional state (euphoria). Others pursue substance use or other rewards which relieve negative emotional states (dysphoria). Beyond the initial experiences of reward and relief, there is a dysfunctional emotional state present in most
cases of addiction, which is associated with the persistence of engagement with addictive behaviors.²

The state of addiction is not the same as the state of intoxication. When anyone experiences mild intoxication from using alcohol or other drugs, or when one engages non-pathologically in potentially addictive behaviors such as gambling or eating, one may experience a high. It is felt as a positive emotional state, associated with increased dopamine and activity in reward circuits of the brain. After such an experience, there is a neurochemical rebound, in which the reward function does not simply revert to baseline, but often drops below the original levels. This is usually not consciously perceptible by the individual and is not necessarily associated with functional impairments.⁷

Tolerance develops to feeling high, but tolerance does not develop to the emotional low associated with the cycle of intoxication and withdrawal. Thus, in addiction, persons repeatedly attempt to create the feeling of being ‘high’ but what they experience is a deeper and deeper ‘low.’ While anyone may want to get high, addicts feel a need to use the addictive substance or engage in the addictive behavior to resolve their distress. Persons with addiction compulsively use their addictive substance even though it may not make them feel good and, in some cases, long after the rewards have stopped being pleasurable.

Clinical interventions can be quite effective in altering 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, which promote personal responsibility and accountability, connection with others, and personal growth also contribute to recovery.

The qualitative ways in which the brain and behavior respond to drug exposure and engagement in addictive behaviors are different at later stages of the condition. As is the case with other chronic diseases, the condition must be monitored and managed over time to decrease the frequency and intensity of relapses, sustain periods of remission, and optimize a person’s level of functioning during periods of remission.

In some cases of addiction, medication management can improve treatment outcomes. In most cases of addiction, the integration of psychosocial rehabilitation and ongoing care with evidence-based pharmacological therapy yields the best results. Chronic disease management is important for minimization of episodes of relapse and their impact.

Addiction professionals and persons in recovery are familiar with the hope that is found in recovery. Recovery is also available to persons who may not at first perceive this hope, especially when the focus is on linking the health consequences to the disease. Peer support, such as that found in various self-help activities, is beneficial in optimizing health status and functional outcomes in recovery. Recovery from addiction is best achieved through a combination of self-management, mutual support, and professional care provided by trained and certified professionals.¹

Heroin Addiction And DSM-5
With heroin use increasing, more people are experiencing the consequences of its repeated use. The Diagnostic and Statistical Manual of Mental Disorders, Edition IV (DSM-IV), published in 1994, came under scrutiny. A working group was formed to evaluate the usefulness of the diagnostic criteria. The DSM-IV used two diagnoses to cover heroin users. The first category was ‘Abuse’. It required one or more of these criteria: hazardous use, social and interpersonal problems, neglect of major roles to use heroin, and legal problems. The second group was described as ‘Dependence’. It required three or more of the following: withdrawal symptoms when not using heroin, tolerance with a need to increase the dose, using larger and larger amounts, repeated, unsuccessful attempts to control or stop using, significant time spent using, physical and psychological problems related to use, and giving up activities to use.

The latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) requires two or more of the symptoms and criteria previously divided into two categories by the DSM-IV. The DSM-5 no longer separates substance abuse from dependence. Instead, it provides criteria for specified substance use disorders, from mild to severe, depending on the number of symptoms, and adds ‘craving’ as a criterion. It includes behavioral addictions, unlike the DSM-IV.¹

**History Of Heroin: Its Properties And Use**

Heroin (chemical name: diacetylmorphine) is a synthetic narcotic, synthesized from the opium-producing poppy *Papaver somniferum*. It was first formulated in 1874, and marketed as a safer substitute for morphine. It was believed to be non-addictive. Soon after its commercial introduction, however, it became clear that heroin was as addictive as morphine. The U.S. government recognized that the use of heroin would have to be regulated.² The Harrison
Narcotics Act of 1914 prohibited the use of heroin except as prescribed by a physician. The Dangerous Drugs Act of 1920 disallowed any use of heroin, even that which a physician had prescribed. In response, sellers and users created a black market.

Afghanistan is the world leader in cultivating opium for the heroin market, which involves 60 percent of the world’s production. South and Central America, which primarily supply North America, account for 7 percent of the world’s opium crop.

**Forms of Heroin**

Sale of pure heroin is rare. Sellers usually mix it with a variety of other substances (sugars, starch, powdered milk, or quinine), stretching the volume of product to maximize profits. South American countries export the highest concentration of heroin, up to 70 percent pure. This form is a white powder with a bitter taste that predominantly originates in South America and, to a lesser extent, from Southeast Asia. This white powder heroin dominates U.S. markets east of the Mississippi River.

Some heroin is sold as *black tar heroin*, a black, sticky substance, the product of crude production. Black tar heroin, which is sticky like roofing tar, or hard like coal. It is predominantly produced in Mexico and sold in U.S. areas west of the Mississippi River. The dark color associated with black tar heroin results from crude processing methods that leave behind impurities. Special considerations for black tar heroin are discussed separately below.

**Prevalence of Heroin Use**

It is difficult to determine the true prevalence of heroin use because it depends
on self-reporting. It is probably much greater than the number reported, and surveys may not reach the heaviest users. According to the United States Substance Abuse and Mental Health Services Administration (SAMHSA) 2014 National Survey on Drug Use and Health (NSDUH), approximately 914,000 persons aged 12 years and older admitted to using heroin in the past year (0.3 percent of that age group). About 435,000 (0.2 percent) were current heroin users, and about 586,000 had a heroin use disorder.³

The NSDUH suggested that those numbers were higher in 2014 than at any time from 2002 to 2013. The increase is attributed to adults 26 years and older, using heroin in greater numbers. There is also an increase in the number of users aged 18 to 25 years, but to a lesser extent than in the aforementioned group.⁴

Heroin was once found only in cities. Now it is found in suburban and rural communities, in largest numbers around Chicago and St. Louis. There are increasing numbers of overdose deaths, especially in those regions. Heroin use is also escalating in urban areas, especially in users 18 to 25-years-old. Between 2002 and 2013, the number of heroin-related deaths quadrupled and the Centers for Disease Control and Prevention (CDC) reported more than 8,200 individuals died in 2013.⁹

**International Use**

The United Nations Office on Drug and Crime (UNODC) reported that in 2014 the global prevalence of opiate use (both heroin and opium) was about 0.4 percent of the population (12.8-20.2 million people). Southwest Asia has a much higher level of opiate use (1.21 percent) than the global average. Eastern and Southeastern Europe (0.82 percent) also have a prevalence
greater than the global average, followed closely by Central Asia and Transcaucasia (0.81 percent).\textsuperscript{24}

The European Monitoring Centre for Drug and Drug Addiction (EMCDDA), in its 2014 report, estimated that there were 1.4 million regular opioid users in Europe, which is about 0.41 percent of the adult population. Heroin is their opiate of choice. The patterns and trends of use varied among countries. The report speculates that Europe is in a long-term, subsiding trend in heroin use, attributed to less interest and reduced availability of the drug.\textsuperscript{24}

**Heroin: A New, Deadly Epidemic**

Today, every newspaper read, and every news broadcast viewed, report that the accelerating heroin epidemic is destroying lives in greater numbers than ever before. Some alarming recent statistics in the U.S. include:\textsuperscript{40}

- Heroin use more than doubled among young adults, aged 18-25 years, during the past decade.
- More than 90 percent of people who used heroin also abused one or multiple other drugs, especially opioid analgesics and cocaine.
- Of the people who used heroin, 45 percent were also addicted to prescription opioid analgesics.
- In 2015, the number of heroin deaths (12,989) surpassed the number of gun homicides (12,979) for the first time in the U.S.

People in healthcare, law enforcement, government, education and others do not have answers, but all know something must be done to contain this epidemic.

The demographics do not fit the image that comes to mind when thinking of the
“heroin addict” – low or no income, vagrant, self-destructive, and prone to perpetrating crimes. Rather, some of the demographic groups in which we historically expect a low incidence of heroin use are experiencing the greatest surges in use and its consequences. Heroin may torment the lives of:

- Men
- Women
- Most age groups
- The privately insured
- The uninsured
- Any income level
- All races and ethnic groups
- All education levels
- Blue collar occupations
- White collar occupations
- The unemployed
- People with disabilities
- High performance athletes
- All geographic regions
- All religions
- No religion
- Health professionals
- Law enforcement officers
- Politicians
- The homeless
- Prison inmates
- Petty criminals
- Extreme criminals
- Parents
- Children
• Boy scout leaders
• Educators
• Nursing students
• Medical students
• Members of the military

In most any U.S. population group heroin users and addicts are represented among the demographic. Many heroin users resort to using one or more additional illicit substances, especially alcohol, cocaine, amphetamines, and prescription opioid analgesics. As heroin use increases, so does the number of heroin-mediated deaths. As cited above, in 2015 the number of heroin deaths in the U.S. were 12,989. This is a disturbing trend when compared to the 8,200 deaths in 2013, which were quadruple the number of deaths prior to 2002.

**Methods Of Heroin Use**

There are many methods for using heroin. It is usually injected, sniffed/snorted, or smoked. Injection into a vein is one of the most common methods, causing the most intense response and the quickest "rush" of euphoria within a few seconds after injection. Injecting the drug into a muscle has a relatively slower effect – the user does not feel the effects for five to eight minutes. The sequence of acts leading up to injecting heroin can become a deeply ingrained ritual. It starts with the desire or the craving for the drug, then the decision to act on those impulses.

Users describe a ‘kit’ made up of the heroin, a needle on a syringe, a lighter or candle, a cigarette filter or cotton, a belt or shoelace, citric acid and water. The heroin, acid and water are put into the spoon. The spoon is held over the lighter
or candle flame – the heat mixes the substances. Then the cigarette filter is placed in the spoon, and the user draws the liquid into the syringe through the filter or cotton, hoping to separate the drug from the toxins and contaminants often mixed into the heroin by the seller. The belt or shoelace is usually tied tightly around the arm, to make the veins bulge. Eventually the veins are damaged and destroyed, becoming unusable. Then the addict must inject into other areas of the body, such as the groin, behind the knees, and anywhere they can get into a vein, including the neck.

Smoking heroin is another common method of use. It is also known as *Chasing the Dragon*. New and younger users often start with smoking or snorting – they don't want the social stigma of injecting drugs. Many mistakenly believe that they cannot get addicted from snorting or smoking heroin. Smokers often ‘graduate’ to injection because their bodies become less responsive to the drug. Tolerance develops quickly, and the user has to use more drugs to get the same effect.²

As mentioned above, the production of black tar heroin contains many impurities. Impure heroin is usually dissolved, diluted, and injected into veins, muscles, or under the skin.

**Mechanism of Action**

Heroin is a synthetic narcotic synthesized from morphine which has been extracted from opium poppy plants. Its greatest effects occur when the route of ingestion is intravenous. When injected, it is 3-5 times more potent than morphine. It causes euphoria and alters pain perception. Heroin and the metabolites it produces affect the mu, kappa, and delta receptors in the
nervous system. It is stimulation of the mu receptors that produces the euphoria, analgesia, and CNS depression, especially respiratory depression. The delta and kappa receptors are also analgesic, but affect primarily spinal nerves.²

Heroin reduces the brain’s responsiveness to increasing carbon dioxide levels in the bloodstream, and to decreasing oxygen saturation of hemoglobin – the body’s signals which drive an individual to breathe. The result is respiratory depression. It also decreases peripheral vascular resistance, which lowers blood pressure. Blood vessels in the skin dilate, which causes flushing, and histamine release, which causes intense pruritus. The effect of heroin on heart rate occurs by inhibition of baroreceptor reflexes. The result is bradycardia, not the compensatory increase in heart rate which is the norm when blood pressure declines.²

Heroin inhibits the effect of acetylcholine on the small intestine, decreasing the natural rhythm and rate of propulsive waves in the colon. The decrease in gastric motility prolongs gastric emptying time, causing constipation in users with ongoing use.²

**Effects on the Body**

Heroin activates specific receptors in the brain called mu-opioid receptors (MORs). Naturally occurring chemicals called neurotransmitters that bind to these receptors exist throughout the brain and body to regulate pain, hormone release, and feelings of wellbeing.⁶ When MORs are activated in the reward center of the brain, they stimulate the release of the neurotransmitter dopamine, causing a sensation of pleasure.⁷ The consequences of activating opioid receptors with externally administered opioids, depend on a variety of
factors; such as, how much is used, where in the brain or body it binds, strength and duration of the bonds, and how quickly it gets to the brain.

**Short-term Effects of Heroin Use**

Once heroin enters the brain, it is converted to morphine and binds rapidly to opioid receptors. Those using heroin typically report feeling a surge of pleasurable sensation, which they call a ‘rush’. With heroin, the rush is usually accompanied by a warm flushing of the skin, dry mouth, and a heavy feeling in the extremities, which may be accompanied by nausea, vomiting, and severe itching. After the initial effects, users usually will be drowsy for several hours, experience clouding of their mental function, and slowed heart rate and breathing that can also lead to coma, permanent brain damage, and death.

**Long-term Effects**

Repeated heroin use changes the physical structure and physiology of the brain, creating long-term imbalances in neuronal and hormonal systems that are not easily reversed. Studies have shown some deterioration of the brain’s white matter due to heroin use, which may affect decision-making abilities, the ability to regulate behavior, and responses to stressful situations. Heroin also produces profound degrees of tolerance and physical dependence.

Tolerance occurs when increasingly more of the drug is required to achieve the same effects. With physical dependence, the body adapts to the presence of the drug and withdrawal symptoms occur if use is reduced abruptly. Withdrawal may occur within a few hours after the last time the drug is taken. Symptoms of withdrawal include restlessness, muscle and bone pain,
insomnia, diarrhea, vomiting, cold flashes with goose bumps ('cold turkey'),
and leg movements. Major withdrawal symptoms peak between 24–48 hours
after the last dose of heroin and subside after about a week. However, some
people have shown persistent withdrawal signs for many months.

Finally, repeated heroin use often results in addiction — a chronic relapsing
disease that goes beyond physical dependence and is characterized by
uncontrollable drug-seeking no matter the consequences. Heroin is extremely
addictive, no matter how it is administered, although routes of administration
that allow it to reach the brain the fastest (i.e., injection and smoking) increase
the risk of addiction. Additional long-term effects include:²,¹⁵

- Infectious disease (i.e., HIV, hepatitis B and C)
- Collapsed veins
- Bacterial infections
- Abscesses
- Infection of heart lining and valves
- Arthritis and other rheumatologic problems
- Liver and kidney disease

**Prescription Opioid Use And Heroin Addiction**

Harmful health consequences resulting from the use of opioid medications that
are prescribed for the treatment of pain, such as Oxycontin®, Vicodin®, and
Demerol®, has dramatically increased in recent years. For example,
unintentional poisoning deaths from prescription opioids quadrupled from
1999 to 2010 and now outnumber those from heroin and cocaine combined.
People often assume prescription pain relievers are safer than illicit drugs
because they are medically prescribed; however, when these drugs are taken
for reasons or in ways or amounts not intended by a physician, or taken by someone other than the person for whom they are prescribed, they can result in severe adverse health effects including addiction, overdose, and death, especially when combined with other drugs or alcohol.

Research now suggests that use of these medications may open the door to heroin use. Nearly half of young people who inject heroin surveyed in three recent studies reported using prescription opioids before starting to use heroin. Some individuals reported switching to heroin because it is cheaper and easier to obtain than prescription opioids.\textsuperscript{15-17}

**Medical Complications**

No matter how they ingest the drug, chronic heroin users experience a variety of medical complications including insomnia and constipation. Lung complications (including various types of pneumonia and tuberculosis) may result from the poor health of the user as well as from heroin’s effect of depressing respiration. Many experience mental disorders such as depression and antisocial personality disorder. Men often experience sexual dysfunction and women’s menstrual cycles often become irregular. There are also specific consequences associated with different routes of administration. For example, people who repeatedly snort heroin can damage the mucosal tissues in their noses as well as perforate the nasal septum (the tissue that separates the nasal passages).

Medical consequences of chronic injection use include scarred and/or collapsed veins, bacterial infections of the blood vessels and heart valves, abscesses (boils), and other soft-tissue infections. Many of the additives in street heroin
may include substances that do not readily dissolve and result in clogging the blood vessels that lead to the lungs, liver, kidneys, or brain. This can cause infection or even death of small patches of cells in vital organs. Immune reactions to these or other contaminants can cause arthritis or other rheumatologic problems.

Sharing of injection equipment or fluids can lead to some of the most severe consequences of heroin use — infections with hepatitis B and C, HIV, and a host of other blood-borne viruses, which drug users can then pass on to their sexual partners and children.

How Heroin Harms

The consequences of heroin use are ubiquitous, and severe, even to death.

• Heroin is illegal.
• Heroin is highly addictive.
• Heroin suppresses the body’s innate drive to breathe, leading to coma and death.
• Heroin is often used in combination with other drugs or alcohol, increasing the risk for overdose.
• Heroin use by injection poses some risks not associated with smoking and snorting. The risks and complications associated with intravenous use includes (not all-inclusive): HIV, hepatitis C, hepatitis B, bacterial infections of the skin, sepsis, and cardiac valve bacterial infection with vegetation on one or more of the heart valves.

Some individuals who are at the greatest risk for developing heroin addiction include:
• People who are addicted to prescription opioid painkillers
• People who are addicted to cocaine
• People without insurance
• People enrolled in Medicaid
• Non-Hispanic Caucasians
• Males
• People who are addicted to marijuana
• People who are alcoholic, actively drinking
• People living in large cities
• People 18-25 years of age

Potential Solutions

Federal Government Interventions

Health clinicians need more educational training and resources, which enable them to make more-informed decisions about the prescribing of opioid analgesics. This education should include: 1) Prescribing guidelines for better management of chronic pain, and 2) Prescription drug monitoring programs, which should consist of electronic databases that track the dispensing of some drugs as an integral part of practice.

Increasing access to substance use treatment services was expected to be done through the Affordable Care Act, but the future of the ACA is uncertain. Additionally, greater use of Medication-Assisted Treatment (MAT) and wider distribution of naloxone, with education for the public in its use, to reduce heroin and prescription opioid overdose deaths is recommended. Supporting research and development of analgesics less prone to misuse, and improving community surveillance to better track trends, and identify
communities with the greatest problems or those at risk is an ongoing need. It is critical that there be ongoing development of prevention strategies.

**State Government Interventions**

The greatest risk factor for heroin addiction – addiction to prescription opioid analgesics, must be addressed. These include: 1) Develop prescription drug monitoring programs for controlled substances that clinicians can review before they prescribe opioid analgesics; and, 2) Before prescribing opioid analgesics, examine state workers’ compensation and Medicaid history, to identify inappropriate prescribing and avoid inappropriate prescribing.

As with federal interventions, at the state level there needs to be efforts to increase access to substance use treatment services, including MAT for opioid addiction; and, to work with Medicaid and other insurance companies to provide coverage for MAT and to support adoption of MAT in community settings.

State initiatives need to expand access to and training for administering naloxone to reduce opioid overdose deaths. Ensuring that people have access to integrated prevention services is critical, including access to sterile injection equipment from a reliable source, as allowed by local policy. There needs to be ongoing help provided for local jurisdictions to put these effective practices to work in communities where drug addiction is common.

**Role of Health Clinicians**

This section will begin with a focus on the prevention of heroin use and addiction for clinicians to implement into practice. Clinicians can prevent
people from starting to use heroin by decreasing the use of prescription opioid analgesics. Further, it is important for clinicians to focus on reversing the trend in heroin-related deaths by supporting public education about the use of naloxone for acute heroin overdoses and ensuring it is available when needed; and, by striving to reduce the number of deaths from heroin through greater use of medication-assisted treatment (MAT).

Health clinicians must follow best practices for responsible painkiller prescribing to reduce opioid painkiller addiction, the strongest risk factor for heroin addiction. They can do this by adhering to the following recommendations:

- Use prescription drug monitoring programs and ask patients about past or current drug and alcohol use prior to considering opioid treatment.
- Prescribe the lowest effective dose and only the quantity needed for each patient.
- Link patients with substance use disorders to effective substance use and addiction treatment services.

Clinicians should support the use of Food and Drug Administration (FDA) approved MAT options (methadone, buprenorphine, and naltrexone) in patients addicted to prescription opioid painkillers or heroin. Clinicians can learn more about the heroin epidemic, its problems, consequences, and the search for answers online at: http://www.cdc.gov/vitalsigns/heroin.

**Opioid Use: An Epidemic of Deaths**
Daily in the U.S., more than 650,000 opioid prescriptions are dispensed, and 3,900 people initiate use of prescription opioid. Additionally, 580 people initiate heroin use and 78 people die from an opioid-related overdose.

**Economic Impact of the Opioid Epidemic**

There is 55 billion in health and social costs related to prescription opioid use reported each year, and 20 billion in emergency department and inpatient care for opioid poisonings.

**The Problem Of Prescription Opioids And Heroin**

Drug overdose deaths involving prescription opioid pain relievers have increased dramatically since 1999. Concerted federal and state efforts have been made to curb this epidemic. In 2011, the White House released an interagency strategy for Responding to America’s Prescription Drug Crisis.

Enacting this strategy, federal agencies have worked with states to 1) educate providers, pharmacists, patients, parents, and youth about the dangers of prescription drug use and the need for proper prescribing, dispensing, use, and disposal, 2) implement effective prescription drug monitoring programs, 3) facilitate proper medication disposal through prescription take-back initiatives, and 4) support aggressive enforcement to address doctor-shopping and pill mills and support the development of drug use-resistance formulations for opioid pain relievers.

Improvements have been seen in some regions of the country in the form of decreasing availability of prescription opioid drugs and a decline in overdose
deaths in states with the most aggressive policies. However, since 2007, overdose deaths related to heroin have started to increase. The Centers for Disease Control and Prevention counted 10,574 heroin overdose deaths in 2014, which represents more than a fivefold increase of the heroin death rate from 2002 to 2014.\textsuperscript{39}

To combat the intertwined problems of prescription opioid misuse and heroin use, in March of 2015 the Secretary of Health and Human Services (HHS) announced the Secretary’s Opioid Initiative which aims to reduce addiction and mortality related to opioid drug use by reforming opioid prescribing practices, expanding access to the overdose-reversal drug naloxone, and expanding access to medication-assisted treatment for opioid use disorder.\textsuperscript{49}

The relationship between prescription opioid use and increases in heroin use in the U.S. is under scrutiny. These substances are all part of the same opioid drug category and overlap in important ways. Currently available research demonstrates:\textsuperscript{18-20}

- Prescription opioid use is a risk factor for heroin use.
- Prescription opioids and heroin have similar effects, different risk factors.
- A subset of people who abuse prescription opioids may progress to heroin use.
- Increased drug availability is associated with increased use and overdose.
- Heroin use is driven by its low cost and high availability.
- Emphasis is needed on both prevention and treatment.

\textbf{Treatment For A Substance Use Disorder And Addiction}
The Substance Abuse and Mental Health Service Administration’s National Survey on Drug Use and Health (SAMHSA) reported that 22.5 million people (8.5 percent of the U.S. population) aged 12 years or older needed treatment for an illicit drug problem in 2014. Only 4.2 million (18.5 percent of those who needed treatment) received any substance use treatment. Of those, only 2.6 million people received treatment specific to addiction.\textsuperscript{18-20}

Drug addiction and its treatment are complex and multifactorial. Fortunately, there are general principles and methods applicable to virtually all drug addictions. There are also unique features specific to each drug. Treatment becomes even more complex when an individual is using more than one drug – a common problem. Treatment of drug addiction, to be successful, means that all the substances which an individual is using must be addressed specifically. This section of the course pertains to heroin addiction, but it should be kept in mind that other substances which a heroin addict is using must be considered to optimize the chance for long-term freedom from all illicit drug use.

Heroin addiction is a chronic disease, which is characterized by compulsive drug seeking and use, despite adverse consequences and alterations in the brain, which may be long-lasting or permanent. Drug addiction is also characterized by relapse, but relapse is not inevitable. Drug addiction begins with a choice to use an addictive substance. Over time, seeking out the drug and using it becomes compulsive, as long-term exposure to the drug alters the parts of the brain involved in reward, motivation, learning, memory, and self-control. The addict loses the choice about using.
Drug addiction is treatable, but it’s a chronic disease, for which there is no cure. An addict can’t simply stop using drugs for a few days and be well. Most patients need long-term, and frequently, repeated treatment to stop using all mood-altering substances and to build a life, mindful of the potential for relapse.

**Principles of Effective Treatment**

The foundation of an effective treatment program includes the following principles.

- Addiction is a complex, but treatable, chronic disease.
- Addiction affects both brain function and behavior.
- Treatment must be individualized.
- When an addict decides to accept treatment, it must be accessible quickly.
- Effective treatment considers all the patient’s needs, not just drug use.
- The longer the duration of treatment, the better the outcome.
- Behavioral therapies are the most commonly used forms of treatment.
- Medications are often an important part of treatment, in combination with behavioral therapies.

For treatment plans to effective, treatment must be reviewed often, and adjusted, in accordance with the patient’s changing needs. The patient should be assessed for the presence of additional mental disorders and treatment adjusted accordingly. Medically assisted detoxification is the first step of a treatment plan, but never the only step of effective treatment.
Involuntary (initially) treatment can be effective. The patient must be monitored for drug use throughout treatment. Treatment programs should test patients for HIV/AIDS, hepatitis B and C, tuberculosis, and other infectious diseases. They should be instructed in infectious disease prevention.

**Treatment Stages**

Successful treatment has several components, which frequently are simultaneously applied. These include:

- detoxification – elimination of the drug from the body after use cessation
- behavioral therapies, including counseling
- medications – most common with opioid, tobacco, or alcohol addiction
- assessment for, and management of, co-occurring mental health issues – the most common are depression and anxiety
- Indefinite management to prevent relapse

Treatment should include medical care and mental health services, as well as family and community support systems.

**Medication Use in Treatment**

Medications can serve one or multiple purposes, such as withdrawal, relapse prevention, and co-occurring conditions.\(^{22}\)
Withdrawal

Medications help suppress withdrawal symptoms during detoxification. Medications are used for about 80 percent of detoxifications. Patients who get no further treatment after detoxification usually relapse immediately, and resume their drug use. One study of treatment facilities found that medications were used in almost 80 percent of detoxifications.

Relapse Prevention

Patients can use medications to help re-establish normal brain function and decrease cravings. Medications are often used long-term when the patients’ addiction was heroin or prescription pain relievers. People who use more than one drug (frequently the case) must have treatment for all the drugs used.

Co-occurring Conditions

Mental health issues, which often contribute to or exacerbate addiction, must be treated. Depression and anxiety are common in addiction and recovery. There are several medications available for heroin addiction: 1) methadone (Dolophine®, Methadose®), 2) buprenorphine (Suboxone®, Subutex®, Probuphine®), and 3) naltrexone (Vivitrol®). These medications act on the same receptors in the brain as heroin.

Methadone and buprenorphine suppress withdrawal symptoms and relieve cravings. Naltrexone blocks the opioid receptor sites in the brain. It is not used for detoxification. All three reduce drug-seeking and criminal behavior. They help the addict accept behavioral therapies.
Behavioral Therapies

Behavioral Therapies help patients to change their beliefs and behaviors related to drug use, and encourage or enable patients to persist with the various other elements of their individualized treatment plan, such as use of medication, and learning healthy life skills.

Outpatient behavioral treatment consists of a wide variety of programs for patients who are not in a residential setting, but need ongoing, regular contact with a behavioral health counselor. The programs consist of individual sessions with a counselor as well as supervised group meetings with other addicts, who are usually also new to recovery or share similar issues of concern. Some forms of behavioral therapies include:

- **Cognitive-behavioral Therapy:** This therapy helps patients recognize situations which may trigger drug use, and how to avoid or cope with those situations without using drugs.

- **Multidimensional Family Therapy:** This therapy is for adolescents with drug use problems and their families, addressing a range of influences on their drug-use patterns, to improve overall family functioning.

- **Motivational Interviewing:** This program makes the most of an addict's readiness to change his or her behavior and enter treatment.

- **Motivational Incentives:** This (contingency management) uses positive reinforcement to encourage abstinence from drugs.
Outpatient treatment is usually intensive at first – patients attend multiple outpatient sessions each week. After a variable number of weeks of intensive treatment, patients may meet less often and for fewer hours per week.

Inpatient treatment consists of licensed residential treatment facilities with 24-hour structured care, including housing and medical attention. The facilities use a variety of therapeutic approaches, separating the addict from his or her drugs while teaching the patient to live a drug-free, crime-free lifestyle. Examples of residential treatment settings include: 20,21

• **Short-term Residential Treatment**: This treatment is usually 28 days or less. It usually focuses on detoxification and initial intensive counseling, as well as preparation for ongoing treatment in a community-based setting.

• **Recovery Housing**: This program provides supervised, short-term to indefinite-duration living. These are often the residence of choice following completion of inpatient or residential treatment. Recovery housing can help people successfully navigate the transition to independent sober living. It often includes opportunities to learn life skills, such as managing finances, or seeking employment. These facilities usually emphasize connecting to support services in the community.

**Successful Treatment Steps:**
Addiction treatment must help the person to stop using drugs, stay drug-free, and be productive in the family, at work, and in society. Successful treatment has several steps include:

- detoxification
- behavioral counseling
- medication for opioid, tobacco, or alcohol addiction
- evaluation and treatment for co-occurring mental health issues such as depression and anxiety
- long-term follow-up to prevent relapse
- medications used to manage withdrawal symptoms, prevent relapse, and treat co-occurring conditions

Behavioral therapies help patients to modify their attitudes and behaviors related to drug use, increase healthy life skills, and persist with other forms of treatment, such as medication.

Resources for Clinicians


- Step-by-step guides for people who think they or a loved one may need treatment: www.drugabuse.gov/related-topics/treatment

Heroin Toxicity
Heroin has been, and still is, one of the most frequently used and addictive narcotics in the U.S. and worldwide. It may be injected intravenously (mainlining) or subcutaneously (skin-popping). It can also be snorted, smoked or ingested. The statistics are compelling.14-18,25-29

- Drug poisoning (overdose) is the number one cause of injury-related death in the United States, with 43,982 deaths occurring in 2013.
- In 2000, non-Hispanic black persons aged 45-64 had the highest rate of drug-poisoning deaths involving heroin (2.0 per 100,000). In 2013, non-Hispanic white persons aged 18-44 had the highest rate of drug-poisoning deaths (7.0 per 100,000).
- From 2000 through 2013, the age-adjusted rate for drug-poisoning deaths involving heroin increased for all regions in the United States, with the greatest increase in the Midwest.
- The rate for heroin-related drug poisoning deaths was highest among adults aged 25-44 years from 2000 through 2013.
- The age-adjusted rate for drug-poisoning deaths involving opioid analgesics has remained level in recent years, heroin-related overdose deaths have more than quadrupled since 2010.
- In 2013, the number of drug-poisoning deaths involving heroin was almost four times higher for men (6,525 deaths) than women (1,732 deaths).
- From 2014 to 2015 heroin overdose deaths increased by 20.6 percent to nearly 13,000 in 2015.
- In 2015, males aged 25-44 years had the highest death rate, of 13.2 per 100,000, an increase of 22.2 percent from 2014.
- Metabolic breakdown of heroin into morphine in the body can make it difficult to distinguish between deaths from heroin and deaths from morphine. Some deaths reported to involve morphine could be deaths...
from heroin, causing an undercount of heroin-related deaths.

Heroin poisoning (toxicity) occurs when an individual overdoses on the drug, usually unintentionally. Toxicity may also occur in a body packer, body pusher or body stuffer. Body packers are also called mules. They fill small bags, usually plastic, latex, and often condoms, with heroin, which they swallow, packing their gastrointestinal (GI) tracts with the heroin-filled bags. It’s a common method for smuggling illegal drugs across the borders between countries. Body pushers fill small bags with heroin which they pack into their rectums or vaginas. The bags are vulnerable to rupture in both packers and pushers, dumping massive amounts of the drug into the smuggler. The result is a drug overdose, which is often fatal. Body pushing or packing should be considered in people found unconscious during international flights or at airports. Such an overdose can also occur hours or days after a trip from a country in which heroin is endemic.\textsuperscript{25-29}

Body stuffers on the other hand ingest all the drugs in their possession to avoid apprehension by law enforcement. The heroin receptacles are not usually packaged as securely as those carried by the pushers and packers for GI transport; the packaging easily ruptures and severe to fatal toxicity may be the result.

**Causes of Heroin Overdose**

The most common circumstances in which a significant heroin overdose occurs include: 1) Use of a higher dose than usual, 2) Injection of unsuspected, highly concentrated solution, 3) Heroin use after a prolonged period of abstinence, 4) Suicidal (intentional) overdose, and 5) Body packing, pushing or stuffing
Morbidity and Mortality

Heroin overdose resulting in fatality occurs most often in long-term users, usually in their early twenties. Fatalities are more common in people who also use alcohol and other drugs, especially benzodiazepines and cocaine. Respiratory failure and/or asphyxiation are the most common conditions associated with death.\textsuperscript{25-29}

In the United States, the number of fatal heroin overdoses more than tripled from 2010 to 2014, from 1.0 per 100,000 people to 3.4 per 100,000. The deaths from overdose increased 20.6 percent from 2014 to 2015.\textsuperscript{26,27} Of the patients treated for heroin overdose, 3-7 percent require hospital admission for complications such as infection, pneumonia, and pulmonary edema.

Heroin addiction has traditionally been reported as more prevalent in economically disadvantaged communities, but is grossly underreported among the low-income population. The National Institute on Drug Abuse (NIDA) reports that there is little, if any, difference in lifetime heroin use among races and ethnic groups, although there are differences in death rates from heroin overdose. The Centers for Disease Control and Prevention (CDC) reported that non-Hispanic whites had the highest death rate from heroin overdose in 2014.\textsuperscript{26}

Heroin addiction has traditionally been viewed as a disease more common in males; and, heroin addiction in females is grossly underreported. According to NIDA, males are more likely to report heroin use during their lifetime than are females. The death rate for heroin overdose in males was more than four times that of females.
The American Association of Poison Control Centers’ National Poison Data System reports that 2463 single exposures to heroin were reported in 2014, with 2085 of those in persons 20 years of age and older; 15 were in children less than 16 years of age, and 149 were in teenagers.\textsuperscript{29} Deaths from overdose were highest among users aged 25-34 years, according to CDC reporting.

**Clinical Presentation**

The clinical presentation of toxicity is easy to recognize when heroin is the only agent in use, and the health clinician is experienced. It should be suspected in all comatose patients, especially if there is miosis and respiratory depression.

Symptoms of overdose develop within ten minutes of an intravenous injection. After life-saving treatment, the user often admits to taking in a larger than usual dose, or that they knew it was a higher concentration of heroin than usual, or that they used heroin after a prolonged period of abstinence. Overdoses are less common with fluctuations in heroin purity, although there is a moderate increase of overdose fatalities with heroin of greater purity. Fentanyl or fentanyl analogues are sometimes mixed with heroin, or may be sold as heroin; and, they frequently were the cause of opioid overdoses in recent years, although it is not known exactly when fentanyl and analogues became responsible for an increase in overdoses.\textsuperscript{31}

Respiratory arrest is the cause of death in acute heroin overdose. Simultaneous ingestion of other drugs, especially alcohol, methadone and cocaine, as well as the presence of other medical conditions, increases the risk of fatality.\textsuperscript{30,31}
The common clinical features of heroin poisoning are those seen in other medical conditions in which respiratory arrest occurs, or other cases of toxicity.\textsuperscript{2} Clonidine given when pontine hemorrhage (a form of intracranial bleeding) has occurred can cause coma, respiratory depression, and miosis, the same picture as opioid intoxication or overdose. Phencyclidine, some phenothiazines, and organophosphates may also cause miosis with mental status changes. There are other factors that can alter the clinical presentation of heroin toxicity. Some of these are highlighted below.\textsuperscript{2,29,35}

- \textit{Simultaneous Medical Conditions}: head trauma, hypoxia, hypoglycemia, hypovolemia, diseases of the central nervous system, hypoxia, acidosis, and metabolic diseases can alter presentation.
- \textit{Simultaneous Ingestions}: the most common substances ingested with heroin are alcohol, then benzodiazepines, cocaine and amphetamines.
- \textit{Contaminants}: heroin is often adulterated with substances that are toxic, such as amphetamines, anticholinergic drugs, sedative hypnotics, quinine, strychnine, arsenic, heavy metals, clenbuterol, levamisole, and local anesthetics.
- \textit{Biological contaminants}: clostridia-type microorganisms such as anthrax botulism, and tetanus toxoid can alter the clinical presentation.

Heroin body packers and body pushers present a different problem, because they may present with symptoms which seem unrelated to heroin overdose, such as bowel obstruction or rupture. Symptoms of extreme heroin overdose which are unresponsive to the usual therapies should prompt consideration of pushing or packing. People who are found unconscious at airports or on international flights, or who have recently traveled from countries in which
heroin is endemic, should be considered for the same.

Pulmonary edema of noncardiac origin is present in 0.3-2.4 percent of heroin overdose cases. It is usually within 2-4 hours of the overdose that pulmonary edema becomes clinically apparent. Hypoxia, increased respiratory rate, and a cough with frothy pink sputum suggest pulmonary edema. Chest X-ray will show bilateral infiltrates. Pulmonary edema associated with heroin overdose lasts up to 48 hours, and the treatment is supportive care. In most instances, oxygen delivered by mask is sufficient to correct hypoxia. Positive-pressure ventilation, with endotracheal intubation, may be necessary in the presence of airway compromise, severe hypoxia, acidosis, and cardiovascular instability.

Why pulmonary edema occurs with heroin toxicity is unclear, but it is probable that hypoxia-damaged lung tissue has a major role. Other potential causes suggested include anaphylaxis, neurogenic-mediated, immune-complex deposition, and dysfunctional myocardial contractility.

**Physical Signs/Symptoms**

Respiratory suppression, coma, and miosis are the triad characteristic of opioid overdose, with 92 percent sensitivity and 76 percent specificity. In cases with co-ingestions, especially other toxins, such as amphetamines, cocaine, or anticholinergics, or with the presence of medical conditions such as shock, trauma, hypoglycemia, and hypoxia, patients may suffer delirium, mydriasis, and tachypnea. Patients who have ingested other narcotics such as dextromethorphan, codeine, meperidine, fentanyl, pentazocine or propoxyphene are especially vulnerable to respiratory depression.
An overdose with peripheral vasodilation, decreased peripheral resistance and histamine release, as well as suppression of baroreceptor reflexes produce mild hypotension and mild bradycardia. In a patient with heroin poisoning with severe hypotension, identification of additional causes should be pursued, such as hemorrhage, sepsis, hypovolemia, pulmonary embolus, and shock.

Heroin’s effect on the respiratory center is to cause respiratory depression, therefore if tachypnea is present, conditions associated with complications of heroin use should be sought. Tachypnea in a heroin user can also occur with concomitant ingestion of pentazocine or meperidine. The skin may reveal signs of heroin use, such as track marks, fresh punctures, or disc-like patterns associated with skin-popping.

**Differential Diagnoses**

When heroin toxicity is suspected, other substances must be considered. Fentanyl, which is 20-40 times more potent than heroin, is often mixed with heroin. It is becoming more popular sold by itself. Non-pharmaceutical fentanyl, and analogs of fentanyl (such as acetyl fentanyl), are being illicitly manufactured and distributed. There are forms which can be swallowed, injected or snorted. In some geographic regions, fentanyl has become more popular than heroin. It is responsible for a growing number of fatal overdoses, having a faster onset of action and greater potency than heroin.\(^{31,33}\)

Differential Diagnoses include those listed below:

- ARDS (acute respiratory distress syndrome)
- Alcohol toxicity
- Barbiturate toxicity
• Benzodiazepine toxicity
• Diabetic ketoacidosis
• Gamma-hydroxy butyrate toxicity
• Hypercalcemia
• Hypernatremia
• Hyperosmolar hyperglycemic state
• Hypoglycemia
• Hypothermia
• Lactic acidosis
• Metabolic acidosis
• Phencyclidine toxicity
• Respiratory failure

**Physical Workup**

Laboratory tests do not alter therapy in emergent circumstances. The diagnosis of heroin overdose is made clinically. If the patient does not respond to naloxone, however, or is experiencing complications, laboratory analysis and further workup may be indicated.

Qualitative analysis may be used to confirm heroin use, as well as to assess ingestion of other drugs. Alcohol, cocaine, benzodiazepines, and amphetamines are commonly ingested with heroin, and all contribute to a more complicated course with multiple treatment modalities. If the patient has taken prescription narcotics, which commonly contain acetaminophen or aspirin, serum drug levels should be evaluated periodically.

Heroin is metabolized quickly, to morphine and 6-MAM. Most urine qualitative
toxicology tests register morphine only, not heroin. Therefore, the presence of morphine is used as a marker for heroin as well. In some situations, such as criminal and legal cases, identification of specific compounds is necessary. A drug screen positive for 6-MAM, which is generated only from heroin metabolism, is taken as evidence for heroin use.

Arterial blood gas analysis reveals respiratory acidosis in mild to moderate heroin overdose. In more severe cases of heroin overdose, there may be a mixed respiratory and metabolic acidosis, due to tissue hypoxia. Unexplained metabolic acidosis should prompt investigation for co-ingestion or contamination with other toxins, such as cyanide and clenbuterol.

Assessment for hypoglycemia should be immediate, at the bedside, and must be treated emergently. A patient in a coma who does not respond to an infusion of dextrose, thiamine, and naloxone (Narcan) should have a complete metabolic panel. The following should also be considered:

• A pregnancy test should be performed in female patients of childbearing age.
• Liver function tests and coagulation studies are indicated to evaluate for hepatitis, which is more prevalent in illicit drug users. Consider ammonia levels when hepatic encephalopathy is included in the differential diagnosis.
• A complete blood count (CBC) should be obtained to evaluate for infection, immunodeficiency, or blood loss, if these are of concern.
• Renal function should be assessed, and monitored over time, in patients with persistent coma, sepsis, extreme hypertension, the presence of rhabdomyolysis, or shock.
• Lumbar puncture for evaluation of cerebrospinal fluid should be performed if infection is of concern.
• Creatinine kinase levels are indicated if rhabdomyolysis, potential cardiac injury, or compartment syndrome are of concern.

**Imaging Studies**

*Chest Radiographs*

Pulmonary complications of many types are common in heroin toxicity and other drug use, and should be evaluated in patients with persistent hypoxia. Chest x-ray will help diagnose and differentiate pulmonary complications. These include (not all-inclusive):

• Pneumothorax
• Pneumomediastinum
• Septic pulmonary emboli
• Atelectasis
• Pneumoperitoneum
• Fungal infections
• Aspiration pneumonia
• Aspiration pneumonitis

Contaminants adulterating heroin can cause pulmonary injury and pathology. Talc, a common adulterant, can cause thrombosis of small pulmonary vessels, appearing as a reticulonodular pattern on chest radiography. Talc can also cause granulomatosis, and long-term exposure to talc can cause pulmonary hypertension.
**Abdominal Radiographs**

Radiopaque substances may sometimes be visible in the gastrointestinal (GI) tract, such as bags or other receptacles packed with heroin or other drugs. The sensitivity of abdominal radiographs for this purpose is only 85-90 percent.

**Computed Tomography without Contrast**

Computed tomography (CT) scan of the abdomen and pelvis has a higher sensitivity for foreign bodies in the GI tract than simple radiographs. Lack of progression of the foreign body can help to identify the location of an obstruction or organ perforation.

**Computed Tomography Scan of the Brain**

The presence of focal neurologic findings or persistent coma should prompt a CT scan of the brain. It will reveal mass lesions such as abscesses, intracerebral or extra cerebral hematomas or a cerebrovascular accident (CVA or stroke).

**Magnetic Resonance Imaging**

Magnetic Resonance Imaging (MRI) of the brain may elucidate white-matter abnormalities in the cerebellum, indicating heroin-induced leukoencephalopathy in the posterior limb of the internal capsule.

**Electrocardiogram**

Electrocardiogram (ECG) is useful to detect abnormalities in rhythm and rate, which are rare in pure opioid overdoses, but may indicate co-ingestion of
additional street drugs or contaminants often adulterating heroin. It can indicate myocardial ischemia if present, reveal endocarditis, or acute pulmonary hypertension induced by emboli.

**Emergency Interventional Procedures**

Endotracheal intubation may be needed if noncardiac pulmonary edema causes hypoxia. It may be indicated for airway protection, or be required for the management of shock and increased intracranial pressure.

Lumbar puncture is indicated in comatose patients in the absence of signs of increased intracranial pressure, with evidence of meningitis or fever of unknown origin. If bacterial meningitis is suspected, antibiotic therapy should begin immediately, without delay for lumbar puncture.

**Treatment for Heroin Toxicity**

The effects of heroin on the central nervous system (CNS) are quickly reversed with naloxone. It can be given intravenously, intramuscularly, subcutaneously, or via endotracheal tube. A newer intranasal formulation has proved especially convenient for first responders and laypersons.32

A response to naloxone should be evident within 5 minutes, and the effects last for 20-40 minutes. Re-sedation occurs when large doses of heroin are used, such as occurs from a ruptured transport bag, or in the presence of a long-acting narcotic drug. The absence of a response to a standard dose of naloxone indicates a need to evaluate for another cause of the clinical presentation, such as hypoglycemia. Opioid-induced respiratory depression
from fentanyl and acetyl fentanyl may require larger doses of naloxone, because of the higher potency of these drugs compared with heroin.\textsuperscript{32}

Gastric lavage for an oral heroin overdose is generally not recommended. It has no value. Furthermore, gastric lavage is contraindicated in body packers and body stuffers because the procedure may rupture a package. Activated charcoal is becoming increasingly controversial. Aspiration pneumonitis is a potential complication, and charcoal is of no benefit in pure heroin overdose.

Body packers and body stuffers usually require whole-bowel irrigation, except in the presence of intestinal obstruction or perforation. Whole-bowel irrigation may be accomplished with an oral polyethylene glycol (GoLYTELY) solution at a rate of 2 L/h until stools are watery and clear.

Admission to the hospital is rare, and is limited to patients with complications of heroin overdose and intravenous drug use (\textit{i.e.}, endocarditis, epidural abscess, and cellulitis). Admission for intensive care is also rarely required, but is indicated for patients who require respiratory support, or those with life-threatening arrhythmias, shock, and recurrent convulsions, as well as those who require continuous naloxone infusions.

\textit{Pulmonary Edema}

Noncardiogenic pulmonary edema (NCPE) occurs 0.3-2.4% of heroin overdoses, generally lasts 24-48 hours and responds to supportive care. In most instances, hypoxia improves with mask oxygen ventilation only, but noninvasive positive-pressure ventilation (NIPPV) and endotracheal intubation may be required. Endotracheal intubation is indicated for airway protection,
severe hypoxia, acidosis, respiratory arrest, and cardiovascular instability. It is usually within 2-4 hours of the overdose that pulmonary edema becomes clinically apparent. Hypoxia, increased respiratory rate, and a cough with frothy pink sputum suggest pulmonary edema. Chest X-ray will show bilateral infiltrates.

Why pulmonary edema occurs with heroin toxicity is unclear, but it is probable that hypoxia-damaged lung tissue has a major role. Other potential causes suggested include anaphylaxis, neurogenic-mediated, immune-complex deposition, and dysfunctional myocardial contractility.

Seizure

The presence of recurrent seizure in a patient with heroin overdose should prompt a search for causes of seizures, such as hypoxia, CNS injury, adulterants, or co-ingestions (i.e., tricyclic antidepressants, cocaine, amphetamines). Some narcotics, such as meperidine (Demerol), pentazocine (Talwin), diphenoxylate (Lomotil), and fentanyl (Actiq), or their metabolites, may cause seizures. Heroin and narcotic-related seizures respond to conventional benzodiazepine therapy.

Rhabdomyolysis

Prolonged coma and seizures may contribute to the development of rhabdomyolysis, which is treated conventionally, with large amounts of crystalloid solutions, alkalization of the urine, and forced diuresis. Infusion of large amounts of crystalloids in patients with narcotic overdose may require close monitoring of hemodynamic parameters because these patients are also at risk for pulmonary edema.
Special Considerations of Treatment

Pregnant Patients

Heroin addiction in the pregnant patient is grossly underestimated. Heroin readily crosses the placenta and the blood-brain barrier of the fetus, leading to narcotic dependence in the fetus and neonate. Heroin overdose results in hypoxia, which, in turn, causes placental vasoconstriction, thus causing further injury to the fetus. Complications in the mother can lead to additional and similar complications in the fetus.

Childhood Heroin Overdose

Childhood heroin overdose is rare and does not differ clinically from an adult overdose. Similarly, treatment of pediatric heroin overdose would not differ from that of an adult. In all cases of pediatric heroin overdose, social services should be involved.

Medications Used during Treatment

Narcotic Antagonist: Naloxone (Narcan)

In suspected narcotic overdose, small, incremental (<0.1mg) of naloxone may be given until the desired effect is achieved or a total of 10 mg have been given with no response. Large doses in boluses are contraindicated initially, to avoid sudden withdrawal in an opiate addicted patient. Large doses could also trigger reactions with other illicit substances such as amphetamines or cocaine, precipitating a sympathetic or an anticholinergic crisis. When the desired effect is achieved, the patient may require a continuous infusion; a drip solution is
mixed, so that two thirds of the original effective dose is administered per hour. A drip consists of 40 milligram naloxone to 1 L D5W or NS and infuses at 10 ml/h (0.4mg/h)\textsuperscript{52}.

\textit{GI Decontaminants: Polyethylene glycol (GoLYTELY, Colyte)}

Polyethylene glycol has laxative with strong osmotic effects that has cathartic actions in the GI tract. It is used to empty both the small and large bowels.

\textbf{Surgical Treatment}

Body packers who develop a bowel obstruction or bowel perforation will usually require surgery. A ruptured package with life-threatening symptoms not responding to naloxone infusion indicates the need for surgery. Intact packets present for >48 hours are managed expectantly.

\textbf{Specialty Consultations}

A toxicologist or poison control center may be needed, especially if multiple drugs or substances have been ingested.

A psychiatrist should be consulted if the overdose was intentional, \textit{i.e.}, a suicide attempt or gesture.

\textbf{Black Tar Heroin}

Black tar heroin is a scourge all its own. The chemical name is \textit{heroin acetate}. Like other forms of heroin, it is derived from the opium-producing poppy \textit{Papaver somniferum}. It is unlike other forms of heroin which require a series of
steps in their production. Black tar heroin production eliminates some of that processing, forming a solid, sticky substance that looks and feels like tar, or may be rock-like. With less processing, it is a loyal addict’s dream – powerful and cheap.

Black tar heroin (referred to as “black tar” in this course) is often more potent than other forms of heroin, and hooks its victims faster than other forms. There is a misconception that black tar heroin has fewer adulterants and diluents than other forms. The most common substance adulterating tar is lactose. The tar and lactose are dissolved in liquid, heated, filtered, then recrystallizes. It’s a simple process, which anyone can manage with no expertise.

In the mid-1990s, tar cost one-tenth of the powder heroin usually trafficked from South America. Demand and distribution have steadily grown, while U.S.-funded operations to eradicate Colombian poppy fields are shrinking the supply. The cost is climbing, although it is still cheaper than other forms of heroin.

**History of Black Tar Heroin**

Black tar heroin is a relatively new drug to be available on the streets. Heroin was first discovered in the late 1800s, through a process of altering opium to find a more powerful substance than morphine. Black tar heroin was one of the compounds created when scientists were working to find more effective analgesics. Initially used as an effective drug for treating respiratory disorders and for pain relief, heroin soon became a popular recreational drug. Heroin
was outlawed in the early 1930s but addiction rates and recreational use continued to grow.

It was not until recently that black tar heroin was rediscovered, and Mexican drug cartels began to manufacture the drug. This may have been in response to a global rise in demand and higher prices for powdered heroin. Drug traffickers and gangs successful in dealing cocaine from South America now sell black tar heroin as a cheap, easy-to-get drug for young and inexperienced users, as well as those who have established substance use and addiction to heroin or cocaine.

**Methods of Use**

Black tar heroin is usually smoked or injected after heating and dissolving it in liquid. Those methods are preferred because they are the fastest ways to get drug to the brain.

**Alternative Routes for Use**

- **Grinding into a powder form:**
  Grinding into a powder form is one of the more popular ways of consuming black tar to those who do not wish to use needles. The black tar heroin is put into a blender and mixed with lactose. It creates a fine powder which is easily snorted.

- **Water looping:**
  Water looping involves a user placing the heroin in an empty eye dropper
bottle, or a syringe with the needle removed. The heroin is dissolved in water and the solution is dropped into the nose.

- **Vaporizing (chasing the dragon):**
  Vaporizing involves a user putting the heroin on a piece of foil, and inhaling the vapor formed as the foil is heated by a lighter underneath it.

- **Drinking:**
  Drinking is less common, because much of the drug and its effects are wasted, but it is done like the water looping method. Instead of being delivered through the nose, the solution is swallowed.

- **Suppository:**
  The most effective route of administration which does not require a needle is delivering a solution (via syringe) or lubricated mass of the narcotic into the rectum or vagina. It can lead to internal bleeding.

**Drug Effects**

As black tar heroin enters the brain it activates opioid receptors that release dopamine, a chemical neurotransmitter which causes feelings of pleasure and relaxation. It also relieves anxiety. Depending on the route of administration, potency, and amount, the dopamine floods the brain and causes euphoria. Described as a ‘rush’, the user has a sense of warmth and numbness that flows through the body. In general, the faster and more intense the ‘high’, the more the drug interferes with normal brain chemical functions. There is a significant loss of ability to concentrate or focus, followed by a dream-like, sleepy state.

Black tar suppresses the functions of the central nervous system, decreasing response to pain and painful stimuli. Blood pressure, heart rate and respiration are depressed. With an overdose, death by respiratory arrest can occur. The
user may experience nausea, vomiting, constipation, pruritus, dry mouth and diarrhea. According to the Drug Enforcement Administration (DEA), most of this type of heroin is from Mexico. It is distributed primarily in the western U.S., although it has been found throughout the country.

**Risks of Black Tar Use**

Black tar heroin has a higher risk of overdose or death due to the unknown purity of the drug. Tar may be approximately as little as 20 percent or as much as 80 percent heroin. The drug is often used by young and inexperienced people, with complications caused by the lack of experience. Black tar heroin may also be cut with harmful adulterant substances which can cause significant health problems. 36-38

People who intravenously inject black tar heroin are at higher risk of venous sclerosis than those injecting powdered heroin. In venous sclerosis, the veins narrow and harden which makes repeat injection into the same veins prohibitive. Researchers at the University of California San Francisco have found that the rapidity with which black tar heroin destroys veins, and its gummier consistency, may put people who inject it at a lower risk of HIV infection because they may be forced to inject subcutaneously. Also, needles must be thoroughly rinsed free of black tar between injections if new needles are not available.

The presence of 6-monoacetylmorphine found in tar heroin has not been tested in humans, but has been shown to be toxic alone, and more toxic when mixed with mono- or di-acetyl morphine.
According to NIDA, about 23% of the individuals who use heroin become dependent on it. In 2011, there were an estimated 4.2 million Americans, 12 years of age and older, who had used heroin at least once in their lifetime. Black tar heroin users are finding themselves more dependent, more quickly, both physically and psychologically.

**Signs of Black Tar Heroin Addiction**

The physical aspect of black tar heroin use and addiction is the state of needing the drug to function or depending on it to survive. Tolerance is another physical aspect where the user needs to consume more or repeat the dosages several times a day to avoid feeling ill related to withdrawal symptoms.

The psychological aspect of black tar heroin use and addiction becomes more complex, involving cravings, uncontrollable use of the drug, social and environmental consequences, and constant disruptions in mental health states from cravings and obsessions to intoxications and withdrawals. The cycles become vicious repeats of themselves and the adaptations to heroin in the brain leads to the reinforcement of behaviors to use.

At least one study has drawn attention to lower rates of HIV infection amongst drug injectors in which black tar heroin is the major form of street-available heroin, suggesting that this may be due to the need to heat black tar heroin to dissolve it (which also inactivates any HIV present in the solution). However, black tar heroin injectors can be at increased risk of life-threatening bacterial infections, including necrotizing soft tissue infection. The practice of
skin-popping or subcutaneous injection predisposes to necrotizing fasciitis or necrotizing cellulitis from *Clostridium perfringens*, while deep intramuscular injection predisposes to necrotizing myositis. Tar heroin injection can also be associated with *Clostridium botulinum* infection. Symptoms of this infection include blurred vision, vertigo, and difficulty in swallowing or weakness.

**Physical Signs of Black Tar Heroin Addiction**

The signs of black tar heroin addiction can be recognized as the progression of use continues, and physical signs may include:

- Stained fingers, hands, injection sites, and veins
- Tolerance to black tar heroin use once the person uses it for a while; the dosages must be increased in order to achieve the desired effects. This also leads to a shorter duration of the effects.
- Physical dependence, resulting in withdrawal upon cessation of use, according to the 2014 World Drug Report by the United Nations Office on Drugs and Crime (UNODC) is an emerging phenomenon among opioid-dependent drug users in the United States of America is that synthetic opioids are being replaced with heroin, driven by the increased availability of heroin in parts of the United States, and lesser costs to regular users to maintain their dependency.
- Withdrawal symptoms of cravings, nausea, body aches, vomiting, diarrhea, fever, runny nose, excessive yawning, sweating, chills, sneezing, weakness, abdominal cramps, increased blood pressure, tachycardia, restlessness, and irritability. Other symptoms can occur in chronic cases.
- Track marks from intravenous use
• Sores, infections, and life-threatening bacterial infections at injection sites and within soft tissues, veins, or arteries because of the impurities it often contains.

• Organ impairments and immunity problems including respiratory and cardiovascular problems from persistent CNS depression effects and low oxygen flows within the blood.

• Contracting of diseases such as Hepatitis C, HIV, AIDS, tuberculosis, or other infectious or blood-borne diseases

• Collapsed or clogged veins because of the sticky substance form

**Psychological Signs of Black Tar Heroin Addiction**

The most common psychological signs of black tar heroin addiction include:

• Uncontrollable cravings

• Low self-esteem, guilt, or social withdrawal

• Loss of interest in once enjoyable activities

• Slowed cognition, drowsiness, sedation, “nodding off” or inability to focus

• Loss of inhibitions and reasonable judgment

• Mood swings or inability to control emotions

• Psychological withdrawals of anxiety, irritability, or depression

**Behavioral Signs of Black Tar Heroin Addiction**
The alterations in the brain’s chemistry and dopamine functions over time, reinforces the behaviors to use in much the same way as hunger reinforces the need to eat or thirst reinforces the need to drink. Behaviors indicative of black tar heroin addiction include:

• Compulsive drug seeking and use despite the harm or consequences to self or others

• Failing to perform obligations to family, work, or school because of use

• Changing habits and associations to promote drug activities

• Engaging in dangerous, criminal, immoral, or unhealthy behaviors while using or to be able to use

• Attitude changes that may reflect more negativity or disregard for others

• Lack of motivation or finances and frequently needing to borrow from others

**Treatment**

To treat black tar heroin and other opioid addictions, treatment programs must be able to address the unique needs of the addict helping them to regain functionality, while helping them to abstain from using opioids. Lesson learned from studies of heroin addiction treatment programs with methadone highlight the benefits and promising results of medication assisted detox and medication maintenance therapies combined with counseling, behavioral therapies, harm reduction education and interventions, and psychosocial support.

*Medication Assisted Detox*
Medically supervised withdrawal using methadone or buprenorphine reduces cravings and withdrawal symptoms and can be gradually tapered off over several days. Other antagonist drugs such as naloxone or naltrexone may be used in detox methods for rapid detox or in combination with non-opioid medications to ease withdrawal discomfort. Retention and detox completion are key elements to obtaining abstinence from opioids and this can be done in several ways, but, because the relapse rates run extremely high, detox alone is insufficient. According to the Substance Abuse and Mental Health Services Administration, research has shown that retention in treatment over an extended period is key to successful outcomes for opioid addiction in many patients.

Medication Assisted Maintenance

Detox from opioids using methadone or buprenorphine can be extended for longer periods under medication maintenance programs as determined by the addict’s willingness to comply with the treatment programs, their treatment progression, and concerns regarding relapse. Black tar heroin addiction treatment should not be rushed and the longevity of these programs are beneficial to keeping the addict engaged in treatment and helping them to regain control of their life, while managing urges to use other opioids.

Other aims of this type of treatment are to improve functionality while reducing potential harm, whether to the addict or to others such as preventing the spread of diseases through needle sharing. Black tar heroin often contains impurities and because of the nature of its substance, repeated injections can have serious medical consequences along with high overdose and mortality rates.
Counseling and Behavioral Therapies

Counseling and behavioral therapies are necessary elements of treatment to help the addict identify, avoid, or cope with the issues surrounding their addiction. Cognitive behavioral therapy helps them to identify thoughts that lead to behaviors and addictive habits which they can change or learn to avoid the triggers. Contingency therapies promote progress in treatment on a reward basis such as producing a heroin-free urinalysis or achieving a specific treatment goal.

Psychosocial Interventions

There are often co-existing mental health concerns, environmental issues such as abuse, violence, or homelessness, and social difficulties such as relationship problems, unemployment, financial difficulties, and legal problems that can contribute to black tar heroin relapse if left unresolved. By providing medical and psychiatric services along with outreach support the black tar heroin addict can gain improvements in health, functionality, productiveness, and integrity that play an important role in long-term recovery outcomes. Outreach support services may include access to resources for family counseling, domestic violence or anger management counseling, legal counseling, or transportation, housing, financial, educational, vocational, or employment help.

Self-Help Groups

Self-help groups such as Alcoholics Anonymous and Narcotics Anonymous are highly advocated for relapse prevention and long term recovery. These groups
help the people to share the common concerns and interests of addictions between those who are undergoing similar recovery circumstances.

**Drug Addiction Among Health Professionals**

The National Institute on Drug Abuse estimates that 10 percent of adults in the U.S. use drugs at some time during their lives. It is difficult though, to determine the accuracy of statistics about drug use and addiction, because the disorder still carries with it a sense of secrecy and shame. Society has become much better educated about addiction as a disease, rather than regarding it as a product of insanity, sociopathy, moral weakness, or lack of character. Still, there is some stigma about people with drug abuse and addiction, particularly in some professions.

The disease of addiction among health professionals may carry the greatest stigma. They are expected to be the epitome of professionalism, beyond reproach, selfless, and resistant to addiction based on their education and the nature of the work. ‘They should know better’ is often the public opinion. A clinician’s education and knowledge of substances prone to be misused can be a liability; it can mean that he/she can keep up the appearance of being functional longer, even to death.43

Drug addiction is even more devastating to health professionals than to the public. The addicted individuals often feel tremendous shame and guilt. They fear losing their jobs, reputations, family and friends. It is a breach of professional ethics, puts patients at risk, and affects the reputations of the facilities where they work. Physicians and nurses can be exceptionally hard on themselves and on colleagues with active addictions. Such attitudes can
prevent the clinician from seeking help. Facilities may be deterred from providing adequate support programs for addicted and recovering clinicians. This can put patients at risk.

**Incidence of Addiction**

The American Nurses Association (ANA) states that approximately 10 percent of nurses are dependent on drugs, which is consistent with the general population of the United States. There are about three million registered nurses (RN) employed in the U.S. Ten percent of those using drugs suggest that approximately 300,000 RNs may be substance users. Put another way, that’s one in ten nurses.\(^\text{47,48}\)

Physicians are reported to have a higher chance of substance use and addiction disorders related to alcohol, opiates, and sedatives than other health clinicians. Anesthesiologists have a greater risk of addiction than their medical colleagues because of their access to controlled substances, such as fentanyl, commonly available to administer to patients during surgery. Some reports on physician addiction have noted an increasing trend to use sublingual and intravenously administered analgesics. Close behind the problem of addicted anesthesiologists are surgeons, pain and emergency physicians. Fortunately, physicians have been found to respond well to addiction treatment, speaking to the importance of available employer and local programs supporting recovery.\(^\text{51}\)

**An Occupational Hazard**

Drug addiction is an occupational hazard and major health risk among
physicians, nurses and other health professionals. State boards of nursing review hundreds of cases per state, per month, of many types. More than 50 percent of the cases carry concerns about an RN who may be using or addicted to drugs, board officials report. Some specialties within healthcare are believed to have higher numbers of substance users or addicts. The greater emotional and physical demands of critical care, anesthesia, oncology, and some other health professions, along with the availability of controlled substances, can be a threatening combination.

**Addiction Triggers**

Most health clinicians experience stresses such as mandatory overtime, shift rotations, and long shifts. These strenuous work schedules take a toll on the clinician’s relationships outside of work. Family and friends are affected as well. Emotional demands are inherent to the health profession. Health clinicians often pour themselves into meeting patient emotional needs, often becoming drained themselves of energy and the time needed for self-care. All health professionals are often expected to maintain composure and, depending on the specialty, may be required to make immediate split-second decisions on matters of life and death. Often health clinicians are personally present with patients when catastrophe occurs.

Clinicians in acute are settings are often the ones determining the quality of care delivered and guarding the wellbeing of patients. A clinician with untreated addiction has questionable judgment, slower reaction times, may neglect his or her patients, and may divert a patient’s drugs to the detriment of the patient. Mistakes can be swift, irreversible and fatal. Medications are readily available in most acute care settings. Not infrequently, the addicted health clinicians will assume the belief that medication will help them feel
better and perform better. Health clinicians have witnessed how medications can solve health symptoms. With their experience and knowledge, some clinicians feel comfortable administering medication to themselves. Many health professionals have the erroneous belief that they can self-medicate without becoming addicted, that they can stop at any time.

Drugs of Choice

In numbers using or addicted to drugs, health professionals are equally affected as the public, but the substances may vary. Use and addiction to prescription medications is higher among some health clinicians. Use of cocaine, marijuana, and other street drugs, is less among health clinicians. According to the ANA, in the nursing profession alcohol is the most-used substance, followed by amphetamines, opiates (i.e., fentanyl), sedatives, tranquilizers, and inhalants.

Studies show that nurses obtain drugs in a variety of ways. They may ask a physician for a prescription, or steal paper prescriptions and forge a physician’s handwriting to write their own prescription. Some nurses divert drugs in an inpatient setting by giving a patient part of a dose, and saving the other part for themselves. One nurse may ask another nurse to co-sign a narcotics record without witnessing the drug’s disposal, saying that the medication was wasted. Some nurses will sign out medications for patients who have been transferred to other units or who have been discharged. Some patients may not request medications prescribed on an as-needed basis, but nurses may falsify the record to give the impression that the patient requested the medication and the nurse administered it, although the drug was kept for personal use. 44,47,48
For physicians, as already mentioned, certain specialties have increased exposure to drugs and a corresponding increased chance of becoming addicted similar to nurses and others in the general population. Physicians working with a problem of physical pain are able to obtain a narcotic, such as hydrocodone and may continue to use beyond what is needed to control symptoms of pain. The stress of work and increasing demands of conducting the business of healthcare are associated with the higher numbers of physician addicts dealing with daily triggers of anxiety, depression as well as cognitive difficulties.\textsuperscript{51}

**Signs of Impairment**

Some signs that a health clinician may be impaired include:

- Frequent job changes
- Prefers night or other shifts with less supervision and greater access to medications
- Glassy-eyed or pinpoint pupils
- Smells of alcohol or uses mouthwash and breath mints to excess
- Is sleepy at work, falls asleep in meetings
- Frequently complains of pain associated with previous surgery or injury
- Forms close relationships with physicians who may prescribe for them
- Significant problems in relationships, chaotic family issues
- Frequently volunteers to administer narcotics to patients
- Patients may complain of pain not relieved by medication a physician or nurse had administered
- Fails to complete charting
- Mistakes or omissions of duties
- Eager for extra shifts and overtime
- Labile affect: moody, irritable, isolated, jumpy, lethargic
Treatment

Addiction is regarded as a chronic, progressive, and treatable disease by medical and nursing professional bodies. Without intervention, the disease will invariably get worse, and eventually overdoses, accidents, and other consequences will accumulate, and may be fatal. The numbers of physicians and nurses found to have substance use and addiction disorders should strongly encourage medical facilities to provide education that teaches clinicians how to recognize signs of impairment.

All health professionals should know the policies of the facility where they work and the state licensure board. All members of a health team should understand how to support their colleagues in recovery and rehabilitation. When an impaired clinician returns to work after treatment, a team effort will give the clinician the best chance of staying in recovery.

Self-reporting is rare as the addict fears losing his/her job, license to practice, and livelihood. The biochemical changes in the brains of addicts can deceive them, and give them a false sense of self-control. The addict in denial must oftentimes hit bottom. If they are offered treatment and rehabilitation it can save their licenses, and their life. Eventually, it is hoped that the impaired clinician will remain drug-free long enough and will want to stay in recovery.

Summary

The accelerating heroin epidemic is destroying lives in greater numbers than ever before. More often than not, heroin is misused along with other drugs, especially cocaine and opioid analgesics. Someone who is addicted to alcohol
and other substances has higher likelihood to become addicted to heroin as a nonuser. Along with the increase in heroin use is an increase in the number of heroin-related deaths. These alarming circumstances are addressed by the healthcare community through understanding addiction and the treatments and therapies for heroin, which is highly addictive. This is particularly important when dealing with substance use by a health clinician to prevent harm to the clinician and patients assigned to their care.

Drug addiction and its treatment are complex and multifactorial. For the treatment of drug addiction to be successful all the substances which an individual is using must be addressed specifically. This course focused on heroin addiction, but it should be kept in mind that other substances which a heroin addict is using must be considered to optimize the chance for long-term freedom from all illicit drug use.

**References Section**

The References below include published works and in-text citations of published works that are intended as helpful material for your further reading.


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