

Chapter 11

Opioid Use, Abuse, and Addiction

Introduction

- Many physicians under prescribe narcotic analgesics and then interrupt request of additional analgesics as evidence of drug-seeking behavior
- An estimated 73% of persons in moderate to severe pain receive less than adequate analgesics due to physicians fear of inducing a SUD
- 74.6% increase in number of prescription analgesics between 2002 and 2010
- Narcotics also involved in 40% of overdose deaths in recent years

A history of opioids

- Anthropologists believe opium has used as an analgesic for at least 3,500 years
- There is evidence of it being cultivated as early as 10,000 years ago suggesting an even earlier knowledge of its analgesic effects
- In 1806, morphine was isolated as the main active ingredient in opium
- In 1857, the hypodermic needle was invented and by the Civil War both were available without a prescription

A history of opioids

- Was often a “hidden” ingredient in over the counter “patent” medicines
- By 1900 more than 4% of the US population was addicted to opium or other narcotics
- The Pure Food and Drug Act of 1906 required ingredients be listed on patent medicines
- The Harrison Narcotics Act of 1914, ruled that only a licensed physician or dentist prescribe a narcotic analgesic

Medical applications of narcotics

- Classification of narcotic analgesics:
 - Natural
 - Semi-synthetic
 - Synthetic
- The problem of pain
 - General anesthetic agents
 - Local anesthetic agents
 - Narcotics which block pain in the CNS

Where Opium is Produced

- Morphine is usually derived from opium poppies
- The need to medicinal opium can be met by opium fields in India
- However vast opium fields in other countries meant for illicit trade
 - Afghanistan produces 63% of the opium on the planet

Current medical uses of narcotics

- For thousands of years, opium was one of the few compounds available to treat pain
- Used for pain, cough suppression and severe diarrhea
- Estimated that 5% of the US adult population took an opioid in the past 12 months
- Vast majority of users take for short term pain control, but nearly half use them for more than 2 years, and 1 in 5 more than 5 years

Pharmacology of Narcotics

- Morphine is the gold standard against which effects of narcotics are measured
- Pain suppression achieved through:
 - Inhibiting pain signal from the spinal cord to the brain
 - Activates pain suppressing systems in brain and spinal cord
 - Alters perception and emotional response to pain

Pharmacology of Narcotics

- Mimics the effects of endogenous opioid peptides
- Each family of opioid peptides is found mainly in a specific region of the brain, with some overlap
- Narcotic analgesics function as opioid agonists, stimulating or enhancing the their effects
- Subjective effects of narcotic analgesics differ in those in pain vs. those not in significant pain
- Any sense of euphoria thought to be caused by the effects of these compounds in the ventral tegmental region of the brain

Codeine

- Mild analgesic potential
- Can suppress the cough reflex
- 1/5th the potency of morphine
- Usually administered orally
- Commonly mixed with OTC aspirin or acetaminophen

Fentanyl

- A synthetic opioid introduced in 1968
- Popular during and immediately after surgery
- Quite a potent compound
- A typical intravenous dose is one microgram
- Suppresses respiration longer than it induces analgesia
- Patients may experience anxiety, hallucinations or feelings of depression

Heroin

- Heroin is just two morphine molecules joined together by an oxygen molecule
- Twice as potent as morphine
- Not used medically in the US but is used in other countries to treat severe pain

Hydrocodone/hydromorphone

- Semisynthetic narcotic derived from codeine
- Used to control coughs and mild to moderate levels of pain relief
- Orally administered doses of hydromorphone are thought to be 5-7 times as potent as morphine
- Side effects include dizziness, sedation, mental confusion, anxiety, fear, nausea and or vomiting, dysphoria and respiratory depression

Methadone

- Synthetic opioid developed in the 1930's
- Used as a substitute for morphine during WWII
- Used in Methadone Maintenance Programs
- About as potent as Morphine
- Tolerance to euphoria develops quickly
- Can induce cardiac arrhythmias both when used at therapeutic doses and when it is abused
- When used as prescribed has a very good safety profile

Morphine

- First isolated more than 150 years ago
- Usually administered by intramuscular or intravenous injections
- Analgesic effects last approximately 4 hours

OxyContin

- Introduced in 1995
- A time released form of oxycodone, a synthetic opioid
- A relatively stable blood level of OxyContin could be reached after 2-3 doses, providing better pain control than could be achieved using short-acting narcotic analgesics
- OxyContin has become a major drug of abuse

Tramadol

- A distant cousin to codeine
- Used to treat mild to moderate levels of pain
- Thought to be about as potent as morphine
- May be more toxic than originally thought

Neuroadaptation to narcotics

- Analgesia influenced by host of factors:
 - Genetic heritage
 - Innate tolerance
 - Disease progression
 - Level of activity
 - Medication compliance
 - Medication interaction
 - Neuroadaptation to the medications being used
 - Acquired tolerance
 - Pseudo-addiction

Subject effects of narcotics in medicinal setting

- Several factors influence the effects such as:
 - Route of administration
 - Interval between doses
 - Actual dose
 - Half life of the medication being used
 - Individual's anxiety level
 - Individual's expectations
 - Individual's biochemistry

Complications caused by narcotics

- Constriction of the pupils
- Respiratory depression
- Gastrointestinal side effects
- Blood pressure effects
- Urinary retention
- Sedation
- Irritability
- Physician-induced addiction
 - Unless history of SUD, only 1 in 14,000 receiving narcotics for short-term pain is thought to be at risk

Opiates as drugs of abuse

- Popular because it makes people feel “good” i.e., induce a sense of pleasure
- Depending on several factors, subjective experience can range from mild to comparable to sexual orgasm
- Globally, about 11.7 million users
- About 1.2 million in the US

Heroin

- Short history of heroin
 - Developed by Bayer pharmaceuticals
 - Thought to be treatment of morphine addiction
- Pharmacology of heroin
 - More potent than morphine
 - Is metabolized into morphine
 - Crosses blood-brain barrier 100 times more rapidly than morphine

Subjective effects when abused

- A number of factors influence the subjective effects of heroin when it is abuse including:
 - The individual's expectations
 - Dose
 - Method of heroin abuse
- Intranasal user report a gentle euphoria while IV report a minute long “rush” or “flash” that is similar to sexual orgasm
- Users report warmth under skin, floating sensation “nodding off”

Other Opioids of Abuse

- Codeine has emerged as a drug of abuse accounting for 10% of all drug related deaths
- OxyContin-was released in 1995 and became a drug of abuse shortly afterwards. It has been estimated that 13.7 million people in the US have used OxyContin for non-medical purposes in the year 2003
- Buprenorphine-administered sublingually is an alternative to methadone as a treatment for opioid addiction. Intravenously administered has significant abuse potential

Methods of opiate abuse

- Injected under the skin (skin popping)
- Injected directly into a vein (intravenously, IV)
- Smoked
- Used intranasally (insufflation)

Sources of Illicit Narcotics

- Pharmaceuticals are obtained in a variety of ways
 - The diversion of prescription narcotics
 - Internet pharmacies have become a source of “prescribed” medications that are used for illicit purposes
 - Heroin is still illegal in the US so it must be smuggled in
 - Health care professionals may divert pharmaceuticals for their own use

Development of tolerance

- The mechanism through which tolerance to a narcotic analgesic develops is poorly understood
- While tolerant to many of the effects, abusers still experience the narcotic-induced sense of gentle euphoria that is by itself an incentive for continued use
- It is not uncommon for an abuser to miscalculate their tolerance level and overdose
- some users go through cycles of use until tolerance develops and then periods of withdrawal

Scope of the problem of narcotic abuse and addiction

- Physical dependence can develop in a very short time, possibly after just a few days of use
- In the US, abuse of prescription narcotics is more common than heroin addiction
- Males predominate the opioid addiction problem by a ratio of about 3:1
- Is difficult to separate drug-seeking patients from those with a legitimate need for pain relief, especially in patients with a physical illness

Scope of heroin abuse in the US

- The late 1990's heroin use rose
 - “Heroin chic”
- Average age of the individual's first use of heroin dropped from 27 in 1988 to 19 by the mid 90s

Complications caused by chronic opiate abuse

- Narcotic withdrawal syndrome
 - Acute withdrawal
 - Extended withdrawal symptoms
- Organ damage
- Overdose
 - Suicide attempt
 - Use of substitute or contaminated illicit drugs
 - Unusual sensitivity
 - Error in calculating dosage

Opioid use or abuse and the DSM-V

- Opioid use disorder
- Opioid intoxication
- Opioid withdrawal
- Other opioid-induced disorders
- Unspecified opioid-related disorders