Substance Abuse: Current Science of Addictions

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Darryl S. Inaba, PharmD. & Lynn E. O'Connor, Ph. D.
Haight-Ashbury Free Clinics — Wright Institute
San Francisco, CA — Berkeley, CA

PRESENTATION GOALS:

Participation in this presentation will result in the following:

- Increased awareness of rapidly growing science of Addictionology.
- Clearer understanding of alcoholism and addicted populations.
- Familiarity with basic neurocellular and neurochemical mechanisms of compulsive behaviors.
- Consider the complexity of medication prescribing for the addictive population.

PRESENTATION OBJECTIVES:

Upon completion of the presentation, participants will be able to:

- Cite at least 4 commonly held myths or misconceptions that hamper the understanding of and appropriate medical interactions with chemically dependent individuals.
- Describe populations and prevalence of alcohol and other drug addictions in the US along with its impact on our economy and public health.
- Name the 4 brain structures in the meso and neo cortex that are vital to the Reward Reinforcement Circuitry in chemical dependence.
- List at least 3 classes of commonly prescribed psychoactive medications that can lead to cravings and relapse in recovering addicts.
- Identify and list at least 5 neurotransmitters that are disrupted by drug abuse and addiction.

Substance Abuse: Current Science of Addiction

I. BACKGROUND, SIGNIFICANCE, INCIDENCE, PERSPECTIVE AND MISCONCEPTIONS

Prevention, Identification, Intervention, Treatment and even Acceptance that addiction is a medical illness is hampered by ***Common Myths, Misunderstandings & Misconceptions about Addiction*** (DEA and ONDCP Data):

- Inner big city problem? 60% of illicit drugs are sold in suburbs and rural US
- Common youthful curiosity, will mature – 10 to12 year olds' use of alcohol, marijuana and nicotine = 476 times more likely to have a drug or alcohol problem in their lifetime than those starting after age 25 (& even 5 times more likely than those who first use at age 18-19). **Early Onset Drug Use is single best predictor of future drug problems in an individual.** Projected reasons for this are NAc and OFC more sensitive and brain not fully developed until mid 20's, less body water/fat in adolescents, immature enzyme metabolism, genetic factors, environments (availability), less coping and life skills
- Addicts and alcoholics are predominately unemployed indigent criminals - 75% of hard-core drug users and 75% of known Heroin addicts are gainfully employed individuals
- Conditioned to view Alcoholics as winos, public inebriates, sot, toper, drunks, bar flies, rummy, boozer, lushes, Boracho(a) - only 5% fit these common descriptions
- Addiction occurs more in people of color – ONDCP and Gallup studies show this to be an incorrect perception
- Addicts are weak, bad, stupid, crazy or immoral – Actually almost the opposite is true: Professionals, MENSA, Clergy, Lincoln 1860 quote, more intelligent, sensitive, compassionate, creative, charming and skilled
- Addicts simply pleasure seeking irresponsible, willful misconduct - (Haight Ashbury Free Clinics Stats)-
    - 93% self referred into treatment
    - 34-38% extremely depressed as measured by Beck's Depression Inventory
    - 30-33% state they have attempted suicide at least once before coming to treatment
- Addiction is purely an emotional and behavioral maladaption to environment – Addiction is a biologic and psychological life-style condition via impairment of organ (brain) hidden from public view

Louis Judd Decade of the Brain: 1997 Mental Health Parity Act via a formula of documenting prevalence, costs and objective Diagnosis

Addiction is America's and maybe world's #1 Public Health Problem:

Prevalence – 10-12% Alcoholism, 33% Nicotine (30% smoke, 3% dip), ~20% Caffeinism (if 350mg/day but if 100mg then 50%), then meth, heroin cocaine, marijuana, Soma, inhalants, Rx opioids, sedatives, stimulant, antihistamines, DXM, and more

Cost – $158 Billion on nicotine alone, $300 Billion on Alcohol and drug abuse

Mortality – 440,000 N, 130,000 A, 6,000 Cocaine and Heroin, 2,500 inhalants

Morbidity – Hospitalizations 40% N, 25-30% Alcohol

(Abused Prescription drugs were 80% of mentions and 30% ER deaths in 2004)

Substance Abuse: Current Science of Addiction

II. SCIENCE OF ADDICTION = Objective Diagnostic Discoveries

Olds/Heath = Power and anatomy; Gerald Mclaren, TK Li genetic predisposition in C57bl mice Nora Volkow, Joyce Lowenson, Edythe London, Avrum Goldstein, Henri Beigleiter, Ken Blum, Et Al = **Reward Reinforcement Circuitry** - 3 phase mechanism of Ventral Tegmental, Lateral Hypothalamus, Nucleus Accumbens Septi and Orbital Frontal Cortex

Disruption of normal brain neurotransmitter activity: Opiates/opiods = endorphins, enkephalins; marijuana = endocannabinoids (anandamide & 2AG); Benzodiazepines = GABA; psycho-stimulants = epi & norepinephrine, dopamine, serotonin; alcohol = metenkephalin, serotonin, dopamine, GABA.

Addiction Diagnoses per DSM-IVtr, ASI, CAGE, CRIT, moCRIT, ET Al but all clearly includes physical (including genetics), toxicological, psychological, environmental, and even spiritual factors: Tissue Dependence, Tolerance, Withdraw Phenomena and Psychological Dependence

Four Cornerstones: Lack of Control (robbed of choice, "Normies"), Compulsion, Craving (subtle but powerful physical and emotional signs) and Continued despite Negative Consequences (history of loss)

Etiology is multi-sourced, **Diathesis:** heredity, environment (nutrition), toxicology resulting in anatomical anomalies in the meso-limbic Medial Forebrain Bundle and the Orbito Frontal Cortex which respond to a variety of neurotransmitter disruptions due to drugs of addiction

III. CURRENT TRENDS SUBSTANCE ABUSE

Endemic Three: **Nicotine, Alcohol and Marijuana**
Cocaine (especially "Crack") and heroin now steady and endemic as well.

Explosive abuse of **methamphetamine** as dextro isomer methamphetamine in western states and rapidly moving eastward

Recent burst of **Prescription Drug abuse**:
Approximately 15–17 million Americans now admit to abusing prescription drugs, doubling the number of a decade earlier. Abuse of prescriptions drugs has risen even more rapidly in teens, tripling during the same period of time. Teen abuse of prescription opioid pain medications increased over 540% in the last few years alone (CASA, 2005). Abuse of prescription and OTC medications by teens now exceed abuse levels for many of the media hyped street drugs like ecstasy and methamphetamine.

Percent of Teens Who Have Used a Substance that a Doctor Did Not Prescribe to Them:

Alcohol	77%
Nicotine	53%

Marijuana	37%
Inhalants	19%
Vicodin®	**18%**
OxyContin®	**10%**
Ritalin or Adderall®	**10%**
Cough Medicine (dextro-methorphan [DXM])	**10%**
Cocaine or Crack Cocaine	9%
Ecstasy (MDMA)	9%
Methamphetamine	8%
LSD	6%
Ketamine	5%
Heroin	4%

(PATS, 2004; University of Michigan, 2005)

Adolescent abuse of prescription sedatives like Valium® and Xanax® as well as prescription anabolic-androgenic steroids or "roids," like Anadrol® and Equipoise®, has also increased greatly in recent years (CASA, 2005).

A strong association between the abuse of street drugs and alcohol has been noted in those teens who abuse prescription drugs. The 2004 Partnership Attitude Tracking Study found that teens who abused prescription drugs were 21 times more likely than those who didn't to abuse cocaine, 12 times more likely to do heroin, 5 times more likely to abuse marijuana and twice as likely to use alcohol (CASA, 2005)

A number of reasons for the recent increase in prescription drug abuse have been suggested.

- Increased airport and US entry point security since 911 has slowed the influx of illegal ecstasy and other club drugs (Leinwand, 2005).
- Increased availability of abusable prescription drugs to adults in the last decade has increased 150% and the number of people abusing them has risen 7 times faster than the U.S. population growth (CASA, 2005).
- The tremendous increase in the availability of prescription drugs over the Internet has enabled teens to sidestep normal precautions taken by pharmacies and physicians.
- Youth and adults gain access to these medications through "grazing," the raiding of medication cabinets for controlled substance prescriptions during visits to homes of others.
- Increased prescribing of controlled substances to youth has resulted in greater diversion of these medications for abuse both by those who take them for non-medical purposes and by the sharing of those medications with others.
- Increased awareness of street drugs dangers in the media, drug abuse prevention campaigns, and especially the internet has made prescription drugs a seemingly safer and more attractive alternative for altering states of consciousness.
- Abusable prescription drugs are more reliable, more available and cost less than street drugs.

Substance Abuse: Current Science of Addiction

- A July 2005 survey conducted by the National Center on Addictions and Substance Abuse at Columbia University found that 75% of physicians and 50% of pharmacists had received no training since professional school in identifying prescription drug abuse or diversion of prescription drugs.

The most rapid increase in diversion of prescription drugs for abuse has occurred with prescription opioid pain medications like OxyContin® and Vicodin®. In 2002 13% of persons age 12 or older (almost 30 million Americans) had used prescription pain relievers nonmedically in their lifetime (SAMHSA, 2005). By 2004, 4.3 million teens (18%) had abused Vicodin® (hydrocodone) and 2.3 million had abused OxyContin® (oxycodone)(PATS, 2005).

The continuing abuse of OxyContin® shows how a technological change can increase problems with an existing drug. OxyContin® is a time-release version of oxycodone an opiate originally sold as Percodan®. Opiate addicts discovered that when crushed, the drug loses its time-release capabilities and when swallowed or injected thereafter, it gives them a powerful almost heroin-like high. A rash of pharmacy robberies, forged prescriptions, and overdoses caused the DEA to send out warnings. In response the manufacturer, Purdue Pharma, is developing new formulations that would decrease this form of abuse in addition to placing tracking labels on all wholesale shipments.

Hydrocodone (Vicodin®, Lortab®, Norco®, Anexsia®, Hycodan®, Tylox®) is the most widely used and abused prescription opiate, a title that used to belong to codeine-based prescriptions. Hydrocodone causes less nausea but still has the same pain diminishing effect as well as the addictive potential of codeine. The number of people who took painkillers like hydrocodone in the past month for nonmedical reasons has risen to 4.7 million (SAMHSA, 2004). Since 1990 there has been a 500% increase in the number of emergency department visits due to hydrocodone. Because it is often co-formulated with acetaminophen, the abuse of the combination for the psychic effects of the opioid can cause liver damage from the acetaminophen.

VII. TREATMENT CONSIDERATIONS

Treatment Works! Outcome studies like CALDATA and DATOS document positive treatment outcomes for drug and alcohol addiction including methamphetamine:

- Continued 3 to 5 year abstinence for almost 50% of those treated
- 74% decrease of crime in those treated
- Actual $7 - $12 savings for ever $1 spent on treatment; a meta-analysis of more than 1000 addiction treatment outcome studies by the University of Pennsylvania released in March 2005 documented only cost savings found in all studies ranging from 33 cents to $39 for every $1 spent
- Minimum 6 to 8 months continuous treatment needed for positive results
- Alcohol treatment had best results and heroin the worse with methamphetamine treatment in between those two outcomes
- Group therapy showed better outcomes than just individual counseling

- "Coerced" treatment (Drug Courts, probation, parole) have better outcomes than voluntary treatment
- Cultural consistent treatment had better outcomes than generic treatment models

Relapse Prevention by avoiding slips and effective management of craving is key to sustaining positive treatment outcomes. Treatment data demonstrate that a drug exposure "slip" results in an almost immediate full addiction relapse 95% of the time.

Endogenous Craving is seen in early recovery and stem from the disrupted neurotransmitter balance caused by excessive drug use.

Environmental Cued or Triggered Craving results from embedded memories of drug use or effects stimulated by sensory (sight, odor, experiences) stimulus's that remind the recovering addict of drug their past drug abuse. Pharmacological treatments: naltrexone, acamprosate, deoo-naltrexone (Vivitrol).

Iatrogenic Activated Craving results from the lax prescribing of addictive psychoactive drugs to a recovering alcoholic/addict or to those with a strong family history of addiction. E.g. Excessive and unmonitored benzodiazepine, opioid pain medication, muscle relaxant, psycho-stimulants and even cough or cold medication.

Co-Occurring Disorders also known as dual diagnosis, MICA, co-current disorders, double trouble is the simultaneous occurrence of both addiction and major psychiatric disorders. Rates vary from 25-80% depending on diagnostic criteria used and patient population. Presents diagnostic and treatment challenges. Best treated simultaneously in the same program

Inappropriate Medication Termination, addictive psychoactive medications should not be abruptly discontinued in a patient is discovered to be chemically dependent. This action results in dangerous withdrawal symptoms and cravings.

VIII. QUESTIONS AND CLOSING REMARKS

REFERENCE: Inaba, DS and Cohen, WE: **UPPERS, DOWNERS, ALL AROUNDERS, 5th *Edition***; Cinemed, Medford, OR; 2003.

Substance Abuse: Current Science of Addiction

EVALUATION QUESTIONS (True or False)

T F **1.** The abuse of drugs in the US predominantly occurs in large inner city ghettos, barrios and "seedier" area of large urban settings.

T F **2.** The abuse of Prescription Opioids, stimulants, and even non-prescription cough medicines containing dextrometorphan now rival the abuse of street heroin, cocaine and methamphetamine abuse in the US.

T F **3.** Addicts and alcoholics are usually uneducated, indigent, criminal and weak willed, pleasure-seeking individuals.

T F **4.** Careless prescribing of benzodiazepine, opioid pain drugs, muscle relaxants and even opioid cough liquids to recovering addicts can result in a relapse.

Current Science of Addiction

T F **5.** Stimulant drugs like cocaine and methamphetamine disrupt the balance of brain neurotansmitters: epinephrine, nor-epinephrine, serotonin, and dopamine. These are the same brain chemicals that are involved with anxiety, mood and thought disorders.

T F **6.** Treatment of chemical dependency results in good outcomes of sustained recovery from drug addiction.

T F **7.** In the Reward Reinforcement Circuitry of an addict's brain, their Nucleus Accumbens Septi becomes hyperactive while their Orbito Frontal Cortex becomes hypoactive in response to the increased release of dopamine brought about by use of an addictive drug.

T F **8.** Hardcore Addicts and Alcoholics are predominantly unemployed, indigent, homeless criminals.

T F **9.** Chemical Dependency results from a neurocellular and neurochemical anomaly of the brain that is influenced by genetic, environment and toxic elements.

T F **10.** No other condition results in greater annual US morbidity and mortality than chemical dependency.

(Answers: 1-F, 2-T, 3-F, 4-T, 5-T, 6-T, 7-T, 8-F, 9-T, 10-T)