
Substance Abuse

1. A 24-year-old black man was admitted to the hospital with jaundice and fever. On physical examination, many black marks were found along the veins on his forearms. He was diagnosed as having serum hepatitis associated with intravenous drug abuse.
2. A 16-year-old male was arrested by the police as he was caught red-handed stealing a television set from a house he had broken into. The reason for the burglary was to buy a "fix."
3. An 18-year-old college freshman died after being forced to drink a whole bottle of bourbon as a part of an initiation ritual in a fraternity. (Newspaper clipping)
4. In the 1960s and 1970s, LSD was advocated by the youth culture to "turn on, tune in, and drop out."
5. A 13-year-old girl smoked her first cigarette at the urging of her older friends. Although she felt dizzy and nauseated, she said, "I like it, it tastes good!" She continued to smoke because she felt she looked and felt more mature smoking a cigarette. Soon, she could not do without cigarettes.
6. A 43-year-old white male staff physician in a hospital was admitted to a psychiatric hospital. Of late, the physician had been making a number of careless mistakes such as prescribing the wrong dosage or not taking into account obvious laboratory abnormalities. He was also frequently absent from work claiming illness. On occasion, his speech was thought to be slurred when he called in sick. A concerned physician friend had visited him and discovered him at home quite drunk in the middle of the day. The friend found out that the patient's wife had left him about five months previously. Since that time the patient has been drinking excessively and also taking sedative drugs at nights. The patient was persuaded by his friend to admit himself voluntarily for the treatment of alcoholism. The friend had

threatened to report him to the state medical board, which could result in the revocation of his medical license if he did not agree to seek help.

INTRODUCTION

Substance abuse is an important problem today that affects the health of millions of people. Direct health consequences include the risk of cancer and heart disease due to smoking, liver disease and fetal alcohol syndrome* due to alcoholism, and acquired immune deficiency syndrome (AIDS) and hepatitis due to use of shared needles by intravenous drug abusers. Also, there are indirect consequences of substance abuse such as lowered learning ability, diminished productivity, and an increase in accident and crime rates (see vignettes 1 and 2). About 30-50% of all accidents treated in emergency rooms are the result of intoxication, and 50% of serious traffic accidents involve alcohol abuse (Arif and Westermeyer, 1988). Opiates and cocaine are examples of drugs that are medically useful but often abused. Morphine is an analgesic essential to medical practice, and cocaine is a very useful topical anesthetic. Heroin and cocaine are the most commonly abused substances next to tobacco and alcohol.

The recognition and management (or referral) of patients with substance abuse problems is an important task for the evaluating physician.

Historical Perspective

Drugs have been used throughout history for both legitimate and illegitimate reasons.

Although the Sumerians in Mesopotamia knew the medical values of opium as long as six or seven thousand years ago, it took several centuries for opium use to spread by land trade to India and China from the Middle East. With increased sea trade made possible by improved ship design, opium use in China reached epidemic proportions two centuries ago, resulting in the Opium Wars (1839-42, 1856-60) between China and the European nations that were responsible for the trade. With China's defeat, opium use in China went unchecked until World War II.

*Fetal alcohol syndrome is characterized by microcephaly, mental retardation, a long upper lip, and "railroad track ears." This syndrome is caused by exposure of the fetus to high doses of alcohol. Drinking during pregnancy should be preferably stopped, or at least restricted to less than 2 oz of alcohol weekly (Arif and Westermeyer, 1988).

Some traditional uses of drugs have been specific to regions and cultures. For example, coca leaf has been chewed to overcome hunger as well as fatigue in the Andes region, and peyote and tobacco have been used by some American Indians as sacramental drugs, as wine is sacramental in some Christian rituals.

With increasing global travel, tobacco use spread from America to Europe and Asia, opium derivatives from Asia to America and Europe, distilled liquors from Europe to America, and cocaine from South America to North America and Europe.

The use of hallucinogens became widespread during the 1960s and 1970s in the United States and other industrialized countries during the social turmoil surrounding the Vietnam War (see vignette 4).

As substance abuse increased, many societies attempted to control it through legislation and other means. National prohibition of alcohol in the United States during the 1920s is an outstanding example. Most countries currently have laws prohibiting the manufacture, sale, and possession of certain addictive substances and regulating the prescription and use of others.

Drug Use, Abuse, Dependence, and Addiction

There is considerable confusion concerning the terms related to drug use. DSM-III-R describes the essential features of *psychoactive substance dependence* as a cluster of cognitive, behavioral, and physiological symptoms indicating that the person has impaired control of psychoactive substance use and continues use of the substance despite adverse consequences. The symptoms of the dependence syndrome include, but are not limited to, the physiological symptoms of tolerance and withdrawal. *Psychoactive substance abuse* refers to maladaptive patterns of psychoactive drug use that do not meet the criteria for dependence. In this chapter, the term "substance abuse" is used in a general sense that includes dependence as well as abuse. Addiction is a general term that denotes both dependence and physiological tolerance and withdrawal.

Drugs of Abuse

The following drugs are commonly abused: alcohol, amphetamines, cannabis, cocaine, hallucinogens, marijuana, inhalants, opioids, phen-cyclidine, tobacco, sedative hypnotic and anxiolytics, and polysubstance abuse.

ETIOLOGICAL CONSIDERATIONS

Many theories, sometimes contradictory, have been advanced to explain why certain individuals abuse drugs (Kleber, 1983).

Biological Dimension

The role of genetic factors has been established in alcoholism. Children of alcoholics are four times as likely to develop alcoholism as compared to children of nonalcoholics (Murray *et al.*, 1983; Peel, 1986; Schuckit, 1987). The rate for alcohol dependence in the males from families of alcoholics ranges from 25-50%, while the rate for females is 5-10%. Up to one half of hospitalized alcohol-dependent persons come from homes where one or both parents have abused alcohol (Arif and Westermeyer, 1988). Exactly what is inherited in alcoholism is not clear, but sons of alcoholics, on average, respond less intensely to moderate doses of alcohol, indicating increased initial tolerance (Marlatt, 1988). Genetically controlled alcohol-metabolizing enzymes, such as the more than 20 different alcohol dehydrogenase isoenzymes and several aldehyde dehydrogenase isoenzymes, may play a role in alcoholism as well as in some racial differences in susceptibility to alcohol. The flush reaction seen in some individuals (especially in some Asians) may be due to the accumulation of acetaldehyde due to the deficiency in a subtype of aldehyde dehydrogenase.

Endogenous opioids may play a mediating role in kinds of substance abuse. Laboratory mice have been bred to prefer alcohol over water. Such alcohol-preferring mice have been shown to exhibit subnormal levels of brain met-enkephalins (Gatchel *et al.*, 1989). For such animals, alcohol consumption may be a compensatory maneuver to increase brain opioid levels. Products of alcohol metabolism can condense with dopamine and form alkaloids known as tetrahydroisoquinolines (THIQs). THIQs are intermediary products in the formation of morphine in plants. Alcohol may also modify opioid receptor sensitivity.

The reward (or pleasure) related opioid receptors seem to be localized in the ventral tegmental area (VTA) of the midbrain, the site where the dopaminergic mesolimbic system (see Chapter 7) cell bodies are localized (Kiyatkin, 1989). Intra-VTA application of opioids thus enhances operant conditioning and decreases self-stimulation thresholds. Intra-VTA administration of naloxone significantly reduced heroin self-administration (Bozarth and Wise, 1983).

Dopamine is currently considered to be the most likely candidate for the *mediator of reinforcement* (reward). Numerous data support the essential role of cerebral dopamine in the mediation of self-stimulation reward (Kiyatkin, 1989). The brain sites that induce electrical self-stimulation are closely related to the cell bodies and terminals of dopamine-containing neurons, and damage or pharmacological blockade of dopamine receptors result in inhibition or reduction of self-stimulation behavior. Self-stimulation is accompanied by a prominent increase of dopamine turnover in terminal areas of mesolimbic and mesostriatal cells. Drugs that produce an increase of dopamine concentration in the synaptic cleft are drugs of abuse (amphetamine, cocaine, opiates, nicotine, etc.). In other words, all drugs of abuse seem to increase the firing of the mesolimbic dopaminergic system.

Norepinephrine was the first candidate for a reward-mediating neurotransmitter. Currently, however, norepinephrine-containing neurons are considered to be more concerned with the mediation of sensory arousal and the inhibition of overactivation of the organism to stressful stimuli. Norepinephrine is, then, considered to be involved in selective attention, learning and memory, regulation of arousal and vigilance, brain metabolism and brain circulation, neuronal plasticity, anxiety, and reinforcement (Kiyatkin, 1989).

Personal Dimension

Personality disturbances, especially antisocial behaviors, are quite common among substance abusers. They often have difficulty in handling aggressive and sexual impulses, and have conflicts concerning dependency. Drug abuse may be an attempt to medicate for depression in some. In general, however, no personality disorder specific to substance abuse has been demonstrated. Chronic substance abuse can also produce psychological deficits.

Conditioning, both classical and operant, may play a role in the development of substance abuse. Wikler (as described by O'Brien *et al.*, 1988) noted in the 1940s that during group therapy sessions of substance abusers, the discussion would often turn to the details of drug procurement and usage. During such times when the topic of drugs was being discussed, the drug-free recovering addicts showed yawning and eye-tearing as though they might be undergoing mild withdrawal (a typical classically conditioned phenomenon). In humans, both drug-like and drug-opposite responses can be conditioned (O'Brien *et al.*, 1988). Drug-opposite conditioned responses are those responses that are elicited by previously neutral stimuli (conditioned stimulus) following a series of

pairings with a drug (unconditioned stimulus), but which are opposite to the responses produced by the drug itself.

Conditioned withdrawal was the first type of conditioning considered by Wikler. Operant conditioning occurs with the direct reinforcing qualities of the substances, as well as with the interpersonal reinforcement associated with the drug subculture or with the "drinking buddies." The *tension-reduction hypothesis* postulates that alcohol or other substances of abuse reduce tension and anxiety and thus are reinforcing. Many studies, however, contradict this view. With alcoholics, for example, anxiety level does decrease after an initial 12- to 24-hr period of drinking, but anxiety and depression increased following this period with continued drinking (Gatchel *et al.*, 1989).

Environmental Dimension

Availability. Obviously, abuse is impossible if the substance is not available. Availability, however, is a necessary but not sufficient condition for abuse. American experience with prohibition of alcohol demonstrated that illicit substances can be made available through ingenious methods as long as there is demand for them.

Culture. Four cultural attitudes toward drug use have been described (Arif and Westermeyer, 1988):

1. Complete abstinence
2. Ritualistic, ceremonial use
3. Convivial use (emphasizes social group use)
4. Utilitarian use (emphasizes the personal aspects of drug use)

The prevalence of substance use is influenced considerably by cultural attitudes and cultural change. Wine and beer drinking, for example, is quite common in some European countries, together with high rates of undiagnosed alcoholism. Alcoholism is less common in certain Asian countries (e.g., Japan, China) but not others (e.g., Korea), perhaps owing to both cultural and genetic factors (Helzer *et al.*, 1990). Certain drugs (e.g., heroin, crack) may tend to be more commonly abused in inner city ghettos.

Social and Socioeconomic Factors. Poverty and accompanying hopelessness may increase the risk of substance abuse in the ghetto. Certain social evils, e.g., economic inequality, sexism, racism, etc., may cause alienation and disaffection in certain individuals who may then use drugs to escape from the disturbing environment. Drug abuse, however,

occurs in every society where abusable substances exist regardless of the social or economic structure of the society (Kleber, 1983).

Family attitudes and practices concerning substance use and abuse play an important role apart from the genetic influences. Peer group influence is also an important factor in the initiation and maintenance, as well as in the treatment, of substance abuse disorders (vignette 5).

NATURAL COURSE OF SUBSTANCE ABUSE

Many substances of abuse have a normal, nonpathological, or non-abusive range of use, for example, social drinking. While most people fortunately stay with this level of usage, some progress into abuse and dependency. Certain early, prodromal signs may suggest beginning drug dependence: the person begins to think about and anticipate the next drug intake—drug use becomes an end in itself. The person then begins to organize his or her life around the drug. In the early stage, the person may consume the drug more rapidly than before. He or she becomes defensive and hostile when drug use is criticized. Later, concern about overuse typically ensues (Arif and Westermeyer, 1988).

Tables 14-18 summarize the order of progression of substance abuse according to several dimensions.

Opioids

Opium smokers in Asia as well as chronic alcoholics often stay on stable doses for decades without progression. Within a decade or two of heavy use, most opium-dependent persons and alcoholics make a serious attempt to abstain, and most succeed in abstaining for a while without treatment. A small portion eventually give up drugs completely (Arif and Westermeyer, 1988). The course of heroin dependence seems to be more rapid than that of opium.

Alcohol

Three phases of alcohol dependence have been identified (Jellinek, 1952): (1) prodromal, (2) crucial, and (3) chronic phases. The onset of amnesia while drinking (blackouts) indicates the beginning of the prodromal phase, the inability to regulate the amount or duration of drinking (complete, partial, or intermittent loss of control) marks the beginning of the crucial phase, and the onset of prolonged intoxication marks the

Table 14. Phases of Drug Dependence: Behavioral Factors^a

Characteristic	Early phase: problematic usage	Middle phase: chronic dependence, addiction	Late phase: deterioration
Drug usage	Increasing amounts and frequency of use	"Titer" or "binge" usage; attempts at abstinence	Continuous usage; uses "substitute" intoxicants
Control over usage	Begins attempts to decrease amounts or frequency of use	Begins to lose control (takes longer period than intended)	Loses control most of the time
Drug-related behavior	Seeks occasions to use; chooses friends who use heavily; may begin to be secretive about usage	Increased need to use at specific times and places; develops ingenuity at obtaining, paying for, hiding, and using drug	Compulsive usage, despite many problems associated with usage and decreased enjoyment from drug or alcohol; plans daily activities around usage
Drug effects on behavior	Episodic intoxication, dysarthria, emotional lability; attempts to hide drug or alcohol effects from others	Impairment between intoxication episodes; trite and illogical expressions prevail in conversation; fatigue; decreased productivity	Poor grooming, disheveled dress; lack of interest in appearance; unconcern with opinions of others

^aFrom Arif and Westermeyer (1988). Reproduced with permission.

Table 15. Phases of Drug Dependence: Psychological Factors^a

Characteristic	Early phase: problematic usage	Middle phase: chronic dependence, addiction	Late phase: deterioration
Motivation	Uses to enjoy, build up confidence, relieve insomnia, anxiety, etc.; use becomes increasingly important	Uses to feel normal; use is as important as family, friends, work	Enjoys usage less, but cannot stop; use becomes the central element of person's life
Emotional concomitants	Mood swings related to usage: anger, remorse, anxiety; shamed or anxious regarding usage; feels weak, remorseful	Personality change, increasing emotional lability; ambivalent about usage; feels guilty, resentful, inadequate, inferior	Erratic, suspicious, often apathetic; defensive regarding usage; feels alone, deserted
Cognitive processes	Obsesses regarding next usage; reduced interests and ambition; focuses thoughts and conversation on chemical usage	Increasing self-pity, deteriorating self-image, self-deception regarding usage and its effects; loses sense of time	Confused, projects own problems onto others; unable to conceptualize current status objectively
Judgment, insight	Begins to exercise poor judgment; still able to extricate self from most problems; episodic insight and concern with drug or alcohol usage	Large proportion of decisions lead to problems; problem solving increasingly ineffective; avoids being insightful, though capable of insight	Extremely poor judgment in most matters; unable to solve own problems; is not insightful even during abstinent intervals

^aFrom Arif and Westermeyer (1988). Reproduced with permission.

Table 16. Phases of Drug Dependence: Social Factors^a

Characteristic	Early phase: problematic usage	Middle phase: chronic dependence, addiction	Late phase: deterioration
Interpersonal relationships	Changes associates, from abstainers and moderate users to heavy users	Alienates others by arguing, embarrassing, taking advantage; breaks promises, lies	Manipulates others to obtain drug or alcohol; compensatory bragging
Family	Argues with family over usage; spends less time at home; neglects family emotionally	Abuses family by lying, stealing, and/or fighting; spends most of time away from home	Alienated from family; lives away from family
Employment	"Monday morning" absenteeism; conflict with boss	Decreased job efficiency; changes jobs often or is fired; decreasing job prestige; holds jobs for shorter periods	Day labor; unemployed, on relief or social welfare
Residence	Stable residence; lives with others	Begins moving from place to place; loses roommates, family members	Lower socioeconomic neighborhood; lives alone
School ^b	Decreasing grades; complaints from teachers	Suspension from school, school dropout	Requires special educational and rehabilitation facilities
Legal effects	May have legal problems; DWI, ^c & disorderly, assault	Usually has legal problems and large attorney fees; may be litigious	Defaults on contractual obligations; may be imprisoned for property offenses, manslaughter or alcohol; financially destitute
Finances	Spends increasing funds on drug or alcohol; may take extra job to support habit; may become extravagant	Spends large amount of annual income on drug or alcohol; heavily in debt, bankruptcy	Spends most of income on drugs or alcohol; financially destitute
Social affiliations	Discontinues social activities not involving alcohol or drug usage (e.g., church, sports)	Drops formal group affiliations; begins short-lived companionship with chemically dependent persons	Becomes an involuntary client of social institutions (e.g., jail, social welfare, hospitals)

^aFrom Arif and Westermeyer (1988). Reproduced with permission.

^bFor drug-dependent persons of school age.

^cDWI, driving while intoxicated.

Table 17. Phases of Drug Dependence: Biomedical Factors^a

Characteristic	Early phase: problematic usage	Middle phase: chronic dependence, addiction	Late phase: deterioration
Pharmacology	Tolerance increases; larger doses used to relax, relieve insomnia or other symptoms	Withdrawal effects; blackout (for alcohol); morning or daytime usage to alleviate withdrawal	Decreased tolerance (early onset of intoxication or blackout); delirium tremens or withdrawal seizure
Common health problems	Injuries: vehicular or industrial, accidents, falls, burns	Infections: respiratory, urogenital, skin; injuries, accidental overdosage, suicide attempt	Parenteral users: septicemia, pulmonary edema, endocarditis; alcoholics: cirrhosis, violence, injuries, homicide, suicide; nutritional problems: vitamin, protein, mineral deficiency; acquired immune deficiency syndrome (AIDS)
Sexual effects	May initially enhance sexual function	Sexual problems; impotence, frigidity, promiscuity or extramarital liaisons, venereal disease	Difficulty obtaining sexual partner; purchase of sexual services; loss of interest in sex; prostitution to obtain funds for drug
Common symptoms	Insomnia, boredom, chronic anxiety, headache, palpitations, tachycardia, flatulence, belching, cramps, epigastric distress, irritability, puffy face or extremities	Sweating, apprehension, decreased libido, visual disturbances, myalgia, malaise, obesity, diarrhea, weight change (loss or gain), memory lapses, weak, fatigues easily, "dry heaves," depression, panic, fears	Bad taste, impotence, halitosis, cachexia, persistent abdominal pain

^aFrom Arif and Westermeyer (1988). Reproduced with permission.

Table 18. Phases of Drug Dependence: Treatment Approaches^a

Characteristic	Early phase: problematic usage	Middle phase: chronic dependence, addiction	Late phase: deterioration
Prognosis without treatment	Some spontaneously improve, some progress to later stages (percentages unknown)	Small percentage spontaneously improve; most progress to later stage	Virtually no spontaneous improvement; a few "plateau"; most deteriorate rapidly
Most effective treatment modalities	Self-help groups; marital, family therapy; selective use of pharmacotherapy for 1-2 years (e.g., antidepressants, disulfiram), partial hospitalization (e.g., day only, evening only, weekend only)	Initial residential treatment; hospital or detoxification unit, therapeutic community, halfway house, followed by some outpatient treatment methods, as in "early phase"	Long-term residential treatment; special long-term units, nursing home, quarter-way house, followed by "middle" or "early" treatment methods in selected cases, methadone maintenance for opiate dependence
Prognosis with optimal treatment	Good to very good: 60-80% "significantly improved" at 1 year posttreatment	Fair to good: 30-60% "significantly improved" at 1 year posttreatment	Fair to poor: 10-30% improved at 1 year; high mortality and morbidity rate in remainder
Cooperation with treatment	Willing to undertake a prolonged period of abstinence, see physician regularly, follow treatment recommendations	Does not enter treatment unless pressured by family, employer, court, friends, physician	Will not undertake abstinence voluntarily; must be coerced by society (e.g., incarceration, legal commitment into treatment)

^aFrom Arif and Westermeyer (1988). Reproduced with permission.

beginning of the chronic phase. Symptom clusters associated with progression include: (1) psychological dependence, (2) mild dependence (tremor, morning drinking, amnesia), and (3) severe withdrawal (delirium tremens).

Jellinek (1959, cited in Arif and Westermeyer, 1988) described the following types of alcoholism:

1. Alpha alcoholism: Persons drink to deal with discomfort and have not yet lost control, but may have experienced unpleasant social consequences on occasion. No withdrawal symptoms. May show no tendency to progress.
2. Beta alcoholism: They begin to experience physical problems such as gastritis or mild liver problems, but no physical or psychological dependence.
3. Gamma alcoholism: This conforms most closely to the popular notion of alcoholism, with loss of control, tolerance, physical dependence, and withdrawal symptoms.
4. Delta alcoholism: They are unable to avoid drinking even for a day. High intake at a stabilized level.
5. Epsilon alcoholism: periodic or binge drinking

These types and phases of alcoholism are not mutually exclusive. Remissions from alcoholism can occur at all ages, but untreated alcohol-dependent persons tend to do poorly over time.

Cocaine

In the past, cocaine tended to be used by some middle-class populations as occasional recreation. In 1980, cocaine was considered to be a safe, nonaddicting euphoriant. Cocaine, however, creates powerful urges to use stronger and more frequent dosages if use persists.

By 1985, cocaine abuse became a national problem. A powerful new route of administration, smoking cocaine "free base" or "crack," turned out to be as addictive as intravenous injection without the stigma of injection (Gawin and Ellinwood, 1989). The National Institute on Drug Abuse (NIDA) now considers cocaine "the drug of greatest national public health concern." There are an estimated 2,000,000 addicts, four times the number of heroin addicts.

Cocaine abuse develops within a social-occupational matrix. Low cocaine doses initially enhance interactions with the environment. Euphoria in the early stages seems to be largely due to perceived increase in the positive feedback coming from the environment. As cocaine use increases, the role of direct pharmacological effect increases and the use

becomes more socially isolated. In cocaine dependence, a transition to high-dose bingeing occurs, which then becomes a solitary, compulsive behavior. Such binges produce extreme euphoria, forming vivid memories that are later contrasted with current dysphoria to produce stimulant craving (Gawin and Ellinwood, 1988).

Continuous and rapid self-administration occurs in animals if unlimited cocaine access is provided, resulting in death within 14 days. Only limitations on drug access seem to regulate both animal and human self-stimulation with cocaine (Gawin and Ellinwood, 1989).

Cocaine abstinence symptoms are triphasic (Gawin and Ellinwood, 1989):

Phase 1 is called "crash," characterized by crash of mood and energy immediately following the cessation of a binge. Craving, depression, agitation, and anxiety intensify rapidly. In approximately 1 to 4 hr, mounting exhaustion and a craving for sleep ensue. At this point, further use of cocaine is strongly rejected, unlike in opiate, sedative, or alcohol withdrawal. Mood normalizes after the hypersomnolence.

Phase 2 is a withdrawal phase that emerges shortly after the "crash." During phase 2, protracted dysphoria occurs with decreased activation, amotivation, and intense boredom and anhedonia. Although the symptoms are rather subtle, and not accompanied by gross physiological changes, resumption of cocaine abuse often occurs during this phase. If abusers sustain abstinence, anhedonic symptoms lift within 2 to 12 weeks.

Phase 3 is an "extinction" phase that follows the resolution of withdrawal anhedonia. During this period, intermittent conditioned craving may still occur. The craving is episodic, lasting only hours. This may appear months or even years after last cocaine use. The cues inducing the conditioned craving include mood states, specific locations, persons, time of the year, or seeing objects such as white powder, syringe, etc.

Tobacco

Tobacco addiction is the most common type of drug dependency in the United States (Gatchel *et al.*, 1989). Nicotine is an extremely addicting substance, and sudden cessation of its use may result in both psychological and physiological withdrawal, including symptoms of depression.

Tobacco dependence usually begins in adolescence, influenced by peer groups (see vignette 5). The dependence, once established, may last throughout the lifetime. Large numbers of smokers do spontaneously abstain, but 70–80% relapse within a year (Arif and Westermeyer, 1988).

Most smoking cessation programs, regardless of the type, have initial good results, but 60–70% of the patients relapse approximately three months posttreatment.

Tobacco dependence on cigarettes is expressed in terms of pack-years. One pack-year consists of a pack of 20 cigarettes per day taken over a one-year period. Thus, ten pack-years would be one pack per day for 10 years, 1.5 packs per day over 6.7 years, or two packs a day for five years. Physical complications associated with chronic tobacco use, such as lung cancer and heart disease, begin to appear in about 20 pack-years. Local irritative symptoms such as laryngitis and bronchitis often occur earlier (Arif and Westermeyer, 1988). Cessation of smoking at any stage has an almost immediate beneficial effect.

Since the publication of the Surgeon General's Report in 1964 that identified the health risks of tobacco smoking, there has been an encouraging trend concerning smoking in the United States. Approximately 42% of the U.S. adult population smoked cigarettes in 1965. The rate was 37% in 1975, and 30% in 1985. The reduction in the rate of smoking has been more pronounced among the males than in females (52% males who smoked vs. 34% females in 1965, 42% males vs. 32% females in 1975, and 33% males vs. 28% females in 1985 [Greene *et al.*, 1988]).

Cannabis (Marijuana)

Tolerance develops with repeated cannabis use. Deterioration of mental functioning often develops with heavy cannabis abuse, and an amotivational syndrome consisting of diminished ambition and drive, apathy, distractibility, impaired communication, derealization, and depersonalization may ensue in susceptible individuals (Arif and Westermeyer, 1988).

Sedatives, Hypnotics, and Analgesics

Dependence on sedatives and hypnotics, such as barbiturates and benzodiazepines, may occur either on the "street" or as a consequence of abuse of a drug that was initially prescribed for a medical reason. Some patients who are treated with narcotic analgesics, such as codeine or meperidine, may become dependent on them. The risk of iatrogenic dependence on narcotic analgesics, however, should not preclude the judicious use of narcotic analgesics if a painful condition persists (see Chapter 9 for further discussion).

Polydrug Abuse

Drug-dependent individuals frequently use more than one substance either simultaneously, alternately, or in rotation. Polydrug abuse often presents with special problems in diagnosis and treatment. One drug may be used to counteract the consequences of another drug, e.g., taking a sedative for sleep after abusing a stimulant. When the patient is a polydrug abuser, treatment of only one drug problem may result in rebound abuse of the other drug (Arif and Westermeyer, 1988).

Substance Abuse by Physicians

Because of easy availability and high stress, physicians are at a much higher risk for narcotic and sedative/hypnotic drug addiction than the general population. The incidence of narcotic addiction in physicians is estimated to be 30 to 100 times greater than the general population. One in ten physicians will become dependent on drugs or alcohol sufficient to impair the practice of medicine at some time during their careers. One in 100 physicians will become narcotic addicts some time during their careers, and one in ten physician addicts or alcoholics will commit suicide (Webster, 1983). An estimated 15,000 physicians in the United States have undetected drug addiction and alcohol problems.

In physician addiction, common precipitating factors include physical pain and chronic illness. Family tragedy (death of spouse or child), marital problems, an addicted spouse, or work stress also contribute to the high incidence of drug dependence.

The outlook for physician drug dependence is considerably improved by systematic and individualized attention that provides confidentiality, active treatment, and external controls if necessary (see vignette 6). Compulsory follow-up is necessary at more advanced stages of narcotic addiction. Such follow-up includes removal or restricting of licensure, continued enforceable surveillance and reevaluation, mandatory removal of narcotic license, as well as treatment and continuing education. Under these conditions, rehabilitation rates improved from 27-28% in earlier studies to 72-92% (Webster, 1983).

EVALUATION OF SUBSTANCE ABUSE

Because of the stigmatization and illegality associated with substance abuse, the recognition and evaluation of substance abuse in a patient may present special problems. The help-seeking behavior is often

at the insistence of others rather than the patient's own initiative. The patient may feel compelled to seek help (see vignette 6), but may feel ambivalent about giving up the substance abuse.

General Principles

The evaluation of substance abuse requires collaboration from the patient as well as other significant persons (e.g., family, friend, employer). Information will be available only to the extent that the informant feels safe, is taken seriously, and trusts the physician (Arif and Westermeyer, 1988). Arif and Westermeyer list the following principles and attitudes that the physician may usefully keep in mind as helpful approaches in evaluating a drug abuse patient (reproduced with permission):

- Empathy with and acceptance of the patient as a person do not imply acceptance of the drug habits
- Readiness to listen and understand before coming to premature conclusions
- Being clear and firm regarding one's own role, functions, abilities, powers, limits, and boundaries
- Avoiding ambiguous messages
- Awareness of one's own feelings toward the patient (e.g., distrust, sympathy, repulsion, interest, identification, fear)
- Appreciating the patient's ethical concerns while avoiding moral judgments
- Inquiry should be guided by the intent to help the patient in coping with the situation, and not simply by the intent to find the patient guilty of drug dependence

In certain situations, the physician may be requested to evaluate a patient by a social institution, such as a school, prison, or a corporation. Under those circumstances, the physician should make clear from the outset exactly what his or her role is and to whom the report will be sent.

History Taking

The evaluation of a patient with substance abuse problems should start with thorough *history taking*, with particular attention to drug history including the onset, length of time used, frequency of use, route of administration, amount, cost, and purpose (to get high, to sleep, for energy, to relieve depression, to relieve withdrawal symptoms, etc.). It is advisable not to ask for the details of how the patient obtains the illicit

substance, however, as this will tend to arouse the patient's suspicions as to whether the physician is planning to involve the legal authorities.

Data about the patient's *social environment* is an important part of the history. Information should be obtained concerning the patient's living arrangements, significant others, sexual orientation, employment and educational status, family members, and recreational activities. Special attention should be paid to any recent changes in the interpersonal relationships that may have affected drug-taking behavior (see vignette 6). Information in this dimension is also useful in understanding the possible social support or obstacles (e.g., the patient's only friends are also drug-dependent) in any treatment plans.

Careful *psychiatric history* is important for several reasons. If the patient had an episode of psychiatric symptoms, such as anxiety, depression, confusion and disorientation, or psychosis, it is important to determine whether the episode predated or followed the substance abuse as substances of abuse may be used in an attempt to obtain relief from psychiatric symptoms, as well as be a cause of it. The physician has to be very careful in prescribing psychiatric medications to a substance-abusing population because of the risk of abuse as well as problems with compliance in taking the prescribed drug when the patient might be under the influence of the substance of abuse. Increasing experience with patients who have both substance abuse and a separate psychiatric disorder has led to development of the term "dual diagnosis." This alerts the clinician to the fact that having a substance-abuse diagnosis is strongly associated with having any other psychiatric diagnosis. Both conditions should receive evaluation and treatment.

Physical Examination

Physical examination may provide the physician with extremely useful information concerning the direct or indirect sequelae of drug abuse. For example, *cutaneous signs* such as needle puncture marks usually found on the veins in the antecubital area, dorsum of hands, and forearms may raise suspicion concerning intravenous drug abuse. "Tracks" are hyperpigmented, usually linear, scars located along veins, caused by frequent unsterile injections and from the deposit of carbon black from attempts to sterilize the needle with a match (Kleber, 1983) (see vignette 1). Because tracks are such a well-known marker of drug abuse, some addicts may hide them by having a tattoo over the area. *Thrombophlebitis* is commonly found in intravenous drug abusers because of the unsterile injections and the irritant quality of some of the adulterants mixed with the active drug. *Abscesses and ulcers* are common among patients who

inject barbiturates because of the drug's irritant quality. *Ulceration and perforation* of the nasal septum is a frequent effect of inhalation or "snorting." *Cigarette burns* or scars from old burns are another sign of drug abuse. It has been estimated that over 90% of addicts and alcoholics smoke (Kleber, 1983).

Piloerection ("gooseflesh") occurs during opiate withdrawal, usually found on the arms and trunk. *Cheilitis* is cracking of skin at corners of the mouth and may occur in chronic amphetamine users and in opiate-dependent persons prior to or during detoxification. *Contact dermatitis* may occur in inhalant abuse, such as glue sniffing. *Jaundice* due to hepatitis is common in intravenous drug users as well as in chronic alcoholics with cirrhosis.

Many other medical conditions are associated with drug abuse, such as lung cancer and heart disease, especially with smoking.

Laboratory tests, especially the *toxicology screen*, are very helpful in diagnosing substance abuse. Other laboratory tests may uncover medical complications due to substance abuse. These tests should include complete blood cell count (CBC), blood chemistry, serology, Australia antigen, and urinalysis. Pregnancy test should be done on any female patients with missed or irregular periods where drug abuse is suspected. Additional tests may be indicated on the basis of history or physical examination.

MANAGEMENT OF SUBSTANCE ABUSE

The management of substance abuse involves detoxification, management of withdrawal, and psychosocial rehabilitation. We will discuss briefly some fundamental principles in the management of substance abuse. For detailed discussion, the reader is referred to standard textbooks of psychiatry and substance abuse.

Acute Intoxication

Violent or agitated behavior may be associated with intoxication with alcohol, stimulants, hallucinogens, and phencyclidine (PCP). Treatment should be geared to preventing the patient from harming self or others and waiting for the effects to wear off (Arif & Westermeyer, 1988). This involves close observation, restraint when necessary, reduction of sensory input, and reassurance. Neuroleptic drugs or benzodiazepines (in case of PCP) may be necessary to control the agitation.

Acute intoxication may cause a toxic psychosis, the management of which should be along the lines of any acute psychosis (Chapter 7).

Withdrawal

Mild withdrawal symptoms usually do not require medication. In moderate to severe withdrawal, a substitute drug that resembles the drug of abuse in pharmacological action may be used to relieve the withdrawal symptoms, then a gradual withdrawal from the substitute drug should be done.

The onset, duration, and severity of withdrawal symptoms are related to the drug's half-life. With drugs that have a short half-life, the withdrawal tends to begin earlier with more florid symptoms but with a shorter total withdrawal course, as compared to drugs with a long half-life.

Convulsions are common in sedative/hypnotic withdrawal, especially barbiturate withdrawal. Sedative and alcohol withdrawal syndromes are more life-threatening than opiate withdrawal.

In general, any opioid may be used for opioid withdrawal, and any sedative may be used in sedative/hypnotic withdrawal. In order to ensure a smooth withdrawal, usually a longer-acting drug is used as a substitute drug, which is then tapered off gradually.

Although stimulants are usually withdrawn without substitution with another drug, severe depression may ensue. Tricyclic antidepressants may be used to reduce the depression in cocaine and amphetamine withdrawal.

Analgesia in the Opioid-Dependent Person

If indicated for pain, narcotic analgesics should be given in addition to any maintenance or withdrawal dose of the opioid given as a substitute drug. The dose of the analgesic may need to be increased by 25-50% because of cross-tolerance. Agonist-antagonist analgesics such as pentazocine should be avoided in opioid-dependent individuals because they will cause withdrawal and exacerbate pain (Arif and Westermeyer, 1988).

Psychosocial Rehabilitation

The most difficult, and most important, aspect of the management of substance abuse is prevention of recidivism and rehabilitation of the individual as a productive member of the society. This process involves

the family, the workplace, and the life-style of the patient and his or her significant others. This process begins with the formation of a trusting doctor-patient relationship and proceeds to referral for specific treatments that usually require the collaboration and cooperation of the patient and the significant others. Some of the specialized techniques include the following.

Behavior Therapy. Using operant and classical conditioning principles, behavior therapy is aimed at the extinction of the learned drug-taking behavior by eliminating environmental reinforcers for drug-taking behavior (e.g., avoiding places and things that remind the patient of drug-taking) and developing substitute behaviors that are reinforced, such as relaxation and planned activity.

Aversion therapy is a form of behavior therapy in which an unpleasant experience is deliberately associated with drug-taking behavior. For example, an alcoholic may be asked to smell a glass containing an alcoholic beverage. Then, an electric shock is given (Gatchel *et al.*, 1989). An aversion response will ensue to the smell of alcohol. The use of disulfiram (Antabuse), which produces extremely unpleasant physical effects if alcohol is ingested, is a form of behavior therapy called "contingency management." Contingency management procedures are based on the principle that the consequences of any given behavior govern the probability of continuing or discontinuing that behavior.

Family Therapy. Family treatment must address both the identified patient as well as the role of the family in the maintenance of the drug dependence. The family may play an important role in monitoring drug detoxification, in maintaining drug-free state, and in facilitating the reintegration of the patient as a rehabilitated member of the society.

Group Therapy. Group therapy, in general, is especially helpful in drug abuse patients in confronting their problems and in receiving empathy and advice from fellow addicts. Role-playing or psychodrama may be used in groups effectively. The patient may role-play a particular situation that may lead to drug craving, and may learn ways of dealing with it.

Therapeutic Community. Residential therapeutic communities provide a protective, drug-free setting in which a variety of treatment modalities may occur, including group therapy, behavior therapy, etc.

Outpatient and Day Programs. These outpatient services differ enormously from each other in the services they provide. The modalities used

in outpatient settings include group therapy, individual therapy, vocational counseling, etc.

A subset of outpatient programs use maintenance drugs, such as methadone or narcotic antagonists. The rationale for maintenance with these drugs is to reduce the drug-seeking behavior and permit the individual to function in society.

Self-Help Groups. Alcoholics Anonymous (AA) and Narcotics Anonymous (NA) are the representative examples of these, and are valuable tools that can provide recovering people with examples and teachers of techniques of recovery (Arif and Westermeyer, 1988). They also provide structure, meetings, sponsors for new members, an abstinence-oriented subculture, and a supportive philosophy. The groups decrease shame and isolation and offer mutual assistance.

Pharmacotherapy. Pharmacotherapies are of several types: agonists to reduce the need for the illicit substance (e.g., methadone maintenance), antagonists that block the euphoriant effect (e.g., naltrexone), aversive agents (e.g., disulfiram), agents for dual diagnosis (e.g., tricyclic antidepressants for depressives), and agents to reduce craving. Pharmacotherapy is used in conjunction with the other rehabilitative programs discussed above.

SUMMARY

Substance abuse is an important health problem today since it adversely affects the physical and mental health of millions of people. It is a common cause of serious medical diseases as well as of anxiety, psychosis, depression, and confusion. Tobacco and alcohol are the most common legal substances abused. Cocaine and opioids are the most common illicit substances abused.

All substances that are abused seem to enhance dopaminergic nerve transmission in the mesolimbic tract, which has been shown to be a reinforcement system.

The etiology of substance abuse is complex, with genetic, pharmacological, psychological, and environmental factors playing specific roles.

The evaluation of substance abuse must begin with the formation of a trusting doctor-patient relationship, followed by comprehensive history taking and a thorough physical examination and laboratory tests.

The management of substance abuse is geared to the treatment of acute intoxication, withdrawal states, and psychosocial rehabilitation.

IMPLICATIONS

For the Patient

Substance abuse is a serious health problem that may be either not recognized or denied by the patient. Even if the patient recognizes the problem, he or she may feel ambivalent about receiving treatment or may feel too ashamed or fearful to seek help for the condition.

Many patients who seek help may do so under duress, from either the family or the employer. This may affect the patient's motivation and ability to receive treatment.

For some patients, substance abuse may be an attempt to relieve an emotional distress, such as anxiety or depression. Recognition of these emotional states antedating the onset of substance abuse may provide a key to successful treatment.

For the Physician

Many persons who abuse substances provoke a negative reaction on the part of the physician. Being nonjudgmental, providing an open channel of communication to the patient, allowing the patient to feel safe enough to talk—these are prerequisites for the formation of a trusting doctor-patient relationship for a substance abuse patient just as for any other patient.

Physicians should be aware of the importance of history taking and physical examination in evaluating substance abuse and its sequelae. Physicians should be familiar with the techniques for treatment of acute intoxications and of withdrawal states, and they should be aware of the many different treatment modalities for substance abuse. For psychosocial rehabilitation, referral to a reputable treatment center is usually indicated.

The physician should provide education concerning the hazards of smoking and excessive drinking. Only around 20-25% of current alcoholics are obtaining alcohol treatment while over 90% have seen a physician in the past year. While alcoholism is frequently seen as a severe, lifelong condition with a poor prognosis and a high probability of relapse, alcoholism is best seen as existing along a continuum from mild to severe cases. For mildly dependent alcoholics, brief interventions, including education by physicians and pamphlets, have been shown to

result in significant reductions in heavy drinking. Patients with a positive family history of alcoholism should be warned against heavy drinking (defined as drinking more than four standard drinks/occasion and more than four times per week). Treatment is most effective when it is entered early in a drug-abusing career than later. The physician should also be aware that substance abuse is an occupational hazard of being a physician, especially with alcohol and controlled substances because of their availability to him or her.

For the Community and the Health-Care System

Substance abuse is, to a large extent, a community problem requiring a community effort. While law enforcement against illicit drugs may reduce their availability, community efforts should be focused on the prevention and treatment of licit substance abuse as well, namely smoking and alcohol abuse. Educational programs should emphasize the importance of prevention of disease associated with these substances.

Some countries have experimented with legalization and control of certain substances such as opioids (e.g., Great Britain). Our society must decide what the most efficacious method of dealing with illicit substances might be—continuing prohibition and attempt at seizure and prosecution or legalization that reduces the profit motive coupled with education, control, and rehabilitation. The British experiment with legalization, however, has not been an unqualified success, and more recent trends have been for increased control.

The society at large must develop policies concerning the traffic accidents associated with intoxication, fires associated with smoking, the staggering health-care costs associated with lung cancer and heart disease associated with smoking, the violent and other crimes associated with some kinds of drug abuse (e.g., cocaine), and criminal activities growing out of the high profits associated with distribution and sale of illegal drugs.

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RECOMMENDED READINGS

- Arif A, Westermeyer J (eds): *Manual of Drug and Alcohol Abuse: Guidelines for Teaching in Medical and Health Institutions*. New York, Plenum Medical, 1988. This is a concise but comprehensive manual produced by the World Health Organization (WHO) in response to the numerous requests to it for educational materials concerning substance abuse. Many experts in the area of substance abuse contributed to the manual, which includes sections on teaching approaches, assessment of substance abuse, epidemiological and etiological considerations, natural course and psychosocial manifestations, pharmacological factors, as well as diagnosis and management. Highly recommended.
- Kiyatkin EA: Neurophysiology and neurochemistry of drug dependence: A review. *Int J Neurosci* 44:283-316, 1989. This is a comprehensive review of the neurobiology of drug dependence with a good discussion of the reinforcement pathways.

Leigh H (ed): *Psychiatry in the Practice of Medicine*. Menlo Park, California, Addison-Wesley, 1983. A companion book to *The Patient*. This book deals with the more practical issues of psychiatry relevant to the primary physician. The chapters dealing with substance abuse are highly recommended. They are: Chapter 15, Evaluation and Management of Alcoholism, by Mary Swigar, MD, and Chapter 16, Drug Dependence, by Herbert D. Kleber, MD.