Cocaine

COCAINE is a stimulant derived from the South American coca plant. It is imported in the form of a salt, cocaine hydrochloride, a white odourless crystalline powder with a bitter taste. Cocaine base can be extracted from the powder to form rocks or crystals known as 'freebase' or 'crack' that are smoked and produce strong subjective effects almost immediately.

Although it is relatively easy to make crack from cocaine hydrochloride, and some Australian cocaine users report doing this, there is little evidence of widespread or problematic crack cocaine smoking in Australia to date.

PHARMACOLOGY

Cocaine blocks the reuptake of dopamine (DA), noradrenaline and serotonin at presynaptic locations, thus increasing the concentration of these transmitters at postsynaptic receptor sites (Chesher, 1993). DA concentration is particularly increased, and is thought to be the basis for cocaine's abuse potential. Cocaine also stimulates the sympathetic nervous system, which accounts for its activating effects.

Tolerance to the acute effects develops extremely rapidly, before the depletion of plasma levels. Most of the active drug is metabolised in the liver, but some is acted on by plasma esterases, and a small amount is excreted unchanged in the urine (Schuckit, 1995). Cocaine metabolites may be detected in urine for three days or longer following use.

Australian Street Names

Most common:

- cocaine
- coke
- charlie

Less common:

- okey doke
- nose candy
- toot
- blow
- snow
- white lady

PREVALENCE AND PATTERNS OF USE

Darke et al., 2000

Lifetime

The proportion of the Australian population who reported having used cocaine at some time increased from 2.5% in 1993 to 4.4% in 2001 (AIHW, 2002).

Past Year

The proportion who had used cocaine in the past year increased from 0.5% in 1993 to 1.3% in 2001 (AIHW, 2002).

Gender

In 1998, males were more likely than females to report lifetime (5.3% versus 3.3%) and past year (1.9% versus 0.9%) cocaine use.

Age

Cocaine use is most common amongst young people. In 1998, 8% of Australians aged 20–29 years reported having used cocaine in their lifetime, and 3% in the past year.

AVAILABILITY

Since the late 1990s there has been a marked increase in cocaine availability and use, especially in Sydney (Darke et al., 2002a). Although cocaine is available in other jurisdictions it is harder to get and more expensive than in Sydney (Topp et al., 2002).

The late 1990s saw an increase in use in Sydney. It was most apparent amongst committed heroin injectors, who administered the two drugs simultaneously in a 'speedball' or 'CC' (cocaine cocktail) or sequentially. In 2001, when the availability and use of heroin decreased substantially, the frequency of injection of cocaine amongst former primary heroin users in Sydney increased markedly (Darke et al., 2002b).

ROUTES OF ADMINISTRATION

In Australia, cocaine is generally administered intranasally (snorted) or intravenously (injected). Onset of action is rapid via either route of administration: within eight minutes when snorted and within two minutes when injected. Peak blood levels develop within five to 30 minutes. Duration of action is relatively brief: the half-life of cocaine's active metabolites is typically 15 to 30 minutes when the drug is injected and 60 minutes when snorted (Chesher, 1993; Platt, 1997).

Those who inject cocaine tend to have a higher quantity and frequency of use, and experience more associated harm, than those who snort it (Kaye et al., 2000).

BINGEING

A substantial proportion of those who use cocaine heavily do so in 'binges', i.e. where it is administered at short intervals repeatedly until either the supply or the user is exhausted. This destructive pattern of use appears to arise because tolerance to the rewarding effects of cocaine develops extremely quickly, as a result of rapid neuroadaptation (i.e., where the neurons on which cocaine exerts its effects attempt to restore normal function) (Chesher, 1993). Thus, the intense pleasure experienced after cocaine injection is of only short duration and is followed by either an absence of euphoria or even a dysphoria. Such rapid mood changes seem to stimulate the need for more cocaine.

TYPES OF USERS

Most Australians who use cocaine snort small amounts infrequently and with few problems.

People who use cocaine more heavily tend to fall into two groups:

- middle-class, well-educated professionals who generally snort the drug; and
- injecting drug users who inject cocaine, often (but not always) in association with heroin

POLYDRUG USE

Cocaine users tend to be extensive polydrug users; other drugs are used both in conjunction with cocaine as well as to medicate the 'come down' (aversive recovery period following use).

Snorters

Those who snort cocaine tend to do so in a social context such as at dance parties, and tend to use other party drugs such as ecstasy, methamphetamine, ketamine, and/or GHB, as well as alcohol and cannabis, and may use benzodiazepines to come down (Topp et al., 2000). A small proportion of this group progress to problematic cocaine use, in which large amounts of the drug are snorted frequently.

Injectors

Those who inject cocaine tend to be either:

- former heavy cocaine snorters who have developed nasal problems and/or a high level of tolerance and so make the transition to injecting; or
- committed injecting drug users who have added cocaine to their injection repertoire, and will usually inject other drugs including heroin and methamphetamine, and use a wide range of other drugs including alcohol, cannabis, benzodiazepines and methadone (Kaye et al., 2001)

It is estimated that the latter group constitutes a higher proportion of cocaine injectors than the former.

Cocaine and Alcohol

- a common pattern of polydrug use
- with repeated administration, alcohol sensitises the body's reaction to cocaine, and cocaine attenuates the development of tolerance to alcohol
- the combination produces a third active substance, cocaethylene (Schuckit, 1995), which has a half-life of two hours (as opposed to about 30 minutes for cocaine alone)
- concurrent use of cocaine and alcohol leads to a significantly elevated risk for sudden cardiac deaths

EFFECTS OF COCAINE

Factors Influencing the Effects

- form (powder versus crack)
- dose (influenced by purity as well as quantity)
- route of administration
- intensity and duration of use
- concurrent polydrug use

Desired Effects

- euphoria
- sociability, gregariousness and talkativeness
- increased confidence and feelings of control
- energy
- decreased need for sleep
- temporary increase in functional activity or efficiency
- suppressed appetite

Other Acute Effects of Low Doses

- local anaesthesia
- pupillary dilation
- vasoconstriction
- increased respiration
- increased heart rate
- increased blood pressure
- increased body temperature

Acute Effects of High Doses ('Toxic Reactions')

See p. 111
'Treatment of Toxic Reactions'

Toxic reactions are cocaine 'overdoses'. They occur after excessive doses. Any of the following signs and symptoms may be expected as part of a toxic reaction to cocaine:

- stereotyped, repetitive behaviour
- anxiety/severe agitation/panic
- aggression/hostility
- muscle twitches/tremors/loss of coordination
- heightened reflexes
- respiratory failure
- markedly elevated blood pressure
- chest pain/angina
- pulmonary oedema
- acute renal failure
- convulsions
- blurred vision
- acute stroke
- pallor
- confusion/delirium
- hallucinations, most often auditory or tactile, e.g. formication (the feeling of bugs crawling under the skin)
- dizziness
- muscle rigidity
- weak, rapid pulse
- cardiac arrhythmias including malignant arrhythmias
- myocardial ischaemia and infarction
- sweating/very high body temperature (up to 41°C rectally)
- headache
- stomach pain/nausea/vomiting

Effects of Chronic Use

- insomnia
- depression
- aggression or violence
- loss of appetite and concomitant weight loss
- muscle twitching
- anxiety
- psychosis — paranoid delusions, hallucinations
- loss of libido and/or impotence
- heightened reflexes
- increased pulse rate

PHYSICAL AND PSYCHOSOCIAL COMPLICATIONS

Physical Problems Relating to Route of Administration

Intranasal users

Intranasal users may suffer from:

- runny nose
- blood nose
- nasal ulcers
- sinusitis
- epistaxis
- perforated nasal septum
- slight risk of hepatitis C transmission due to sharing of straws or other equipment used to snort cocaine which may contain traces of blood

Injecting users

Injecting users may suffer from:

- systemic and local infections which may be viral, bacterial, fungal or parasitic
- local inflammatory and infection complications can be more common than with heroin due to the vasoconstrictive and anaesthetic properties of cocaine
- injection-related abscesses, cellulitis, phlebitis
- bacterial endocarditis
- transmission of blood borne viral infection such as hepatitis C, hepatitis B and HIV

Other Physical Problems

Other physical problems may be experienced regardless of route of administration, particularly cardiovascular complications.

Cocaine-related Death

Death is relatively rare, but is associated with:

- muscle rigidity
- delirium
- agitation
- a stroke-like CNS vascular picture
- cardiac arrhythmias
- elevated body temperature

Psychological Problems

Psychological complications are the most common cocaine-related problems. See ‘Acute Effects of High Doses’ and ‘Effects of Chronic Use’ above.

Social Problems

Intensity of cocaine use may incur:

- interpersonal problems
  - heightened discord in significant relationships
  - paranoia leading to irrational jealousy
  - alienation from social support networks
- occupational problems
  - impaired productivity
  - absenteeism
  - job loss

- financial problems
  - cocaine is expensive and use can escalate rapidly
  - debt to dealers and/or others may grow
  - dealing or other criminal activity may appear a viable financial option
  - financial problems may be compounded by job loss
- legal problems
  - may be directly drug-related
  - may be the result of criminal activity designed to support use

Cocaine Dependence

Key criteria for diagnosing drug dependence are:

- continued use of a drug despite knowing that it causes significant harm
- loss of control over use manifest by using more or for longer than intended
- repeated relapse despite resolving to reduce or eliminate use

(APA, 1994)

Some cocaine users clearly develop such symptoms of dependence, along with others including tolerance.

Cocaine Withdrawal Syndrome

The existence of cocaine withdrawal is contentious because the syndrome is dominated by symptoms rather than clinical signs. The aversive nature of the experience for users, and the strong motivation to resume use to alleviate withdrawal, however, is well documented.

DSM–IV (APA, 1994) describes withdrawal after several days of heavy cocaine use as consisting of:

- dysphoric mood (anhedonia or sadness rather than depression) and at least two of the following symptoms:
  - fatigue
  - insomnia or hypersomnia
  - psychomotor agitation or retardation
  - craving
  - increased appetite
  - vivid, unpleasant dreams
- withdrawal reaches its peak in 2–4 days
- dysphoric symptoms persist for up to 10 weeks (Lago & Kosten, 1994). Some suggest that cocaine craving and a desire to resume use may persist indefinitely, even after withdrawal is complete and normal mood and the ability to enjoy experiences have returned (Gawin & Kleber, 1986)

Foetal Effects

Exposure to cocaine during pregnancy has been associated with:

- shorter gestation
- premature delivery
- abruption of placenta
- retardation of growth
- behavioural problems

However, many of the perinatal and postnatal adverse effects commonly attributed to cocaine may be caused by multiple confounders

that can occur in a cocaine using mother, rather than by cocaine itself (Addis et al., 2001), such as:

- polydrug use, including alcohol and cigarettes
- poor prenatal care
- single motherhood
- poverty
- poor quality postnatal environment

MANAGEMENT AND INTERVENTION STRATEGIES

Clinical Screening

The most common clinical problems associated with cocaine use are anxiety conditions, temporary psychosis and cardiovascular problems.

Acute toxic reactions

Possible cocaine use should be considered in individuals who manifest:

- dilated pupils
- dry mouth
- increased reflexes
- elevated temperature
- sweating
- increased heart rate
- a restless, hyperalert state
- an anxiety-like attack (usually nervousness plus rapid pulse)
- emotional lability or irritability
- aggressive or violent outbursts
- paranoia or suspiciousness
- hallucinations, especially auditory or tactile
- confusion or an organic brain syndrome
- behavioural abnormalities
- acute ischaemic events

If the clinician suspects cocaine use, blood or urine toxicological analysis will confirm the diagnosis.

Chronic Cocaine Use

Chronic cocaine users who do not disclose their use may manifest:

- depression/anxiety
- suicidal ideation
- paranoia/hallucinations
- lethargy
- insomnia
- loss of libido
- social problems (as outlined above)
- evidence of IV drug use (track marks, abscesses)
- abnormalities in the nasal lining or mucosa
- worn teeth (from tooth grinding during intoxication)
- missed appointments and other signs of chaotic lifestyle
- seeking of medications such as benzodiazepines, antidepressants or opioids to relieve withdrawal, medicate side effects or to sell for profit

Treatment of Toxic Reactions

The treatment chosen will depend on the condition of the patient at the time of presentation. Priorities are:

- emergency care to ensure a clear airway, circulatory stability and treatment of shock
- control of elevated body temperature with hydration, sedation, cold water, ice packs or in extreme cases, a hypothermic blanket
- control of seizures with doses of IV diazepam of 5 to 20 mg injected very slowly and repeated as required
- diazepam will also reduce agitation
- vigorous treatment of a sustained elevation in blood pressure with phentalomine (5–10 mg IV) to prevent CNS haemorrhage

- CT scans and lumbar puncture in the confused or unconscious patient will rule out the possibility of cerebral haemorrhage
- excretion of cocaine can be hastened through acidification of the urine with 500 mg ammonium chloride orally every 3–4 hours. The goal is a urinary pH under 6.6
- low doses of an antipsychotic such as haloperidol may be required to manage psychotic patients when benzodiazepines are insufficient. Such patients should be closely monitored as haloperidol can reduce the seizure threshold and may increase the risk of seizures (Nathan et al., 1998)
- once the patients start to recover, they should be reassured and comforted, preferably by supportive friends or relatives, and placed in a quiet room with minimal stimulation to be closely monitored

Management of Withdrawal

There is, as yet, no generally accepted, effective pharmacotherapy for cocaine withdrawal. Management of withdrawal is largely supportive.

Issues to be considered include:

Assessment

- careful neurological and physical examination
- detailed psychiatric history
- detailed drug use history
- concomitant use of other drugs, licit and illicit
- reasons for withdrawal

Management

- the patient should be placed in quiet surroundings for several days and allowed to sleep and eat as much as is needed
- benzodiazepines may be prescribed on a short-term basis for agitation
- if the patient is markedly despondent, (temporary) suicide precautions may be necessary
- severe and persistent depression may require antidepressants. Antidepressants are not effective in reducing cocaine use itself, but can be effective in the management of major depressive episodes associated with cocaine use
- care should be taken in prescribing SSRIs if cocaine use is continued, as toxic interactions have been described (Barrett et al., 1996), and, in mice, SSRIs have facilitated cocaine-induced convulsions (O'Dell et al., 2000)

Treatment of Cocaine Dependence

Pharmacotherapy

There is no widely effective pharmacotherapy for cocaine dependence:

- disulfiram as an adjunct to buprenorphine or methadone maintenance may reduce cocaine use in opioid-dependent clients (George et al., 2000; Petrakis et al., 2000)
- however, there is a potential interaction between disulfiram and cocaine that increases cocaine associated cardiovascular responses and consequently may increase cocaine toxicity (McCance-Katz et al., 1998)

Behavioural and psychosocial therapies have produced better results.

Cognitive-behavioural therapy

- aims to reduce cocaine use by helping the client master an individualised set of coping strategies as effective alternatives to cocaine use (Carroll, 2000)
- typical skills taught include:
  - identifying high-risk situations for relapse
  - identifying the functions of cocaine use
  - developing skills for coping with craving

- has been shown to be more effective than control treatments for more severely dependent cocaine users and those with comorbid mental disorders
- is more effective than less intensive approaches
- effects are durable, with clients continuing to reduce their cocaine use even after they leave treatment (Carroll, 2000)

Contingency management

- has shown promise in increasing cocaine abstinence and treatment retention in research-based treatment programs
- uses an escalating reward system in which violations are punished both by denying the immediate reward and taking away the benefits of an escalated payment (Sindelar & Fiellin, 2001)
- different types of rewards have been used, including money and vouchers which can be exchanged for retail goods

Enhancement of psychosocial skills

- an adjunct to conventional therapy associated with better treatment outcome is the enhancement of social skills through training programs (Volpicelli et al., 2000)

Acupuncture

- may be useful for some cocaine dependent clients, particularly those maintained on methadone (Avants et al., 2000)

General approaches

Given the lack of generally accepted, effective treatments for cocaine dependence in Australia, efforts aimed at rehabilitation of cocaine users should follow the same general supportive and commonsense approaches used for those dependent on other drugs.

Clinicians should:

- *not* judge the user and should not insist on abstinence
- seek to engage and retain the user in treatment for as long as possible, as retention is associated with better outcomes (Simpson et al., 1999)
- ensure understanding of the client/patient's treatment goals (e.g., to make it through an acute crisis; to reduce frequency and/or quantity of cocaine use; to achieve long-term abstinence)
- tailor the treatment where possible to meet those goals, including referral when appropriate to:
  - treatment programs
  - individual counsellors
  - family counsellors
  - self-help groups such as NA
- remember the need for flexibility of service delivery; as goals and outcomes change throughout the course of treatment, the treatment program should be adjusted to reflect these changes
- provide as multifaceted and intensive a program as possible, as more intensive psychosocial treatment programs are associated with better outcome (Crits-Cristoph et al., 1999)

NIDA has produced a manual for an individual counselling approach for cocaine dependence that consists of 36 sessions designed to take place over six months (Merder & Woody, 1999).

Comorbid disorders

Cocaine users often have multiple psychiatric and psychosocial problems. It is estimated that 30% of cocaine treatment presentations suffer with anxiety disorders, 20% with bipolar disorders, and 5% with attention deficit disorders (Tutton & Crayton, 1993). Programs that assess and address these issues

have better outcomes than those which do not (McLellan et al., 1997, 1998).

Readiness to change

In patients who do not wish to become abstinent despite significant impairment related to cocaine use, the clinician should attempt to:

- establish an empathetic, respectful relationship
- retain contact with the client
- maximise physical and mental health, as clients will find it difficult to achieve long-term abstinence if chronic medical problems have not been adequately treated
- enhance motivation toward abstinence by educating clients and their significant others about the usual course of cocaine dependence and the relationship between cocaine use and current and/or future problems
- emphasise the client's responsibility for their own actions
- help clients rebuild a life without cocaine through:
  - vocational counselling
  - family counselling
  - helping them develop a network of non-drug using peers
  - showing them how to use free time appropriately

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Cocaine