

INSIGHT: Alcohol and Other Drug
Training and Education Unit



Induction Module 2

Understanding Psychoactive Drugs

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**Queensland
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Welcome to Alcohol and Other Drugs Sector Induction Material

Learning Material

This series of modules is designed to service health staff interested in addressing alcohol and other drug (AOD) issues with their clientele. The introductory material seeks to provide information to new workers in the alcohol and drug sector. The modules are based on best practice, and contain the most recent information available.

About InSight

InSight is a clinical support service that provides AOD clinical education and training, and clinical education services. InSight sits within the ADS which has a mission to minimise alcohol and other drug related harm and improve the health and well being of the Queensland people we serve.

Contact InSight

InSight can be contacted by phone or email if you have any queries or comments regarding this module, or for general information regarding training opportunities.

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How to use Module Materials

- The module is a study guide (PDF) that can be downloaded. Please be aware this is copyrighted material. If a colleague requests this module, direct them to the web page for their personal module download.
- There are suggested readings and references for further study. The suggested subject text for this module is:

Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs, 12th ed. Worth Publishers: New York.

- The module is designed as a 2 - 4 hour short course.
- A short multiple choice assessment can be submitted to InSight to enable us to forward your completion certificate.
- You may contact InSight regarding this module at any time.

Psychoactive Drugs: An Introduction

Aim

This module aims to provide an introductory knowledge base in relation to psychoactive drugs, drug use and misuse.

Objectives

The objectives for this module are to:

- outline how drugs function in the body
- identify different drug classifications
- identify routes of drug administration
- describe common drugs and their effects.

Introduction

Understanding the pharmacology of psychoactive drugs is an important aspect in working effectively with clients with alcohol and other drug issues. Psychoactive drugs are substances that affect the central nervous system and can have a **depressant**, **stimulant**, or **hallucinogenic** effect on a person. In this way, a psychoactive substance can affect an individual's mood, their perception and thoughts.

Psychoactive drugs are used for many different reasons, including;

- cultural or religious ceremonies
- treat illness or to relieve pain
- pleasurable effects
- to belong to a particular group
- relaxation or stress relief
- to forget ones problems
- satisfy curiosity.

A number of people in our society have used or continue to use some form of psychoactive drugs.

Legal Status of Psychoactive Drugs

Psychoactive drugs are described as being either legal (licit) or illegal (illicit). Legal drugs are those such as alcohol, tobacco, caffeine (found in tea, coffee, cola drinks and some over the counter preparations), prescription drugs such as tranquillisers, painkillers, and some amphetamine preparations, which are sanctioned by the government. Illegal drugs are those that are prohibited by law because their use is considered to be dangerous to the individual and society. Illegal drugs include heroin, cocaine (some restricted medical use is allowed), cannabis, amphetamines, hallucinogens and “designer” drugs such as ecstasy, gamma hydroxybutyrate (GHB) and phencyclidine (PCP).

Whether a drug is classified as legal or illegal depends on any combination of the following:

- The age of the person consuming/purchasing it. Many drugs cannot be used legally by people under a certain age. For example, a person under 18 years of age is not legally allowed to purchase alcohol.
- Whether the substance is registered as illegal by the Government. For example, there are many drugs that are illegal to obtain and use in Australia – such as heroin and methamphetamine.
- How the drug is obtained. Some drugs are illegal if not obtained through authorised channels – such as methadone is legal if it is obtained via prescription; however it is illegal if it is obtained from a dealer.
- Time also affects whether a drug is deemed to be legal or illegal. For example, many drugs were once classified as legally obtainable (eg, heroin was once used in cough syrups). Over time, governments can change their stance towards a drugs legal status and deem them unsafe for use, and therefore illegal.

Alcohol and other legal drugs are produced and packaged in quality controlled environments. That is, they are produced in sterile conditions and the exact amount of the drug is known. Counter to this, illegal drugs are produced in environments that may not be clean and sanitary. They are sold in uncontrolled/unknown quantities and often contain other harmful ingredients/ additives.

It is important to consider the legal status of the drug a client reports ingesting. There are risks of harm associated with any psychoactive drug use, whether it is categorised as legal or illegal. However, when assessing the amount of a drug a client is using, the legal status of that drug may provide an indication of how accurate that amount is.

Drug Classification

Psychoactive drugs can be grouped into three main classifications:

1. Stimulants: Increase central nervous system activity.
2. Depressants: Decrease central nervous activity.
3. Hallucinogens: Producing distortions of the senses, mood, and thought.

Table 1 below identifies the classification of a number of psychoactive drugs.

CLASSIFICATION	DRUG	STREET NAME
DEPRESSANTS	Alcohol Opioids: Heroin Morphine Methadone Pethidine Codeine Cannabis (low THC) Benzodiazepines Volatile Substances	Booze, grog 'H', Hammer, Smack, Gear, Scag, Horse, Club, Caps M, Miss Emma, Morph, Done Peth Coedies Mary Jane, Pot, Weed, Grass, Acapulco Gold Serries, Rowies, Sleepers, Downers, Benzos Poppers, Petrol, Chrome
STIMULANTS	Amphetamine Meth-amphetamine Ecstasy (MDMA) Cocaine Caffeine Nicotine	Speed, Goey, Uppers, Crank, Dexies, Leapers Base, Crystal-Meth, Ice E, Eccy's, XTC, Love Drug Coke, 'C', Crystal, Crack Coffee, Cola, No Doze Fags, Smokes, Cigarettes, Tobacco
HALLUCINOGENS	LSD (Lysergic Acid Diethylamide) GHB (Gamma-hydroxybutyrate) Ketamine Phencyclidine Psilocibin Cannabis (high THC, low CBD)	Acid, Blotters, Barts (any name of the picture on the paper) Fantasy, Grievous Bodily Harm, Liquid X Special K PCP, Angel Dust, DOA Gold Tops, Magic Mushrooms Hydro, Head, Skunk, Ganga, Mullumbimby Madness, Hash

Table 1. Psychoactive Drug Classifications and Common Street Names

Principles of Drug Action

In pharmacology, the way in which the body acts towards a drug is known as Pharmacokinetics. Once a drug has been administered, pharmacokinetics involves the following mechanisms:

- absorption
- distribution
- metabolism
- excretion.

Absorption

The process by which a drug enters the blood stream is known as absorption. The amount of drug which reaches the blood stream (bioavailability) is directly related to the route by which it was administered. Commonly used routes of drug administration include the following:

- **Intravenous drug use (IVDU)** – the drug goes directly into the blood stream with 100% bioavailability. This route is commonly used for heroin and amphetamines.
- **Oral or swallowing** – the liver metabolises many drugs before they enter the blood stream. This takes time and the bioavailability of oral medication is reduced to approx 10-50%. This route may be used for pills such as benzodiazepines and ecstasy, and alcohol.
- **Inhalation** – the drug is inhaled directly into the lungs and absorbed quickly via the alveoli (mucous cell linings of the lung) into the blood stream. This route is commonly used for smoking tobacco and cannabis.
- **Snorting/Sniffing** – absorption through nasal mucosa and sinus cavities is quick owing to the rich blood supply to the area. This route is commonly used for cocaine and volatile substances.
- **Shafting** – anal/rectal absorption of the drug through the mucosal tissue of the lower gastrointestinal tract.

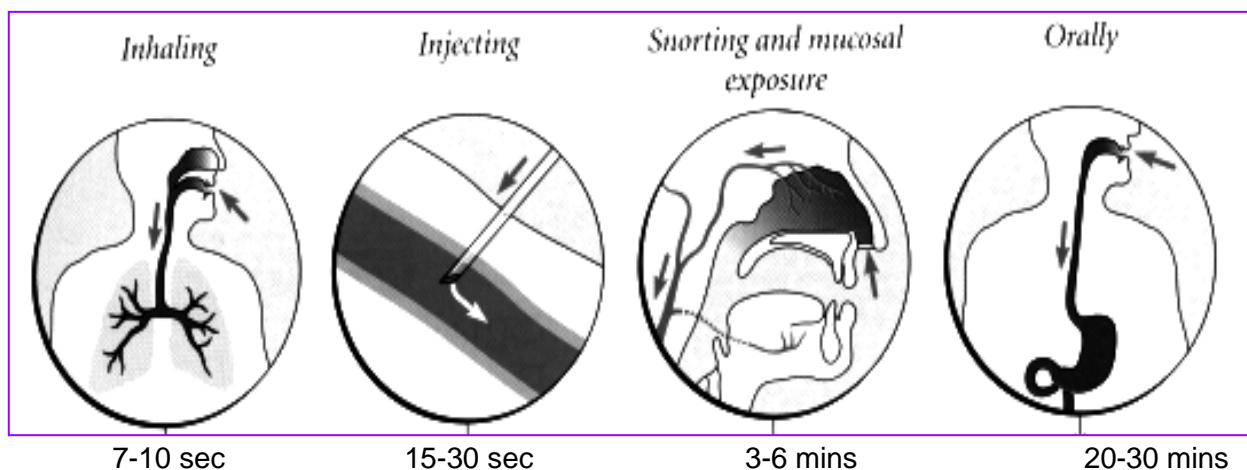


Figure 1. Routes of Drug Administration and Absorption Times (Inaba et al. 2007, pp: 48)

Distribution

Once psychoactive drugs enter the blood stream they are transported directly to act on the Central Nervous System (**CNS**) of the brain. The effect an individual experiences following use of a psychoactive drug will depend on how the messages are transmitted to the body via the CNS.

Psychoactive drugs directly affect the transmission of messages to the neurons in the CNS. Neurons are a core component of the CNS and connect to each other to form neural networks. They are the brain's information processing units and are electrochemical devices which process and transmit information via chemical signaling known as a synapse.

During a synapse, the terminals of one neuron do not touch the adjoining neuron directly because there is a minute gap in between them known as the synaptic gap. By crossing this gap, neurotransmitters (bio-chemicals) may be accepted by the next neuron at a specialised site called a receptor (See Figure 2). Neurotransmitters are the 'language' of the nervous system and they are the means by which neurons communicate with each other to process information and send messages to the rest of the body. The action that follows activation of a receptor site may be either depolarisation (excitatory) or hyperpolarisation (inhibitory). In this way neurotransmitters regulate many body activities and states e.g. sleep, hunger, memory, mobility, anger and joy.

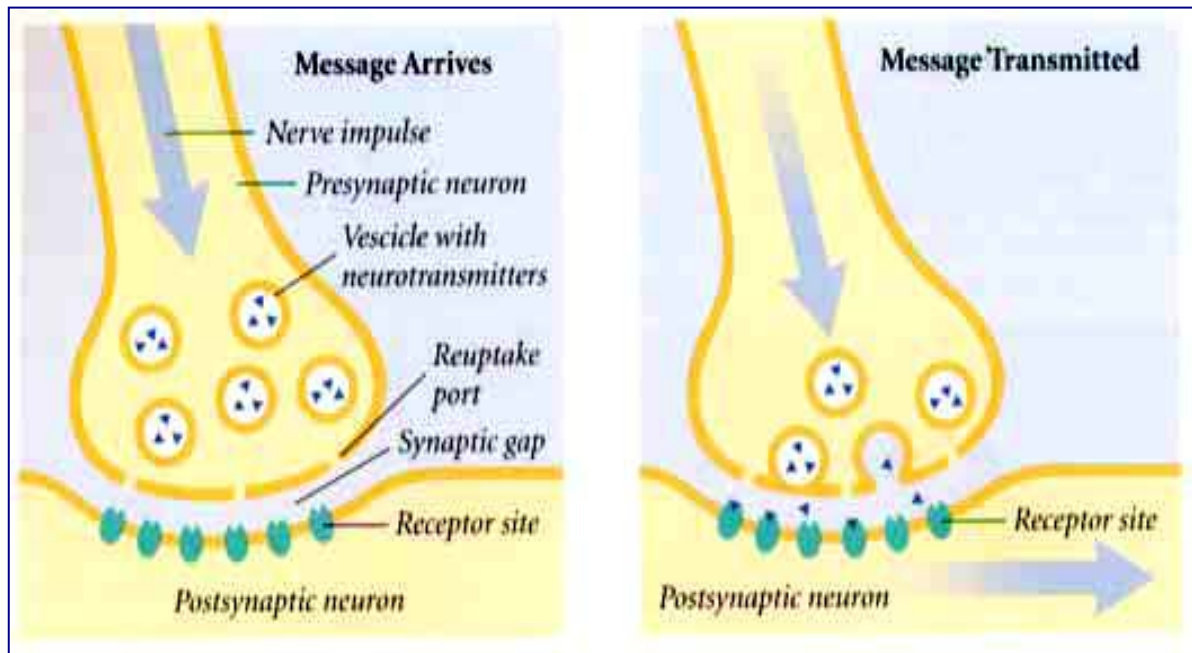


Figure 2. Transmission of Neurotransmitters from the CNS. (Inaba, 2007, pp: 61)

The effect a drug has on the body relies on the specific interaction that takes place between particular neurotransmitters and their respective binding receptor sites. To produce an effect, a drug must bind to and interact with receptors. For psychoactive drugs, these receptors are located on the surface of neurons in the CNS. The pharmacological, physiological or behavioural effects induced by a drug follow from their interaction with receptors.

Psychoactive drugs alter the message transmissions of neurotransmitters between neurons. The most common ways that drugs act are as agonists and antagonists.

Agonists mimic or enhance neurotransmitter action by binding to receptors, inhibiting reuptake, or inhibiting enzymatic breakdown. **Antagonists** prevent neurotransmitter action by blocking receptors.

When a psychoactive drug binds to a receptor it alters the normal function of that receptor. This alteration can be either:

- a) an immediate response to the presence of the drug
- b) a long-term changes in neuronal functioning (dependence), resulting from a drug being in contact with its receptor continually over a period of time, such that the neurons “adapt” to the presence of the drug.

Metabolism

Most psychoactive drugs have lipid soluble properties which are metabolised by the liver. The action of enzymes in the liver changes the drugs structure such that the lipid soluble drugs are converted to water soluble metabolites to enable their elimination from the body.

Elimination

Elimination is the process by which the body excretes the metabolites of psychoactive drugs. Primarily elimination is carried out by the filtration system of the kidneys, lungs, and skin. Body fluids such as sweat, saliva, bile, faeces and breast milk can also remove metabolites from the body.

The **half-life** of a drug refers to the amount of time that it takes to eliminate half of the concentration of the drug from the blood stream. It is an important concept to understand in psychoactive drug use, as it provides an indicator for the treatment of withdrawal and drug overdose. For example, a drug such as Diazepam (valium) has a long half-life and will not produce withdrawal symptoms for up to three days following the last dose taken. This is due to the fact that it takes a long time to be eliminated from the body. Heroin has a short half life of approximately six hours, and would be eliminated from the body in a short amount of time. Several doses of this drug would be required in a day to prevent withdrawal symptoms occurring. On the other hand, methadone has a long half-life of 24–36 hours. This makes it useful for opioid substitution therapy, as only a single daily dose needs to be taken to maintain therapeutic levels.

Tolerance

When an individual is exposed to regular doses of a psychoactive drug over time, a decreasing responsiveness, or sensitivity develops towards the drug. This decreased sensitivity can lead to higher doses of the drug being necessary to obtain the same effect formerly achieved using a lower amount. The extent to which tolerance develops varies considerably between drugs. There are several types of tolerance that the body develops with the continued presence of the drug:

Metabolic Tolerance

Metabolic tolerance occurs when the drug metabolising system becomes increasingly efficient at metabolising and eliminating the drug from the body. The peak effect of the drug and the duration of this effect will be reduced over time. The result of which, is that the desired effect is not able to be achieved at the usual dose. The individual will then often increase the dose of the drug they have been taking to achieve the desired effect.

Behavioural Tolerance

Behavioural tolerance occurs when the brain begins to compensate for the particular area of function that has been affected by the drug. The brain manages to cope with the effects of the drug by learning to use other parts to compensate for the effects of the drug on it.

CNS Tolerance

CNS tolerance occurs when the receptors in the brain become less sensitive to the effects of the drug, and therefore the drug has less effect on the body.

Reverse Tolerance

Reverse tolerance happens as the drug affects tissues in the body by causing damage. The drug effects are then altered due to the impairment of organ function. An example of this is when a person with alcohol dependence has sustained liver damage, the ability of the liver to metabolise alcohol is impaired. As a result, it takes longer for alcohol to leave their body. Consequently, the person becomes intoxicated when drinking smaller amounts of alcohol than they had previously and they can remain intoxicated over a longer period of time.

Cross Tolerance

Cross tolerance occurs when the individual is tolerant to a drug and shows tolerance to other drugs in the same drug classification. For example, a person who has developed a tolerance to one opioid such as morphine will also have a tolerance to heroin (Julien, R.M., Advokat, C.D. and Comaty, J.E. 2010, pp. 336).

Interested in more? Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). Chapters 1, 2, In *A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs*. New York: Worth Publishers.

Substance Dependence

Alcohol and other drug dependence is a syndrome that develops after repeated use (over months or years) of a psychoactive substance. It is manifested by a behaviour change in which the use of a given psychoactive drug is allocated a much higher priority than other behaviours that once had higher value. Life becomes more and more focused on alcohol and other drug use. Tolerance typically develops as a neuro-adaptive response, and many persons experience withdrawal symptoms when their alcohol or drug use is reduced or stopped. Dependence involves a cluster of cognitive, behavioural and physiological changes. It exists in various degrees of severity, and is not an “all-or-nothing” phenomenon. The Diagnostic and Statistical Manual (Version 4, DSM-IV, p. 181) describes substance dependence as:

A maladaptive pattern of substance use, leading directly to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12 month period:

- 1** Tolerance as defined by either of the following:
 - a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect
 - b) markedly diminished effect with continued use of the same amount of the substance.
- 2** Withdrawal, as manifest by either of the following:
 - a) the characteristic withdrawal syndrome for the substance
 - b) the same (or closely related) substance is taken to relieve or avoid withdrawal symptoms.
- 3** The substance is often taken in larger amounts over a longer period than was intended.
- 4** There is a persistent desire or unsuccessful efforts to cut down or control substance use.
- 5** A great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors, or driving long distances), use the substance (chain smoking), or recover from its effects.

- 6** Important social, occupational, or recreational activities are given up or reduced because of substance use.
- 7** The substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g. current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption).

Factors which Influence Psychoactive Drug Effects

Influencing Factors

The same drug used by the same person, at the same dose, may cause completely different effects when used in different environments. There are a number of factors that may influence the actual effects of psychoactive drugs. These include:

- type of drug
- amount of drug taken
- dose / concentration / potency
- duration of use
- frequency of use
- route of administration
- concurrent use of other drugs
- individual characteristics e.g. Age, gender, weight, health, genetics
- mood
- tolerance
- previous drug experience
- expectations of effect
- suggestibility of the subject
- activities of the user
- place
- presence of other people.

Patterns of Drug Use

People vary in the patterns in which they use drugs. These patterns can be described on a spectrum that ranges from non-use to dependent drug use. People can move along the spectrum in any direction and stop at any point. When more than one drug is used, each different drug can be at a different point along the spectrum. For example a client may be alcohol dependent and smoke cannabis recreationally with friends less than once per month. The spectrum of drug use is illustrated in Figure 3.

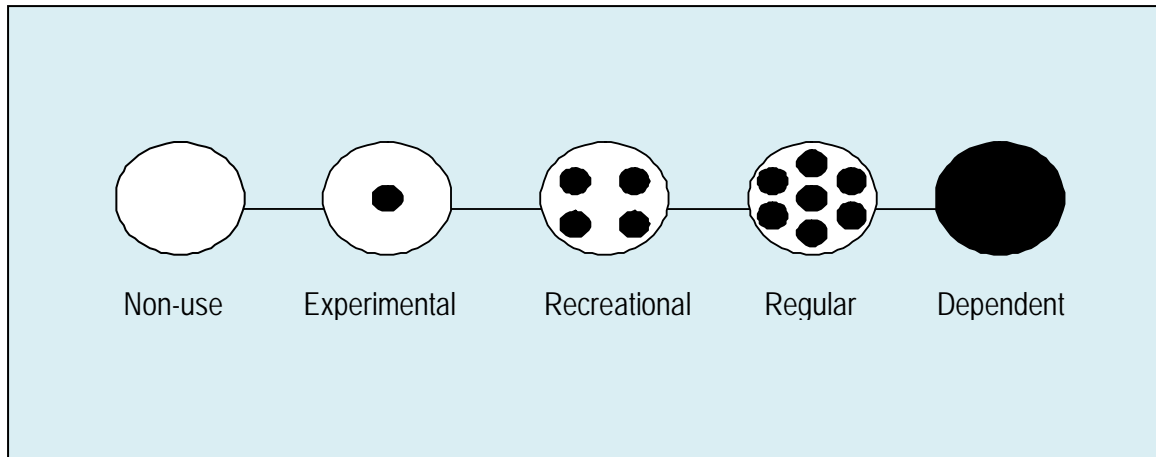


Figure 3. The Spectrum of Drug Use

Each stage of the spectrum can be readily identified by the pattern of use as follows:

1. **Non-Use:** Some people choose not to use psychoactive substances for cultural, religious, or personal reasons. Non-use also includes individuals who may have used psychoactive substances at one time, but are now abstinent from AOD use.
2. **Experimentation:** People are often curious about drugs. They may have observed the effects in others and want to try it out for themselves. Experimentation is limited to only minimal use. After their curiosity has been satisfied, the person may either discontinue their use or progress to another pattern of use.
3. **Occasional/Recreational Use:** This pattern of use tends to be irregular or spasmodic. There is no established pattern of use evident.
4. **Regular Use:** This pattern of use is where a person consumes a drug on a regular basis and often there is a set pattern identified. However, the individual may use regularly under certain guidelines (e.g. maintaining recommended safe levels of alcohol consumption).
5. **Dependent Use:** The individual uses regularly and has developed a dependence on the drug.

Harms of drug use

Drug related harm may be experienced either through isolated experiences of drug use or with continued or regular use. There are a number of ways drug related harm can be experienced which include:

- a change in behaviour as a result of the intoxicating effects of the drug
- acute or chronic toxic effects of the drug
- harm suffered because of the change in the priorities associated with dependent use.

Both illicit and licit drugs are considered to have potential harms associated with their use. Problems associated with specific drugs are covered further on in this module.

Key Psychoactive Drugs: Central Nervous System Depressants

Alcohol

Ethanol is the psychoactive substance in alcohol. Ethanol is classed as a sedative hypnotic drug. It is one of the oldest and most widely used drugs, and differs from other sedative hypnotic drugs because of its widespread social use.

Alcohol is measured in standard drinks, each standard drink containing ten grams of alcohol. Figure 4 shows a standard drink equivalent for some alcoholic beverages.

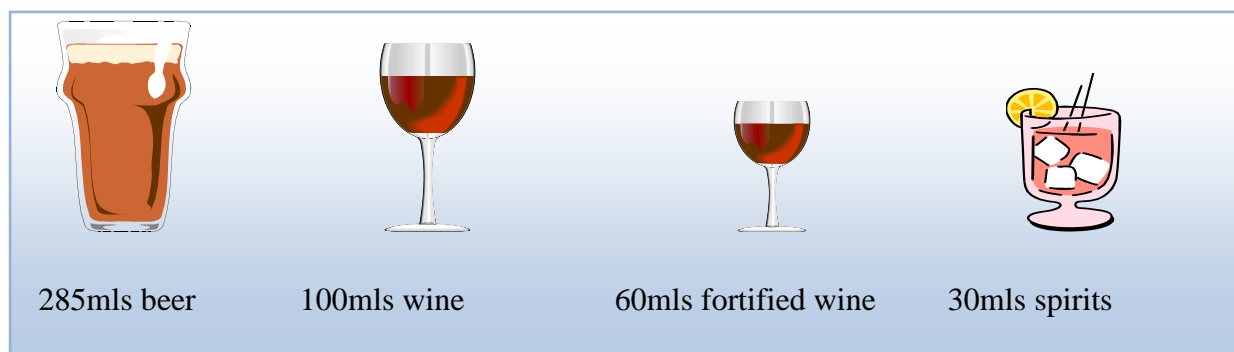


Figure 4. Standard drinks.

Alcohol as a beverage will contain different percentages of strength per volume. Levels of alcohol in the human body can be measured either by a breathalyser or a blood test. A breathalyser measures deep lung sample (the lung has a very rich blood supply) and is effective in determining blood alcohol levels (BAL).

The National Health and Medical Research Council (NHMRC, 2009) has outlined drinking guidelines to reduce the risk of alcohol related harm for both males and females. These guidelines provide information regarding drinking levels to reduce the overall risk of alcohol related harm over a person's lifetime, and lower the immediate risk of alcohol related harm. They provide universal guidance to healthy adults over 18 years of age, and specific guidance to young people and children, and pregnant and breastfeeding women.

The four NHMRC 2009 drinking guidelines can be viewed in Module 1: The Big Picture: Alcohol and Other Drugs.

Alcohol Intoxication

Intoxication occurs over time and each individual will experience intoxication according to a number of factors. These factors include the following:

- amount consumed
- environment
- the individual's previous experience
- expectations of the drugs' effects
- current levels of tolerance
- degree of dependency.

For most people who are drinking at low risk levels, their experience will often be one of mild relaxation, some loss of inhibitions, relief of anxiety and tension, and for some, drowsiness, or mild motor impairment. These effects are often pleasant for many people, and may largely explain the widespread use of alcohol as a recreational drug.

As the amount of alcohol consumed increases, several changes take place in brain functioning. Mood and personality changes may often occur because of impairment to the forebrain function (hence the happy drinker, the argumentative drinker, etc.). When impairment of the mid-brain occurs, an unstable gait, slurred speech, and general loss of body co-ordination is experienced. Some people who consume large amounts of alcohol will experience blackouts, whereby they experience an episode of impaired memory without a loss of consciousness.

Alcohol Withdrawal

Some people may experience withdrawal symptoms once they cease drinking. The severity and onset of withdrawal symptoms will depend on the level of consumption, tolerance, dependence, and the physical and psychological health of the individual. Most dependent users will experience mild to moderate withdrawal symptoms. However, some will experience severe withdrawals that can lead to delirium tremens (DT's) or other complications of withdrawal, such as seizures. Seizures usually manifest within 48 hours of ceasing drinking and are usually a single 'grand mal' type seizure. Untreated delirium tremens are life threatening.

Signs of Alcohol Withdrawal

Early recognition and treatment intervention for alcohol withdrawal symptoms can prevent the development of more severe withdrawal symptoms and delirium tremens. Symptoms of **mild to moderate** alcohol withdrawal include:

- fever
- hypertension
- tachycardia
- hyperventilation
- sweats
- agitation
- nausea
- headaches
- tremor
- anxiety
- nightmares
- restlessness
- insomnia
- vomiting.

Table 2 below outlines the complications associated with **severe** alcohol withdrawal and chronic use.

COMPLICATION	SYMPTOM
Delirium Tremens (DT's)	<ul style="list-style-type: none">• Occurs between two and five days after alcohol consumption has ceased.• Symptoms include disorientation, tremors, paranoia, fluctuating blood pressure, and hallucinations.• Potentially life-threatening.
Seizures	<ul style="list-style-type: none">• Usually occurs within the first 48 hours of drinking cessation.
Wernicke's Encephalopathy	<ul style="list-style-type: none">• Caused by inadequate intake or absorption of thiamine.• Symptoms include staggering, agitation, confusion, abnormal eye movement, and drowsiness.

Table 2. Complications and Severe Withdrawal Symptoms.

Side Effects and Toxic Effects

Long-term ingestion of alcohol can cause the following health concerns:

- liver damage
- pancreatitis
- gastritis and ulceration
- increased risk of cancers
- hypertension and alcoholic heart disease
- brain damage.

Combining alcohol with other drugs, especially other CNS depressants, can be harmful. The effects of one drug can greatly enhance the effect of the other, resulting in the potential for drug interactions, overdose, and death.

Interested in more? Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). Chapter 13, In *A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs*. New York: Worth Publishers.

Opioids

Effects of Opioids

There are a number of immediate effects experienced by an individual when an opioid drug has been used. These effects include:

- euphoria
- relief of pain
- nausea, vomiting, constipation
- drowsiness
- low blood pressure
- constriction of pupils
- shallow breathing
- unconsciousness and death can occur in overdose
- dry mouth.

If a person shows signs of opioid intoxication or overdose, do not leave them alone as they can deteriorate quickly (respiratory depression). When an overdose occurs, the situation

becomes a medical emergency that often requires cardio-pulmonary resuscitation. Naloxone hydrochloride, an opioid antagonist, is given to reverse the effects of the opioid (administered by medical personnel only).

Signs of Opioid Intoxication

- pinpoint pupils (miosis)
- 'nodding off' drowsiness/sedation
- nausea and vomiting
- dizziness
- itchy nose or face
- slurred speech
- impaired cognition
- unsteady gait
- shallow breathing
- low blood pressure
- slow heart rate
- difficult to rouse
- unconsciousness
- psychomotor retardation.

Opioid Withdrawal

The onset of withdrawal symptoms will vary according to the type of opioid being used (e.g. heroin withdrawal will commence within 8-12 hours as the half-life of heroin is short, where as methadone has a much longer half life, and withdrawal will not commence for 24 - 48 hours). Withdrawal symptoms from opioids have been described as being similar to a severe bout of influenza. However there is some debate about whether this is an accurate characterisation. Regardless, opioid withdrawal is uncomfortable but is not usually life threatening. The duration of withdrawal symptoms will vary and is likely to be 5 -7 days for heroin and for methadone from 5 - 21 days. Inaba and Cohen (2007) suggest a protracted withdrawal may continue for a number of months after abstinence has commenced.

Signs and Symptoms of Opioid Withdrawal

- dilated pupils
- watering eyes (lacrimation)
- rhinorrhoea (runny nose)
- insomnia
- elevated blood pressure
- diarrhoea
- yawning
- hot and cold flushes
- perspiration
- fatigue
- gooseflesh (piloerection).

Want to learn more? Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). Chapter 10, In *A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs*. New York: Worth Publishers.

Once a person has completed withdrawal from opioids and experienced a period of abstinence from the drug, their tolerance decreases. A dose that was previously tolerated by the user can become fatal once their tolerance to that drug has decreased.

Benzodiazepines

Benzodiazepines are one of the more widely prescribed psychoactive drugs. They have a large therapeutic index - that is the difference between the amount of drug which produces sedation and the amount required to overdose.

Effects of Benzodiazepines

- poor motor co-ordination
- sedation
- anxiolytic (anti-anxiety)
- unsteady gait
- lethargy
- muscle relaxation
- anticonvulsant
- confusion
- stupor
- slurred speech.

Tolerance and dependence to benzodiazepines can occur in as little as two weeks, even when only taking a therapeutic dose. Some individuals may experience a paradoxical reaction to the drug where a state of agitation or excitement occurs, instead of a sedative or anxiolytic effect. Benzodiazepines can become lethal in an overdose when combined with other psychoactive drugs, in particular CNS depressants such as alcohol or opioids.

Different benzodiazepines have a different half-life. The onset of withdrawal symptoms may be varied and will be determined by the particular benzodiazepine being used. Table 3 shows the half-life of a number of benzodiazepines.

DRUG	HALF-LIFE
Alprazolam (Xanax)	6 – 12 hours
Clonazepam (Rivotril)	20 – 50 hours
Diazepam (Valium)	30 - 60 hours
Flunitrazepam (Rohypnol)	20 - 30 hours
Lorazepam (Ativan)	10 - 20 hours
Oxazepam (Serepax)	5 - 10 hours
Temazepam (Temaze)	7 - 10 hours

Table 3. Benzodiazepine Half-life (adapted from Inaba et al. 2007).

Signs and Symptoms of Benzodiazepine Withdrawal

There are many signs and symptoms associated with benzodiazepine withdrawal. These are listed as follows:

- irritability
- fatigue
- poor concentration
- decreased appetite
- palpitations
- sensitivity to touch
- rebound anxiety
- insomnia
- confusion and disorientation
- blurred vision
- headache
- muscle weakness
- agitation
- auditory hallucinations
- sense of fear
- emotional bluntness
- disturbances of perception
- seizures may occur.

Withdrawal symptoms can be long and protracted and vary day to day. Residual withdrawal symptoms may be present in some individuals for several months.

Want to learn more? Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). Chapter 7, In *A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs*. New York: Worth Publishers.

Cannabis

Cannabis contains at least 60 active chemicals collectively known as cannabinoids. The strength (potency) of cannabis varies widely, due to the different conditions in which it was grown. Two of the constituents, tetrahydrocannabinol (THC) and cannabidiol (CBD), are responsible for the psychoactive effects of cannabis. Research has shown that CBD has antipsychotic and anxiolytic properties that can offset some of the psychoactive effects of THC. Cannabis is lipid soluble and leaves the bloodstream readily. It is distributed into the fatty tissues of the body where its metabolites can remain detectable in long term users for up to several months after ceasing use.

Effects of Cannabis

The effects of cannabis are described as:

- feelings of self confidence, euphoria, well being and relaxation
- altered perception of time and space, heightened perceptions of taste, smell, touch and hearing
- difficulties with concentration and memory
- psychomotor impairment
- delusions and hallucinations (at high doses).

Tolerance and dependence develop with prolonged and habitual use. Withdrawal symptoms manifest when dependent use ceases.

Cannabis Withdrawal Symptoms

Withdrawal symptoms generally occur after one to three days of ceasing cannabis use and can last up to 14 days. Symptoms of withdrawal may include the following:

- anger, aggression, irritability
- anxiety, nervousness
- craving
- nausea
- weight change/decreased appetite
- headache
- poor concentration
- sleep difficulties, including strange dreams
- physical discomfort: stomach pains, chills, sweating, or shakiness.

Want to learn more? Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). Chapter 14, In A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs. New York: Worth Publishers.

(Source: NPIC 2009)

Volatile Substances

Volatile substance use (VSU) is described as the deliberate inhaling of vaporous substances for the purpose of becoming intoxicated. Volatile substances fall into three categories being solvents, gases, and aerosols. Commonly used volatile substances are shown in Table 4 below.

CATEGORY	EXAMPLES
Solvents	Correction fluid and thinner Dry-cleaning fluid Modeling glue Nail polish remover Petrol Paint stripper Superglue
Gases	Fire extinguisher Fuel gas and lighter fluid
Aerosols (containing propellants and/or solvents)	Deodorants Hairspray Vegetable oil sprays Spray paint

Table 4. Categories of Common Volatile Substances. (Source: NHMRC 2011)

Volatile substances are administered using one of the following methods:

- sniffing (inhaling through the nose)
- huffing (stuffing an inhalant soaked rag into the mouth)

- bagging (inhaling fumes from a plastic bag)
- chroming (inhaling spray paint fumes from a spray can).

Effects and Intoxication

The effects of the solvents vary according to the particular solvent being used. However, there are similar effects that occur with most of these substances such as:

- euphoria
- nausea
- vomiting
- sense of invulnerability
- elation
- perceptual distortions
- slurred speech
- unsteady gait
- drowsiness
- confusion
- disorientation.

Withdrawal Symptoms

It is thought that chronic VSU may lead to dependence with a recognised withdrawal syndrome. However, symptoms are generally not severe and may last up to one week in heavy chronic users. Withdrawal symptoms may include:

- runny eyes or nose
- fast heart beat
- trembling
- irritability
- nausea
- trouble concentrating
- headaches
- anxiety
- depressed mood
- cravings
- hallucinations
- trouble sleeping.

(Source: NHMRC, 2011)

Want to learn more? Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). Chapter 13, In A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs. New York: Worth Publishers, (pp. 464-470).

Key Psychoactive Drugs: Central Nervous System Stimulants

Nicotine

Nicotine is the primary psychoactive substance in tobacco. Tobacco use is found to be significantly higher (up to 80 %) in persons who use alcohol and other drugs. This is approximately four times greater than the incidence of use found in the general population (Kenny et al., 2009).

Effects of Nicotine

The nicotine from tobacco smoke is readily absorbed from the lungs, buccal and nasal mucosa, skin, and gastrointestinal tract. Smokers have control of the dose of nicotine they use through methods such as depth of inhalation, frequency of inhalation, amount of time the smoke is held in the lungs, and the number of cigarettes smoked. Smoking is known to increase blood pressure and heart rate.

Withdrawal Symptoms of Nicotine

The half-life of nicotine in a chronic smoker is two hours. To prevent withdrawal symptoms, the smoker requires frequent administration of the tobacco product.

Withdrawal symptoms from nicotine are usually not life-threatening and include:

- depressed mood
- insomnia
- irritability, frustration, or anger
- difficulty concentrating
- anxiety
- increased appetite or weight gain
- cravings

Psychostimulants

Psychostimulants increase the activity of the neurotransmitters of the CNS. The following drugs are psychostimulants:

- amphetamine
- methamphetamine
- cocaine
- methylene-dioxy-methamphetamine (MDMA).

Effects of Psychostimulants

Psychostimulants have both short term and long term effects on an individual as follows:

Short term effects

- euphoria
- increased well being, confidence and physical activity
- increased blood pressure
- increased pulse
- increased temperature (hyperthermia)
- pupil dilation
- loss of appetite
- dry mouth.

Long term effects

- insomnia
- depression
- headaches
- muscle stiffness.

Withdrawal Symptoms of Amphetamine

Individuals experiencing amphetamine withdrawal who are also exhibiting symptoms of depression and/or suicidal ideation should be referred promptly for a mental health assessment. Amphetamine withdrawal symptoms include:

- exhaustion
- depression
- increased appetite
- hypersomnia
- irritability
- strong cravings
- sleep disturbances
- poor concentration
- mood swings
- headache.

Cocaine

Effects of Cocaine

Cocaine is a short acting stimulant derived from the psychoactive alkaloid of the coca plant. Cocaine is also an effective topical anaesthetic and therefore can cause numbing of the oral and nasal tissues. Effects of intoxication are similar to amphetamines, with a heightened sense of grandiosity.

Withdrawal Symptoms of Cocaine

The withdrawal from cocaine is similar to amphetamine withdrawal, and initially manifests in a 'crash' which lasts from several hours to days. This 'crash' is characterised by depression, hypersomnia, fatigue, and craving. Less intense symptoms may last from weeks to months.

MDMA (Ecstasy)

MDMA (Methylenedioxymethamphetamine) or 'Ecstasy' is structurally related to amphetamine. Ecstasy is available in tablet form, with the onset of its effects being reached within 30 minutes and lasting up to eight hours.

Effects of MDMA (Ecstasy)

- euphoria
- feeling closeness to others
- heightened sociability
- sharpened sensory perception
- extraversion
- positive mood state
- feelings of peacefulness or tranquility
- heightened state of consciousness
- increased pulse and temperature
- loss of appetite
- excess energy
- wakefulness
- hallucinations (in some cases).

Psychostimulant toxicity can occur following protracted (either long-term use or binging) use of psychostimulants, and should be treated in an emergency medical setting. Significant consequences of psychostimulant toxicity can include: psychosis, hyperthermia, cerebrovascular and neurological complications, cardiovascular complications, electrolyte disturbances, hypoglycaemia, rhabdomyolysis, and serotonin toxicity (Queensland Health, 2008).

Want to learn more? Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). Chapter 11, In *A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs*. New York: Worth Publishers.

Key Psychoactive Drugs: Hallucinogens

LSD (Lysergic Acid Diethylamide)

Hallucinogens or psychedelic drugs cause changes in perception, thought and mood. These drugs act on various neurotransmitters in the CNS and may produce visual hallucinations or out-of-body experiences.

Effects of LSD

The effects of LSD are described as:

- altered perception, thought, emotions
- unusual and vivid perception on shapes, colours and sounds
- blurred boundary between self and surroundings
- dizziness
- weakness
- nausea.

There is no evidence of development of dependence and no withdrawal symptoms following cessation of LSD use.

Want to learn more? Julien, R.M., Advokat, C.D. and Comaty, J.E. (2010). Chapter 15, In A Primer of Drug Action: A comprehensive guide to the actions, uses, and side effects of psychoactive drugs. New York: Worth Publishers.

Pregnancy and Drug Use

Alcohol and drug use during pregnancy puts both the mother and the foetus at risk. Psychoactive drugs cross the placental barrier, exposing the foetus to the same drug effects that the mother experiences. The foetus has an immature metabolism and the drug may persist in its system at a higher concentration over a longer period of time than that experienced by the mother. The foetus may also experience harm from maternal substance use that extends beyond birth. Some psychoactive drugs have specific effects when use occurs during pregnancy. It is recommended that dependent mothers be referred to a GP or ATODS program to decrease the risk associated with maternal alcohol and other drug use on the foetus.

Alcohol

Drinking alcohol during pregnancy increases the incidents of miscarriage and infant mortality. The harmful effects of alcohol on the foetus can range from mild to severe, and appear to be related to the level and rate of maternal consumption. Foetal effects range from a mild decrease in cognitive functioning to foetal alcohol syndrome (FAS) at the severest end of the scale (de Crespigny, 2003). FAS is a developmental disorder that occurs in the babies of mothers who have high blood levels of alcohol during critical stages of foetal development (Julien, R.M., Advokat, C.D. and Comaty, J.E. 2010).

Features of FAS include:

- restricted foetal growth resulting in lower birth weight and small stature
- small head circumferences, smaller brain development, and size
- intellectual impairment
- behavioural problems
- facial deformities such as flat mid-face, lower nasal bridge, small chin, thin upper lip and shorter eye openings
- higher incidence of other abnormalities such as spina bifida, cleft palate, and heart disease.

It is currently recommended that women contemplating pregnancy and pregnant women do not consume alcohol. If there is concern about potential withdrawal complications or

alcohol-related harm, women should be directed to seek expert advice from specialist medical services.

Opioids

Opioids do not have the same tissue toxic effects as alcohol. However, other risks to the foetus are associated with opioid dependency, complications of intravenous drug use, and overdose. Opioids cross the placental barrier. Therefore, if the mother is dependent on opioids the newborn will also be opioid dependent. Following birth, neonatal withdrawal symptoms will need to be treated medically.

Other complications of maternal opioid use are:

- risk of HIV, hepatitis C and hepatitis B viral infections
- intrauterine growth restriction (IUGR)
- miscarriage
- intrauterine foetal death (IUFD)
- neonatal abstinence syndrome (NAS)
- premature birth.

It is recommended that opioid dependent mothers be maintained on an opioid treatment program to decrease the risks of maternal opioid use on the foetus (MCDS, 2006).

Benzodiazepines

Regular benzodiazepine use in pregnancy may be associated with a neonatal abstinence syndrome of delayed onset (MCDS, 2006). Babies may show a variety of symptoms due to benzodiazepine intoxication or withdrawal, such as:

- respiratory distress
- poor sucking
- hypotonia (poor muscle tone)
- poor temperature regulation.

(Source: de Crespigny, 2003)

Cocaine

Cocaine use during pregnancy is associated with an increased risk of:

- IUGR
- premature membrane rupture
- placental abruption
- low birth weight
- still birth.

(Source: MCDS, 2006; de Crespigny, 2003).

Volatile Substances

Use of volatile substances during pregnancy may cause:

- low birth weight
- increased risk of miscarriage
- increased risk of sudden infant death syndrome (SIDS).

(Source: MCDS, 2006)

Psychoactive drug use during pregnancy poses very real problems, both for the mother and the baby. Overdose is a major risk that can result in the death of the mother, the baby, or both. Any psychoactive drug use during pregnancy is not recommended. However if psychoactive drug use is identified in pregnancy, specialist management is recommended.

Conclusion and Course Completion

Understanding the pharmacology of psychoactive drugs helps us understand and work with clients who have alcohol and other drug issues. It is important to understand the effects of psychoactive drugs, why a person chooses a certain drug over another and what the implications for tolerance and withdrawal.

Course Completion Certificate

To complete this module and **receive a completion certificate**, the following multiple choice questions must be completed and submitted to InSight. Please ensure you follow the guidelines for submission.

Guidelines:

- Your full name
- Work place address
- Date of submission
- Module number
- Evaluation of the module attached (last page of this module)

Mailed or faxed to :

InSight: Centre for Workforce Development
Training and Education
Alcohol and Drug Service
270 Roma Street
Brisbane Qld 4000
FAX NO: (07) 3837 5716

Psychoactive Drugs Module Assessment

Assessment Questions

Please circle your response to the following multiple choice questions.

1. Which of the following is not a psychoactive drug?

- (a) Cannabis
- (b) Caffeine
- (c) Ecstasy
- (d) Paracetamol

2. What is the significance of a drug half life?

- (a) It indicates possible drug interactions
- (b) It represents time to peak drug effects
- (c) Assists in determining onset of withdrawal
- (d) none of the above

3. How many standard drinks are contained in a 150ml glass of wine?

- (a) 1
- (b) 1.5
- (c) 2
- (d) 2.5

4. Which of the following drugs is not classified as a stimulant?

- (a) Nicotine
- (b) Cannabis
- (c) Ecstasy
- (d) Caffeine

5. Which of the following drugs is not classified as a depressant?

- (a) Alcohol
- (b) Cannabis
- (c) Benzodiazepines
- (d) LSD

6. Which of the following routes of drug administration would take the longest period of time for a drug to be absorbed into the blood stream?

- (a) Snorting/Sniffing
- (b) Injecting
- (c) Oral
- (d) Inhalation

7. If you were counselling an intravenous drug user, what strategies could you convey to reduce the risks of harm occurring?

- (a) Use clean injecting equipment
- (b) Use in a safe place, and not alone
- (c) Don't mix with other drugs
- (d) All of the above

8. Mandy goes out clubbing with friends most Friday nights. Recently one of Mandy's friends gave her some ecstasy. Mandy has decided not to use ecstasy again. Where would Mandy's experience of ecstasy use most likely be placed on the spectrum of drug use?

- (a) Abstinence
- (b) Experimentation
- (c) Tolerance
- (d) Regular use
- (e) Dependent use

9. Bob likes to come home from work and have a drink to unwind. Recently he has found he no longer experiences the same relaxing effect that one drink used to have. Which of the following would describe Bob's increased need to have a second drink to help him unwind?

- (a) Dependence
- (b) Intoxication
- (c) Tolerance
- (d) Abuse

10. Withdrawal symptoms can be severe and life threatening for some people. Which of the following drugs can produce life threatening withdrawal symptoms if not treated correctly?

- (a) Alcohol
- (b) Benzodiazepines
- (c) None of the above
- (d) Both alcohol and benzodiazepines

Module Evaluation

(please attach this evaluation to your assessment)

Your name:

Date:

Module number: **2**

Module name: **Psychoactive Drugs**

Please tick the box where appropriate:

After completing this module:	None	Limited	Some	Very Good
<i>My understanding of how drug function in the body is:</i>				
<i>My understanding of the different drug classifications is:</i>				
<i>My understanding of the different routes of drug administration is:</i>				
<i>My understanding of common drugs and their effects is:</i>				
	Not at all	Limited	Somewh at	Very
<i>Was the module useful?</i>				
<i>Was the eLearning material readily accessible?</i>				

As an introductory in-service what other information would have been useful?

Thank you!

Remember to attach this evaluation to your assessment

References and Further Reading

Diagnostic and Statistical Manual of Mental Disorders, 4th Ed. (1994). American Psychiatric Association, Washington, DC.

De Crespigny, C., Talmet, J., Modystack, K., Cusack, L. and Watkinson, J. (2003) Alcohol, Tobacco and Other Drugs: Guidelines for Nurses and Midwives. Flinders University and Drug and Alcohol Services Council, South Australia

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