VOLUME C
Pharmacological Treatment for Drug Use Disorders
Drug Treatment for Special Populations
**MODULE 1**

**Dependence Basics**

- Drug use, addiction and dependence
- Management of Alcohol & benzodiazepine dependence
- Psychostimulants
- Volatile substances, cannabis and new psychoactive substances

**MODULE 2**

**Basics of Opioid Dependence. Pharmacotherapy Options**

- Opioids: Definition, effects and treatment implications
- Opioid dependence treatment with Methadone
- Opioid dependence treatment with Buprenorphine
- Opioid antagonist treatment

**MODULE 3**

**Special Populations: Co-Occurring Disorders, Women and Young People**

- Co-occurring psychiatric and substance use disorders
- Women: substance use disorders and treatment issues
- Young people: substance use disorders and treatment issues
MODULE 1
DEPENDENCE BASICS
Training goals

- Increase knowledge of the medical and drug dependence-related problems associated with alcohol, benzodiazepines, psycho stimulants, volatile substances and cannabis

- Learn medical detoxification and post detoxification pharmacotherapies appropriate to treat these substance use disorders

- Promote the use of these techniques by practitioners and organizations
Module 1

Drug Dependence basics

1. Drug use, addiction and dependence
2. Management of Alcohol & benzodiazepine dependence
3. Psychostimulants
4. Volatile substances, cannabis and new psychoactive substances
Pre-assessment
Icebreaker
Workshop 1

Drug use, addiction and dependence
At the end of this workshop you will be able to:

► Explain basic principles and concepts of drug use and dependence
► Understand the basic pharmacology of alcohol, benzodiazepines, psychostimulants, volatile substances and cannabis
► Determine the specific role of pharmacotherapy for overdose, withdrawal treatments, maintenance treatments and relapse prevention treatments
► Describe clinical populations and treatment settings where pharmacotherapies can be used
Addiction basics
What is addiction?

- Advances in science have revolutionized our fundamental views of drug use, dependence and addiction.

- Decades of research have revealed addiction to be a disease that alters the brain.
Addiction is a brain disease, characterised by:

► Compulsive behaviour
► Continued use of drugs despite negative consequences
► Persistent changes in the brain’s structure and function
In this training, “addiction” will be the term used to refer to the pattern of continued use of drugs despite pathological behaviours and other negative outcomes.

“Dependence” will only be used to refer to physical dependence on the substance as indicated by tolerance and withdrawal as described above.
Addiction as a brain disease

► Addiction is a chronic, often relapsing brain disease that causes compulsive drug seeking and use, despite harmful consequences to the addicted individual and to those around him or her.

► Although the initial decision to take drugs is voluntary for most people, the brain changes that occur over time challenge an addicted person’s self control and hamper his or her ability to resist intense impulses to take drugs.
Drug addiction as a chronic medical condition

- Addiction is similar to other chronic (c/c), relapsing diseases like diabetes, asthma/heart disease
- Drug addiction can be managed successfully
- As with other c/c diseases, it is not uncommon for a person to relapse and begin using drugs again
- Relapse does not signal treatment failure – it indicates that treatment should be reinstated or adjusted to help the individual regain control and recover
Addiction is a lot like other diseases

- It is PREVENTABLE
- It is TREATABLE
- It CHANGES BIOLOGY
- If UNTREATED, it can LAST A LIFE TIME
Drug addiction as a chronic medical condition

Why is addiction treatment evaluated differently? Both addiction and chronic medical condition require ongoing care.

Hypertension Treatment

Addiction Treatment

Severity of condition

Stage of treatment
Addiction as a complex disease influenced by multiple entangled factors

- Biology/genes
- Environment
- DRUG
- Brain mechanisms
- ADDICTION
Addiction is a development disease that starts in adolescence and childhood

(National Epidemiologic Survey on Alcohol and related conditions, 2003)
Addiction is, fundamentally, a brain disease,

...BUT

It is not JUST a brain disease.
Why do people initiate drug use?
Let’s reflect!

Think of the patients/clients in your treatment facility:

► What kind of life experiences have they had?

► What reasons do they name for initiating drug use?

► Do you think there are some other reasons behind their drug use?
Why do people initiate drug use?

► To feel good, to have novel:
  – Feelings
  – Sensations
  – Experiences
  – And to share them

► To feel better, to lessen:
  – Anxiety
  – Worries
  – Fears
  – Depression
  – Hopelessness
Why do people use drugs?

Illicit drugs engage MOTIVATION and PLEASURE pathways of the brain.
**Why do people initiate drug use?**

<table>
<thead>
<tr>
<th>Drug use INITIATION starts through:</th>
<th>Key MOTIVATORS &amp; conditioning factors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Vulnerability conditions due to abuse, violence and neglect in early childhood</td>
<td>• Stress/pain amelioration</td>
</tr>
<tr>
<td>• Exposure to abuse, neglect and violence in early childhood</td>
<td>• Functional (purposeful)</td>
</tr>
<tr>
<td>• Peer pressure</td>
<td>• Fun (pleasure)</td>
</tr>
<tr>
<td>• Personality disorder</td>
<td>• Psychiatric disorders</td>
</tr>
<tr>
<td>• Comorbid psychiatric disorder</td>
<td>• Social/educational disadvantages</td>
</tr>
<tr>
<td>• Experimental use</td>
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</tbody>
</table>
How are drugs able to affect brain chemicals?

Drugs can be “imposters” of brain messages.
Dopamine

Basis for motivation, reward and addiction

► Movement
► Motivation
► Addiction
► Reward and well-being
Dopamine

Dopamine is a basis for:

► Movement
► Motivation
► Reward and well-being
► Addiction
Dopamine for neurotransmission
Dopamine neurotransmission from natural rewards & drugs

Nicotine increases dopamine release in a synapse
Increase in brain dopamine levels

Effects of drugs on dopamine release

**Amphetamine**

- Accumbens

**Cocaine**

- DA
- DOPAC
- HVA

**Nicotine**

- Accumbens
- Caudate

**Morphine**

- Dose:
  - 0.5 mg/kg
  - 1.0 mg/kg
  - 2.5 mg/kg
  - 10 mg/kg

*Di Chiara and Imperato, PNAS, 1988*
Dopamine is only PART of the story.

Scientific research has shown that other neurotransmitter systems are also affected:

► Serotonin (regulates mood, sleep, etc.)
► Glutamate (regulates learning and memory, etc.)
Why can’t people stop drug use?
Why can’t people just stop drug use?

When people first try drugs, it is usually a voluntary decision…

…but after using the drug for a while, it is no longer voluntary!
Why can’t people stop?

Because their brains have been re-wired by drug use
Brain pathways are affected by drugs

- Binge and intoxication
- Withdrawal and negative affect
- Stress and reward
- Response to drug
- Preoccupation and anticipation

Neuroadaptations
- Neurocircuits ↔ Synaptic systems ↔ Molecules ↔ Epigenetics
Drug use changes brain

These changes are difficult to undo and may last a long time

► Prolonged drug use changes the brain in fundamental ways that reinforce drug taking and lead to addiction dependence

► Drug use changes both the structure of the brain and its functionality

► Exposure to some drugs can change the structure of neurons in the brain

► Repeated drug exposure also changes brain function

► Decrease in Dopamine transporter activity, e.g. Methamphetamine
What are the implications?

Brain changes resulting from prolonged use of drugs may compromise mental and motor function.
Circuits involved in drug abuse and addiction

All of these brain regions must be considered in developing strategies to effectively treat addiction.
Changes to brain circuit lead to impaired control over drug use

Addiction changes brain circuits
Why can’t people just stop drug use?

Prolonged drug use changes the brain in fundamental and long-lasting ways!
What factors affect vulnerability to drug use initiation, dependence and addiction?

Vulnerability is a product of the interaction of a person’s biology including their genes, environment, and age. These interactions are complex and difficult to tease apart.
Vulnerability: biological factors

► **Dopamine Function:** Studies have shown that individual differences in a marker of dopamine function can influence a person’s susceptibility to continued drug use.

► **Genetics:** 40-60% of the predisposition to addiction can be attributed to genetics. Risk conveyed by genes + increased impact of environment.

► **Comorbidity:** The prevalence of addiction is higher in those with comorbid mental disorders. Substance users have higher rates of other comorbid mental illnesses. Although comorbidity is common, causality is more difficult to demonstrate.
Vulnerability: environmental factors

- Stress
- Early physical/sexual abuse
- Witnessing violence
- Peers who use drugs
- Drugs availability
Conclusion from research studying Social Rank & Dopamine receptor expression:

- Research has shown that those primates that were at the top of their social rank – experiencing less stress and more access to natural rewards – expressed more dopamine receptors and took less cocaine than did submissive monkeys.
Addiction process – four stages

Stage 1: Experimentation

Stage 2: Active seeking

Stage 3: Preoccupation

Stage 4: Dependence
Where are we so far?

- What is addiction?
- What common characteristics are there between addiction and other chronic diseases?
- Why do people start using drugs?
- Why is it hard for people to stop using drugs?
- Which factors contribute to vulnerability for initiating drug use?
Break
Psychoactive drugs
Psychoactive drugs are generally defined as substances that alter:

- Mood
- Cognition (thoughts)
- Behaviour
Psychoactive drugs

- Affect mental processes and behaviour
- Affect thought processes and actions
- Alter perceptions of reality
- Change level of alertness, response time, and perception of the world
- Achieve effects by interacting with the central nervous system (CNS)
Psychoactive drug use

- Is a common activity
- Is part of a range of human behaviours
- Can be classified in many ways, including legal status, drug effects
- Alters mood or consciousness, although there are other ways to achieve this:
  - e.g., skydiving, meditation, extreme (and non-extreme) sports, sex. Children, for example, love to alter their consciousness by spinning around.
Views about alcohol or drug related issues

Our thinking about alcohol and other drug (AOD) related issues is informed by factors such as:

► Experience
► Culture
► Education
► Religion
► Family/environment
► Legislation
Psychoactive drugs may be classified according to their:

- **Status**
  - Legal
  - Chemical
  - Medical
  - Social

- **Action and properties**
  - Depressant
  - Stimulant
  - Hallucinogenic
  - etc.
The following classification is based on the psychoactive effects of drugs. It is intended as a general guide to better understand relative drug effects, harms and potential withdrawal features.

Variations in effects and intensity for drugs in the same category may occur for drugs within the same class.
# Classifying psychoactive drugs

<table>
<thead>
<tr>
<th>Category</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depressants</strong></td>
<td>- <strong>Slow down the CNS</strong> and body functions, such as heart rate, breathing, blood pressure, etc. and behaviour, e.g., slow/uncoordinated movements, slurred speech, etc.</td>
</tr>
<tr>
<td><strong>Stimulants</strong></td>
<td>- <strong>Speed up the CNS</strong> and body functions. It can be noticed on mood – happy, excited, euphoria; cognitive performance – better concentration, increased alertness; and behaviour – insomnia, fast movements/speech, etc.</td>
</tr>
<tr>
<td><strong>Hallucinogens</strong></td>
<td>- <strong>Alter states of perception and feelings</strong>, there are 3 types. <strong>Psychedelics</strong>: feeling new ways of relating with their inner mind. <strong>Dissociative</strong>: feelings of being separated from one’s body and environment. <strong>Delirant</strong>: confusional state and problems to focus attention.</td>
</tr>
</tbody>
</table>
## Classifying psychoactive drugs

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<thead>
<tr>
<th>Depressants</th>
<th>Stimulants</th>
<th>Hallucinogens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol (at high dose)</td>
<td>Alcohol (at low dose)</td>
<td>LSD, DMT</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Amphetamines</td>
<td>Mescaline</td>
</tr>
<tr>
<td>Opioids</td>
<td>Methamphetamine</td>
<td>PCP</td>
</tr>
<tr>
<td>Solvents</td>
<td>Cocaine</td>
<td>Ketamine</td>
</tr>
<tr>
<td>Barbiturates</td>
<td>Nicotine</td>
<td>Cannabis (high doses)</td>
</tr>
<tr>
<td>Cannabis (low doses)</td>
<td>Khat</td>
<td>Magic mushrooms</td>
</tr>
<tr>
<td></td>
<td>MDMA</td>
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</tbody>
</table>
Drug use and health
Drug use and health

Patients with drug problems:

► Often have multiple health and social problems

► Expect doctors to ask and provide information about alcohol and drug issues – failure to inquire may lead to medical malpractice in some situations
Types of problems

- Different patterns of drug use result in different types of problems
- Because individuals have different genetic make ups and early experiences, they may respond differently to drugs and have a different risk for drug use disorders and dependence
- Drug use may affect all areas of a patient’s life and problems are not restricted to dependent drug use
The impact of dependence can be far-reaching

- Cardiovascular disease
- Stroke
- Cancer
- HIV/AIDS
- Hepatitis B and C
- Lung disease
- Mental disorders
1 out of 3 U.S. AIDS deaths are related to drug use
Types of problems: Thorley’s Model

**Intoxication**
- Accidents / injury
- Poisoning / hangovers
- Absenteeism
- High-risk behaviour

**Dependence**
- Impaired control
- Drug-centred behaviour
- Isolation / social problems
- Withdrawal symptoms and psychiatric problems
- Health Problems

**Regular/excessive use**
- Health
- Finances
- Relationships
- Child neglect
Important terminology

- Harmful use
- Physical dependence vs. addiction
- Psychological craving
- Tolerance
- Withdrawal symptoms
- Neurotransmitters and receptors
What is harmful use? (ICD-10)

A pattern of psychoactive substance use that is damaging to physical and/or mental health.
Psychological craving is a strong desire or urge to use drugs. Cravings are most apparent during drug withdrawal.
Tolerance is a state in which a person no longer gets the expected responses from a drug as it was experienced before. A higher dose is now required to achieve the same effect.
Withdrawal

A period during which somebody addicted to dependent on a drug or other addictive substance reduces their use or stops taking it, causing the person to experience painful or uncomfortable symptoms

OR

A person takes a similar substance in order to avoid experiencing the effects described above
Withdrawal

When a drug is removed, physical and/or mental disturbances may occur, including:

► Physical symptoms
► Emotional problems
► Cognitive and attention deficits
► Aggressive behavior
► Hallucinations
► Convulsions
► Death
DSM-V criteria for substance use disorder

Presence of at least 2 of 11 criteria which are clustered into 4 groups:

1. Impaired control
   (1) Substance taken more than or for longer than intended
   (2) Unsuccessful efforts to cut down or stop
   (3) Great deal of time spent to get/ use/recover from the drug
   (4) Craving

2. Social impairment
   (5) Failure to fulfill major obligations due to use
   (6) Continued use despite problems caused/exacerbated by use
   (7) Important activities given up/reduced because of use
DSM-V criteria for substance use disorder

3. Risky use
   (8) Recurrent use in hazardous situations
   (9) Persistent use despite physical /psychological problems due to use

4. Pharmacologic dependence
   (10) Tolerance
   (11) Withdrawal
ICD-10 criteria for dependence

Dependence

3 or more of the following:

a) Strong desire or sense of compulsion to take the substance

b) Difficulties in controlling substance-taking behaviour in terms of its onset, termination, or levels of use

c) A physiological withdrawal state

d) Evidence of tolerance

e) Progressive neglect of alternative pleasures or interests

f) Persisting with substance use despite clear evidence of overtly harmful consequences
Since addiction changes brain circuitry, making it hard to "apply the brakes" to detrimental behaviours, people affected by drug use disorders “can't just quit”, treatment is essential.

Treatment can work.

Behavioural therapies can engage people in treatment, modify their attitudes and behaviours related to drug use and increase their life skills.

Medications are now available to treat opioid, alcohol and tobacco addiction, while others are on the horizon.

Behavioural therapies can enhance the effectiveness of these medications and can help people stay in treatment longer.
Full recovery from addiction

Full recovery is a challenge, but it is possible

Decades of research bears this out…
Extended abstinence predicts sustained recovery

Duration of abstinence at year 7

- 1 to 12 months (n=157; OR=1.0)
- 1 to 3 years (n=138; OR=3.4)
- 3 to 5 years (n=59; OR=11.2)
- 5+ years (n=96; OR=11.2)
Recovery of brain dopamine transporters

Partial Recovery of Brain Dopamine Transporters in Methamphetamine (METH) Abuser After Protracted Abstinence

Normal Control  METH Abuser (1 month detox)  METH Abuser (24 months detox)
Treating bio-behavioural disorder must go beyond just fixing the chemistry –

**We need to treat the whole person!**

In social context:

- Pharmacological treatments (medications)
  - medical services
- Behavioural therapies
  - social services
Treatment of biobehavioural disorder

Treating a biobehavioural disorder must go beyond just fixing the chemistry – we need to treat the whole person!

Pharmacological treatments (medications)

Behavioural treatments

Medical services

Social services

In social context
Let’s think!

Think of your experience:

► Which substances do your patients/clients most commonly use?

► What effects on their health have you noticed?
Questions
Wrap-up

► What is addiction? What common characteristics does it share with other chronic diseases?
► Why people cannot easily stop drug use?
► How do drugs affect the brain?
► What are biological and environmental factors of vulnerability to drugs?
► What are the components of treating biobehavioural disorders?
Thank you for your time!
End of workshop 1