Substance Use Disorders and Cognition

Ms Nikki Ridley and Dr Adrienne Withall
Dementia Collaborative Research Centre, UNSW
Introduction

• Substance use and cognitive impairment
• Specific substances and effect on cognition
• Cognitive assessment
• Recommendations based on current evidence
Substance Use and Cognitive Impairment

- Substance use disorders in >50s predicted to double by 2020
- Some evidence that rates of cognitive disorders are rising in line with these increased use rates
- Prevalence of ARBD rising – e.g. Netherlands, Scotland
- Eastern Sydney Study of Younger Onset Dementia ~20% cases related to alcohol use (Withall & Draper, 2009).

- DH, 2008; WHO, 2007; Kok, 1991; Ramayya & Jauhar, 1997; Smith and Hillman, 1999; MacRae & Cox, 2003; Cox et al., 2004; Jacques & Stevenson, 2000
Alcohol and the brain

- Alcohol has overall depressant effect on the CNS
- Direct intoxication impairs most cognitive skills, and in excess may lead to stupor and respiratory depression
- Acute withdrawal in long-term alcohol users can result in tremor, hallucinations, seizures and fluctuating alertness
Alcohol-related brain damage

- Neuroimaging and neuropathology of heavy alcohol users show widespread white matter loss and neuronal loss in frontal cortex, hypothalamus and cerebellum.
- Lesions associated with thiamine deficiency include lesions to grey matter (paraventricular), thalamus, mammillary bodies and hippocampus.
- Some evidence for reversibility of white matter shrinkage with abstinence – accompanied by clinical improvement in cognitive and motor abilities.

Harper, 2009; Sullivan & Pfefferbaum, 2005; Zahr et al., 2011
Alcohol-related brain damage

- Two main theories of how alcohol causes brain damage
  - Neurotoxicity hypothesis
  - Thiamine deficiency

- Historically, cognitive disorders related to alcohol use have been divided based on this distinction – alcohol related dementia and Wernicke Korsakoff Syndrome

- Growing evidence for overlap between the two disorders
  - KS abnormalities in other brain regions
  - ARD chronic sub-clinical thiamine deficiency?

Torvick, 1982; Lishman, 1986; Vetreno et al., 2011;
Alcohol-related brain damage

- Lasting impairment likely relates to damage from thiamine deficiency, neurotoxicity, or a compound effect.
- Increasing use of ‘alcohol-related brain damage’ or ‘alcohol-related cognitive impairment’.
- DSM-V – Major and minor neurocognitive disorder – supersedes ‘alcohol-related dementia’ and ‘alcohol-induced persisting amnestic disorder’.

Homewood & Bond, 1999; Jauhar & Smith, 2009
Alcohol-related brain damage

- Good performance on language and semantic tasks
- Poor visuospatial skills
- Deficits on tasks of working memory, speed and executive function
- Poor verbal learning and recall, better recognition
- In extreme cases (Korsakoff Syndrome), extensive anterograde amnesia

Saxton et al., 2000; Parsons & Nixon, 1998; Munro et al., 2001
Prediction of outcome: ARBD

- Oslin & Cary (1998) suggest a 5 year history of consuming 35 std drinks/wk (men) or 28 (women) risks ARBD
- Recovery of cognitive skills seem to be related to amount of recent alcohol use and duration and abstinence, rather than life-time alcohol consumption
- Older drinkers show greater alcohol-related cognitive changes and less likely to recover function
- Females appear more vulnerable
- Education protective factor?
- Multiple withdrawals/ binge drinking risk factor
Opioids and cognition

- Heroin and methadone; prescription opioid misuse
- Immediate effects – drowsiness, slurred and slow speech, reduced coordination, impaired concentration
- Evidence for mild cognitive deficits in attention, complex working memory and verbal memory in chronic cases
- Persistent impairment with abstinence only found in executive (higher-order) functions
- Reversible structural changes with abstinence

Rapeli et al., 2006; Mitrovic et al., 2011
Cannabis and cognition

- Multiple effects on the central nervous system
- Some evidence of significant decline of cognitive abilities in users compared to healthy controls; deficits include verbal memory, executive functioning and psychomotor function
- Current body of literature provides mixed results regarding long-term effects
- Use of cannabis during critical developmental periods (adolescence) possibly relates to worse outcome
- Increased risk of psychosis, schizophrenia

Shrivastava et al., 2011; Grant et al., 2003; Dragt et al., 2010
Cannabis, cognition and the older user

- Effects of LT cannabis use on the risk of cognitive impairment amongst older users remains unknown
- Mixed data but some support for significant reductions in hippocampal volume, and abnormalities of the prefrontal cortex, cerebellum and amygdala i.e. cannabinoid receptor rich areas
- Recent lab data suggest that cannabinoids might actually reduce the risk of cognitive decline amongst older people, and AD in particular, by reducing beta amyloid aggregation
Future Directions – Tackling the Stigma

• Triple association with alcohol, mental health problems and cognitive impairment

• Clients feel the terms ARBD and Korsakoff’s are stigmatising e.g. we do not talk about “smoking-related lung cancer”
Difficulties with Cognitive Assessment

- Continued substance intake makes it difficult to distinguish acute from chronic effects ⇔ optimal assessment following abstinence, but not always achievable
- Many have comorbid physical &/or MH conditions
- May be difficult to gain informed consent
- May be difficult to gain accurate information
- May be difficult to obtain information from different agencies involved in care or from informants
Cognitive Screening Tools

• The Addenbrooke’s Cognitive Examination (ACE-R or ACE-III) is a better cognitive screen for this group than the MMSE – generally well-received and brief enough to administer despite poor motivation

• Developed to provide a brief test of cognitive functions that are sensitive to the early stage of dementia (FTD and AD)

• The Montreal Cognitive Assessment (MoCA) shows promise as a tool that is more sensitive to attentional and executive disturbances

Mioshi et al., 2006; Nasreddine et al., 2005; DSRC (2004); Dawe et al. (2002)
Benefits to assessing cognition

• Provides a baseline measure of function – monitoring of improvement with abstinence, or deterioration
• For individuals frequently in primary health services, allows us to compare general cognitive level over visits
• Allows us to compare cognitive level over the course of an admission (e.g., withdrawal stage, delirium)
• Insight into functional deficits
• Insight into strengths and weaknesses – strategies
• Referral to other agencies
• Feedback can encourage abstinence
Cognitive Screening in SESLHD

- Currently over 40 individuals have been seen for cognitive screening within the SESLHD within the last 12 months
- Majority referred for a re-screening (changes with abstinence); around 8 referred to the Memory Clinic at POW for further investigation
- Aim to develop a comprehensive network to allow monitoring of cognitive status for individuals at risk of cognitive impairment
Needs of clients with substance abuse and cognitive impairments

- Diverse, complex and fluctuating needs
- Needs span mental health services (incl. dementia, acquired brain injury, D&A) & services for older people
- Require ongoing monitoring
- Need structured, daily routines
- Maintenance of abstinence crucial
- Avoid premature placement where possible
- Need to balance right to autonomy with protection for the client and others (who also need support!)
Successful activities involve

- Knowing the person
- Tapping strengths and preserved skills
- Setting realistic goals
- Reducing demands on memory
- Promoting routine and structure
- Promoting healthy living – eating well, exercise, social and mental stimulation
What messages should we be giving about Alcohol & Cognitive Disorders?

- There is no single clear message
- In older people, the upper ‘safe limit’ for older people is 1.5 units/day or 11 units/week & binge drinking should be defined as >4.5 units in a single session for men and >3 units for women (Royal College Psychiatrists, 2011)
- In younger people, significant alcohol use (minimum 35 standard drinks per week for men, and 28 for women) for a period > 5 years may place the individual at risk for ARBD
- Brain damage – evidence for improvement of structure and function with abstinence! A positive take-home message
Thank you

Pills?
What pills?
I don't have any more pills.
Do you got any pills?

n.ridley@unsw.edu.au
a.withall@unsw.edu.au