

SUBSTANCE INDUCED NEUROCOGNITIVE DISORDER

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OBJECTIVES:

- ❖ Case presentation
- ❖ Diagnostic criteria of substance/medication-induced neurocognitive disorder
- ❖ Factors impacting neurocognitive functioning due to substance abuse
- ❖ Cognitive deficits due to few specific substances
- ❖ Consequences of cognitive impairment
- ❖ Therapeutic strategies

BASIC INFORMATION

28 yr old Caucasian Female



INCOMPETENT



AT THE TIME OF ADMISSION

- Depressed mood
- Anxiety
- Drug seeking behavior
- Chronic muscle and back pain
- No active psychotic symptoms
- History of manic symptoms in past

PAST PSYCHIATRIC HISTORY

- Bipolar I disorder, most recent episode manic
- Cannabis use disorder
- Stimulant use disorder
- Inhalant use disorder
- Sedative, hypnotic, or anxiolytic use disorder
- Three past suicidal attempts by overdosing with pills
- Hospitalized at other psychiatric hospital after one suicidal attempt.
- Previous medication trials: Lorazepam, Paliperidone, Aripiprazole, Sertraline, Paroxetine, Amitriptyline, Duloxetine, Lithium, and Valproic acid



SUBSTANCE USE HISTORY:

- Methamphetamine: Age 15 to 27
Route: IV and nasal
- Marijuana: Age 18 to 27; daily
- Inhalants: Age 18 to 22; daily
- Opiates: Since age 18; few times per week
- Benzodiazepines: Since age 18; few times per week
- Others: One time use of Psilocybin, LSD, heroin, cocaine at age 18
- Tobacco: 2PPD
- Alcohol: Patient denies drinking

Longest period of sobriety: >1 week

SOCIAL HISTORY

- Born in Kansas state and raised in Missouri
- Raised by both the parents
- Never married and no children
- Never employed
- Social security disability benefits
- Multiple legal charges related to drug possession
- History of verbal abuse and neglect by mother

DEVELOPMENTAL HISTORY

- Birth: Full term normal vaginal delivery
- No complications during pregnancy or after birth
- No delayed milestones

EDUCATIONAL HISTORY

- Repeated first grade
- Poor attendance
- At age 14, diagnosed with specific learning disorder

FAMILY HISTORY

- Father: Completed suicide
- Father: Cannabis and Alprazolam abuse
- Paternal family: Bipolar disorder, Schizophrenia, substance abuse

MEDICAL HISTORY

- Untreated Hepatitis C
- Fibromyalgia
- Obesity

STABILIZED ON THESE MEDICATION

- Valproic acid 1000mg QHS PO for mood stabilization
- Paliperidone 6mg daily for psychosis

- Gabapentin 200mg TID for neuropathic pain
- Cyclobenzaprine 10mg QHS for muscle spasms,
- Vitamin D 1,000 units daily for Vit D deficiency

AFTER 6 MONTHS OF ADMISSION:

- No depressive symptoms
- No psychotic symptoms
- No Manic/hypomanic symptoms
- Anxiety - Limited participation in group activities
- Prefers interacting with selected peers

MENTAL STATUS EXAMINATION

- Appearance: Appears to be stated age, wearing casual clothes, poor grooming and hygiene, good eye contact
- Cooperativeness: Calm and cooperative
- Psychomotor activity: No agitation or retardation.
- Abnormal movements: No abnormal movements
- Speech: Normal rate, volume and rhythm
- Mood is reported as “Good”
- Affect: Constricted
- Thought process: Linear and goal directed, no loosening of associations
- Thought content: No SI, No HI, No delusions
- Perception: No AH, No VH, Not responding to internal stimuli
- Memory: Immediate memory decreased, short and long term memory poor
- Attention: Short spanned, easily distractible, unable to engage in lengthy conversation
- Concentration: Fair, able to spell “world” backwards
- Orientation: Oriented to place, person, and situation, not oriented to time
- Insight and Judgment: Fair



SLUMS

Mental Status Exam

16/30

SIGNIFICANT LAB INVESTIGATIONS

BMP:WNL

CBC:WNL

LFT: WNL

Thyroid panel:WNL

UDS: Negative

VIT D: 12mg/dl (low)

Hepatitis C: Positive

HIV: Non-reactive

Treponema Pallidum Ab: Non-reactive

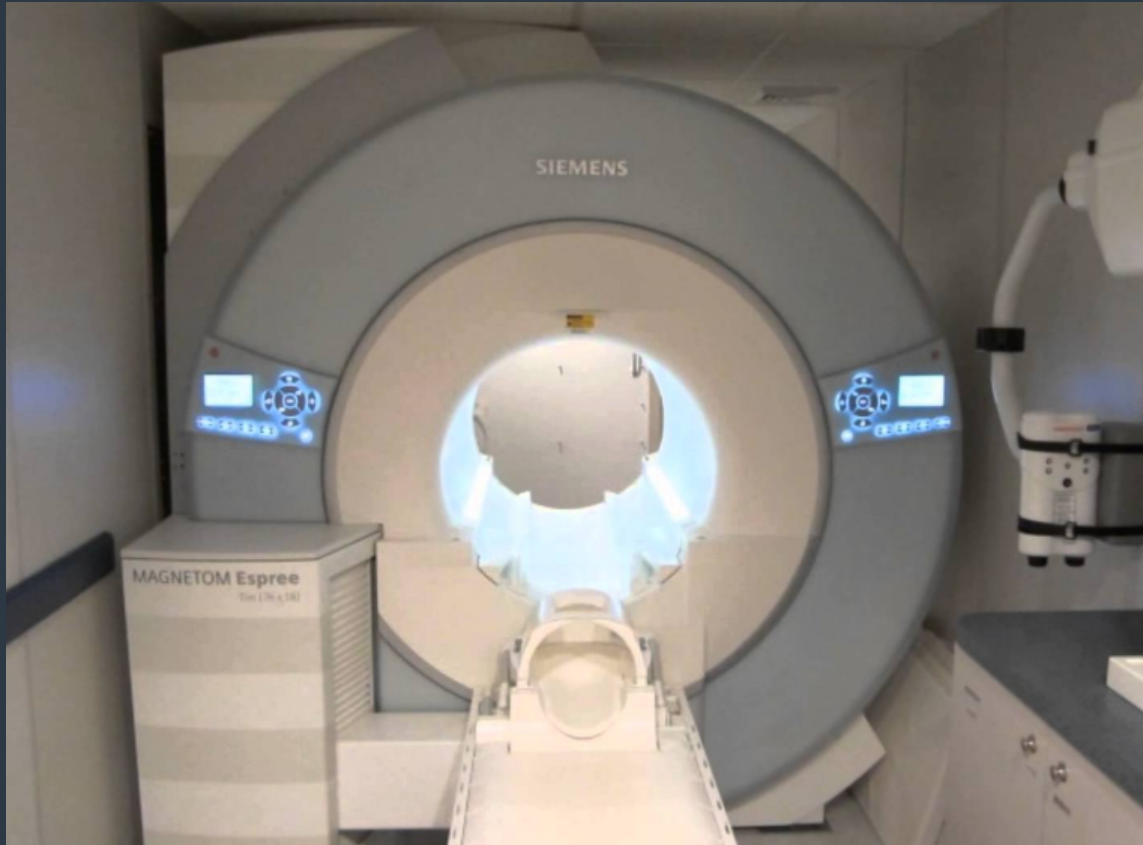
Vitamin B12: 660 mg/dl (Normal: 211-946)

Folate: 16.5 mg/dl (Normal >4.5)

Psychological testing: Moderate to severe impairment of various cognitive domains



MRI BRAIN



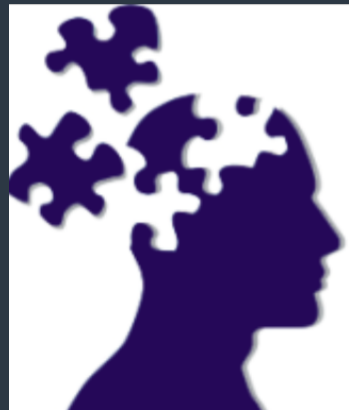
NORMAL

**SUBSTANCE
INDUCED
NEUROCOGNITIV
E DISORDER**

SUBSTANCE/MEDICATION-INDUCED NEUROCOGNITIVE DISORDER

DIAGNOSTIC CRITERIA:

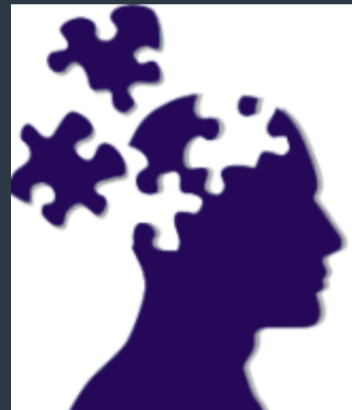
- A. The criteria are met for major or mild neurocognitive disorder.
- B. The neurocognitive impairments do not occur exclusively during the course of a delirium and persist beyond the usual duration of intoxication and acute withdrawal.
- C. The involved substance or medication and duration and extent of use are capable of producing the neurocognitive impairment.
- D. The temporal course of the neurocognitive deficits is consistent with the timing of substance or medication use and abstinence (e.g., the deficits remain stable or improve after a period of abstinence).
- E. The neurocognitive disorder is not attributable to another medical condition or is not better explained by another mental disorder.

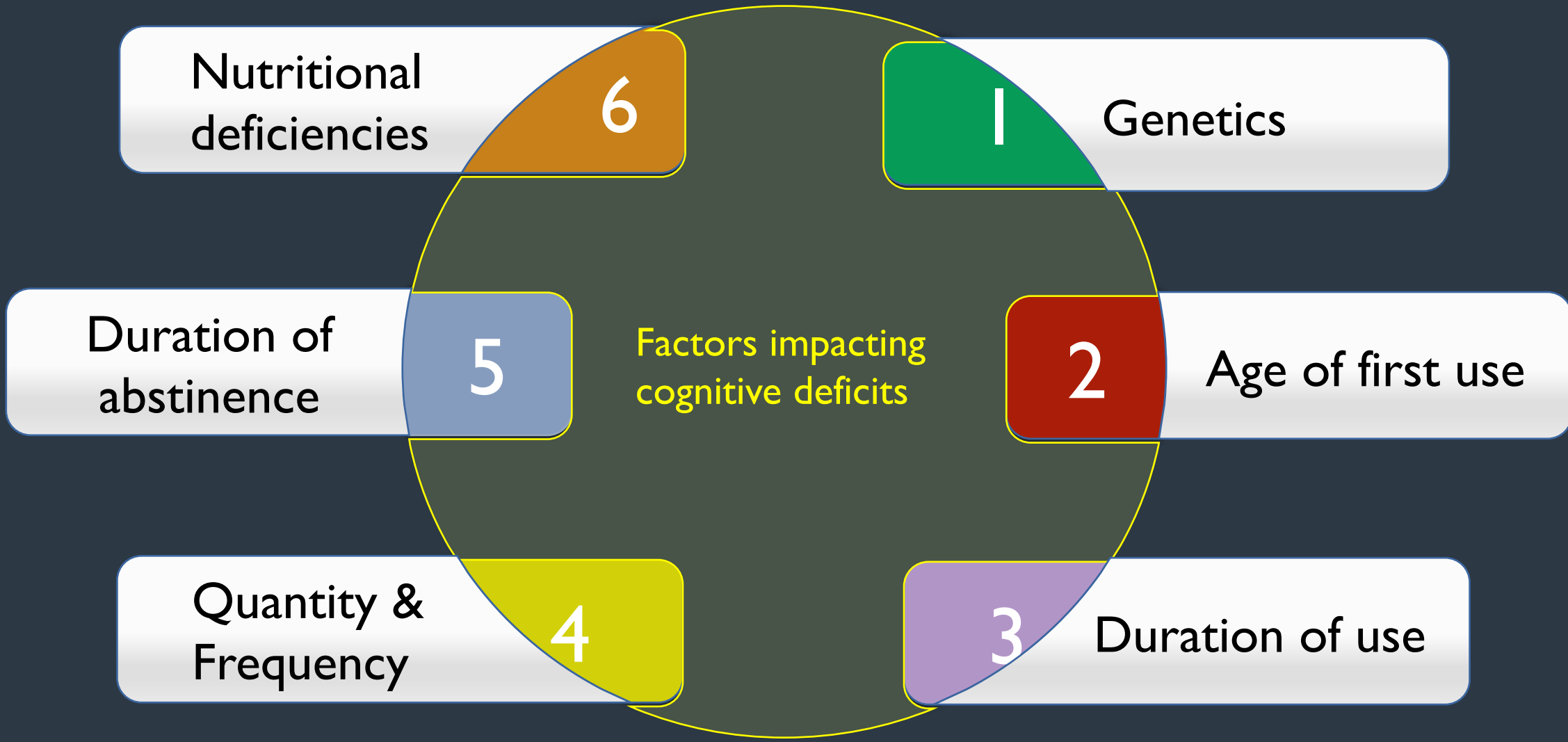


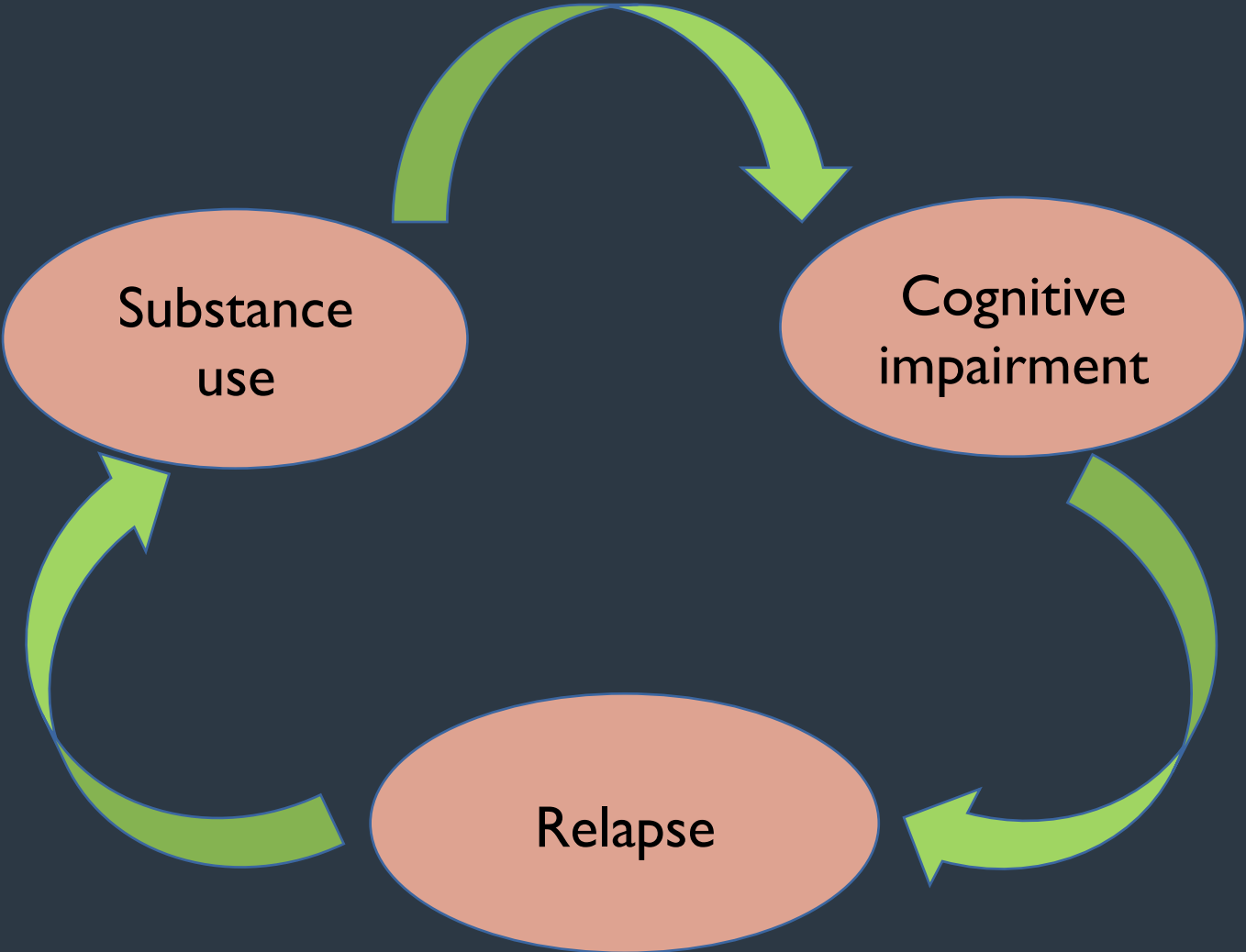
MAJOR AND MILD NEUROCOGNITIVE DISORDER

DIAGNOSTIC CRITERIA:

- A. Evidence of significant cognitive decline from a previous level of performance in one or more cognitive domains (complex attention, executive function, learning and memory, language, perceptual-motor, or social cognition)
- B. The cognitive deficits interfere with independence in everyday activities (i.e., at a minimum, requiring assistance with complex instrumental activities of daily living such as paying bills or managing medications).
- C. The cognitive deficits do not occur exclusively in the context of a delirium.
- D. The cognitive deficits are not better explained by another mental disorder (e.g., major depressive disorder, schizophrenia).







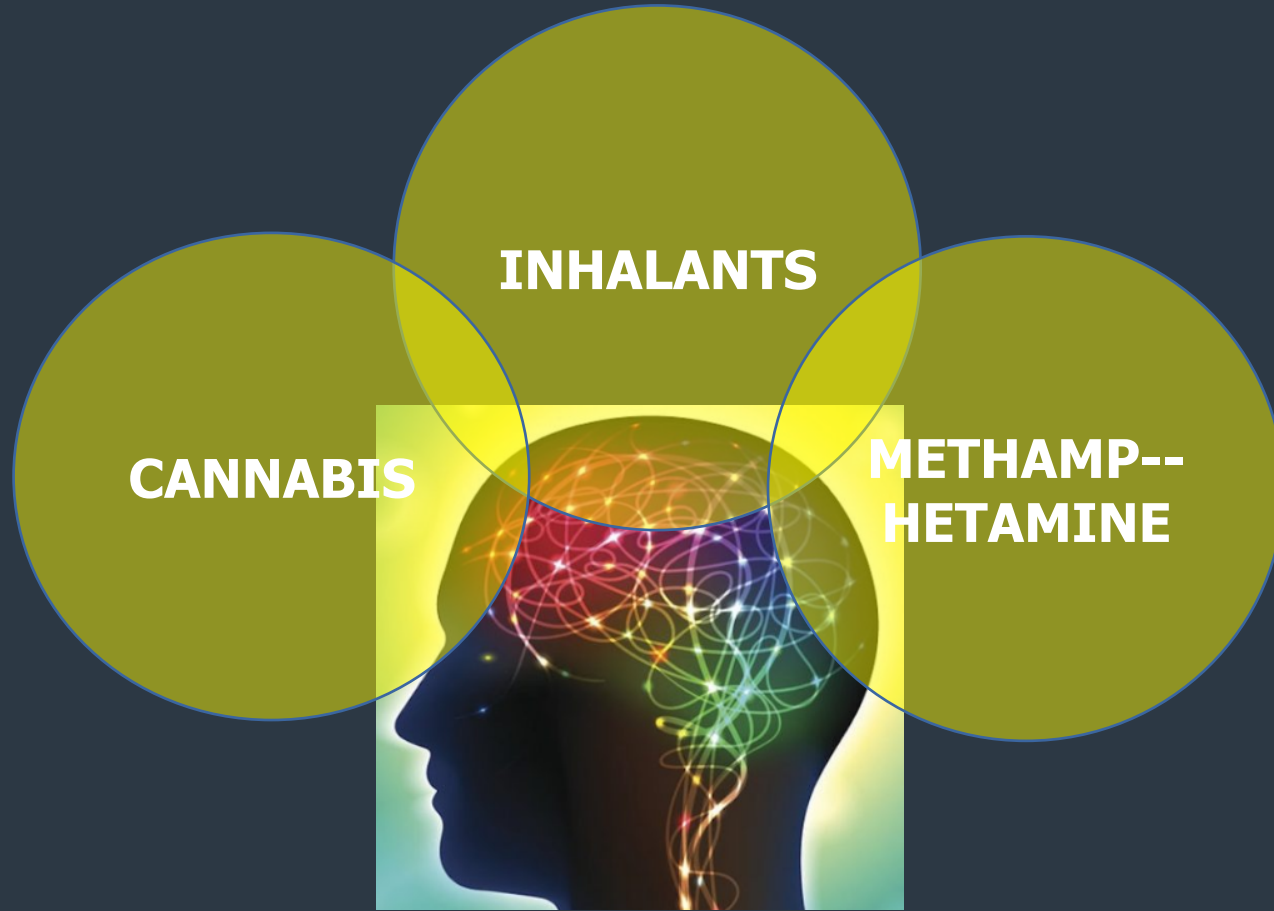
Substance
use

Cognitive
impairment

Relapse

SUBSTANCE INDUCED NEUROCOGNITIVE DISORDER

- Culprits: Most illicit drugs
- Affects many areas of cognitive function
- Generalized deficit pattern
- Recovery is unpredictable



MARIJUANA

- Delta-9-tetrahydrocannabinol, or THC:
psychoactive component
- Most widely used worldwide
2017: 55 million Americans

MARIJUANA



National Survey on Drug Use and Health: Trends in Prevalence of Marijuana in 2017 (in percent)*				
Drug	Time Period	Ages 12-17	Ages 18-25	Ages > 26
Marijuana	Past month	6.50	22.10	7.90
	Past year	12.40	34.90	12.20
	Life time	15.30	52.70	47.50

MARIJUANA



ADOLESCENT

- Greater decline in cognitive dysfunction
 - Hard to restore with abstinence

❖ Brook et al., 2008: Adolescents who started smoking between the ages of 14–22 years old and stopped by age 22 had significantly more cognitive problems at age 27 than their non-using peers

MARIJUANA

ADULT

- Significant deficits
- Deficits may resolve with abstinence

❖ Pope et al: Cannabis users who began smoking after the age of 17 had less significant impairments in measures of executive functioning than users who began smoking before the age of 17

INHALANTS

- Toluene, xylene, n-hexane and benzene, found in glue, paint thinners, gasoline and aerosol solvents
- Commonly used by adolescents
- Impedes brain maturation
- Higher likelihood of using other substances



INHALANTS



National Survey on Drug Use and Health: Trends in Prevalence of Inhalants in 2017 (in percent)*

Drug	Time Period	Ages 12-17	Ages 18-25	Ages > 26
Inhalants	Past month	0.60	0.50	0.10
	Past year	2.30	1.60	0.30
	Life time	8.60	9.50	9.30

INHALANTS (CONT.)

Studies:

- Scott et al (2013): 754 participants
 - 262 Poly-substances including inhalants (PSI)
 - 492 Poly-substances without inhalants (PSO)

Results:

- Executive functioning and processing speed lower in PSI compared to PSO
- PSI users were younger, used more drugs and had more psychiatric admissions than PSO users

METHAMPHETAMINE



☐ Second most commonly used substance

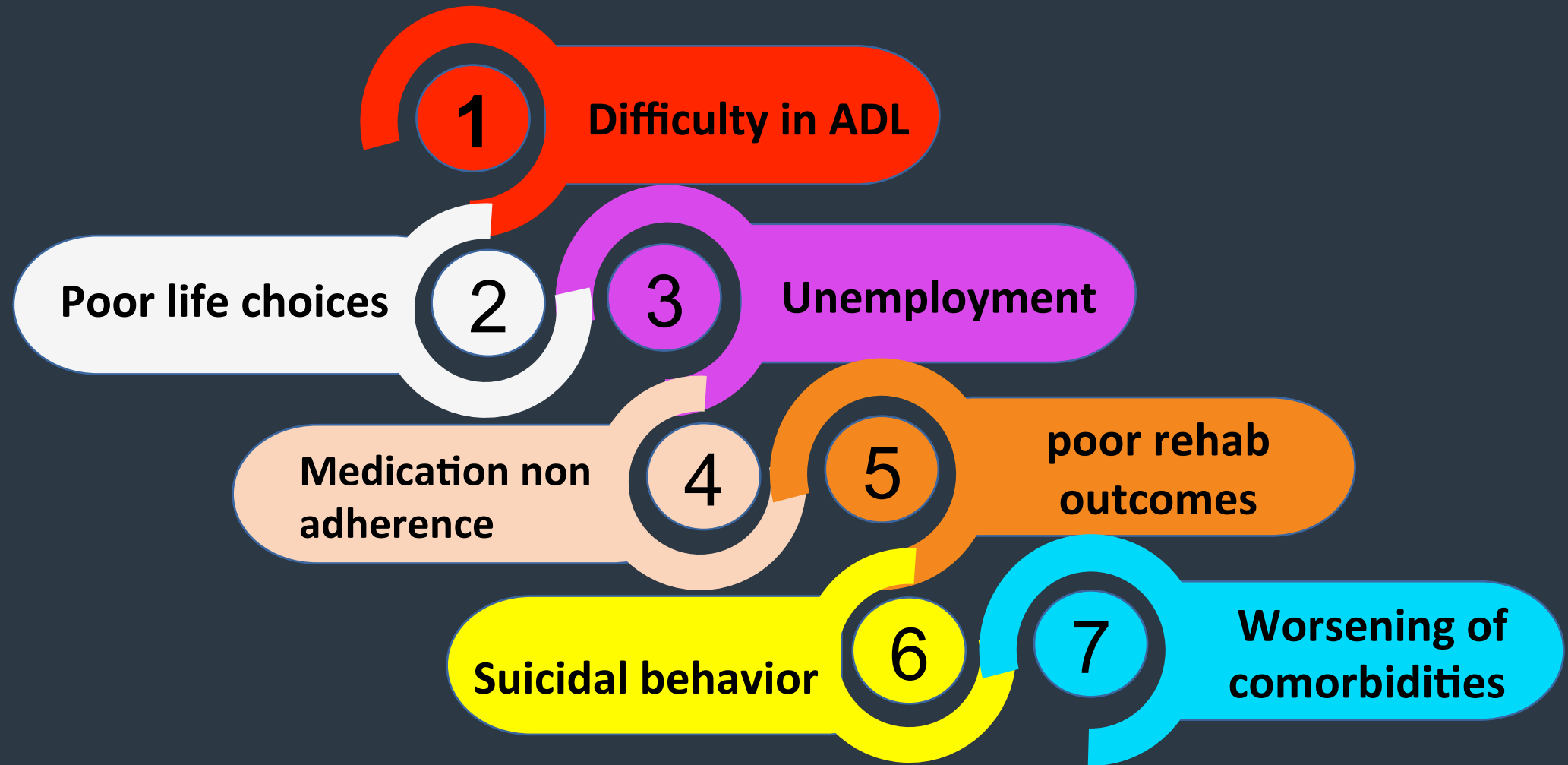
National Survey on Drug Use and Health: Trends in Prevalence of Methamphetamine in 2017 (in percent)*

Drug	Time Period	Ages 12-17	Ages 18-25	Ages > 26
Methamphetamine	Past month	0.10	0.40	0.30
	Past year	0.20	1.10	0.60
	Life time	0.30	3.00	6.40

METHAMPHETAMINE (cont.)

- Meta analysis (Potvin et al., 2018)
 - Moderate impairment across most cognitive domains
 - Prominent effects on social cognition and impulsivity/reward processing
 - Visual learning and visuospatial abilities were relatively spared

POSSIBLE CONSEQUENCES OF COGNITIVE DEFICITS

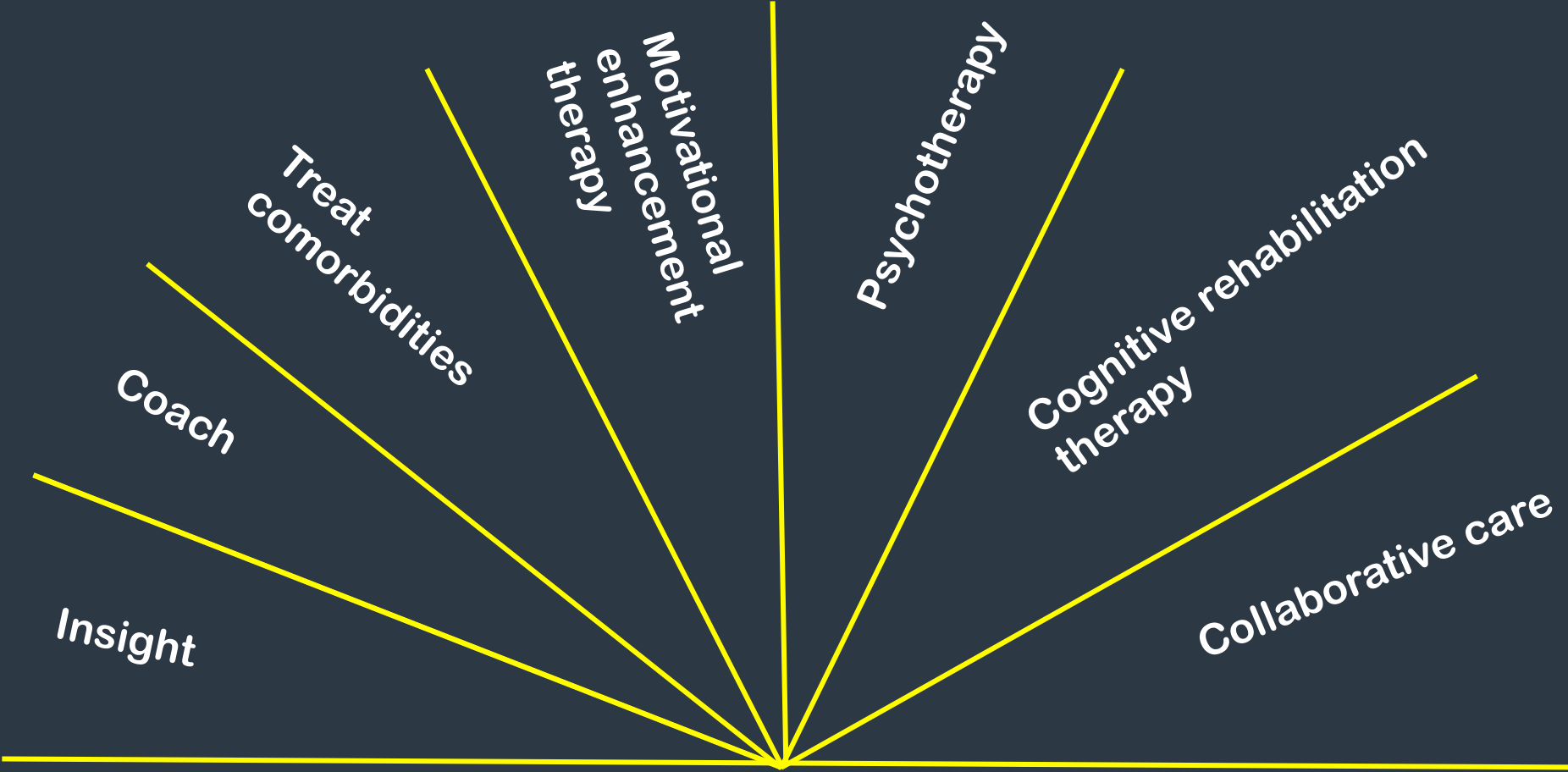


WHAT CAN WE DO FOR THEM?

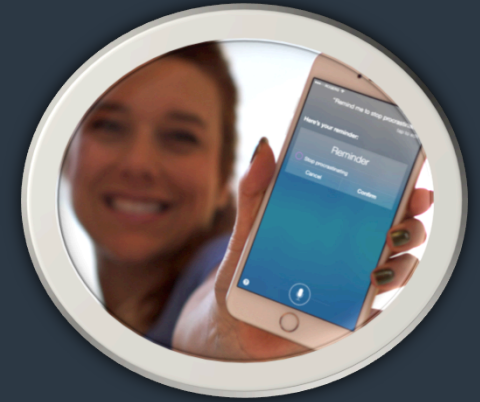
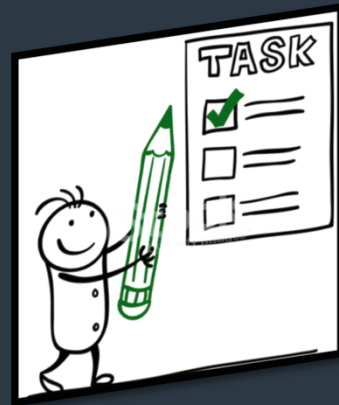
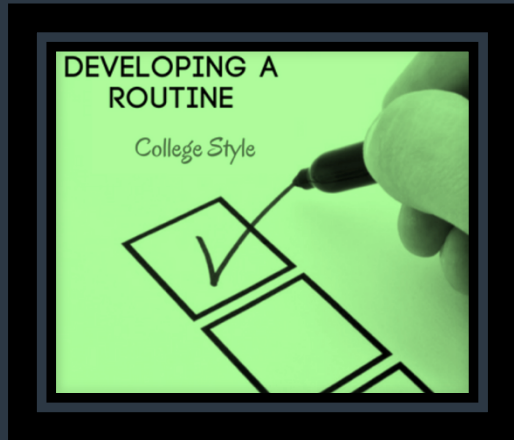


**SORRY,
THERE ARE
NO
MAGIC
PILLS**

THERAPEUTIC STRATEGIES

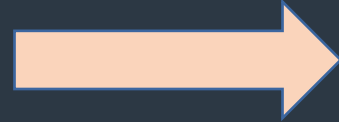


COACHING STRATEGIES



Back to our patient...

- Competency groups three times a week.
- Group education session every week regarding court case by forensic psychologist



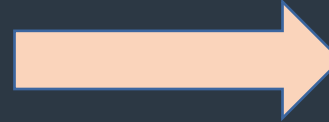
Competency test at 6 months



Back to our patient...

Additional strategies:

- Coping strategies
- Increased the number of education sessions with less duration
- One on one education session every week regarding court case by forensic psychologist



Competency test at 9 months



REFERENCES

- Diagnostic and Statistical Manual of Mental Disorders: Fifth edition
- <https://www.verywellmind.com/medication-or-substance-induced-neurocognitive-disorder-4144778>
- Mandelbaum DE, M. de la Monte S; Adverse Structural and Functional Effects of Marijuana on the Brain: Evidence Reviewed; *Pediatric Neurology* (2016) 1 – 9
- <https://www.drugabuse.gov/national-survey-drug-use-health>
- Crean R, Crane NA, Mason BJ. An evidence based review of acute and long-term effects of cannabis use on executive cognitive functions. *J Addict Med.* 2011 Mar;5(1):1-8
- Pope HG Jr, Gruber AJ, Hudson JI, Cohane G, Huestis MA, Yurgelun-Todd D. Early-onset cannabis use and cognitive deficits: what is the nature of the association? *Drug Alcohol Depend.* 2003 Apr 1;69(3):303-10.
- Scott KD, Scott AA. Adolescent inhalant use and executive cognitive functioning. *Child Care Health Dev.* 2014 Jan;40(1):20-8.
- Cairney S, Maruff P, Burns CB, Currie J, Currie BJ. Neurological and cognitive recovery following abstinence from petrol sniffing. *Neuropsychopharmacology.* 2005 May;30(5):1019-27.
- Cairney S, O' Connor N, Dingwall K M, Maruff P, Shafiq-Antonacci S, Currie J, Currie B A prospective study of neurocognitive changes 15 years after chronic inhalant abuse . *Addiction* June 2013 Volume108, Issue6 Pages 1107-1114
- Pompili M1, Lester D, Girardi P, Tatarelli R. High suicide risk after the development of cognitive and working memory deficits caused by cannabis, cocaine and ecstasy use. *Subst Abus.* 2007 Mar;28(1):25-30
- Zhu J P Q, Xu W, And Angulo Ja. Distinct Mechanisms Mediating Methamphetamine-Induced Neuronal Apoptosis and Dopamine Terminal Damage Share the Neuropeptide Substance P in the Striatum of Mice. *Ann N Y Acad Sci.* 2006 Aug; 1074: 135–148
- Potvin S, Pelletier J, Grot S, Hébert C, Barr AM, Lecomte T. Cognitive deficits in individuals with methamphetamine use disorder: A meta-analysis. *Addict Behav.* 2018 May;80:154-160
- SAMSHA: Chronic Substance Use and Cognitive Effects on the Brain: An Introduction

This memory foam
mattress isn't working. I
still can't remember
where I put my glasses

Thank You!

