The Science of Substance Use Disorders

Integration Summit

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Presentation Length: 1.25 hours

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THE SCIENCE OF SUBSTANCE USE DISORDERS

Learning Objectives:
At the end of this presentation participants will be able to:

- Name at least 1 change that occurs in the brain related to exposure to substances of abuse
- State if substance use disorders have the same, greater than or lower rates of response to treatment than other chronic conditions
- Summarize how long brain changes last after someone stops using substances
- Identify one difference between the 2 commonly used medications for alcohol use disorder
- List the key difference between the 3 the commonly used medications for opioid use disorder

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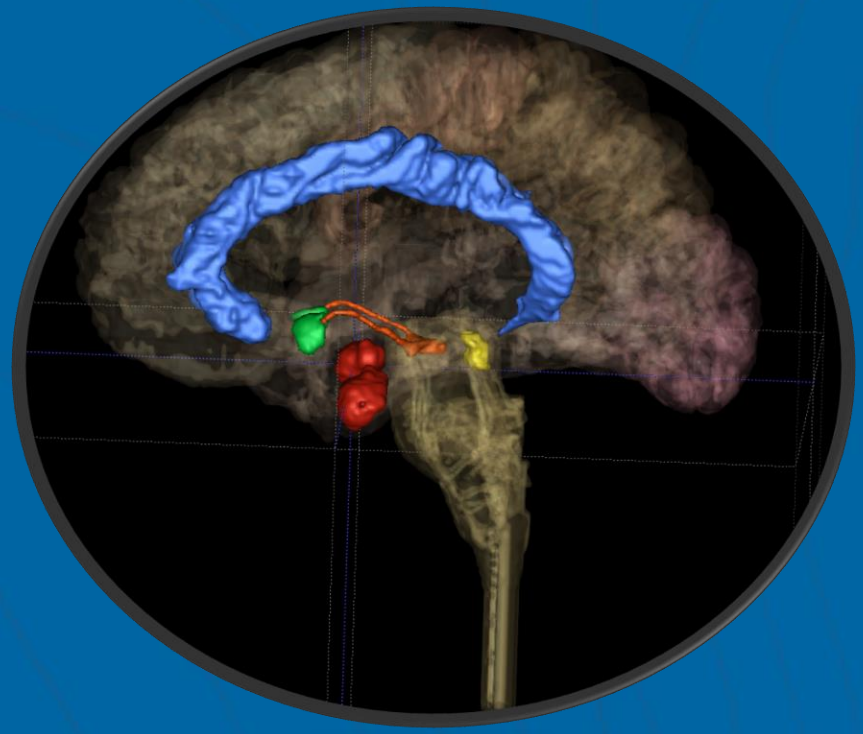
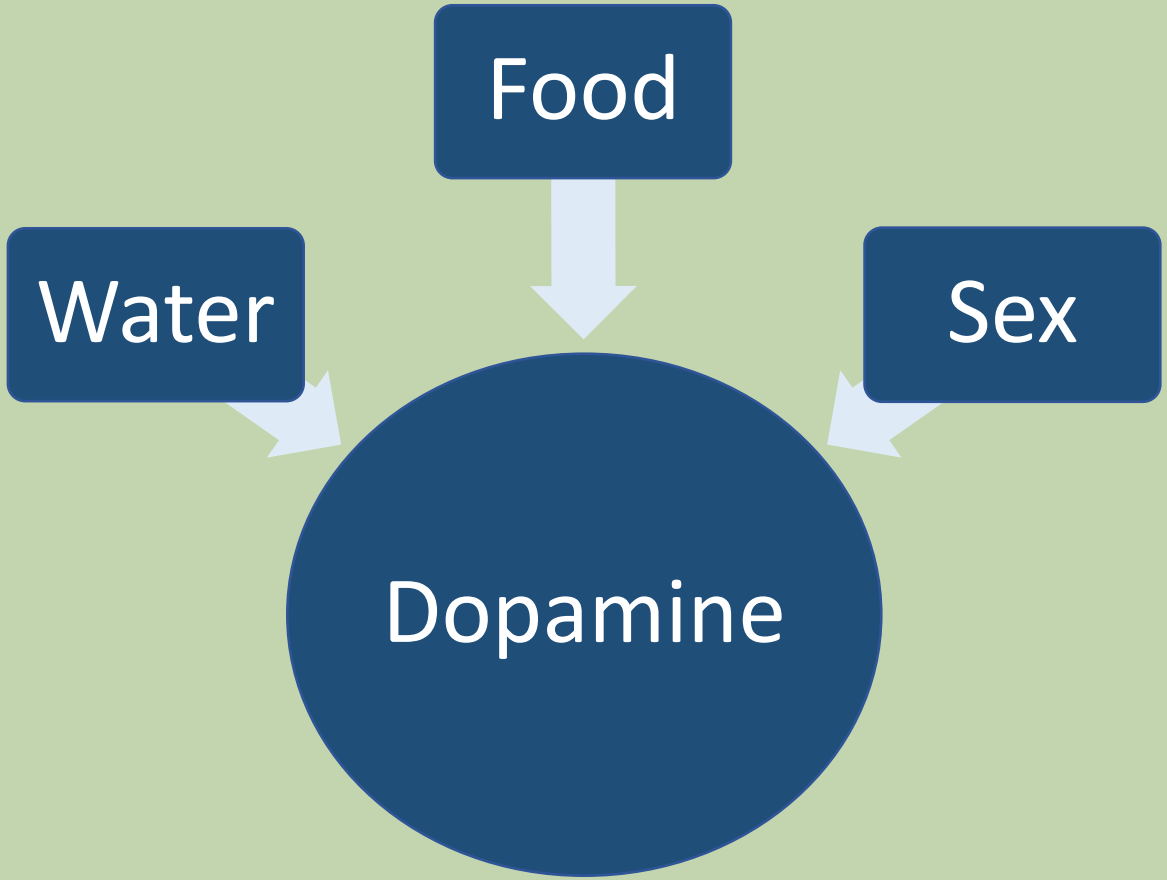


SUBSTANCE USE DISORDERS
CHRONIC BRAIN DISEASE

NATURAL REWARDS RELEASE DOPAMINE

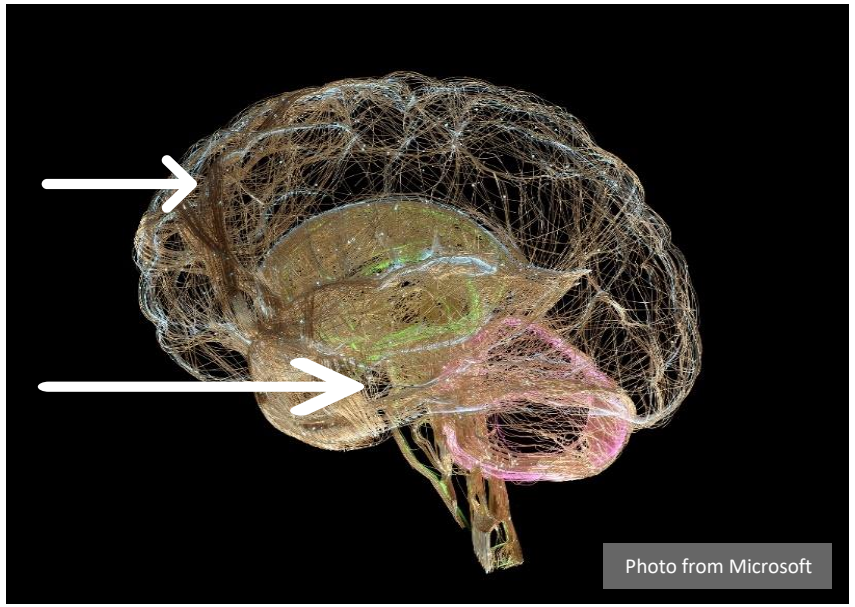


HOW SUBSTANCES OF ABUSE AFFECT THE BRAIN

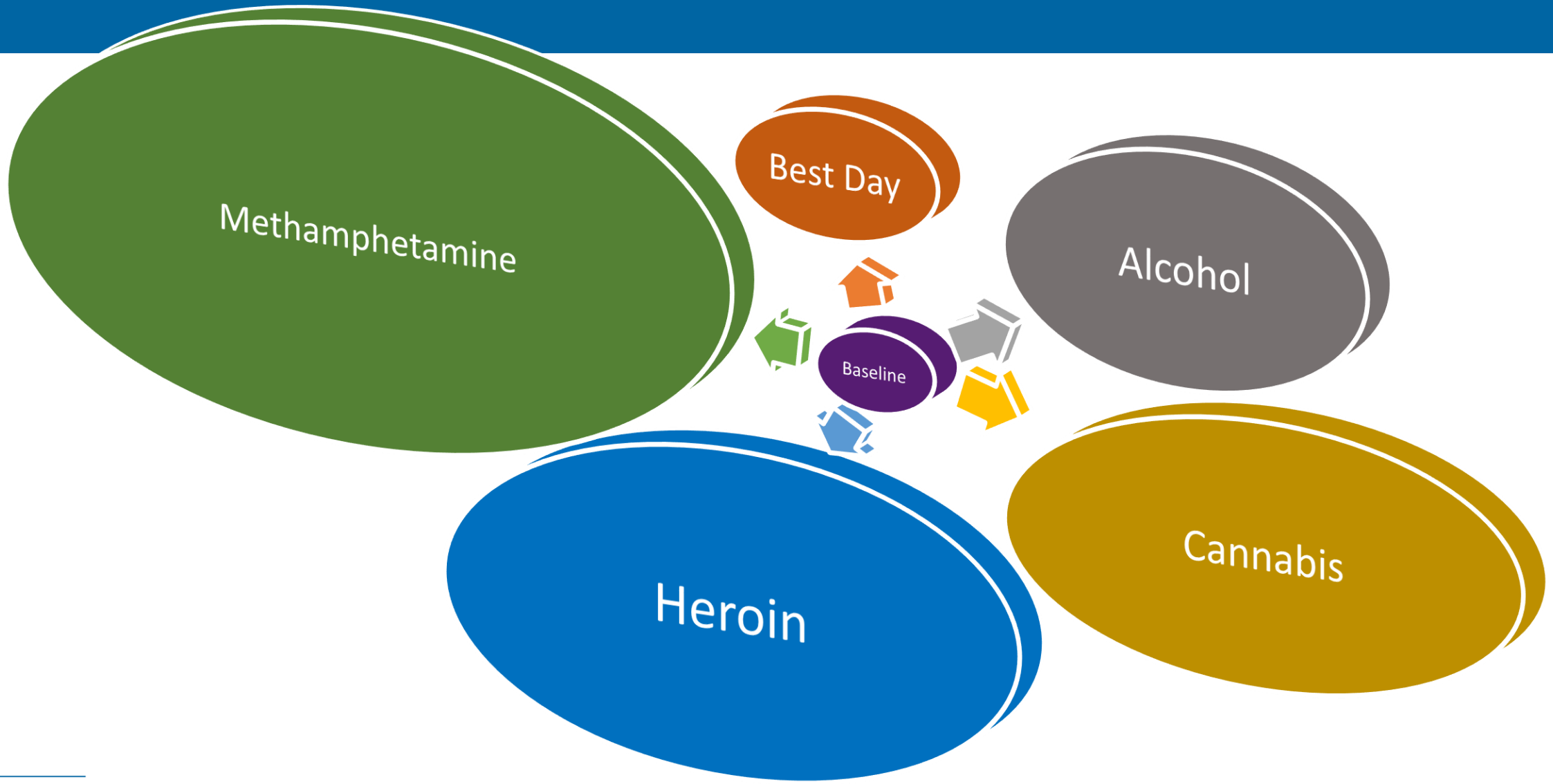
- All substances of abuse result in the activation of the reward pathway
- The same pathway activated by naturally rewarding substances and events

Thinking part of brain

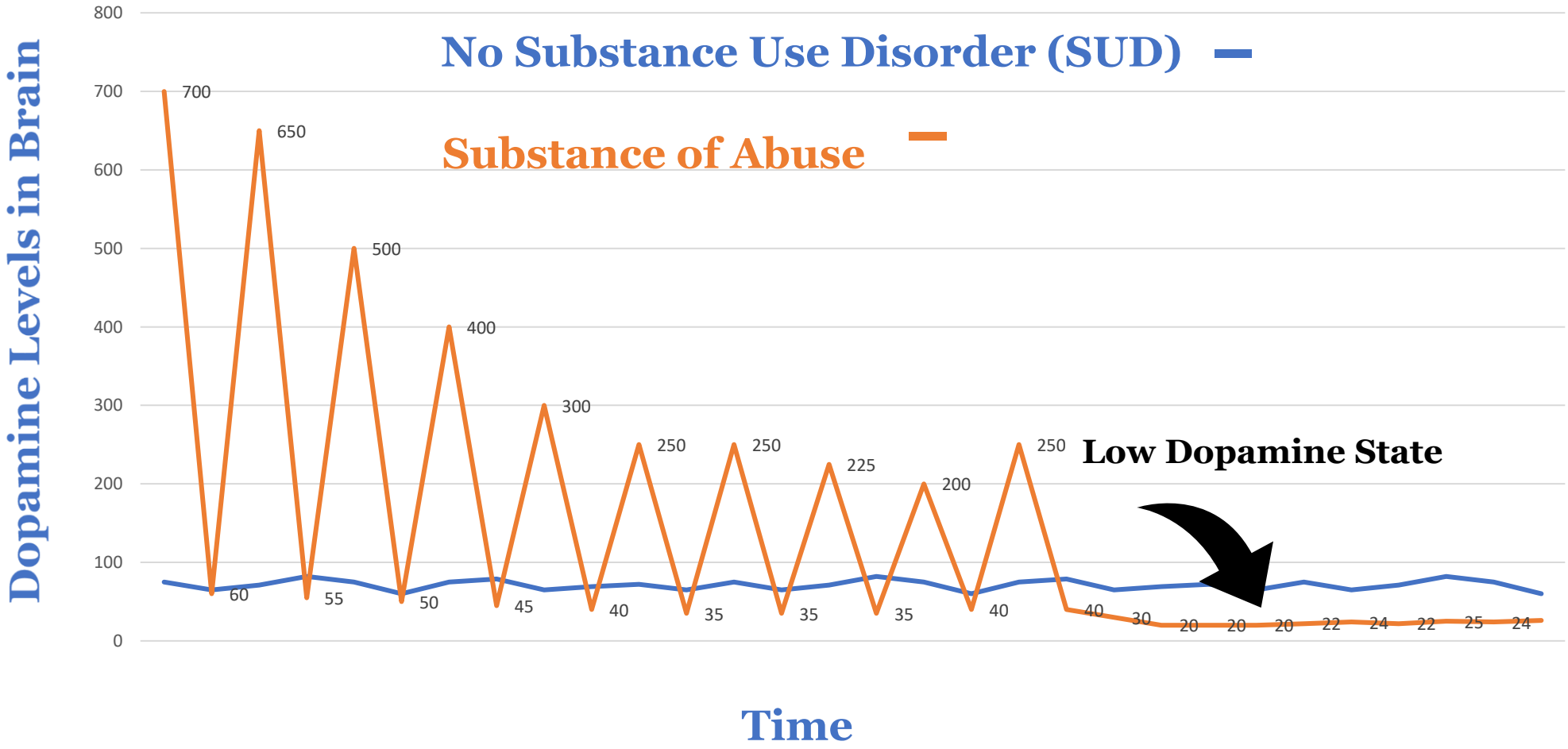
Primitive parts of brain



DOPAMINE RESPONSE



BRAIN CHANGES WITH EPISODES OF SUBSTANCE USE



INTENSITY OF CRAVINGS

A direct, or indirect, force pulling someone towards a substance or behavior


Unsplash: Erda Estremera

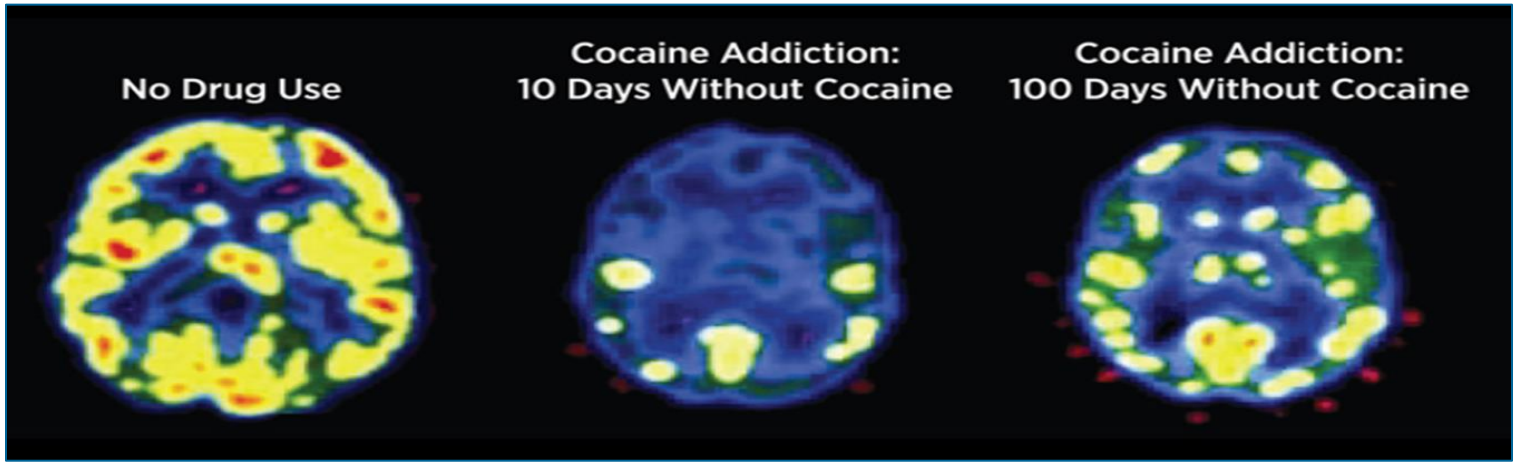

Photo from Microsoft


Unsplash: Sven Wilhelm

IT TAKES TIME FOR YOUR BRAIN TO RECOVER

- The brain function takes at least 1 year to return to “normal” after you stop substances of abuse
- If you stop treatment before a year, you may lose the medication benefits

How the Brain Changes and Recovers from Drug Use

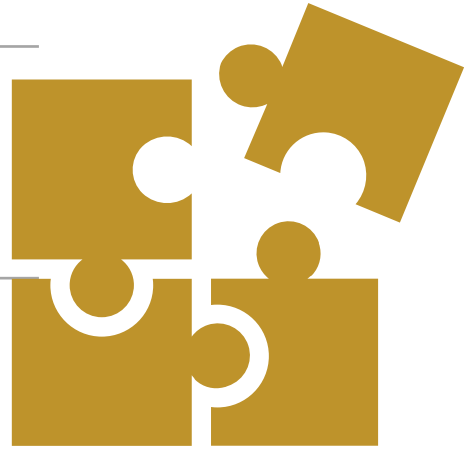


Source: https://nida.nih.gov/publications/teaching-addiction-science/bringing-power-science-to-bear-drug-abuse-addiction

CHRONIC MEDICAL DISORDERS

Chronic Diseases: Substance Use Disorder (SUD) and Diabetes II

Cause: Genes, Environment and Behavior



Prevention: Change Environmental and Behavior

Treatment: Long Term Medicine and Lifestyle Changes

What is Different?

Features of Chronic Disease

Features	SUD	Hypertension	Diabetes II
Gradual onset	Yes	Yes	Yes
All racial, ethnic, IQ & income	Yes	Yes	Yes
Use of substance not allowed	Yes	Yes	Yes
Use despite negative effects	Yes	Yes	Yes
Can present as life threatening	Yes	Yes	Yes
Taking medication as prescribed	50%	50%	50%
Lifestyle changes needed & help	Yes	Yes	Yes
Return of symptoms after a period without symptoms	Yes	Yes	Yes

Source: McLellan 2000

UNDERSTANDING ADDICTION TO INFORM TREATMENT

Diabetes and Addiction: You make a mistake…what could you lose?

	Diabetes	Addiction
Treatment	No	YES
Custody of Children	No	YES
Freedom (Probation, Incarceration)	No	YES
Housing	No	YES
Family	No	YES
Work Identity	No	YES

CHRONIC DISEASES OVER TIME

- Remission (no symptoms)
  - Can medication be stopped? Or will symptoms return?
- Better but not in remission
  - Continue treatment
  - Adjust treatment with goal of remission
- Not responding or getting worse
  - Treatment is changed
    - Medications
    - Counseling
    - Self-help program

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SCREENING

- **Screening is the act of identifying if someone is at risk for an illness**
- Routine screening for chronic diseases is a regular part of a primary care
  - Depression → PHQ9
  - Anxiety → GAD7
  - Gestational diabetes → Glucose challenge test
  - Breast Cancer→ Mammogram
- **It is important to use a tool that is scientifically validated**

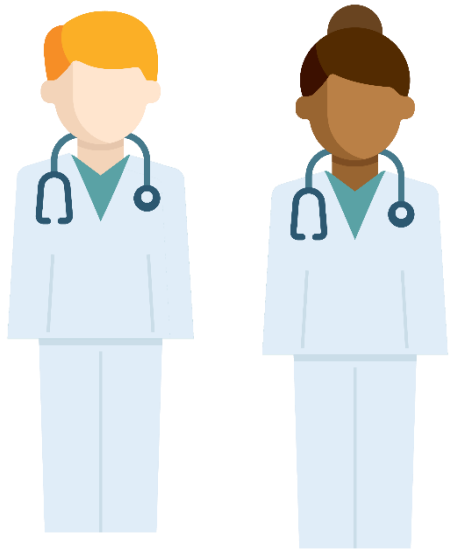


Photo Source: Microsoft Stock Icons

UNIVERSAL SCREENING

- Holistic approach supporting:
  - Safe use or abstinence
  - Harm reduction
  - Prevention of dependence
  - Reduces overuse of healthcare resources

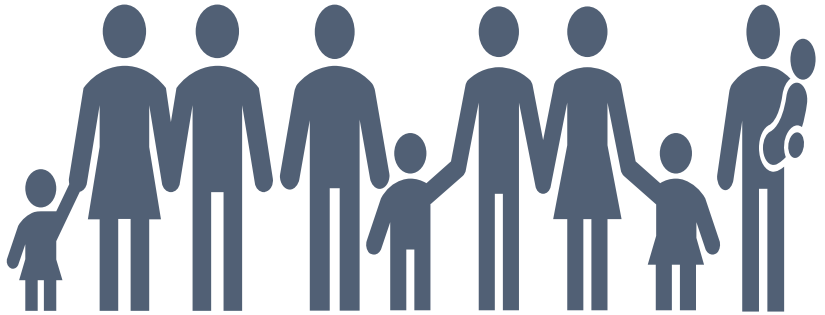


Photo Source: Microsoft Stock Icons

- Screen for tobacco, alcohol, illicit and prescriptions drugs at the same time
- Why SUD Screenings Should be Universal:
  - Deciding to screen some patients but not others may introduce the risk of racial, ethnic, socioeconomic, gender, age, and other biases resulting in missed opportunities to identify and intervene
  - It also normalizes SUD one of several chronic diseases that we screen for

SELECTING A VALIDATED SCREENING TOOL

Tool	Substance Type		Patient Age		How tool is administered	
	Alcohol	Drugs	Adults	Adolescents	Self-administered	Clinician - administered
Screening to Brief Intervention (S2BI)	X	X		X	X	X
Brief Screener for Alcohol, Tobacco, and other Drugs (BSTAD)	X	X		X	X	X
Tobacco, Alcohol, Prescription medication, and other Substance use (TAPS)	X	X	X		X	X

Source: https://www.drugabuse.gov/nidamed-medical-health-professionals/screening-tools-resources/chart-screening-tools

SCREENING RATES

- Primary Care
  - 72% were screened for alcohol and 71% for drug use
  - **Self administered screening** was associated with greater detection of moderate to high-risk alcohol use compared to staff administered screening
  - Screening at any appointment type increases rate of screening
  - Use of counseling script after a positive screen was < 13% in primary care study above

Source: McNeely 2021

SCREENING RATES

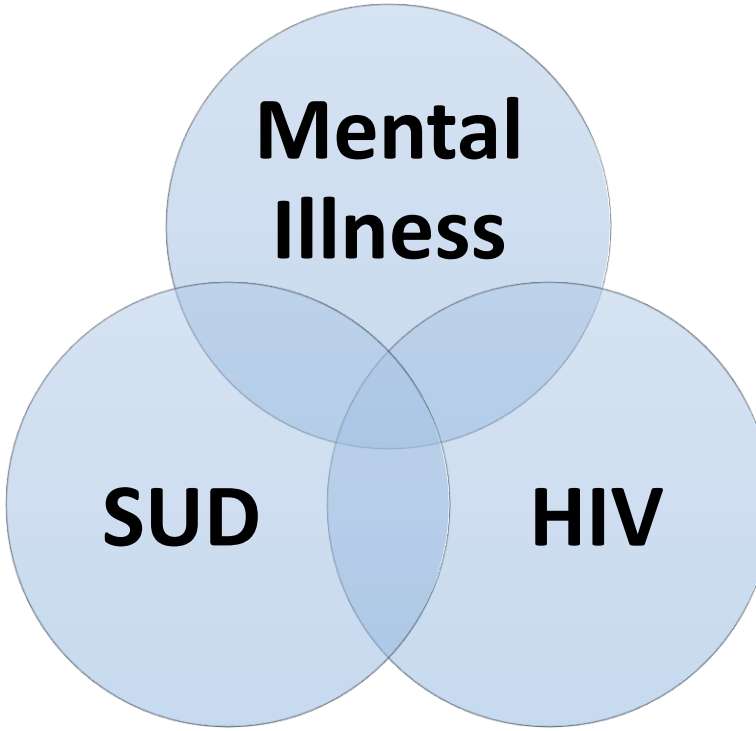
- Outpatient BH clinics- screening rates varied from 48-100%
- Inpatient
  - Detection rates varied by race, ie screening was not done universally
  - HIV inpatient care program <50% conducted recommended screening & brief intervention for alcohol

Source: Woodward 2023
Serowik 2021

SUD, HIV AND MENTAL ILLNESS

- 54% report moderate to high-risk cannabis use
- 40% report moderate to high-risk drinking
- 12% report moderate to high-risk cocaine
- 11% reported moderate to high risk of amphetamine use

- Only 35% of people in 10 outpatient HIV clinics reported talking to primary care provider (PCP) about alcohol use
- < 50% of providers in hospital-based HIV care programs conducted recommended screening and brief interventions for reducing alcohol



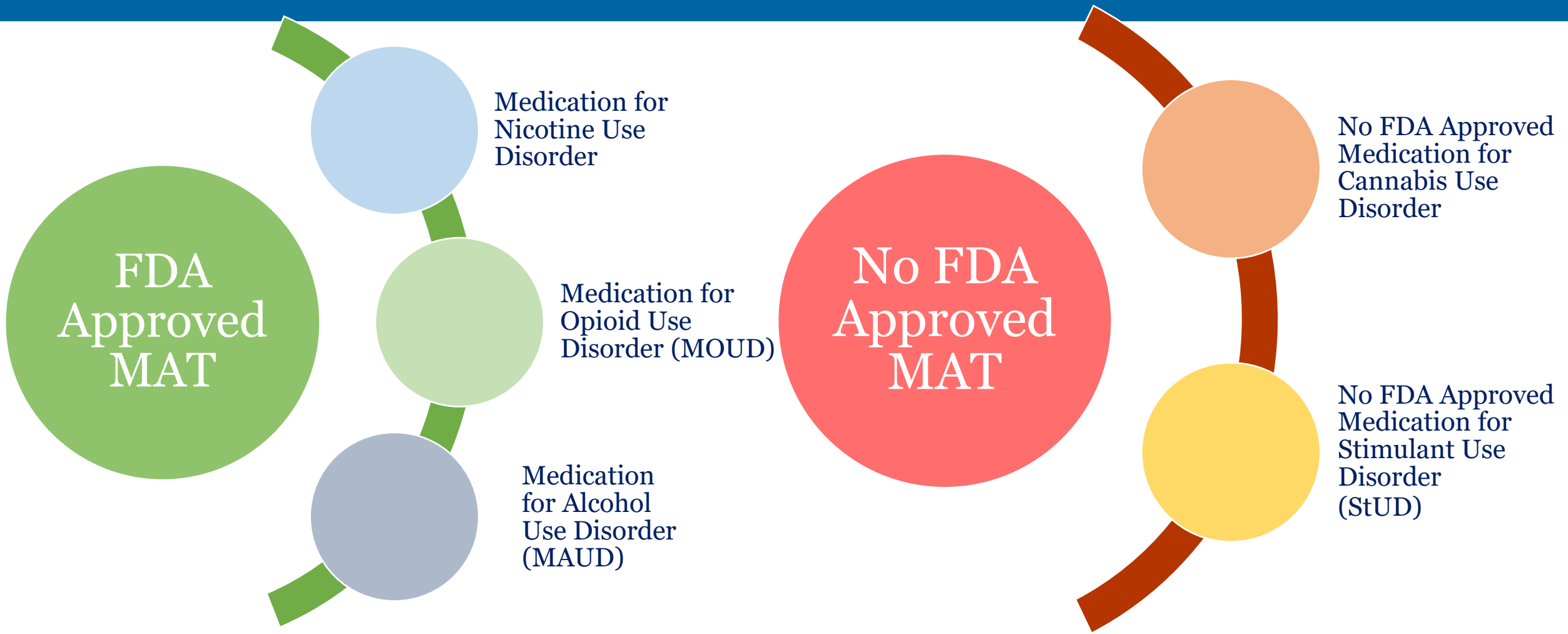
Sources: Staruss, S.M. 2009
Andriote, JM. 2012
Dawson Rose 2017

SBIRT

https://www.samhsa.gov/sbirt/resources

MEDICATIONS FOR ADDICTION TREATMENT

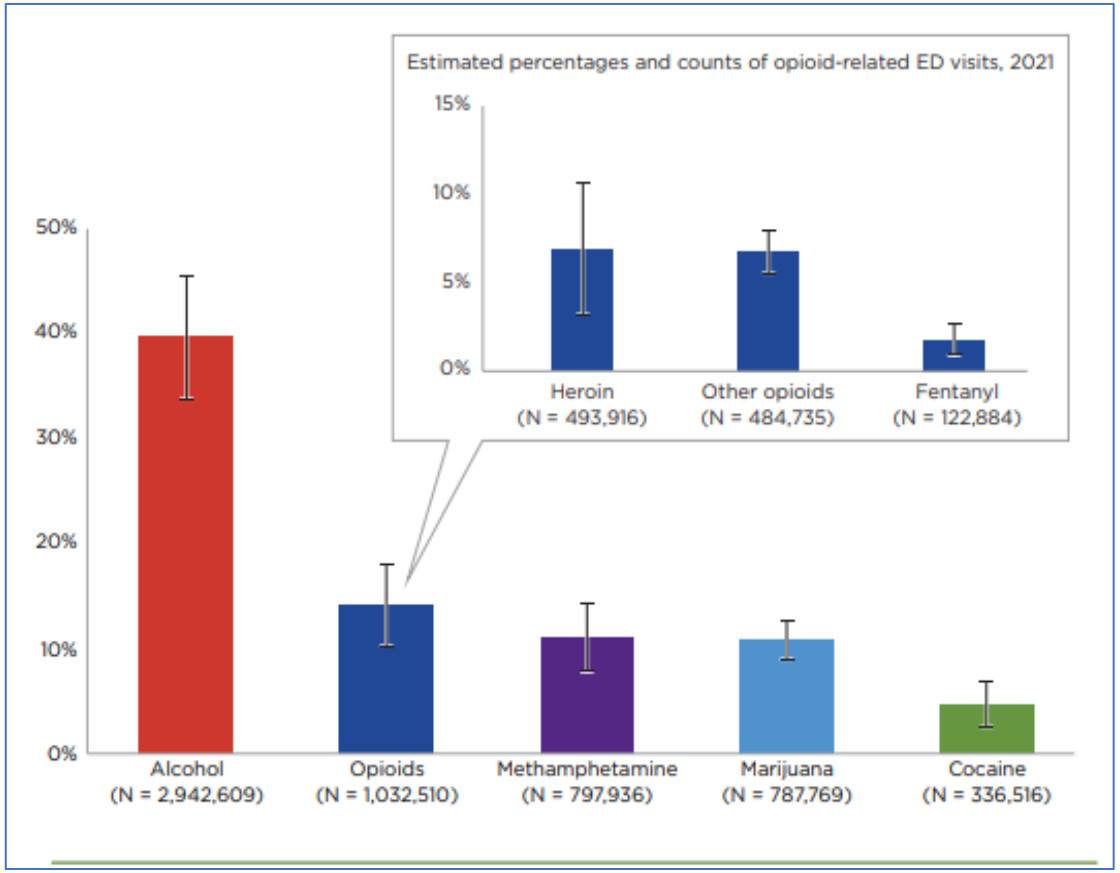
FDA APPROVED MEDICATIONS FOR ADDICTION TREATMENT (MAT)



ALCOHOL

- Alcohol is the most used substance of abuse
- Alcohol-related deaths continue to increase
  - 25% increase from 2019 to 2020
- Alcohol-related emergency room visits are higher than for any other substance

Figure 4.1 Estimated percentages and counts of drug-related ED visits by the top five drugs (January 2021-December 2021)



Source: https://www.samhsa.gov/data/sites/default/files/reports/rpt29393/2019NSDUHFFRPDFWHTML/2019NSDUHFFR090120.htm#:~:text=%22misuse.%22)-,Among%20people%20aged%2012%20or%20older%20in%202019%2C%2060.1%20percent

ALCOHOL USE DISORDER

Acamprosate (Campral®)	Naltrexone (Revia® or Vivitrol®)
Decrease drinking & stay in treatment longer	Decrease drinking & stay in treatment longer
Three times per day dosing	Oral daily & long acting injectable every 4 weeks
Drug Interactions: none	Drug Interactions: opioids
Contraindications: severe renal impairment or allergy to medication	Contraindications: on opioids, in withdrawal, or allergy to medication

Source: SAMHSA and NIAAA, Medication for the Treatment of Alcohol Use Disorder: A Brief Guide. HHS Publication No. (SMA) 15-4907. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2015.;chick 2003; Mann 2004; Garbutt 1999; SAMHSA 2015.

MEDICATIONS FOR OPIOID USE DISORDER (MOUD)

Photo Source: Microsoft

BENEFITS OF MEDICATION FOR OPIOID USE DISORDER (MOUD)

- Treats withdrawal symptoms
- Stabilizes dopamine
- Helps people feel normal
- Increased attendance in treatment
- Decreased cravings
- Decreased opioid use
- Decreased intravenous drug use and complications
- Decreased overdose
- Decreases death
- Improves functioning
- Decreased criminal behavior

Sources:
The ASAM National Practice Guideline for the Treatment of Opioid Use Disorder: 2020
Tsui JI et al., 2014
Metzger DS et al., 1993
Mattick, RP, et al. 2009
Mattick, RP, et al. 2014
Lobmaier, P et al. 2008
Lutgen-Nieves, L. et. al. 2021
Santo, T 2021

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FDA APPROVED MOUD & OPIOID OVERDOSE

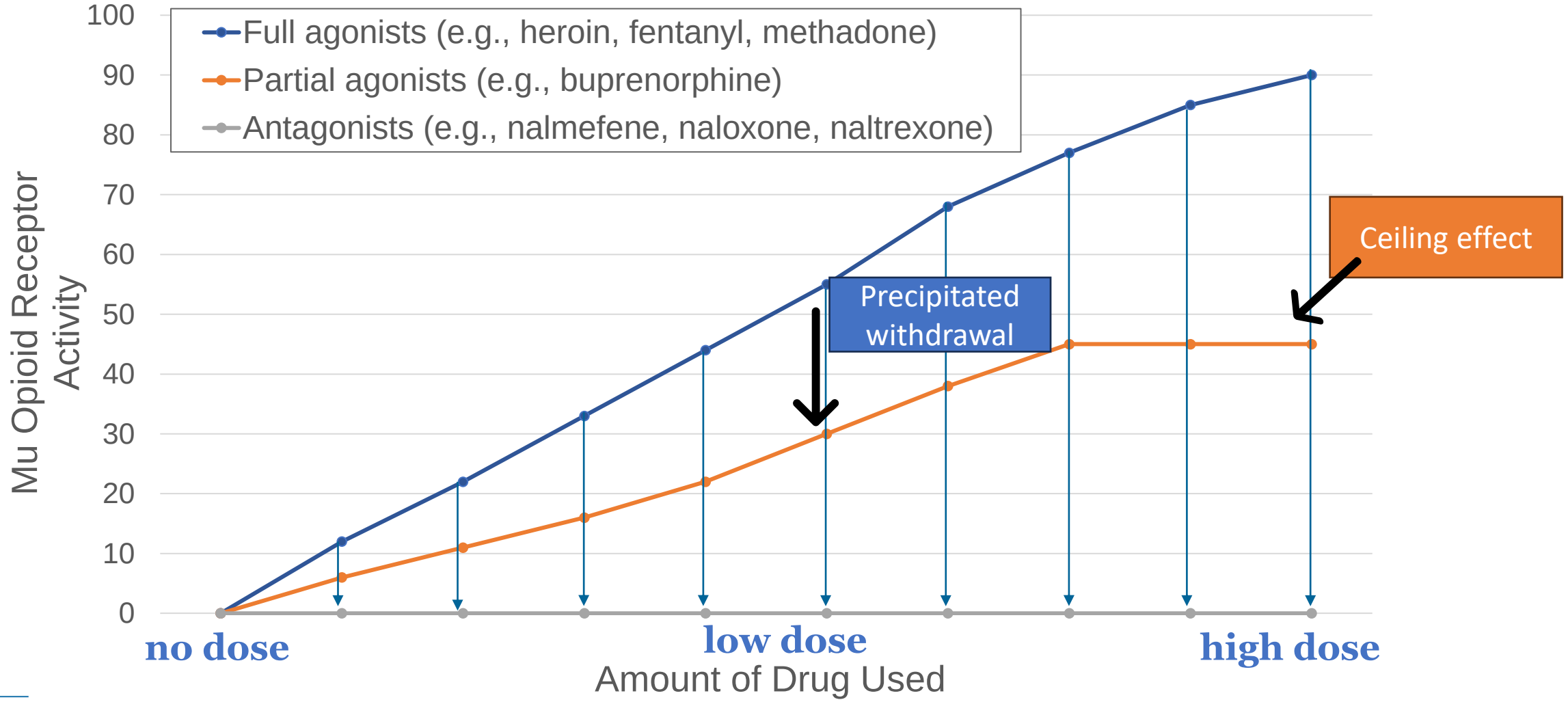
Agonist Treatment (turns on receptor):

- Methadone - approved for cough in 1940s, for OUD 1972
- Buprenorphine-approved in 1981 for pain; oral approved for OUD 2002; patch, implants, and injection later

Antagonist Treatment (blocks receptor from being turned on):

- Naltrexone-oral approved 1984; injectable 2006 AUD, OUD 2010
- Naloxone-approved 1961, autoinjector 2014, nasal spray 2015
- Nalmefene- injectable approved 1995; nasal spray 2023

FULL, PARTIAL, OR NO EFFECT



METHADONE

HIGHLY EFFECTIVE:

- 33% fewer opioid positive tests compared to those receiving no medication*
- 4.4x more likely to stay in treatment*
- Reduced crime**
- Reduced infectious disease***
- Reduced death*****

Sources: * Mattick, 2009, ** Lutgen-Nieves, 2021, *** Tsui, 2014, Metzger, 1993, **** Santo, 2021; Wakeman, 2020

METHADONE: WHAT IS IT AND FOR WHOM?

- Turns on the opioid receptor
- No "ceiling effect"
- Do not need to be in withdrawal to start
- Takes time to reach an effective dose
- Lots of medication interactions

Who should take methadone?

Patients with a more severe OUD

Patients who would benefit from the services available including daily observed dosing required in Narcotic Treatment Programs

Patients who did not reach goals with other medications for opioid use disorder

BUPRENORPHINE

Highly Effective

- 1.82 times more likely to stay in treatment if on 16 mg per day or higher
- Decreased opioid use
- Decreased death

Safer than other opioids because of ceiling effect; higher doses do NOT cause

- Increased “high”
- Decreased breathing

Source: Kakko 2003
NIDA Medications to Treat OUD Research Report Updated December 2021
Mattick 2014 Cochrane Review
Santo 2021, Wakeman 2020

BUPRENORPHINE: WHAT AND FOR WHOM?

- Turns on opioid receptor part way
- Has ceiling effect
- Binds more strongly to receptor than full agonists
  - Start buprenorphine when in moderate withdrawal
- Dosing
  - Typical dose is 16-32 mg/day
  - Some patients will need higher doses
- Fewer medication interactions than methadone

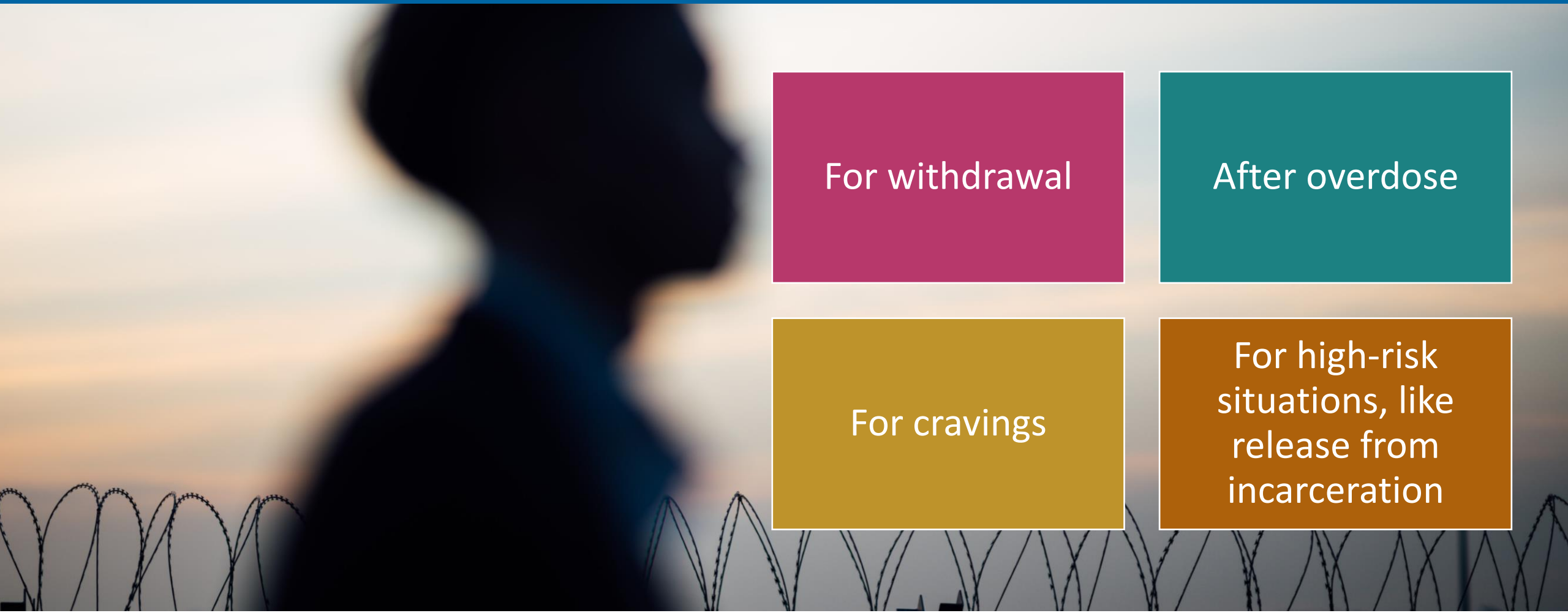
Who should take buprenorphine?

Opioid use disorder or opioid withdrawal

Patient wants agonist treatment

Source: Mattick 2014

MEDICATION INITIATION FOR OPIOID USE DISORDER



NALTREXONE

Stock photos.

NALTREXONE: WHAT AND FOR WHOM?

- Long-acting injection approved for OUD
- Blocks opioid receptor
- Does NOT treat withdrawal or underlying low dopamine level
- Patient must be opioid-free seven days before starting, making it more difficult to start than buprenorphine or methadone
- No evidence of decreased death

Who should take naltrexone?

Patients still getting rewards from normal activities

Patients who did not reach treatment goals with other medications

Can be useful as “back-up” after stopping buprenorphine or methadone, or in high-risk situations

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HOW LONG SHOULD SOMEONE BE ON MEDICATION?

Long-term or indefinite treatment with medications for OUD is often needed to maintain outcomes	Discontinuing buprenorphine or methadone is usually only successful in about 15% of cases	Discontinuing medication without return to opioid use usually occurs, if at all, when people have been treated with MOUD for at least 3 years

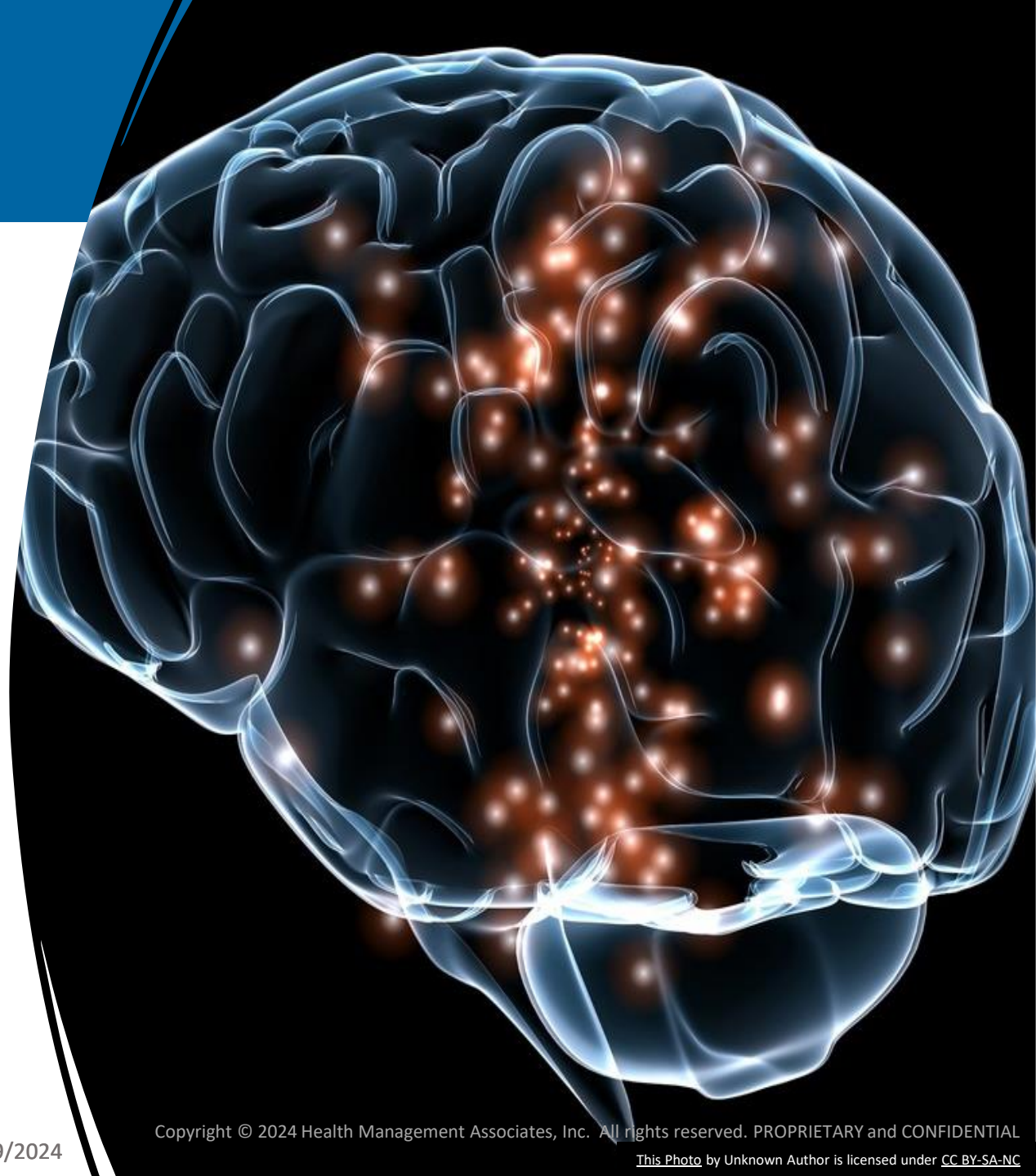
Sources: National Academies of Sciences, Engineering, and Medicine. (2019). Nosyk, B. et al. (2012). SAMHSA & the Office of the Surgeon General (2018).

BARRIERS

OUR THOUGHTS CAN BE BARRIERS TO TREATMENT

Most common barriers we hear are:

- We are just replacing one addiction for another
- We are just replacing one drug with another
- You can't give meds without counseling
- They need to hit rock bottom before they'll get better



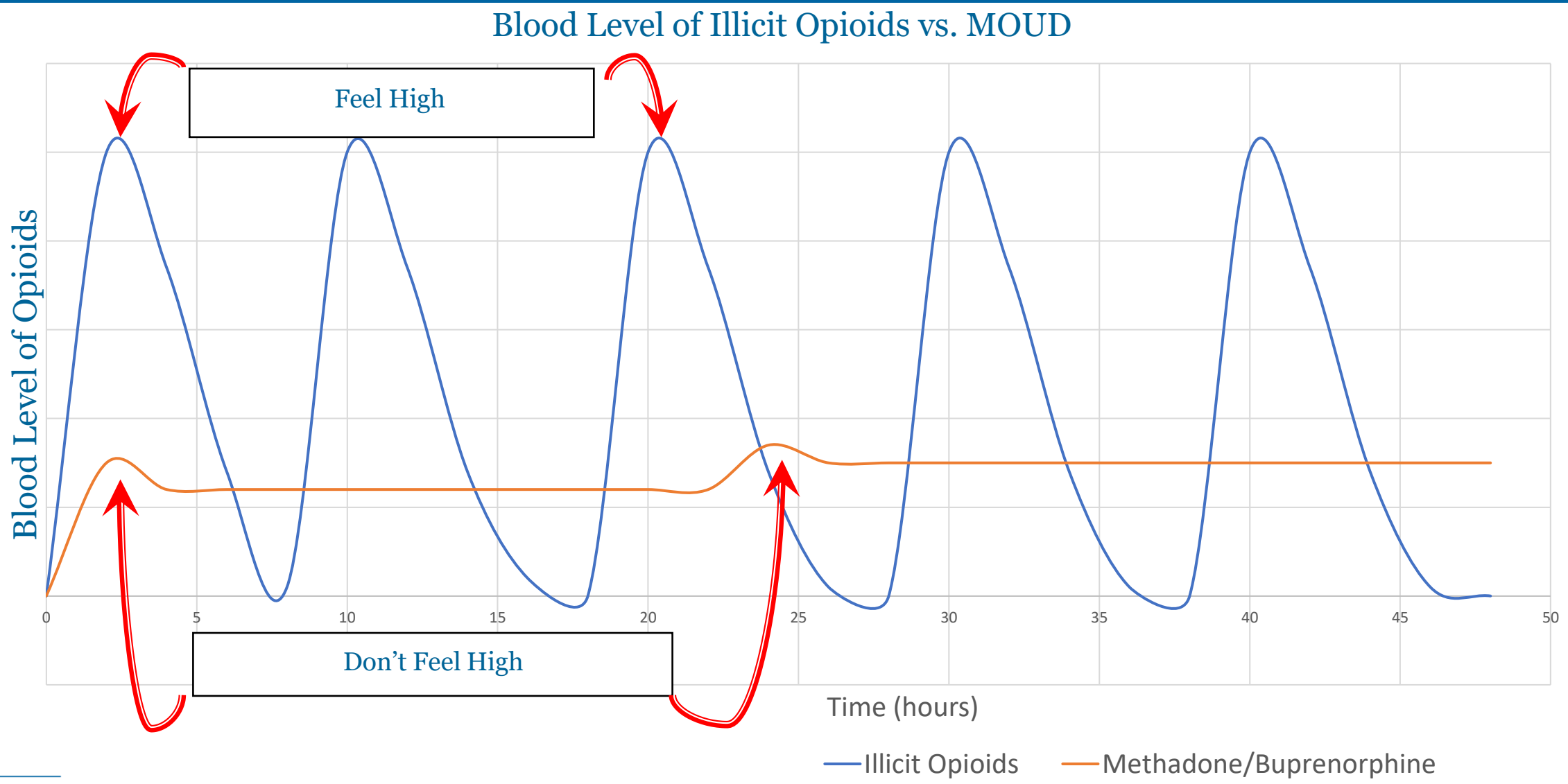
“WE ARE JUST REPLACING ONE ADDICTION WITH ANOTHER”

Substance Use Disorder Diagnostic Criteria

1. Using more or longer than you said you would
2. You would like to cut down your use
3. You spend a lot of time getting, using or recover from drug
4. Drug use makes it difficult for you to work, do good in school, or take care of the house
5. You continue to use even though you have problems with your family & friends due to using
6. You give up activities to use
7. You use in dangerous places or times
8. You use even though you are having physical or mental problems related to drug use
9. You crave the drug
10. It takes more drug to have the same effect
11. You feel sick if you don’t use

Source: DSM V

PHYSIOLOGICALLY:
WE ARE NOT REPLACING ONE DRUG WITH ANOTHER



WHAT IS STIGMA?

- Westfall, Miller and Bazemore '…bad thoughts about mental health or substance use that cause people to have bad behavior"
  - If a person with a problem says, "I should be able to stop on my own," then they might not ask for help.
  - When a doctors says, "it's a waste of my time to help them, they will just keep using," then the doctor doesn't offer them medication.
- Stigma is born out of thoughts and beliefs..

Source: Westfall 2016

“UNLESS THERE IS COUNSELING, YOU CAN’T HAVE MOUD”

Improve patient survival (MOUD only)

Source: Sordo 2017, Wakeman 2020, Walley 2020, Santo 2022

Increase retention in treatment (MOUD only)

Source: Mattick 2009 & 2014, Lobmaier 2008

Decrease illicit opiate use and other criminal activity among people with OUD (MOUD only)

Source: Mattick 2009 & 2014; Krupitsky 2011, Lutgen-Nieves, L. 2021

Improve birth outcomes among women who have SUD and are pregnant (MOUD only)

Source: SAMHSA. TIP 63, 2018, ASAM Practice Guidelines for OUD 2020, Mascola 2017

Increase patients’ ability to gain and maintain employment (MOUD + behavioral health treatment)

Source: Leary 2016, Guillery 2021, Sun 2015

THEY NEED TO HIT ROCK BOTTOM

- Rock bottom in the era of fentanyl is deceased
- People who are coerced to go into treatment for criminal justice reasons or to maintain a job have similar outcomes to those who choose treatment

Photo Source: Stock Photo

Sources: Pilarinos, A., Barker, B., Nosova, E., Milloy, M-J., Hayashi, K., Wood, E., Kerr, T., & DeBeck, K. (2021). Coercion into addiction treatment and subsequent substance use patterns among people who use illicit drugs in Vancouver, Canada. Addiction, 115(1), 97-106. DOI: 10.1111/add.14769

Farabee, D et al. 1998 · The effectiveness of coerced treatment for drug-abusing offenders. Federal Probation, 62(1), 3–10.

DECREASING STIGMA

Listen to people who have gotten better (increase empathy)

Talk about people getting better (SUD is treatable)

Provide information when thoughts are not true

Talk about the whole person not just the problem (person first language)

Talk about how hard it is to get help

Source: Abadia & Castro 2006
McGinty 2018

STIGMA, THOUGHTS, AND MISINFORMATION

"They need to make better choices. The patient is in this situation because of their own choices."

"Having Narcan encourages people to party."

"I got sober without meds; people should do it without medication."

"It's a waste of time to help them. They haven't hit rock bottom."
"They just keep using."

"Having clean needles encourages people to party. "

"Treating people with addiction takes up time that could be used for other people."

Sources: Strugar-Fritsch, (2019)
McLellan, (2000)
https://www.nap.edu/catalog/25310/medications-for-opioid-use-disorder-save-live

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TIME FOR QUESTIONS AND ANSWERS

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