Welcome to DH Learning Collaborative

- ***As you join you will be promoted to presenter.***
- ***You will be muted.***
- ***Please unmute yourself by clicking on the microphone icon for asking questions and participation in discussions.***
- ***You may also put your questions and comments in the Chat box.***
- ***We encourage active participation!***

Monthly Webinars

- ***Virtual CO MAT Learning Forum***

  1st Thursday 12:30pm-1:30pm

  REGISTER

- ***Induction Basics: Tips from the Trenches****

  2nd Tuesday 7:30am-8:30am

  REGISTER

  **same topic each month*

- ***Denver Health Learning Collaborative***

  3rd Wednesday 12:15pm-1:15pm

  REGISTER

Denver Health Addiction Journal Club

Scheduled dates for 2020

- *Every fourth Tuesday January-October*
- *November 10th*
- *December 8th*

Time; noon to 1 pm

To join; email ITMATTTRs2@UCDENVER.EDU

- See our website for previous presentations & resources as well as upcoming topics
  - https://www.practiceinnovationco.org/itmatttrs2/mat-forum/

Methamphetamine use and cognitive dysfunction:

Presentation, impacts on function, and communication

Joshua Blum MD

January 15, 2020

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Learning Objectives

- Understand the interplay between methamphetamine use and psychotic disorders
- Recognize chronic cognitive dysfunction associated with methamphetamine and other drug use
  - Adjust communication and teaching style to account for dysfunction
- Appreciate treatment options and facilitate referral to medical treatment and community recovery supports

Case: DB

- 45 year old single male, HIV+ x 15 years
- History of childhood and adult trauma
  - Sexual and emotional
- Complex medical history
- Difficulty maintaining jobs
- Uses intermittent methamphetamine to facilitate intimacy
  - “I can’t have sex without it.”
- Complains that a recent partner replaced an art poster on his wall with a near exact replica while he was gone
  - Can’t recall all events of the previous night

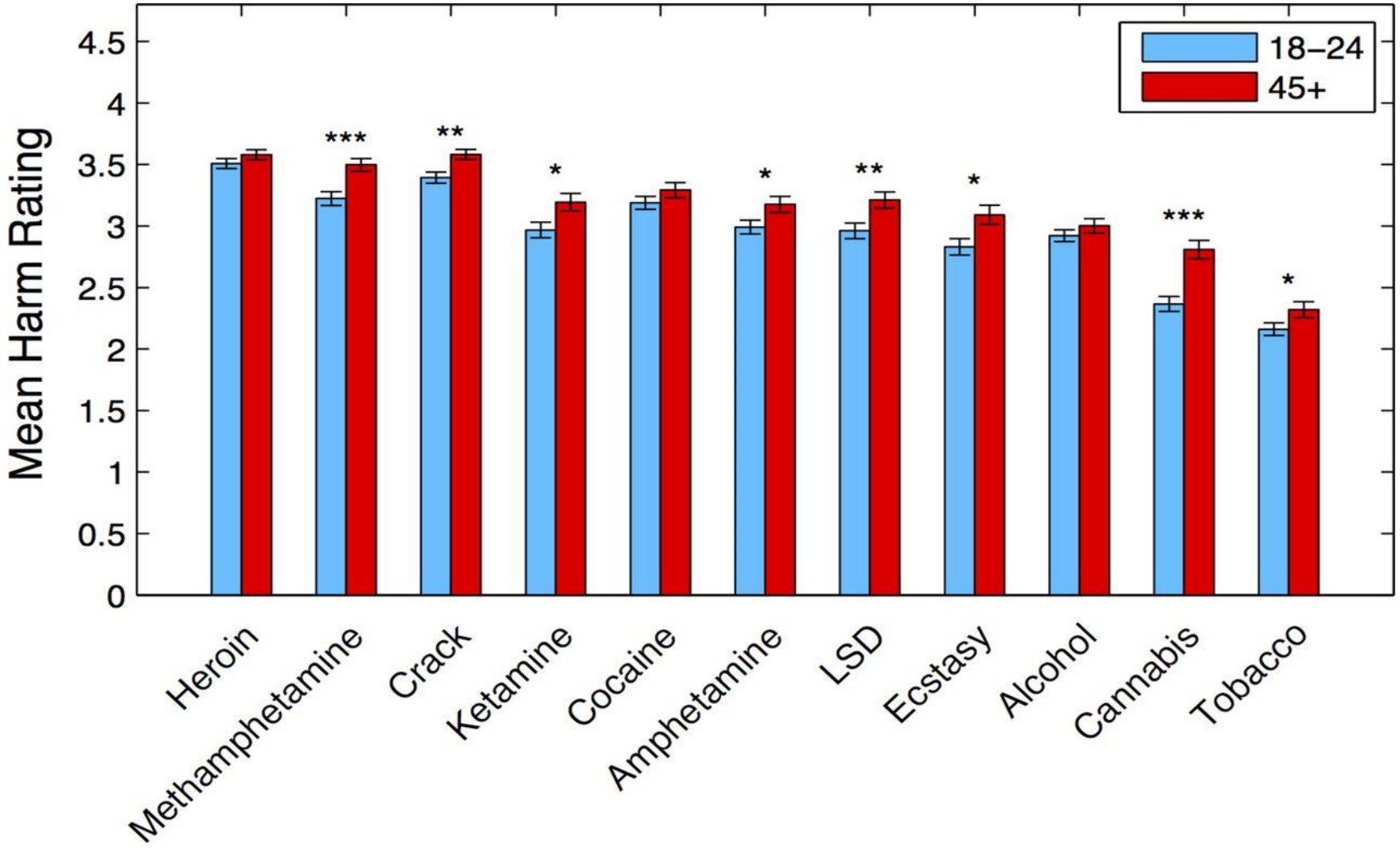
Case: DB

- Comes in for medication refill, new scaly dry rash, case management visit. Asking for treatment for scabies
- Exam shows multiple excoriated scabs on arms, paranoid ideation
- His after-visit paperwork includes instructions to go to the lab for tests, call for a dermatology appointment, fax in a recent utility bill, and go to the pharmacy to pick up a cream.
- He returns in a month. His skin is worse. He got his labs drawn but hasn’t made an appointment, picked up the skin cream, or sent in his bill.

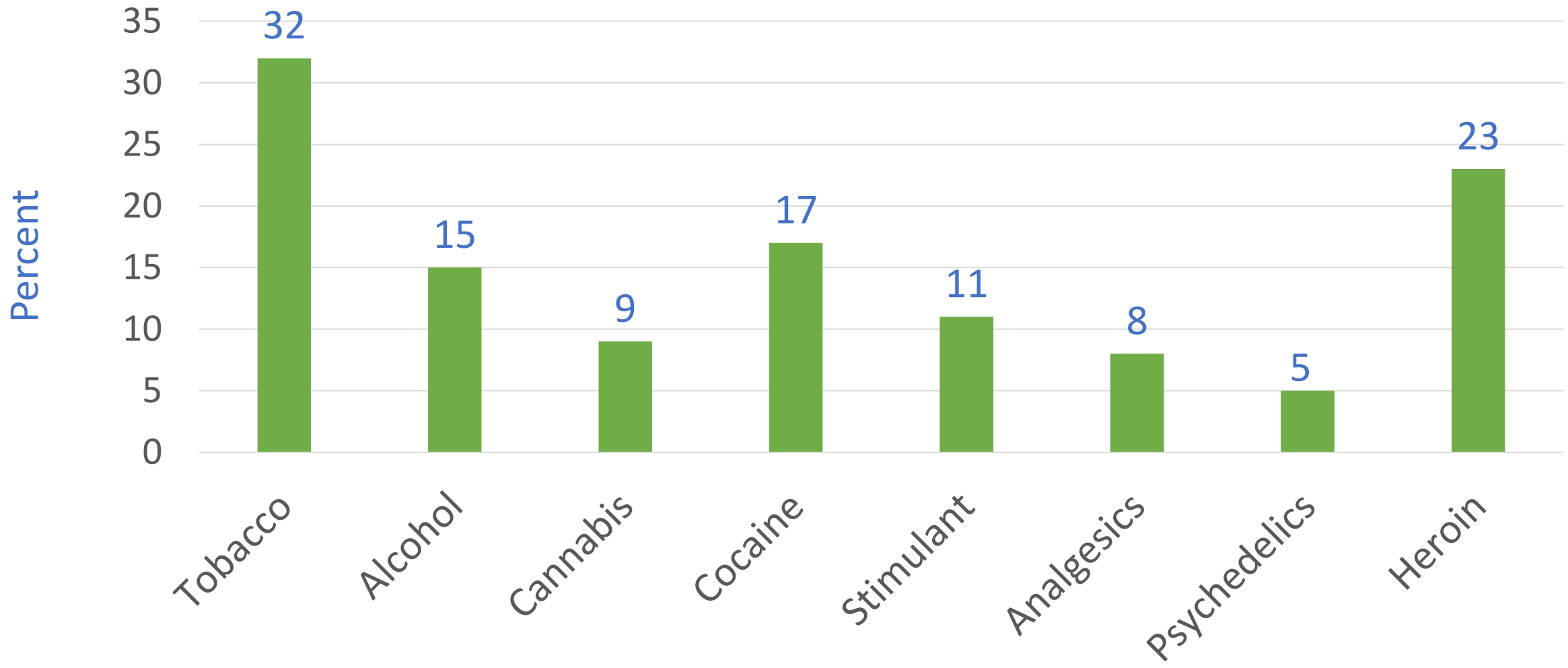
Case DB: What's going on?

- He didn't understand the instructions
- He doesn't remember the instructions
- He's depressed
- He dissociated
- He's self-destructive
- He has neurosyphilis
- He's using drugs
- ***Any or all of the above are possibilities***

Perceived drug risk



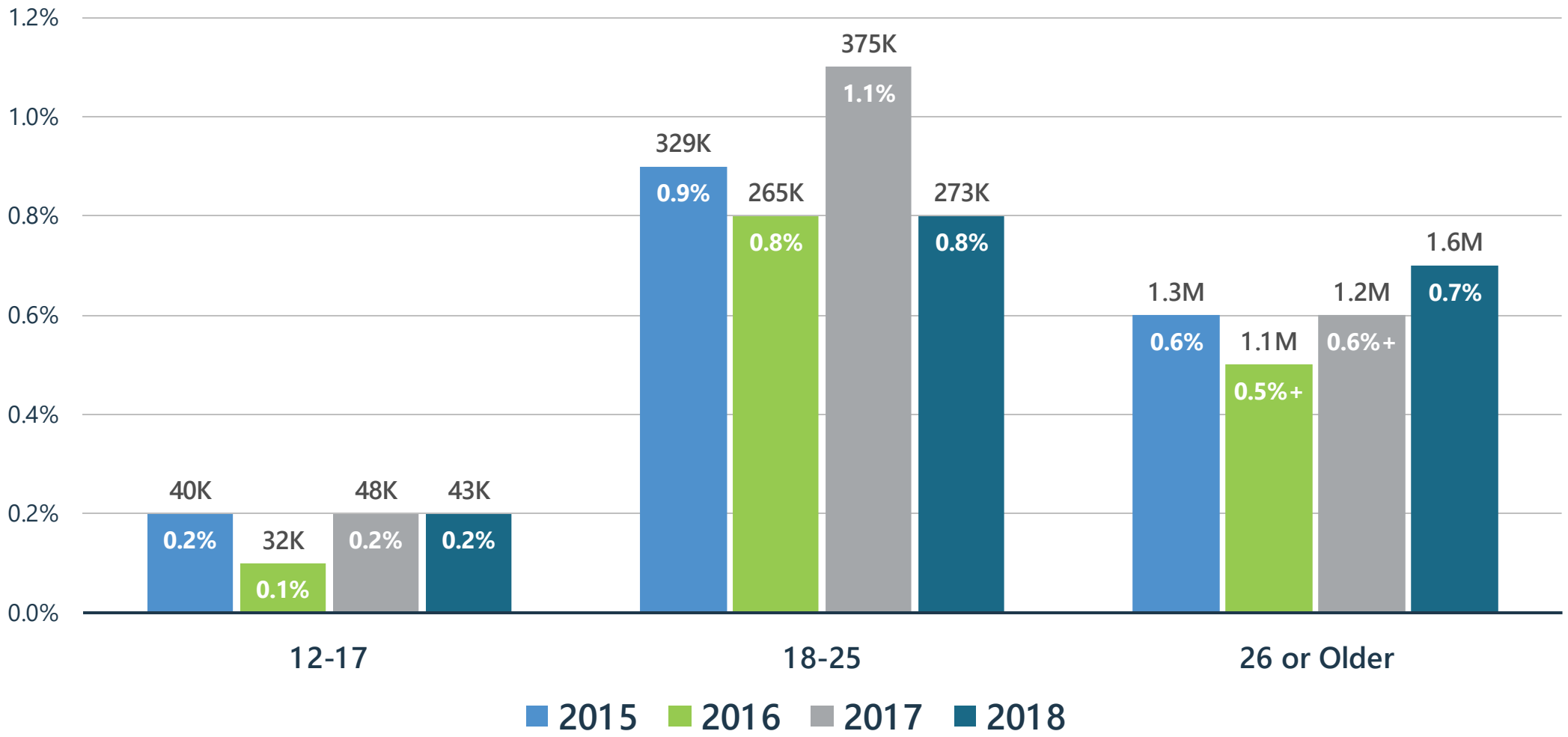
Survjit Cheeta et al. BMJ Open 2018;8:e021109



Anthony JC et al., Exp Clin Psychopharm 1994
Birge M et al., Nicotine and Tobacco Research 2017

National trends

PAST YEAR, 2015-2018 NSDUH, 12+



+ Difference between this estimate and the 2018 estimate is statistically significant at the .05 level.

Urine toxicology testing trends

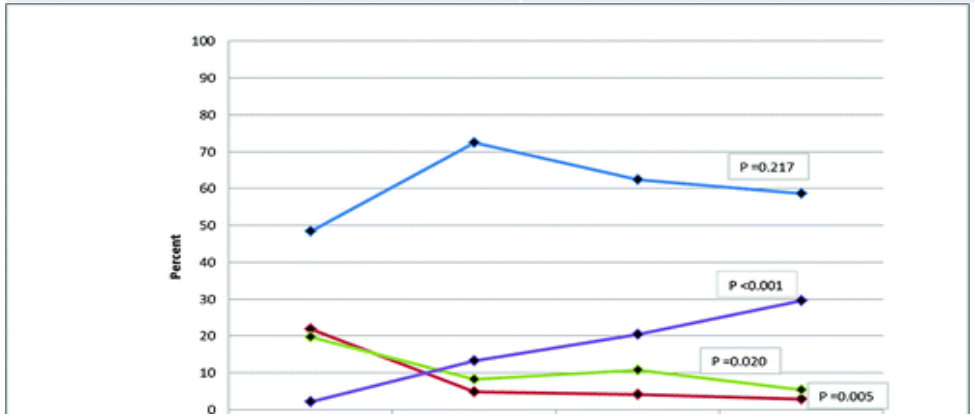
- Millennium health database
  - >1,000,000 unique individuals from all 50 States
- MA
  - 2013: 1.43%
  - 2019: 8.39% (487% increase)
- Fentanyl
  - 2013: 1.09%
  - 2019: 4.72% (333% increase)
- Heroin
  - 2013: 1.41%
  - 2019: 1.99% (peaked in 2016, now declining)

Twillman et al., *JAMA Open Network* January 2020

Meth in Colorado

- CO methamphetamine deaths 2018: 280
- Most meth produced in industrial labs in Mexico; only 2 local meth labs seized in 2008
- NHBS: Meth as most frequently IV drug:
  - Meth users:
    - More likely to inject multiple times/day
    - More likely to be homeless
    - More likely to share syringes

Year	%
2005	2.1%
2009	13.3%
2012	20.5%
2015	29.6%



Al-Tayyib A, et al. *Substance Use and Misuse* 2017

Contributors to cognitive dysfunction

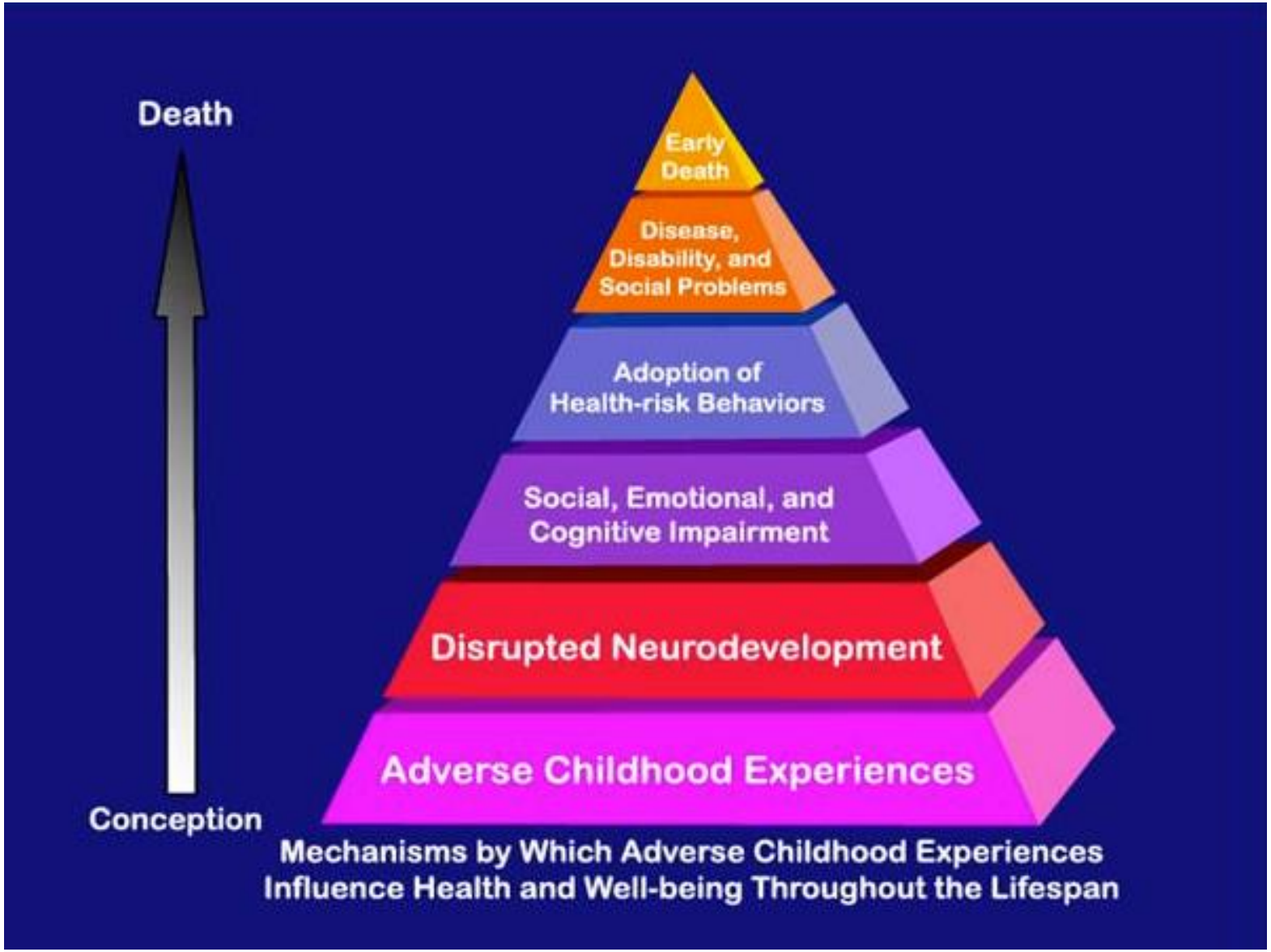
The impact of trauma

- Physical, sexual, and/or psychological abuse is incredibly common
  - 20% of all women, 5-10% of men
- And even more so among our patients:
  - Up to 62% of substance users
  - Increased odds of injection drug use
- Abuse can lead to worse outcomes
  - Psychiatric disease, medical complications
- And other bad things
  - Strong correlation with risky sex, commercial sex work

Woerner J et al. *Addictive Behaviors* 2016
Barth et al. *Int J Public Health* 2013

How do ACEs contribute to health outcomes?

- Chronic “fight or flight” environment induce release of counter-regulatory hormones
  - Adrenaline, cortisol
- Inhibits use/development of inhibitory centers of brain
  - Prefrontal cortex
- Chronic deficits in executive function


Death
Conception
Early Death
Disease, Disability, and Social Problems
Adoption of Health-risk Behaviors
Social, Emotional, and Cognitive Impairment
Disrupted Neurodevelopment
Adverse Childhood Experiences
Mechanisms by Which Adverse Childhood Experiences Influence Health and Well-being Throughout the Lifespan

Executive Function

- “The air traffic control center for the brain”
- Working memory
- Inhibitory control
- Mental flexibility

Deficits in executive function

- In fight/flight/freeze mode, executive function is impaired
  - Poor school performance
  - Problems with peers
  - Problems with authority figures

MA and psychosis

- ↑ Psychosis risk
  - 2x in recreational users
  - 5x in regular users
  - Often unmasks schizophrenia

McKetin R *JAMA Psych* 2013

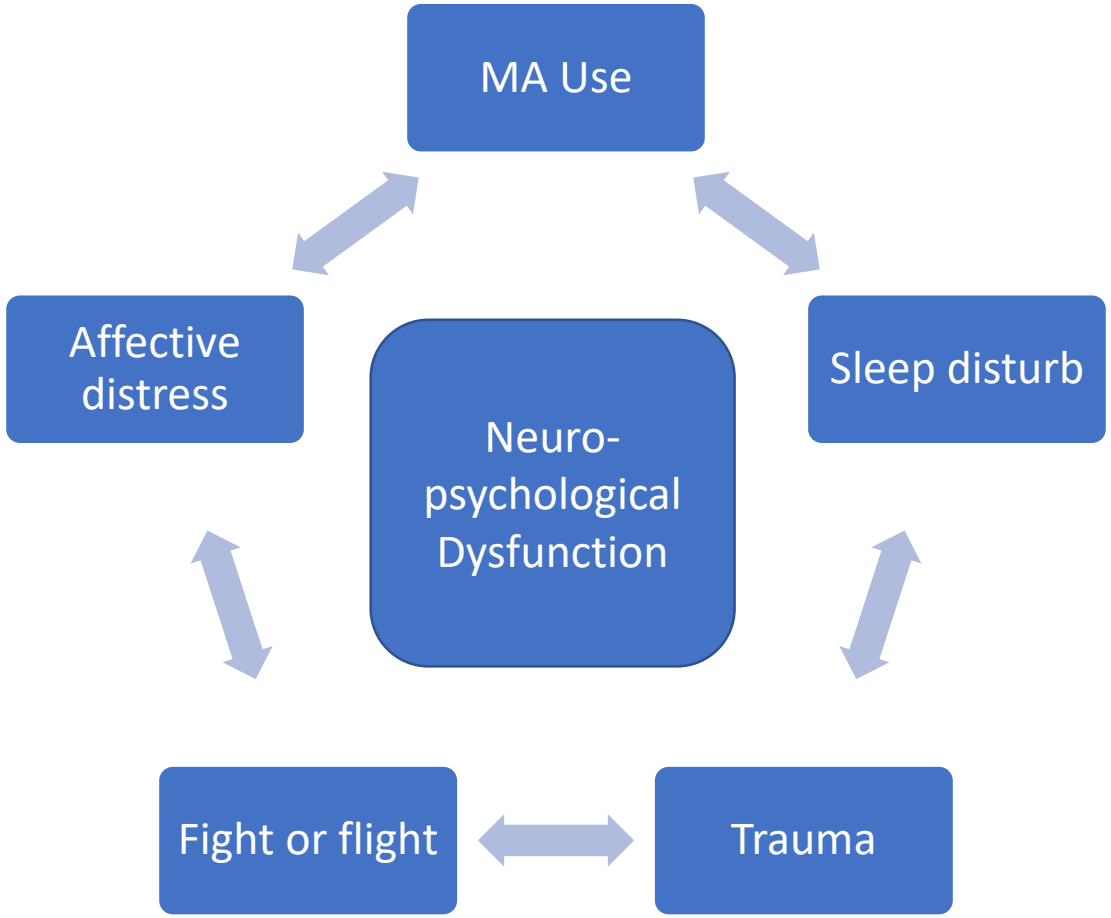
MA and psychosis

- Loss of touch with reality
- Auditory hallucinations
- Persecutory and reference delusions
- Psychotic sx may persist or recur spontaneously even following prolonged abstinence
- MA users with psychosis have:
  - More severe impairment
  - More health service utilization
  - Poorer prognosis

MA and psychosis

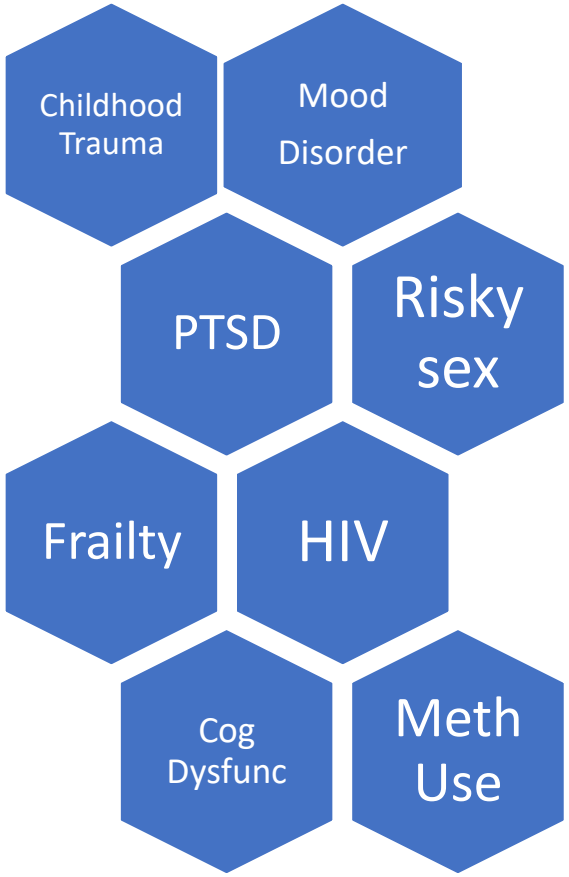
- Less negative symptoms, less paranoia compared with schizophrenia
- Somewhat better social functioning compared with schizophrenics
- Thought disturbance may respond to neuroleptics

MA Use Associated with Affective Distress and Cognitive Dysfunction



MA and frailty

- Increased inflammatory markers
- Diminished global neurocognition
- Frailty: “accumulated multisystem deficits”



Paolillo EW *AIDS Research Human Retrovirus* 2019

How do patients present?

- More distressed
- Impaired attention
- Psychotic symptoms
  - Paranoia
- Decreased working memory
- Prematurely old

Improvement in cognition seen with abstinence

- Long-term sobriety leads to partial normalization
  - Lower affective distress
  - Better neuropsychological function
- Improvement in depression may further assist cognition

Iudicello JA *J Clin Exp Neuropsych* 2010
Glasner-Edwards S *J Nerv Ment Dis* 2009

Case DB: 3-month follow up

- Broke up with boyfriend
- No longer using MA though not engaged in any form of treatment
- Less agitated, disorganized, labile
- Paranoia somewhat better
  - Not sure if the poster he has is the original; still thinks that his cell phone has been hacked
- More insight into drug use contributing to symptoms

Treatment Options: Medications

Stimulant replacement therapy

- Modafinil 200-400 mg daily
- Bupropion 150 mg twice daily
- Methylphenidate 54-180 mg daily
- Dextroamphetamine 60-110 mg daily

- Most trials short: 8-12 weeks

Bhatt M, et al. *Systematic Reviews* 2016

Results: Odds ratios for use

- 642 patients/5 studies
- Modafinil: 0.86
- Bupropion: 1.12

- Low-frequency users: 1.24
- Unspecified frequency: 0.92
- Treatment retention: 1.20

- No statistically significant benefit to any psychostimulant on frequency of use, sustained abstinence, or retention in treatment

Bhatt M, et al. *Systematic Reviews* 2016

Newer treatments

- Depot naltrexone plus buproprion: ADAPT-2 study
  - Multi-site clinical research
  - Currently recruiting at UT SW

- Novel molecule: JPC-077
  - Vesicular Monoamine Transporter-2 (VMAT2) antagonist

Therapeutic interventions

Contingency Management

- Based on operant conditioning model of SUDs
- 3 key aspects:
  - Amount of reinforcement per behavior
  - Immediacy of delivery
  - Magnitude of reinforcement
- Meta-analysis showed that CM is effective in 61% of treatment episodes versus 39% for other interventions
- Effective across substances: alcohol, opiates, cocaine, methamphetamine, marijuana, benzodiazepines

McPherson SM et al. *Substance Abuse and Rehabilitation* 2018
Roll JM, et al. *Addictive Behaviors* 2013

Importance of immediate reinforcement

- Delay discounting
  - Prefrontal cortex, responsible for planning, looking forward, is overridden by amygdala in drug users
  - Focus is on immediate reward

Contingency management optimization

- CM “shaping”
  - Reinforcing progressively closer estimates of abstinence
- “High magnitude” CM
  - >$500 vs lower rewards
- Leveraging telehealth and remote monitoring

McPherson SM et al. *Substance Abuse and Rehabilitation* 2018

Other therapies

- Motivational Enhancement Therapy
- Cognitive Behavioral Therapy
  - MATRIX model

Matrix Model Guiding Principles

- Respect
  - Build strong relationship between therapist and client using mutual respect
- Follow-through on structure and expectations
  - Client must be embrace the entire program and meet expectations
- Quality educational content
- Varied treatment approaches
  - Includes motivational interviewing, CBT

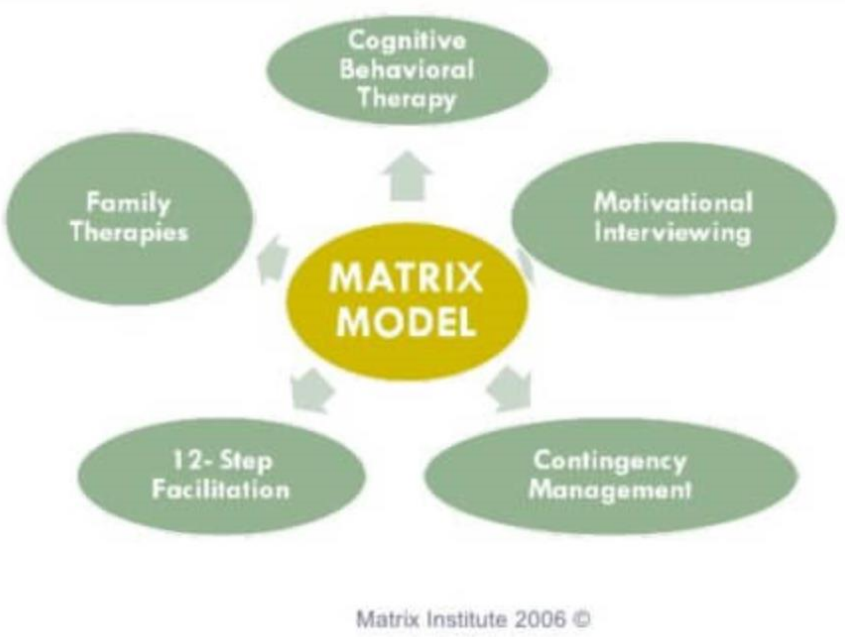
Huber, A et al. *Journal of Addictive Diseases* 1997

Matrix Model Guiding Principles

- Reward and encouragement
  - Rewards for desired behaviors, extinguish negative behaviors
- Engagement and Education
  - Includes the entire family
- Participation in self-help and community-based programs
  - Strongly encourage participants to engage in mutual help programs
- Periodic drug testing

Huber, A et al. *Journal of Addictive Diseases* 1997

Matrix Model



- 16-week program
  - Individual counseling
  - Group: Early Recovery Skills (ERS)
    - 8 sessions over the first month, focusing on 2 concepts:
      - Individual power to increase likelihood of abstinence
      - Importance of community-based recovery groups
  - Group: Relapse Prevention
    - Beginning and end of each week for 90 minutes
      - Identify the signs of relapse in order to prevent. Some topics addressed:
        - Relapse is predictable, shame and guilt, identifying triggers
  - Group: Family Education
  - Group: Social Support
    - Begins in 3rd month and continues for 36 weeks
    - Recognizes that PWUD often lose (or never had) ability to interact socially in a healthy way

Patient communication

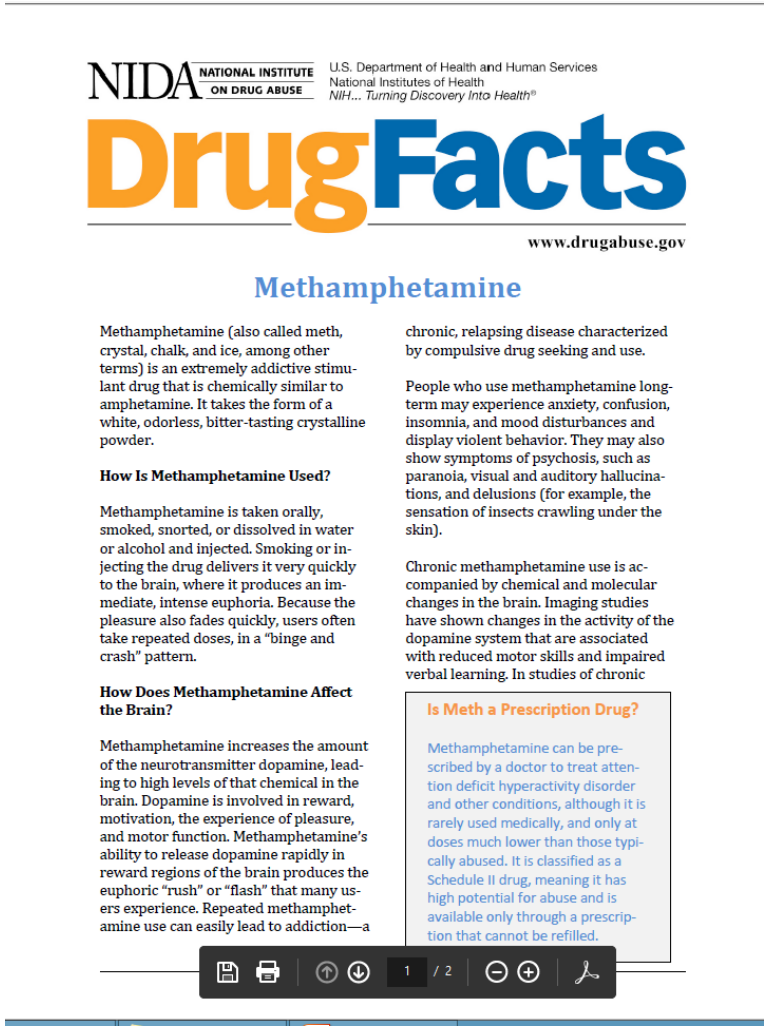
- Be patient
- Simplify goals
- Repeat and reinforce simple messages
- Offer short-term rewards and positive feedback
- Identify cognitive dysfunction
- Refer to community supports

Case DB: 6-month follow up

- Reunited with boyfriend
- More agitated, paranoid, labile
- Believes he has scabies again, asking for treatment
- Liver enzymes elevated
  - New diagnosis of HCV reinfection
- Not returning calls

More help and information

- Treatment
  - Denver Health OBHS
    - https://www.denverhealth.org/services/behavioral-health/addiction-services
  - Mile High Behavioral Healthcare
    - Momentum, Peer Support Services
    - https://www.milehighbehavioralhealthcare.org/integrated-health
    - The Denver Element: https://denverelement.org
  - ARTS
    - https://www.artstreatment.com/meth-treatment/



NIDA NATIONAL INSTITUTE ON DRUG ABUSE
U.S. Department of Health and Human Services
National Institutes of Health
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DrugFacts

www.drugabuse.gov

Methamphetamine

Methamphetamine (also called meth, crystal, chalk, and ice, among other terms) is an extremely addictive stimulant drug that is chemically similar to amphetamine. It takes the form of a white, odorless, bitter-tasting crystalline powder.

How Is Methamphetamine Used?

Methamphetamine is taken orally, smoked, snorted, or dissolved in water or alcohol and injected. Smoking or injecting the drug delivers it very quickly to the brain, where it produces an immediate, intense euphoria. Because the pleasure also fades quickly, users often take repeated doses, in a "binge and crash" pattern.

How Does Methamphetamine Affect the Brain?

Methamphetamine increases the amount of the neurotransmitter dopamine, leading to high levels of that chemical in the brain. Dopamine is involved in reward, motivation, the experience of pleasure, and motor function. Methamphetamine's ability to release dopamine rapidly in reward regions of the brain produces the euphoric "rush" or "flash" that many users experience. Repeated methamphetamine use can easily lead to addiction—a chronic, relapsing disease characterized by compulsive drug seeking and use.

People who use methamphetamine long-term may experience anxiety, confusion, insomnia, and mood disturbances and display violent behavior. They may also show symptoms of psychosis, such as paranoia, visual and auditory hallucinations, and delusions (for example, the sensation of insects crawling under the skin).

Chronic methamphetamine use is accompanied by chemical and molecular changes in the brain. Imaging studies have shown changes in the activity of the dopamine system that are associated with reduced motor skills and impaired verbal learning. In studies of chronic

Is Meth a Prescription Drug?

Methamphetamine can be prescribed by a doctor to treat attention deficit hyperactivity disorder and other conditions, although it is rarely used medically, and only at doses much lower than those typically abused. It is classified as a Schedule II drug, meaning it has high potential for abuse and is available only through a prescription that cannot be refilled.

1 / 2

Community Supports

- Crystal Meth Anonymous
  - https://crystalmeth.org/cma-meetings/cma-meetings-directory/3151-colorado.html
- Cocaine Anonymous Colorado
  - https://cacolorado.org/meetings-previous-structure/
- SMART Recovery
  - https://www.smartrecovery.org/
- LifeRing Secular Recovery
  - http://liferingcolorado.org/meetings/
- Young People in Recovery Epic Program
  - https://youngpeopleinrecovery.org/epic/
- Women for Sobriety
  - https://womenforsobriety.org
- Celebrate Recovery
  - https://www.celebraterecovery.com

End

Questions

Why is there so much meth use among gay men?

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Methamphetamine use in PLWH

- ↓ ARV adherence
- ↓ viral suppression
- ↑ Mortality
  - 3x elevated standardized mortality ratio
  - Most pronounced with MA+nicotine (5x)
- ↑ Risky sex
  - Especially with depression
- ↑ STI prevalence
  - 77 STIs in 286 MSM/MA over 9 months
  - 78% PLWH

Carrico JW *JAIDS* 2019
Reback CJ *AIDS Ed and Prevent* 2018

Feldman MB *Drug Alc Depend* 2018
Passaro R *Drug Alc Depend* 2019
Fletcher JB *AIDS & Behavior* 2018