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Alcohol Use, Injecting and Sexual Risk Behaviors Among Methamphetamine Users: Implications for HIV and Hepatitis C Virus

William A. Zule, Dr.P.H.
Behavioral Health Criminal Justice Division
RTI International
zule@rti.org

University of Texas El Paso
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Overview

- Brief History of Methamphetamine
- Methamphetamine Today
- Methamphetamine and HIV
- Methamphetamine and Hepatitis C Virus (HCV)
- Alcohol Use HCV and Methamphetamine
- Emerging research on low dead space syringes and HIV and HCV prevention

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Amphetamines and Methamphetamine

Amphetamines are the second most commonly used illicit drug type worldwide, after cannabis (United Nations Office on Drugs and Crime, 2009).

They are central nervous system (CNS) stimulants that were first synthesized more than a century ago.

Initially used for medical applications, they are currently produced by legal and illegal manufacturers; multiple forms of amphetamines exist,

Methamphetamine and amphetamine (M/A) are reportedly the most common amphetamine type stimulants (ATS) used globally (United Nations Office on Drugs and Crime, 2007b).

Degenhardt et al 2010

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Timeline of Use in the US

- **1950s**: Oral use was common; intravenous use was present but rare
- **Early to mid 1960s**: methamphetamine moved into the counter-culture
- **Late 1960s**: rapid increase in the number of users
- **Early 1970s**: use peaked and began decreasing
- **Mid 1970s-late 1990s**: use continued to decrease in some areas, but stabilized and remained endemic through the 1990s in other areas.
- **2000**: Increase since 2000

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Actions and Reactions

- **1965:** FDA restricted sales of pharmaceutical methamphetamine
- **1968-1971:** *Desoxyn (diet pills): script doctors and drugstore burglaries*
- **1970-1973:** Crack down on script doctors and increase in drugstore security
- **1970-1975:** *Increase in local labs*
- **1980s:** Restrictions on P2P and other precursors
- **1990s:** *Switch to pseudoephedrine recipes*
- **2000s:** Restrictions on pseudoephedrine purchases
- **2010s:** *Rise of shake & bake mini-labs in the US and international super-labs*

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Meth Labs

Meth lab 1970s- 80s

Shake and Bake Labs 2012

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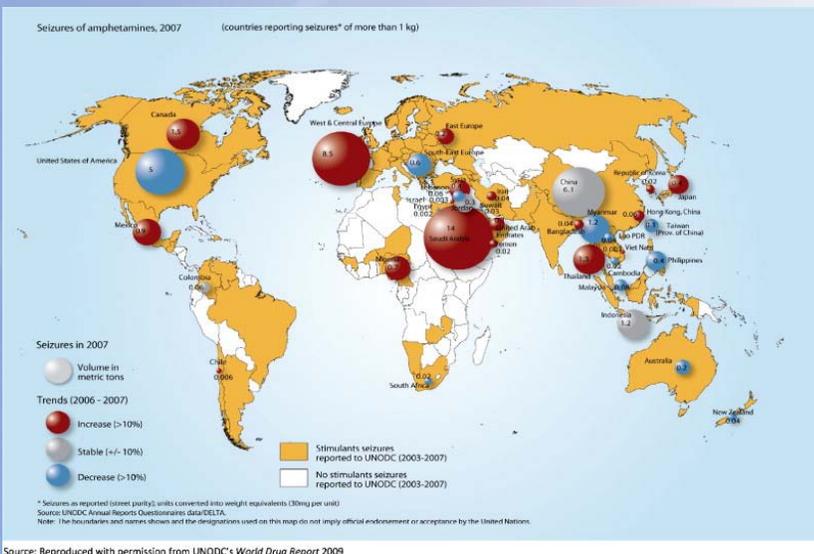
Methamphetamine 2012

New York Times 2-9-2012

MEXICO CITY — Mexican authorities announced their largest methamphetamine seizure ever late Wednesday: 15 tons, found in pure powder form at a ranch outside Guadalajara.
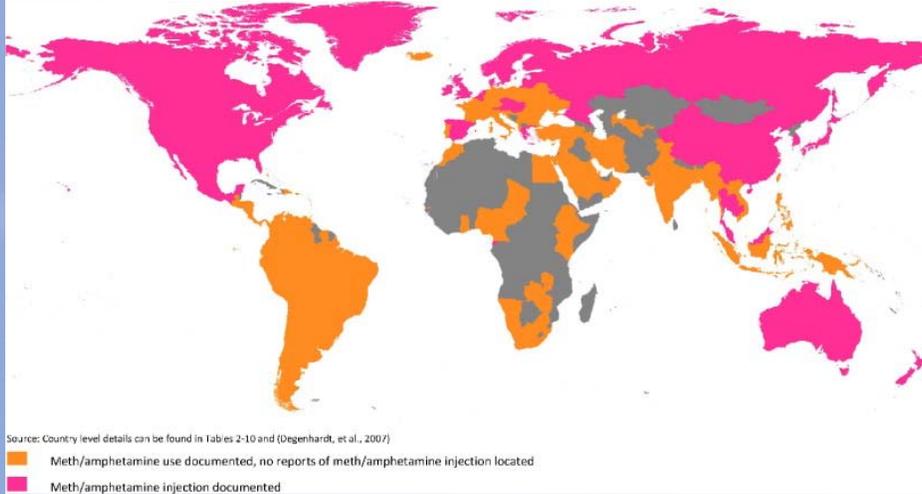
USA Today 1-23-2012

A crude new method of making methamphetamine (Shake & Bake) ....is filling hospitals with thousands of uninsured burn patients requiring millions of dollars in advanced treatment — a burden so costly that it's contributing to the closure of some burn units.

Global Methamphetamine Seizures

Source: Reproduced with permission from UNODC's *World Drug Report* 2009

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Slide 1

Global Methamphetamine Injection

Source: Country level details can be found in Tables 2-10 and (Degenhardt, et al., 2007)

■ Meth/amphetamine use documented, no reports of meth/amphetamine injection located
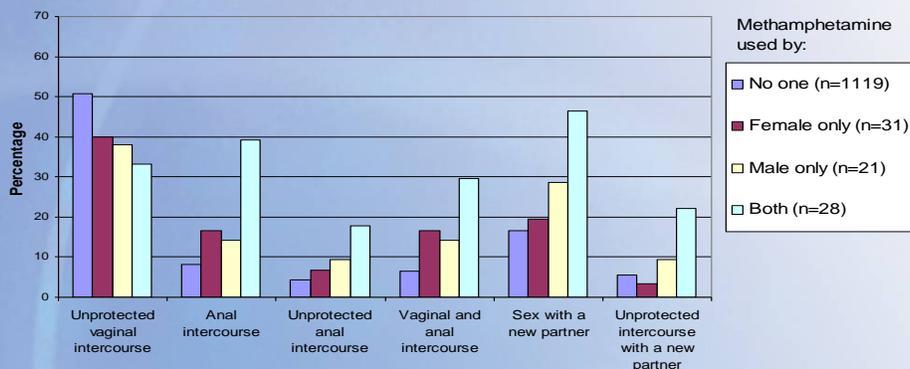
■ Meth/amphetamine injection documented

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Slide 2

Methamphetamine and HIV

- **Sexual Risk**
  - Men who have sex with men (MSM)
  - Heterosexuals
- **Injection risk**

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Methamphetamine and Sexual Risk

- *Event-level studies that link the occurrence of unprotected sex and use a specific drug during the same sexual encounter provide the strongest evidence of a causal link between drug use and risky sex.*

- In event-level studies, only methamphetamine and binge alcohol use have been associated consistently with HIV sex risk behaviors among MSM (Vosburgh et al 2012).

- Event-level studies of methamphetamine use and risky sex have linked methamphetamine use to risky sexual behavior among heterosexuals (Zule et al 2007).

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Sexual behavior by methamphetamine use during encounter

Methamphetamine used by:
- No one (n=1119)
- Female only (n=31)
- Male only (n=21)
- Both (n=28)

Zule et al, 2007

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Bivariate and multivariate models[a] for the association methamphetamine use by both partners and engaging in 6 different sexual risk behaviors

Behavior	OR (95% C.I.)	AOR (95% C.I.)
Unprotected vaginal intercourse[b]	0.79 (0.37, 1.71)	0.69 (0.29, 1.68)
Anal intercourse[b]	6.88 (3.03, 15.64)***	4.72 (1.90, 11.69)***
Unprotected anal intercourse[b]	4.63 (1.69, 12.70)**	2.95 (0.87, 10.06)
Vaginal and anal intercourse during encounter[b]	5.95 (2.53, 14.03)***	3.67 (1.41, 9.60)***
Sex with a new partner	4.73 (2.22, 10.09)***	5.01 (2.12, 11.83)***
Unprotected intercourse with a new partner	5.20 (2.09, 12.93)***	4.99 (1.89, 13.18)**

[a] All models adjusted for age of male partner, age of female partner, race of male partner, and use of cocaine (i.e. powder, crack, or speedball) by either partner.
[b] Multivariate models also adjusted for type of partner (main or casual)
*p < 0.05, **p < 0.01, ***p <0.001.

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Methamphetamine and Injection Risk

- Association between methamphetamine use and risky injection practices varies across studies
- An early (1990-1991) ethnographic study found lower injection risk among methamphetamine users than among heroin users in San Antonio (Zule et al 1999)
- In the US methamphetamine injection is concentrated primarily among non-Hispanic whites
    - HIV prevalence is lower among non-Hispanic white injectors than among African-American and Hispanic injectors; HIV prevalence tends to be lower among methamphetamine injectors than among people who inject other drugs

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Hepatitis C Virus (HCV) Infection

- HCV is transmitted efficiently through exposures involving blood
- The probability of HCV infection following an exposure via needle stick is estimated to be 10 times greater than the probability of HIV infection
- Sexual transmission of HCV is inefficient, but sex is more common than injecting drug use and we are unsure how much HCV is transmitted sexually

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Background

- HCV among Injecting Drug Users (IDUs)
  - Prevalence: 50% to 90%
  - Time to infection: 50% infected within 2 years of first injection
  - Course of infection: variable, 20% progress to cirrhosis within 20 years of infection others may never progress
  - Effects of alcohol use: heavy alcohol use increases the rate of HCV progression

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Harm Reduction, HCV, and IDUs
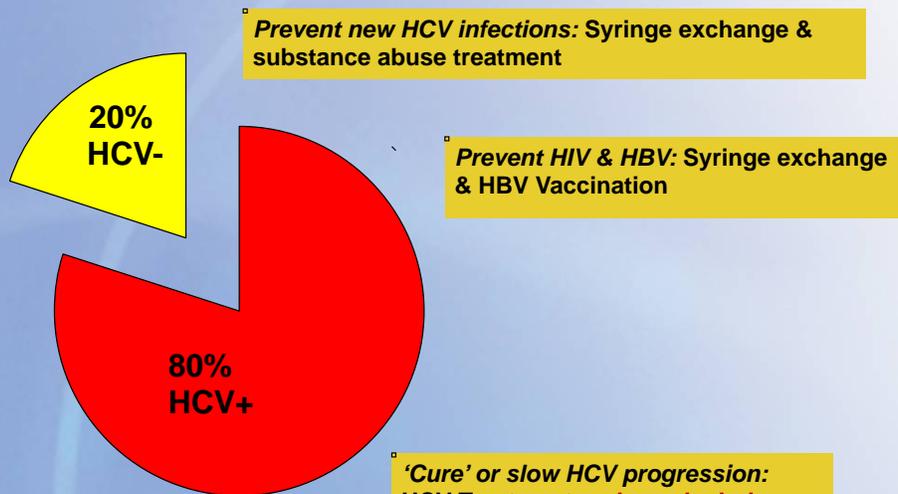
Prevent new HCV infections: Syringe exchange & substance abuse treatment

Prevent HIV & HBV: Syringe exchange & HBV Vaccination

20% HCV-

80% HCV+

'Cure' or slow HCV progression: HCV Treatment, reduce alcohol use

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Current treatments

- <u>Effectiveness</u>: 50% to 85%
- <u>Side effects</u>: fatigue, depression, inability to concentrate
- <u>Duration</u>: 24-48 weeks (may be shorter with new drug combinations)
- <u>Cost</u>: expensive
- <u>Payment</u>: most IDUs lack insurance and many governments are unwilling to pay

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What can be done?

- **Reduce alcohol use**
- Rationale
  - In one retrospective cohort study of people with HCV infection, 12% of non-drinkers progressed to cirrhosis within 20 years while 58% of heavy drinkers progressed to cirrhosis within 20 years
  - Heavy alcohol use is common among IDUs

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Intervention Comparison

- Both groups received 6-sessions (30-60 min.)
  - Session 1: pre-test counseling (HIV, HCV, HBV)
  - Session 2: post-test counseling (HIV, HCV, HBV)
  - Sessions 3-6:
    - Experimental group: motivational interviewing tailored to each individual's stage of change regarding risk behaviors and alcohol use
    - Comparison group: educational sessions on direct and indirect sharing/injection risk, HIV, HCV, addiction, using videos
  - 45% completed all 6 intervention sessions
  - Mean of 4.2 sessions completed
   - No differences between groups in numbers of sessions completed

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Sample

Socio-demographics (n=620)

Mean age (S.D) in years	41 (9)
% male	73
Race/ethnicity	
% non-Hispanic white	27
% African-American	66
% other	7
% completed high school or GED	69
% unemployed	70
% homeless	35
% ever in substance abuse treatment	67
% ever in prison	57
% HIV positive	9
% HCV positive	**55**

Drug Use Last 30 days (n=620)

% drank alcohol	69
% harmful drinkers (AUDIT ≥ 8)	58
% smoked crack	72
% used powdered cocaine	65
% used heroin	70
% used speedball (heroin and cocaine combined)	59
% used methamphetamine	12

Injecting practices last 30 days

Mean number of injections (SD)	26 (42)
% shared syringes (receptive sharing)	17
% shared cookers, cottons, rinse water	23

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Alcohol use past 30 days by intervention condition
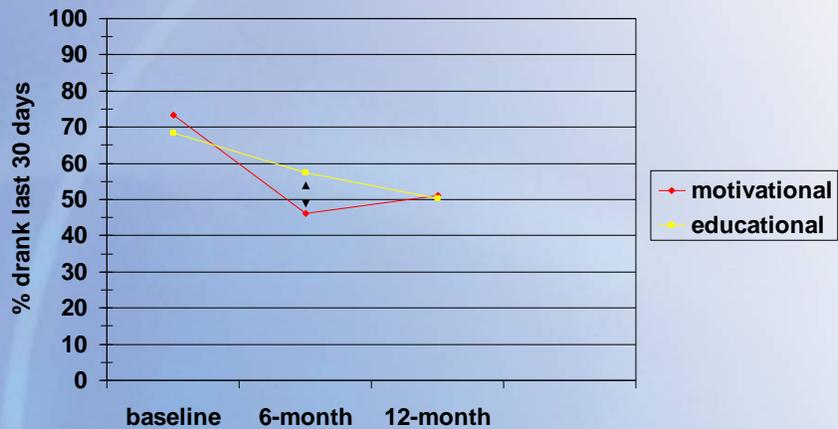
Baseline to 6-month change significantly greater in motivational group compared to educational group

Predictors of alcohol use at 6-month follow-up

Variables	p-value	Odds Ratio	95% CI
alcohol use last 30 days baseline	< 0.001	4.05	(2.62, 6.27)
HCV (positive=1; negative=0)	0. 03	0.66	(0.45, 0.96)
Intervention (motivational=1; educational=0)	0.04	0.66	(0.46, 0.98)

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Implications for reducing HCV-related harm

- Harm reduction for IDUs should include alcohol reduction
- Relatively brief motivational intervention delivered by lay people can impact use
- Additional strategies are needed to slow liver disease progression among HCV+ injectors (the majority)

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Methamphetamine and HCV and Alcohol

- Methamphetamine users who inject are at high risk of HCV infection
- 70% of methamphetamine injectors in our North Carolina study met criteria for "harmful drinking" on the Alcohol Use Disorders Identification Test (AUDIT)
- In our ethnographic study in San Antonio, 50% of methamphetamine injectors reported drinking daily and 40% reported drinking 12 or more drinks on days when they drank
- In another study in North Carolina, 55% of former injectors reported binge drinking (>5 drinks in 2 hours) in the previous 30 days

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## Implications for HCV Progression

- Heavy alcohol use among methamphetamine injectors is likely to increase the probability of HCV progression
- Heavy alcohol use among former methamphetamine injectors means that HCV progression is likely to continue
- Many people who begin injecting methamphetamine or other drugs in their teens or early 20s are likely contract HCV and to develop serious liver problems in their late 40s and begin dying in their mid 50s and early 60s

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Syringe Design and HIV and HCV Risk

- Syringes used by IDUs vary in size and design
- Some designs retain more fluid and blood after use than others
- HIV viral burden (viral load x volume of inoculum) in an exposure influences the probability of HIV transmission
- The viral burden exposure via syringe sharing is a function of:

  Viral burden = volume of blood x HIV viral load

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Syringe Design Influences Fluid/Blood Retention
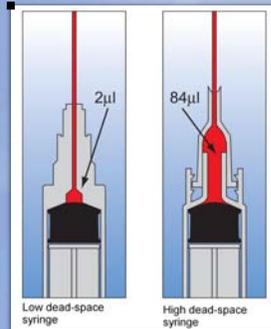
Fact: Some syringes retain more fluid and blood than other syringes retain.
Hypothesis: Syringes that retain less blood reduce HIV transmission risk.

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https://www.facebook.com/LowDeadSpaceSyringes

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Revised on 9/17/2012

Blood Retained after Rinsing Varies by Syringe Type

Syringe type	2nd rinse
Low dead space syringes (LDSS)	< 0.001 µL
High dead space syringes (HDSS)	1.01 µL
Ratio of blood retained in HDSS/LDSS	> 1,000

- *Involved registering with 0.1 ml, booting with 0.1 ml of blood and 2 water rinses with 0.5 ml of water**

*Zule et al, 1997. JAIDS

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How Syringe Type Influences HIV Viral Burden

		HIV RNA Copies per exposure*	
Stage of Infection	Plasma viral load HIV copies/ mL	HDSS (1 µL of blood)	LDSS (0.001 µL of blood)
Acute (very high)	100,000,000	100,000	**100**
Acute	5,000,000	5,000	5
Latent (moderately high)	100,000	**100**	1 copy in 10 exposures
Latent	10,000	10	1 copy in 100 exposures
End stage (AIDS)	1,000,000	1,000	1

•Each HIV virion contains 2 copies of HIV RNA

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LDSS Reduce HIV Prevalence in a High Risk IDU Population Over Time

100% HDSS

0% HDSS
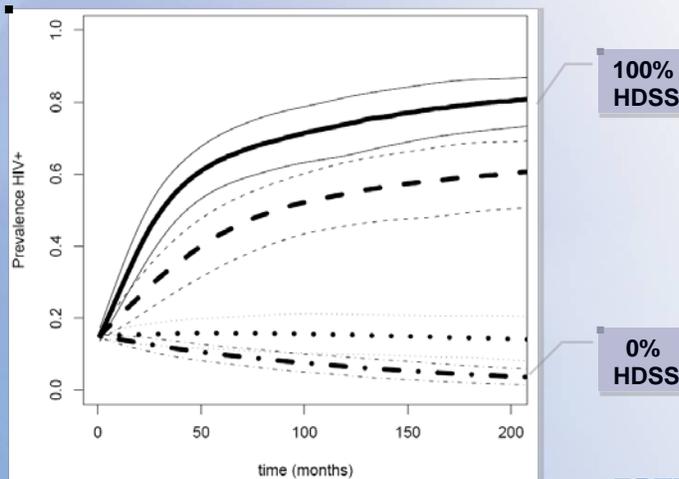
Bobashev & Zule (2010) Addiction

Low Dead Space Syringes and HCV

- HCV survives for up to 60 days in a high dead space syringe, but it only survives up to 1 day in a low dead space syringe (Paintsil et al 2010).
- In North Carolina, we found no association between a history of sharing low dead space syringes and HCV infection, whereas IDUs who had shared high dead space syringes were over twice as likely to be infected.

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