

Strategies for Preventing HCV among Persons Who Inject Drugs

with a particular focus on prescription opioid analgesics

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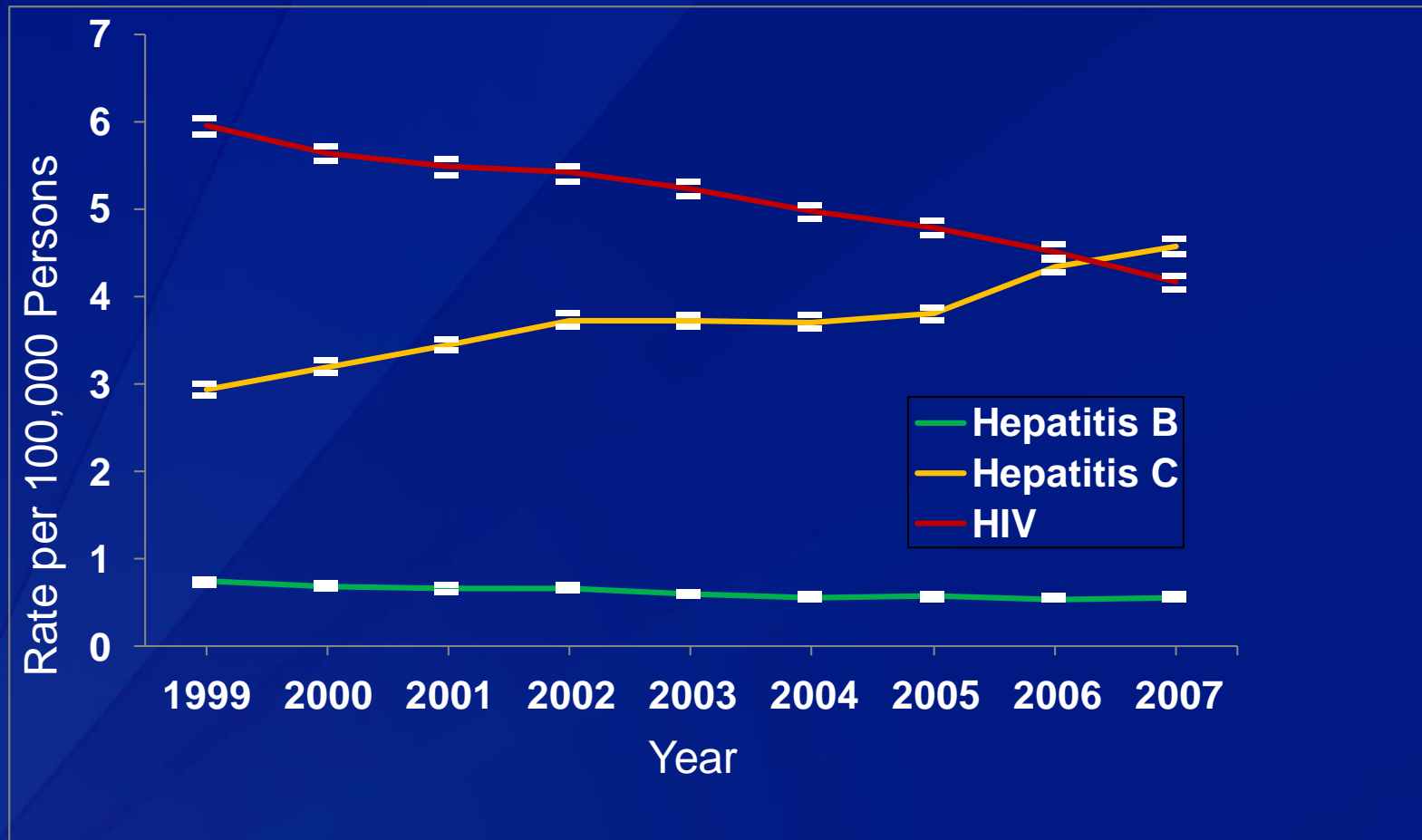
HCV Infections among PWID

- ❑ Injection drug use (IDU) is the principle “motor” of HCV incidence¹
- ❑ HCV antibody (anti-HCV) prevalence among PWID between 30% and 70%²
- ❑ anti-HCV incidence among PWID between 16% and 42% per year³
- ❑ anti-HCV prevalence among *younger injectors* (18—29 yo) between 10% and 36%⁴

HCV v. HIV

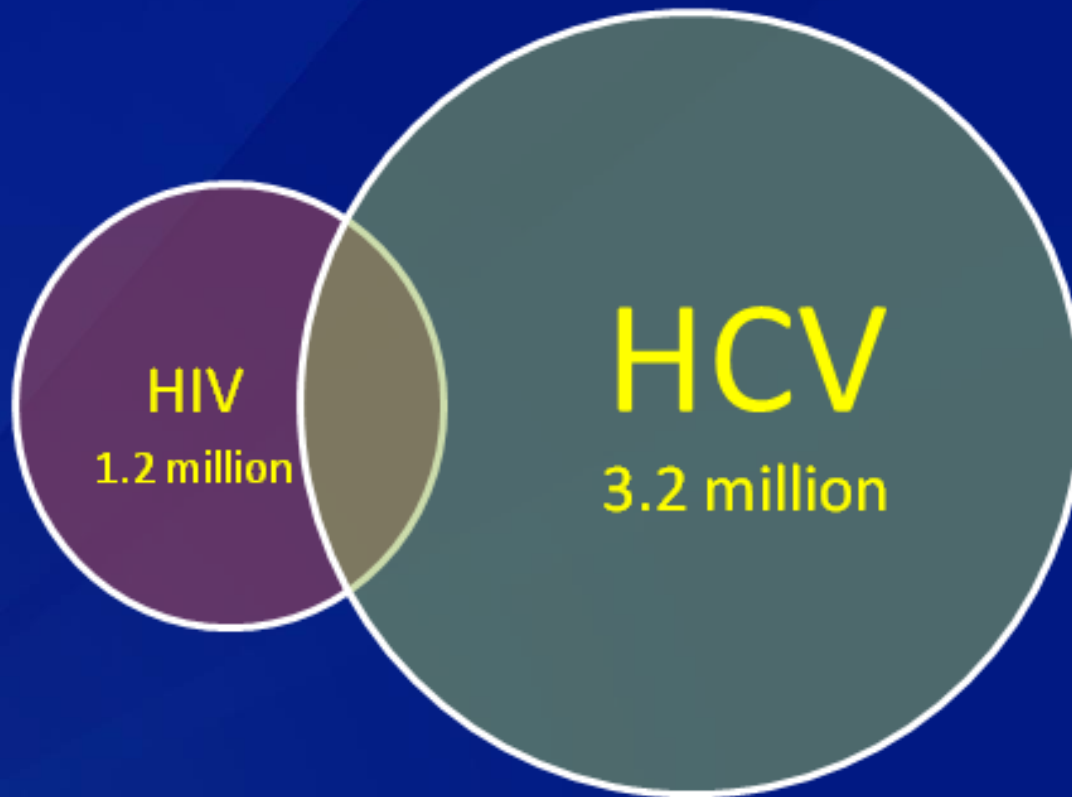
- ❑ From 1996 through 2010, the rate of admission for **HIV fell** from 9.9 per 100,000 people to 5.3, while the rate for **HCV rose** from 2.2 per 100,000 to 10.5*
- ❑ **HIV prevalence** is between 1 and 10% while **HCV prevalence** is between 30 and 70%
- ❑ 4.1 million persons infected with **HCV_{ab}** and 1.2 million persons infected with **HIV**.

Age-Adjusted Rates of Mortality: Hepatitis B, Hepatitis C, and HIV, United States, 1999–2007*



- In 2007, > 70% of registered deaths in HCV-infected were aged 45-64 years old**

HIV/HCV Co-infection



Research Question

Why is there such a high HCV prevalence among PWID (30-70%) while HIV prevalence is comparatively lower (1-10%)?

Prevalence and Viral Characteristics

Higher HCV prevalence contributes to higher HCV incidence

- ★ The probability of injecting with someone who is HCV-infected is now greater than the probability of injecting with someone who is HIV-infected.

Differences in viral infectivity and stability

- ★ HCV is more concentrated (i.e. replicates faster) in blood than HIV
- ★ HCV is more stable outside the body than HIV
- ★ HCV can survive longer on inanimate objects than HIV

HCV's Behavioral Risk Profile

Viral Infectivity of HCV persists for:

- Up to **63 days** in syringe barrel and dead space
- Up to **21 days** in H₂O in plastic container
- Up to **14 days** on inanimate faces (cookers and inj. surfaces)
- Up to **24 hours** in filter; and **48 hours** when foil-wrapped

HCV-contaminated solution needs to be heated for almost a **90 seconds** and reach temperatures of **144°F** for infectivity to be at undetectable levels.

Paintsil et al. Survival of Hepatitis C Virus in Syringes: Implication for Transmission among Injection Drug Users. *JID*, 2010

Doerrbecker et al. Inactivation and survival of hepatitis C virus on inanimate surfaces. *JID*, 2011

Doerrbecker et al. Transmission of Hepatitis C Virus Among PWID: Viral Stability and Association With Drug Preparation Equipment, *JID*, 2012

HCV presents a unique set of behavioral risks for PWID

These viral characteristics transform every piece of injecting equipment into a primary transmission vector.

HCV's protracted infectivity and environmental stability has the potential to transform the entire injection episode into a substantial risk factor since the setting itself contains a plethora of mandatory equipment that can harbor and transmit HCV.

Preparation Equipment



Filters



Cookers

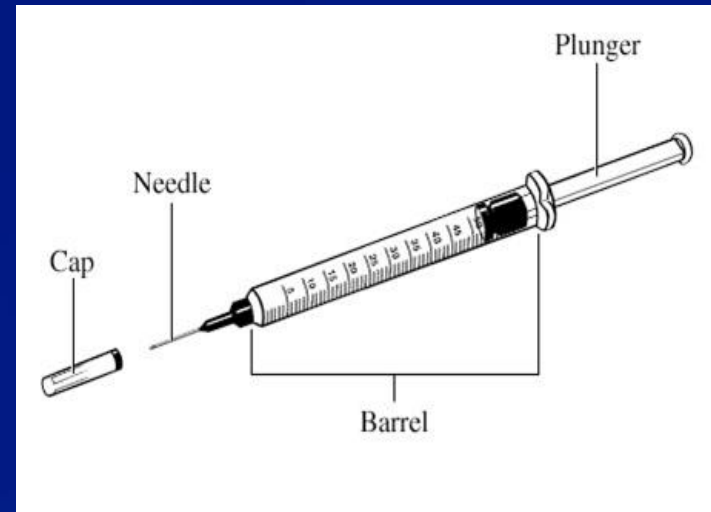
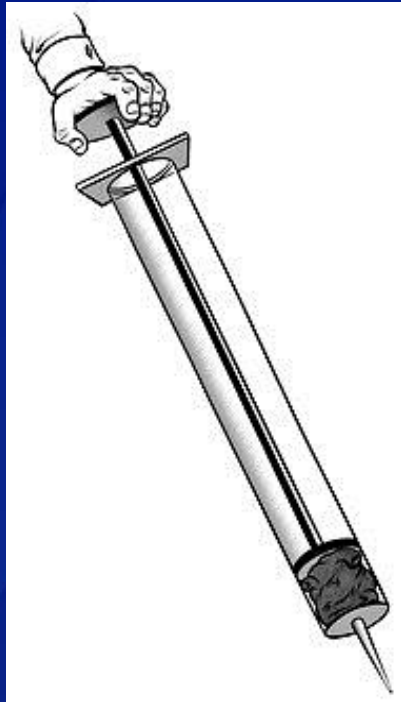


Water



Surfaces

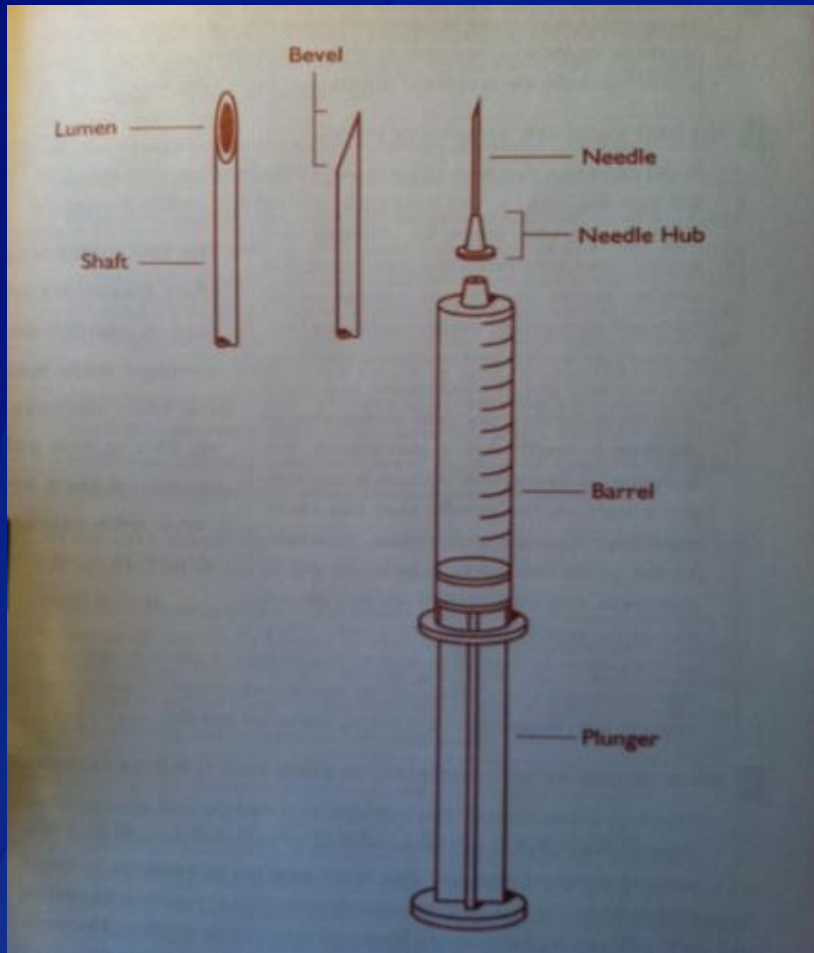
Needles and Syringes



Fixed (i.e. Integrated) Needles

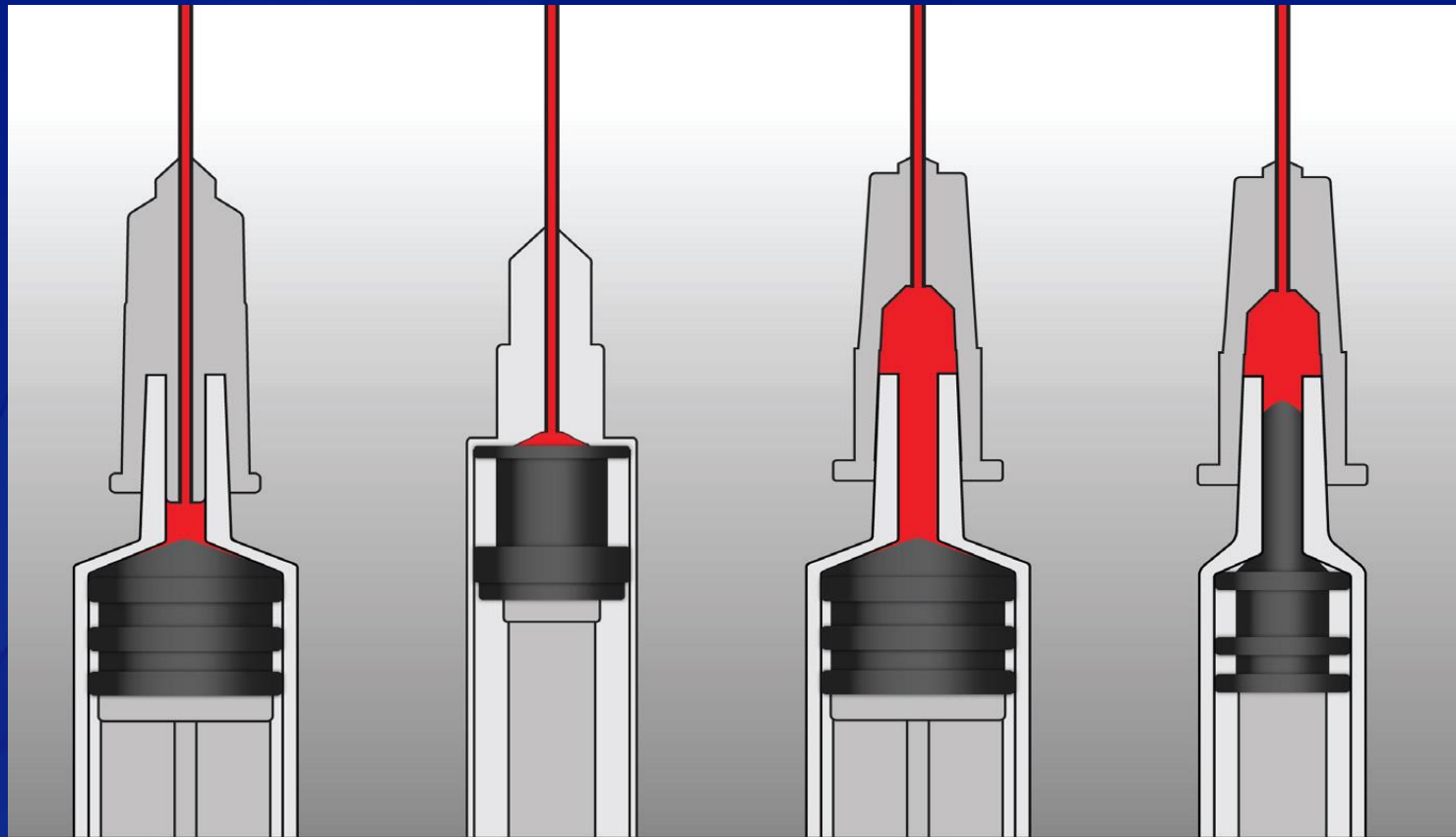


Detachable Needles

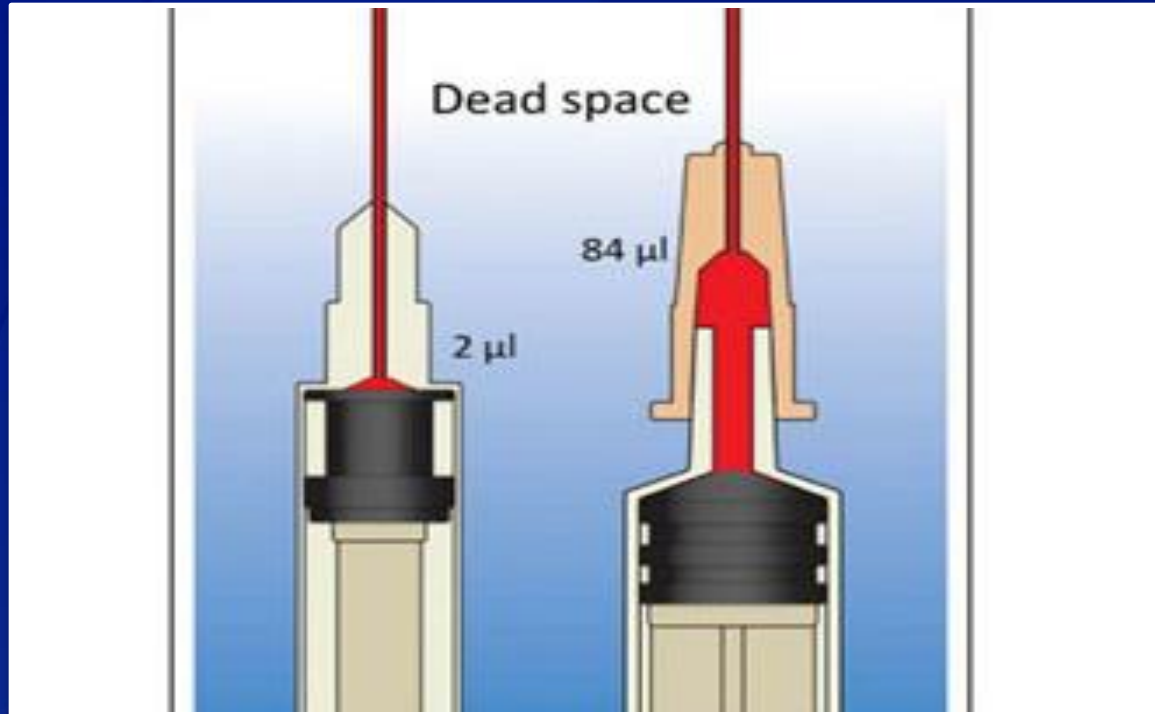


Dead Space – all syringes have it

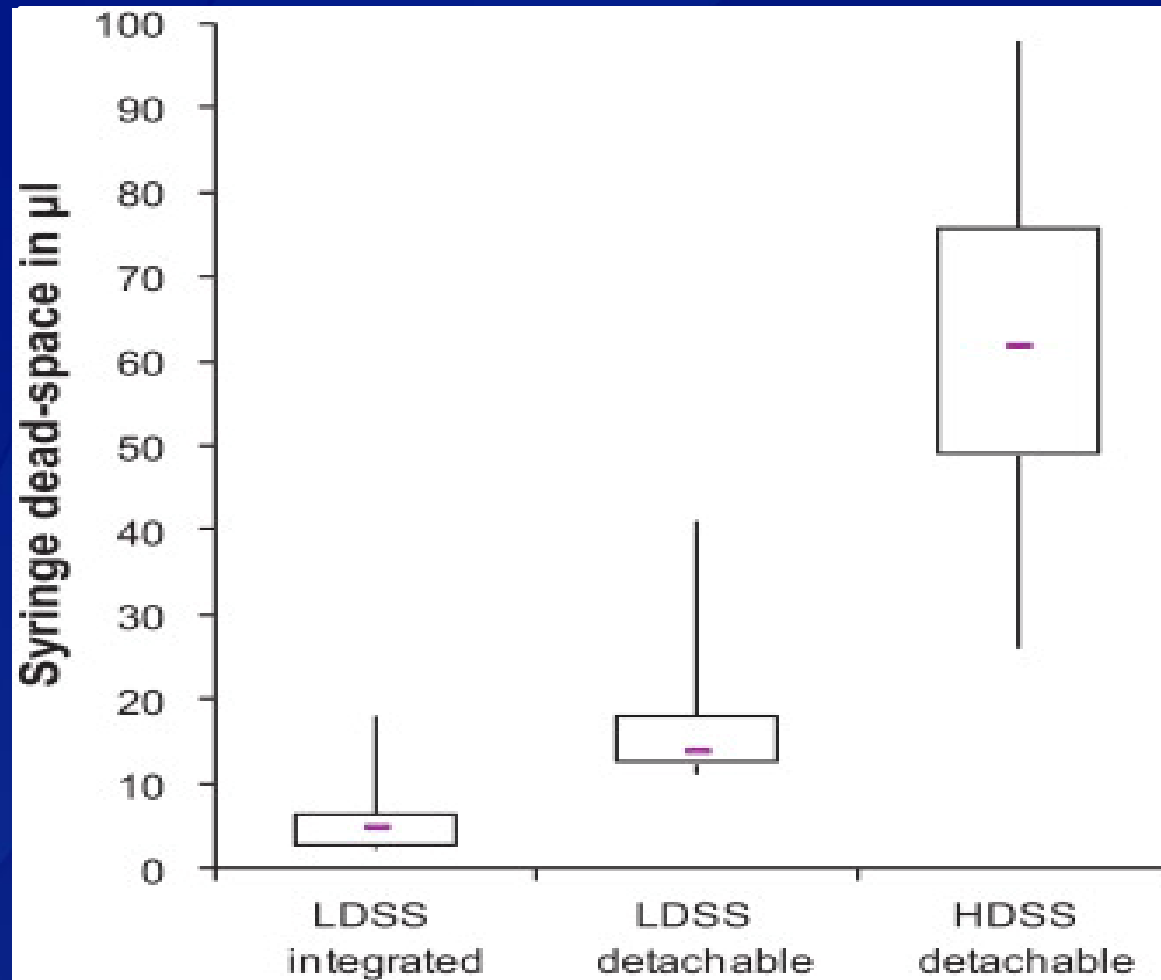
The space between the tip of the syringe —i.e. the hub of the needle— and the needle itself contains small amounts of solution when the plunger is fully depressed



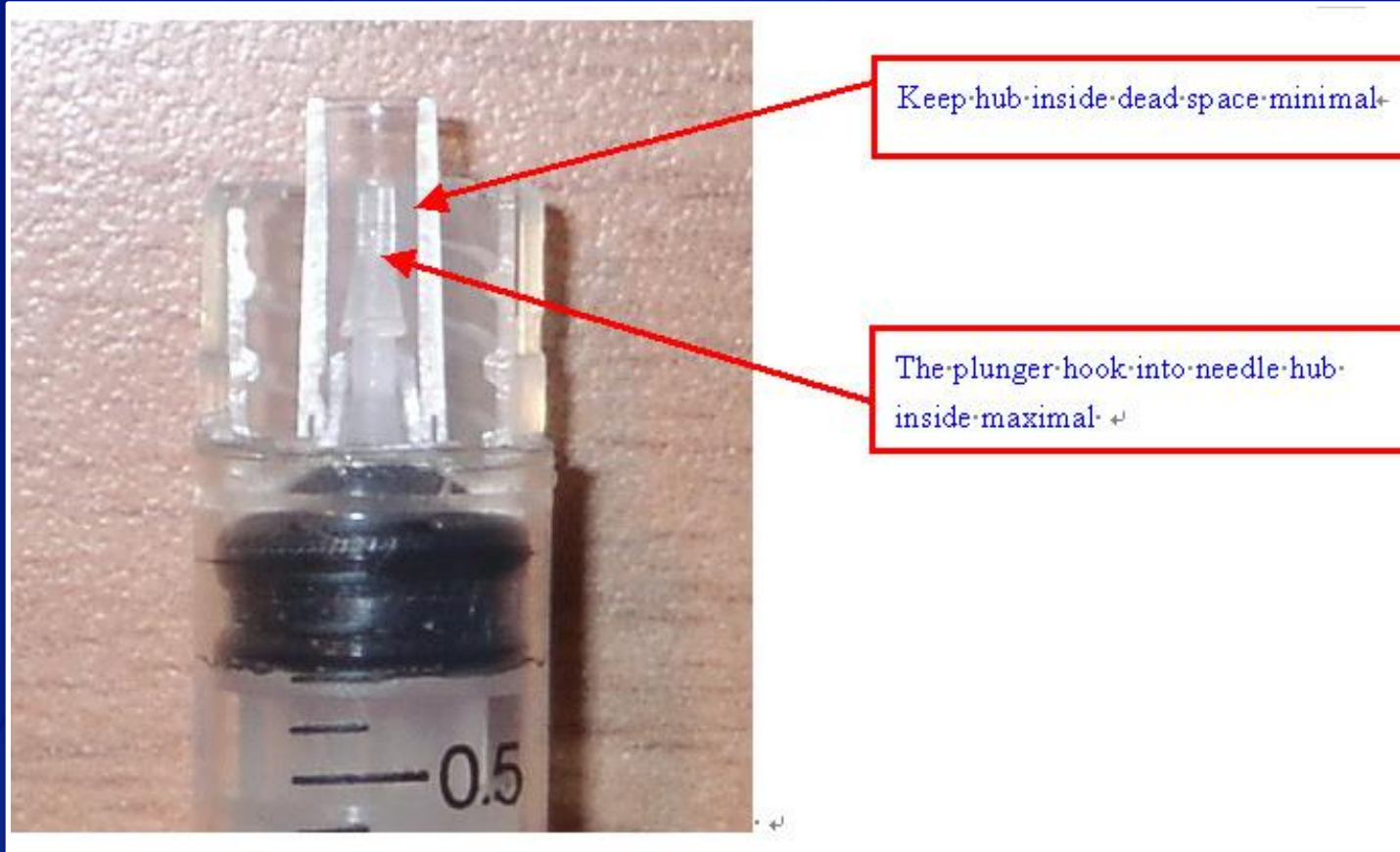
Mean volume of fluid retained with plunger depressed



**HDSS are able to retain 1000 times more
blood after rinsing than LDSS***



Syringe Type and Dead-Space Volume



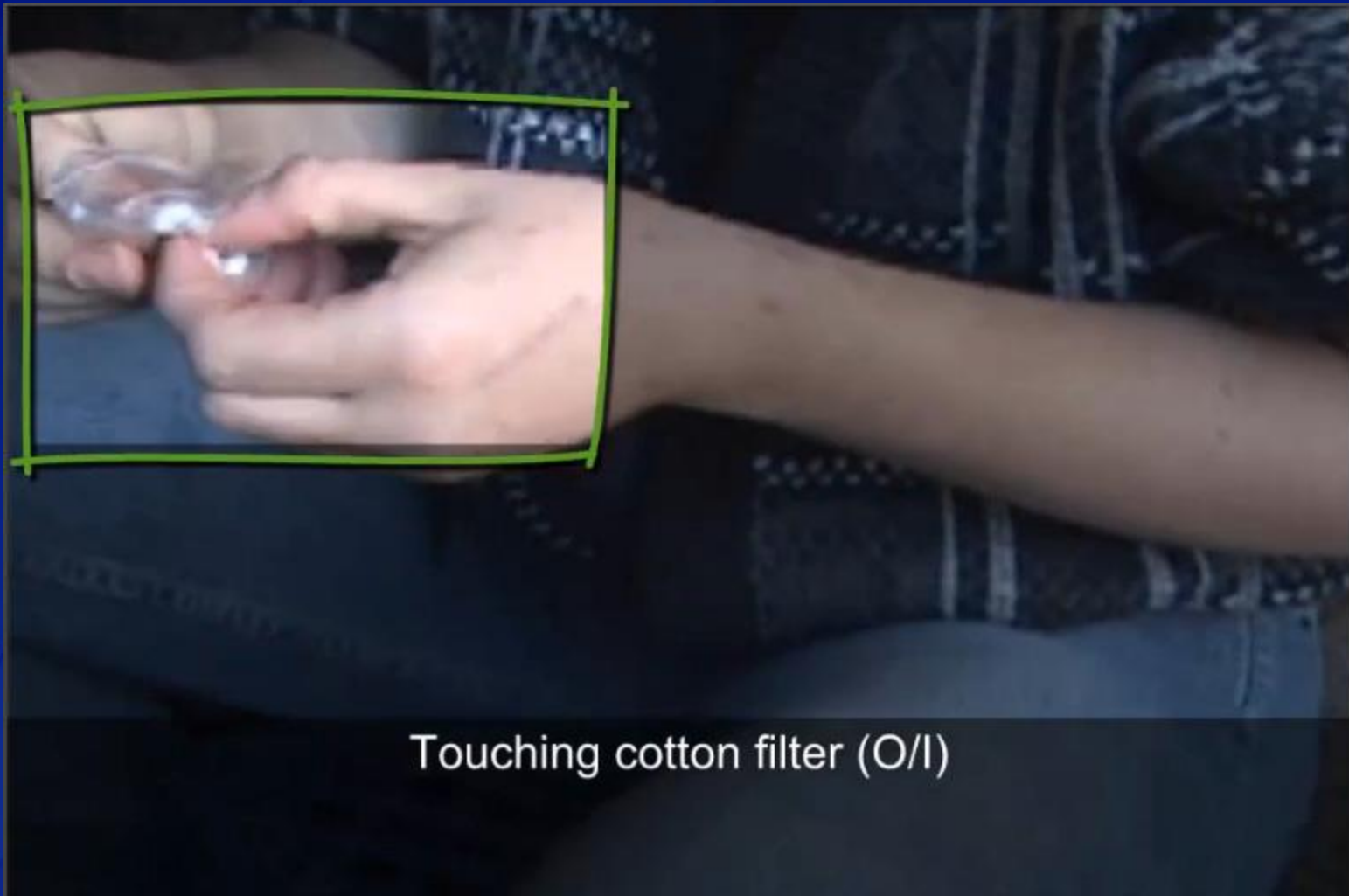
Reducing Dead-Space in Detachable Units



Bloody Fingers

fingers on cooker and in solution





Touching cotton filter (O/I)



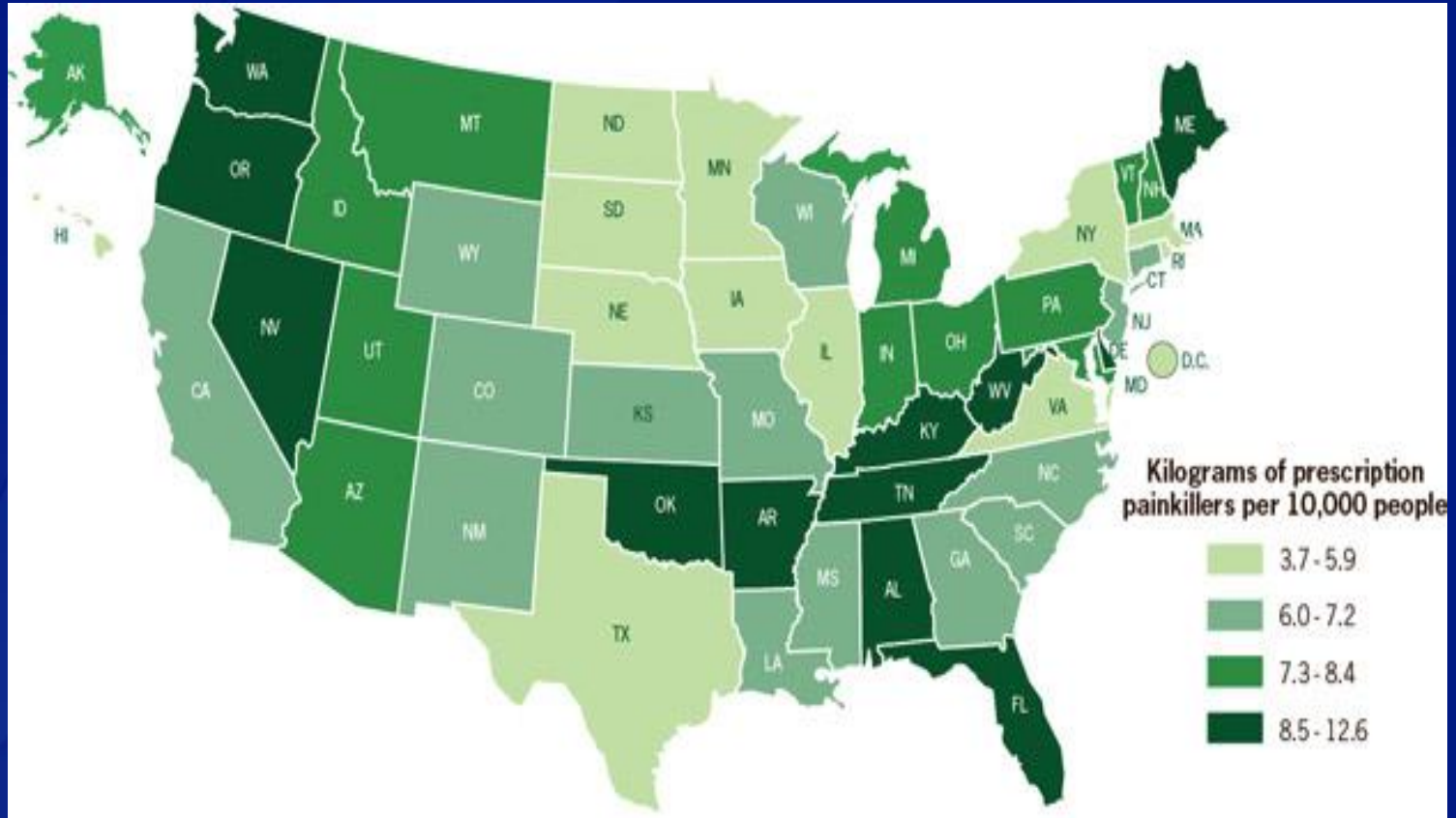
“Fishing” for a Vein

A New Kit for Every Hit!



Prescription Opioid Analgesics

(kilograms of opioid analgesics prescribed *per 10,000 persons*)



Increasing reports of injection-related HCV infections among persons under 30 years aged

❑ Massachusetts

MMWR, **Hepatitis C Virus Infection Among Adolescents and Young Adults – Massachusetts, 2002—2009**, May 6, 2011 / 60(17);537-541

❑ Upstate New York

MMWR. **Use of enhanced surveillance for hepatitis C virus infection to detect a cluster among young injection drug users---New York, November 2004—April 2007**. 2008;57:517—21.

❑ Wisconsin

MMWR, **Notes from the Field: Hepatitis C Virus Infections among young adults – rural Wisconsin, 2010**, May 18, 2012 / 61(19);358-358

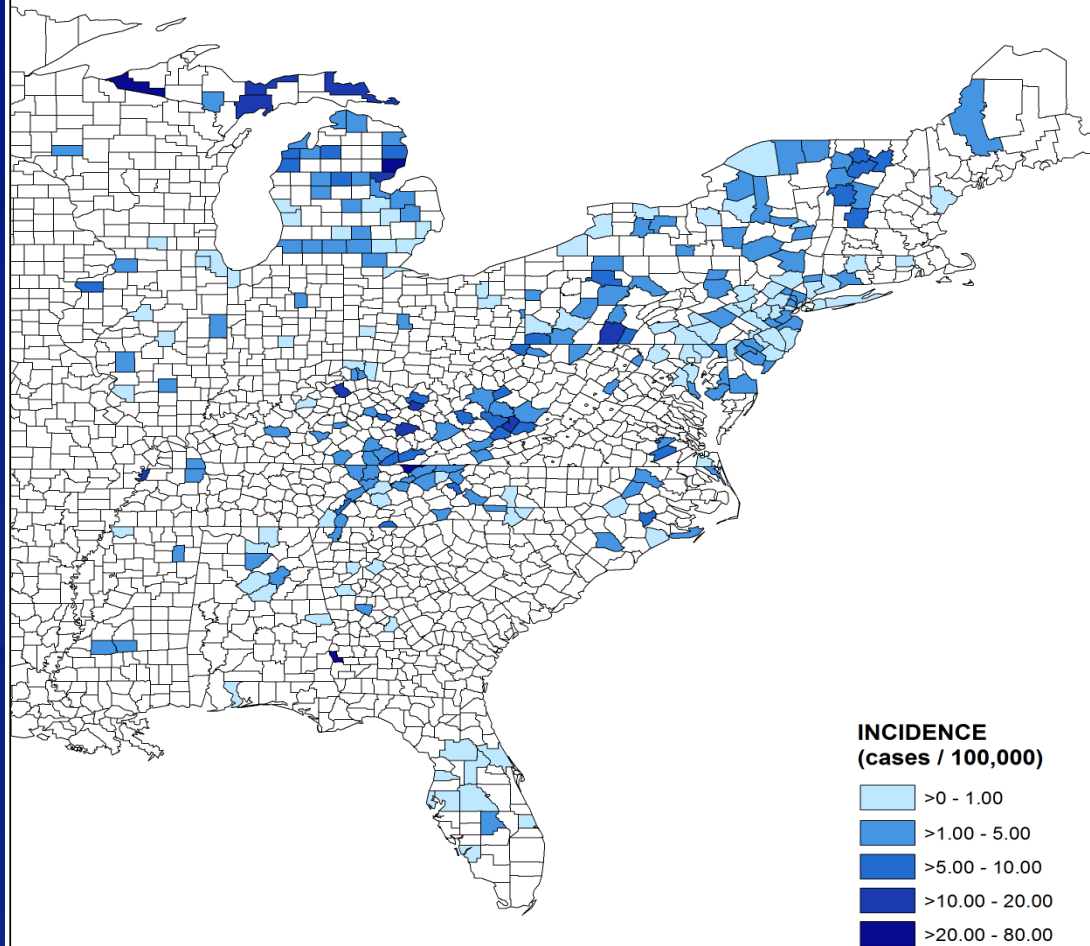
- ❑ **Additional states reporting increases in HCV cases:** Alabama, Colorado, Connecticut, Georgia, Indiana, Kentucky, Maine, Maryland, Montana, New Mexico, North Carolina, Oregon, Tennessee, Washington and West Virginia

Reports of increasing HCV infections related to IDU among persons under 30 in New York State

1. Cluster identified in Buffalo suburbs in 2007 (MMWR 2008;57:517-21)
2. Rise in reported cases in town of Corinth, located in Saratoga county in Upstate NY
3. Most recently, reports in Cortland county, a rural county outside of Syracuse, sparked initial investigation (n=11) and follow-up, targeted survey (n=124)

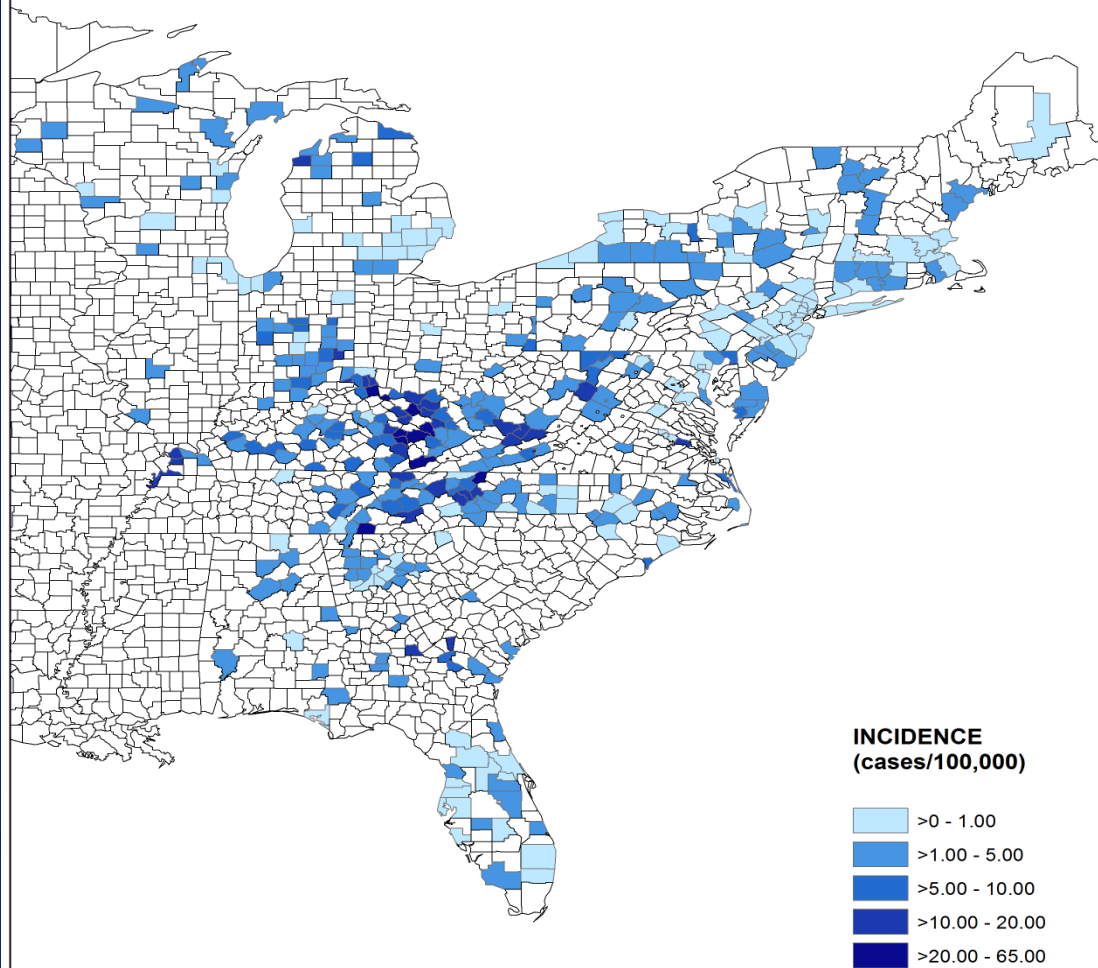


HCV Incidence by Eastern US County, 2006



Source: National Notifiable Disease Surveillance System

HCV Incidence by Eastern US County, 2011



Source: National Notifiable Disease Surveillance System

OPANA®

(oxymorphone hydrochloride)





Forget OxyContin: Opana Now Most-Abused Painkiller

11/11, 2012 6:50 AM CDT

Bioavailability: 10% oral; 40% intranasal; 100% IV/IM (compared to 87% oral bioavailability of oxycodone)

Because of its low bioavailability —10% when taken orally— a 10 mg tablet represents 10 times the average IV dose in a single tablet.

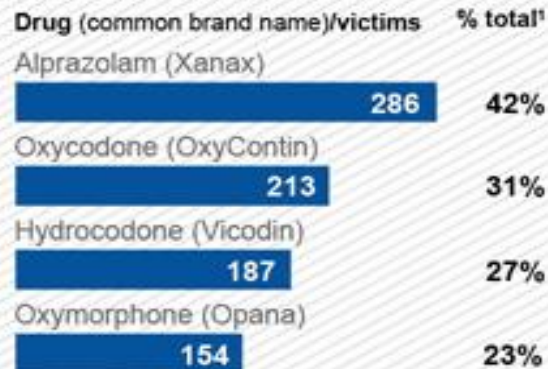
In 2012, Opana IR was changed to the INTAC platform of extended release and abuse deterrent—similar to the changed Oxycontin platform using Polyethylenoxide under pressure and heat for extruding pills.

Case study: Kentucky

Oxymorphone, the active ingredient in Opana, has become one of the most common drugs found in the blood of overdose victims in Kentucky, where abuse has spiked.



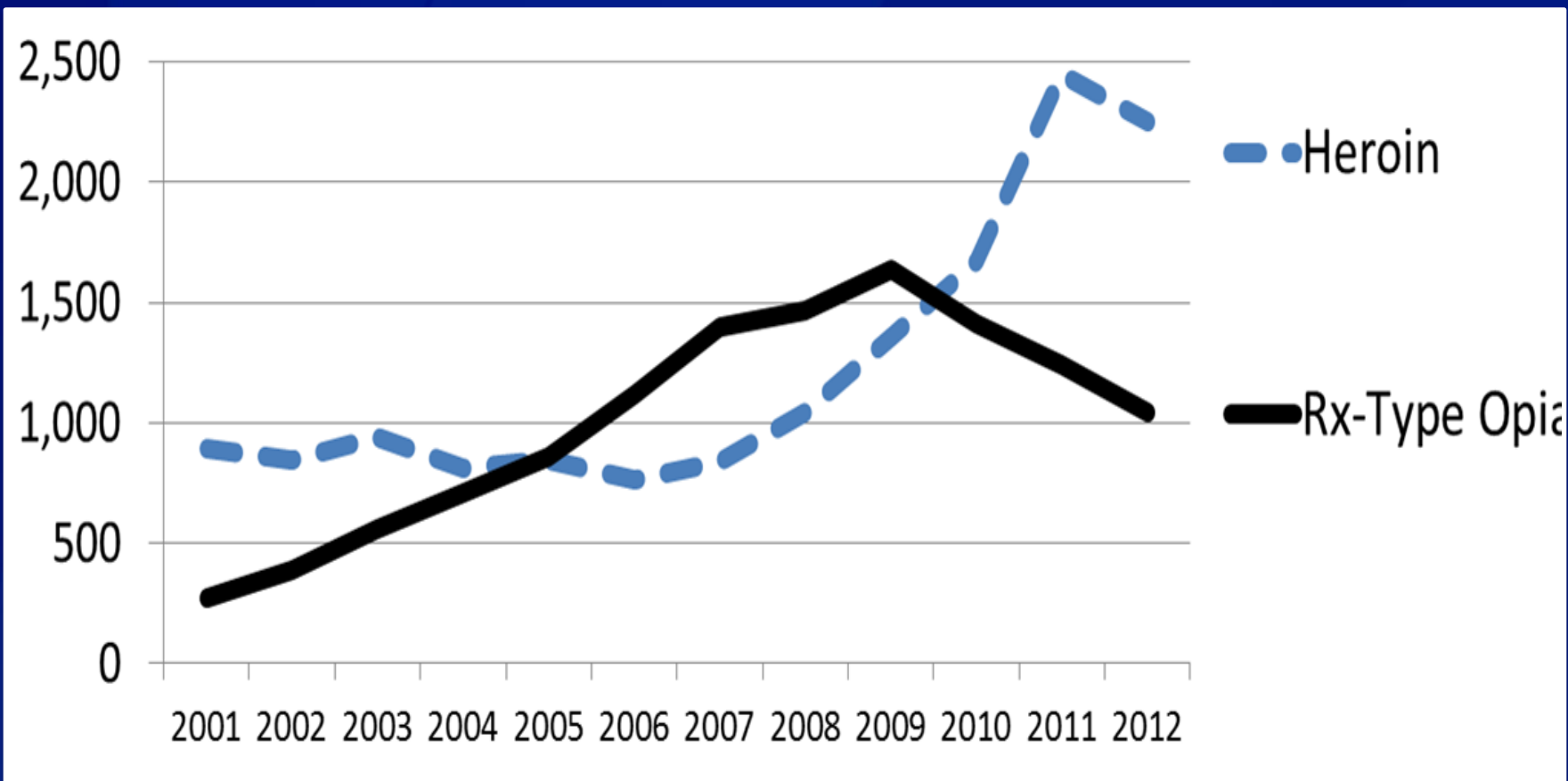
Drugs most frequently found in overdose victims in 2011



1 – Percentages add up to more than 100% because of more than one drug present in many decedents.

Source: Kentucky Medical Examiner's Office, Kentucky Justice & Public Safety Cabinet Annual Report

By Janet Loehrke, USA TODAY



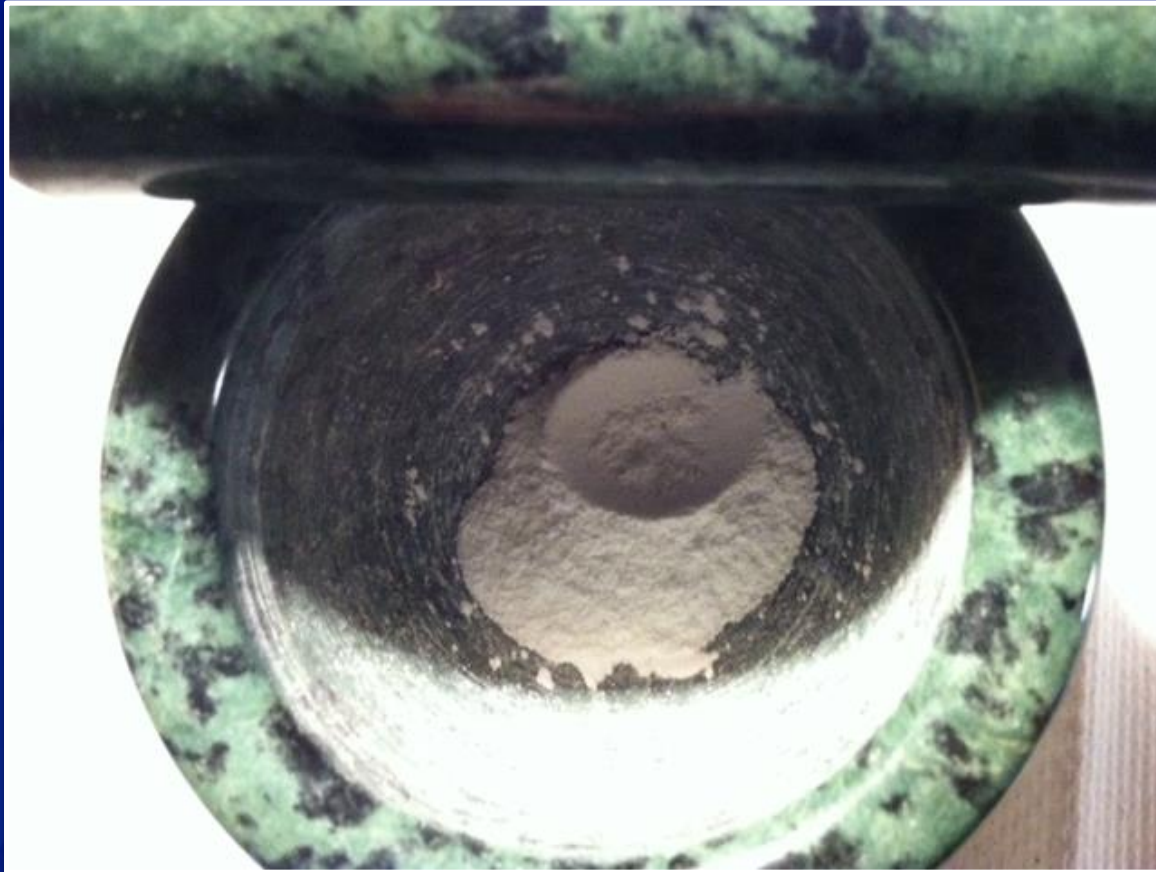
Police Evidence, WA, 2001-2012

(x axis = # pieces of evidence)



"Opana abuse in USA overtakes Oxycontin"

"In many cases, robbers are asking specifically for Opana when they enter pharmacy stores. This attempted robbery occurred on Feb. 27 at a Kroger Pharmacy in Fort Wayne, Ind." –USA Today, 07/11/12



**Opana (instant release) crushed by
Mortar/Pistil**



Opana IR in Solution



TimerX
(Anti-Diversion Mechanism)

Dual Matrix of hydroxythyl cellulose and polyethylene glycol

Opana ER with TimerX turns gelatinous when H₂O is added



Oxycontin
Abuse-Deterrent Formula



Old Formula



New Formula

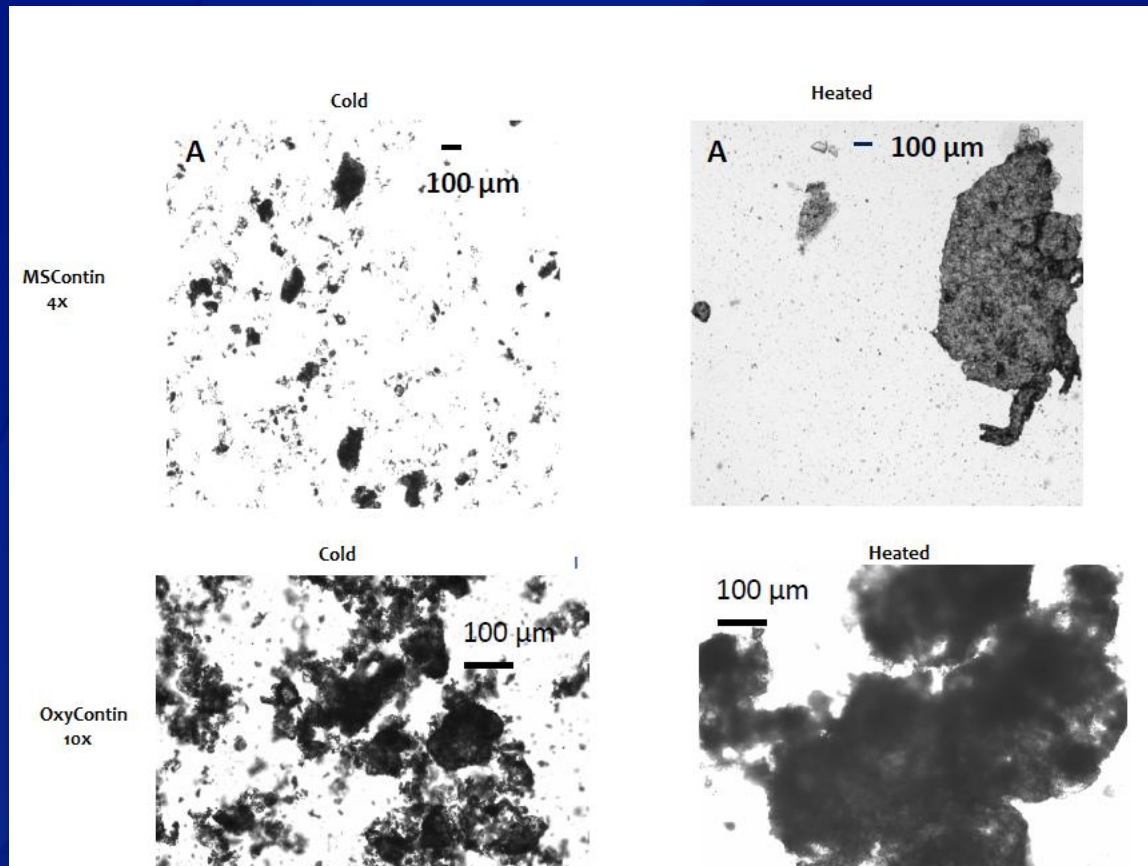
OXYCONTIN
(Time-released Oxycodone)



Oxycontin

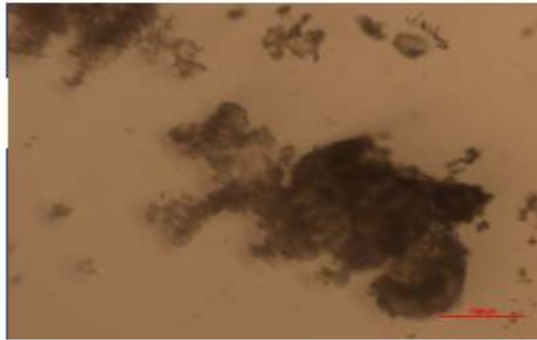
Abuse-Deterrent Formula

The grind affects the solution but both solutions gel



Granulation of Solution (heated vs. cold)

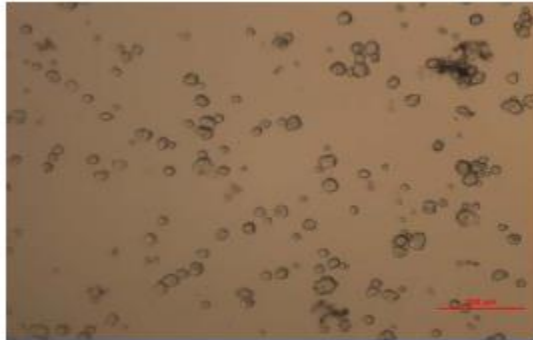
Unfiltered



After rollie + 0.22um
wheel filter



Subutex

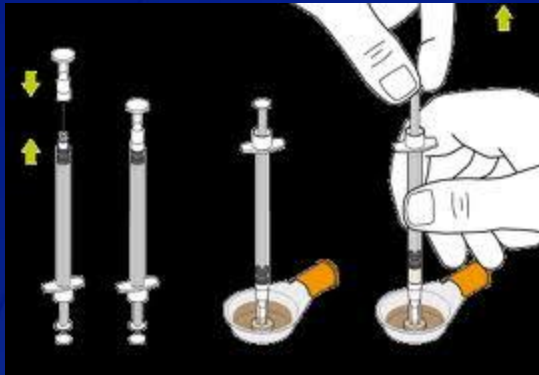


Granulation of Solution

(Unfiltered vs. Filtered)

Filters

(for tablet-based solutions)



BEST PRACTICE: STERI-FILT® OR WHEEL FILTERS

DIVERTING DIVERSION

How to Inject OPANA ER

Taken From Drugs-Forum.com

A friend of Mine has been prescribed 40mg Opana ER. He say's it works we'll to relieve his back pain but it has such a bad bioavailability when taken orally. He has been trying very hard to find a method to IV it and has finally done it. For those unfamiliar with Opana ER, Endo Pharmaceuticals, the company that makes Opana ER, has spent millions to develop TimerX, a time release mechanism designed to make the pill abuse-resistant. After much trial and error I watched him successfully prepare and inject Opana ER and with GREAT results to. Here's how they did it:

1. scrape or pick off the color coating of the pill. Don't use water to wash it off, you don't want to get your pill wet. It will form a layer of gel due to the TimerX
2. Crush the pill as finely as possible
3. Take a shot glass and fill it up about half way with alcohol. Add the crushed Opana to the glass of alcohol stir it we'll let it sit for at least 2 min. Stirring it every minute or so
4. Filter out all the particles left in the alcohol. **Get two 3cc syringes** with the needles pulled out. Take out the plunger on one syringe and pack it with a large clump of dry cotton. use enough so there's about a 1/3 to 1/2 inch layer of packed cotton. Take the other syringe and begin drawing up the alcohol and spraying it into the other syringe once full. Put the plunger back on the cotton packed syringe and spray the alcohol though filtering it. Continue doing this until all the alcohol has been filtered
6. Take the shot glass of filtered alcohol and place it on an electric stove turn the heat on medium high and slowly boil off the alcohol. Once it has all boiled off there will be a layer of Oxymorphone and part of the TimerX
7. Use your needle to add 1cc H₂O to the glass and stir up the solution. There will be a film that forms and clumps together - this is good. Let it sit in the water for 10-15 min. Add a piece of cotton to the mix for a filter and draw it up into your rig. Adding a little citric acid or sour salt to the water helps break it down.

Sorry for the long post, but it's a long but we'll worth it process

DO I REALLY NEED 3 MLs OF WATER?

The more water you use, the better the opioid will dissolve into the mix, the more effective the filtration will be and the more of the opioid will end up in your shot.

MY MIX IS GLUGGY. WHAT DO I DO?

Some pills, like MS Contin, contain a lot of microcellulose. The only way to deal with gluggy mixes is to add more water and repeat the coarse filtration with fresh cotton wool as you draw up. You may need a larger barrel and more water, and a coarser wheel filter (red). Microcellulose can easily get into your lungs and organs, causing severe damage over time, so be careful.



Pill Injection Kit

IDU, HCV and PO Injection

- Two recent studies found the injection of PO to be an independent predictor of anti-HCV infection¹
- Independent association between the sharing of HDSS and anti-HCV infections among PWID in North Carolina²
- Two-thirds of young PWID in rural Appalachia report injecting pills: 67% of hydromorphone users and 63% of morphine users reported intravenous administration³

¹ Bruneau et al., *Addiction*, 2012; Havens et al., *AJPH*, 2013

² Zule WA, Bobashev G. 2009, *Drug Alcohol Depend*

³Young et al. *Harm Reduct J*, 2010

Rural Particularities

- ❑ Drug treatment options extremely limited in rural areas — especially for youth
- ❑ Lack of syringe exchange programs; reduced access to injection-related health education
- ❑ HCV treatment is limited, difficult to access, and expensive
- ❑ Rural areas tend to be more politically & socially conservative
- ❑ State-level reporting indicates that anti-HCV positive PWID in rural and suburban areas are:
 - younger than urban PWID
 - disproportionately white
 - injecting prescription opioids in larger proportions

Multi-Component Interventions

- Increase access to injection equipment
- Increase access to agonist therapies
- Increase on-demand, abstinence-based treatment
- HCV-specific safer injection protocols
- Increase HCV testing (both ab and RNA)
- Increase access to HCV treatment and care

Can a totality of low-threshold services offered from one location?

Thank you kindly,
for both your time and interest.

In memoriam



Dave Purchase

With special thanks to:

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.