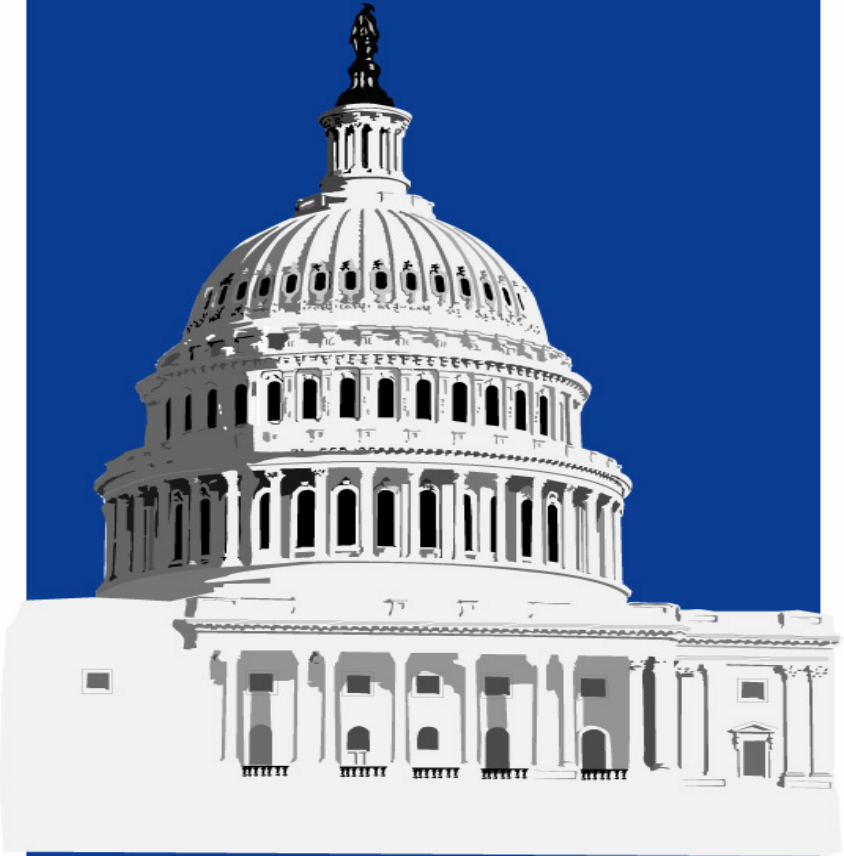

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DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

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Injection Drug Use: Prevention of Hepatitis C Virus and Human Immunodeficiency Virus Infections

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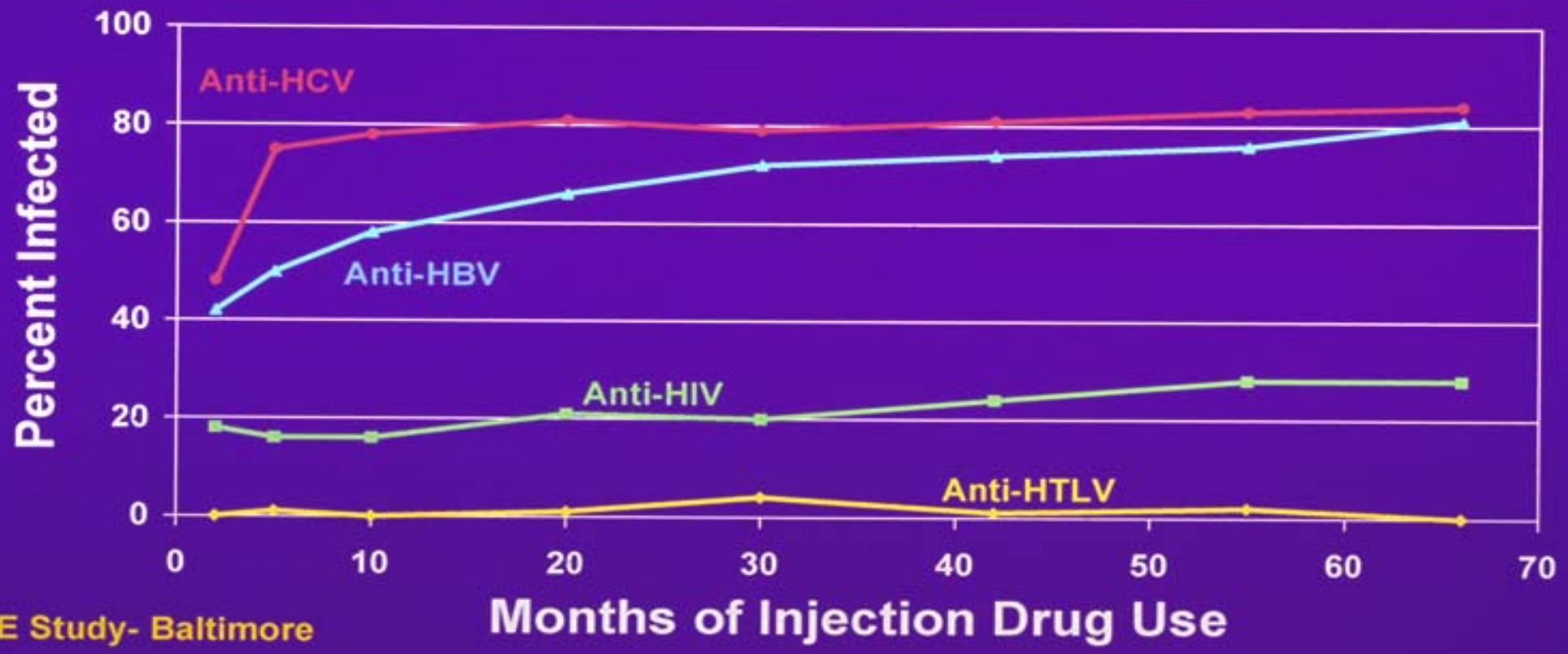
Rates of HCV and HIV Injection among Injection Drug Users Tested in the Same Population, 1995-2001.

Country	HCV Rate	HIV Rate
France	58.4%	19%
Belgium	78.3%	1%
Southern Italy	68.0%	16%
Netherlands	65.0%	31%
England/Wales	30.0%	1%

Duration of Injecting Drug Use and the Prevalence of Bloodborne Viruses



ALIVE Study- Baltimore

What Accounts for Differences Between HIV and HCV Rates in Injection Drug Users?

Virion production higher in HCV than HIV

Viability

Risk Factors for HIV-1 Infection Among Injecting Drug Users

- Frequency of Injection
- Cocaine Injection
- Injection in Shooting Galleries
- Number of Needle Sharing Partners
- Female Gender
- Male Homosexual/Bisexual

Conditional Logistic Regression of HIV Seroconversion by Drug Injection Variables Among Intravenous Drug Users, Baltimore, Maryland

Variable	Adjusted Odds Ratio	(95% CI)
Injection Duration		
≥5 years	1.00	--
<5 years	7.97	(2.30-27.59)
Number Sharing Partners		
0-1	1.00	--
>1	2.94	(1.19-7.30)
Injection Frequency		
<1x/day	1.00	--
≥1x/day	3.38	(1.19-9.57)

Risk Factors among Recent Onset Injection Drug Users for HCV

New York City: Manhattan

Site Variables	Harlem (n=200) Odds Ratio* (95% CI)
Injected Cocaine	3.08 (1.58,6.20)
Shared Cotton	2.13 (1.03, 4.42)
Received Money for Sex	3.50 (1.53, 9.67)

*Adjusted for age, years injection, hx drug treatment

HCV in Manhattan IDUs

- Prevalence of HCV infection increased with duration of injection in both north and south Manhattan. (However, less than Baltimore.)
- In Harlem, HCV was associated with cocaine injection, sharing cotton, and receiving money for sex.
- SUMMARY: Cumulative exposure and **"Risk Factors Travel Together".**

*Diaz, et al. Am J Public Health 2001;91:23-30

Rates Factors among Recent Onset Injection Drug Users for HCV and HIV

Vancouver: N=243

Prevalence HCV= 46%

Incidence =37.3/100 PY

Risk Factors:

- Racial/Ethnic Minority
- Cocaine, had helpers with injection
- Sex Trade:> 100 lifetime sex partners

Role of Frontloading/Backloading in HCV Transmission

324 IDUs in Berlin, 84% front loaded ever

46% > 100x.

Risk Factors	Odds Ratio : HIV	HCV
Frontload> 100 x		5.4

HCV Risk Factors – Injection Drug Users

Author, Year	Sample, design	Risk Factor
Multiple studies, 1992-	Cross-sectional	Time at risk Syringe sharing Cooker/cotton sharing Backloading Young, new injector
Hahn et al, 2002	195 San Francisco IDUs, Cohort	Syringe sharing
Hagan et al, 2002	317 Seattle IDUs, Cohort	Cooker/cotton sharing Syringe sharing
Thorpe et al, 2002 (CIDUS II)	510 IDUs in 6 US cities, Cohort	Cooker/cotton sharing

HIV Infection by Diabetes among Injection Drug Users ALIVE Study, Baltimore, Maryland 1988 - 89

	N	%HIV+
Diabetic	41	10%
Non-Diabetic	2950	24%

p = .03, Odds ratio = 0.36

Studies of HIV/HCV prevention – Injectors

Author, Year	Sample, Design	Results
Needle Exchange:		
Hagan et al, 1995 (Sentinel Counties)	Tacoma IDUs, Case-control	5-7 fold lower risk of HBV and HCV
Hagan et al, 1999	187 Seattle IDUs, Cohort	No difference in HCV or HBV incidence
Des Jarlais et al, 2003	150 NYC Young IDUs, Cohort	No association w/exchange, but neighborhood differences
Community-level interventions:		
Patrick et al, 2001	155 Vancouver IDUs, cohort	• HCV incidence 29% to 16% • HIV incidence 19% to 5%
Goldberg et al, 2001	Scottish IDUs, Cross-sectional	HCV Prevalence in young IDUs • Edinburgh 69% 1989 to 13% 1997 • Glasgow 91% 1990 to 43% 1997
Hope et al, 2001	IDUs in UK, cross-sectional	Prevalence of HCV 30%, HBV 21%, HIV 1%

Comparison of 34 HIV Seroconverters and 154 Seronegative Controls* by Frequency of Disinfectant Use, ALIVE Study, Baltimore, MD

Frequency of disinfectant	Case (n=34)	Controls (n=154)	Odds (95% CI) Ratio	
None	21%	20%	1.00	--
< All the time	35%	34%	1.02	(0.36-2.82)
All the time	44%	46%	0.87	(0.32-2.37)

HCV Seroconversion by Self-Reported Use of Bleach Disinfection of Syringes among Injection Drug Users, Nested Case Control Studies.

Study	Serconverters (n)	Seronegatives (n)	Odds Ratio (95% CI)
CIDUS	78	390	0.4 (0.1-1.6)
RAVEN	45	150	1.4 (0.7-3.0)
ALIVE	25	114	0.5 (0.1-2.4)

$R_o = \beta c D$

R_o = Reproductive Rate

(# 2^0 infections/infected case)

β = average probability susceptible partner will be infected over duration of relationship

c = average rate of acquiring new partners

D = average duration of infectiousness

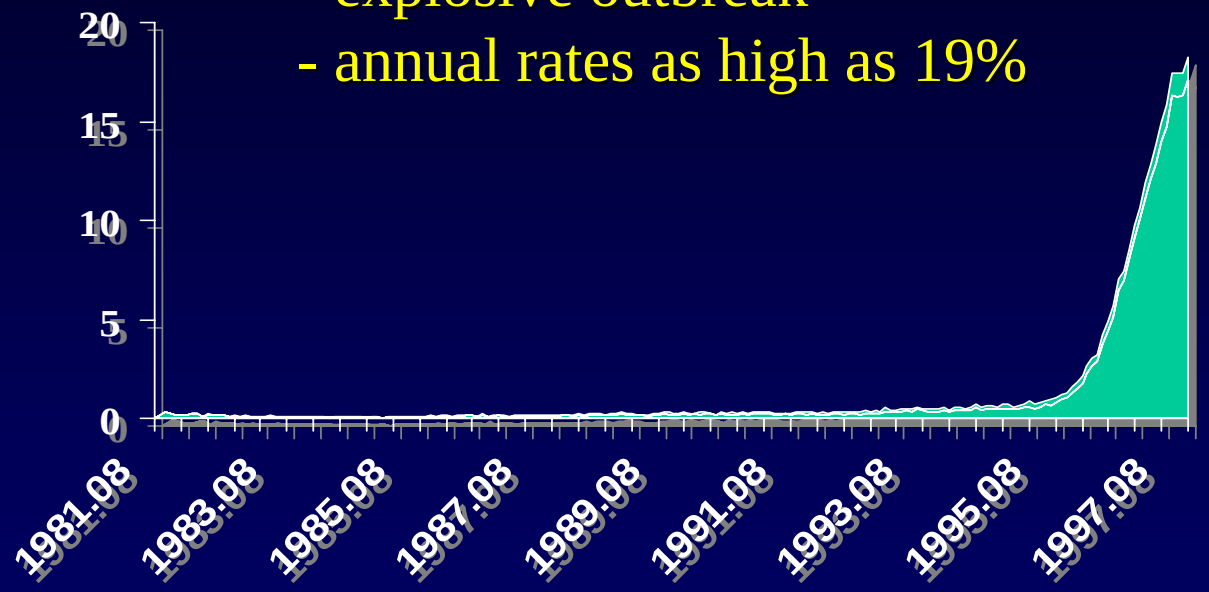
-Anderson & May, 1988

To Sustain an Epidemic:

$R_o > 1$;	but also
$\beta > 0$:	(transmission must be possible)
	can block with barriers.
$c > 0$:	(new susceptibles)
	can reduce contacts
$D > 0$:	(maintain infectiousness)
	can treat infection

IDUs in Vancouver

- explosive outbreak
- annual rates as high as 19%



IDU Simulations - Vancouver

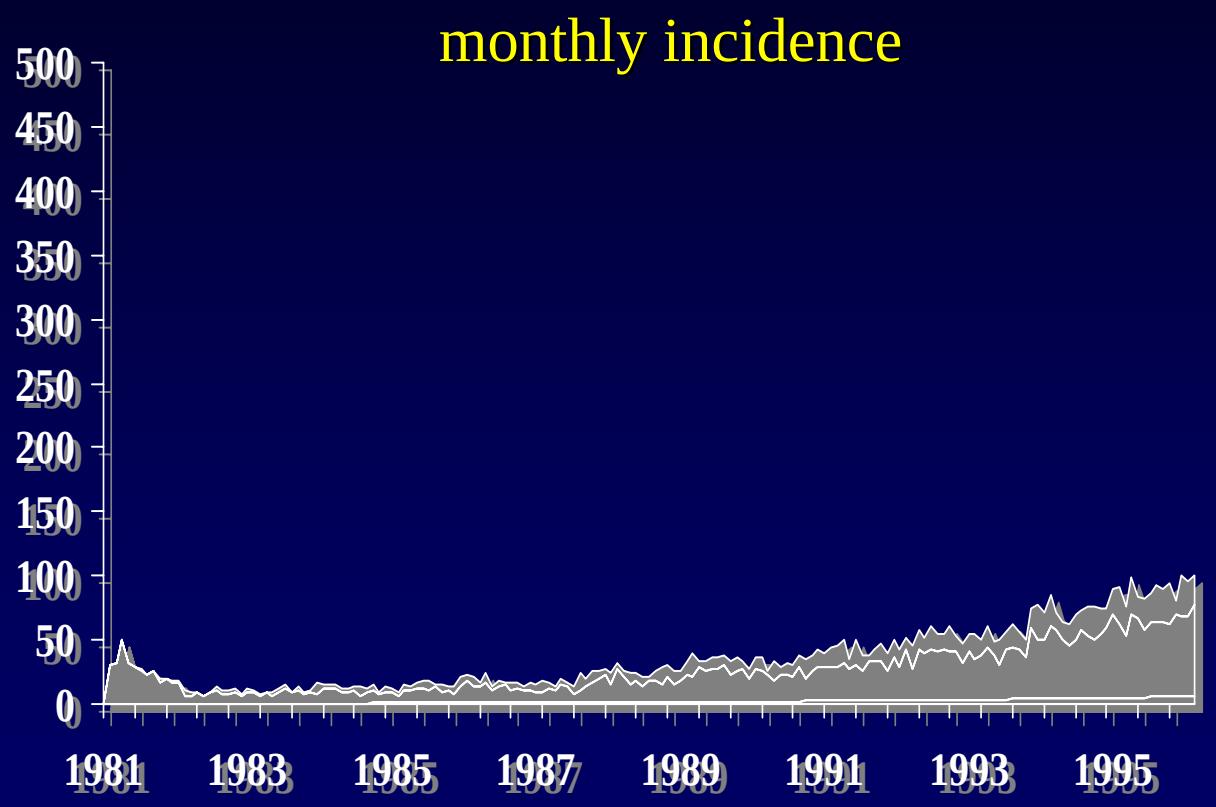
$N \equiv 100{,}000$

$\beta_a \equiv 0.1$

$\beta_b \equiv 0.002$

$c \equiv 2.5$

$D_a \equiv 3$ mos



IDU Simulations

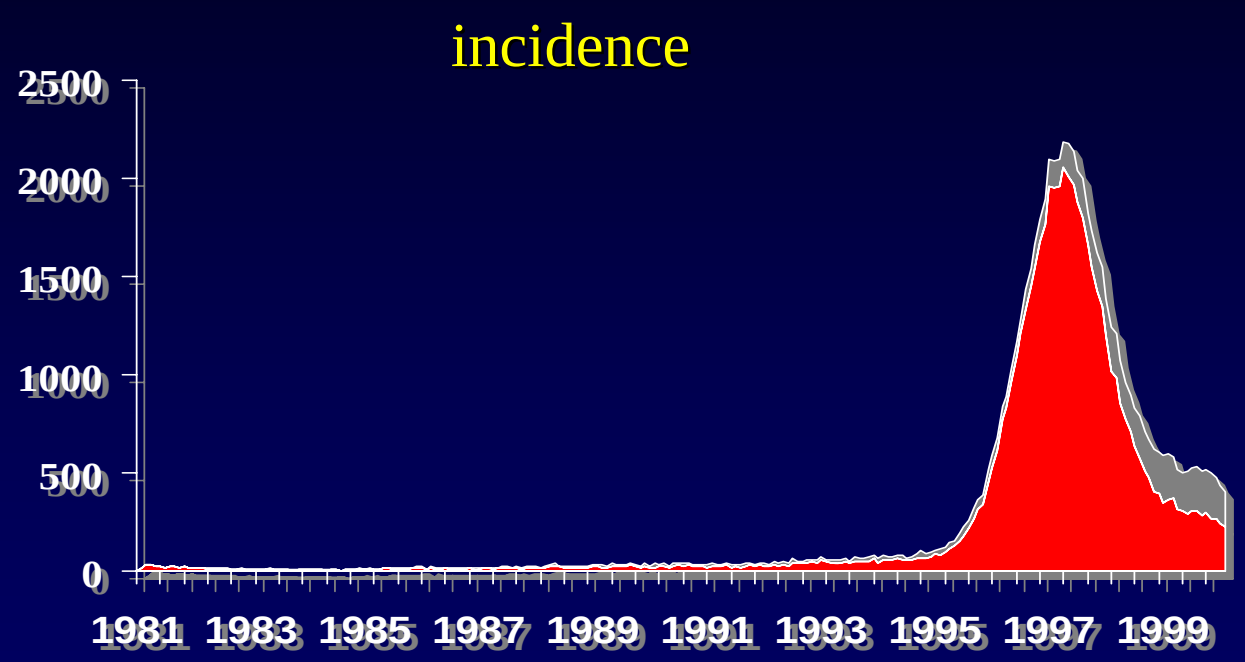
$N \equiv 100{,}000$

$\beta_a \equiv 0.1$

$\beta_b \equiv 0.002$

$c \equiv 2.5 \rightarrow 4.5$

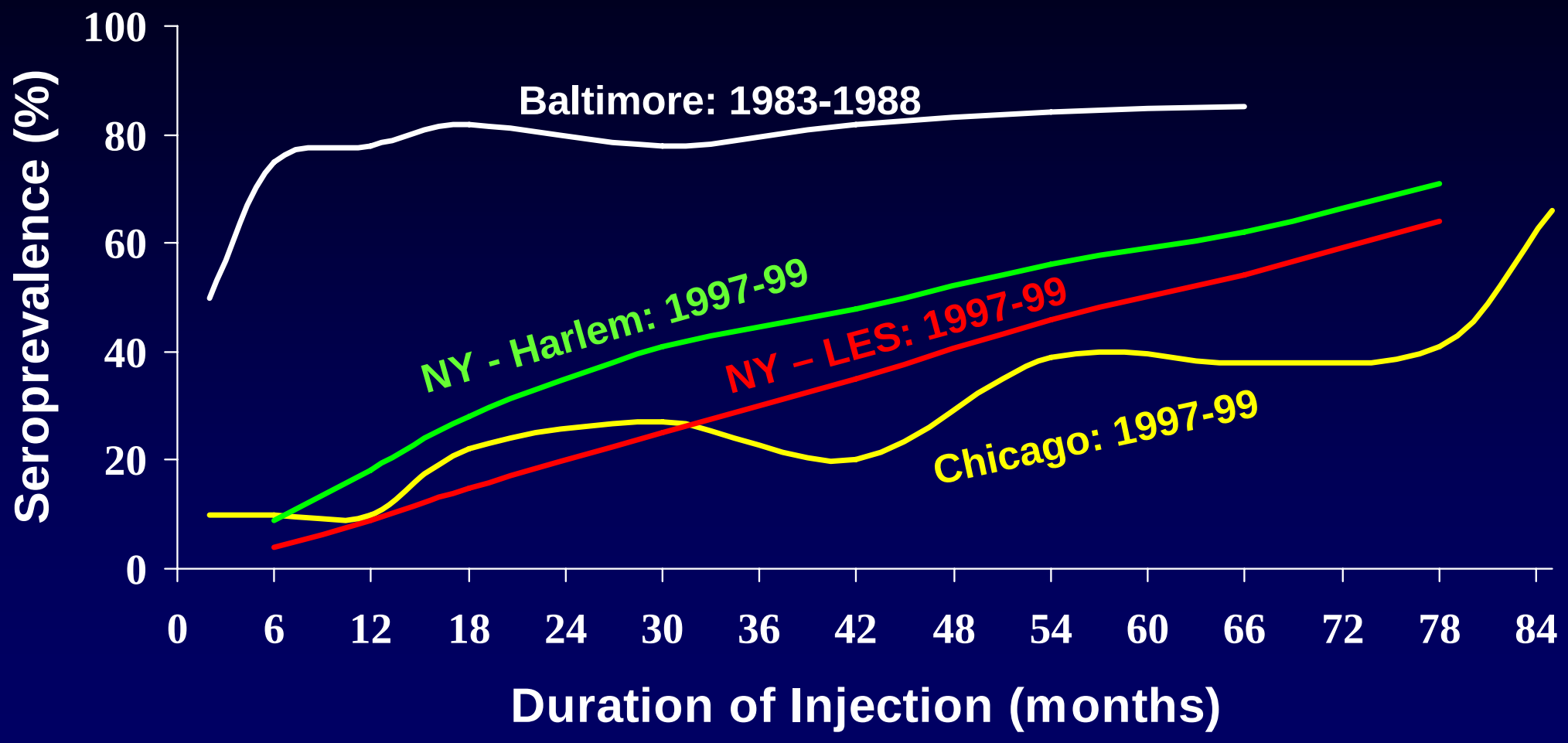
$D_a \equiv 3$ mos



Do HIV Prevention Programs Work Better than HCV Program for IDUs

- If there is the same number of needle sharing partners, rate of HCV > HIV.
- If IDUs reduce needle sharing partners, (e.g., average from 5 to 3), sufficient to reduce HIV but probably not HCV .
- HCV>HIV spread even when reduce partners because infectiousness is higher.

Risk of HCV Infection Among Injection Drug Users



Garfein RS *Am J Public Health* 1996; 86:655. Thorpe LE *JID* 2000;182:1588-94.
Diaz T *Am J Public Health* 2001; 91(1): 23-30.

Prevalence and Incidence of HCV and HIV among Injection and Non-Injection Drug Users within the Same Study

Country	**HCV**		HIV	
	IDU	**NIDU**	IDU	NIDU
Prevalence:				
Spain	87.6%	35.3%	21.8%	2.7%
Belgium	78.3%	2.4%	0.9%	0.0%
USA (NYC)	52.0%	4.7%	5.1%	9.8%
Incidence (% per 100 PY)				
USA (NYC)	**35.0%**	**0.7%**	0.7%	0.7%

Lifetime Drug Use Behaviors, Non-Injecting Drug Users, New York City, 2000-2002 (n=276)

Drug	N*	%	%HCV+	P-value
Sniff/Snort Cocaine				
No	17	6.3	5.9	.83
Yes	254	93.7	4.7	
Smoked Crack				
No	54	19.8	3.7	.68
Yes	219	80.2	5.0	
Sniff/Snort Heroin				
No	93	34.3	5.4	.75
Yes	178	65.7	4.5	

Lifetime Drug Use Behaviors, Non-Injecting Drug Users, New York City, 2000-2002 (n=276) cont'd

Drug	N*	%	%HCV +	P-value
Sniff/Snort Heroin with Cocaine				
No	195	72.2	**3.1**	.03
Yes	75	27.8	**9.3**	
Smoked Heroin with Crack				
No	190	72.5	3.7	.26
Yes	72	27.5	5.0	

Pre-Initiation Drug Injection Practices Among Adolescent New Onset Injection Drug Users, Baltimore 1997-1999 and General Population Comparison NHSDA, 2000;

Drug	% Used Before IDU Onset	[NHSDA] [18-25 y.o.]
Marijuana	89%	[46%]
Inhalants	21%	[14%]
Hallucinogens	21%	[15%]
Snorted Cocaine	60%	[11%]
Snorted Heroin	**79%**	**[2%]**
Smoked Crack	**55%**	**[3%]**

Percent Decreased Risk Behavior > 3 Months After Disclosure of HCV Test Result IDUs, Baltimore, Maryland, 1997-1999.

High Risk Behavior	HCV(+) (n=46)	HCV(-) (n=60)	p-value .
Needle sharing	17%	11%	.08
Back loading	17%	13%	.82
Share cookers	30%	28%	.42
Share filters	26%	22%	.96
Share rinse water	24%	28%	.56
Alcohol use	33%	43%	.11

Conclusion about Prevention in IDUs

HCV rates are high; Rates are high early:

-Cross sectional data conflict

-New injector data incidence: 10-39/ 100PY

Non injector rates are lower:

-Transition to injection drug use

-Usually through non injection drug use

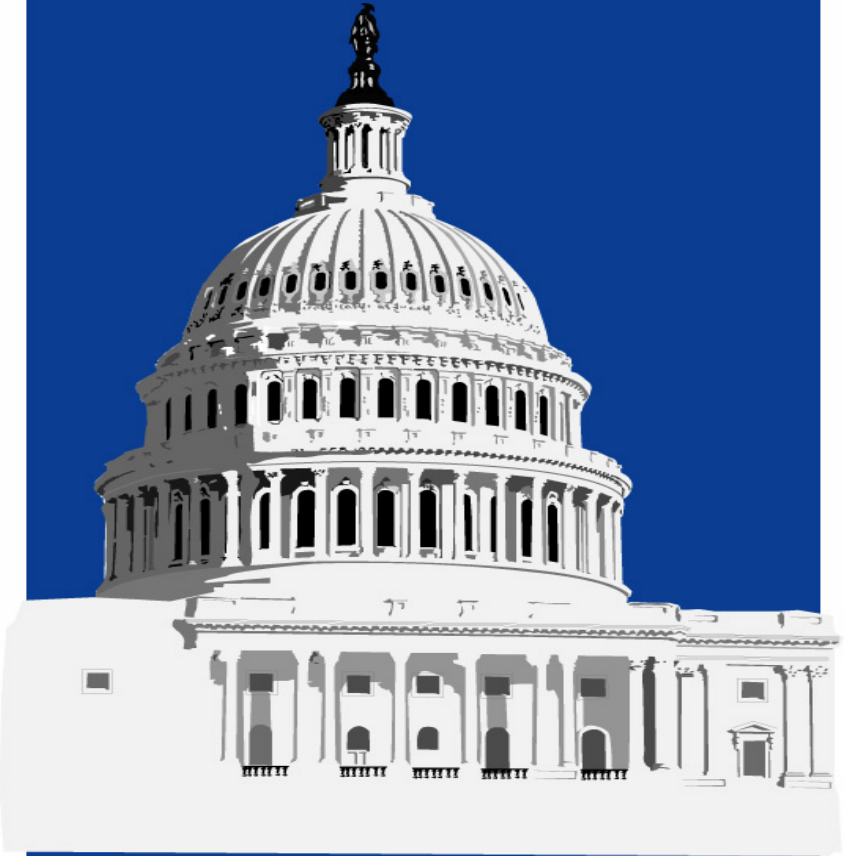
Intervention:

-Outreach to prevent transition

-In uninfected, stop injection

HCV Transmission Summary

- Drug use
  - ? Intranasal cocaine
- Unacknowledged drug use
- ?Sexual
- Nosocomial: developing nations
- Perinatal



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