



BC Centre for Disease Control
An agency of the Provincial Health Services Authority

Effect Of OST and Psychotherapy on HIV Risk among HCV Infected Individuals



ZA Butt¹, N Shrestha¹, NZ Janjua^{1,2}, Gesink D⁴, Gilbert M², J Wong^{1,2}, M Kuo², A Yu², Alvarez M², Chong M², H Samji², J Buxton^{1,2}, Roth D², Consolacion T², Murti M^{1,5}, Ogilvie G^{1,2}, Balshaw R², M Tyndall^{1,2}, M Kraiden^{1,2,3}
¹ University of British Columbia, ² BC Centre for Disease Control, ³ BCCDC Public Health Laboratory, ⁴ Dalla Lana School of Public Health, ⁵ Fraser Health

Introduction

- Hepatitis C Virus (HCV) and HIV infections co-occur in certain population groups because of shared risk factors.
- An estimated 2-15% of people living with HIV are co-infected with HCV worldwide and out of these; around 90% are people who inject drugs (PWID).
- HIV infection among HCV infected individuals is a major predictor of morbidity and mortality.
- Limited data on time to HIV infection among HCV infected individuals is available.
- Understanding factors that increase or decrease the incidence of HIV among HCV infected population could inform prevention programs.
- We estimated the time to HIV diagnosis among HCV infected individuals and evaluated factors that could affect HIV infection risk.

Methods

The BC Hepatitis Testers Cohort (BC-HTC):

- The British Columbia Hepatitis Testers Cohort (BC-HTC) includes all BC residents (~1.5 million) tested for HCV or HIV from 1990 to 2013 and links medical visits, hospitalizations, cancers, prescriptions and deaths.
- All HCV positive individuals who were tested for HIV and found HIV+ \geq 42 days were included in the analysis. Those HCV+ individuals who were tested for HIV earlier or on the same day of HCV diagnosis date were excluded.

Risk factors:

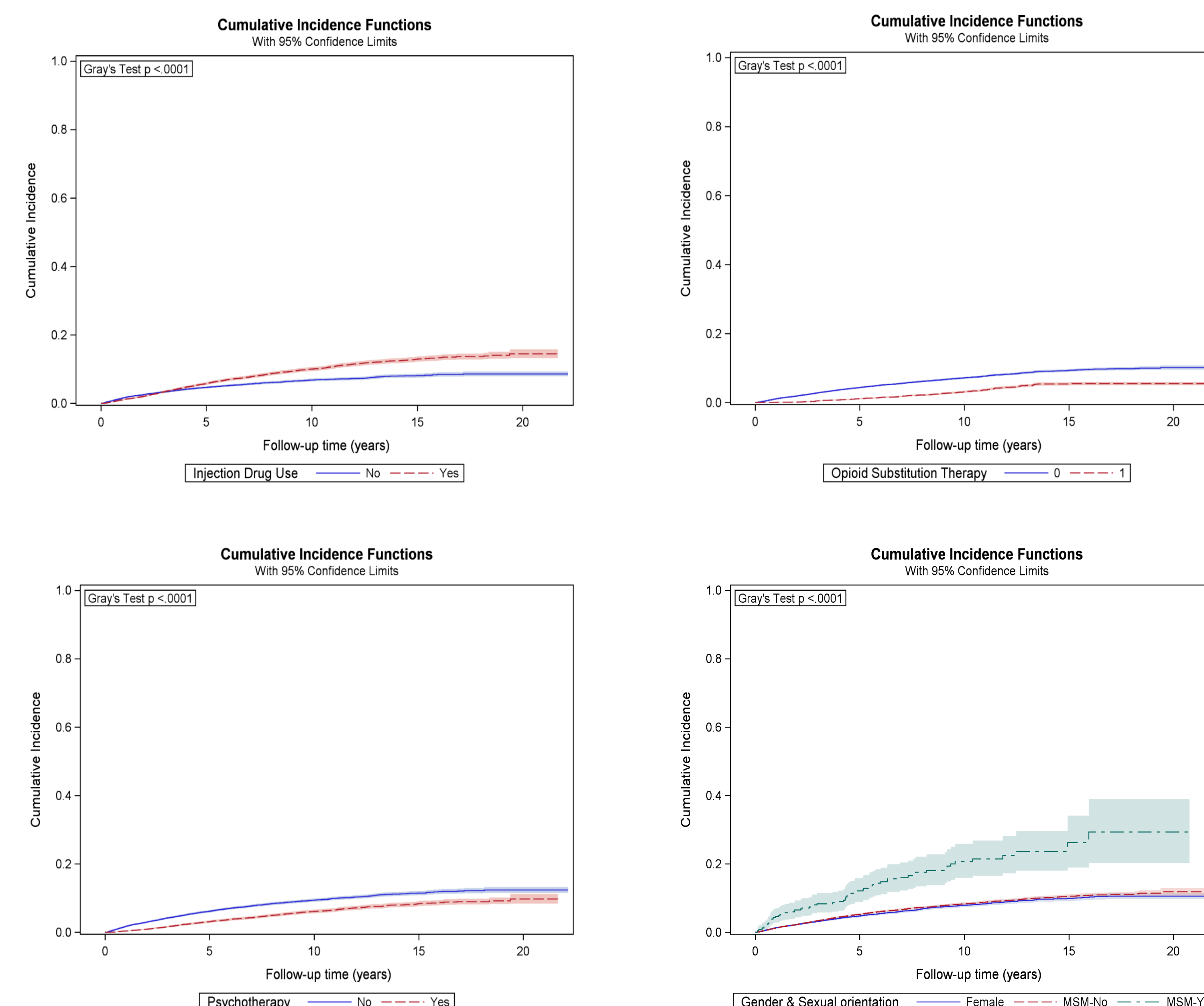
- Opioid Substitution Therapy (OST) assessed based on recorded prescriptions and evaluated as a time varying variable. An individual was considered off OST if interval between two successive prescriptions for OST was $>$ 28 days.
- Socioeconomic status was assessed using the Québec Index of Material and Social Deprivation. Assessment of injection drug use (IDU), major mental illness, and problematic alcohol use was based on diagnostic codes for medical visits and hospitalizations in respective databases.
- MSM status was assessed using penalized GLM based prediction model utilizing a set number of variables.
- Psychiatric counseling was based on fee item codes.

Statistical analysis

- Incidence rates of HIV were calculated for HCV+ infected individuals overall and for HCV+ seroconverters and HCV+ prevalent individuals separately.
- Cumulative Incidence curves were constructed for HCV+ serostatus and other factors (Figure 1).
- Cox regression was used to calculate Hazard Ratios (HR) and Confidence Intervals (CI) to assess the association between various factors and HIV infection.

Results

Figure 1. The cumulative incidence of HIV by various factors, BC Hepatitis Testers Cohort



- Of 36,163 individuals who were HCV positive and HIV negative at cohort entry, 2255 (6.2%) acquired HIV over 266,010 years of follow-up for an overall incidence rate of 8.5/1000PY (person years).
- The HIV incidence rate among HCV+ seroconverters was 10.7/1000PY versus 8.2/1000PY among those with prevalent HCV+ infection at diagnosis.
- Overall median [IQR] time to HIV infection was 3.36 [4.96] years, shorter for seroconverters than prevalent HCV infections (2.78 vs 3.52, $p=0.003$).
- Being male, having a history of IDU, mental illness, problematic alcohol use, co-morbidities (active TB, Hepatitis B Virus [HBV]), MSM status, younger age and urban residence were associated with a higher incidence rate of HIV; however, the magnitude was lower in HCV prevalent individuals as compared to HCV+ seroconverters.
- OST was associated with a lower incidence rate of HIV in both HCV+ seroconverters and prevalent individuals.
- In Cox regression, PWID, those with HBV infection, men who have sex with men, and urban residence were associated with higher risk of HIV infection after adjusting for number of HIV tests (Figure 2).
- OST and psychiatric counseling were associated with lower risk of HIV infection.

Results (cont'd)

Figure 2. Multivariate Cox regression analysis of factors associated with time to HIV infection in the BC Hepatitis Testers Cohort

Variable	Adjusted hazard ratio (95% CI)		
	HCV infection	HCV+ seroconverters	HCV+ prevalent
Age at diagnosis			
<25	2.42(2.03-2.90)	1.14(0.73-1.79)	2.22(1.81-2.73)
25-34	1.99(1.71-2.32)	0.74(0.47-1.15)	2.15(1.83-2.52)
35-44	1.61(1.39-1.87)	1.1(0.70-1.72)	1.54(1.31-1.80)
\geq 45	1	1	1
Year of diagnosis			
<2000	1.39(0.69-2.81)	2.54(0.61-10.55)	1.72(0.76-3.89)
2000-2004	0.77(0.38-1.56)	1.6(0.39-6.61)	1.02(0.45-2.32)
2005-2008	0.64(0.31-1.32)	1.12(0.26-4.71)	0.6(0.26-1.41)
2009-2011	0.65(0.30-1.40)	1.14(0.26-4.99)	0.7(0.27-1.77)
>2011	1	1	1
Urban			
No	1	1	1
Yes	1.38(1.16-1.64)	0.98(0.67-1.45)	1.4(1.16-1.70)
Unknown	0.75(0.45-1.25)	0	0.88(0.52-1.50)
Gender & Sexual orientation			
Male not MSM	1	1	1
Male yes MSM	2.68(2.03-3.54)	5.26(2.85-9.70)	2.48(1.81-3.4)
Female	0.85(0.77-0.94)	0.93(0.74-1.18)	0.84(0.75-0.93)
No. of HIV tests per year	1.53(1.51-1.56)	1.42(1.37-1.47)	1.9(1.86-1.95)
IDU *			
No	1	1	1
Yes	1.43(1.3-1.59)	1.06(0.81-1.39)	1.53(1.38-1.71)
OST*	0.3(0.26-0.36)	0.38(0.27-0.53)	0.23(0.19-0.28)
Problematic alcohol use *			
No	1	1	1
Yes	0.95(0.85-1.06)	0.95(0.72-1.24)	0.84(0.74-0.94)
Psychiatric counselling *			
No	1	1	1
Yes	0.48(0.43-0.54)	0.58(0.45-0.75)	0.46(0.40-0.52)
Active TB *			
No	1	1	1
Yes	0.74(0.35-1.57)	1.54(0.21-11.13)	0.7(0.31-1.57)
Hepatitis B *			
No	1	1	1
Yes	1.34(1.15-1.56)	1.74(1.15-2.65)	1.27(1.07-1.49)
Material deprivation quintile			
Q1 (most privileged)	1	1	1
Q2	0.73(0.61-0.87)	0.79(0.51-1.22)	0.89(0.73-1.07)
Q3	0.73(0.61-0.87)	0.76(0.49-1.16)	0.79(0.65-0.96)
Q4	0.89(0.75-1.04)	0.83(0.56-1.23)	0.95(0.79-1.13)
Q5 (most deprived)	1.12(0.97-1.29)	0.8(0.55-1.16)	1.24(1.06-1.45)
Unknown	1.45(1.04-2.01)	0.61(0.22-1.72)	1.68(1.19-2.39)

* History of disease/risk factor in the interval between the HCV diagnosis and HIV diagnosis

Conclusions

- Injection drug use, HBV coinfection, MSM, and urban residence increased the risk of HIV; while engagement in OST and mental health counseling reduced the risk of HIV infection among HCV infected individuals.
- Harm reduction programs coupled with OST and engagement with mental health services may reduce the risk of acquiring HIV.