Differing profiles of people diagnosed with acute and chronic hepatitis B virus infection in British Columbia, Canada

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Supplementary Material

Supplementary Table 1 Criteria and Data Sources for the British Columbia Hepatitis Testers Cohort (BC-HTC):

Criteria for Inclusion in BC-HTC:

All individuals:

- tested at the centralized provincial laboratory for HCV or HIV   OR

- reported by BC public health as a confirmed case of HCV OR

- reported in BC enhanced surveillance system as a confirmed case of HIV or AIDS (all reports)   OR

- reported by BC public health as a confirmed case of HBV OR

- included in BC Enhanced Strain Surveillance System (EHSSS) as an acute HBV or HCV case

All individuals meeting at least one the above criteria were linked internally across all their tests and case reports. Those with a valid personal health number (PHN) were then sent for deterministic linkage with province-wide Cancer and Ministry of Health (MoH) datasets

Provincial Communicable Disease Data Sources:	**Data Date Ranges:**
- BC-PHMRL HIV laboratory testing datasets (tests: ELISA, Western blot, NAAT, p24, culture)	1988–2015
- BCCDC PHL HCV laboratory tests datasets (tests: antibody, HCV	1992–2015

RNA, genotyping)

• HIV/AIDS Information System (HAISYS) (public health HIV/AIDS case reports)	1980–2015
• Integrated Public Health information System (iPHIS) (public health case reports of HCV, HBV, and TB)	1990–2015
• Enhanced Strain Surveillance System (EHSSS) (risk factor data on a subset of acute HCV and acute HBV cases)	2000–2015
Cancer and MoH Administrative Data Sources:	**Data Date Ranges:**
• BC Cancer Registry (BCCR) (primary tumour registry, excludes metastatic cancers)	1970–2014
• Discharge Abstracts Dataset (DAD) (hospitalization records)[S1]	1985–2015
• Medical Services Plan (MSP) (physician diagnostic and billing data)[S2]	1990–2015
• PharmaCare/PharmaNet (Pharma) (prescription drug dispensations)[S3, S4]	1985–2016
• BC Vital Statistics (VS) (deaths registry)[S5]	1985–2016

The final BC-HTC comprises all individuals successfully linked on PHN to the MoH Client Roster[S6] (a registry of all BC residents enrolled in the publicly-funded universal healthcare system)

HCV: Hepatitis C Virus; **HBV:** Hepatitis B Virus; **HIV/AIDS:** Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome; BCCDC: British Columbia Centre for Disease Control; **BCCDC-PHL:** BCCDC Public Health Laboratory; **RNA:** Ribonucleic Acid; **PCR:** Polymerase Chain Reaction.

SUPPLEMENTARY REFERENCES:

S1 **British Columbia Ministry of Health** [creator]. Discharge Abstract Database (Hospital Separations). British Columbia Ministry of Health [publisher]. Data Extract. MOH (2013). 2014. http://www.health.gov.bc.ca/data/

S2 **British Columbia Ministry of Health** [creator]. Medical Services Plan (MSP) Payment Information File. British Columbia Ministry of Health [publisher]. Data Extract. MOH (2013). 2014. http://www.health.gov.bc.ca/data/

S3 **British Columbia Ministry of Health** [creator]. PharmaCare. British Columbia Ministry of Health [publisher]. Data Extract. MOH (2013). 2014. http://www.health.gov.bc.ca/data/

S4 **British Columbia Ministry of Health** [creator]. PharmaNet. British Columbia Ministry of Health [publisher]. Data Extract. MOH (2013). 2014. http://www.health.gov.bc.ca/data/

S5 **BC Vital Statistics Agency** [creator]. Vital Statistics Deaths. BC Vital Statistics Agency [publisher]. Data Extract. BC Vital Statistics Agency (2014). 2014.

S6 **British Columbia Ministry of Health** [creator]. Client Roster (Client Registry System/Enterprise Master Patient Index). British Columbia Ministry of Health [publisher]. Data Extract. MOH (2013). 2014. http://www.health.gov.bc.ca/data/

Supplementary Table 2 Hepatitis B and comorbid condition definitions

1. Hepatitis B

Hepatitis B was flagged at the first occurrence of a case of HBV recorded in iPHIS or PANORAMA; if none recorded, then the first occurrence of 2 MSP (2 physician visits or 2 fee items), 1 hospitalization code or 1 PharmaNet code involving acute or chronic hepatitis B diagnoses with or without hepatic coma and with or without delta agents; inactive carriers; or hepatitis B-specific treatment among those diagnosed at age 18 months or older.

Physician Billing Data: MSP ICD-9 diagnostic codes: starting with 0702, 0703 or exact code V0261; or fee item codes 90831 and 90675.

Hospitalization Data: DAD1/ICD-9-CM diagnostic codes: starting with 0702, 0703; or exact code V0261. DAD2/ICD-10-CA diagnostic codes: starting with B16, B180, B181; or exact code Z2250.

PharmaNet DIN/PIN for HCV treatments*: 2247823, 2282224, 2247128, 2239193, 2288389

2. Major Mental Health Diagnosis

Major mental illness was flagged at the first occurrence of either 1 hospitalization diagnostic code OR 2 MSP diagnostic codes from a psychiatrist visit for schizophrenic, bipolar, delusional, nonorganic psychotic, adjustment, anxiety, dissociative, personality and major depressive disorders

Physician Billing Data: MSP ICD-9 diagnostic codes: starting with 295-298, 300-301, 308-309, 311 AND claim specialty = 3

Hospitalization Data: DAD1/ICD-9-CM: starting with 295-298, 300-301, 308-309, 311; DAD2/ICD-10-CA: starting with F20-F25, F28-F34, F38-F45, F48, F60-F61

3. Problematic Alcohol Use

Problematic alcohol use was defined at the first occurrence of 2 MSP or 1 hospitalization codes for major alcohol-related diagnoses including alcoholic mental

disorders and dependence/abuse syndromes; alcoholic polyneuropathy, myopathy, cardiomyopathy; pseudo Cushing's syndrome; or discharge to alcohol rehabilitation, counselling, or surveillance

Physician Billing Data: MSP ICD-9 diagnostic codes: starting with 291, 303, 3050, 3575, 4255

Hospitalization Data: DAD1/ICD-9-CM: starting with 291, 303, 3050,3575, 4255; DAD2/ICD-10-CA: starting with F10, E244, G312, G621, G721, I426, Z502, Z714

4. Illicit Drug Use

Illicit drug use was flagged at the first occurrence of 1 MSP,1 hospitalization code or 1 PharmaNet code for major drug-related diagnoses involving addiction, dependence, and drug-induced mental disorders, withdrawal and hallucination; or illicit use of prescribed drugs including: hallucinogens, barbituates/tranquilizers, sedatives, hypnotics, anxiolytics, opioids, cocaine, amphetamine, volatile solvents; dependence due to maternal drug use, antepartum and post-partum conditions or complications; injection-related infections; discharge to drug rehabilitation, counselling, or surveillance; or methadone/buprenorphine substitution treatment.

Physician Billing Data: MSP ICD-9 diagnostic codes: starting with 292, 970, 3040, 3042, 3044, 3046, 3047, 3048, 3049, 3054, 3055, 3056, 3057, 3059, 6483, 9650, 9697, E8500, V6532; or fee item code 39.

Hospitalization Data: DAD1/ICD-9-CM diagnostic codes: starting with 292, 970, 3040, 3042, 3044, 3046, 3047, 3048, 3049, 3054, 3055, 3056, 3057, 3059, 6483, 9650, 9697, E8500. DAD2/ICD-10-CA diagnostic codes: starting with F11, F13, F14, F15, F18, F19, T42; or exact codes T401, T402, T404, T405, T406, T436, T438, T439, T507.

PharmaNet DIN/PIN*: 2242963, 2242964, 99792, 66999990-66999993, 66999997, 66999998, 66999999, 67000000, 2295695, 2295709

5. Injection Drug Use

Illicit Drug Use was defined at the first occurrence of 1 MSP or 1 hospitalization

diagnostic codes for major drug-related diagnoses involving addiction, dependence, and drug-induced mental disorders; illicit drug use most likely to be injectables (e.g. excluding cannabis), or illicit use of prescribed drugs including: hallucinogens, barbituates/tranquillizers, sedatives, hypnotics, anxiolytics, opioids, cocaine, amphetamine, volatile solvents; or discharge to drug rehabilitation, counselling, surveillance or methadone/buprenorphine substitution treatment.

Physician Billing Data: MSP ICD-9 diagnostic codes: starting with 292, 3040, 3042, 3044, 3046-9, 3054-7, 3059, 6483, 9650, 9697, 970, E8500, or exact codes V6542 or fee item = 39

Hospitalization Data: DAD1/ICD-9-CM: starting with 292, 3040, 3042, 3044, 3046-9, 3054-7, 3059, 6483, 9650, 9697, 970, E8500; DAD2/ICD-10-CA: starting with F11, F13-5, F18, F19, T42, or exact codes T401, T402, T404-6, T436, T438, T439, T507.

PharmaNet DIN/PIN*: 2242963, 2242964, 99792, 66999990-66999993, 66999997, 66999998, 66999999, 67000000, 2295695, 2295709

6. Opioid Substitution Therapy (OST)

Opioid substitution therapy was flagged at the first occurrence of either 1 MSP or 1 PharmaNet code involving methadone or buphrenorphine substitution treatment, with or without direct pharmacist interaction.

Physician Billing Data: MSP fee item 39

PharmaNet DIN/PIN*: 2242963, 2242964, 99792, 66999990, 66999991, 66999992, 66999993, 66999997, 66999998, 66999999, 67000000, 2295695, 2295709

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*DIN = Drug Identification Number; PIN = Product Information Number

Supplementary Table 3 Multivariable multinomial regression model for factors associated acute or chronic HBV in the British Columbia Hepatitis Testers Cohort, 1990-2015: Birth Cohort Model

	Adjusted OR (95% CI)	
	Acute HBV	**Chronic HBV**
Sex		
Male	2.21 (2.00-2.44)	1.40 (1.37-1.43)
Female	1.00	1.00
Birth Cohort		
<1945	1.00	1.00
1945-1964	1.72 (1.47-2.01)	1.49 (1.44-1.55)
1965-1974	2.29 (1.94-2.70)	1.29 (1.24-1.34)
>1974	1.39 (1.14-1.69)	0.95 (0.91-0.99)
Ethnicity		
East Asian	1.77 (1.54-2.03)	12.40 (12.09-12.71)
Other	0.91 (0.65-1.28)	3.11 (2.94-3.29)
South Asian	1.71 (1.41-2.08)	1.29 (1.21-1.36)
White	1.00	1.00
HCV		
Positive	4.83 (4.30-5.43)	2.73 (2.62-2.84)
Negative	1.00	1.00
HIV		
Positive	5.43 (4.42-6.68)	5.70 (5.27-6.17)
Negative	1.00	1.00
Active tuberculosis		
Yes	0.57 (0.31-1.06)	0.97 (0.86-1.10)
No	1.00	1.00
Problematic alcohol use		
Yes	0.83 (0.70-0.99)	1.00 (0.94-1.06)

No	1.00	1.00
Injection drug use		
Yes	1.91 (1.63-2.24)	1.70 (1.61-1.80)
No	1.00	1.00
Major mental illness		
Yes	0.71 (0.61-0.83)	0.73 (0.70-0.77)
No	1.00	1.00
Material deprivation quintile		
Q2-Q4	1.07 (0.94-1.22)	1.09 (1.05-1.12)
Q5 (most deprived)	1.37 (1.19-1.58)	1.34 (1.29-1.38)
Q1 (most privileged)	1.00	1.00
Social deprivation quintile		
Q2-Q4	1.21 (1.05-1.39)	0.98 (0.95-1.00)
Q5 (most deprived)	1.57 (1.35-1.83)	1.01 (0.98-1.04)
Q1 (most privileged)	1.00	1.00
Year of HBV diagnosis		
1990-1999	1.00	1.00
2000-2004	0.10 (0.09-0.11)	0.28 (0.27-0.29)
2005-2009	0.03 (0.03-0.04)	0.15 (0.14-0.15)
2010-2015	0.00 (0.00-0.01)	0.06 (0.06-0.06)

HIV: Human immunodeficiency virus; HCV: Hepatitis C virus; HBV: Hepatitis B virus; Q: Quintile