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# Assessment of Injection Drug Use through Administrative Data: Implications for community level programming

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# Background

- People who inject drugs (PWID) are at high risk of hepatitis C virus (HCV), hepatitis B virus (HBV), HIV and other blood-borne infections (BBI)
- Substance use, co-occurring infections and social conditions are associated with high morbidity and mortality among PWID
- Requires the identification and enumeration of the PWID population
  - Monitoring syndemics of substance use, infections, and social conditions
  - Planning and provision of services for management

# Background & Objectives

- Opioid overdose crisis in Canada and in the United States has highlighted the need for accurate estimates of the population size of PWID.
- Linked surveillance and healthcare utilization datasets, could provide a cost-effective and efficient mechanism to characterize syndemics, and better inform intervention programs and monitoring of disease outcomes among PWID
- Large administrative datasets based on the coverage of entire population of a geographic area could provide an efficient mechanism for estimating PWID population size in that geographic area.
- We identified and validated algorithms based on diagnostics codes and prescription records representing IDU in linked administrative datasets against interview-based IDU data.

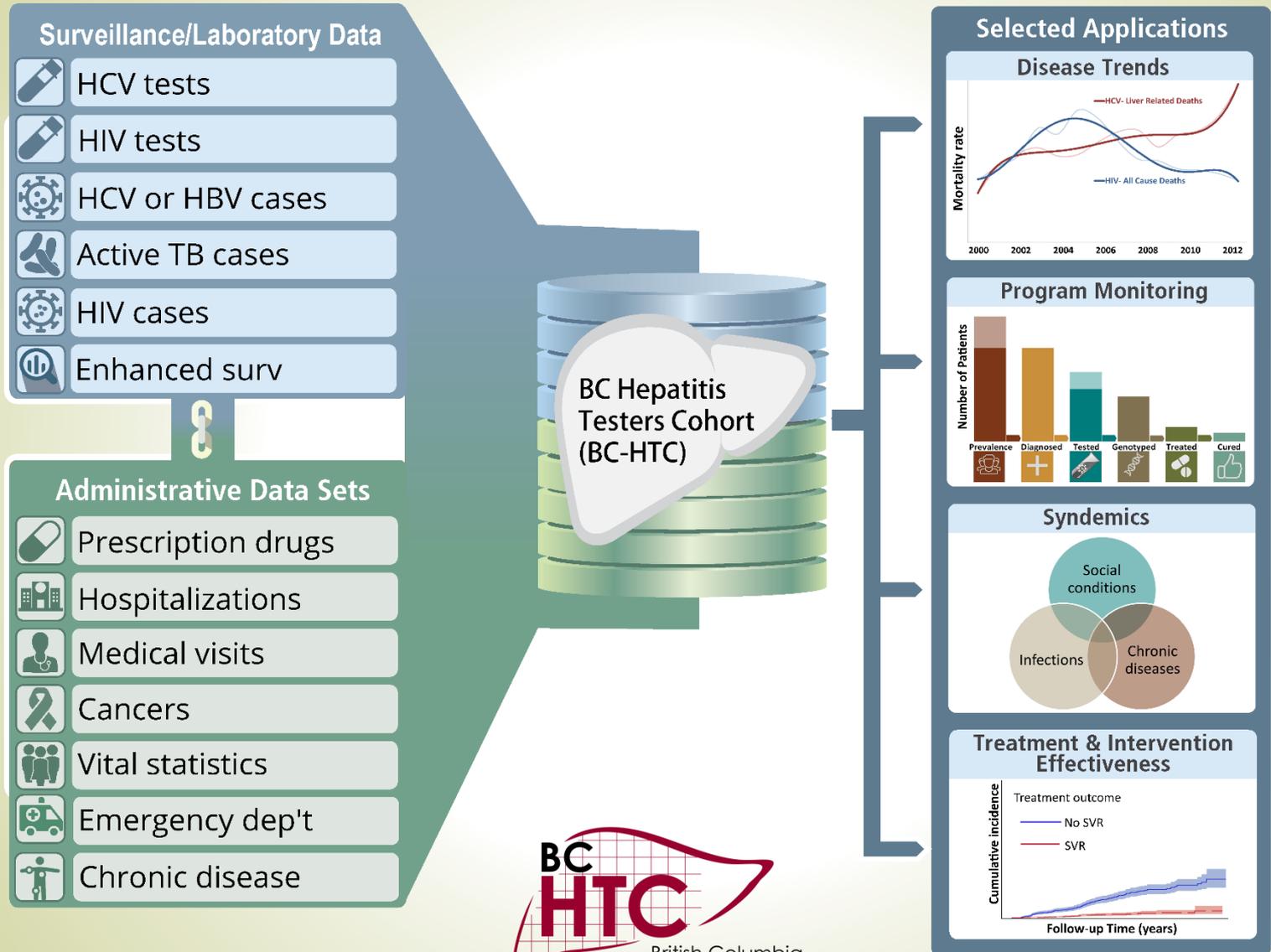
# BC Hepatitis Testers Cohort 1992 to 2016

## Health Information on ~1.7 million British Columbians

Janjua et al. PLOS one 2016



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# Methods

## Study Population:

- Individuals ages 11-65 years who were interviewed by public health nurses for risk factors assessment using standard case report forms at the time of their HIV, HBV or HCV diagnosis as part of provincial surveillance of blood borne infections according to provincial guidelines.

## IDU algorithms in administrative datasets

- IDU was identified through:
  - diagnostic codes for drug use and injecting-related infections such as skin and soft tissue infections from medical visit and hospitalization datasets and
  - dispensation records of prescription drug used for the management of opioid addiction including methadone and buprenorphine/naloxone
  - Added data from emergency department visits recently



# ICD codes for defining IDU

Diagnoses	ICD-9 and ICD-10 codes in medical visit and hospitalization data
<b>Drug use diagnoses</b>	
Opiates	E8500*, 3040*, 3047*, 3055*, 9650*, F11*, T400, T401, T402, T403, T404, T406, R781
Cocaine	3042*, 3056*, 970*, F14*, T405, R782,
Amphetamines	3044*, 3057*, 9697*, F15*, T436
Sedatives	3041*, 9694*, 3054*, F13*, T423-T428,
Other	292*, 3045*, 3046*, 3048*, 3049*, 3053*, 3059*, 6483*, 7960*, 9621*, 9658*, 9663*, 9664*, 9670*, 9684*, 9685*, 9696*, 9698*, 9699*, 970*, V6542, , F19*, Z715*, Z503*, T42*, T387,T408, T409, T412,T436-T439, T439, T507
Fee item (OST)	39
DIN/PINs for OST	2242963, 2242964, 999792-3, 66999990-3, 66999997-9, 67000000-4, 2295695, 2295709, 2408104, 2424851, 2424878, 999776, 22123346-9, 655619, 655627, 781460, 781479, 2408090
<b>Infections</b>	
Endocarditis	1128, 11281, 421*, 424*, B376, I33*-I37*, I38, I39*
Bacteremia or Sepsis	038*, 4151, 41512, 4229, 42292, 449*, 7855*, 7907*, 9959, 99590-2, A40*, A41*, I269, I400, R572, R651, R659
Osteomyelitis	7300*-7302*, 7309*, M86*, M899*
Skin or soft tissue infections	0400*, 324*, 326*, 451*, 5672, 56722, 56731, 56738, 5695*, 5720*, 5901*, 681*, 682*, 7071*, 7078*, 7079*, 7098*, 7236*, 72886, 7293, 72930, 72939, 7854*, I80*, L97*, L988, M793*, A480, G06*, G09, K630, K650, K750, L02*, L03*, M5402, M726*, N10, R02

# Performance characteristics of various IDU algorithms

Code	Description	Sensitivity	Specificity	PPV	NPV
<b>Algorithms for Drug Misuse (DM)</b>					
DM-1M	1 medical visit or 1 hospitalization for illicit drug use or drug misuse	90	73	65	93
DM-2M	2 medical visit or 1 hospitalization for illicit drug use or drug misuse	87	77	69	91
<b>Algorithms for Injection Drug Use (IDU)</b>					
IDU-1M	1 medical visit or 1 hospitalization for injectables	80	81	71	88
<b>IDU-2M</b>	<b>2 medical visits or 1 hospitalization for injectables</b>	<b>78</b>	<b>83</b>	<b>73</b>	<b>87</b>
IDU-1M OST	1 medical visit, 1 hospitalization for injectables or record for OST	85	80	70	90
<b>IDU-2M OST</b>	<b>2 medical visit, 1 hospitalization for injectables or record for OST</b>	<b>83</b>	<b>82</b>	<b>72</b>	<b>90</b>
<b>Algorithms for Injection Drug Use (IDU) and/or injecting-related infection (IRI)</b>					
IDU- 2M + IRI 2yr	(2 medical visits or 1 hospitalization for injectables) AND injecting-related infection code within 2 years of a qualifying code	60	90	78	80
IDU-2M OST+ IRI 2yr	(2 medical visit or 1 hospitalization for injectables or record for OST) AND injecting-related infection code within 2 years of a qualifying code	65	90	78	82
IDU- 2M + IRI 1yr	(2 medical visits or 1 hospitalization for injectables) AND injecting-related infection code within 1 year of a qualifying code	57	92	79	79
IDU- 2M OST + IRI 1yr	(2 medical visit or 1 hospitalization for injectables or record for OST) AND injecting-related infection code within 1 year of a qualifying code	62	91	79	81
IDU-2M IRI	2 medical visits or 1 hospitalization for injectables or injecting-related infection code	91	43	48	90
<b>IDU-2M OST IRI</b>	<b>2 medical visits or 1 hospitalization or record for OST or injecting-related infection</b>	<b>94</b>	<b>42</b>	<b>48</b>	<b>92</b>
IRI	Injection-related infection	82	46	47	82

# Performance characteristics of various IDU algorithms from hospitalization data

Code/Abbreviation	Description	Sensitivity	Specificity	PPV	NPV
IDU-H	1 hospitalization for injectables	73	85	74	85
<b>IDU-H OST</b>	<b>1 hospitalization for injectables OR record for OST</b>	<b>82</b>	<b>84</b>	<b>74</b>	<b>89</b>
IDU-H IRI	1 hospitalization for injectables OR Injecting-related infections	77	77	66	86
<b>IDU-H OST IRI</b>	<b>1 hospitalization for injectables OR record for OST OR injecting-related infections</b>	<b>85</b>	<b>76</b>	<b>66</b>	<b>90</b>
IDU-H + IRI 1yr	1 hospitalization for injectables AND Injecting-related infections within 1 year of a qualifying code	38	96	83	73
<b>IDU-H OST + IRI 1yr</b>	<b>(1 hospitalization for injectables OR record for OST) AND injecting-related infections within 1 year of a qualifying code</b>	<b>40</b>	<b>96</b>	<b>83</b>	<b>74</b>
IDU-H + IRI 2yr	1 hospitalization for injectables AND Injecting-related infections within 2 year of a qualifying code	40	95	83	74
<b>IDU-H + IRI 2yr</b>	<b>(1 hospitalization for injectables OR record for OST) AND injecting-related infections within 2 year of a qualifying code</b>	<b>41</b>	<b>95</b>	<b>83</b>	<b>74</b>

# Performance of various IDU algorithms including ER data

Description	Sensitivity	Specificity	PPV	NPV
2m_0n_1d_0p_er IDU based on 2 MSP/ 0 NACRS/ 1 DAD/ No OST	77.6	83.3	72.5	86.8
2m_1n_1d_0p_er IDU based on 2 MSP/ 1 NACRS/ 1 DAD/ No OST	<b>78.9</b>	<b>81.6</b>	<b>70.8</b>	<b>87.2</b>
2m_2n_1d_0p_er IDU based on 2 MSP/ 2 NACRS/ 1 DAD/ No OST	78.2	82.8	72.1	87.0
2m_3n_1d_0p_er IDU based on 2 MSP/ 3 NACRS/ 1 DAD/ No OST	77.8	83.0	72.2	86.8

EVER - IDU based on 2 MSP/ 1 NACRS/ 1 DAD/ OST: N=105,951 unique individuals

2013 to 2015 - IDU based on 2 MSP/ 1 NACRS/ 1 DAD/ OST/: N=45,610 unique individuals



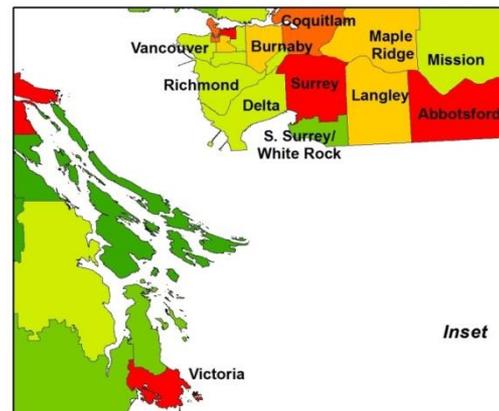
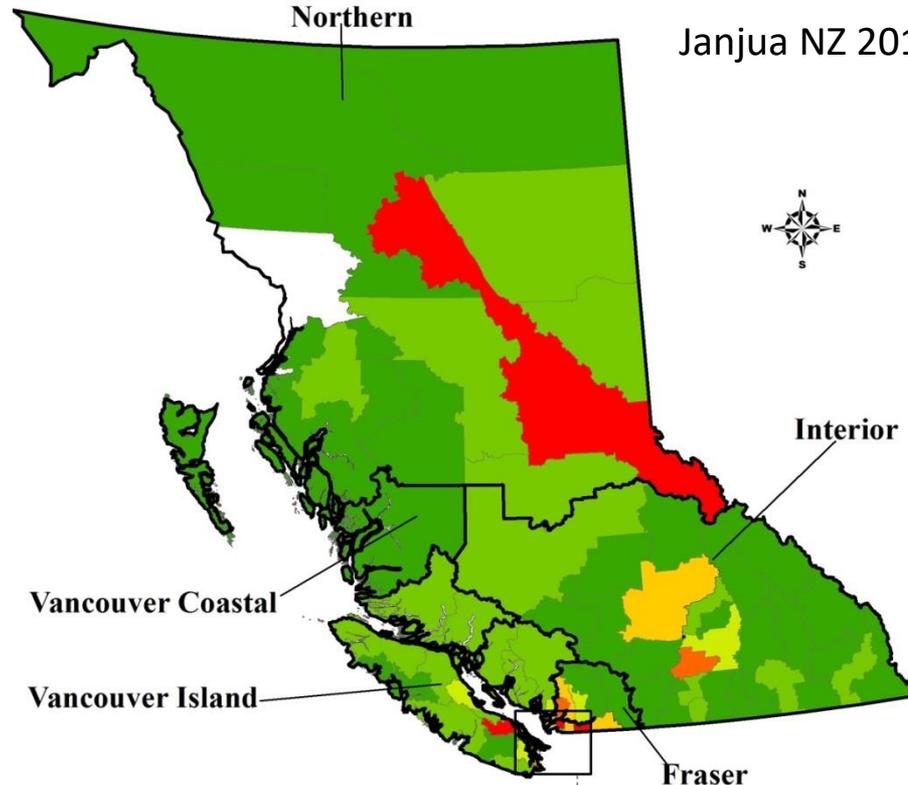
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# Use and Application

# PWID population size estimates by local health areas in British Columbia, Canada (2013-2015)

Janjua NZ 2018 Int J of Drug Policy

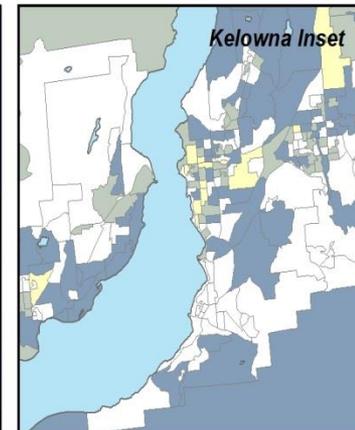
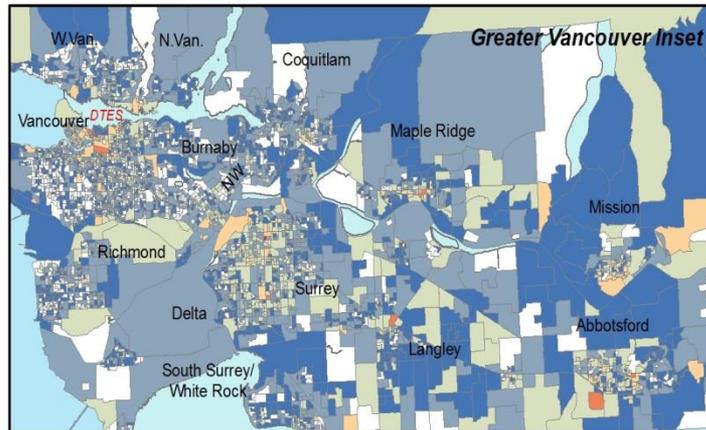
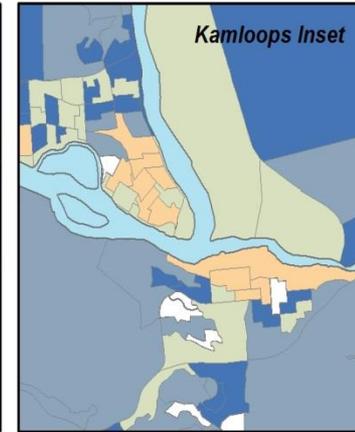
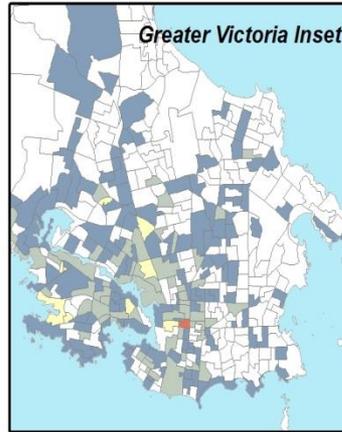
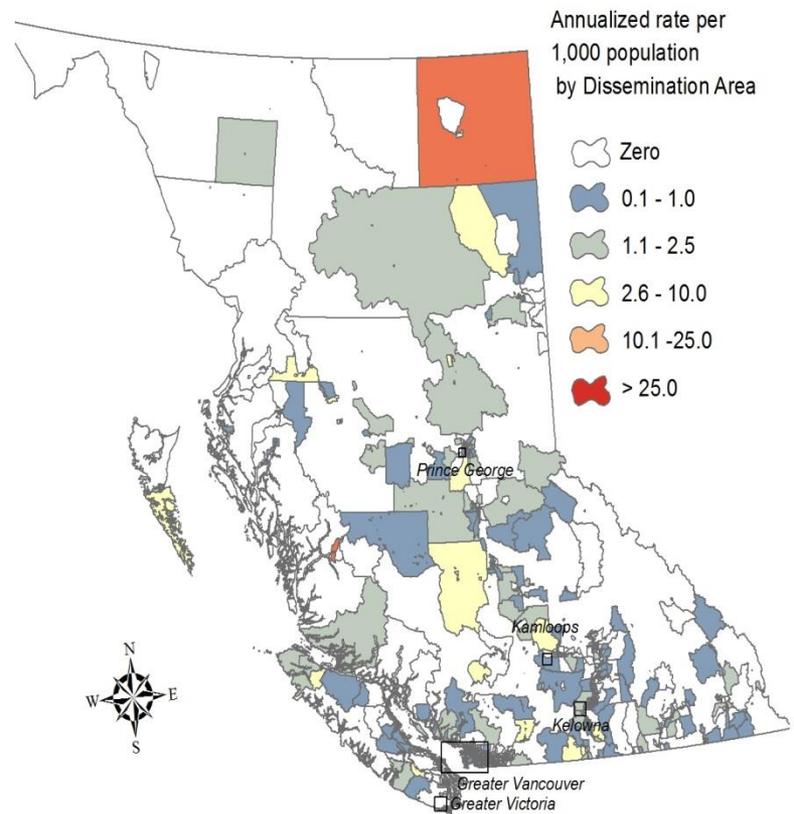


Number of PWID



# Distribution of IDU in British Columbia 2009-2013

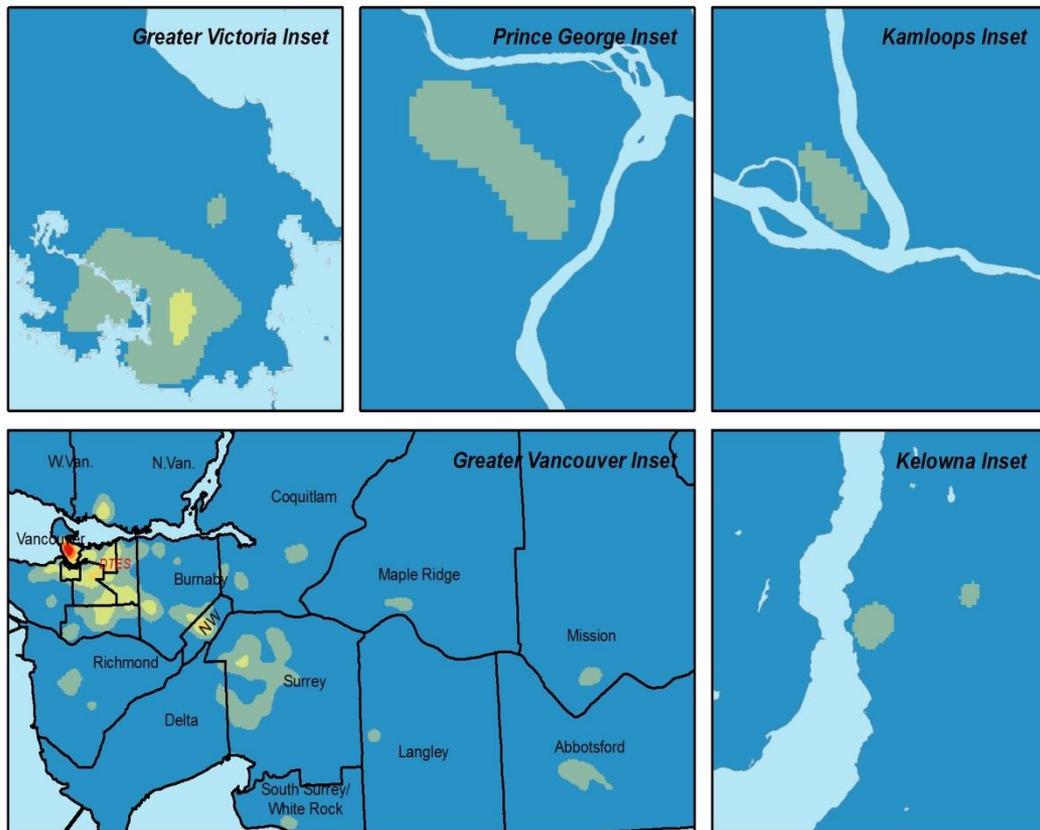
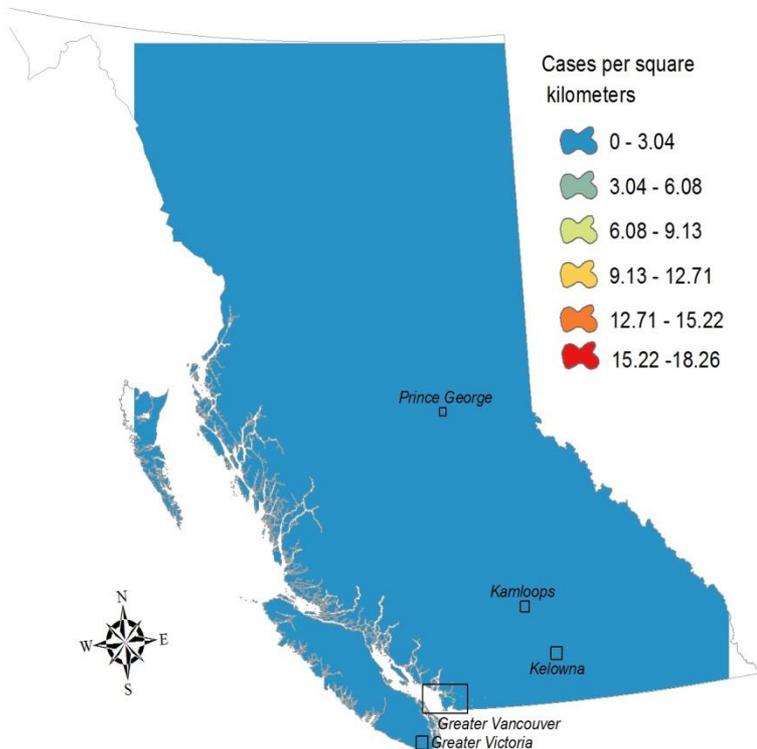
Distribution of HCV in British Columbia 2009-2013 by Census Dissemination Area



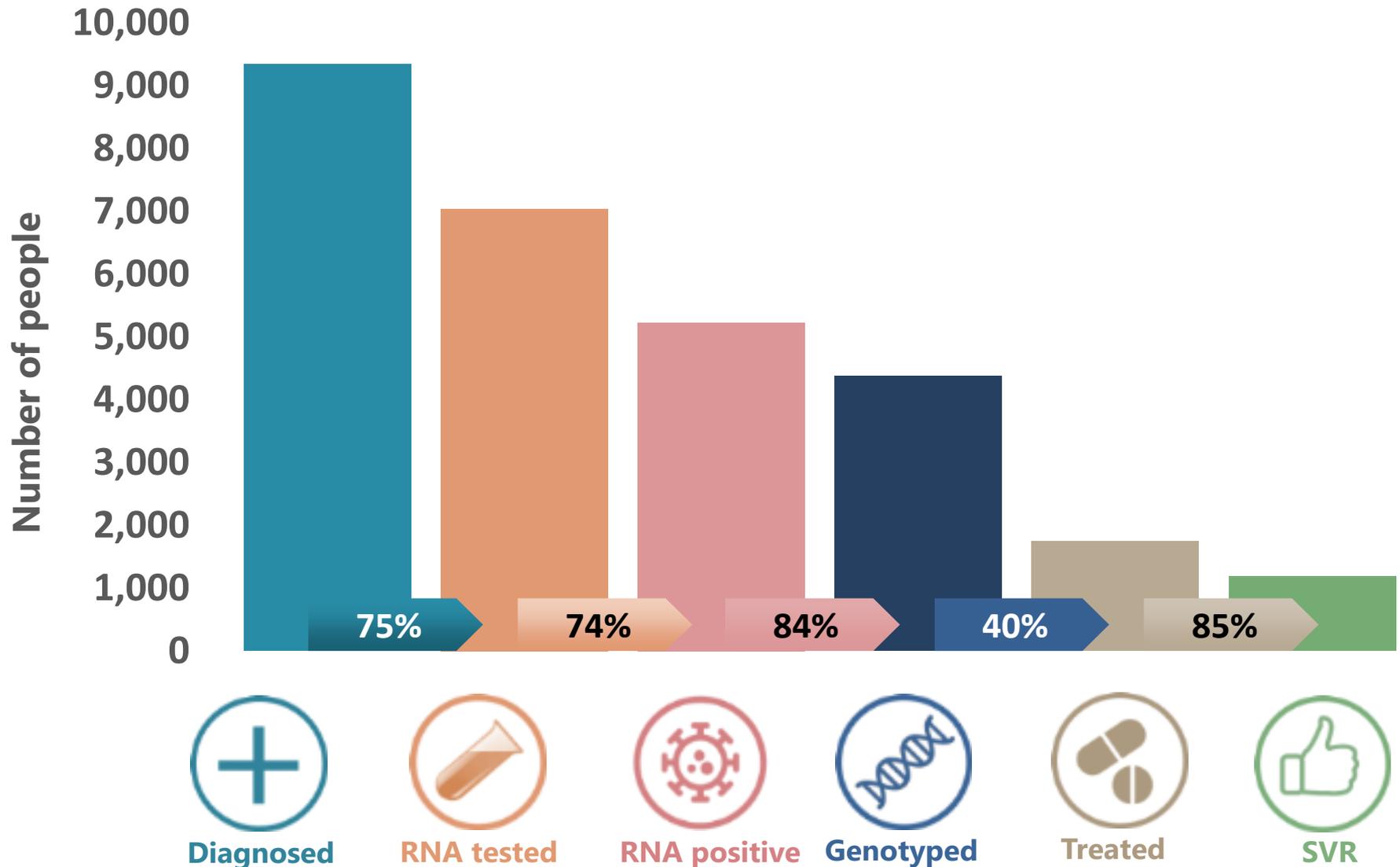
# Distribution of HCV in British Columbia

## Kernel density Estimation maps 2009-2013

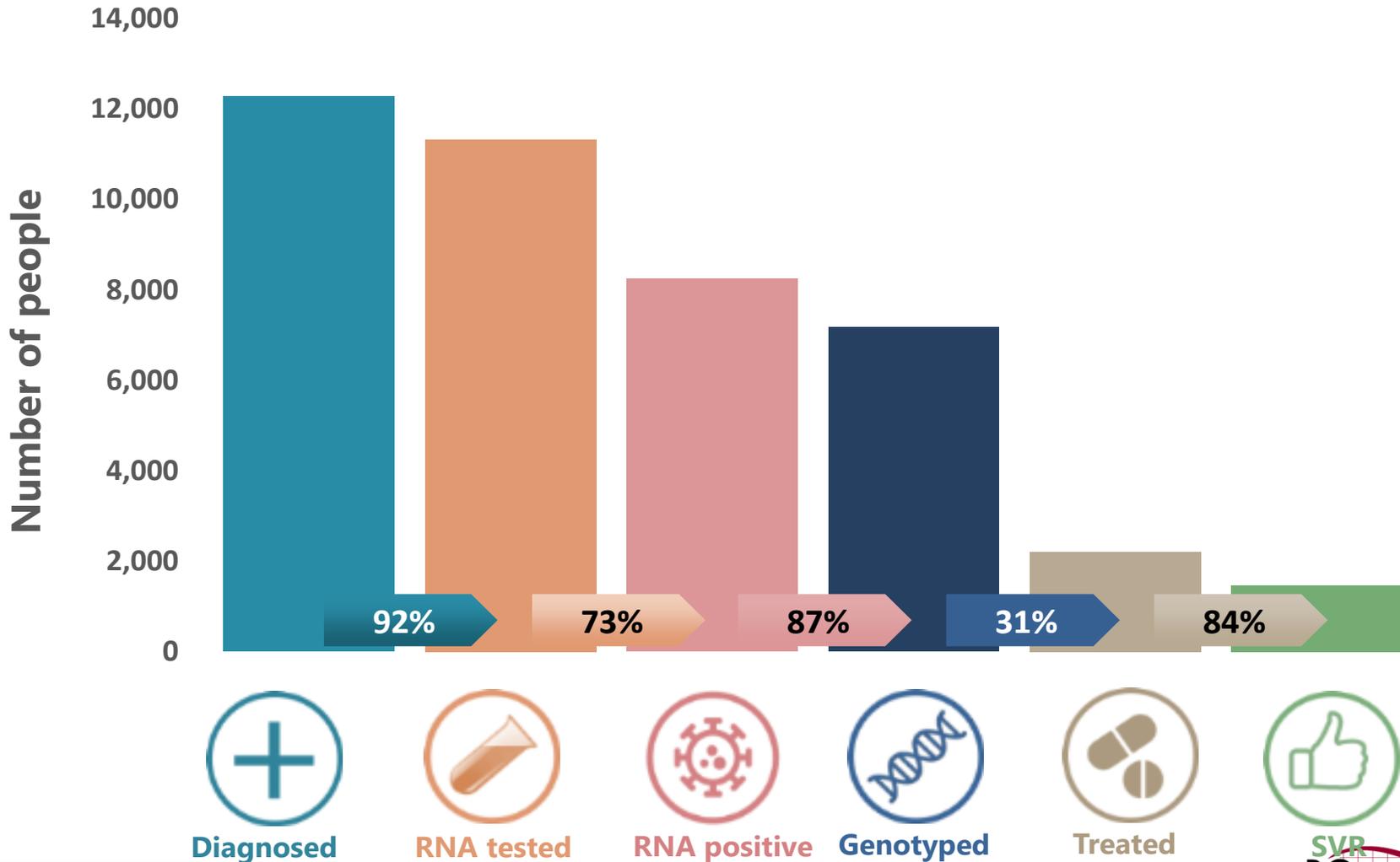
Distribution of HCV in British Columbia 2009-2013 by Census Dissemination Area



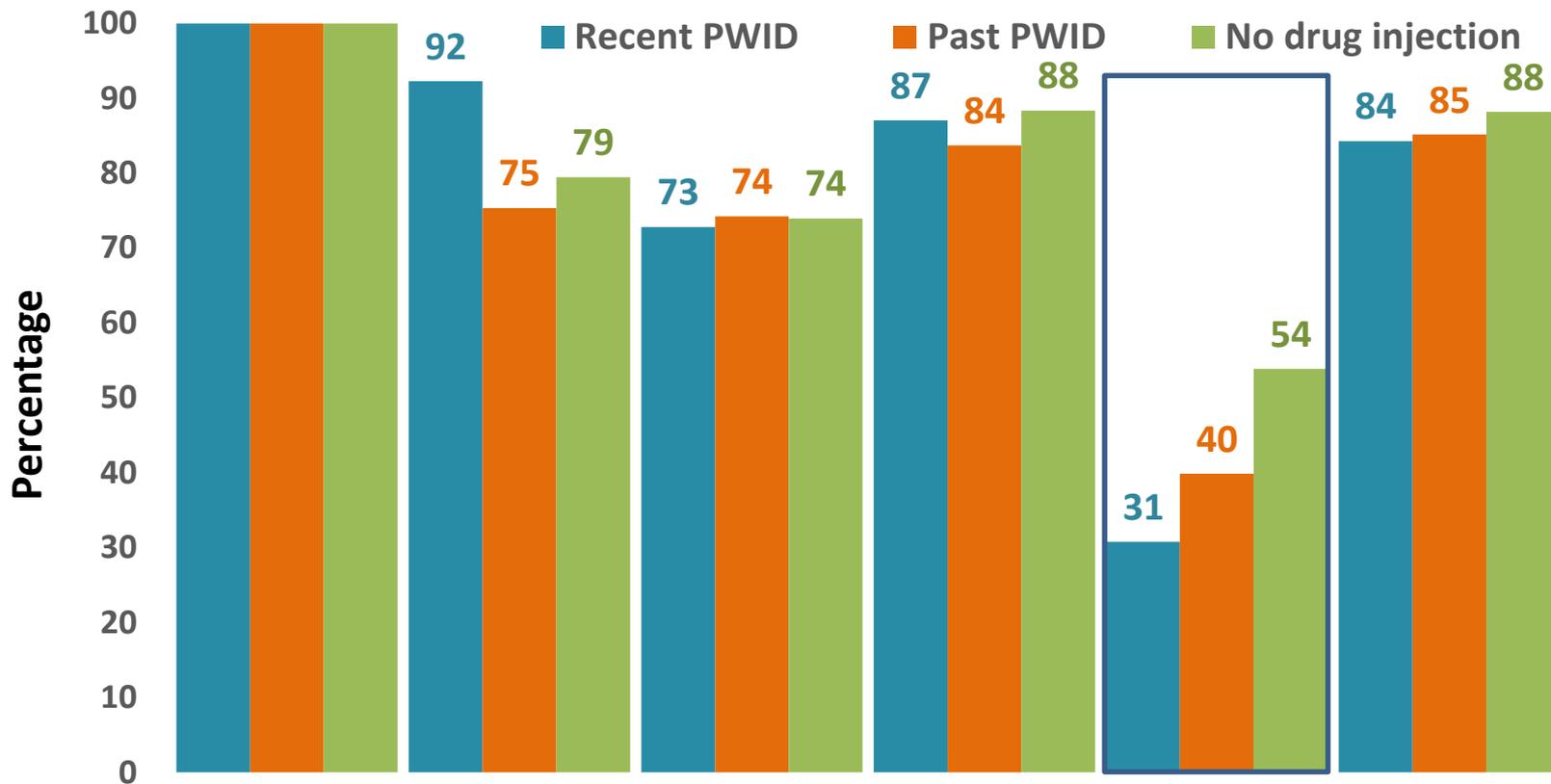
# HCV cascade among past PWID in British Columbia, December 31, 2016



# HCV cascade among recent PWID in British Columbia, December 31, 2016



# Comparison of HCV Cascade by Injection Drug Use



Diagnosed



RNA tested



RNA positive



Genotyped



Treated



SVR

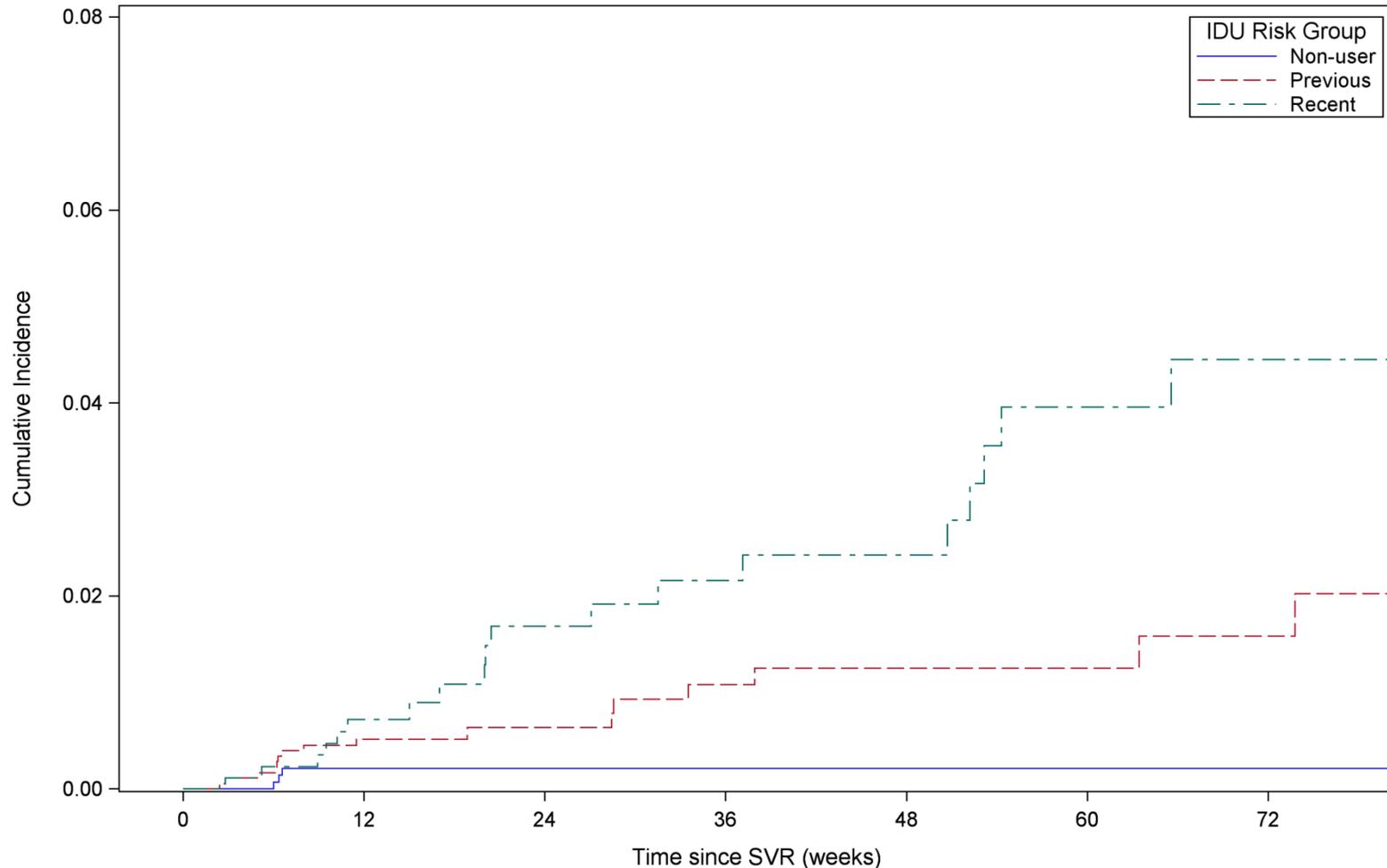


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# Cumulative incidence curves for reinfection following SVR by injection drug use history



# Interpretation and Caveats

- Algorithms based on administrative datasets
  - Misclassification
  - Under ascertainment due to coding practices
- Health care utilization dependent
  - Access and frequency of use affect assessment
- No method for estimation of PWID population size perfect
- Overall PWID population size estimates a guide

# Summary

- Diagnostic codes based algorithms could be used to identify injection drug use in administrative datasets.
- Enables an assessment of the distribution of PWID at population level which can help in planning harm reduction services and overdose response at the local community level.
  - Estimates being used for harm reduction supplies planning in BC
- Could be used for providing testing, care and treatment, and to examine the linkage to care for HCV, HIV, mental illness and other conditions among PWID in small geographic areas.
- Cascade of prevention services for HCV at local level
  - NSP, OST, mental health services
- Local cascade of care for substance use services

# Acknowledgements

- BCCDC
  - The BC-HTC Team
  - Public Health Analytics
  - PMR, PHSA
- BCCA
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- Canadian HCV Network
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Thank you!

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