Changes in hepatitis C prevalence and incidence after the introduction of universal access to direct-acting antivirals in Australia: findings from a prospective cohort of people who inject drugs

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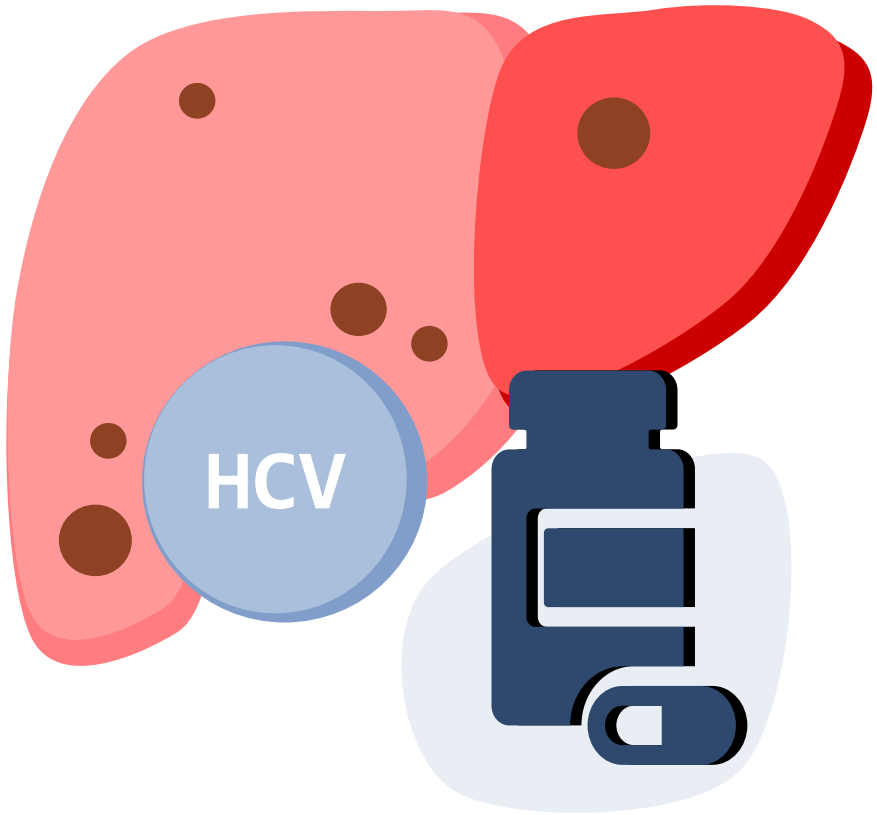
AT BURNET INSTITUTE, WE PROUDLY ACKNOWLEDGE THE BOON WURRUNG PEOPLE OF THE KULIN NATIONS AS THE TRADITIONAL CUSTODIANS OF THE LAND ON WHICH OUR OFFICE IS LOCATED. WE PAY OUR RESPECT TO ELDERS PAST AND PRESENT, AND EXTEND THAT RESPECT TO ALL FIRST NATIONS PEOPLE.

Background

HEPATITIS C TREATMENT AS PREVENTION

The availability of highly effective and tolerable direct-acting antiviral (DAA) therapies for hepatitis C virus (HCV) could lead to reductions in HCV incidence through a treatment as prevention effect, where treatment of individuals with HCV infection reduces risk of onward transmission.



Background

PEOPLE WHO INJECT DRUGS ARE A KEY POPULATION

Sharing injecting equipment is the main route of HCV transmission, globally.

Most data on the impact of DAA availability on HCV prevalence and incidence in people who inject drugs has been collected through studies of people recruited from drug treatment or harm reduction services.

Aim

To measure changes in HCV prevalence and primary (first) HCV infection incidence in a prospective, community-based cohort of people who inject drugs in Melbourne, Australia, following the introduction of broad access to DAAs.

Methods

THE SUPERMIX COHORT

- Prospective cohort of people who inject drugs
- Commenced in 2008, with blood collection commencing in 2010
- Annual F2F interview and blood samples
- Recruitment by RDS/street outreach/snowball sampling
- Sample size ~1500

Methods

HCV DATA COLLECTION

Systematic annual blood testing from March 2010 to December 2022:

1. HCV antibody test – Past or current infection
2. HCV RNA test – Current infection

Definitions - Prevalence

PREVALENCE OF CURRENT HEPATITIS C INFECTION

CURRENT INFECTION	PREVALENCE MEASUREMENT	ESTIMATE CALCULATION
RNA positive	At annual intervals (spanning March to February)	$\frac{\text{\# HCV RNA positive}}{\text{\# with a valid HCV test}}$

Definitions - Incidence

INCIDENCE OF PRIMARY HEPATITIS C INFECTION

STUDY ELIGIBILITY	CASE DEFINITION	ENTER STUDY	EXIT STUDY
Participants with a negative HCV antibody test and ≥1 subsequent HCV test were eligible for inclusion	Negative HCV antibody test followed by a positive HCV test	Time zero: first negative HCV antibody test date	Last negative antibody test or estimated infection date (midpoint method)

Statistical analysis

CHANGES IN PREVALENCE OF CURRENT HCV INFECTION FOLLOWING DAA INTRODUCTION

Interrupted time series model implemented using log-binomial generalized estimating equations

CHANGES IN PRIMARY HCV INCIDENCE FOLLOWING DAA INTRODUCTION

Poisson regression

Results: Participants

INCLUSION

Among 1497 participants recruited into SuperMIX, 1083 had ≥1 HCV test.

BASELINE CHARACTERISTICS

68%
Male

32 years
Median age

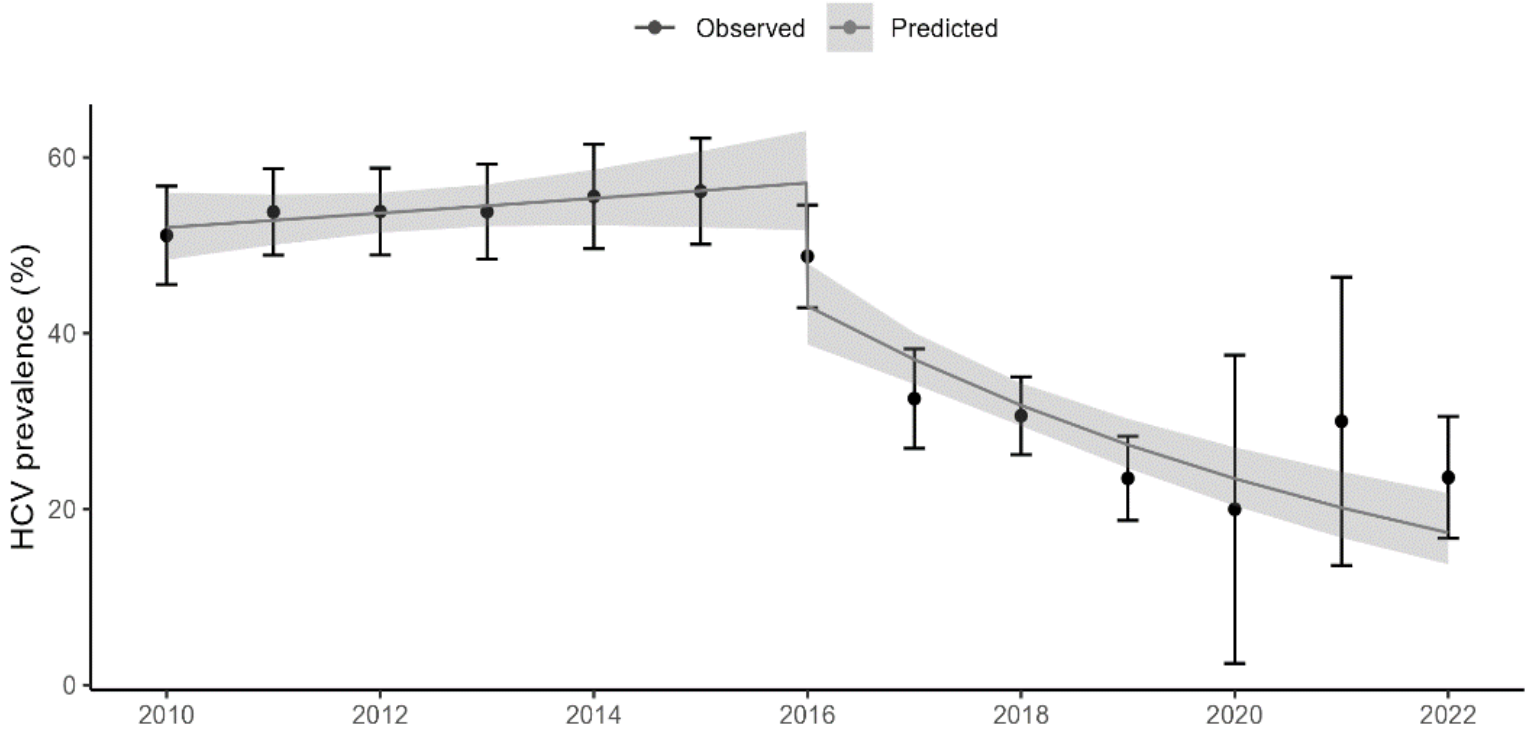
41%
Injected daily or more frequently

46%
Received opiate agonist therapy

Results: Prevalence

- Prevalence was stable at 52% (95% CI: 48-56%) from March 2010-February 2016.
- We estimated a decline of 17% (prevalence ratio: 0.83, 95% CI: 0.73-0.94) in 2016, followed by a sustained decline of 14% per annum thereafter (prevalence ratio: 0.86, 95% CI: 0.82-0.90).
- Results were similar in a model adjusted for potential confounders.

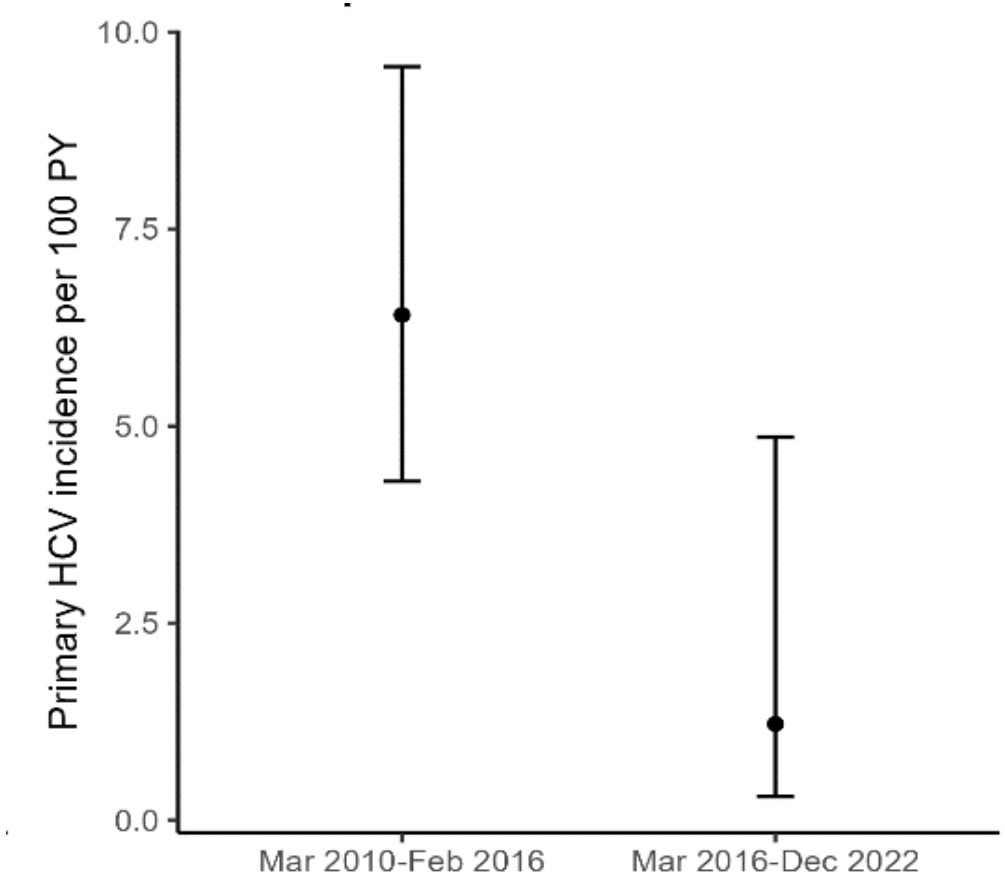
FIGURE 1. CHANGES IN HCV PREVALENCE AFTER INTRODUCTION OF DAAS IN MAR 2016



Results: Incidence

- Pre-DAA HCV incidence was 6.41 per 100 PY (24 cases, 374.5 PY, 95% CI:4.30, 9.56), declining to 1.22 per 100 PY (2 cases, 164.5 PY, 95% CI: 0.30, 4.86) post-DAA.
- The estimated decline in HCV incidence was 81% (incidence rate ratio: 0.19, 95% CI: 0.04, 0.80).

FIGURE 2. CHANGES IN HCV INCIDENCE AFTER INTRODUCTION OF DAAS IN MAR 2016



Discussion

- Universal DAA access was associated with declines in HCV prevalence and incidence
- Declines in prevalence potentially more modest in this street-recruited cohort of people who inject drugs compared to previous estimates from participants recruited from harm reduction or drug treatment sites.
- Incidence of primary HCV infection lower pre-DAA in SuperMIX than ANSPS with potentially greater declines
- Despite declines in HCV prevalence and incidence, approximately one fifth of participants remain HCV RNA positive in 2022.

Tables: HCV prevalence and incidence in SuperMIX compared to other studies

Study	Year	Prevalence
ANSPS	2015	51%
	2022	12%
ETHOS	2018-19	24%
	2019-21	17%
SuperMIX	2015	52%
	2022	Observed 24% Predicted 17%
Study	**Period**	**Incidence**
ANSPS	2010-15	13.6 per 100 PY
	2016-21	5.4 per 100 PY
SuperMIX	2010-15	6.4 per 100 PY
	2016-22	1.2 per 100 PY

References: Kirby annual surveillance report 2023, Valerio Int J Drug Policy 2022; 105; Iversen Addiction 2023; 118(5):901-11

Discussion – WHO targets

Absolute target <2 per 100 PY by 2030

- 2016-22: 1.22 per 100 PY (95% CI: 0.30, 4.86)

Relative target 30% reduction by 2020; 80% by 2030

- 2016-22: 81% reduction (95% CI: 20%-96%)

Note targets include primary infection and reinfection

Discussion – treatment as prevention

- Incidence is one of two key impact indicators for measuring progress towards HCV elimination as a public health threat.
- We showed that there was a decline in incidence associated with DAA access, but very small numbers of incident infections after DAA access made it difficult to quantify the extent of that decline.
- Analysis of trends in HCV prevalence clearly show an immediate and sustained decline in current HCV infection associated with introduction of DAA access.
- Taken together with the timing of changes in HCV prevalence, the observed decline in HCV incidence is consistent with a treatment as prevention effect.

Limitations & future work

This study considered incidence of primary (first) HCV infection. More work is needed to access the incidence of HCV reinfection.

The cohort is not a representative sample and may not be generalizable to all people who inject drugs in Melbourne, Australia. Notably, the participants were younger and reported less OAT usage at baseline than participants of other Australian studies that have investigated the impact of DAA access on HCV prevalence and incidence in people who inject drugs.

Participants in SuperMIX were offered the opportunity to participate in the Treatment as Prevention (TAP) study so may be more likely to have received treatment than other people who inject drugs.

Blood collection was limited during 2020-2021 due to COVID-19.

Conclusions

Universal DAA access was associated with declines in HCV prevalence and incidence, consistent with a treatment-as-prevention effect.

Despite declines in HCV prevalence and incidence, approximately one fifth of participants remain HCV RNA positive in 2022.

Additional interventions may be required to eliminate HCV as a public health threat.

Acknowledgements

PEOPLE

- SuperMIX participants
- Staff at recruitment sites
- Fieldwork team
- Chief investigators
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Thank you

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