

Evaluating a machine learning based risk stratification model to identify people who have injected drugs for surveillance

Carol El-Hayek, Thi Nguyen, Jason Asselin, Mark Stooze, Anna Wilkinson, Kit Fairley, Phillip Read, Sione Crawford, Annie Madden, Htein Linn Aung, Victoria Polkinghorne, Douglas Boyle, Jane Hocking, Adam Dunn and Margaret Hellard

14th Australasian Viral Hepatitis Conference 2024



Burnet
reach for the many



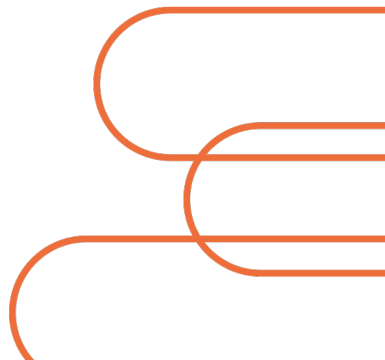
AT BURNET INSTITUTE, WE PROUDLY ACKNOWLEDGE
THE BOON WURRUNG PEOPLE OF THE KULIN NATIONS
AS THE TRADITIONAL CUSTODIANS OF THE LAND ON
WHICH OUR OFFICE IS LOCATED. WE PAY OUR
RESPECT TO ELDERS PAST AND PRESENT, AND EXTEND
THAT RESPECT TO ALL FIRST NATIONS PEOPLE.





Disclosure of interest

Carol El-Hayek has received scholarship funding from the National Health and Medical Research Council for this study.



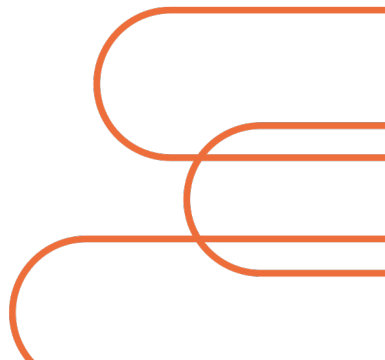


The role of surveillance data in viral hepatitis elimination

*“Quality, accessible, timely and reliable disaggregated data will be needed to help with the measurement of progress and to **ensure that no one is left behind.***

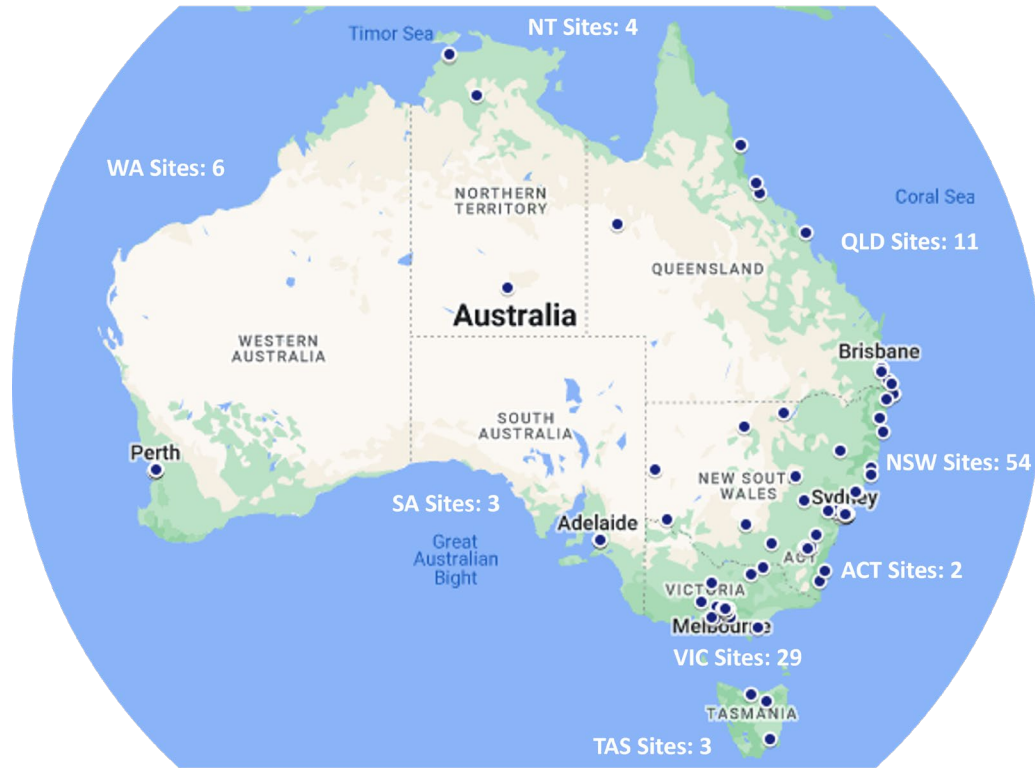
Such data is key to decision making.”

2030 Agenda for Sustainable Development, United Nations 2015





Australian Collaboration for Coordinated Sentinel Surveillance of Bloodborne Viruses and Sexually Transmissible Infections (BBVSTIs)



Source: accessproject.org.au

Challenge of identifying injecting drug use in medical records

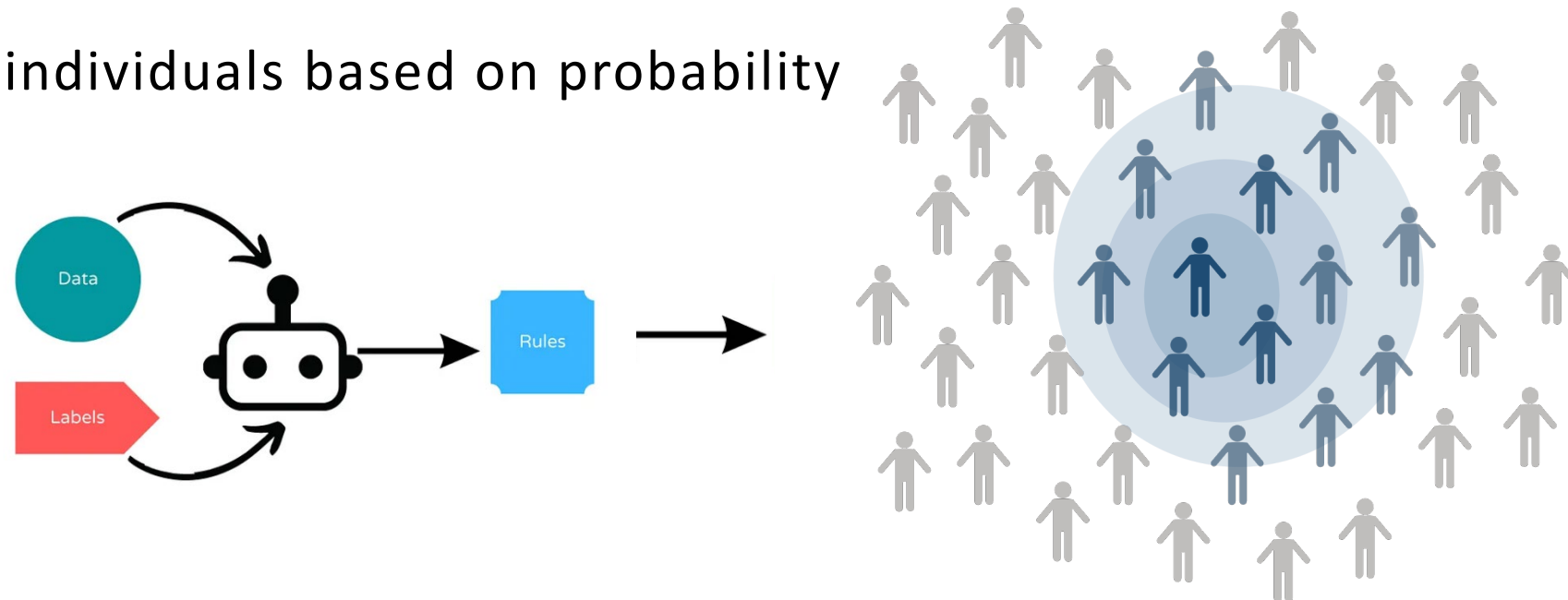
Inconsistently missing direct indicators of injecting drug use

Existing indicators of IDU in ACCESS

- Self-reported via behavioural survey as part of routine care
- Opioid agonist treatment prescribed

Using machine learning and stratification to identify injecting drug use

- Computer learns from examples of medical records indicating IDU
- Predicts the probability of having injected drugs for all individuals
- Group individuals based on probability



Variables derived from ACCESS data and used in the model

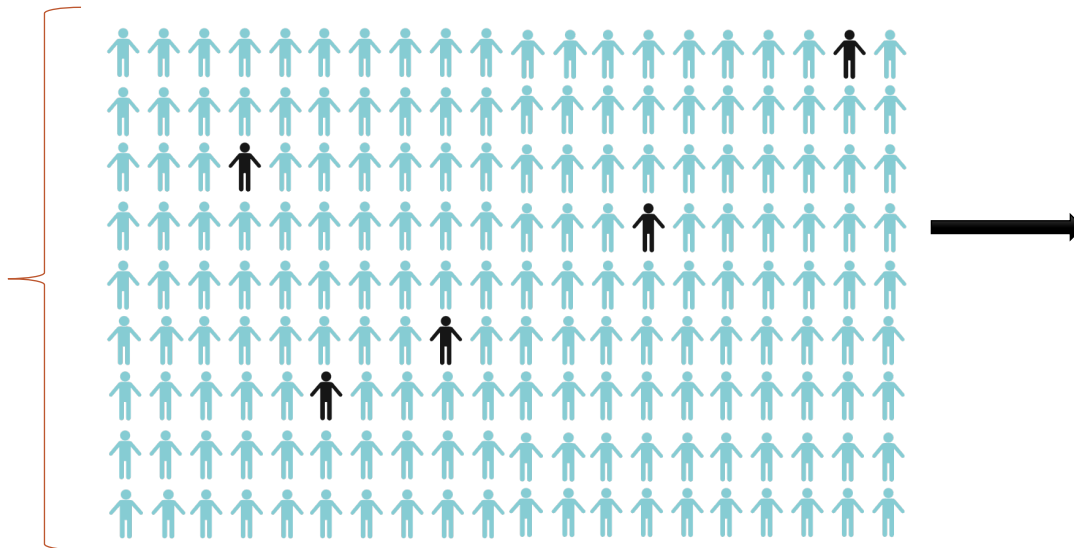
ACCESS DATASET	MODEL FEATURES	ACCESS DATASET	MODEL FEATURES
DEMOGRAPHICS	<ul style="list-style-type: none"> Generation from year of birth Sex at birth categories Region of birth categories First Nations 	HIV, HCV, STI PATHOLOGY	<ul style="list-style-type: none"> Test rate for each BBV and STI Positivity (not for HCV) No test record
RESIDENCE	<ul style="list-style-type: none"> Postcode by Aus Post region Postcodes by SEIFA Count of total postcodes 	PRESCRIPTIONS	<ul style="list-style-type: none"> Medications grouped by PBS schedule No prescription record
CONSULTATIONS	<ul style="list-style-type: none"> Total number of clinical visits Total number of clinics visited Total number of clinic types visited Year of visit grouped by 2-year periods Type of clinic visited Practitioner type at visit Type of consultation Time in years between first and last visit 		

Results - Model applied with 75% probability cut-off

2.9% of people had existing indicators – self report or OAT

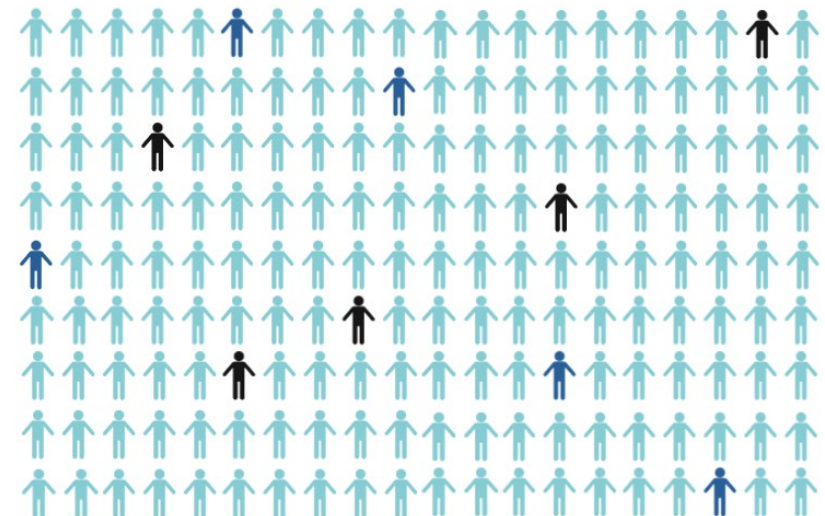
n = 50,236

N=1.7 million



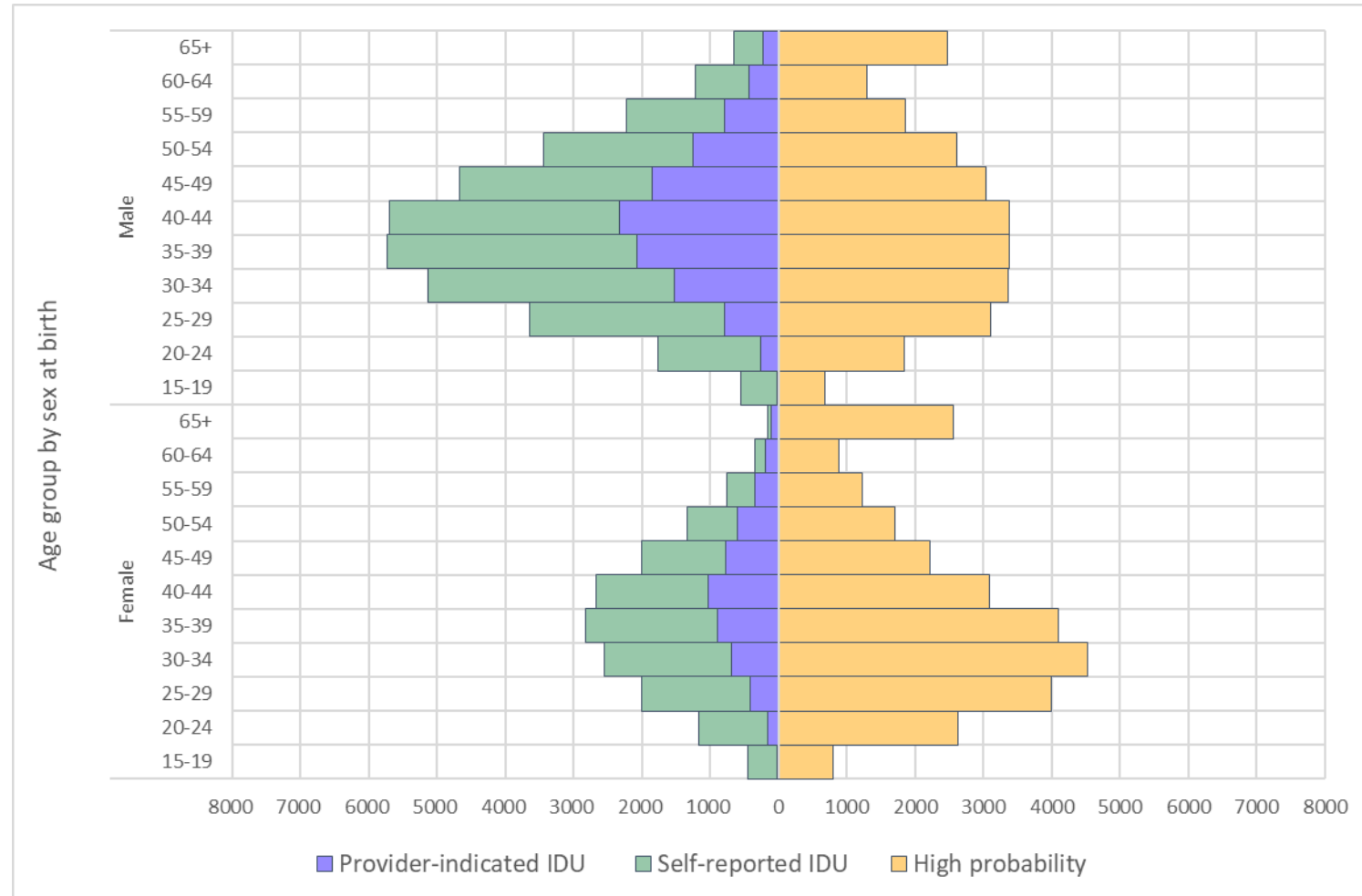
2.7% of people had high likelihood – probability $\geq 75\%$

n = 45,495



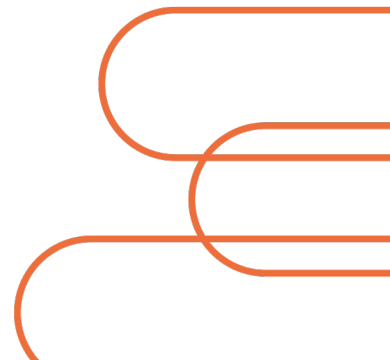


Distribution of patient characteristics by age and sex



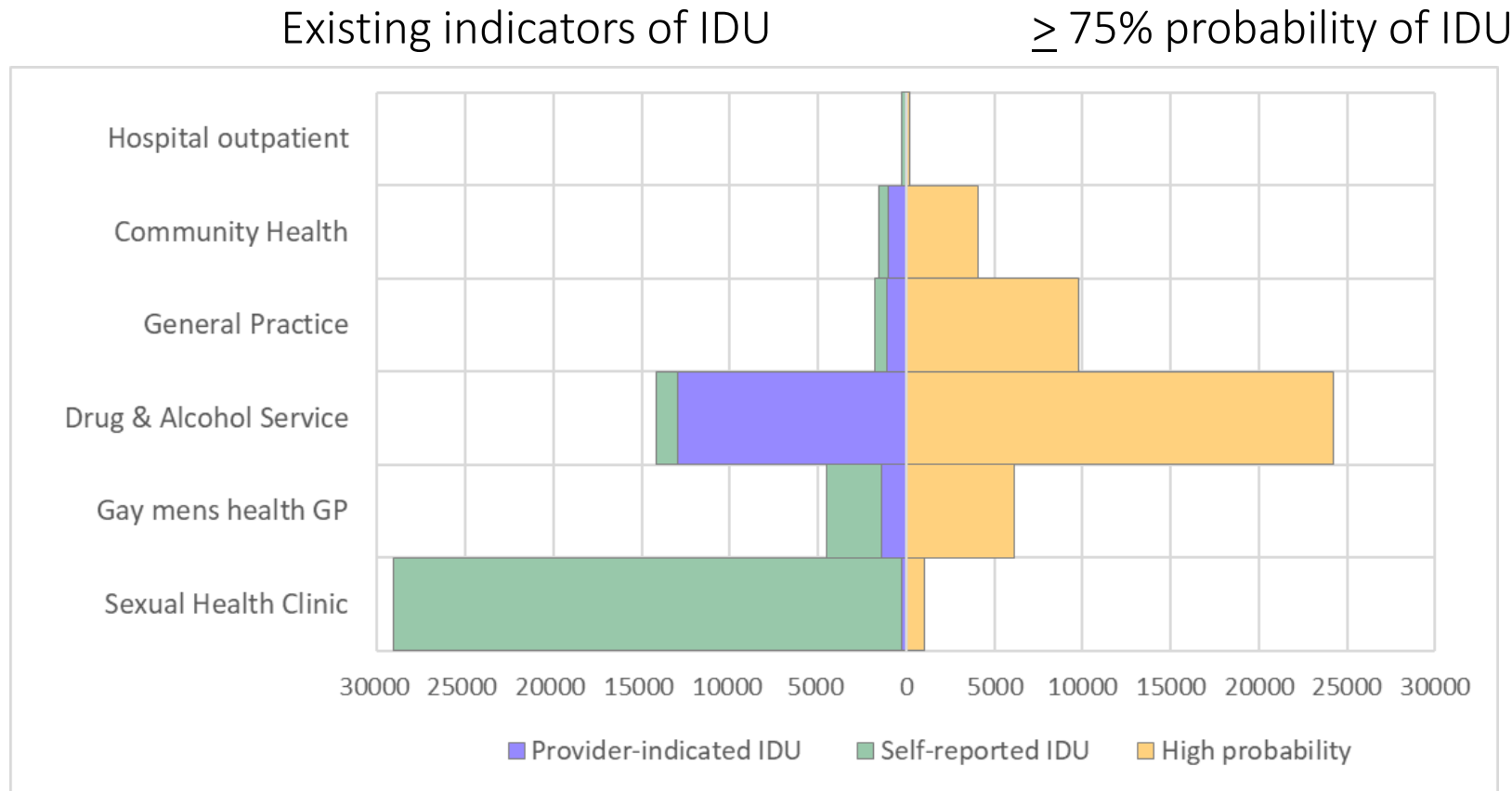
Existing indicators of IDU

$\geq 75\%$ probability of IDU





Distribution of patient characteristics by clinic type



Summary and future direction

- The model can “predict” IDU beyond existing indicators
- Can improve evidence to facilitate the reach of services to a wider population
- Probability cut-offs can be changed to suit surveillance objectives
- Grouping people by likelihood of IDU for a more tailored approach to interventions
- Further work required before implementing the methods

Acknowledgements

All clinical services participating in ACCESS

ACCESS Operational Team @ Burnet & Kirby Institutes

ACCESS Executive and Advisory committees

ACCESS receives core funding from Australian Department of Health and Aged Care



Supervision

Prof Margaret Hellard, Burnet Institute

Prof Adam Dunn, University of Sydney

Prof Jane Hocking, University of Melbourne

Prof Douglas Boyle, University of Melbourne

Financial support

NHMRC scholarship Dec 2020-Dec 2023

Burnet Institute Jul-Nov 2020



Burnet
reach for the many

Thank you

Carol.el-hayek@burnet.edu.au



burnet.edu.au