DEVELOPMENT OF AI-AUGMENTED HCV SURVEILLANCE FOR AUSTRALIA

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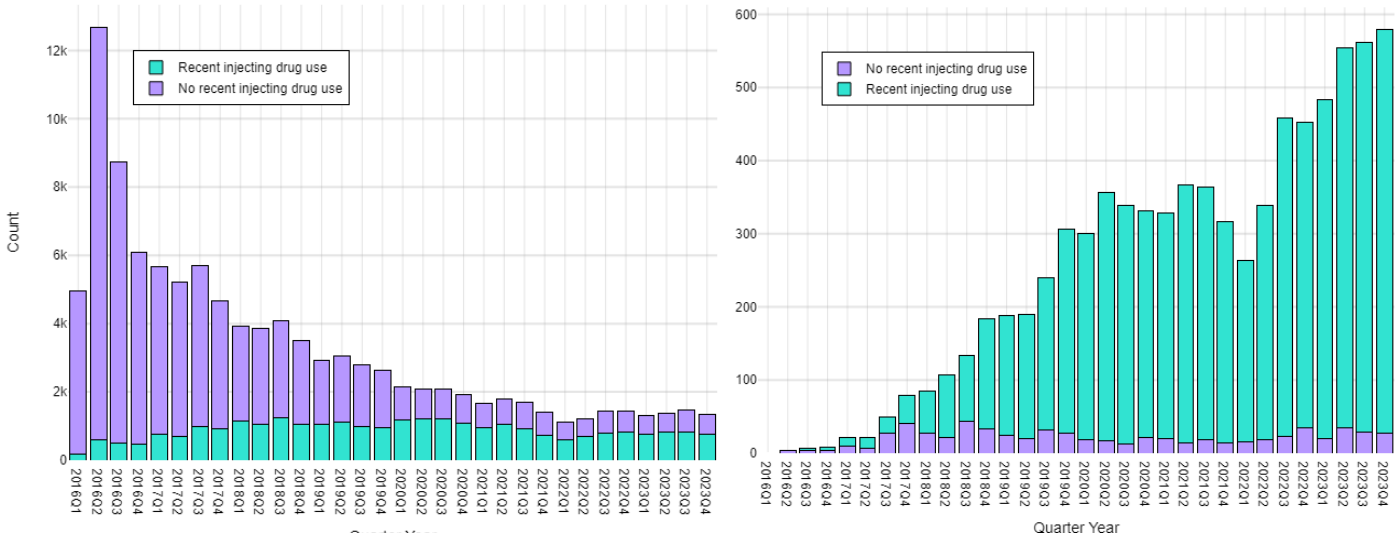
Background:
Monitoring HCV (re)treatment among people who inject drugs (PWID) is crucial to support elimination efforts in Australia. However, national surveillance was lacking. This project aimed to develop artificial intelligence (AI) augmented HCV surveillance to fill this critical gap.

Methods:
All DAA (re)treatment in Australia is reported in pharmaceutical administrative data, but retreatment reason, PWID categorization, and incarceration are not. Supervised machine learning models were developed using real-world standard-of-care data (REACH-C cohort; 10843 treated; 350 retreated) to classify retreatment reason (reinfection or treatment failure; sensitivity=97%; specificity=96%) and PWID (injected drugs past 6-months; sensitivity=75%; specificity=85%). An algorithm developed on administrative codes was used to classify incarceration. Models were applied to national administrative data.

Results:
Between 2016-2023, 105,947 people initiated HCV treatment of whom an estimated 30% (n=31,818) were PWID. Total treatment initiation decreased over time, however treatment initiation among PWID was stable **(Figure 1A)**. One third (30%) of treatments among PWID occurred in prison. Retreatment initiations increased over time. By 2023, 10% of the treated population had been retreated at least once; higher at 24% among PWID. Of retreatments (n=13496), 60% were estimated as for reinfection. Retreatment for reinfection increased over time, with distinct acceleration in 2022-2023 (**Figure 1B)**. In 2023, 25% of all DAAs prescribed in Australia were reinfection retreatments. Of reinfection retreatments, an estimated 92% were PWID of whom 53% were incarcerated. Estimated retreatment for treatment failure stabilized from 2020. Of people retreated for treatment failure, 52% discontinued initial treatment (missed ≥4weeks of 8-24 week DAA therapy) of whom an estimated 75% were PWID.

Conclusion:
AI-augmented HCV surveillance provides critical information for elimination policy, although ongoing model validation is essential. Predictive modelling indicates rising retreatment is driven by PWID reinfection and treatment discontinuation. Future modelling iterations will utilize comprehensive national-level data-linkage, including HCV testing, to monitor reinfection and treatment failure.

Figure 1. (A) Initial treatment and (B) retreatment for reinfection by recent injecting drug use.



Disclosure of interest:
The Kirby Institute is funded by the Australian Government Department of Health. The views expressed in this publication do not necessarily represent the position of the Australian Government.