Return on investment for a prison-based needle and syringe program in Australia

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Acknowledgement

I would like to acknowledge the Larrakia people, the traditional owners of the land I am on today, and pay my respect to elders past, present and emerging.

Background

- Needle and syringe programs (NSPs) reduce harms associated with injecting drug use:
  - Prevention of HCV transmission among people who inject drugs
  - Decreased risk of injection-related infections (IRIs)[1]
- World Health Organization 2022-2030 HCV strategy has set targets for
  - <2 new infections per 100 people who inject drugs per year
  - 300 needles & syringes per person who injects drugs per year
- Prisons are high-risk settings for HCV acquisition
- Prison NSPs in 9/173 countries as of 2023
  - 1st Prison NSP in Switzerland in 1992
  - No current prison NSP in Australia

[1] skin or soft tissue infections and invasive infections (bloodstream infection/sepsis, osteomyelitis/septic arthritis, and infective endocarditis)

Estimating the return-on-investment of a prison NSP in Australia

AIMS

Estimate the impact (HCV infections and IRIs averted), economic benefits and benefit-cost ratio of a potential prison NSP in Australia.

SCENARIOS

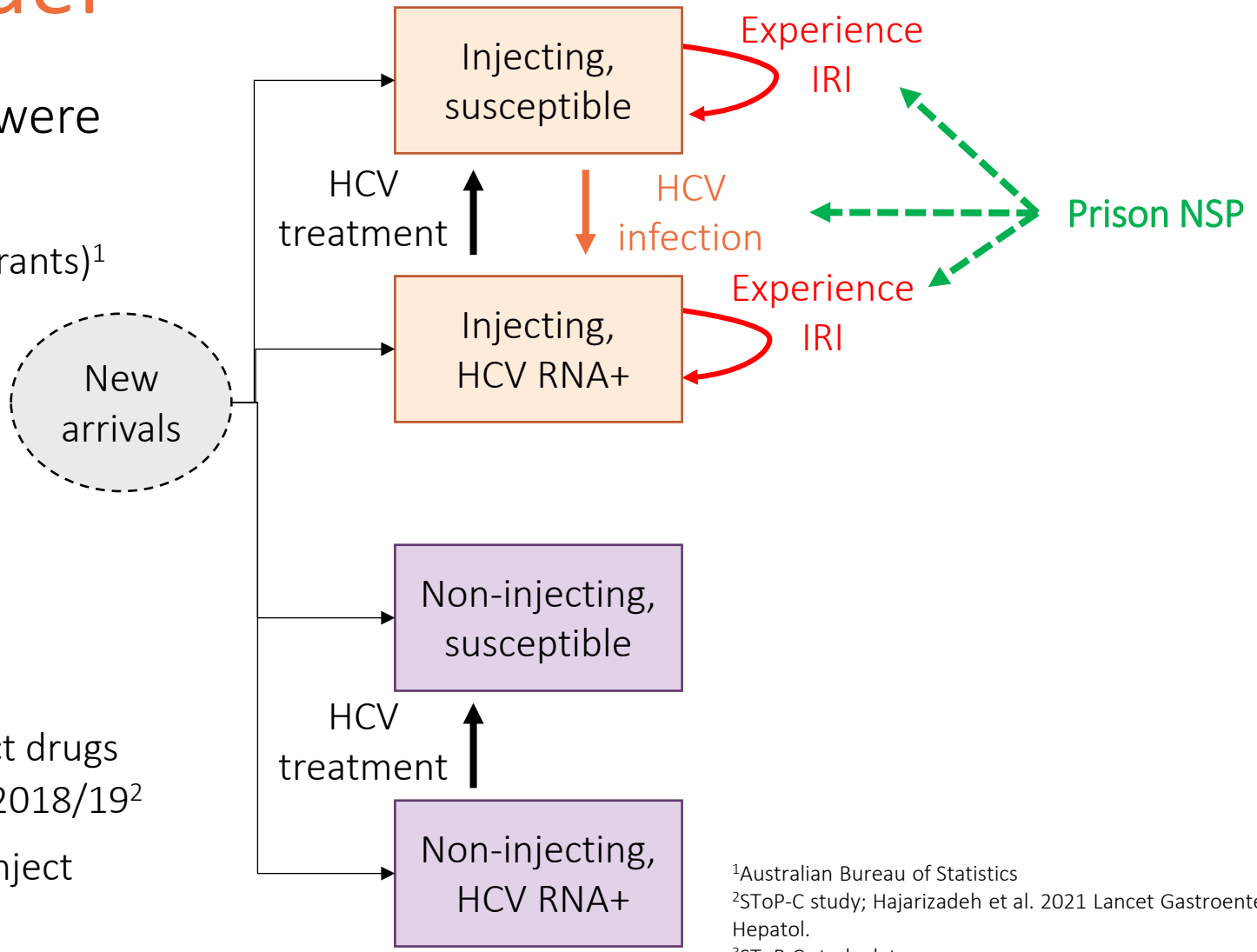
Status-quo. No prison NSP. Model projections for HCV infections and IRIs in prison between 2025-2030. Includes HCV testing/treatment programs.

Prison NSP scale-up. NSPs implemented across prisons 2025–2027; coverage increased linearly to 50% of people who inject drugs in prison by 2030.

Epidemiological model

Stochastic compartmental model. Data were obtained from various sources:

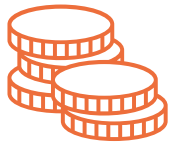
- ~42,000 individuals in prison in 2023 (68,300 entrants)[1]
- 56% of prison population with a history of IDU[2]
  - 66% of individuals with history of IDU inject while in prison[3]
- Overall HCV RNA prevalence among entrants with IDU history: decreased from 51% in 2015 to 12% in 2022 due to testing/treatment[5]
- Annual ~2000-3000 HCV treatments in prison[4]
- HCV incidence rate ~22 per 100 people who inject drugs in prison per year (2014-17), reducing to ~10 by 2018/19[2]
- 3.1 hospitalizations for IRIs per 100 people who inject drugs in prison per year[6]



[1]Australian Bureau of Statistics
[2]SToP-C study; Hajarizadeh et al. 2021 Lancet Gastroenterol Hepatol.
[3]SToP-C study data
[4]Burnet-Kirby annual progress towards elimination report
[5]Kirby Institute. Annual Surveillance Report
[6]aRRR from Brothers et al. 2023 IJDP applied to estimated rates in the community Curtis et al 2023 Epidemiol Infect.

Economic model

COSTS



- Calculated from a health and correctional systems perspective.
- Estimated using an ingredients-based approach: including start-up costs, one-off prison NSP initiation cost per participant, costs per unit, and annual operational costs.

BENEFITS

- Treatment costs saved from HCV cases and IRIs prevented.
- HCV treatment cost from PBS ($36k); $5k and $15k tested in sensitivity analyses.
- Average IRI management cost (~$13k) from the National Hospital Cost Data Collection Public Hospitals Report[1], accounting for distribution of different IRIs (SuperMIX[2]).

BENEFIT -COST RATIO (BCR)

$$Benefit - cost\ ratio\ (BCR) = \frac{total\ benefits}{total\ costs}$$

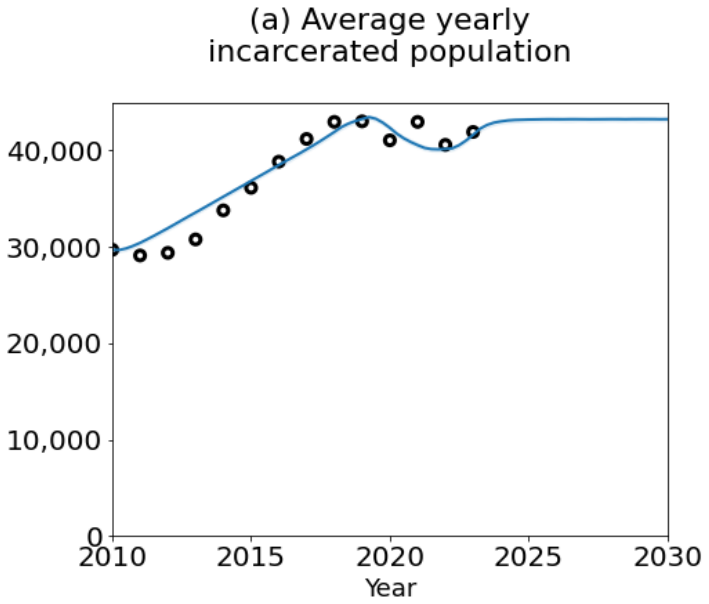
[1]Independent Health and Aged Care Pricing Authority (IHACPA). National Hospital Cost Data Collection (NHCDC) Public Hospitals Report - Round 24 (financial year 2019–20) 2022 [Available from: https://www.ihacpa.gov.au/resources/national-hospital-cost-data-collection-nhcdc-public-hospitals-report-round-24-financial-year-2019-20.

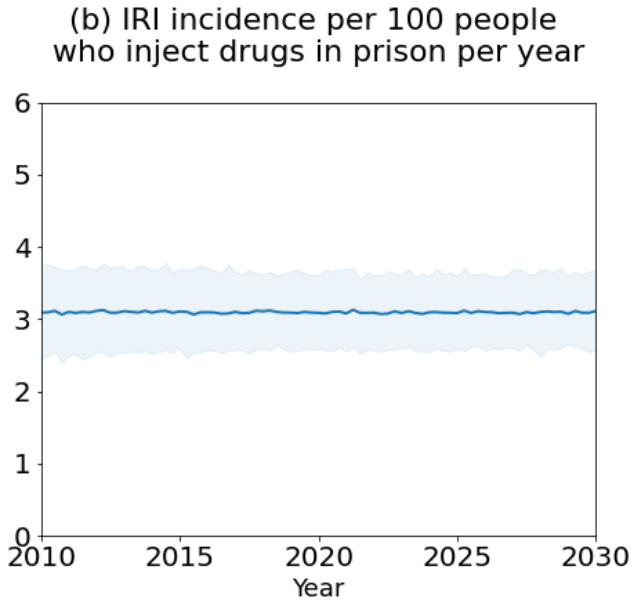
[2]Curtis et al 2023 Epidemiol Infect.

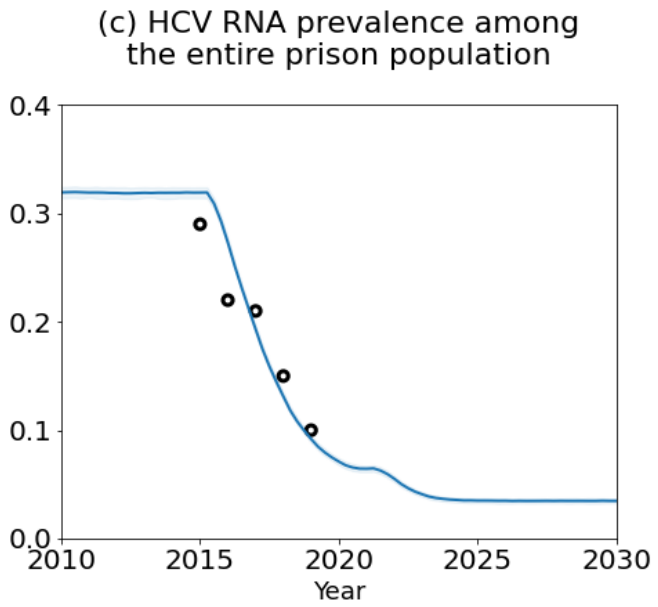
Model calibration

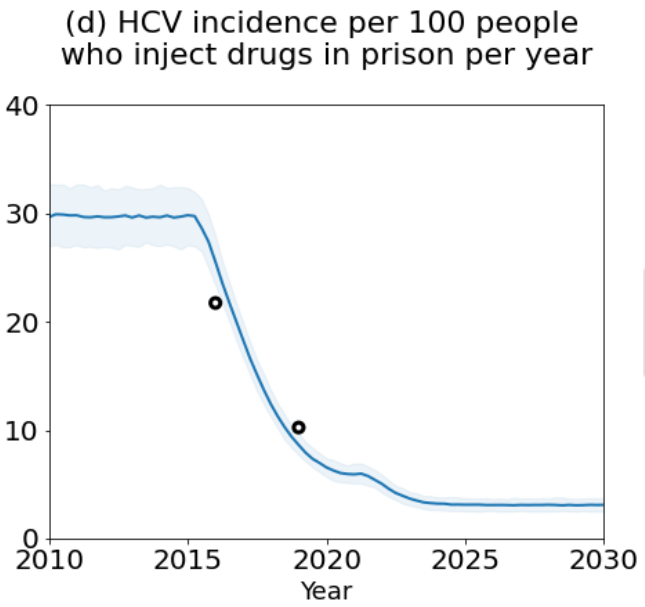
The model was calibrated to prison population size (and turnover) and estimated prevalence and incidence of HCV and IRIs in prison.

This includes the impact of HCV testing and treatment scale-up.









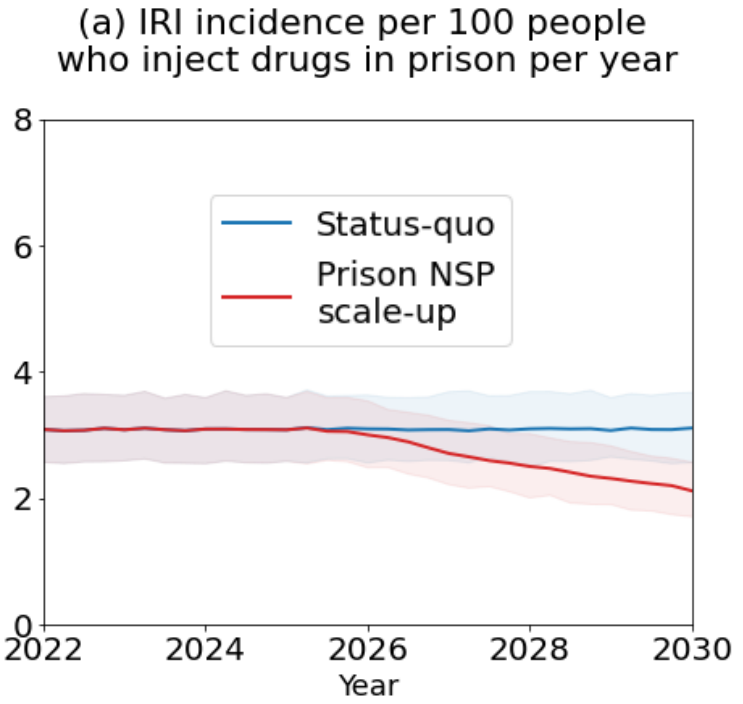
Impact: implementation and scale-up of prison NSP

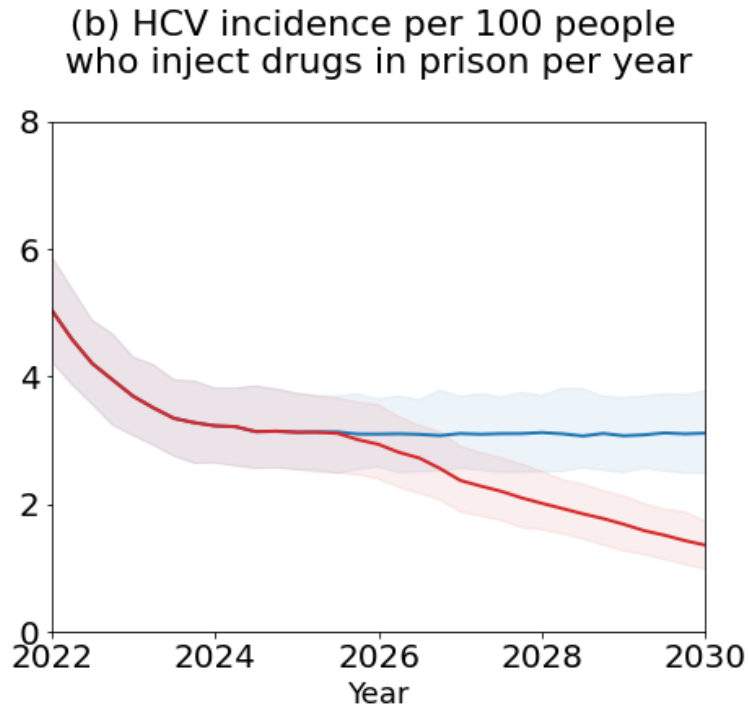
Status-quo (2025–2030):

- HCV infections: 2,932 [uncertainty interval (UI): 2,394 – 3,507]
- IRIs: 3,110 [UI: 2,596 – 3,654]
- HCV incidence rate in 2030: 3.1 [UI: 2.5 – 3.7] per 100 people who inject drugs in prison per year

Scale-up of prison NSP to reach 50% coverage among people who inject drugs in prison by 2030. Impact over 2025–2030:

- HCV cases averted: 890 [UI: 880 - 910]
- IRIs averted: 522 [UI: 509 - 532]
- HCV incidence in 2030: decreased to 1.3 [UI: 1.0 – 1.7] per 100 people who inject drugs in prison per year
- 100% of simulations reach WHO target for <2 per 100 person years





Economic benefits of prison NSP scale-up

Compared to status-quo, 2025–2030:

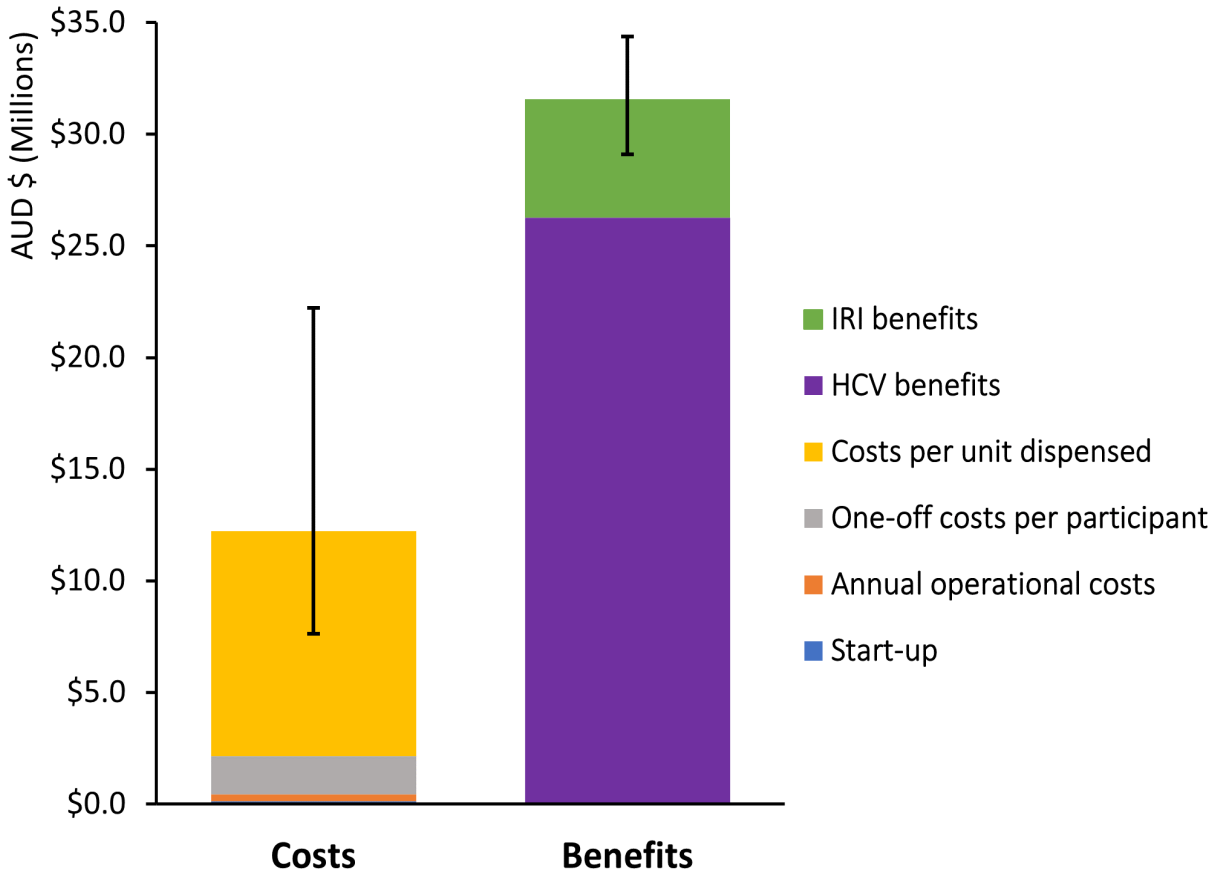
- **Prison NSP costs:** $12.2 [UI: $7.6 – 22.2] million (82% kit distribution)
- **Total benefits:** $31.6 [UI: $29.1 – 34.4] million (83% HCV, 17% IRIs)
- **BCR** = 2.6 [UI: 1.4 – 4.1]

For every dollar spent on prison NSPs, $2.6 could be saved from HCV and IRI treatment costs.

Sensitivity analyses

- Sensitivity to assumed HCV treatment cost: BCR>1 if HCV treatment >~$5k

Costs and associated healthcare savings
Status-quo vs. prison NSP scale-up 2025–2030



Main limitations

- **Intervention costs:** Prison NSP costs were estimated, since they do not currently exist in Australia.
- **Prisons:** The same parameters were used for all prisons, due to limited disaggregated epidemiological and behavioural data.
- **Model structure:** Full complexities of needle sharing behaviours (e.g. injecting networks) or transmission risks (e.g. infection vs reinfection, first vs subsequent incarcerations, shorter vs longer sentences) were not included.
- **Other benefits of prison NSPs not captured:**
  - Severe disease prevented from HCV infections averted
  - Onwards transmission prevented in the community post-release
  - Reduction in HCV outbreak risk in the context of elimination
  - IRI treatment costs exclude low-level infections treated on-site
  - Impact on other BBVs and opportunities to link with treatment / other health services
- **Prison NSP model:** There have been implementation challenges in other settings that could be overcome with design considerations that maximize program participation.

Key takeaways

- In Australia, implementation and scale-up of prison NSP to reach 50% coverage among people who inject drugs in prison by 2030 could prevent 30% of new HCV cases and 17% of IRIs.

- Australia is unlikely to achieve <2 HCV infections per 100 person years among people who inject drugs in prison without a prison NSP. However, this target would be within reach with a prison NSP.

- **Every dollar invested in prison NSPs could save more than two dollars in averted HCV and IRI treatment costs.**
  - This aligns with previous work estimating NSPs in the community in Australia to have BCRs of 1.3-5.5

Thanks

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- Nick Scott

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Thank you

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