

CURRENT AND PROJECTED CASES OF HEPATITIS C CO-INFECTED WITH HIV AMONG AUSTRALIAN INJECTING DRUG USERS: THE IMPACT OF NEEDLE AND SYRINGE PROGRAMS

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BACKGROUND

- The significant burden of HIV and hepatitis C virus (HCV) co-infection is increasingly recognized worldwide.
- Injecting drug use is the most common mode of transmission for HIV and HCV co-infection.
- Monitoring and evaluation of HIV and HCV prevention is a vital element of harm reduction programs.

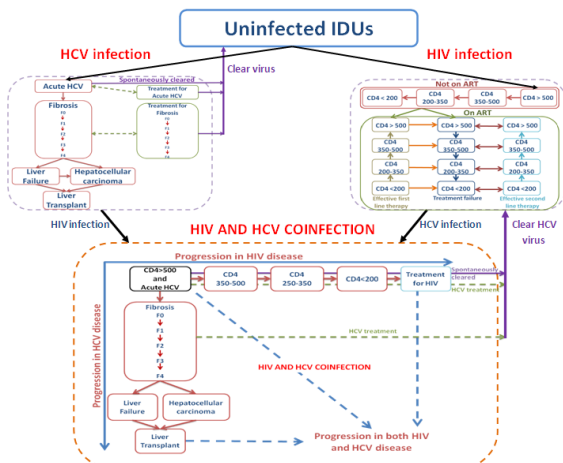
Objectives:

- To estimate the current epidemic of HIV/HCV co-infection among Australian injecting drug users (IDUs).
- To project the epidemiological impact of changes in the distribution of sterile injecting equipment over the period from **2009 to 2018** in Australia.

METHODS

- A mathematical epidemic model was developed to simulate HIV and HCV transmission and disease progression among Australian IDUs (Figure 1).
- The model was used to determine the population-level effectiveness of needle and syringe programs (NSPs) in preventing transmissions of HIV and HCV.
- The model was informed by:
 - Detailed biological data.
 - Australian IDUs behavioral data.
 - Clinical data.
 - Trends in the number of sterile injecting equipment units distributed through NSPs each year (Figure 2).
- The model considered:
 - Heterogeneity in injecting behavior, including frequency of injecting and rates of sharing and cleaning injecting equipment.
 - Entry of new injectors and rate of ceasing injecting.
 - Scenarios: **current** NSP coverage; **50%** current NSP coverage; and **150%** current NSP coverage.
- Mathematical associations between injecting equipment coverage and sharing rates were derived.
- The model is a compartmental model based on 240 ordinary differential equations.
- The model was calibrated to reflect the HIV and HCV epidemiology among Australian IDUs.
- Uncertainty analysis was performed.

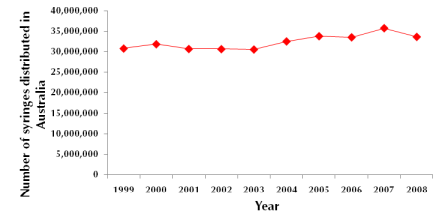
Figure 1. Schematic diagram of HIV and HCV transmission model



METHODS (CONTD.)

Figure 2. Annual number of needles and syringes distributed in Australia (1999-2008)

- ~30 million sterile needles and syringes are distributed each year in Australia.

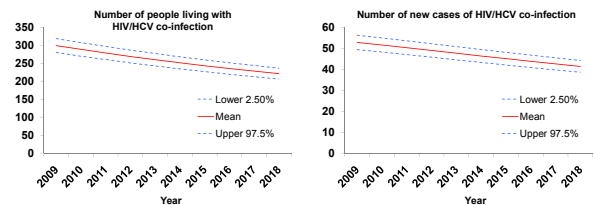


RESULTS

Under current NSP coverage (Figure 3):

- In **2009**, there were:
 - ~**300** IDUs living with HIV/HCV co-infection.
 - ~70% had mild liver disease, 23% had moderate, and 4% had severe liver disease, and 1% had end-stage liver disease (i.e., liver failure, liver cancer).
- 17% of cases had CD4 count below 200 cells/ μ L.
- Over the period **2009-2018**:
 - There would be ~**470** cumulative number of new cases of HIV/HCV co-infection.
 - The number of people living with HIV/HCV co-infection are expected to decline by **26%**.

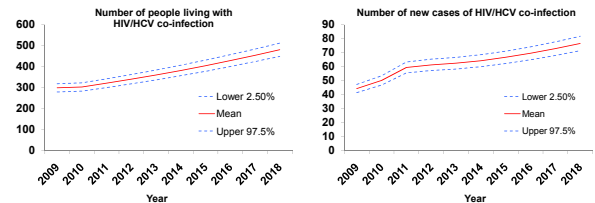
Figure 3. Estimates and projections under NSP coverage



If NSP coverage is reduced by 50% (Figure 4):

- There would be ~**628** cumulative number of new cases of HIV/HCV co-infection over the period 2009-2018.
- The number of people living with HIV/HCV co-infection are expected to increase by **61%**.

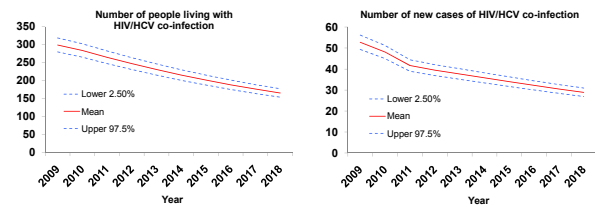
Figure 4. Estimates and projections under 50% current NSP coverage



If NSP coverage is increased by 150% (Figure 5):

- There would be ~**381** cumulative number of new cases of HIV/HCV co-infection over the period 2009-2018.
- The number of people living with HIV/HCV co-infection are expected to decline by **45%**.

Figure 5. Estimates and projections under 150% current NSP coverage



CONCLUSIONS

- Our results highlight the effectiveness of NSPs in reducing the number of HIV/HCV co-infections among Australian IDUs.
- These results have public health implications for at least maintaining the current levels of NSP coverage to mitigate the future burden of co-infection with HIV and hepatitis C.

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