HCV treatment for people who inject drugs: modeling population prevention benefits

Natasha Martin, DPhil
Associate Professor, Division of Infectious Diseases and Global Public Health, University of Bristol
HCV TREATMENT FOR PWID

• HCV treatment highly effective for PWID\textsuperscript{1}
• Yet few are treated
• Concerns about reinfection
• HIV treatment as prevention
  • What about HCV treatment for prevention??

1. Hajarizadeh et al. Lancet Gastro Hep 2018
HCV TREATMENT FOR PWID: TREATMENT AS PREVENTION
EVALUATING HCV TREATMENT AS PREVENTION: A DYNAMIC HCV TRANSMISSION MODEL IS NECESSARY

- Incidence related to prevalence, level of interventions, and risk behavior -> can predict incidence
- As treatment increases, prevalence AND incidence decrease accordingly.
RETHINKING HCV TREATMENT FOR PWID....AS PREVENTION?

Data
- No scale-up from baseline (5 per 1000 PWID annually)
- Scale-up to 10 per 1000 PWID annually
- Scale-up to 20 per 1000 PWID annually
- Scale-up to 40 per 1000 PWID annually
- Scale-up to 80 per 1000 PWID annually

HCV chronic prevalence (%) among PWID

Year

2002 2007 2012 2017 2022 2027

0 10 20 30 40 50 60 70 80 90 100

HCV TREATMENT AS PREVENTION IN U.S. – CHRONIC HCV AMONG PWID

- Increasing epidemic in rural areas (Indiana and Kentucky) compared with stable epidemic in urban (San Francisco).

- Full harm reduction (50% coverage OST and high coverage needle/syringe programs) and treat 50 per 1000 PWID annually - 95% decrease in KY and SF

Fraser H et al. Am J Epidemiol 2019;
Fraser H et al. Addiction 2018
HCV TREATMENT AS PREVENTION IN U.S. – HCV INCIDENCE AMONG PWID

Scott County, Indiana

Perry County, Kentucky

San Francisco

- High incidence (>10 per 100pyrs) in all 3 settings - lowest stable incidence in San Francisco, increasing and much higher in Indiana.
- **Treatment** further decreases incidence as did for prevalence - towards elimination levels in Kentucky and San Francisco, but less so in Indiana because of high incidence

Fraser H et al. Am J Epidemiol 2019;
Fraser H et al. Addiction 2018
HCV TREATMENT FOR PWID: THE ECONOMICS
IS TREATMENT FOR PWID COST-EFFECTIVE?

• Are DAAs cost-effective for PWID?
  • YES - in UK, Australia, Netherlands$^{1-3}$
  • Early DAA treatment for PWID cost-effective compared to delay to cirrhosis$^1$

1. Martin NK et al. J Hepatol 2016
TREATMENT FOR PWID SHOULD BE PRIORITIZED AFTER TREATING CIRRHOTICS

- Traditional thinking is most cost-effective to prioritize by disease stage
- BUT if include prevention benefits, more cost-effective to prioritize early treatment to PWID regardless of liver disease stage, then to form PWID with moderate disease 20%/40% chronic prevalence settings¹

Early treatment vs delay to cirrhosis

Incremental cost-effectiveness ratio (£/QALY gained) of early DAAs

UK willingness-to-pay threshold

20% chronic prevalence among PWID
40% chronic prevalence among PWID
60% chronic prevalence among PWID

£1 = USD $1.30

Martin NK et al. J Hepatol 2016
HCV TREATMENT FOR PWID:
RETHINKING REINFECTION
REINFECTIONS

• Some reinfections will occur
• Reinfection is not all bad news (means we are treating the population truly at risk of transmission)
• Key is providing harm reduction to prevent reinfection, retest, retreat
IMPACT OF OPIATE SUBSTITUTION THERAPY (OST) ON HCV INCIDENCE: COCHRANE REVIEW

OVERALL: 50% reduction in risk of HCV

Platt L et al. Cochrane Database Syst Rev 2017
IMPACT OF HIGH COVERAGE NEEDLE/SYRINGE PROGRAMS (NSP) & OST ON HCV INCIDENCE: COCHRANE REVIEW

OVERALL: Reduced HCV incidence by 71%

Platt L et al. Cochrane Database Syst Rev 2017
RETESTING AND RETREATMENT CRITICAL TO MAINTAINING IMPACT, HARM REDUCTION CAN HELP

- If no retreatment, HCV epidemic can rebound due to reinfection in Scott County, IN
- Harm reduction (OST and NSP) can maintain impact

Fraser H et al, Addiction 2017
INCARCERATED POPULATIONS
HCV SCREENING/TREATMENT IN PRISONS COULD BE HIGHLY EFFECTIVE AND COST-EFFECTIVE

United States

- Prison treatment for 80% infected PWID prison entrants with sentences >12 weeks could halve chronic prevalence and incidence among PWID in 15 years


United States

UK

- Community treatments only after 2015
- Continuing status quo with DAA (10.4 per 1000 incarcerated PWID)
- Treat 80% infected PWID prison entrants with sentence lengths >16 weeks
- Treat 80% infected PWID prison entrants with sentence lengths >12 weeks

Martin NK et al. Hepatology 2016
CONCLUSIONS

• HCV treatment for PWID could prevent transmission and reduce HCV incidence
• DAA treatment for PWID is cost-effective, despite reinfection
• Prioritization strategies should prioritize both by liver disease AND risk (e.g. early treatment for PWID economically beneficial because of prevention benefits)
• Reinfection not all bad, means treating the right people (those at risk of transmission)
  – Need to retest/retreat/provide harm reduction
• Treatment of incarcerated populations (many PWID) may have substantial benefits on prevention in the community
ACKNOWLEDGEMENTS

• University of Bristol
  – Matthew Hickman
  – Peter Vickerman
  – Hannah Fraser
  – Zoe Ward
  – Jack Stone
  – Aaron Lim

• UCSD
  – Annick Borquez
  – Javier Cepeda

• Glasgow Caledonian University
  – Sharon Hutchinson
  – David Goldberg

• NHS Tayside
  – John Dillon

• LSHTM
  - Alec Miners

• Queen Mary’s
  - Graham Foster

• UNSW
  - Greg Dore
  - Jason Grebely
  - Lisa Maher
  - Jenny Iversen

• Burnet Institute
  - Margaret Hellard
  - Nick Scott

FUNDERS: NIH (NIAID/NIDA), NIHR