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# EPIToPe - HCV prevention Among People who Inject Drugs

Matt Hickman, Sharon Hutchinson, John Dillon

# Acknowledgements & Disclosure/CoI


- National Institute for Health Research (NIHR) Programme Grants for Applied Research programme (RP-PG-0616-20008) – EPIToPe – [Ethics:18/ES/0128; Trial Reg:ISRCTN72038467]
- NIHR Health Protection Research Unit in Behavioural Science and Evaluation of Interventions
- Public Health Scotland: HCV Action Plan
- European Commission Drug Prevention and Information Programme (DIPP) "Treatment as Prevention in Europe: Model Projections [JUST/2013/DPIP/AG/4812]
- NIHR (HS&DR) (12/3070/13) - Assessing the impact and cost-effectiveness of NSP
- Extending HCV community care pathways in Tayside [ERADICATE C, ISRCTN27564683, Super DOT C Trial NCT02706223).
- MH received honoraria from Gilead and MSD in last 3 years

**The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.**

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# Primary Prevention

Cochrane Library

Cochrane Database of Systematic Reviews

**Needle syringe programmes and opioid substitution therapy for preventing hepatitis C transmission in people who inject drugs (Review)**

Platt L, Minozzi S, Reed J, Vickerman P, Hagan H, French C, Jordan A, Degenhardt L, Hope V, Hutchinson S, Maher L, Palmateer N, Taylor A, Bruneau J, Hickman M

ADDICTION

SSA SOCIETY FOR THE STUDY OF ADDICTION

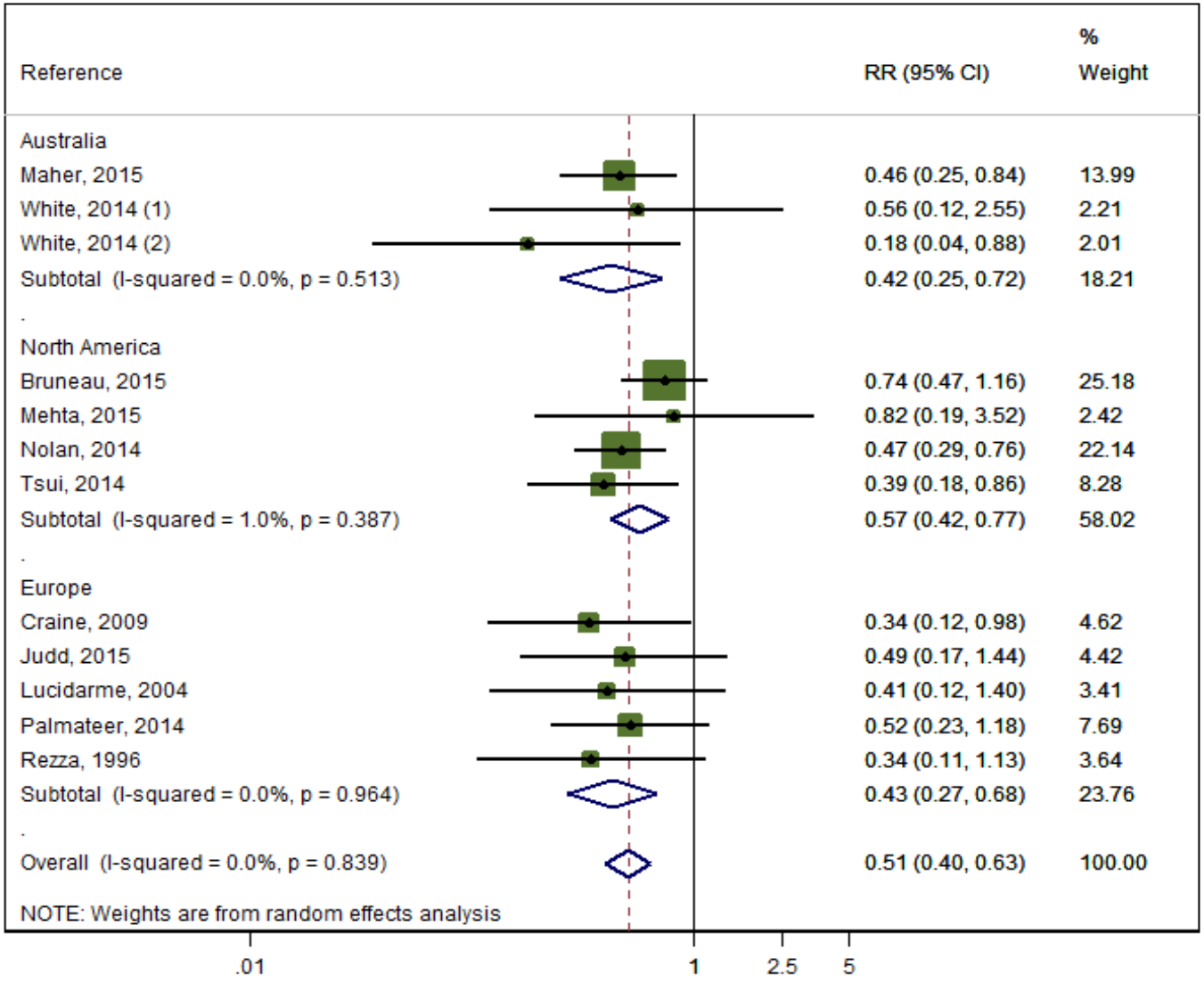
HCV PREVENTION

doi:10.1111/add.14012

**Needle and syringe programmes and opioid substitution therapy for preventing HCV transmission among people who inject drugs: findings from a Cochrane Review and meta-analysis**

Lucy Platt[1], Silvia Minozzi[2], Jennifer Reed[3], Peter Vickerman[4], Holly Hagan[3], Clare French[4], Ashly Jordan[3], Louisa Degenhardt[5], Vivian Hope[6], Sharon Hutchinson[7], Lisa Maher[8], Norah Palmateer[7], Avril Taylor[9], Julie Bruneau[10] & Matthew Hickman[4]

# Impact of current OST exposure (adjusted estimates)



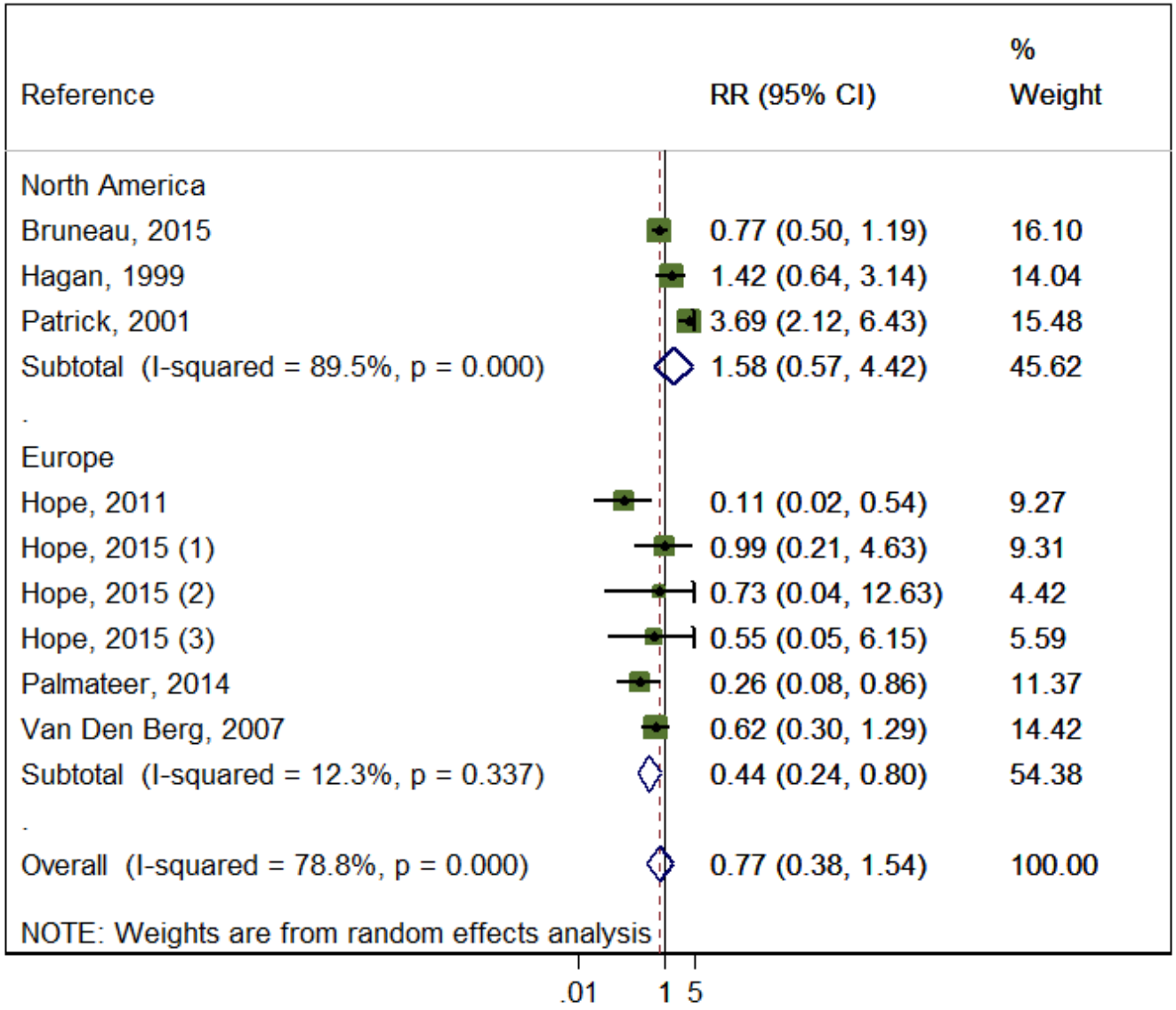

- 12 studies:
- 6361 participants
- 1030 HCV cases

- **50% reduction** in risk of HCV

- Little heterogeneity

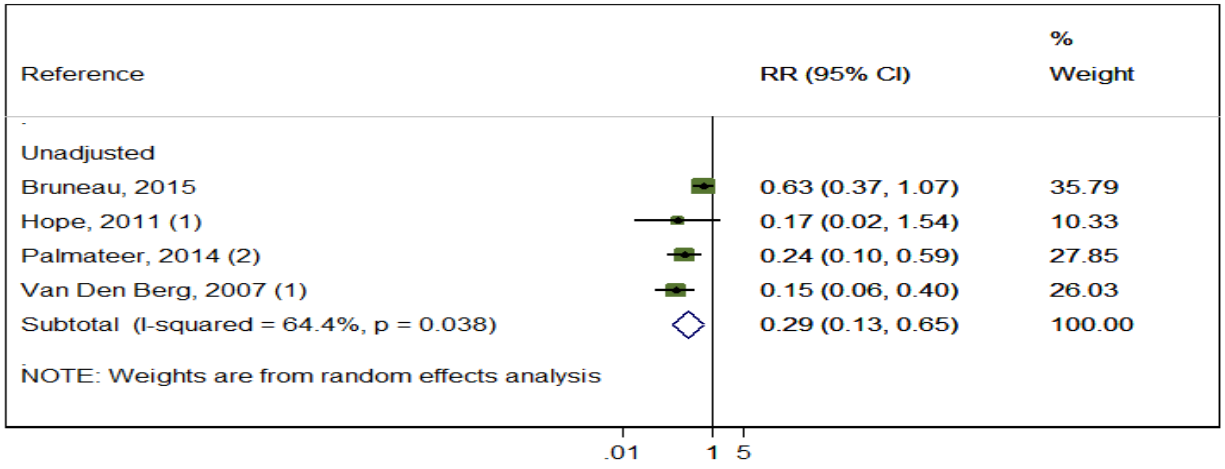
- GRADE: Low Evidence.

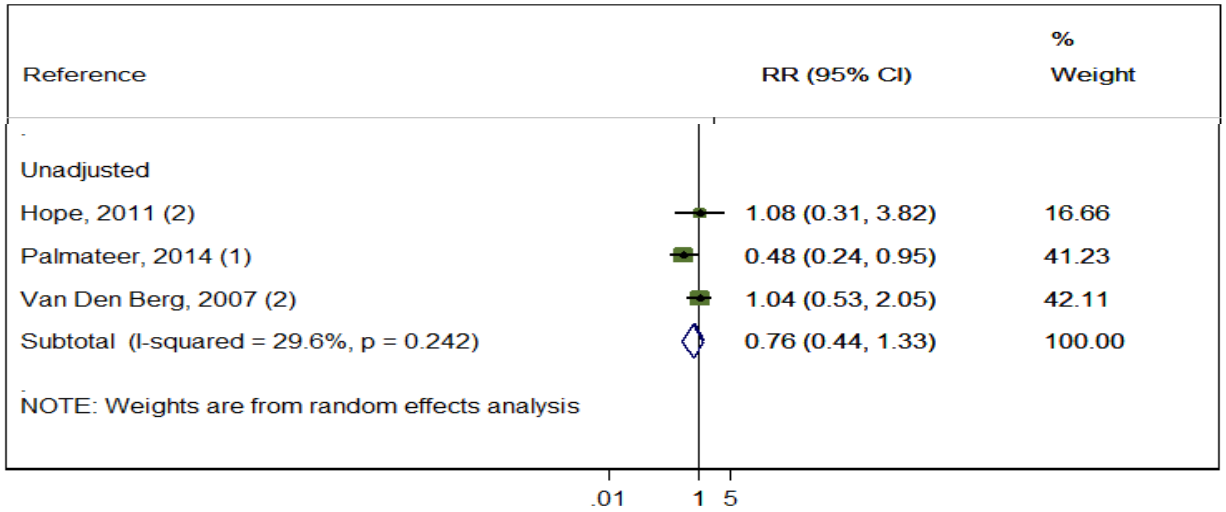
# Impact of high NSP by region (unadjusted analyses)




- 7 studies
- High heterogeneity ($I^2$=79%)
- Weak evidence overall – RR 0.77
- In Europe NSP associated with 66% reduction in HCV
- Grade: very low evidence

# Impact of NSP and OST




**High NSP with OST**

- 4 studies
- 3356 participants
- 518 HCV cases
- **Reduced HCV by 71%**
- moderate heterogeneity

**Low NSP with OST**

- 3 studies
- 3071 participants
- 449 HCV cases,
- **Reduced HCV by 24%**

- GRADE: low evidence

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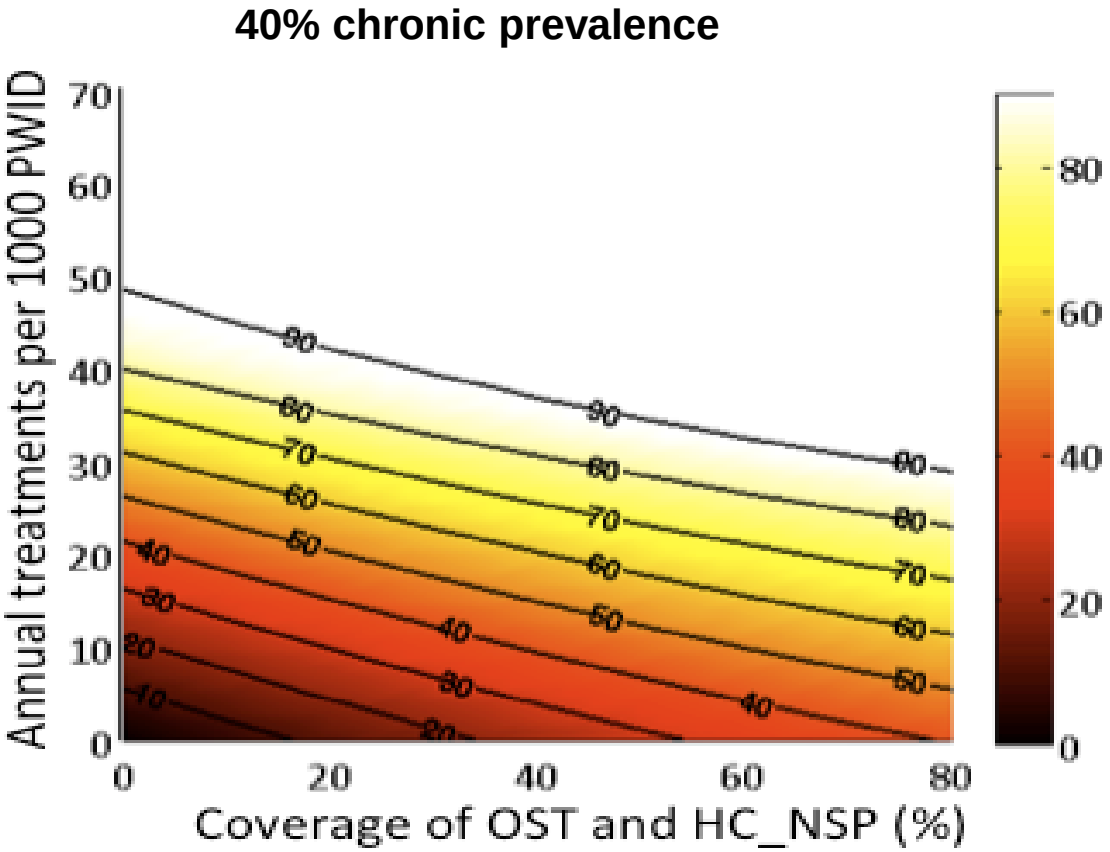
# MODELLING HCV TREATMENT AS PREVENTION

# COMBINATION PREVENTION SCALE-UP:
## 10 YEAR RELATIVE PREVALENCE REDUCTIONS WITH NO BASELINE COVERAGE OF OST/NSP AND USING DAAs




- Dark red: modest (<20%) impact, high HCV
- Orange: ~50% impact
- White: >80% impact
- >40% reduction requires HCV treatment
- OST&NSP increases benefit of HCV treatment

Martin NK, Hickman M, Hutchinson SJ, Goldberg DJ, and Vickerman P. C. Clinical Infectious Diseases 2013

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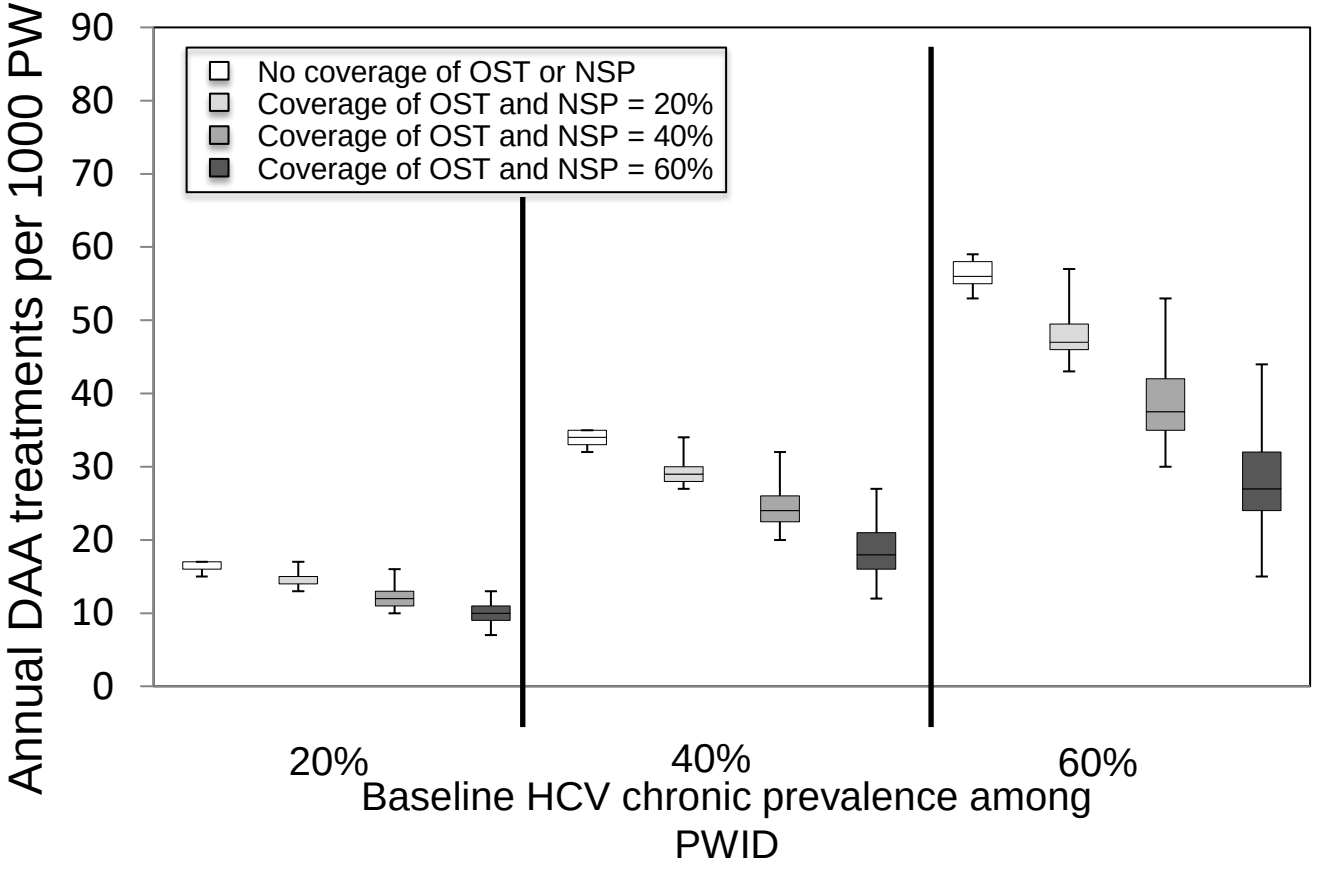
## **GENERAL SCENARIOS:** COMBINATION INTERVENTION REQUIRED TO REDUCE INCIDENCE AMONG PWID BY 90%, 2017-2030




- Stable epidemics, 12 year injecting duration
- <60 per 1000 PWID treated annually without harm reduction
- With harm reduction, could reduce to <40 per 1000 PWID annually

Preliminary work based on Martin NK et al. CID 2013

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Research Article

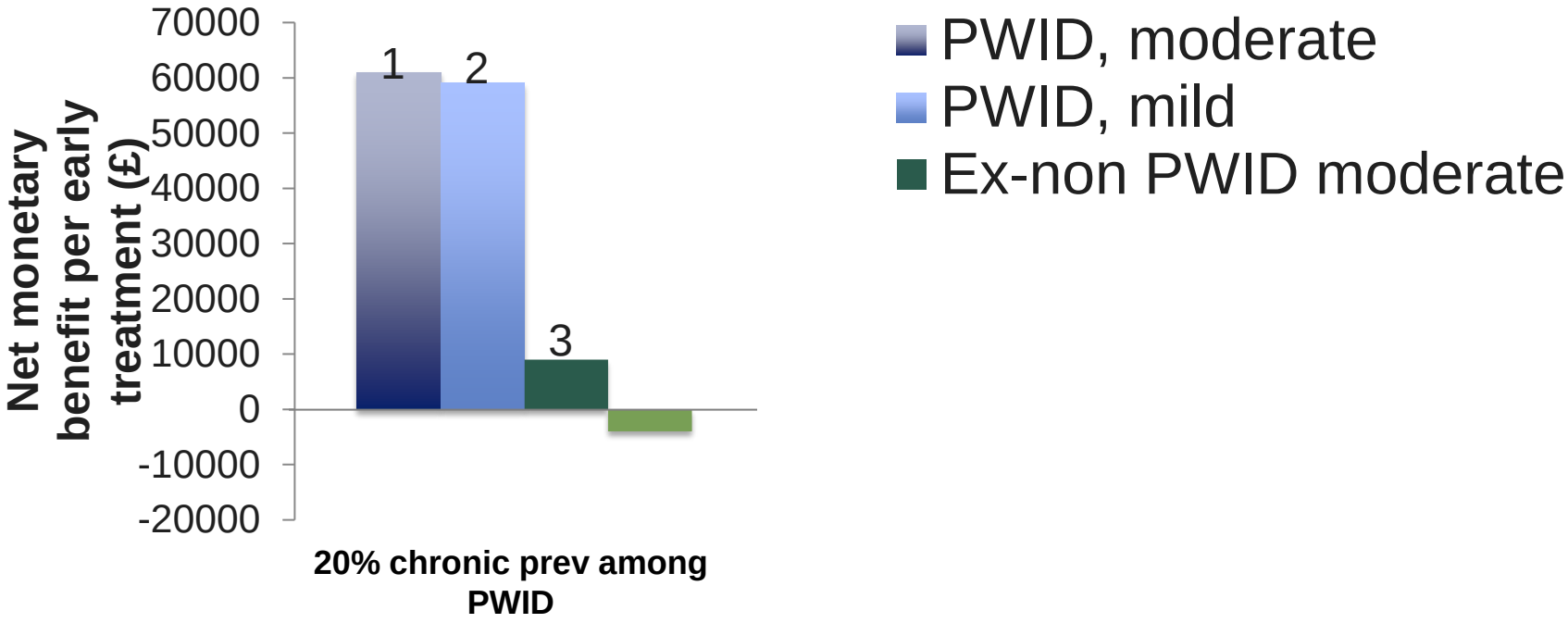

EASL JOURNAL OF HEPATOLOGY

# Prioritization of HCV treatment in the direct-acting antiviral era: An economic evaluation

Natasha K. Martin[1,2,*], Peter Vickerman[2], Gregory J. Dore[3], Jason Grebely[3], Alec Miners[4], John Cairns[4], Graham R. Foster[5], Sharon J. Hutchinson[6,7], David J. Goldberg[6,7], Thomas C.S. Martin[8], Mary Ramsay[9], the STOP-HCV Consortium, Matthew Hickman[2]

[1]*Division of Global Public Health, University of California San Diego, San Diego, USA;* [2]*School of Social and Community Medicine, University of Bristol, UK;* [3]*Kirby Institute, UNSW Australia, Sydney, Australia;* [4]*Faculty of Public Health and Policy, London School of Hygiene and Tropical Medicine, UK;* [5]*Queen Mary's University of London, UK;* [6]*Glasgow Caledonian University, UK;* [7]*Health Protection Scotland, UK;* [8]*Guy's and St Thomas's NHS Foundation Trust, London, UK;* [9]*Public Health England, UK*

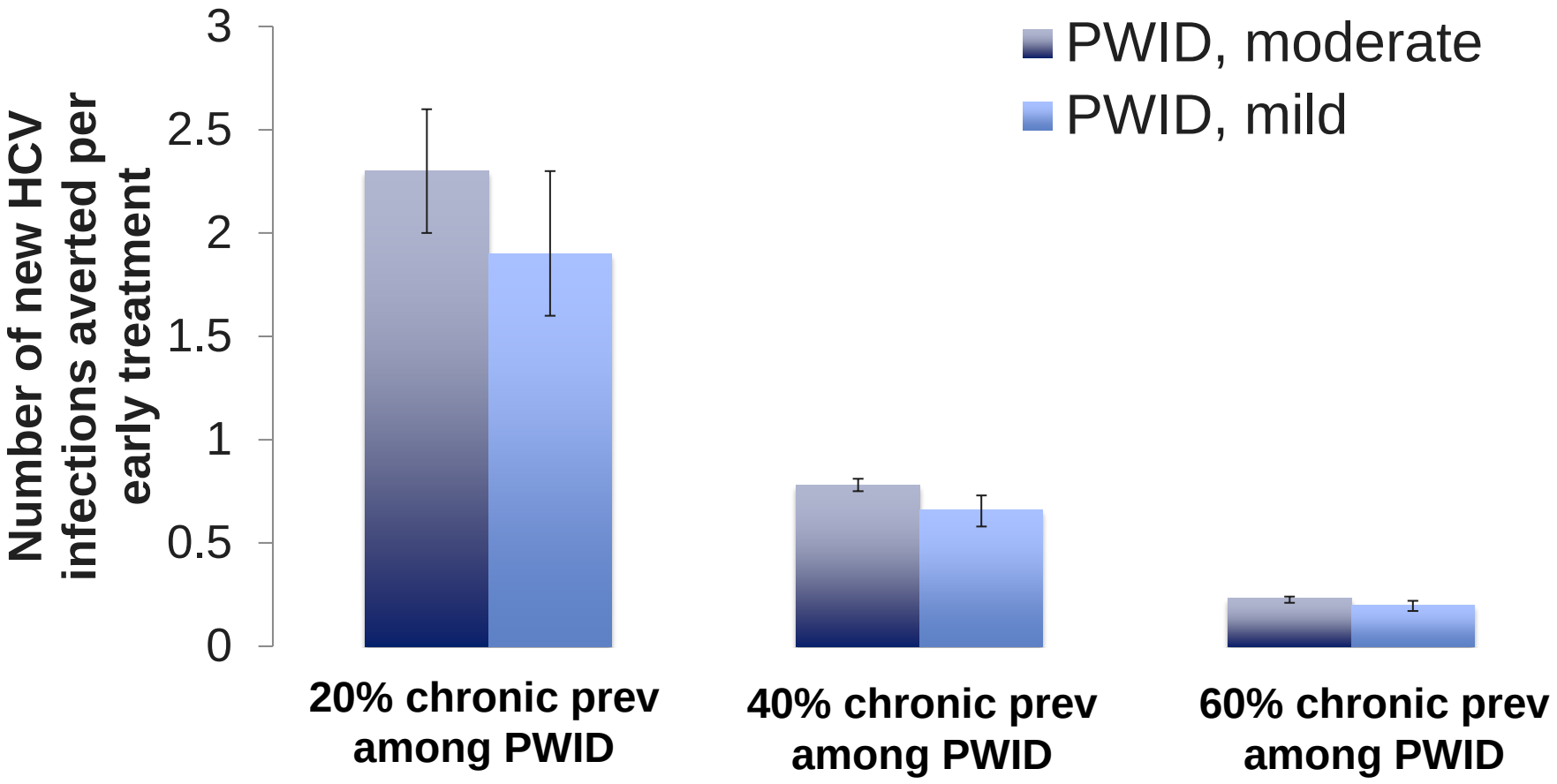
# MORE COST-EFFECTIVE TO PRIORITIZE EARLY TREATMENT FOR PWID INSTEAD OF BY STAGE IN 20/40% PREV SETTINGS




*£20,000 willingness to pay.
Martin NK et al. J Hepatol 2016: 65(1):17-25.

**Economic modeling supports treatment for and prioritization of PWID – essential for achieving elimination targets**

# NUMBER OF NEW INFECTIONS AVERTED PER EARLY TREATMENT




Martin NK et al. J Hepatology 2016

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# ARE CURRENT HCV TREATMENT RATES SUFFICIENT?

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ARTICLE IN PRESS

Research Article
Viral Hepatitis

JOURNAL OF HEPATOLOGY

# Model projections on the impact of HCV treatment in the prevention of HCV transmission among people who inject drugs in Europe

Hannah Fraser[1,*], Natasha K. Martin[2,1], Henrikki Brummer-Korvenkontio[3], Patrizia Carrieri[4,5], Olav Dalgard[6,7], John Dillon[8], David Goldberg[9], Sharon Hutchinson[10,9], Marie Jauffret-Roustide[11,12], Martin Kåberg[13], Amy A. Matser[14,15], Mojca Matičič[16,17], Havard Midgard[6], Viktor Mravcik[18,19,20], Anne Øvrehus[21], Maria Prins[14,22], Jens Reimer[23,24], Geert Robaeys[25,26,27], Bernd Schulte[24], Daniela K. van Santen[14], Ruth Zimmermann[28], Peter Vickerman[1,†], Matthew Hickman[1,†]

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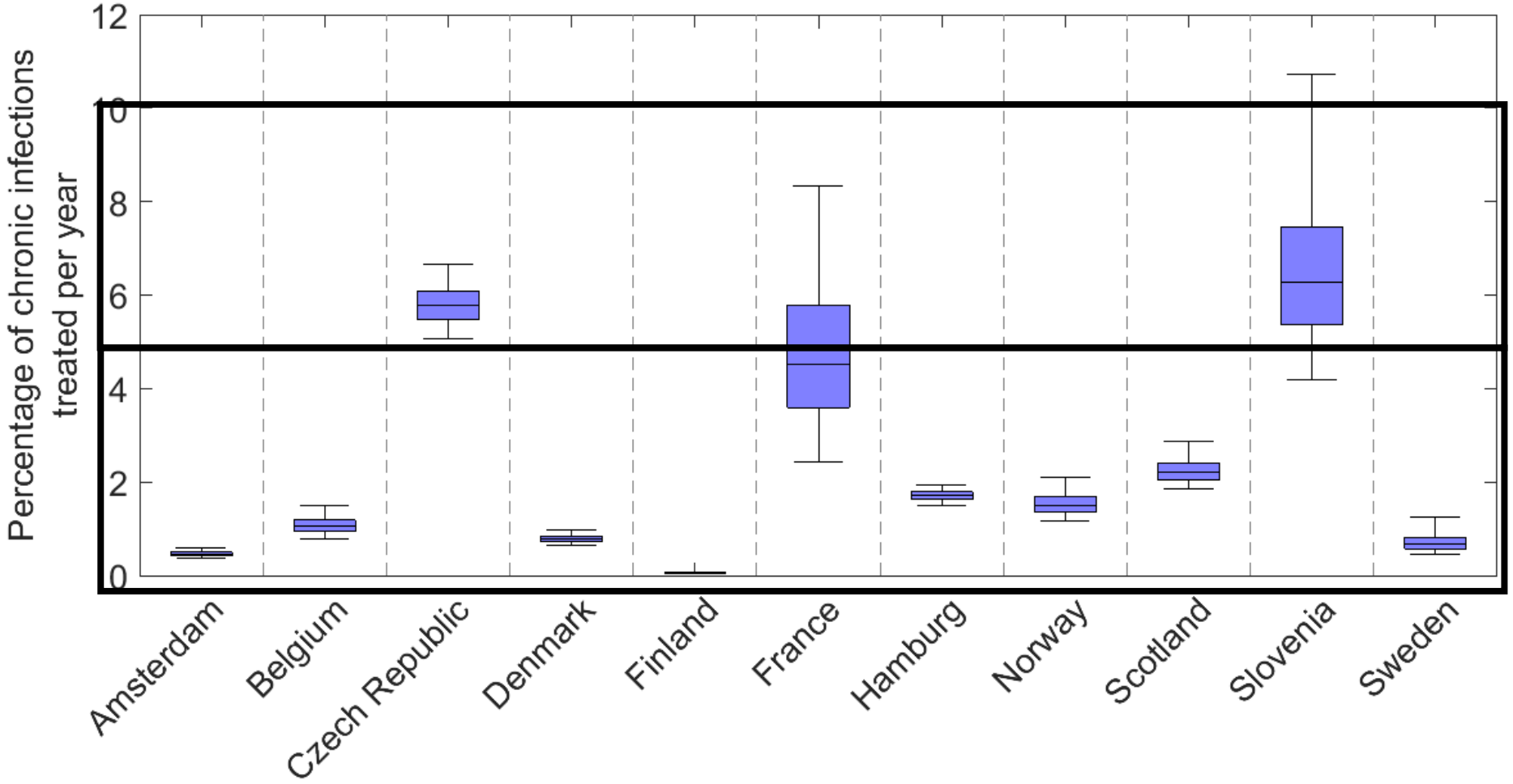
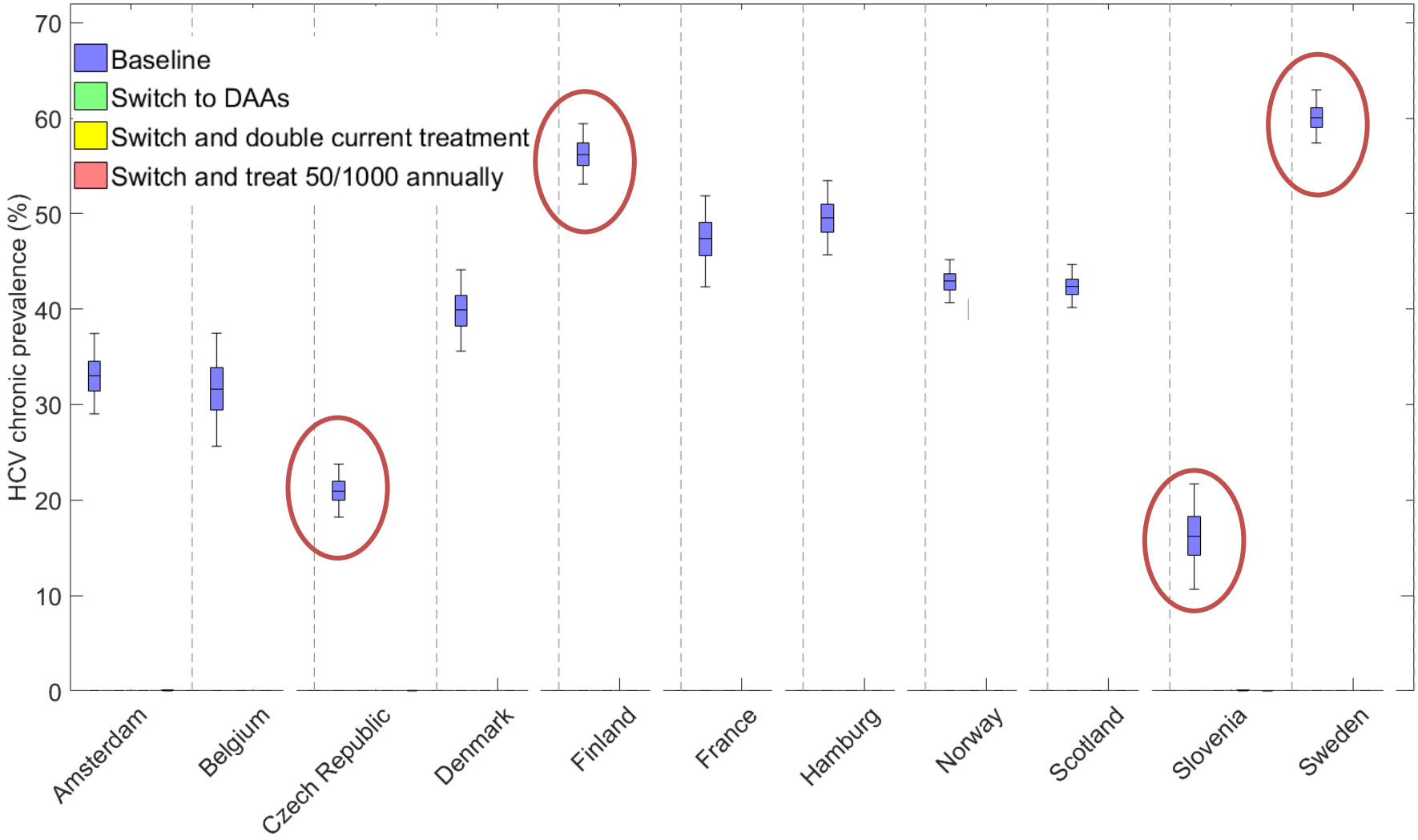
# % of estimated PWID with chronic infections treated at baseline (2015/16)




bristol.ac.uk

Fraser et al, (2017) *Journal of Hepatology*

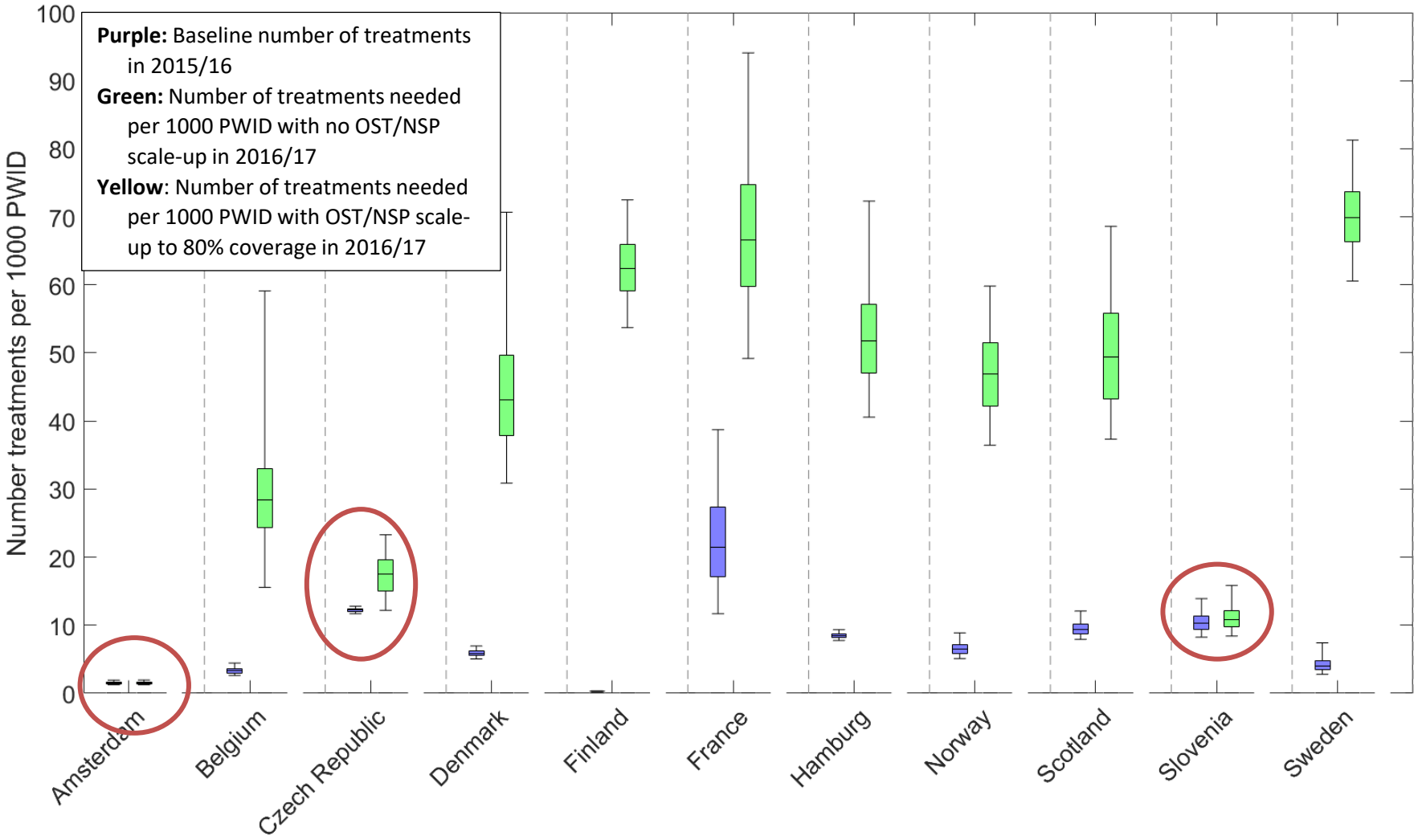
# Baseline chronic prevalence






Fraser et al, (2017) *Journal of Hepatology*

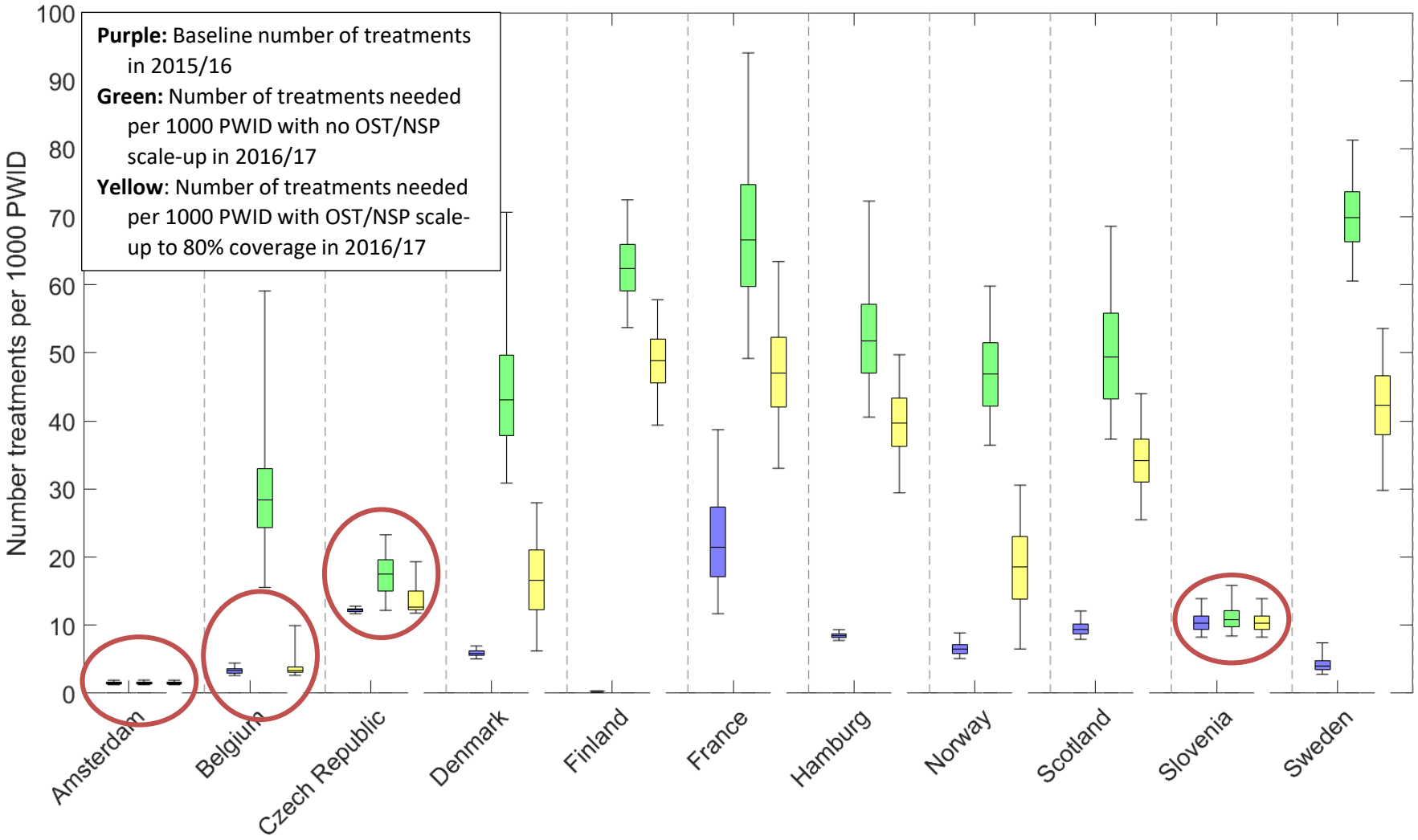
# Treatment needed per 1000 PWID to reduce HCV to 2 per 100pyrs by 2026






Fraser et al, (2017) *Journal of Hepatology*, In press

# Treatment needed per 1000 PWID to reduce HCV to 2% by 2026 IF scale-up OST/NSP






Fraser et al, (2017) *Journal of Hepatology*

EPIToPe
Evaluating the Population Impact of Hepatitis C DAA Treatment as Prevention for PWID

**NIHR Programme (**Evaluating the **P**opulation **I**mpact of Hepatitis C Direct Acting Antiviral **T**reatment as Prevention f**or** **P**eople Who Inject Drugs**)**

Funded by NHS National Institute for Health Research

# Investigators and Collaborators

Matt Hickman, Sharon Hutchinson, John Dillon, Daniela De Angelis, Lawrie Elliott, Graham Foster, David Goldberg, Natasha Martin, Ann Eriksen, Peter Donnan, Sema Mandal, Peter Vickerman, William Hollingworth, David Liddell, Paul Flowers, Samreen iljaz, Magdalena Harris, Viv Hope, Zoe Ward, Ross Harris, Mary Ramsay, Anne Presanis, Ruth Simmons, Katy Sinka, Stephanie Migchelsen, Rachel Glass, Helen Harris, Chris Metcalfe, Athene Lane, David Whiteley, Andrew McAuley, Rebekah Moore, Norah Palmateer, Hamish Innes, Rory Gunson, Lesley Graham, Kate Drysdale, Hannah Fraser, Sarah Inglis, Jade Meadows, Gaby Vojt

Health Protection Scotland

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

Public Health England

Open access Protocol

BMJ Open

## Evaluating the population impact of hepatitis C direct acting antiviral treatment as prevention for people who inject drugs (EPIToPe) – a natural experiment (protocol)

Bristol Randomised Trials Collaboration

Barts and The London School of Medicine and Dentistry

LIVERPOOL JOHN MOORES UNIVERSITY

TASC TAyside medical Science Centre

http://www.bristol.ac.uk/population-health-sciences/projects/epitope/

MRC Biostatistics Unit

SDF Scottish Drugs Forum

University of Dundee

GCU Glasgow Caledonian University
University for the Common Good

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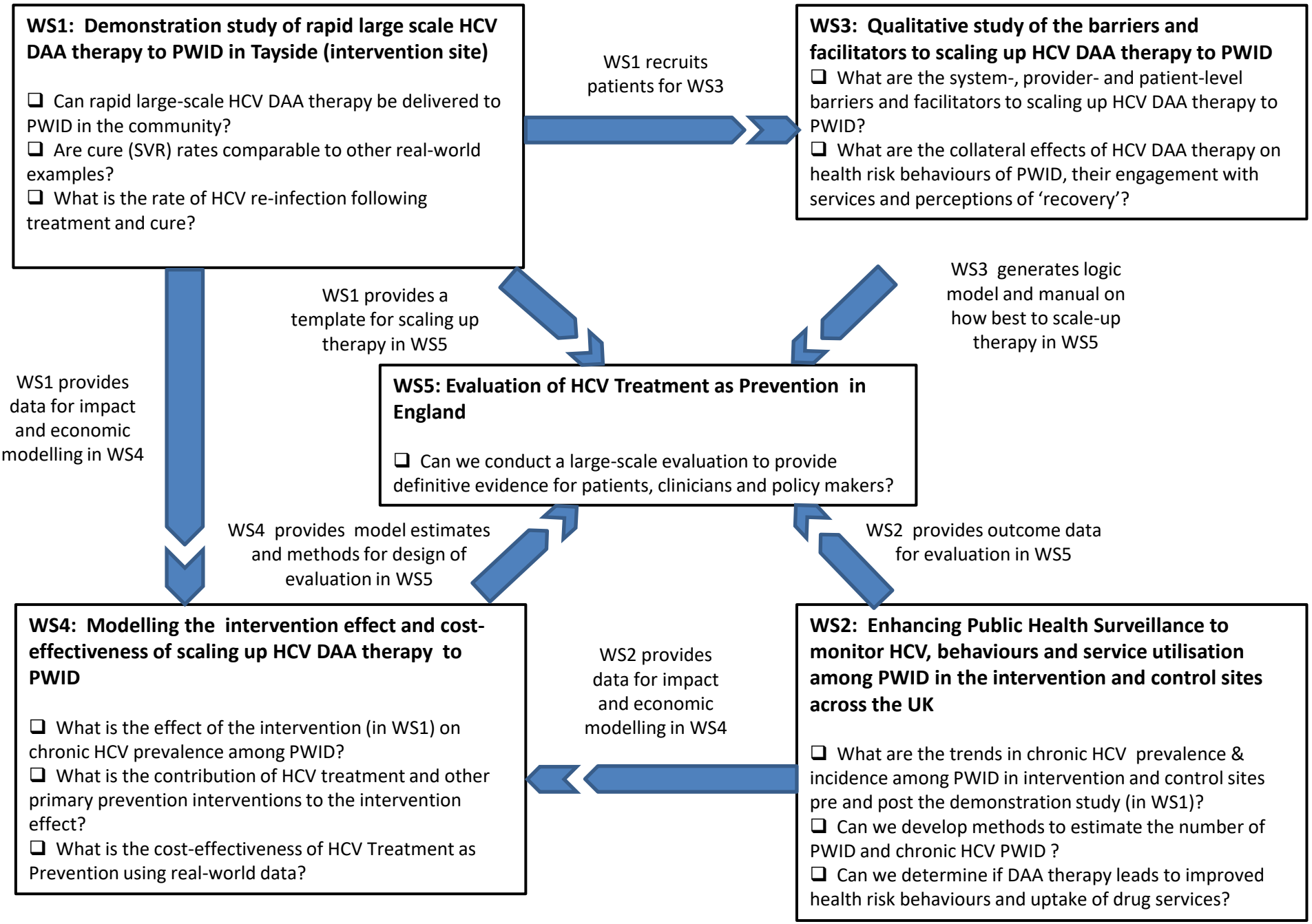
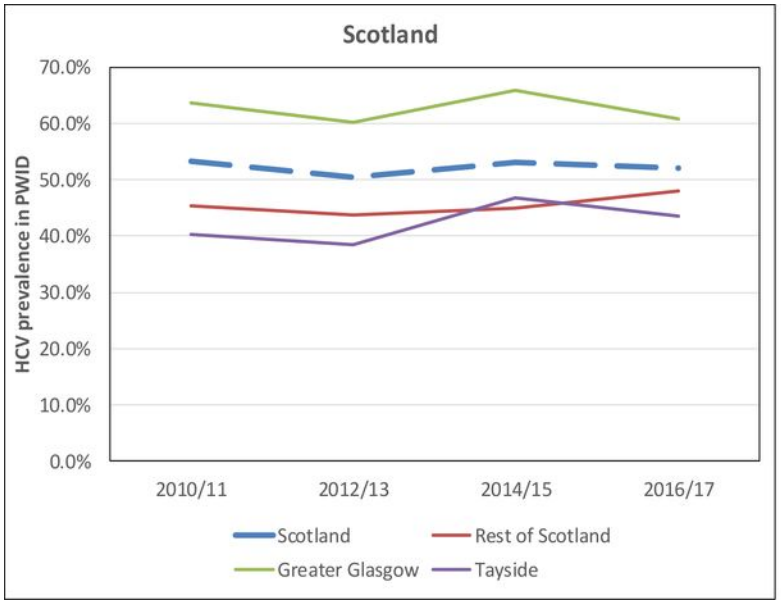
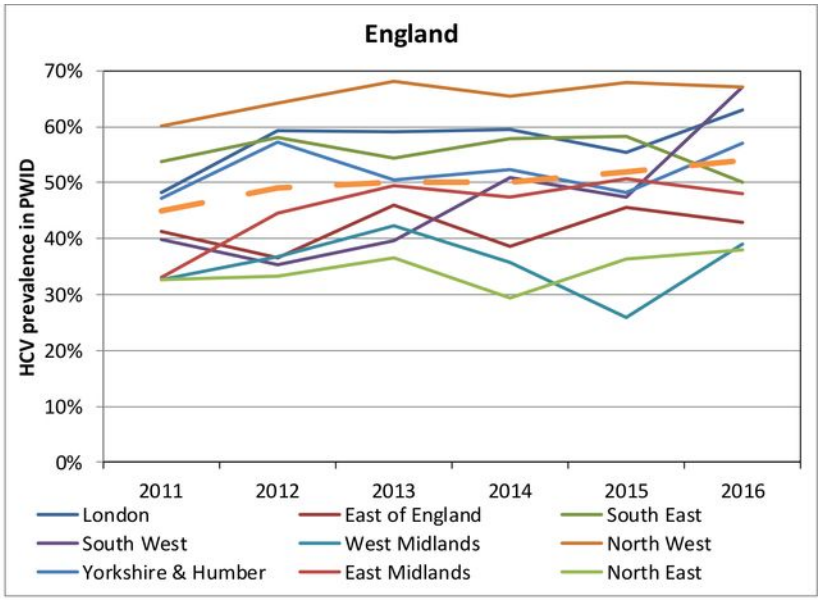
**EPIToPe Programme (E**valuating the **P**opulation **I**mpact of Hepatitis C Direct Acting Antivral **T**reatment as Prevention f**or** **Pe**ople Who Inject Drugs**)**



# Trends in HCV antibody prevalence among PWID in Scotland and England 2010/2011 to 2016.



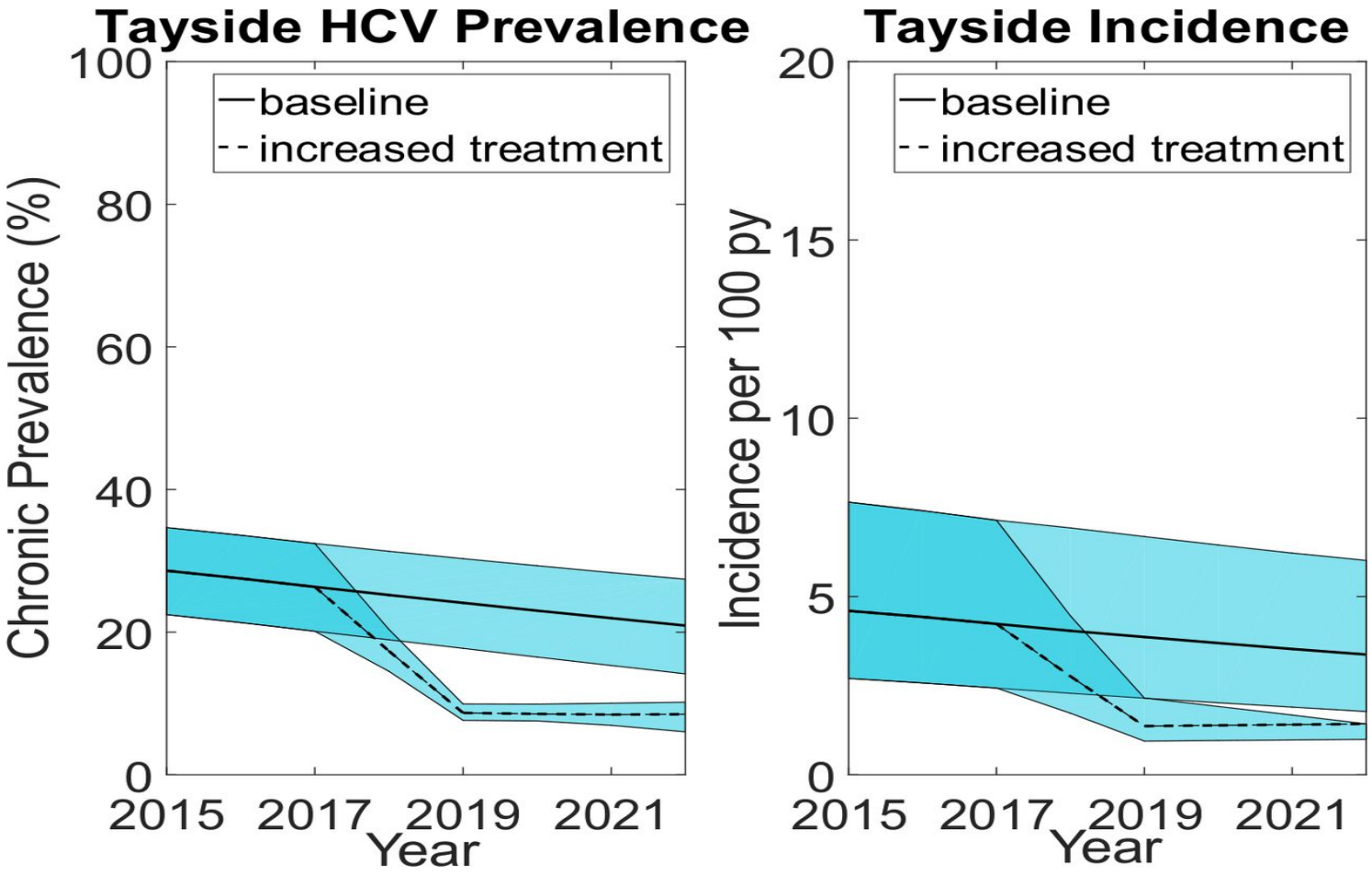




**Matthew Hickman et al. BMJ Open 2019;9:e029538**



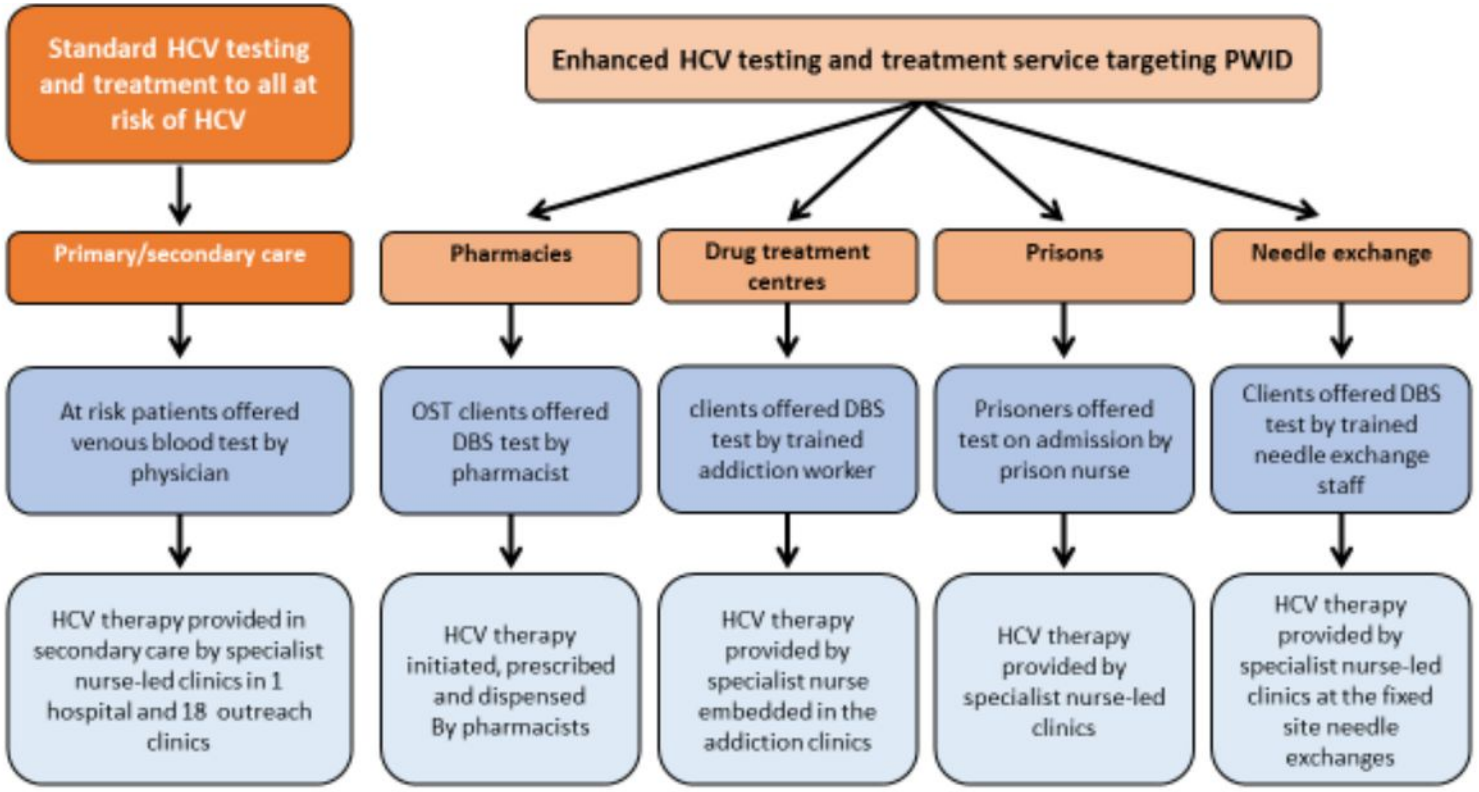
BMJ Open

**Projected chronic HCV prevalence and incidence among PWID in Tayside with and without the intervention.**




Ho: Rapid-scale up - over 2 years from 2017/2018 of at least 500 HCV treatments in PWID will reduce chronic HCV prevalence to ~10% (>60% reduction) and reduce HCV incidence to ~1.4 p100py).

**Overview of HCV testing and treatment pathways for the PWID population in NHS Tayside.**




PWID defined as those who either (a) are currently injecting drugs, (b) have ever injected drugs and are currently on opioid substitute therapy, or (c) have ever injected drugs and are currently in prison

DBS: dried blood spot; OST: opioid substitution therapies; PWID: people who inject drugs

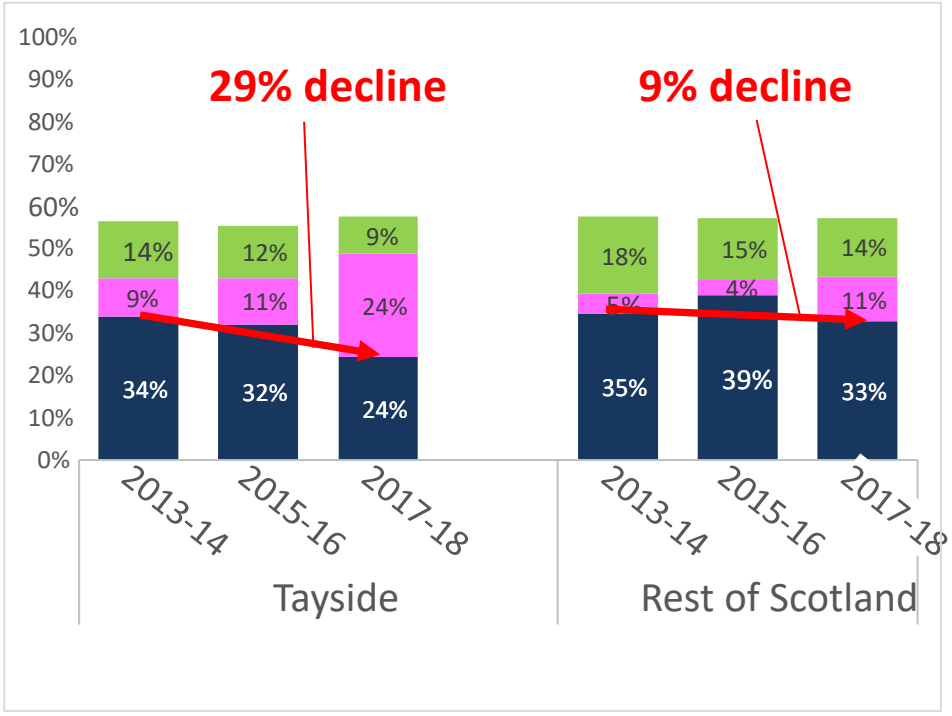
Target Reached ahead of schedule:– 555 patients treated on 583 occasions by September 2019 and to date >730 HCV Rx

# EMERGING EVIDENCE

# Estimates of chronic and cleared HCV infection among PWID in Scotland*

(*missing Ab and RNA data have been imputed)

## All PWID




Chronic HCV

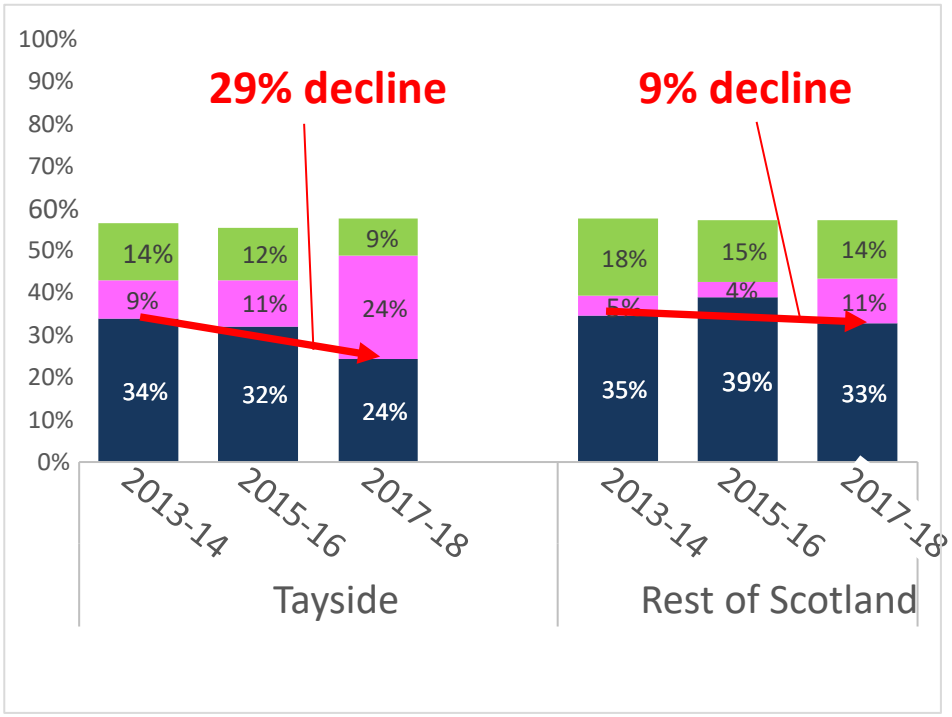
Cleared HCV, with evidence of therapy

Cleared HCV, no evidence of therapy

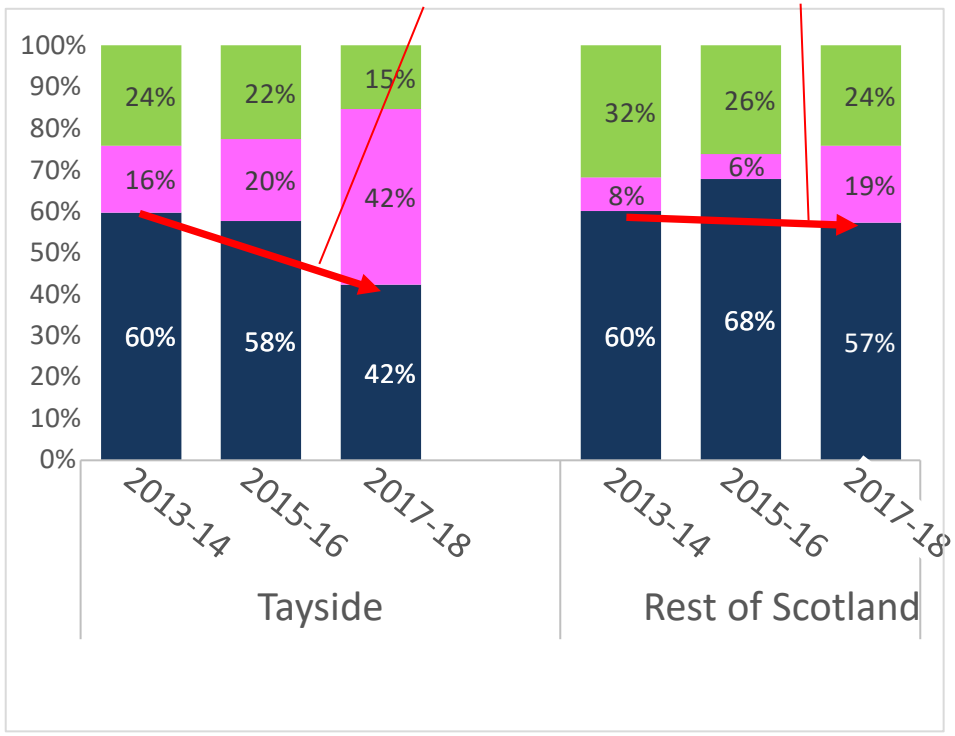
# Estimates of chronic and cleared HCV infection among PWID in Scotland*

(*missing Ab and RNA data have been imputed)

## All PWID




## Antibody positive PWID



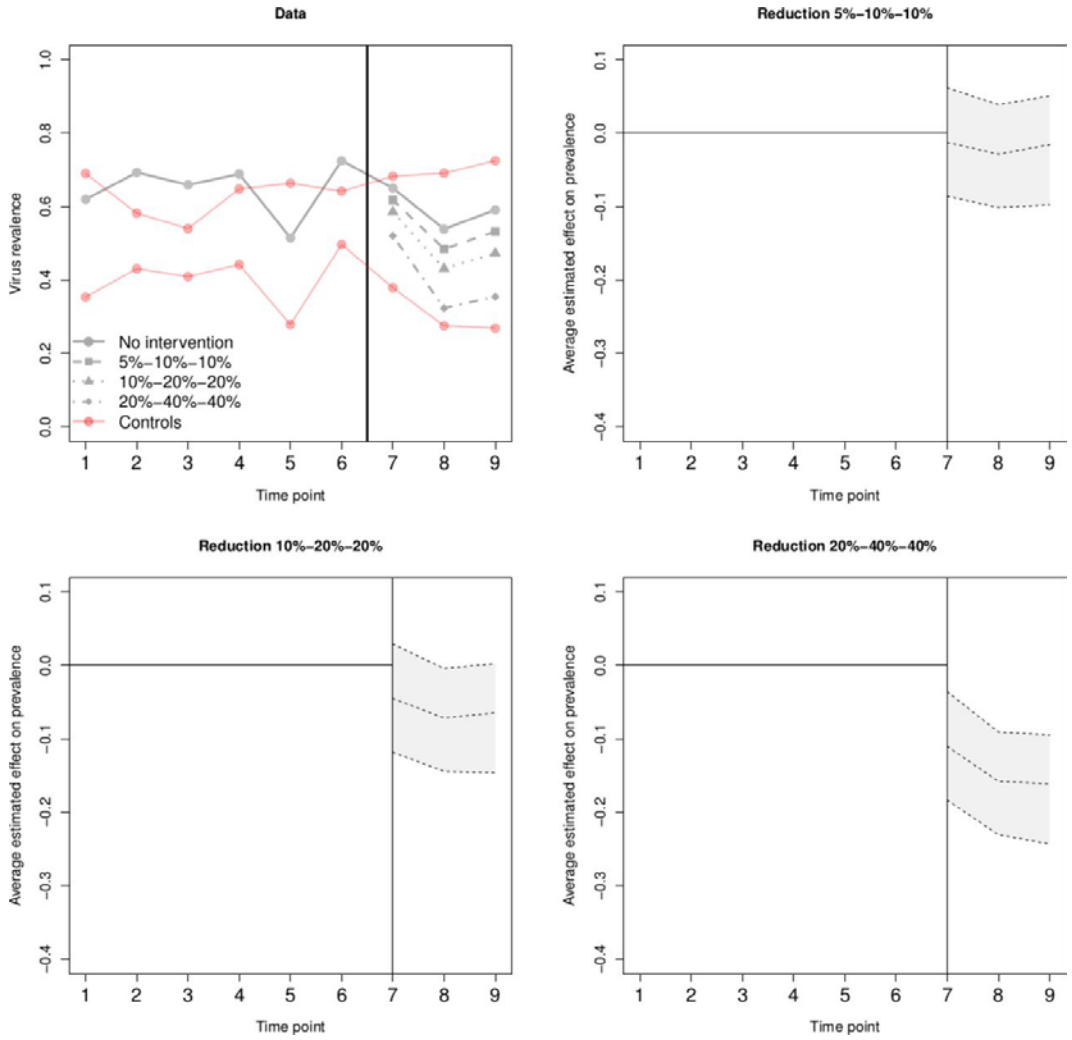

Chronic HCV

Cleared HCV, with evidence of therapy

Cleared HCV, no evidence of therapy

Norah Palmateer REDUCTION IN THE POPULATION PREVALENCE OF HCV VIRAEMIA AMONG PWID…. : REAL WORLD DATA (Addiction under review)

# Causal impact synthetic control method (CIM) simulation and estimated intervention effects and 95% credible intervals for a range of assumed effects.




A Bayesian multivariate factor analysis model for evaluating an intervention by using observational time series data on multiple outcomes. Pantelis Samartsidis et al. JRSSA 2020 doi.org/10.1111/rssa.12569;
Evaluating the power of the causal impact method in natural experiments of HCV treatment as prevention. 'Statistical communications in infectious diseases': under review

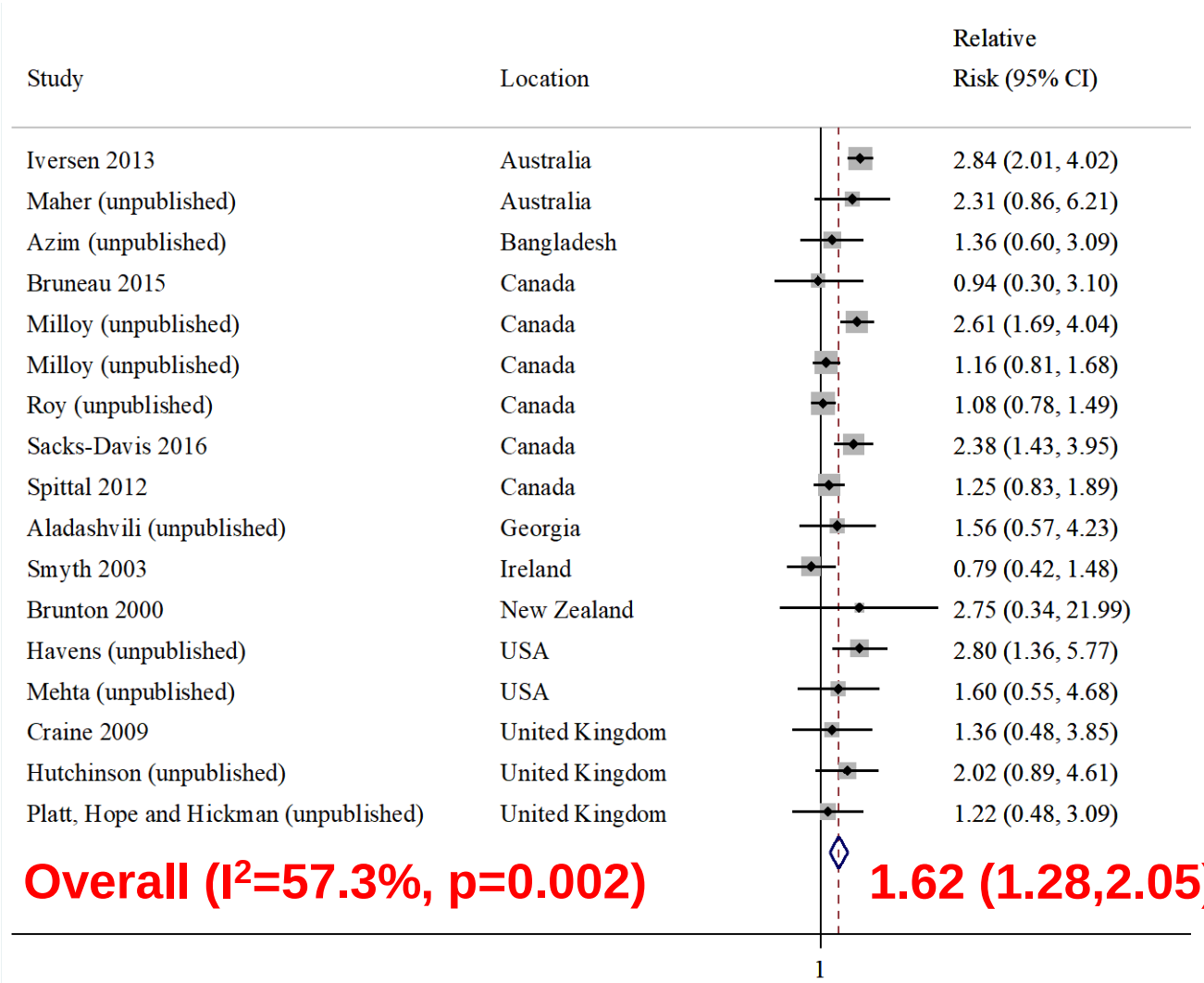
# Next Steps

- Evaluate HCV TasP in Tayside
  - Synthetic control analysis
  - Infectious Disease & Economic Model
  - Qualitative studies of scaling up – manual
  - Qualitative accounts of opioid use disorder treatment outcomes post SVR
- Evaluate HCV TasP in England
  - New protocol – emulate step wedge trial design

# Modelling the impact of incarceration and prison-based hepatitis C virus (HCV) treatment on HCV transmission among people who inject drugs in Scotland

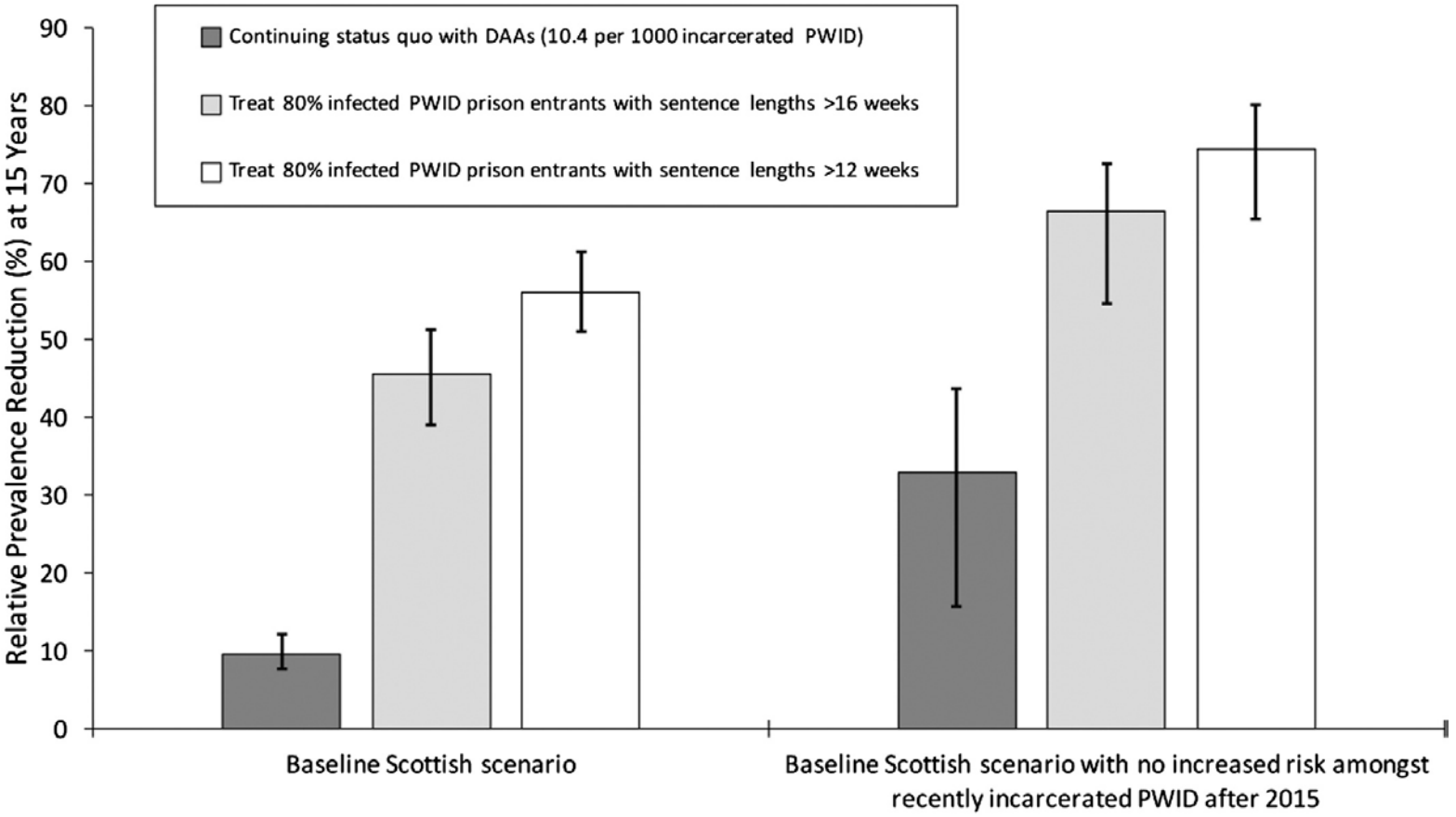
Jack Stone, Peter Vickerman, Sharon Hutchinson, Matt Hickman et al

# Recent incarceration associated with increased risk of HCV/HIV acquisition among PWID



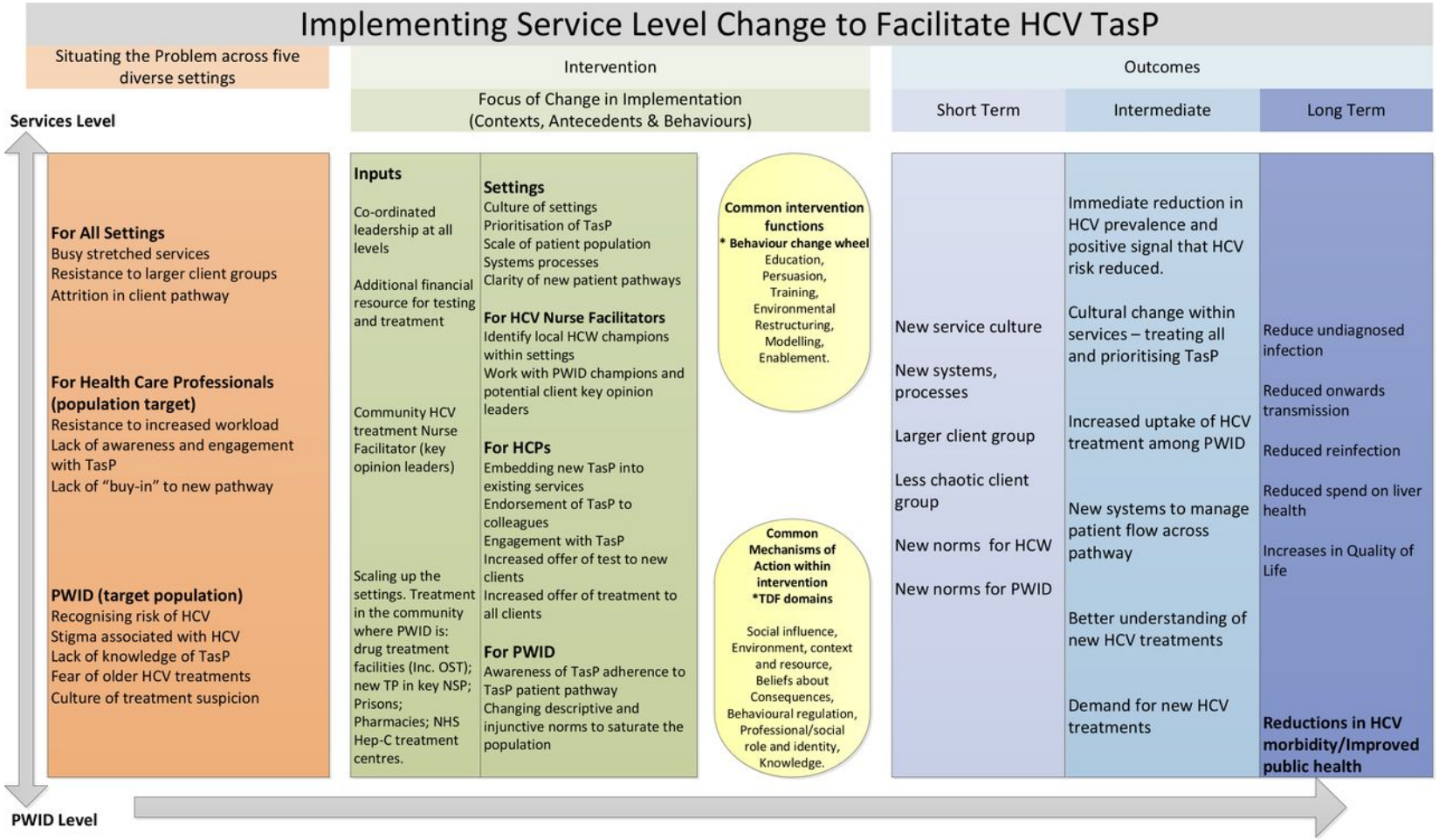

Stone Lancet Infectious Dis 2018

# Impact of Scaling-up Prison Treatments




* 43% of incarcerated PWID have lengths > 16 weeks;
60% have sentence lengths > 12 weeks. sentence

# Preliminary logic model HCV treatment as prevention (EPIToPe).

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BMJ Open