# Cost-effectiveness of treatment for Hepatitis C Virus

## Infectious disease modelling for HTA in R

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# Background

Hepatitis C virus (HCV) is a highly infectious blood-borne virus. It is widespread in people who inject drugs (PWID), and in some settings is also widespread in the general population due to contact with blood products through medical, dental or cosmetic treatments.

In 2016, WHO set a target of eliminating HCV by 2030.

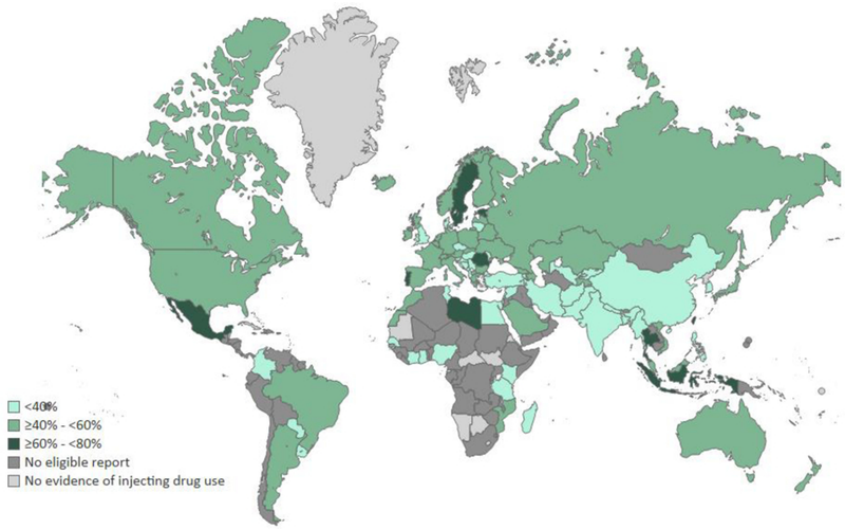



Figure 1: HCV prevalence in PWID (Grebeley et al 2019 Addiction)

# Approach

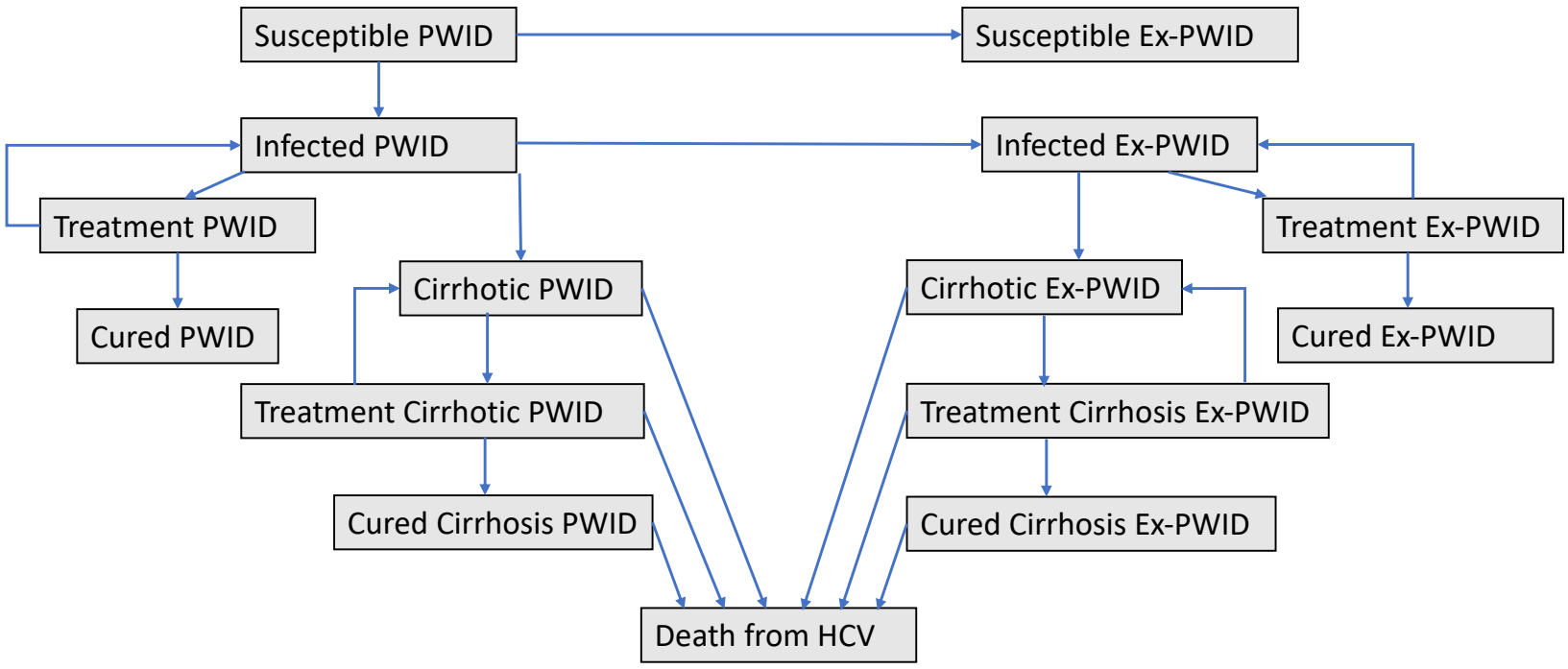
Highly effective drugs are now available to treat HCV, however, access has been limited in many low and middle-income countries.

My job involves modeling the impact and cost-effectiveness of HCV treatment in a variety of settings.

For HCV, a large impact of treatment particularly in PWID is on averted *infections*, which must be estimated with a transmission model.

Here we'll use a basic SIR-type transmission model to do a cost-effectiveness analysis of HCV treatment in PWID.

# Model structure



# Key Model Assumptions

- Transmission only occurs in PWID
- PWID leave injecting at a certain rate
- Those infected with HCV develop cirrhosis over time
- Risk of death is higher for PWID and those with cirrhosis, doesn't change after treatment, but progression to cirrhosis is prevented after treatment
- Cohort of PWID with no replacement

# What can we explore with this model?

- Treating PWID vs ex-PWID
- Treating patients in early or late stage of disease

# Cost-effectiveness analysis

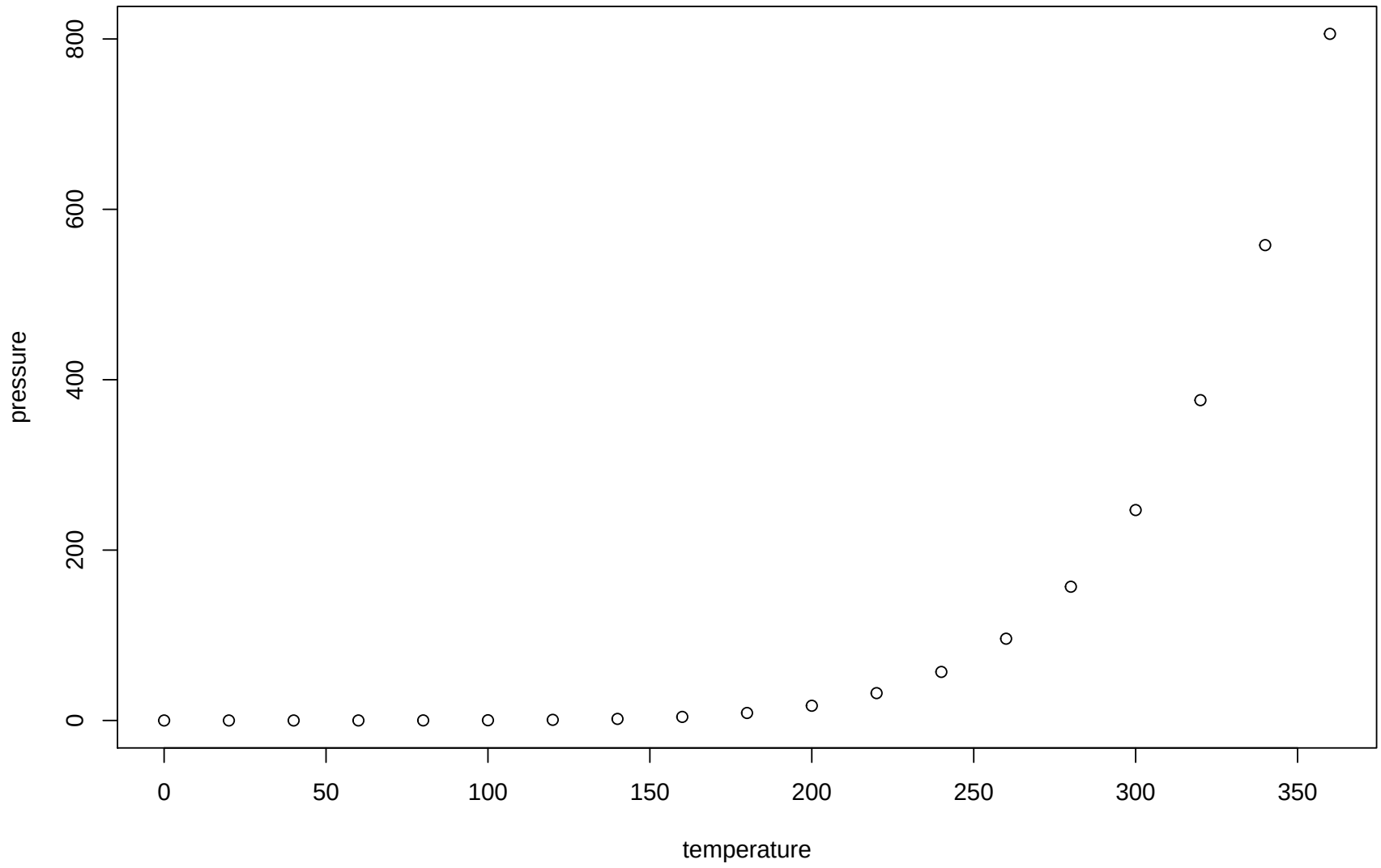
- Assume cost of treatment is $375
- Assume cost of care for cirrhosis is $200/year
- Assume QALY weights:
  - Ex-PWID: Uninfected 0.94; Infected 0.77; Cirrhotic 0.55; Recovered 0.82; Recovered cirrhosis 0.61
  - PWID: As-ExPWID*(0.85/0.94)

# Slide with R Output

```
summary(cars)
```

```
##      speed           dist       
##  Min.   : 4.0   Min.   :  2.00  
##  1st Qu.:12.0   1st Qu.: 26.00  
##  Median :15.0   Median : 36.00  
##  Mean   :15.4   Mean   : 42.98  
##  3rd Qu.:19.0   3rd Qu.: 56.00  
##  Max.   :25.0   Max.   :120.00
```

# Slide with Plot



# Further reading

- Pakistan
  https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30003-6/fulltext (done in Matlab)
- Cambodia
  https://onlinelibrary.wiley.com/doi/full/10.1111/liv.14550
  (Markov model)
- Map source
  https://onlinelibrary.wiley.com/doi/epdf/10.1111/add.14393
- QALY weight source
  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4914770/