Hepatitis C treatment for people who inject drugs: are direct-acting antivirals cost-effective?

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NO CONFLICT OF INTEREST
Introduction

- People who inject drugs (PWID) are the main group affected with Hepatitis C virus (HCV) infection worldwide

- The efficacy of HCV treatment has significantly improved in recent years with the introduction of direct-acting antivirals (DAAs)

- Different combination of DAAs possible, with or without PegIFN

- However, DAAs are more costly than pegylated-interferon and ribavirin (PegIFN/RBV)

- Cost-effectiveness can depend on the type of HCV epidemic (declining or stable)
Aim

In this study we aim to assess the incremental cost-effectiveness ratio (ICER) of six HCV treatment strategies among PWID in a stable and a declining HCV epidemic.
**Individual-based model** was used describing HCV and HIV transmission and disease progression among PWID (de Vos et al. 2012)

At any moment PWID can leave the model due to HIV-related or all-cause mortality
Methods (2)

Treatment setting and uptake

**Multidisciplinary approach (DUTCH-C):** outpatient clinic at the Public Health Service of Amsterdam
- Medical doctor/Coordinator as the outpatient clinic
- Nurses provide PegIFN injections and provide counselling
- Medical specialists: HIV specialist, liver-specialist, psychiatrist.

**Uptake:**
- **15** PWID treated per year
## Methods (3)

### Treatment strategies

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Genotype</th>
<th>Genotype</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>No therapy</td>
<td>No therapy</td>
</tr>
<tr>
<td>2</td>
<td>PegIFN/RBV</td>
<td>PegIFN/RBV</td>
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<tr>
<td>3</td>
<td>DAA/RBV</td>
<td>DAA/RBV</td>
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<tr>
<td>4</td>
<td>DAA/RBV/PegIFN</td>
<td>DAA/RBV</td>
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<tr>
<td>5</td>
<td>Dual DAA</td>
<td>DAA/RBV</td>
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<tr>
<td>6</td>
<td>Dual DAA</td>
<td>Dual DAA</td>
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</table>
Costs (from 2014)

- **Health-perspective:** only health care costs are included
- Included costs specific for PWID (e.g. nurse counselling)

**QALYs / Utilities**

- Multiplied by 0.85 for PWID
Methods (5)

- Incremental cost-effectiveness ratio (ICER)
  
  Cost strategy B – Cost strategy A

  QALYs strategy B – QALYs strategy A

- Cost-effectiveness frontier ➔ compared to a scenario without treatment

- Based on WHO:
  
  Highly cost-effective: 1x Gross Domestic Product (GDP=38,255)
  
  Cost-effective: 3x GDP

- Scenario analysis 45 PWID treated per year
Results (1)
Incrementally

- Declining epidemic
  Dual DAA therapy ICER = 1,932 €/QALY vs. scenario without treatment

- Stable epidemic
  Dual DAA therapy ICER = 2,086 €/QALY vs. scenario without treatment

- Robust over a range of sensitivity analyses
Cost-effectiveness frontier

1. Cost-effectiveness frontier

1.a) Declining HCV epidemic

- 2. PegIFN/RBV
- 3. DAA/RBV
- 4. DAA/RBV genotype-4 & DAA/RBV/PegIFN for genotype-1-4
- 5. DAA/RBV genotype-4 & dual DAA for genotype-1-4
- 6. Dual DAA for all genotypes

1.b) Stable HCV epidemic

- 2. PegIFN/RBV
- 3. DAA/RBV
- 4. DAA/RBV genotype-4 & DAA/RBV/PegIFN for genotype-1-4
- 5. DAA/RBV genotype-4 & dual DAA for genotype-1-4
- 6. Dual DAA for all genotypes
Scenario analyses
Higher Uptake

DE: declining epidemic - SE: stable epidemic - HU: higher uptake
Discussion (1)

- With current treatment uptake, only a slight decrease in HCV RNA prevalence can be expected in a stable epidemic.

- Therefore, scaling-up treatment is essential if the goal is to eliminate HCV.

- Supports previous studies from Martin et al. J viral Hepat, 2015.
Discussion (2)

Limitations:
- SVR mainly based in clinical trials
- Harm-reduction programs in place for screening
- Different health models to provide HCV treatment
- Future research should assess the cost-effectiveness of different health models with DAAs
- Did not assess the effect of an increasing HCV incidence

Strengths:
- Individual based model that took HCV re-infections into account
- Explored different types of HCV treatment
- Based on observation data among PWID
DAA-containing regimes are highly cost-effective among PWID irrespective of the type of HCV epidemic

Providing economic support for treatment for PWID

Now that the treatment landscape is promising even for those traditional “difficult to treat populations”, start thinking about those “difficult to reach populations” which in many countries are PWID
Thank you for your attention and everyone involved in this study!

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Ardine de Wit

Amy Matser  
Maria Prins  
Karen Lindenburg

Sophie Willemse
Sensitivity analyses: Dual DAA

Declining HCV epidemic

- 30 year horizon
- 0% discounting
- DAA costs 2 +/-%
- 2 +/- utility
- 1 +/- utility
- 40% never tested
- Fibrosis 2x
Sensitivity analyses: Dual DAA

Stable HCV epidemic

- 30 year horizon
- HIV not treated
- Treating re-infections
- 0% discounting
- DAA costs 2 +/-
- 2 +/- utility
- 1 +/- utility
- 60% never tested
- 40% never tested
- Fibrosis 2x
Incremental analyses example

- Interventions (treatment strategies) are ordered from least to most effective based on QALYs
- Calculate ICERs between successive pairs of options

Threshold = 21

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<thead>
<tr>
<th>Strategy</th>
<th>QALYs</th>
<th>Costs</th>
<th>ICER</th>
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<tbody>
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