Background

- Hepatitis C virus (HCV) is a sexually transmitted disease among HIV positive men who have sex with men (MSM).
- Since 2000, HCV has evolved into an epidemic with incidence rates of about 1 per 100 person years in HIV+ MSM.
- For many years, acute en chronic HCV was treated with peginterferon (pegIFN) and ribavirin (RBV).
- Recently, direct-acting antivirals have become available. In contrary to peginterferon, DAAs have limited side-effects and high cure rates.
- Unfortunately, DAAs are expensive and treatment can be deferred until later stages of chronic infection.

Objective

The aim of this study was to assess the epidemiological and economic impact of providing DAAs to all co-infected MSM compared to deferring DAAs until fibrosis stage F2 or F3.

Methods

A compartmental deterministic mathematical model was constructed to represent the Dutch HCV epidemic among HIV-infected MSM. (Figure 1)

Two scenarios were compared:

Delayed treatment
- Treatment in acute stage with 24 weeks pegIFN and RBV.
- Initiating a 12 week DAA treatment regimen at F2 or F3.

Immediate treatment
- Spontaneous clearance is awaited in the acute stage of infection. 
- Treatment with a 12 week DAA regimen independent of fibrosis score.

Costs and quality adjusted life years were assigned to each compartment of the deterministic model. (Table 1)

Table 1. Key parameters

<table>
<thead>
<tr>
<th></th>
<th>Costs</th>
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<tbody>
<tr>
<td>24 weeks PegIFN + RBV</td>
<td>€ 7,500</td>
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<tr>
<td>12 week DAA regimen</td>
<td>€ 40,000</td>
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</tbody>
</table>

Quality of Life

- HIV monoinfection: 0.94
- Acute HCV infection: 0.84
- Chronic HCV F0-F3: 0.84
- PegIFN therapy: 0.74-0.81
- DAA therapy: 0.84

Results: effects on the epidemic

a) Incidence

b) Prevalence

Results: effects on costs and benefits

Immediate DAA treatment vs:

<table>
<thead>
<tr>
<th></th>
<th>Costs</th>
<th>IQR</th>
<th>Benefits</th>
<th>IQR</th>
<th>Cost-effectiveness</th>
<th>IQR</th>
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</thead>
<tbody>
<tr>
<td>Delayed at F2 fibrosis</td>
<td>33.2</td>
<td>23.2-47.4</td>
<td>567</td>
<td>475-637</td>
<td>61.000</td>
<td>36.000-96.000</td>
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<tr>
<td>Delayed at F3 fibrosis</td>
<td>39.5</td>
<td>29.2-53.6</td>
<td>644</td>
<td>538-735</td>
<td>64.000</td>
<td>40.000-96.000</td>
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</tbody>
</table>

Cumulative results until 2030; Costs: million Euro’s; Benefits: quality adjusted life years; Cost-effectiveness: Euro’s per quality adjusted life year; IQR: inter quartile range

Results: sensitivity analysis

Immediate DAA treatment vs:

<table>
<thead>
<tr>
<th></th>
<th>delayed at F2</th>
<th>delayed at F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>price</td>
<td>Costs</td>
<td>Benefits</td>
</tr>
<tr>
<td>30.000</td>
<td>22.1</td>
<td>567</td>
</tr>
<tr>
<td>40.000</td>
<td>33.2</td>
<td>567</td>
</tr>
<tr>
<td>50.000</td>
<td>44.6</td>
<td>567</td>
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</table>

Cumulative results until 2030; Costs: million Euro’s; Benefits: quality adjusted life years; ICER: Incremental cost-effectiveness ratio

Conclusion

Treatment of all HCV coinfected MSM does not result in eradication

Prevalence and incidence decrease substantially in 2030

The epidemic is mainly driven by reinfecions

The DAA price is the major determinant for the cost-effectiveness