

**Erasmus MC**



**Viroscience lab**

**Intensive HCV monitoring in previously infected HIV-positive MSM is a cost saving method to reduce the HCV epidemic**

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# Disclosures

- A non restricted educational grant was funded by: Gilead sciences

# Introduction

- High HCV incidence 15/1000PY
- Reinfection rates of 25% within 2 years
- Direct-acting-antivirals (DAAs) cure rate over 95%

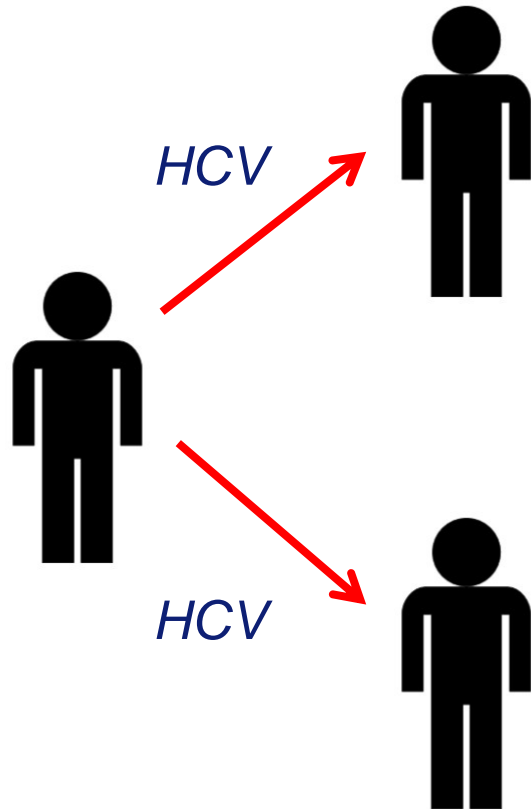
Lambers et al. AIDS, 2011

vanHommel et al. J. Acqui Immune Defic Syndr, 2014

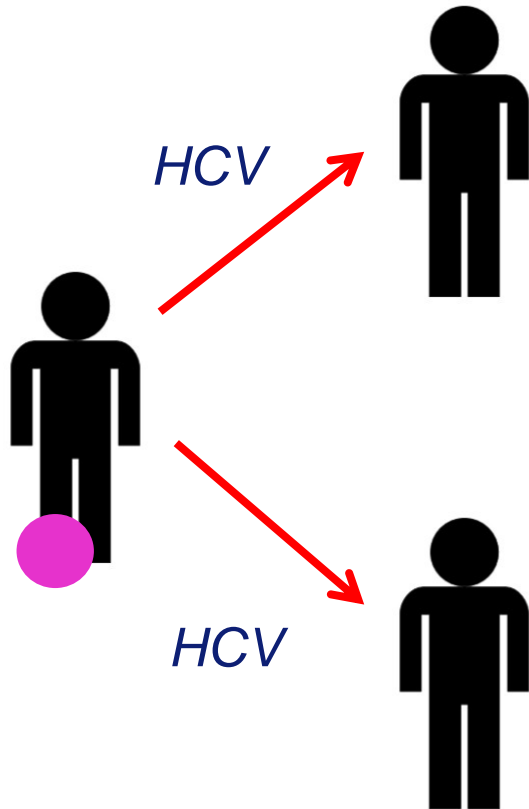
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# Reducing HCV transmission



# Reducing HCV transmission



# Reducing HCV transmission



# HCV monitoring is key

- Current situation
  - ALT measurement, twice a year
  - Antibodies, once a year
- Earlier identification of HCV
  - More sensitive PCR test
  - More frequent monitoring

Ryom, Boesecke et al. 2016, EACS

Thompson EC, 2009, AIDS

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# Cost of new monitoring strategies

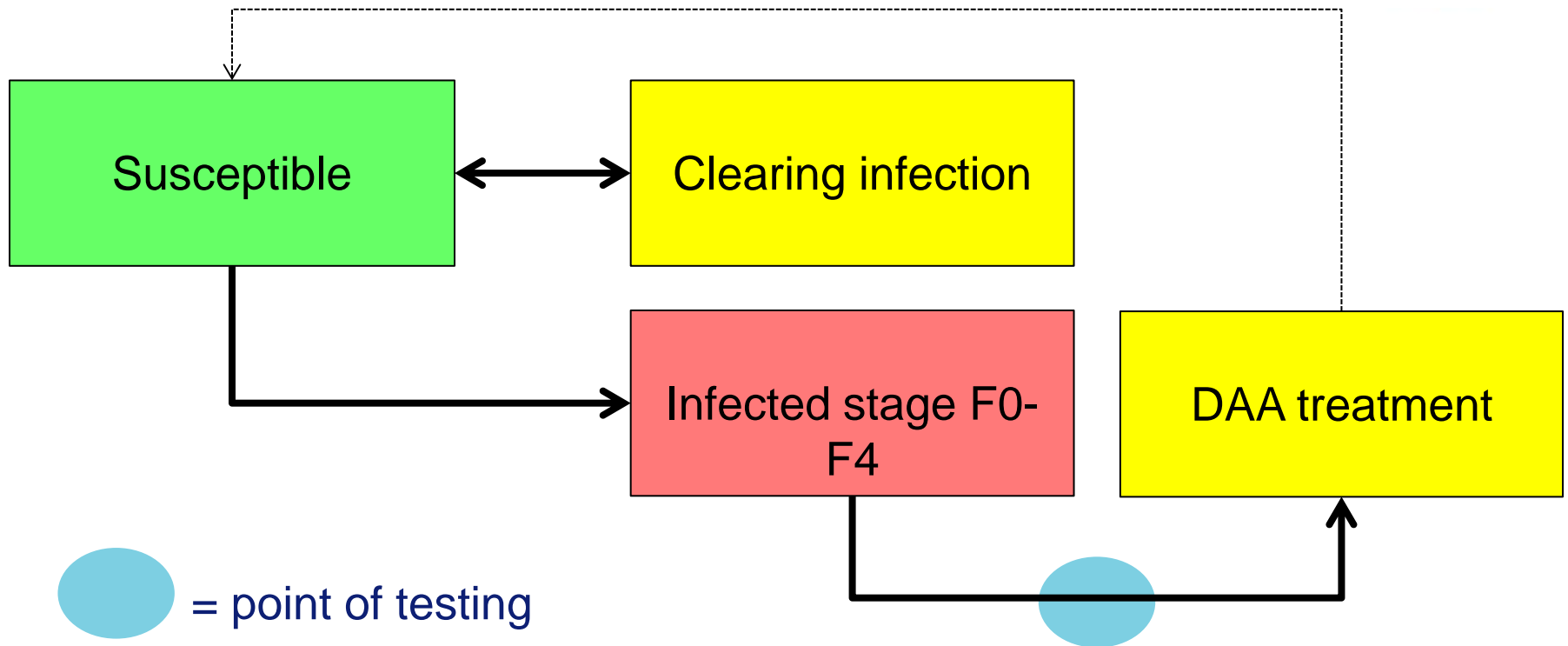
- PCR €165 - €210
- ALT €2

## To reduce costs

- Strategies could be targeted to a group with higher risk



# Cost-effectiveness of different HCV monitoring strategies



Model calibrated on incidence, new HIV diagnoses and reinfection rate

# Epidemiological impact

After 10 years	Incidence per 1000
Current monitoring	<b>5.2</b>

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# Epidemiological impact

After 10 years	Incidence per 1000
Current monitoring	5.2
PCR every six months	4.9
ALT every three months	4.5
PCR every three months	4.3

# Similar results targeted group

After 10 years	Incidence per 1000
Current monitoring	<b>5.2</b>
PCR every six months	<b>4.9 (4.9)</b>
ALT every three months	<b>4.7 (4.5)</b>
PCR every three months	<b>4.6 (4.3)</b>

# Cost effectiveness

$$\frac{\text{Cost } X - \text{Cost } Y}{\text{Qaly } X - \text{Qaly } Y}$$

Qaly 1.0 = perfect health

Conservative threshold for cost-effectiveness  
below €20.000

# Only cost-effective in a targeted group

Testing strategy	Cost (million)	Qaly's gained	Cost-effectiveness €/QALY
Current monitoring	€66.7	0	-

- Conservative threshold for cost-effectiveness below €20.000
- DAA price of €40.000

# Only cost-effective in a targeted group

Testing strategy	Cost (million)	Qaly's gained	Cost-effectiveness €/QALY
Current monitoring	€66.7	0	-
PCR in risk group every 6 months	<b>+ €0.5</b>	42.6	13.000

Conservative threshold for cost-effectiveness below €20.000



# Only cost-effective in a targeted group

Testing strategy	Cost (million)	Qaly's gained	Cost-effectiveness €/QALY
Current monitoring	€66.7	0	-
PCR in risk group every 6 months	<b>+ €0.5</b>	42.6	13.000
ALT in risk group every 3 months	<b>- €2.8</b>	56.3	Cost Saving

Conservative threshold for cost-effectiveness below €20.000

# Conclusion

- DAAs reduce the epidemic in HIV-infected MSM
- Intensified monitoring strategies further reduces the epidemic
- Intensified monitoring will only be cost-saving if targeted to a group of previously infected patients.

# Discussion

- Results only apply when immediate DAA treatment is given
- Number of doctor visits

# Acknowledgements

## Erasmus Medical Center

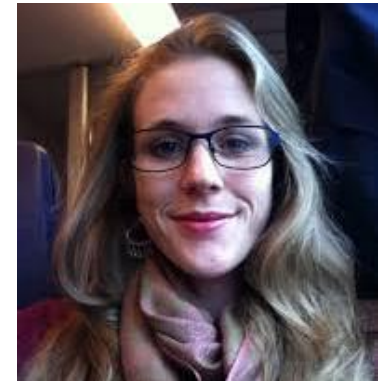
Brooke E. Nichols

Jeroen van Kampen

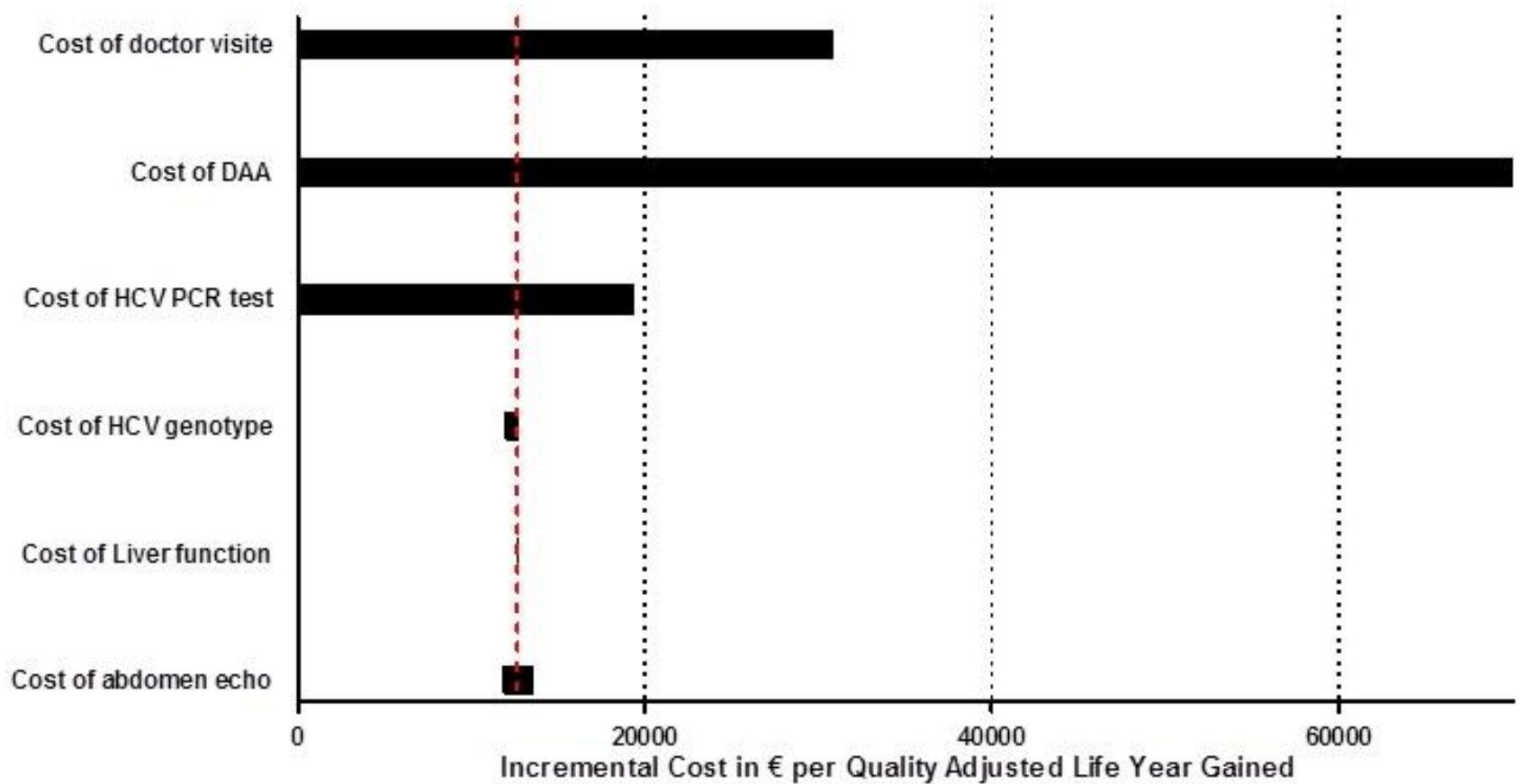
Charles Boucher

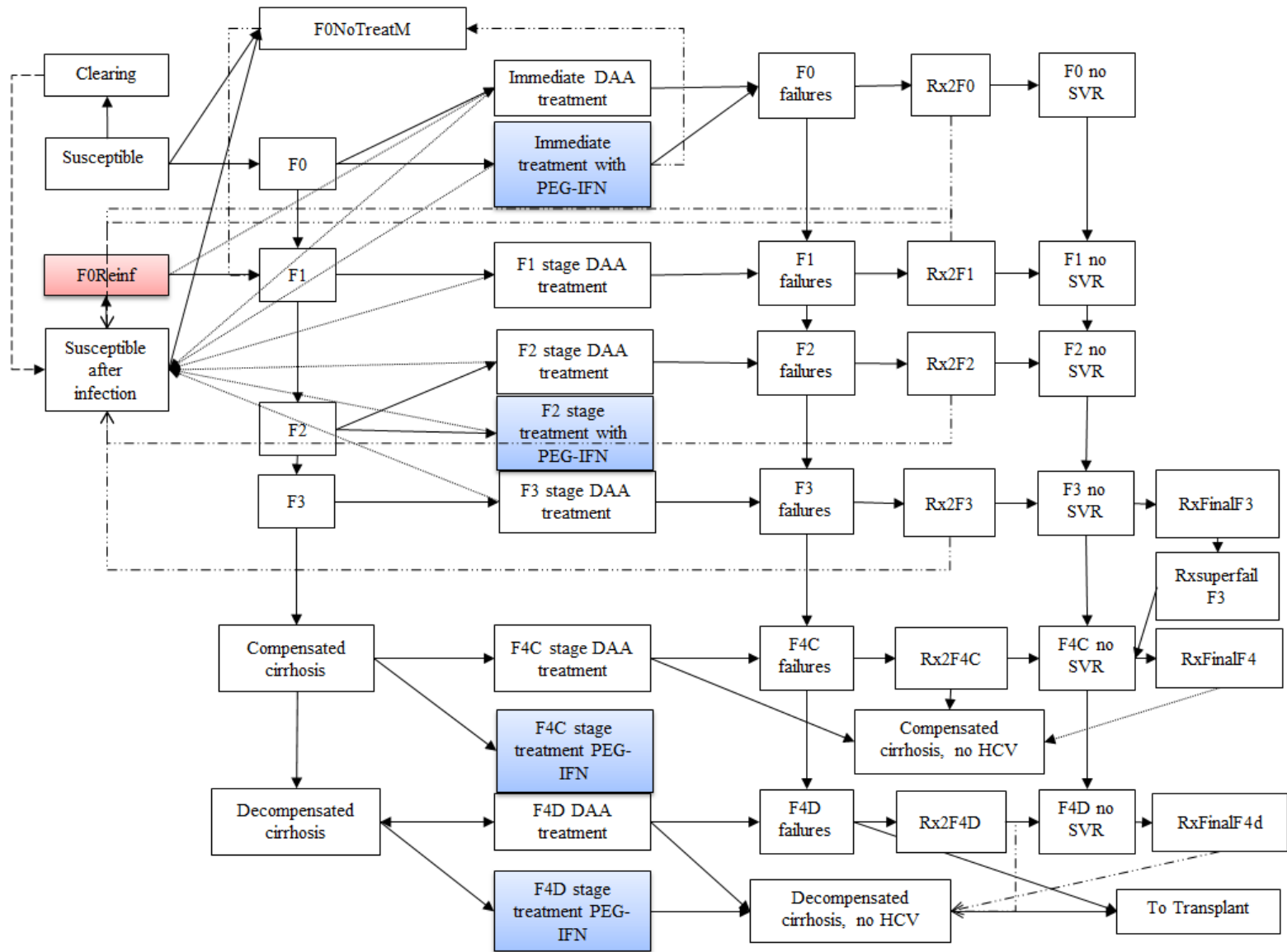
Annelies Verbon

David van de Vijver



# PCR 6 months risk group





<b>Parameters of epidemic among HIV-positive MSM</b>		<b>Range [source/rationale]</b>
New annual HIV diagnoses per year 2002-2014		720-740[19]
New annual HIV diagnoses after 2014		625[19]
Total susceptible individuals in 2002		3800
Mean age of patient when HCV infected		40 [28]
Percentage of HCV in 2002		2%-10% [19] [Calibrated]
Annual new sexual partners		[Calibrated]
	<i>Highest risk group</i>	10-85
	<i>Risk group 2</i>	1-10
	<i>Risk group 3</i>	0.5-1
	<i>Risk group 4</i>	0-0.5
Proportion per risk group		[Calibrated]
	<i>Highest risk group</i>	0.01-0.11
	<i>Risk group 2</i>	0-0.2
	<i>Risk group 3</i>	0-0.3
	<i>Risk group 4</i>	0.4-0.9
Rate of assortative mixing		0-0.8 [Calibrated]
<b>Life Expectancy and mortality</b>		
Mortality		1/45 [29]
Life expectancy Dutch men		79 years
Life expectancy HIV-positive men CD4>350		79 years [29]
Life expectancy HIV-positive HCV (F0-F3stage)		79 years
Life expectancy compensated cirrhosis		0.024-0.055 per year [30]
Life expectancy decompensated cirrhosis		0.019-0.35 per year [30]
<b>Hepatitis C parameters</b>		
Transmissibility of HCV		0.01-0.05 [Calibrated]
Diagnosed percentage of HCV with ALT		70%-100% [13] [31]
Diagnosed percentage of HCV with PCR		90%-100% [17]
Clearance of HCV		15-25%
Time to clearance		40-170 days
Reinfection rate		8-26.5%, per year [15] [18]
Time to start treatment after transmission		16.5 – 25 weeks [28]
Patients in stage F3, F4 in 2002		10%-30% [Calibrated]
<b>Disease progression</b>		

<b>Proportion that will receive PEG-IFN and RBV in acute HCV before 2012</b>	67-75% [local data]
<b>SVR DAA regimen first treatment</b>	89%-100% [33-36]
<b>Duration first DAA treatment</b>	12 weeks
<b>SVR DAA regimen second treatment</b>	89%-100% [33-36]
<b>Duration second DAA treatment</b>	12 weeks
<b>Duration third DAA treatment</b>	12 weeks
<b>Quality of life</b>	
<b>HIV mono-infection</b>	0.94 [37]
<b>Acute HCV infection</b>	0.84[28]
<b>HCV F0-F3 stage</b>	0.84 [16]
<b>Compensated cirrhosis</b>	0.38-0.67
<b>Decompensated cirrhosis</b>	0.38
<b>DAA based therapy</b>	0.84 [ Assumption]
<b>Costs 2016</b>	
<b>Doctors visit</b>	€144 [38]
<b>Single ALT</b>	€ 1.71 [ Dutch data]
<b>Extra diagnostics after elevated ALT</b>	€ 165 [Dutch data]
<b>HCV RNA</b>	€165 [Dutch data]
<b>HCV genotype</b>	€130-€252 [Dutch data]
<b>HIV RNA</b>	€90-€221 [Dutch data]
<b>Abdomen echo</b>	€90-€226 [Dutch data]
<b>Biochemistry and liver function tests</b>	€38-€46 [Dutch data]
<b>DAA regimen 12 weeks</b>	€40,000[38]

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Legend Table 1. model parameters for prediction model