

In patients on cART without an undetectable viral load measured in the last three months the use of condoms is crucial to reduce HIV transmission

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Background

Rate of HIV transmission is related to plasma viral load.

It is assumed that there is effectively no risk of transmission when viral load is undetectable.

This rate of transmission is not known and unlikely to be zero.

Aim of current model:

What is the rate of HIV transmission from men who have sex with men (MSM) in the Netherlands?

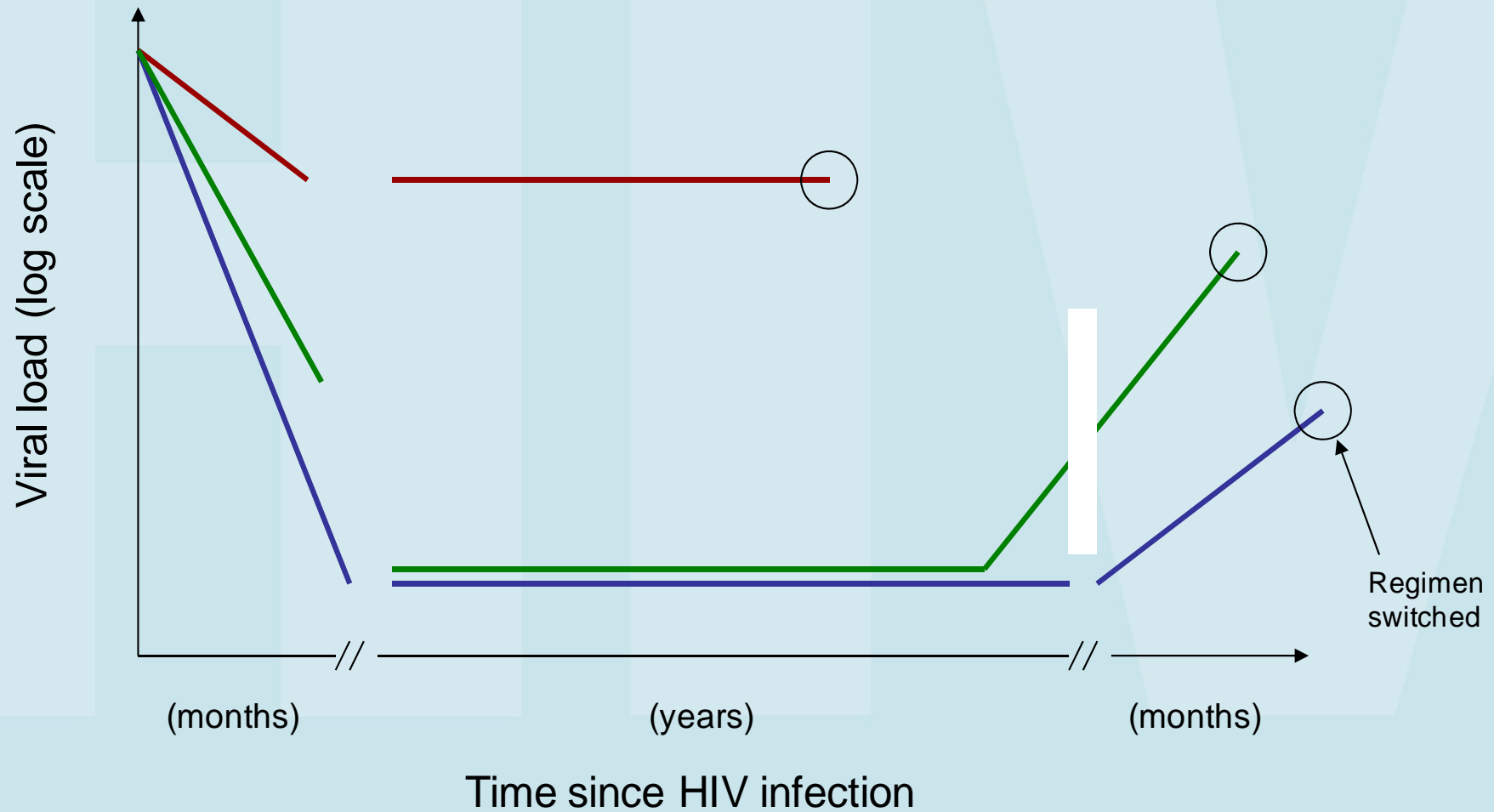
How is this influenced by:

- Patterns of condom use?
- Schedules of viral load monitoring?

Stochastic mathematical model: individual-based simulation of viral load during first line treatment, HIV transmission and patient monitoring

(Hallett, PLoS Med; Smit PLoS One)

Schematic representation of the three assumed trajectories of viral load



Suppression achieved and good adherence (blue line);
Suppression achieved but poor adherence (green line); and,
Suppression not achieved (red line). The circles indicate when the regimen is switched.

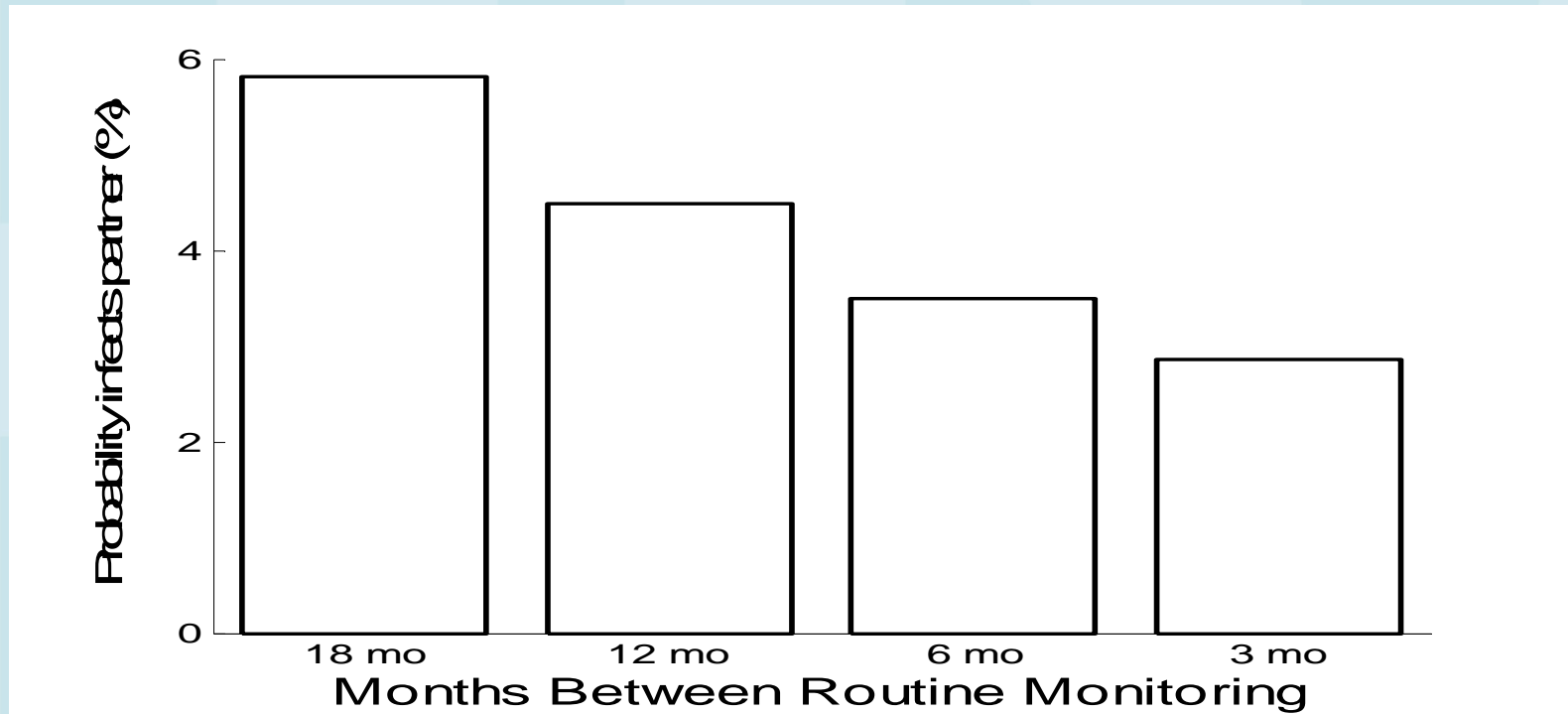
- Risk of transmission: the probability that an individual on treatment will infect his uninfected sexual partner during first line-treatment.
- Functional relationship between plasma viral load and transmission in each sex act based on Hill distribution (*Fraser, 2007*)
Rescaled to match the risk per sex act for MSM (*Wilson, 2008*)
- Assumed 100 sex acts per year
- Scenarios for condom use:
 - Never using condoms
 - Using condoms in 30% of sex acts
 - No condom use if viral load measurement in last 6 months was undetectable
 - Always using condoms

Probability of HIV transmission during first line therapy



- (1) condoms are never used;
- (2) condoms are used 30% of the time;
- (3) condoms are used unless last viral load measurement in last 6 months was undetectable;
- (4) condoms are always used.

Frequency of viral load measurements on the probability of HIV transmission



Key message to patients:

- A small rate of transmission will translate into a large number of new infections.
- Condom use best way to protect partner
- Second best strategy is to stress condom use when last viral load is more than 3 months ago.

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