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Background

- Since 2012, treatment guidelines in the Netherlands recommend starting combination antiretroviral treatment (cART) immediately after HIV diagnosis, regardless of CD4 cell counts.
- At the same time, cART effectiveness and tolerability have improved considerably.
- HIV diagnoses in men who have sex with men (MSM) decreased from 770 in 2011 to 561 in 2015 (*Figure 1*).
- We investigated to what extent the observed decrease in HIV diagnoses could have been the result of earlier diagnosis and treatment.

Methods

- A mathematical model was used to describe transmission of HIV among MSM^{1,2,3}.
- Treatment-related parameters were derived from data in the national ATHENA cohort.
- By fitting the model to annual data on HIV and AIDS diagnoses, we estimated changes over calendar time in:
 - duration from HIV infection to diagnosis.
 - per-capita transmission rate (a proxy for risk behaviour).
 - annual number of newly acquired HIV infections.

References

- ¹Bezemer *et al*, *AIDS* 2008, 22: 1071-1077.
²Bezemer *et al*, *Epidemics* 2010, 2: 66-79.
³Van Sighem & Vidondo *et al*, *PLoS One* 2012, 7: e44819.

Results

- Increasingly earlier treatment and viral suppression and a decreasing proportion with viral rebound (*Figure 2*).
- HIV-positive persons were diagnosed earlier after infection (*Figure 3A*).
- Since 2000, the transmission rate (“risk behaviour”) increased by 19% (*Figure 3B*).
- 1870 (95% CI, 1690-2060) newly acquired HIV infections in 2012-2015 (*Figure 4*).
- 2680 (+810) new HIV infections in a counterfactual scenario with no earlier treatment after 2011.

Figure 2: (A) median time to viral suppression in MSM diagnosed with asymptomatic HIV; (B) proportion of MSM with viral rebound (HIV RNA >1000 copies/ml), data: dashed line, model: solid line.

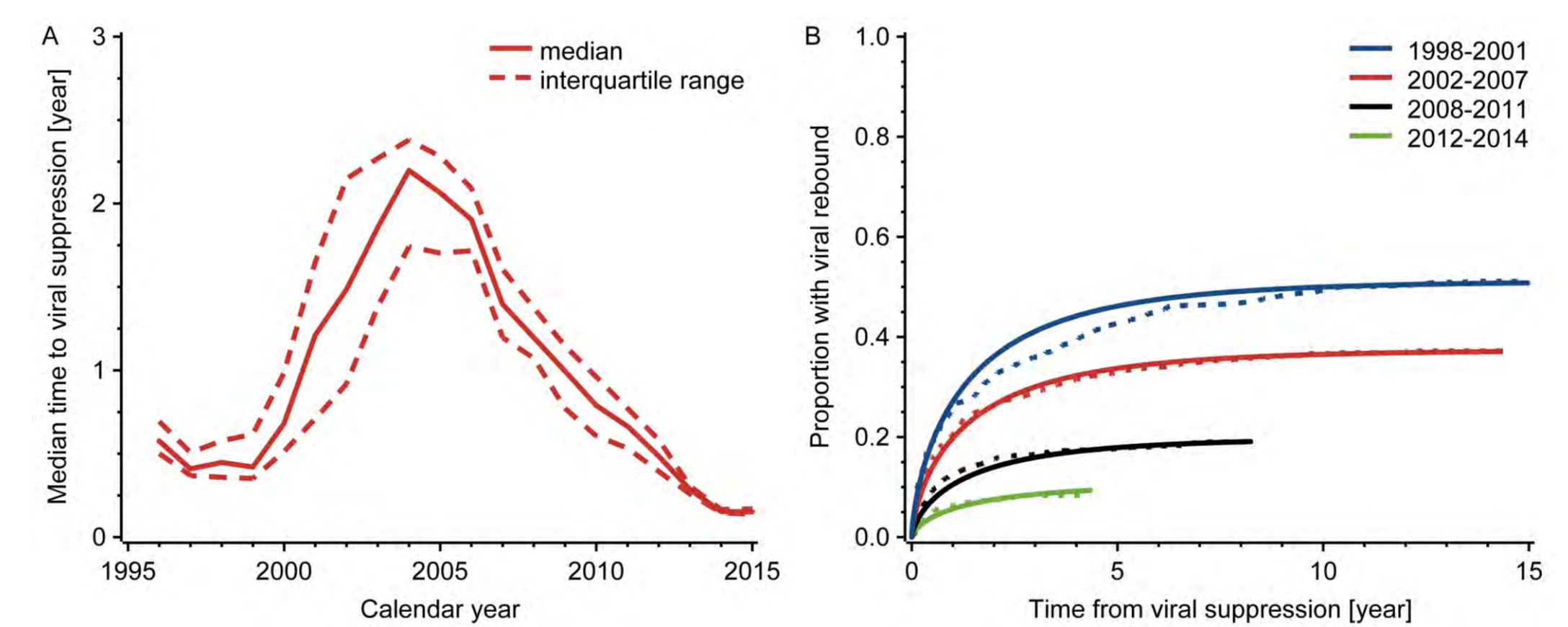


Figure 3: (A) estimated average time between HIV infection and diagnosis; (B) transmission rate relative to 1980-1983. Dashed lines are 95% confidence intervals.

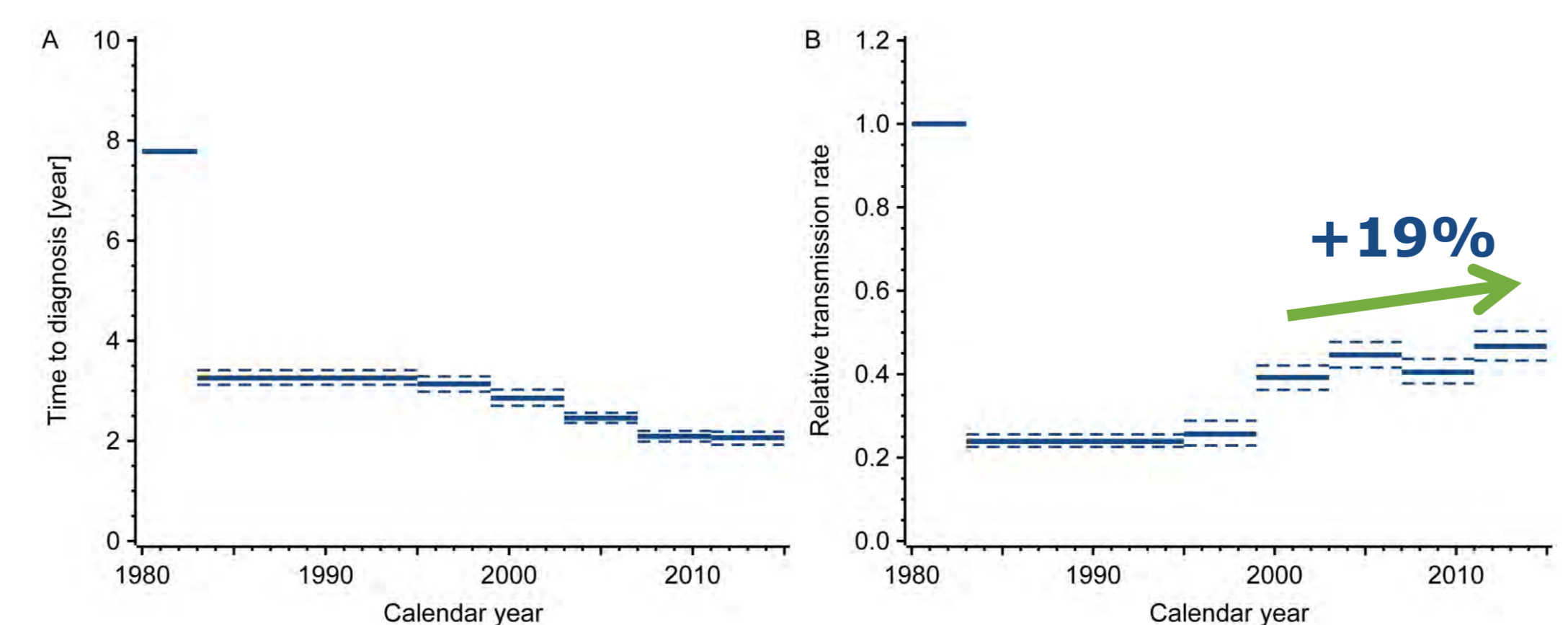


Figure 1: Annual number of newly diagnosed HIV infections. Dots: observed data; solid lines: model fit and projection; dashed lines: 95% confidence intervals

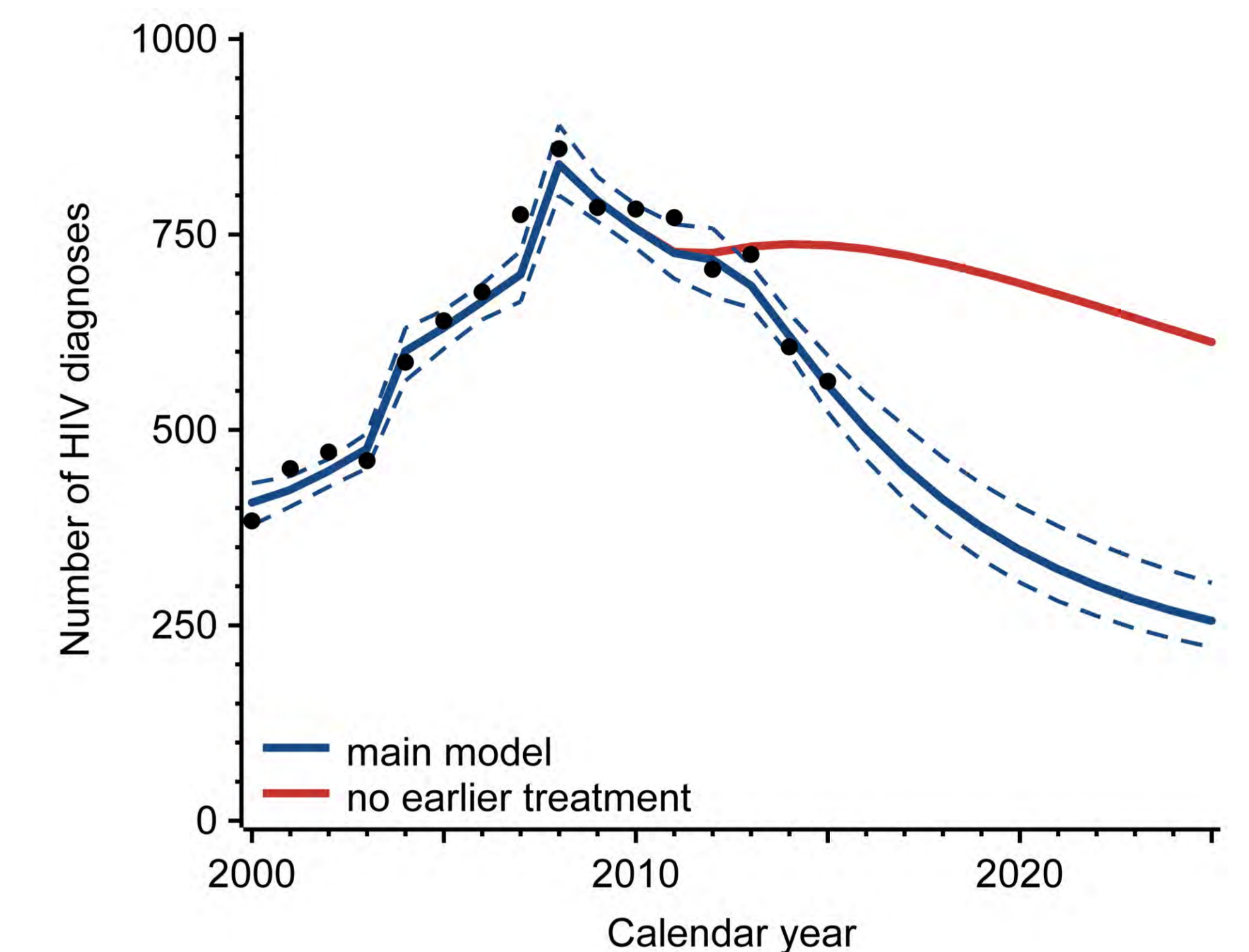
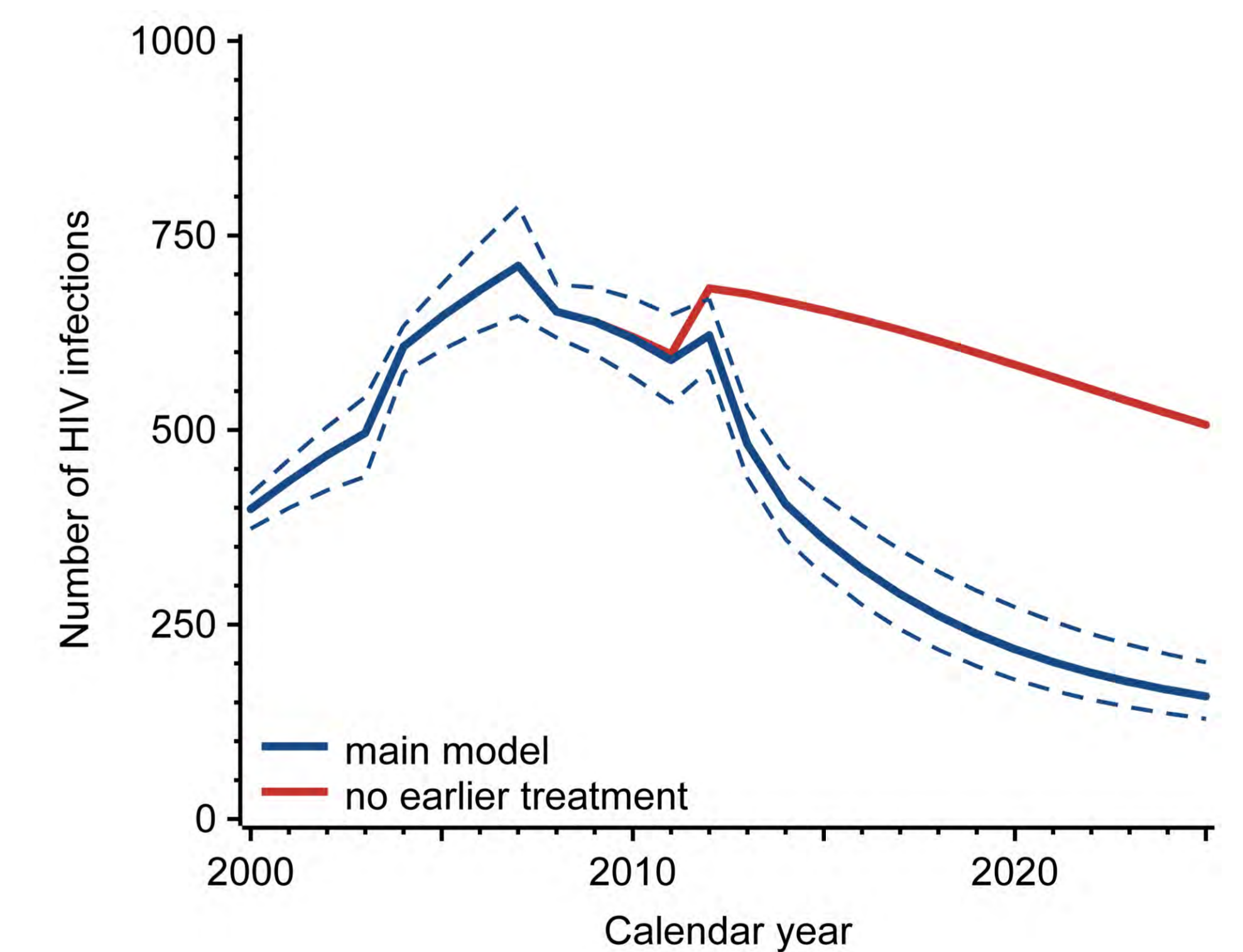


Figure 4: Estimated annual number of newly acquired HIV infections. Solid lines: model prediction; dashed lines: 95% confidence intervals.



Conclusions

- Immediate treatment, in combination with earlier diagnosis and less viral rebound, may have contributed to a substantial decrease in the annual number of new HIV infections in MSM in the Netherlands despite an increase in risk behaviour.

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