

## Appendix 2

A two-state homogeneous Markov model for interval-censored event data was used for the estimation of incidence and clearance rates. This model takes into account the interval censored nature of the data, i.e., it is assumed that transitions between ‘negative’ and ‘positive’ states have occurred between two observations, but at an unknown time.<sup>1,2</sup> In this model individuals can switch between the two stages at any time point, not just at the time of testing. This model thus allows several events (i.e., incident and cleared infections) to occur between two samplings. Therefore, the time of testing does not coincide with the time of event occurrence. For Any HPV, incidence was modeled as the transition from no HPV detected (0) to positivity for at least one HPV type (1). For high-risk HPVs, incidence was modeled as the transition from no high-risk HPV detected (0) to positivity for at least one high-risk type (1). For individual high-risk types, incidence was modeled as the transition from no detection of a specific high-risk type, e.g., HPV16-negative (0) to positivity for that type, i.e., HPV16-positive (1).

1. Geskus RB, González C, Torres M, et al. Incidence and clearance of anal high-risk human papillomavirus in HIV-positive men who have sex with men: Estimates and risk factors. *AIDS* 2016;30(1):37-44.
2. Jackson C. Multi-state models for panel data: The msm package for R. *J Stat Softw* 2011;38(8):1-29.