

Track III. Epidemiology and Prevention V. Epidemiology of HIV Infection

Despite HAART, HIV-1 is once again spreading epidemically amongst men having sex with men in the Netherlands

Background

Though HAART limits onward HIV transmission from treated patients, the annual number of new HIV-1 diagnoses among men having sex with men (MSM) in the Netherlands has increased by 37% since the introduction of HAART in 1996. We analysed the transmission dynamics of HIV-1 amongst MSM in the Netherlands over the past 25 years to achieve insight on the impact of HAART on transmission.

Methods

A measure of transmission, the reproduction number $R(t)$ defined as the average number of people infected by each case over their infectious lifespan, was calculated for HIV-1 transmission among MSM in the Netherlands using a mathematical model. Epidemic spread arises when $R(t)$ is above one. Data on HIV-1 disease progression, diagnosis and use of HAART were obtained from the Netherlands national observational HIV cohort ATHENA and the Amsterdam Cohort Studies. By fitting the model to the observed annual number of new HIV-1 and AIDS diagnoses, risk behaviour and diagnosis rate parameters were estimated for four distinct historical periods. The risk behaviour parameter indicates the extent of risk behaviour between infectious HIV-positive and negative men in each period relative to the initial period.

Results

$R(t)$ was estimated to be 1.7 during 1980-1984, the period when the first AIDS cases were diagnosed. Thereafter between 1984-1995, the risk behaviour parameter declined 40%, and $R(t)$ was reduced to 0.9, i.e. just below the epidemic threshold. With the introduction of HAART in 1995, $R(t)$ declined to 0.8, despite a 17% increase in the risk behaviour parameter. However, for the period 2000-2004 $R(t)$ increased to 1.1, due to a further increase in the risk behaviour of MSM. This return of the HIV-1 epidemic is despite reductions in the estimated mean time from infection to diagnosis (from 3.5 years in 1984-1995 to 2.7 years in 2000-2004) and widespread treatment with HAART. We estimated that 70-93% of HIV-1 transmission is originating from MSM who are unaware of their HIV-positive status. Scenario analysis furthermore revealed that in the absence of HAART, $R(t)$ would have been 1.5 in the 2000-2004 period. If, on the other hand, HAART had been introduced without increases in the risk behaviour parameter, $R(t)$ would have been 0.6 in 2000-2004.

Conclusions

The impact of widespread use of HAART on overall transmission of HIV-1 was offset by an increase in risk behaviour. Consequently, HIV-1 is once again spreading epidemically amongst MSM in the Netherlands.

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