

THE HEPATITIS C EPIDEMIC AMONGST MEN WHO HAVE SEX WITH MEN: MODELLING THE ROLE OF BEHAVIOURAL RISK HETEROGENEITY AND HIV DEPENDENT MIXING PATTERNS

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Background: Transmission of Hepatitis C (HCV) amongst men who have sex with men (MSM) is increasingly important. HCV prevalence among HIV-positive MSM is 10-20 fold higher than HIV-negative MSM (HCV ratio). We explore potential contributors to the HCV ratio.

Methods: A deterministic HIV and HCV transmission model was developed. We fit to reflective UK prevalences of 4.7% HIV amongst MSM and 10% HCV amongst HIV-infected MSM. The European MSM Internet Survey (EMIS) 2010 UK dataset provided estimates of the prevalence of and heterogeneity in risky sexual behaviours (fisting and drugs), levels of mixing by HIV status and frequency of unprotected sex. We included an error measure to denote the accuracy of determining a partner's HIV status, inaccuracy resulting in random selection of partners. We explored how different behavioural and biological complexities could produce the HCV ratio.

Results: The HCV ratio was reproduced for multiple combined behavioural scenarios; the simplest model incorporated behavioural risk heterogeneity and preferential mixing by HIV status at levels consistent with EMIS data. These effects were main drivers for large HCV ratios in all model scenarios. The HCV ratio increase from preferential mixing by HIV status was diminished for increased errors in judgement of HIV status, but accentuated when low condom use was assumed between two knowingly HIV positive men or when HIV-positive MSM were assumed to have increased HCV infectiousness. This latter effect also amplified the HCV ratio for models including behavioural risk heterogeneity.

Conclusions: Preferential mixing by HIV status and behavioural risk heterogeneity could be the main effects causing the HCV ratio. Greater HCV transmission could occur amongst HIV-negative MSM if HIV-negative MSM use condoms less or mix more with HIV-positive MSM; possibly instigated with widespread use of HIV pre-exposure prophylaxis. The effects of new HIV prevention interventions on HCV transmission should therefore be considered.