O1-S06.05 EXPLORING THE POTENTIAL IMPACT ON HIV INCIDENCE OF A REDUCTION IN CONCURRENCY IN RURAL UGANDA: A MODELLING STUDY

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Background The empirical evidence for an association between sexual partnership concurrency and increased HIV acquisition or transmission is equivocal, and the likely impact of changes in the prevalence of concurrency on HIV incidence in countries with generalised HIV epidemics has not been explored. Despite this, a number of SSA counties have planned or implemented campaigns against concurrency. Evaluation of these campaigns is unlikely to provide strong evidence for the likely impact of changes in concurrency on HIV incidence as it will not be possible to separate the effects of a reduction in concurrency from the effects of a reduction in partnership incidence. This modelling study investigates the potential effect on HIV incidence of an intervention to reduce concurrency in rural Uganda, and in other sub-Saharan Africa populations with higher levels of concurrency.
Methods Data on the demography, sexual behaviour, and HIV prevalence of a cohort in Masaka, Uganda were used to parameterise an individual-based HIV transmission model. The UNAIDS recommended definition of concurrency was used. Four scenarios with different prevalences of male and female concurrency were modelled. An intervention that reduced partnership concurrency by 50% between 2010 and 2020 (keeping overall partnership incidence constant) was introduced and the impact on HIV incidence in 2020 was calculated.
Results 9.6% (7.9%—11.4%) of men and 0.2% (0.0%—0.4%) of women reported concurrent sexual partnerships in rural Uganda in 2010. Preliminary results suggest that in the model scenario simulating this reported behaviour, the intervention reduces the incidence of HIV by 7.4% in men and 19.9% in women (Abstract O1-S06.05 figure 1, scenario 1a). If more female concurrency is simulated, the potential reductions of the intervention are greater (11.1%—14.8% in men and 21.6%—24.7% in women, Abstract O1-S06.05 figure 1, scenarios 2a and 3a). The potential reductions are also greater when a higher prevalence of male concurrency is simulated (9.7%—15.5% in men and 26.6%—29.6% in women, Abstract O1-S06.05 figure 1, scenarios 1b, 2b and 3b).
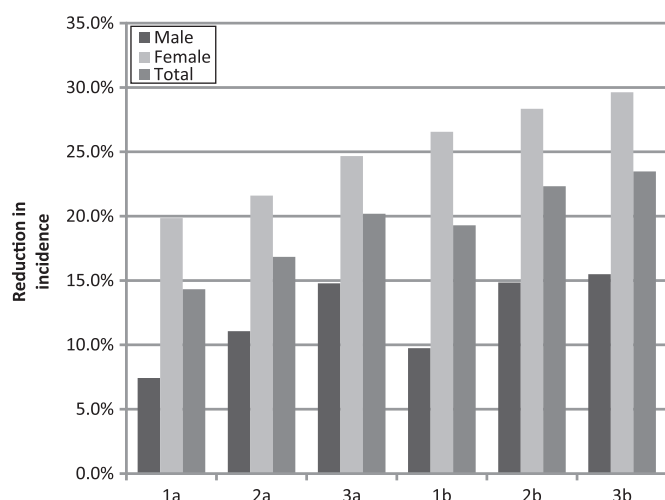
Conclusions In this setting, interventions against concurrency have the potential to reduce the HIV incidence and may have a higher impact on the incidence of HIV in women than in men. However a large simulated change in behaviour resulted in only a moderate decrease in HIV incidence. This study does not provide strong support for the prioritisation of concurrency as a target for behaviour change interventions.

O1-S06.06 PATTERNS AND TRENDS IN CONCURRENCY AND POLYGAMY IN RURAL ZIMBABWE, 1998—2008

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Background It has been suggested that the decline in HIV prevalence in Zimbabwe from the late 1990s may be partly due to reductions in sexual concurrency but little is known about levels and trends in the different forms of concurrency or their association with HIV risk.
Methods We use data from four rounds (1998—2000, 2001—03, 2003—05, 2006—08) of a large longitudinal population-based HIV survey to investigate patterns of non-spousal (two or more current sexual partners, at least one of whom is not a spouse) and spousal (multiple spouses but currently no extra-marital sexual partners) concurrency, and associations with prevalent HIV infection in rural east Zimbabwe.
Results 15.4% (95% CI 14.4% to 16.5%) of men (17—54 yrs, N=4327) and 1.9% (1.5% to 2.3%) of women (15—44 yrs, N=5148) reported concurrent sexual partners at baseline. 11.7% (10.8% to 12.7%) and 3.7% (3.2% to 4.3%) of men reported non-spousal and spousal concurrency, respectively. Non-spousal concurrency was most common in single (16%) and divorced/widowed (11%) men but was also reported by married men with single (6.5%) and multiple (4%) spouses (Abstract O1-S06.06 figure 1). HIV prevalence is similar in men with (19.2%) and without (19.5%) concurrent partners but is higher in those with concurrent partners after controlling for age (age-adj. OR (aOR), 1.37; p=0.02). However, after excluding non-sexually experienced men, this difference was not statistically significant (aOR, 1.27, p=0.08). Among all men, HIV prevalence was higher for those with non-spousal concurrency (aOR, 1.38; p=0.015) but not for those with spousal concurrency (aOR, 1.26; p=0.2). For women, concurrency (all non-spousal) was 1.9% (95% CI 1.2% to 2.7%) in single women, 0.4% (0.2% to 0.7%)

Abstract O1-S06.05 Figure 1 The impact of the intervention on HIV incidence in 2020.
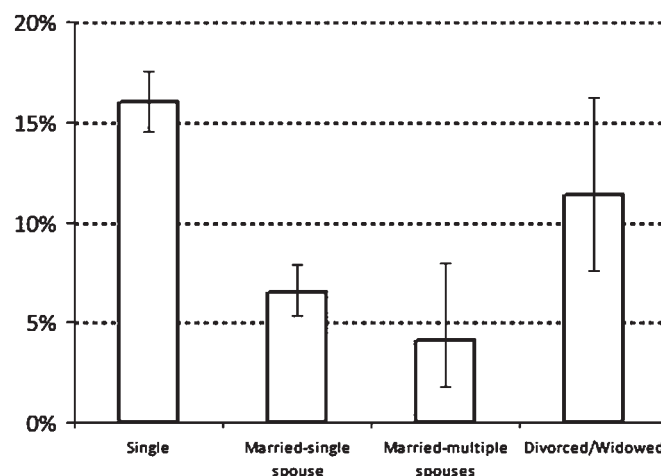
Abstract O1-S06.06 Figure 1 Prevalence of non-spousal concurrency by marital status, Men, 17—54 years.

in married women, and 5.4% (4.1% to 7.0%) in divorced/widowed women. HIV prevalence was higher in women with concurrent partners than in those without (55.7% vs 25.4%; aOR, 3.26, 2.08 to 5.11) even after excluding women who had not started sex (aOR, 2.83; p<0.001). For males, non-spousal concurrency fell from 11.7% (95% CI 10.8% to 12.7%) in 1998−2000 to 6.1% (5.3% to 7.0%) in 2001−2003 and 4.3% (3.7% to 5.0%) in 2006−2008; prevalence of spousal concurrency fell from 3.7% (3.2% to 4.3%) to 2.6% (2.0% to 3.2%) to 1.3% (1.0% to 1.7%) over the same period. For females, concurrency declined from 1.7% (1.4% to 2.1%) in 1998−2000 to 1.0% (0.7% to 1.3%) in 2001−2003 and 0.5% (0.3% to 0.7%) in 2006−2008.

Conclusion A 2/3rds reduction in (mainly non-spousal) concurrency may have contributed to HIV decline in east Zimbabwe.

Epidemiology oral session 7: Neglected issues in anal STIs and transmission

O1-S07.01 THE RELATIVE CONTRIBUTION OF ANAL INTERCOURSE AND PRIMARY INFECTION TO MATURE HETEROSEXUAL HIV EPIDEMICS

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Backgound Current epidemiological evidence suggests that receptive anal intercourse (RAI) considerably increases the risk of HIV infection per sex act (RRRAI) compared to vaginal intercourse (VI). RAI may increase HIV risk to a similar extent or more than primary HIV infection (PI)(ie, recent infection) increases infectivity compared to asymptomatic infection (RRPI). Considerable attention has been placed to understand the role of PI to HIV epidemics. However, the potential role of RAI to heterosexual HIV epidemics has never been assessed even if it seems to be a relatively common practice in many settings. We aim to compare the fraction of HIV infections due to AI and PI in a generalised heterosexual epidemic.

Methods A deterministic model of heterosexual HIV transmission during to VI, RAI and insertive AI, incorporating three HIV infectiousness stages was developed (Abstract O1-S07.01 Table 1). Behaviour and HIV prevalence data from Kalishman's *et al* (2009) study in South Africa was used to define plausible ranges of parameter values (Abstract O1-S07.01 table 1). As it is unknown, the degree of mixing during VI between those who engage and do not engage in AI (non-AI) was varied. 20 parameter sets that best fitted HIV prevalence data by AI/non-AI were identified following exploration of 1000 parameter sets selected by uniformly sampling the plausible parameter ranges.

Results Overall, 17%−40% of annual infections (PAF) may be due to RAI and insertive AI (IAI). The PAF due to AI is 2−2.6 larger for female than male (Abstract O1-S07.01 Table 1). In comparison, the overall PAF due to PI is between 25 and 31%, and more similar between gender (PAF female: male 1.0−1.2). Under our assumptions, the PAF due to AI was always larger (smaller) than the PAF due PI for females (males) (Abstract O1-S07.01 table 1). The PAF due to AI and PI was positively associated with increases in the overall fraction of all sex acts which are AI (%AI), whereas the latter depended on the level of mixing. In order to be able to relax the mixing to make it less assortative, the %AI needed to be reduced to allow more VI between AI and non-AI to occur.

Conclusion Our preliminary results suggest that even a small fraction of AI (<10%) in a population may be as important, to overall HIV transmission in generalised epidemics, as the primary phase of infection, especially for women. Our results are based on the likely assumption that RRRAI equal or larger than RRPI. Focusing

Abstract O1-S07.01 Table 1 Main assumptions and results summary

Main parameters assumptions	Ranges of values in the 20 best fits*
Probability of HIV transmission per VI during asymptomatic phase woman to man / man to woman	0.0013−0.0019/0.0013−0.0019
Duration / increase in infectivity (RR$_{PI}$) (relative to asymptomatic phase) in each HIV stages	Primary/high =6 months/9.2-fold
	Asymptomatic/low =8 years/onefold
	Late/medium =1 year/7.3-fold
Number of sex acts per partner per year	30
Average number of partners per year	2
Overall fraction using condoms during AI or VI (Condom efficacy)	50% (0.90)
a = Degree of mixing between AI and non-AI (a= 0 AI with AI and exclusively VI with exclusively VI, a= 1: proportionate mixing)	0.16−0.71
RR$_{RAI}$ = % Increase in HIV risk per RAI (compared to VI)	7.9 to 19.5-fold
RR$_{IAI}$ = % Increase in HIV risk per insertive AI (compared to VI)	Twofold
Fraction of the population who practice AI	11.5%−13.3%
Fraction of the population who do not practice AI (non-AI or exclusive VI)	86.7−88.5%
Fraction of all sex acts of AI group which are AI women / men	25.3%−52.7%/21.8%−51.8%
Overall fraction of all sex acts which are AI (%AI)	2.9−6.7%
Annual rate of AI who stop AI and become exclusively VI (numbers who leave AI = no who enter AI from VI, in proportion to their respective HIV prevalence)	0.068−0.352
Results	
HIV prevalence simulated:	
Among AI / among non AI (exclusively VI)	19.0%−24.8%/6.8%−11.5%
Overall population	8.5%−12.9%
Cumulative fraction of HIV infections (PAF) annually in mature epidemic due to:	
Anal intercourse	
Women/men	24.7%−54.4% / 9.4%−22.4%
Overall population	17.3%−40.0%
Primary phase of HIV infection (ie, recent infections)	
Women/men	23.7%−26.8%/27.3%−37.0%
Overall population	25.5%−31.2%
Ratio of PAF due to AI: PI	
Women/men	1.04−2.14/0.34−0.61
Overall population	0.67−1.30

*Out of 1000 combinations explored.

prevention to reduce AI may be more cost-effective than to test and treat for recent infections.

O1-S07.02 CHARACTERISTICS OF WOMEN TESTING POSITIVE FOR RECTAL STIS USING SELF-COLLECTED MAILED SPECIMENS

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Background The website http://www.iwantthekit.org/ (IWTK) began offering self-administered rectal swab kits in addition to vaginal swab kits in January 2009 to test for *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and *Trichomonas vaginalis*.

Methods Swab samples were collected at home by participants and sent by US mail and tested by NAAT (Gen-Probe) assays. Participants submitted separate questionnaires for the vaginal and rectal kits. Data were analysed by STATA, version 11.

Results In 1084 questionnaires from women submitting vaginal swabs to the IWTK program since 2009, 194 (17.9%) reported anal