Results At least one HR-HPV was identified in 264 HIV-negative men (37.6%, 403 genotypes total) and 164 HIV-positive men (70.4%, 399 genotypes total) at enrollment. Among HIV-negative men, younger and unmarried men were more likely to have higher viral loads. HR-HPV genotypes with high viral load (grade:3–4) at enrollment were more likely to persist than HR-HPV genotypes with low viral load (grade:1–2) among HIV-negative (month 6: adjPRR = 1.80, 95% CI: 1.31–2.47; month 12: adjPRR = 2.04, 95% CI: 1.39–3.01), and HIV-positive men (month 6: adjPRR = 1.33, 95% CI: 1.06–1.67; month 12: adjPRR = 1.70, 95% CI: 1.16–2.50). Long-term persistence of HR-HPV was more frequent among HIV-positive men compared to HIV-negative men (month 24: adjPRR = 2.24, 95% CI: 1.46–3.45), and HR-HPV infections with low viral loads were detected more frequently among HIV-positive men at all follow-up visits (6 months: PRR = 1.81, 95% CI: 1.17–2.97; 12 months: PRR = 1.43, 95% CI: 0.8–2.4; 24 months: PRR = 2.9, 95% CI: 1.53–5.53)

Conclusions HR-HPV genotypes with high viral load are more likely to persist among HIV-negative and HIV-positive men, though persistence was more common among HIV-positive men. The results may explain the association between high HR-HPV viral load and transmission to women and increased levels of HR-HPV persistence in HIV-positive men.

P3.223 HPV GENOTYPE DISTRIBUTION IN HIV-POSITIVE AFRICAN WOMEN AND ASSOCIATIONS WITH HIGH GRADE HISTOLOGICAL LESIONS BY CD4+ COUNT

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Background To assess the prevalence, genotype distribution and risk factors for high-risk HPV among HIV-positive African women, and associations with cervical histological lesions.

Methods The HARP study enrolled HIV-positive women aged 25–50 in Burkina Faso (BF) and South Africa (SA). A stratified sampling strategy was used, with 2/3 of women on ART. Cervical HPV genotyping was performed using InnoLipa. Four-quadrant cervical biopsies were obtained among women with abnormalities detected by at least one test or by colposcopy.

Results 628 and 624 women were enrolled in BF and SA, respectively. The distribution of CD4+ count (cells/μL) was similar in both sites: 68% with CD4+ ≥ 350 and 10% with CD4+ < 200. Prevalence of HR-HPV genotypes was 62% among women in BF and 78% in SA, and, overall, 67%, 73% and 84% among women with CD4+ ≥ 350, 200–349 and < 200, respectively (Table). The 4 most common genotypes in BF were HPV52 (20%), HPV51 (12%), HPV35 (9%), HPV66 (8%); and in SA, HPV52 (24%), HPV16 (15%), HPV51 (14%) and HPV35 (14%). Multiple types were observed in 41% and 55% of HR-HPV-positive women in BF and SA, respectively; and increased with decreasing CD4 count (46%, 52% and 63%, respectively, P-trend = 0.004). HPV types 58, 33 and 16 were most strongly associated with CIN2+ (OR = 5.06, OR = 4.62, OR = 4.02) and types 16, 35 and 58 were most strongly associated with CIN3+ (OR = 4.59, OR = 3.36, OR = 2.96). Decreasing CD4+ count and younger age were associated with higher HR-HPV prevalence in both countries (Table). Multiple sex partners, smoking and lower income were also significantly associated with HR-HPV in SA.

Conclusions HR-HPV prevalence is high among HIV-positive women with genotype distribution similar in both countries. HR-HPV prevalence is associated with young age and lower CD4+ count. Whilst HPV52 is the most prevalent type, HPV16 is most strongly associated with increasing lesion severity.

Abstract P3.223 Table 1 Table. Association of HR genotypes with site, CD4+ count and age in Burkina Faso and South Africa

	High risk HPV genotypes	
	n/N (%)	OR (95% CI)
Site		P < 0.001
Burkina Faso	285/463 (62%)	1
South Africa	385/492 (78%)	2.24 (1.69–2.99)
CD4+ count (cells/μL)		P-trend = 0.001
< 200	76/90 (84%)	1
200–349	151/206 (73%)	0.51 (0.26–0.97)
> = 350	442/658 (67%)	0.38 (0.21–0.69)
Age group		P-trend = 0.002
25–29	140/178 (79%)	1
30–34	184/254 (72%)	0.71 (0.45–1.12)
35–39	158/237 (67%)	0.54 (0.35–0.85)
40–49	188/286 (66%)	0.52 (0.34–0.80)

P3.224 EFFECT OF HERPES SIMPLEX VIRUS TYPE 2 (HSV-2) INFECTION ON PROGRESSION OF HIV INFECTION AMONG FEMALE SEX WORKERS IN BURKINA FASO

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Background The effect of HSV-2 on the natural history of HIV-1 remains unclear. Although trials have shown a modest but significant impact of HSV-2 suppression on HIV-1 disease progression, the sub-optimal antiviral efficacy of aciclovir and its potential antiretroviral effect have limited our ability to measure the true effect of HSV-2 on HIV-1 disease progression. This study aimed to assess the effect of untreated HSV-2 infection on the time to ART.

Methods From December 2003 to February 2012, HIV-1 infected female sex workers were enrolled in a prospective open cohort in Burkina Faso. At each 3-month follow-up visits, CD4 count and HIV-1 plasma viral load were done. Participants were offered care including ART and psychological support. Participants not on ART and having at least 350 CD4 cells/μl at enrolment (the current CD4 count threshold for ART initiation) were included in this analysis, which was censored at 36 months of follow-up when the assumption of proportional hazard was no longer met.

Results Overall, 164 co-infected women and 20 HIV-1 mono-infected women were enrolled in this study. At enrollment, the only difference between the two groups was a younger age of HIV-1 mono-infected women (median age 24 versus 31 years, p < 0.001). In linear mixed models, the age-adjusted mean CD4 count at baseline (intercept) was significantly lower among HSV-2 positive women (–211 cell/μL, p < 0.001), but no difference in baseline CD4-adjusted plasma viral load was observed. During follow-up, 3 out 20 HIV-1 mono-infected women initiated ART versus 52 out of 164 HSV-2 co-infected women. After adjustment for baseline CD4 count and age, HSV-2 infected women were still much more likely to initiate ART over 36 months (HR = 4.6, CI 95%: 1.04–20.5, p = 0.04).

Conclusion HIV-1 disease progression, as assessed by time to ART eligibility, was much accelerated for women co-infected with HSV-2.

P3.225 HSV-2 SEROPREVALENCE AMONG CURRENT INJECTION DRUG USERS IN ESTONIA

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Background STI prevalence or incidence data among HIV infected can help to distinguish populations with different levels of sexual HIV transmission risk. Herpes simplex virus type 2 (HSV-2) is considered useful because it is almost exclusively sexually transmitted, cannot be cured and leads to the production of lifelong antibodies. Unfortunately, few IDU studies include HSV-2 prevalence data.
Aim of the current work is to examine prevalence of and associations between HSV-2 infection, and HIV infection among injecting drug users (IDUs) in Kohtla-Järve, Estonia.
Methods Current IDU were recruited using chain referral methodology (RDS). Informed consent was obtained, a structured questionnaire including demographics, drug use history, and sexual risk behaviour was administered, and a blood sample was collected for HIV and HSV-2 antibody testing.
Results A total of 600 subjects were recruited in 2012. Subjects were primarily male (73%), with a mean age of 30 (SD 4.9) years. The prevalences of HIV and HSV-2 were 62%, and 32%, accordingly. Odds for being HSV-2 positive was higher among HIV infected IDUs (OR 1.9.95% CI 1.3–2.9). One third (27%) of the sexually active IDUs reported always using condoms (with in the last 4 weeks) prior the study.

Being HSV-2 positive was not associated with reported injection risk behaviour. HSV-2 seropositivity was associated with gender (higher among women; OR 2.7, 95% CI 1.8–4.0), and sexual behaviour: higher among those reporting IDU-sexual partners (OR 1.7, 95% CI 1.1–2.7), and those not always using condom (OR 2.0, 95% CI 1.2–3.4).
Conclusion HSV-2 seroprevalence can be used as a marker of (long-term) sexual risk. However, it might not capture more recent behaviour change in response to the HIV/AIDS among population groups studied.

High prevalence of HSV2 infection coupled with low reported condom use highlight the need of targeted sexual risk reduction interventions for IDU and their partners.

P3.226 PRE-EXPOSURE PROPHYLAXIS (PREP) IS ESTIMATED TO BE A COST-EFFECTIVE ADDITION TO ANTIRETROVIRAL THERAPY (ART) FOR HIV PREVENTION IN A GENERALISED EPIDEMIC SETTING

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Background In KwaZulu-Natal, South Africa, young women face an extraordinarily high risk for HIV acquisition, with annual incidence estimates of 6%. ART-based strategies for HIV prevention have the potential to significantly decrease HIV incidence, but the impact of PrEP in addition to ART scale-up is undefined. Modeling studies suggest that PrEP targeted to highest-risk groups could maximise benefits and contain costs.
Methods We developed a deterministic transmission model of HIV that stratifies the population by age, sexual activity, and includes HIV infection stage. The model was parameterized using data from community-based HIV counselling and testing studies in KwaZulu-Natal and validated using independent HIV prevalence and incidence estimates.

We estimated the effectiveness and cost-effectiveness of a 'test and treat' scenario, targeted PrEP by age and sexual activity, and general PrEP provision. Each scenario was in addition to anticipated baseline ART scale-up for CD4≤ 350 from 35% in 2013, as observed in KwaZulu-Natal, to 60% in 2018 (following national guidelines). We assumed PrEP efficacy of 70%.
Results 'Test and treat' (ART for 80% of all HIV-positive persons) reduced HIV incidence by 58% and averted 25% of cumulative infections by 2025, at an additional $39,900 per infection averted compared to baseline ART scale-up. PrEP targeted to 60% of 20–29-year-olds, in addition to baseline ART scale-up, reduced incidence by 42% and averted 22% of infections at an additional $22,500 per infection averted, whereas PrEP targeted to 80% of high-risk individuals reduced incidence by 33% and averted 13% of infections at an additional $7,400 per infection averted. PrEP coverage of 20% of the general population reduced incidence by 37% and incident infections by 18%, at an additional $26,900 per infection averted.
Conclusion In a generalised HIV epidemic setting PrEP is a cost-effective addition to ART, with targeted PrEP being more cost-effective than generalised PrEP distribution.

P3.227 A COMPARISON OF MICROSIMULATION AND DETERMINISTIC APPROACHES TO MODELLING OF SEXUALLY TRANSMITTED INFECTION DYNAMICS

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Background Deterministic models are widely used in simulating the potential effect of programmes for the prevention and treatment of HIV and other sexually transmitted infections (STIs). However, most deterministic models are frequency-dependent and do not model pair formation explicitly, which can lead to inaccuracies. We aim to quantify these inaccuracies by comparing a frequency-dependent deterministic model to a 'gold standard' microsimulation model of pair formation.
Methods An individual-based microsimulation model was created to represent as closely as possible the assumptions of a previously-developed deterministic model, which simulates heterosexual transmission of seven different STIs (HIV, genital herpes, syphilis, chancroid, gonorrhoea, chlamydia and trichomoniasis) as well as bacterial vaginosis and vaginal candidiasis, in the South African population. The microsimulation model was extended to simulate pair formation. For each STI, steady-state endemic prevalence levels were estimated using both models.
Results The ratio of the endemic STI prevalence in the microsimulation model to that in the deterministic model varied from 0.88 for HIV to 0.81 for genital herpes, 0.53 for chlamydia, 0.42 for trichomoniasis, 0.12 for gonorrhoea and 0.00 for both syphilis and chancroid. In contrast, the ratio was close to 1 for non-sexually transmitted infections (1.00 for vaginal candidiasis and 1.02 for bacterial vaginosis). The ratio was strongly negatively associated with the fraction of transmission occurring in the first 6 months of infection ($r = -0.98$).
Conclusion Frequency-dependent deterministic models of STIs tend to exaggerate the levels of transmission in the early stages of infection, because they ignore the period in which individuals remain in contact with the partner who infected them. This bias is particularly significant for non-viral STIs. Further work is required to assess whether microsimulation models of pair formation predict more accurately the effects of STI prevention and treatment programmes.

P3.228 HSV-2 SEROINCIDENCE AND ITS ASSOCIATION WITH MEDICAL MALE CIRCUMCISION, HIV, GENITAL ULCER DISEASE, AND PENILE EPITHELIAL TRAUMA

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