C1 - Natural history, progression and survival

WEPDB0104
HIV-1 outcompetes HIV-2 in dually infected Senegalese subjects with low CD4 counts
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Background: Dual infection with HIV-1 and HIV-2, which is not uncommon in West Africa, has important implications for transmission, progression, and antiretroviral therapy. Few studies have examined HIV viral dynamics in this setting.

Methods: We compared HIV-1 and HIV-2 viral loads from 65 dually infected, antiretroviral therapy-naı̈ve Senegalese subjects. Participants provided demographic information and blood, oral fluid, and cervicovaginal lavage (CVL) or semen samples for virologic and immunologic testing. Associations between HIV-1 and HIV-2 levels in plasma, PBMC, oral and genital samples were assessed using linear regression models with generalized estimating equations to account for subjects with multiple samples over time.

Results: In analyses adjusting for CD4 count, age, sex, and commercial sex work, HIV-1 RNA levels were significantly higher than HIV-2 levels in semen (β = 2.05 log10 copies/ml, 95% CI 0.44 to 3.66), CVL (β = 1.37, 95% CI 0.83 to 1.91), and oral fluids (β = 1.93, 95% CI 1.56 to 2.30). HIV-1 and HIV-2 PBMC viral DNA loads were similar in those with normal immune function (CD4 counts below 500 cells/µl had higher HIV-1 and lower HIV-2 levels. In plasma, subjects with CD4 counts above 500 cells/µl had higher HIV-1 and lower HIV-2 levels. In plasma, subjects with CD4 counts above 500 cells/µl had mean HIV-1 plasma RNA viral loads 0.87 log10 copies/ml higher (95% CI 0.35 to 1.38) than HIV-2, while among subjects with CD4 counts between 200 and 500 cells/µl or below 200 cells/µl, this difference increased to 4.28 and 4.35 log10 copies/ml (95% CIs 2.51 to 6.04 and 2.67 to 6.04), respectively.

Conclusion: Our data are consistent with the hypothesis that with decreasing CD4 counts and HIV disease progression, HIV-1 may outcompete HIV-2 in dually-infected individuals. This finding may help explain the differences in epidemiology between HIV-1 and HIV-2.

C2 - Trends in morbidity and mortality

MOAC0205
Social disparities and mortality in a large metropolitan HIV cohort
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Background: Evidence is mixed on the emergence of social disparities that may have accompanied the dramatic decline in mortality following the introduction of HAART in 1996. We investigate disparities in mortality with regard to gender, race/ethnicity and education during the first decade of the 21st century for three New York City (NYC) Metropolitan area cohorts.

Methods: Data are pooled for three cohorts. One cohort was recruited in NYC agencies in 1994 and remained active through 2001 (N = 698). A second NYC cohort was recruited in 2002 (N = 693) and remains active. A third cohort was recruited in 2001 from agencies located in three New York counties north of NYC (N = 398). Demographic data were obtained from baseline interviews. Date of death through 2009 was ascertainment through an online death registry. Causes of death were obtained for the two NYC cohorts from death certificates. Excess mortality was estimated by matching cohort mortality rates to NYC death rates on age, gender and race/ethnicity for 2003–2008. Mortality disparities were estimated using Cox proportional hazard models.

Results: Despite a sharp decline in mortality following HAART (Figure 1), the study cohort death rate of 33.2/1,000 person-years,
for 2003–2008, was 28.1 deaths/1,000 person-years in excess of the expected 5.1 death rate for a matched NYC general population. Excess mortality was particularly high for Hispanics (Table 1).

### Table 1. Observed and Excess Mortality

| Gender          | Observed Deaths/1,000 Person-Years | Expected Deaths/1,000 Person-Years | Excess Deaths/1,000 Person-Years |
|-----------------|------------------------------------|------------------------------------|----------------------------------|
| Male            | 37.6                               | 6.4                                | 31.2                             |
| Female          | 27.6                               | 3.5                                | 24.1                             |
| African American| 33.5                               | 6.3                                | 27.2                             |
| Hispanic        | 35.5                               | 3.5                                | 32.0                             |
| White/Other     | 26.9                               | 4.1                                | 22.8                             |

With respect to disparities, educational attainment proved to be a stronger basis for mortality differences than race/ethnicity or gender (Table 2).

### Table 2. Multivariate Hazard Ratios

| Gender          | Hazard Ratio (95% C.I.) |
|-----------------|-------------------------|
| Female          | 1.00                    |
| Male            | 1.28 (1.02–1.60)        |
| Race/Ethnicity  |                         |
| White/Other     | 1.00                    |
| African American| 1.28 (0.92–1.80)        |
| Hispanic        | 1.32 (0.93–1.89)        |
| Education       |                         |
| Less than H.S.  | 1.43 (1.10–1.87)        |
| H.S. Diploma    | 1.28 (0.94–1.72)        |
| Some College    | 1.00                    |

Finally, an analysis of cause specific deaths found that a smaller proportion of whites than African Americans or Hispanics died from opportunistic infections.

**Conclusion:** To further reduce mortality rates and disparities for HIV+ populations efforts should focus on maintaining current initiatives to improve patient engagement in HIV medical care coupled with support for medication adherence, while improving coordination with treatment for preventable deaths from other chronic conditions.

### C3 - Modelling HIV epidemics

#### MOAC0403

**Estimation of HIV sexual transmission potential from IDU to general population in two Russian cities**

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**Background:** HIV epidemic in Russia remains concentrated mostly among injection drug users (IDUs). Little is known about the extent to which sexual partnerships bridge between IDUs and the general population and create the potential for epidemic generalization.

**Methods:** IDUs in two Russian cities, Novosibirsk and Ivanovo (N = 593) were recruited via respondent-driven sampling. A modified one-step snowball strategy was used to recruit IDU’s sex-partners who do not themselves use drugs (PIDU, N = 82). Sexual behaviors of all participants were assessed using an interviewer-administered questionnaire. All participants provided blood specimens for HIV and HCV testing.

**Results:** In Ivanovo HIV prevalence among IDUs was 34% and among PIDUs - 6.8% (p ≤ 0.001). In Novosibirsk the corresponding prevalence were lower- 3.8% and 8.7% (n.s.). In both cities large
proportions of IDUs reported sexual partnerships with non-IDUs - 49.7% in Ivanovo vs. 62.7% in Novosibirsk ($p \leq 0.001$) and fewer than 1 in 4 IDUs reported constant condom use in such partnerships. PIDUs in Novosibirsk also tended to have other sexual relationships with non-IDU (52.2%) while in Ivanovo this behavior was less common (6.8%; $p \leq 0.001$). Based on the proportion of IDUs and their sex-partners reporting sexual connections with non-IDUs and mean number of such partners, we estimate that for every 100 IDUs in Ivanovo there are about 70 linked PIDUs and about 14 PIDUs downstream sex-partners from general population. For Novosibirsk the corresponding estimates are much greater 118 and 95 respectively.

**Conclusion:** This pilot study results shows that two IDU populations with significantly different HIV prevalence both form sexual partnerships with non-IDUs and practice unsafe sexual behavior within such type of partnerships. However the proportion of PIDUs who form partnerships with other non-IDUs that therefore could lead to epidemic generalization is very different between two cities and this difference needs to be considered when estimating the spread of HIV into the general population.

**MOPDC0201 Ageing with HIV in sub-Saharan Africa**

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**Background:** Antiretroviral treatment (ART) coverage is rapidly expanding in sub-Saharan Africa (SSA). Based on the extended survival of HIV-infected people and the reduced transmission, the age composition of the HIV epidemic in the region will change in the coming decades. We quantify the change of the age composition of HIV-infected people in 43 countries in SSA.

**Methods:** We used STDSIM, a stochastic microsimulation model, and developed a general approach to represent HIV prevalence and treatment coverage in 43 SSA countries, using publicly available data. We predict future trends in HIV prevalence and total number of infections among population aged 15–49 and 50 years and older for different ART coverage levels.

**Results:**

- **Introduction of cART lowers HIV incidence, but, by increasing survival of HIV positive individuals, increases HIV prevalence.**

**Conclusion:** Observed trends in incidence and prevalence of HCV and HIV in IDU in Amsterdam can almost exclusively be explained by demographic changes in the population over time. More generally, as the impact of harm reduction cannot easily be shown unequivocally in ecological studies, controlled intervention studies are needed to quantify its effect.

**TUAC0505 Decline in incidence of HIV and hepatitis C virus infection among injecting drug users in Amsterdam: evidence for harm reduction?**

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**Background:** Decline in incidence of HIV and Hepatitis C Virus (HCV) has declined very strongly, recently nearing zero. As previously suggested in van den Berg et al., one possible explanation is the large scale implementation of harm reduction?

**Methods:** We used individual based modeling to explore the transmission dynamics in this IDU population. Information about demographic parameters was obtained from the Amsterdam Cohort Studies among drug users. Our model includes changes in health behavior over time, the latter dependent on age and time since HIV-seroconversion. For Novosibirsk the corresponding estimates are much greater 118 and 95 respectively.

**Conclusion:** This pilot study results shows that two IDU populations with significantly different HIV prevalence both form sexual partnerships with non-IDUs and practice unsafe sexual behavior within such type of partnerships. However the proportion of PIDUs who form partnerships with other non-IDUs that therefore could lead to epidemic generalization is very different between two cities and this difference needs to be considered when estimating the spread of HIV into the general population.
changing the age composition of the HIV epidemic in SSA (Figure 2). In 2011, about 1 in 7 HIV-infected patients was aged over 50 years; in 2040, this ratio will be larger than 1 in 4.

Conclusion: We show that the HIV epidemic in SSA will rapidly age over the coming decades. This has important consequences for both the organization of health care services and the general organization of societies in the sub-continent, as older HIV-infected patients require specialized treatment and care, as well as social and financial support. In addition, expanded treatment coverage is likely to increase the burdens of other diseases in SSA, in particular NCDs.

Figure 2. Trend in total number of infections.

TUPDC0204
The contribution of HIV-discordant couples to HIV transmission in Lilongwe, Malawi
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Background: HIV-discordant couples represent possible targets for HIV transmission prevention strategies, such as pre-exposure prophylaxis and “treatment as prevention.” However, the population-level impact of such strategies on HIV incidence will depend on the relative contribution of discordant couples to HIV spread in a given setting.

Methods: We used a deterministic, compartmental model to estimate the proportion of incident HIV cases arising within stable discordant partnerships in Lilongwe, Malawi. The model, which was based on detailed behavioral and viral load data from a sexually transmitted infections clinic in Lilongwe, included sexual contact within and outside of steady partnerships, as well as changes in HIV transmissibility across infection stages. We used a Bayesian melding approach to fit the model to empirical HIV prevalence estimates, to account for input uncertainty, and to calculate 95% credible intervals around model outputs. The best-fitting model included a “lower-risk” and a “higher-risk” group, with average partnership lengths of 2.5 years and 1.3 months, respectively. We considered partnerships in the lower-risk group to represent stable partnerships. Among those stable partnerships, we estimated the proportions that are currently HIV-discordant, HIV-concordant-negative, and HIV-concordant-positive. We also calculated the proportion of all incident cases arising within the stable, HIV-discordant couples. Results: Based on the best-fitting (i.e., the mode) model simulation, 48.5% (95% credible interval 48.4%–75.2%) of the adult population of Lilongwe, Malawi belongs to a stable partnership. Among the stable partnerships, an estimated 5.0% (3.2%–11.7%) are HIV-discordant, 94.4% (85.5%–96.3%) are concordant-negative, and 0.6% (0.5%–3.0%) are concordant-positive. Only 4.5% (3.3%–39.5%) of all incident infections are estimated to occur within stable, HIV-discordant partnerships annually.

Conclusion: The small proportion of transmission events occurring within stable, HIV-discordant couples in our model suggests that interventions targeted specifically to this group should be complemented by strategies reaching other targets.

WEPDC0106
Population-level benefits from providing effective HIV prevention means to pregnant women in high prevalence settings
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Background: HIV prevalence among pregnant women in Southern Africa is extremely high. Some studies suggest that sexual risk of HIV acquisition during pregnancy is doubled and that infected women may be more likely to transmit HIV to male partners. Also, the association between high maternal viral load implies that HIV infections acquired during pregnancy carry higher risk of mother-to-child transmission (MTCT). We analyze the potential benefits from extending HIV prevention to pregnant women in addition to non-pregnant women using wide-scale microbicide interventions as an example.

Methods: A transmission dynamic model is designed to assess the impact of microbicide usage in high HIV prevalence settings and estimate prevented cumulative fractions of new HIV infections (CPF), fractions of infections acquired during pregnancy, and fractions of MTCT over 10 years.

Results: Consistent use of 70% efficacious microbicide by 60% of the non-pregnant women may prevent 36%–39% and 11% new infections in women and men over 10 years, respectively, assuming no increase in sexual HIV risk to either partner during pregnancy (RRsex/preg = 1). It may also prevent 5%–10% MTCT depending on the increase in MTCT risk when HIV is acquired during pregnancy compared to before pregnancy (RRMTCT/preg=1). The usage of microbicides by pregnant women may increase the absolute CPF by 5% (RRsex/preg = 1) to 10% (RRsex/preg = 2) and reduce the number of HIV infections during pregnancy by 40% to 70% in different scenarios. It may add between 5% (RRsex/preg = 1, RRMTCT/preg = 1) and 22% (RRsex/preg = 2, RRMTCT/preg = 4) reduction in MTCT.

Conclusion: Providing HIV prevention tools to pregnant women in the context of wide-scale interventions would be desirable as it would help to increase the effectiveness of the intervention, especially if sexual risk during pregnancy is elevated. It would significantly reduce the number of HIV infections acquired during pregnancy and help prevent MTCTs but should not be a substitute for PMTCT.

TPHDC0102
Modeling of HIV epidemic among men who have sex with men in Beijing, China
Background: A sharp increase of HIV epidemic has been observed among Chinese men who have sex with men (MSM) in the past 5–10 years, particularly in large cities like Beijing. China has implemented intervention campaigns to tackle this problem, but the impacts are unknown. We developed mathematical models for predicting the trends of HIV epidemic among MSM in Beijing City under different scenarios of interventions.

Methods: Deterministic HIV/AIDS models were developed in which a Bernoulli process was used to assess the relationship between per-act and per-partner anal intervention transmission probabilities over a given number of sex acts. Data for estimating parameters came from national and local HIV reporting and sentinel surveillance networks, Chinese free ART project database, local epidemiological studies and literature. Markov-chain Monte-Carlo simulations were carried out using the Metropolis-Hastings algorithm to estimate mean values of some parameters.

Results: The basic reproduction number is derived and a backward bifurcation occurs for some situations, suggesting that the classical requirement for the basic reproduction number to be below unity, though necessary, is not sufficient for disease control in this case. HIV prevalence rate among MSM in Beijing will increase from reported 1.2% in 2000, 7.8% in 2010 to projected 25% in 2020 if the coverage and intensity of interventions remain same. Simulations show that the sole intervention for increasing HIV testing will not reverse the rising trend of HIV epidemic if MSM do not change their risky sexual behaviors (Figure 1); while HIV epidemic can be reduced if these men reduce their risky sexual behaviors even they have a moderate level of HIV testing (Figure 2).

Conclusion: HIV epidemic will continue to rise rapidly among Chinese MSM if no enhanced prevention interventions are implemented. Integrated interventions for increasing HIV testing, risk reduction and ART update and adherence are needed.

C4 - Risk factors for acquisition of HIV

MOAC0404

Risk profiles of injecting partnerships: correlates of receptive syringe and cooker sharing among a cohort of young injecting drug users in San Francisco, California

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Background: It is increasingly recognized that HIV and hepatitis C (HCV) risk, such as syringe sharing, occurs in the context of relationships between (at least) two people.

Methods: In San Francisco from 2006 to 2011, we enrolled 53 injecting partnerships that were HCV-discordant at baseline based on RNA testing. Partnerships were defined as having injected together 5 or more times in the prior month. Each partnership completed monthly interviews for one year. Generalized linear models were used to examine correlates of two outcomes (1) receptive syringe sharing (RSS) and (2) receptive cooker-sharing (RCS) reported by the HCV-negative partner.

Results: Participants had a median age of 26 (IQR:23–28) and median years injecting of 8 (IQR:3–10). Within partnerships, 62% were female-male, 36% were male-male, 2% were female-female; the median number of times per day partners injected together was 2 (IQR:1–3), 25% were sexual and injecting partnerships and 48% lived together. RSS and RCS was more likely to occur in partnerships that lived together (OR =2.27, 95% CI: 1.42–3.63; OR =2.79, 95% CI: 1.70–4.58) and in sex and injection partnerships (OR =2.76, 95% CI: 1.75–4.36; OR =2.50, 95% CI: 1.55–4.02); partnerships who lived together and had sex were at even greater odds of risk (OR =4.15, 95% CI: 2.57–6.73; OR =3.52, 95% CI: 2.20–5.65). Among partnerships who lived together, living within unstable housing (e.g., on the street, park, or shelter) increased the risk for RSS (OR =2.22, 95% CI: 1.28–2.57) and RCS (OR =1.66, 95% CI: 1.70–2.36) compared to partnerships who lived in an apartment, hotel, or group home. Pooling money to purchase drugs also was positively associated with both outcomes (OR =1.82, 95% CI: 1.38–3.58; OR =2.11, 95% CI: 1.41–3.16). Duration of the relationship, gender composition of the partnership, HIV-status, or HCV-status was not associated with either of the outcomes.

Conclusion: Few studies have examined HIV-risk behaviors within drug-using partnerships. Our results suggest that relationship factors may influence risk within injecting partnerships and are an important consideration in the design of relationship-based interventions.
WEAC0101
Lost in transition: prevalence and correlates of HIV infection among young men and women surviving abduction and displacement in post-conflict Northern Uganda
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Background: After more than two-decades of war and displacement in Northern Uganda, over one million Internally Displaced Peoples (IDPs) are returning to their home villages. However, thousands of IDPs are only halfway home, living in transit camps near their villages. This population in transition provided a unique opportunity to assess the influence of conflict on HIV infection among young people surviving displacement and abduction in post-conflict Northern Uganda.

Methods: In 2010, a cross-sectional demographic and behavioral survey was conducted with 384 young people aged 15–29, residing in transit camps in one of two sub-counties in Gulu District. Biological specimens for HIV were collected for Rapid testing in the field and Confirmatory testing in a lab. Multivariable logistic regression identified factors significantly associated with HIV infection.

Results: Of the 384 participants sampled, 192 (50%) were female and 107 (27.9%) were former child soldiers. Overall HIV prevalence was alarmingly high at 12.8%. HIV prevalence among females was 15.6%, 9.9% among males, and 12.1% among former child soldiers. In multivariable logistic regression, HIV positivity was significantly associated within-consentual sex (AOR: 9.9, 95% CI 1.7, 18.06); sub-county A (AOR: 2.9, 95% CI 1.3, 6.7); STI symptoms past 12 months (AOR: 2.4, 95% CI 1.4, 6.2); practicing dry sex (AOR: 2.3, 95% CI 1.0, 5.1); age (AOR: 1.2, 95% CI 1.1, 1.3); thinking you could protect yourself from HIV (AOR: 29, 95% CI 11.2, 69); and number of HIV tests in lifetime (AOR: 86, 95% CI 81, 91).

Conclusion: In post-conflict Northern Uganda it has been observed that NGOs focused on relief who previously supported HIV/AIDS prevention and treatment have shuttered operations, leaving gaps in care. This, coupled with other strains of post-conflict resettlement, has produced a generation of young people ‘lost in transition’, leaving them at heightened risk of contracting HIV/AIDS. Applicable post-conflict HIV/AIDS programming is urgently required.

WEAC0201
Association between STI/RTI infections, altered cervical innate immunity and HIV-1 seroconversion among hormonal contraceptive users
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Background: Hormonal contraceptives (HC) have been associated with risk of HIV-1 seroconversion in women and their partners. We examined the association between injectable HC (DMPA), combined oral contraceptives (COC), and no hormonal contraceptive use (NH) with genital tract mucosal immunity biomarkers in women with STI/RTI who did or did not become HIV infected.

Methods: Biomarkers were quantified in cervical swabs from 832 HIV-uninfected reproductive-aged Ugandan and Zimbabwean women with documented HC use, HIV/STI behavioral risk factors, STI/RTI signs and symptoms, and were correlated with HIV-1 seroconversion at last visit. C. trachomatis (CT) and N. gonorrhoeae (NG) were diagnosed by PCR, genital herpes by HSV-2 antibody ELISA, BV by Nugent score, and candida by wet mount. Multivariable generalized linear models utilizing Box-Cox power transformation examined associations between levels of biomarkers and risk factors for HIV infection (STIs including signs and symptoms, HC use). Odds ratios with Breslow-Day test for homogeneity described the risk of having top quartile concentrations of biomarkers in STI/RTI+ versus negative women across HC groups.

Results: Women who had both signs and symptoms of STI/RTI had higher beta-defensin (BD)2 and lower SLPI levels in cervical secretions compared to STI-free women. Both of these changes were associated with HIV seroconversion (occurring among 24% of women at the next visit). Among women with BV, odds of top quartile BD2 levels were higher in the OC and DMPA users than in the NH group. When compared to NH, DMPA use was associated with lower levels of the anti-inflammatory regulator IL-1RA overall and, in women with intermediary vaginal microflora, HSV-2 and NG, with significantly lower odds of top quartile IL-1RA concentrations.

Conclusion: OC and DMPA differentially modulate levels of cervical protective immune mediators, altering responses to STI/RTIs, and providing insight into possible biological mechanisms for higher risk of HIV acquisition.

C5 - Hormonal contraception and HIV

WEAC0202
Association of injectable contraception and risk of HIV-1 acquisition in women in HIV-1 serodiscordant partnerships: persistence of effect in multiple sensitivity analyses
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Background: We recently reported that women in HIV-1 serodiscordant partnerships using injectable contraceptives had a 2-fold increase in HIV-1 acquisition risk (ahR = 2.05, p = 0.04; Heffron et al., Lancet Infectious Diseases 2012). Here, we report the results from multiple additional sensitivity analyses examining the robustness of our findings.

Methods: We used Cox proportional hazards regression, adjusting for age, male partner’s plasma viral load, and time-dependent unprotected sex and pregnancy, to compare HIV-1 incidence in women using injectable contraception to women reporting no hormonal method. Sensitivity analyses included: 1) additional or alternative covariates to adjust for sexual behavior, 2) restricting to follow-up periods when unprotected sex was reported,
increased HIV-1 risk despite numerous methods to control for injectable contraception continued to be associated with a nearly 4-fold increased HIV-1 risk (aHR = 3.93, p = 0.01).

Conclusion: Injectable contraception continued to be associated with increased HIV-1 risk despite numerous methods to control for potential imprecision in contraceptive exposure measurement and/or key behavioral confounders. Some analyses had p-values > 0.05 due to reduced statistical power but the magnitude of association continued to be as strong as that seen in our primary analytic model.

WEAC0203
Hormonal contraception and HIV acquisition in women: a systematic review of the epidemiological evidence
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Background: There are data suggesting that use of hormonal contraception (HC) might affect the risk of HIV infection in HIV-negative women.

Methods: We conducted a systematic review of the epidemiological literature on the association between HC and HIV acquisition. We systematically searched for relevant articles in any language published or in press by December 15, 2011, evaluated study quality, assessed the association of study findings with various methodological features, and synthesized the evidence.

Results: We identified twenty relevant studies, eight of which met minimum quality criteria. Of these, only one reported a statistically significant association between use of oral contraceptive pills (OCPs) and HIV acquisition. No studies reported statistically significant associations between use of norethisterone enantate (Net-En) and HIV acquisition, but data were limited. Estimates for depot medroxyprogesterone acetate (DMPA) or non-specified contraceptive injectables and HIV acquisition were heterogeneous, and we considered factors including analysis of condom-use information, length of inter-survey interval, and analysis of serodiscordant couples as possible reasons for heterogeneity.

Conclusion: Overall, current evidence does not suggest an association between OCP use and HIV acquisition. No currently available evidence suggests an association between Net-En and HIV acquisition, though data are limited. Evidence assessing DMPA or non-specified injectable contraception and risk of HIV acquisition is inconsistent; it does not establish a clear causal association with HIV acquisition, nor does it definitively rule out the possibility of an effect. Concerns remain about the potential for residual confounding, even within otherwise high-quality studies. Many women at risk of HIV have a critical need for safe and effective means of pregnancy and infection prevention, and it is imperative that clients and providers are informed that HC does not protect against HIV or other STIs.

WEAC0204
Hormonal contraception and HIV disease progression: a systematic review of the epidemiological evidence
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Background: Prevention of unintended pregnancy remains a key concern for women living with HIV, both as a core strategy to prevent mother-to-child transmission of HIV and to decrease maternal and neonatal morbidity and mortality through lower birth rates, improved birth spacing, and lower rates of unsafe abortion. However, there are theoretical concerns about the effect of various contraceptive methods on HIV disease progression.

Methods: We conducted a systematic review to determine whether HIV-infected women who use hormonal contraception are at increased risk of HIV disease progression compared with those who do not use hormonal contraception. We searched PUBMED and EMBASE for articles published in peer-reviewed journals through December 15, 2011 for evidence relevant to all hormonal contraceptive methods and HIV disease progression.

Results: Twelve reports of eleven studies met inclusion criteria. One randomized controlled trial (RCT) found increased risk of a composite outcome of declining CD4 count or death among hormonal contraceptive users when compared with copper IUD users. Ten observational studies reported no increased risk of HIV disease progression, as measured by mortality, time to CD4 below 200, time to initiation of antiretroviral therapy, increased HIV-RNA viral load, or decreased CD4 count with hormonal contraceptive use compared with non-use.

Conclusion: One RCT found that hormonal contraceptive use was associated with increased risk of HIV disease progression when compared with IUD use, but this study had important methodological shortcomings. Cohort studies consistently found no association between hormonal contraceptive use and HIV disease progression compared with non-use of hormonal contraceptives. Thus, the preponderance of evidence indicates that HIV-positive women can use hormonal contraceptive methods without concern related to HIV disease progression. Prevention of unintended pregnancy through safe and effective contraceptive use among women with HIV remains a public health priority to safeguard maternal health and prevent mother-to-child transmission of HIV.

C6 - Risk factors for infectivity, progression and transmission of HIV
WEAB0202
Racial disparities in antiretroviral therapy use and viral suppression among sexually active HIV-positive men who
have sex with men receiving medical care: United States, Medical Monitoring Project, 2009 data collection cycle
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Background: In the United States, black men who have sex with men (MSM) are substantially more likely to acquire HIV than white MSM. Given highly racially homogeneous sexual networks, lower levels of viral suppression in HIV-infected black MSM (due to differences in antiretroviral [ART] use), might contribute to racial disparities in HIV infection. We present the first nationally representative data on disparities in ART use and viral suppression among sexually active black and white MSM receiving care.

Methods: We used interview and medical record data collected June 2009-May 2010 from the Medical Monitoring Project (MMP), a national probability sample of HIV-infected adults receiving medical care January-April 2009. We estimated the prevalence of self-reported current ART use and clinical documentation of viral suppression (most recent viral load ≤ 200 copies/ml) among sexually active non-Hispanic black MSM and white MSM. Analyses accounted for clustering, unequal selection probabilities, and non-response.

Results: Of 4,217 eligible participants, 313 black MSM and 691 white MSM were identified. Estimated national prevalence of ART use and viral suppression for these subpopulations is shown in the Figure. Black MSM were significantly less likely than white MSM to report ART use (p < .001) and be virally suppressed (p < .01).

Conclusion: Among sexually active MSM receiving care, there are substantial racial disparities in ART use and viral suppression. One-fifth of black MSM were not on ART and almost one-third were not virally suppressed. These differences may contribute to the racial disparity in new infections among MSM. Narrowing gaps in ART use and viral suppression between HIV-infected black and white MSM will reduce morbidity among HIV-infected black MSM and might contribute to reducing new HIV infections among uninfected black MSM.

Figure. Estimated percentage of HIV-infected adults receiving medical care on antiretroviral therapy and with suppressed viral load, among sexually active men who have sex with men (MSM) by race—Medical Monitoring Project (MMP), United States, 2009 Data Collection Cycle [Beer et al. IAC 2012 figure].

TUAC0101
HIV-1 subtype C is not associated with higher risk of heterosexual transmission: a multinational study among African HIV-1 serodiscordant couples
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Background: HIV-1 subtype C is the most common subtype worldwide and the dominant subtype in southern Africa. It has been hypothesized that increased transmissibility could explain the explosive spread of subtype C in southern Africa. We assessed the risk of heterosexual HIV-1 transmission in subtype C compared with other subtypes among serodiscordant couples.

Methods: We performed a nested case-control study within a multinational prospective cohort of stable HIV-1 serodiscordant couples from 7 countries in eastern and southern Africa (Partners in Prevention HIV/HIV Transmission Study). Cases were defined as couples in which phylogenetically-linked HIV-1 transmission occurred within the partnership; four controls for each case were selected proportionally from non-transmitting couples by the study site and gender distribution of the full study cohort. HIV-1 subtype in the HIV-1 infected partner was determined through consensus partial env and gag gene sequencing. We used an adjusted logistic regression to calculate the odds of HIV-1 transmission by subtype C versus non-C subtypes, controlling for gender, age and baseline unprotected sex.

Results: HIV-1 subtype distribution was comparable between cases (N = 123) vs. controls (N = 459): subtype A (45% vs. 44%), subtype C (38% vs. 39%), subtype D (15% vs. 14%), subtype G (1% vs. 1%), and circulating recombinant forms (CRF, 2% vs. 3%). Subtype C was not associated with an increased likelihood of HIV-1 transmission (env adjOR = 0.85, 95% CI 0.52–1.24, p = 0.3; gag adjOR = 1.34, 95% CI 0.86–2.10, p = 0.2). Further adjustment for plasma viral load did not substantially change these risk estimates (env adjOR 0.80, 95% CI 0.51–1.23, p = 0.3; gag adjOR = 1.27, 95% CI 0.80–2.00, p = 0.3). Analyses comparing subtype C to other subtypes showed no significant associations for HIV-1 transmission risk.

Conclusion: In this multinational study of HIV-1 transmission among stable heterosexual African HIV-1 serodiscordant couples, we found no evidence of increased transmission risk for subtype C in adjusted analyses.

TUAC0104
Impact of antiretroviral therapy on HIV-positive status disclosure in rural South Africa
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Background: HIV-positive individuals risk transmission to uninfected sexual partners. This risk may be elevated in the absence of disclosure of HIV status, but could be ameliorated given several options to prevent sexual transmission once HIV status is known. The purpose of this study was to assess the impact of antiretroviral therapy (ART) on degrees of HIV status disclosure.

Methods: In this prospective cohort study, we enrolled consenting, HIV-positive adults from the CAPRISA Vulindlela AIDS Treatment programme into one of two arms (ART experienced or ART naive).
Disclosure of HIV status was not a prerequisite for care or treatment. Data were collected at two time points using structured questionnaires including demographic, clinical, and HIV status disclosure information.

**Results:** Between June 2006–August 2009, 687 HIV-positive individuals were enrolled; 73.3% were female. At enrollment, 414 participants (60.3%) were on ART (median days on ART 54, IQR 167; median CD4 138/L, IQR 86–254). Disclosure was common in ART and non-ART groups, with ART experienced participants more likely to have disclosed to at least one person than ART naive individuals (99% versus 83.3%; p < 0.001). Disclosure occurred soon after HIV diagnosis (median0–1 day, respectively).

Disclosure rates to sexual partners were markedly lower in both ART and non-ART groups (31.6% and 26.0%), and was less common among females compared to males (23.7% versus 45.1%; p < 0.001). Low rates of further partner disclosure persisted at a median of 4.4 months post-enrollment (Females 9.9% versus Males 19.2%; p = 0.003).

**Conclusion:** Patients on ART had higher rates of disclosure. HIV-positive individuals in both arms readily disclosed to family members and wider social networks. Rates of disclosure to sexual partners were much lower, particularly among female participants. This represents an addressable risk for HIV transmission in serodiscordant partnerships.

**TUAC0202:**
More frequent sexual risk behaviours among HIV-negative sexually transmitted infection clinic patients compared to HIV-positive and HIV-negative HIV testing and counseling center patients in Lilongwe, Malawi

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**Background:** Multiple sexual partnerships, specifically concurrent partnerships, may play an important role in HIV transmission. Persons seeking HIV testing and counseling at sexually transmitted infection (STI) clinics may exhibit riskier behavior than those seeking testing at HIV Testing and Counseling (HTC) centers. We examined concurrency and other risk behaviors among HIV-uninfected STI patients and HIV-infected and HIV-uninfected HTC patients in Lilongwe, Malawi.

**Methods:** We recruited participants from a central hospital STI clinic (STI) and a nearby HTC Center (HTC) in Lilongwe, Malawi. Participants provided demographics and sexual behavior. Summary statistics were compared using independent group t-tests (continuous variables) and Pearson’s χ² tests (categorical variables). We investigated associations between several demographic variables with concurrent partnerships using logistic regression.

**Results:** HIV prevalence at HTC was 19.9% CI [0.172, 0.227]. HIV-infected and HIV-uninfected persons at HTC were more alike than HIV-uninfected persons at STI. Among persons at HTC, HIV-infected and HIV-uninfected differed in age, gender, and marital status but there were no differences in risk behaviors. Condom use at last sex was similar across all groups (p = 0.60). HIV-uninfected persons at STI had more sexual partners and were more likely to report concurrent partnerships than either HTC group. Concurrent partnerships were rare among women in either setting (n = 3) so logistic regression models were restricted to males (n = 522). HIV-infected and HIV-uninfected men testing in HTC were significantly less likely to report concurrency than men at STI (OR0.13, CI[0.04, 0.46], OR0.29, CI[0.15, 0.55], respectively), holding age, marital status, and above-listed risk behaviors constant.

**Conclusion:** Persons enrolled in the STI setting had a much higher prevalence of concurrency than HIV-infected or HIV-uninfected persons at HTC. Behavioral similarities and high HIV prevalence at HTC may suggest important role that sexual networks play in HIV acquisition risk. Even in a generalized epidemic, behavioral...
interventions in STI and HTC clinics represent promising opportunities to reduce HIV acquisition.

Patients in routine HIV clinical care at-risk for potentially transmitting HIV in the ‘test-and-treat’ era of HIV prevention

**Background:** While test-and-treat policies with earlier initiation of therapy can decrease HIV transmission, many patients are still at-risk for transmitting HIV even after diagnosis and initiation of care. This study examines rates and predictors of detectable viremia and HIV transmission risk behaviors among patients in clinical care and compares these to predictors of inadequate antiretroviral adherence.

**Methods:** CNICS patients complete a touch-screen-based assessment including drug/alcohol/tobacco use, adherence, and sexual risk behavior measures. Data from 5 sites (Seattle, Boston, Birmingham, San Diego, San Francisco) were included. We used generalized estimating equations adjusting for age, race, sex, and site. Our primary outcome, being at-risk for potentially transmitting HIV, was defined as being sexually active with incomplete/no condom use in the prior 6 months and having a detectable viral load.

**Results:** 15,140 assessments were completed by 5,905 patients. Rates of detectable viremia with incomplete/no condom use were 15/36% by site. Patients > 50 years of age and women were less likely to be at-risk than younger patients or men (p values < 0.001). At-risk patients were more likely to have ≥ 2 sex partners in the prior 6 months (54% vs. 19% p < 0.001). In separate adjusted analyses, patients reporting current amphetamine use or injection drug use of any kind had more than double the odds of being at-risk for potentially transmitting HIV (Figure). Patients reporting current alcohol, marijuana, or cocaine/crack abuse had ~1.5 times the odds of being at-risk. Similar patterns of predictors were found for inadequate adherence (Figure).

**Conclusion:** Even patients who have established outpatient HIV care may engage in risky sexual behavior with detectable viremia, and substance use, particularly amphetamines, may be one important factor. Test-and-treat policies do not eliminate the need to focus on prevention of potential HIV transmission risk with diagnosed patients in care.

Demographics and HIV Risk Behaviors by Group.

|                        | STI (HIV-uninfected) | HTC (HIV-infected) | HTC (HIV-uninfected) | Overall p-value |
|------------------------|----------------------|--------------------|----------------------|-----------------|
|                        | (n = 200)            | (n = 167)          | (n = 669)            |                 |
| Average age            | 28.4                 | 32.2               | 29.9                 | <0.01           |
| Male (%)               | 128 (64)             | 66 (39)            | 362 (54)             | <0.01           |
| Married (%)            | 132 (66)             | 107 (64)           | 349 (52)             | <0.01           |
| # Sexual Partners, last 4 weeks, mean (median) | 1.2 (1) | 0.92 (1) | 0.84 (1) | <0.01 |
| # Sexual Partners, last 3 months, mean (median) | 1.4 (1) | 1.0 (1) | 0.92 (1) | <0.01 |
| Exchanged sex for money (%) | 32 (16) | 4 (3) | 18 (3) | <0.01 |
| Concurrent partnerships, last 3 months (%) | 41 (21) | 5 (3) | 34 (5) | <0.01 |
| Condom use at last sex (%) | 26 (13) | 20 (13) | 98 (15) | P = 0.60 |
| Sex with known HIV+, last 3 months (%) | 9 (5) | 37 (6) | P = 0.33 |

**Figure 1.** A. Odds of Being At-Risk for Potentially Transmitting HIV, B. Odds of Inadequate Adherence.
FRLBC04

BCG vaccination at birth induces non-specific CD4 T cell activation in HIV-exposed South African infants, which may increase HIV transmission through breastfeeding

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Background: In sub-Saharan Africa, where BCG vaccine is routinely given around birth to protect from disseminated TB, almost a third of infants are HIV-exposed. HIV preferentially infects activated CCR5+CD4+ cells. Highly HIV-exposed, seronegative individuals have relatively decreased peripheral CD4 T cell activation. We hypothesized that routine BCG vaccination of HIV-exposed neonates causes non-specific CD4+ T cell activation.

Methods: HIV-exposed, uninfected South African infants were randomized to receive either BCG at birth or at 8 weeks of age, and blood was collected at birth, 2 and 6 weeks. Unstimulated PBMCs were stained with viability dye, anti-CD3, -CD4, -CD8, -CCR5, the activation markers CD38 and HLA-DR, and the proliferation marker Ki67. PBMC and plasma cytokine mRNA and protein levels were measured using RT-PCR and Luminex respectively.

Results: At 6 weeks of age, there was a significantly higher HLA-DR expression and CCR5, HLA-DR and CD38 co-expression on CD4+ T cells (p = .02 and p = .01 respectively; n = 94) in the infants who had received BCG at birth compared to unvaccinated infants (delayed arm). In contrast, there was no difference in CD8 T cell activation between BCG-vaccinated and unvaccinated infants. The CCR5 agonist, MIP1β, was significantly higher at 6 weeks in plasma of unvaccinated infants (p = .02). There were no differences in plasma IFN-α, IFN-γ, MCP-1, TNF-α, IL-8, GMCSF or IP-10 levels, nor differences in PBMC IFN-α, IFN-γ, RANTES, TNF-α, IL-8, IL-10, TGF-β, OAS or IP-10 mRNA levels, between vaccinated and unvaccinated infants.

Conclusion: BCG vaccination induces non-specific CD4+ T cell activation and down-regulation of MIP-1β expression. This elevated T cell activation may increase HIV infections in breastfed infants and may contribute to rapid disease progression. Further research regarding the risks and benefits of BCG vaccination in HIV-exposed infants is needed to inform policy and practice.

FRLBX05

Continuum of HIV care: differences in care and treatment by sex and race/ethnicity in the United States

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Background: Early diagnosis of HIV, prompt linkage and sustained care, and antiretroviral therapy are associated with reduced individual morbidity and mortality and onward transmission of the virus. However, optimal levels of these indicators may not be achieved by all population groups with HIV.

Methods: Using data from CDC’s National HIV Surveillance System, we determined the number of persons living with HIV aware and unaware of their infection using back-calculation models, and the percentage of persons linked to care within three months of diagnosis based on CD4 and viral load tests. We estimated the percentages of persons retained in care, prescribed antiretroviral therapy, and with viral suppression using data from the Medical Monitoring Project, a surveillance system of persons in HIV care in select areas representative of all such persons in the United States. Using these data, we determined the continuum of care indicators for persons with HIV by sex and race/ethnicity.

Results: Of the estimated 1,148,200 persons living with HIV in 2009 in the United States, 869,000 (76%) were male, 510,600 (44%) black or African American, and 220,400 (19%) Hispanic or Latino. The percentages of females diagnosed, linked to care, retained in care, and prescribed ART were slightly higher than for males but there were no substantial differences in viral suppression. The percentages were lower in each stage of the continuum for blacks/African Americans and Hispanics/Latinos compared with whites. Overall, 857,276 persons with HIV were not virally suppressed, including 75% of males, 79% of blacks/African Americans, 74% of Hispanics/Latinos, and 70% of whites. Numbers were too small to present for other races.

Conclusion: Disparities exist in each step of the continuum for blacks/African Americans and Hispanics/Latinos. Additional efforts are needed to ensure that all persons with HIV get optimal care, reduce disparities, and ultimately reduce HIV transmission.
TUPDC0201
One in ten couples in Mozambique is serodiscordant and most do not know it: results from the 2009 national HIV seroprevalence survey

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Background: Serodiscordant couples are an important source of new HIV infections. This analysis explores the prevalence of HIV serodiscordance among couples, HIV-testing behavior, and factors associated with serodiscordance in Mozambique.

Methods: A nationally representative HIV seroprevalence survey was conducted in Mozambique in 2009. Couples who were married or cohabiting were identified, their HIV status compared, and factors associated with concordant positivity versus serodiscordance were measured. Data were analyzed using cross-tabulation and logistic regression.

Results: 15% of 2,468 couples in Mozambique had one or both members HIV infected. Serodiscordant couples outnumbered concordant positive couples two to one (10.2% vs. 4.9%). Among discordant couples, only 15% reported that both members of the couple had been tested for HIV and received the results. Overall, 6% of discordant couples used a condom the last time they had sex with each other (compared with 3% of all couples). Condom use was positively associated with exposure to HIV testing and with HIV-seropositivity in the female partner. The only consistent risk factor for couples being concordant positive vs. discordant in the multivariate analysis was a history of self-reported symptoms of sexually transmitted infections (STIs). For example, in the binomial model, if either member of the couple had an STI, the couple was less likely to be discordant vs. concordant positive (adjusted odds ratio 0.40; 95% confidence interval 0.18, 0.89).

Conclusion: One in every ten couples in Mozambique is HIV-serodiscordant. The HIV-negative partners in this group are at high risk for becoming infected; however, few discordant couples know that they are discordant, and are therefore unlikely to take protective measures.

C7 - Epidemiology of HIV in the general population, women, adolescents and children

FRLBX01
HIV prevalence trends after scale-up of antiretroviral treatment: a population-based study in a poor rural community in KwaZulu-Natal

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Background: Unless compensated by large declines in HIV incidence, the survival benefits of antiretroviral treatment (ART) are expected to lead to increases in HIV prevalence, especially in the world regions with already very high prevalence rates. We investigate HIV prevalence trends in one such region, a rural in KwaZulu-Natal, South Africa, before and after the scale-up of antiretroviral treatment (ART), over the period 2004–2011.

Methods: We estimated adult HIV prevalence trends (overall and in sex-age strata), using data from the longitudinal, population-based HIV surveillance at the Africa Centre for Health and Population Studies. To control for selective surveillance non-participation on a wide range of observed, demographic, social, economic and behavioral factors, we use multiple imputation with chained equations (MICE).

Overall prevalence estimates by method and year.

| Year/Method | Crude Prevalence Estimates (%) | Imputed Prevalence Estimates (%) |
|-------------|-------------------------------|----------------------------------|
| 2004        | 20.0 (18.4–21.6)              | 21.9 (21.1–22.7)                 |
| 2005        | 20.3 (19.7–21.0)              | 20.6 (19.7–21.5)                 |
| 2006        | 20.0 (19.3–20.7)              | 20.2 (19.0–21.4)                 |
| 2007        | 22.1 (21.3–22.8)              | 22.2 (20.7–23.6)                 |
| 2008        | 22.8 (22.1–23.5)              | 23.4 (22.2–24.5)                 |
| 2009        | 26.5 (25.7–27.3)              | 27.0 (26.0–28.0)                 |
| 2010        | 28.9 (28.1–29.7)              | 28.3 (27.0–29.6)                 |
| 2011        | 27.8 (26.6–29.0)              | 28.8 (27.4–30.3)                 |

Figure 1. Female prevalence trends by age group.

Figure 2. Male prevalence trends by age group.
Results: We find a clear upward trend in both crude and imputed prevalence estimates for the overall population, which was particularly large in 2010 and 2011, i.e., at a time when ART coverage under the current South African ART guidelines had reached high levels (about 75% in 2010). For women aged 25–49, we found a clear increase in HIV prevalence starting in 2006, but we did not find similar time trends in women aged 15–24, or men.

Conclusion: We find a large increase in overall adult HIV prevalence in a community in rural KwaZulu-Natal with traditionally very high HIV prevalence and recent achievements of high ART coverage. Decomposing the HIV trends by sex and age group, we find that the increase in overall adult HIV prevalence is largely driven by increases in women aged 25–49, i.e., the sex-age group with the largest absolute number of people receiving ART. These results suggest that the increase in overall HIV prevalence is due to increased survival of HIV-infected people following the ART scale-up, rather than due to dramatic increases in HIV incidence.

Background: HIV prevalence tends to be higher in urban areas and this trend will be exacerbated by continuing urbanization and the anticipated growth of slums. This concentration of HIV in cities requires a matched response that is informed by evidence and adequately resourced. To date, little research or emphasis has been put on urban responses to the epidemic.

Methods: An assessment of the status of urban HIV epidemics and responses in Eastern and Southern Africa (ESA) was based on a synthesis of epidemiological data and literature, evaluation of existing city responses, expert consultations through SEARCH-network and the results from 2 recent city KYE/KYR pilot exercises in Durban and Windhoek.

Results: The review shows that (i) city epidemics show important intra-city variations with higher prevalence in slum-dwellers, women and key populations (ii) that large cities with generalised epidemics host epidemics that are comparable in size to many national epidemics; (iii) in most ESA countries 30–70% of national epidemics is concentrated in the top 4–6 cities; (iv) epidemiological trends and modes of transmission are poorly understood; (v) City prevention responses are sparse, not comprehensive, poorly coordinated, not evidence-based and underfunded; (vi) HIV treatment is increasingly becoming available but universal access is rare; (vii) City specific KYE/KYR exercises provide clear information on gaps and can empower city leadership to strengthen coordination and planning.

Conclusion: The urban HIV epidemic in ESA is large and expected to increase over the next decade. However city epidemics are poorly understood and city specific responses are inadequate. For large and generalized city epidemics, it is recommended that city specific KYE/KYR and synthesis exercises be conducted. It is recommended that sampling frameworks of epidemiological surveys be designed to be representative of urban areas. Ownership by city authorities and partnership with health & social services and civil society is crucial.

Low risk of HIV and STI among drug users in Amsterdam
MOAC0405
Methamphetamine use is associated with sexual abuse and HIV sexual risk behaviours among patrons of alcohol serving venues in Cape Town, South Africa
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Background: South Africa’s Western Cape has experienced a dramatic increase in methamphetamine (“meth”) use over the past decade. There is concern that meth may further fuel the HIV epidemic in this country because of its association with risky sexual behavior. The present study describes the prevalence of meth use and its association with HIV sexual risk behavior.

Methods: Adult patrons (N = 3,328) in 12 alcohol-serving venues in a mixed race township in Cape Town completed brief surveys that assessed substance use, interpersonal violence, and sexual risk behavior. Logistic regression models were used to test the relationship between meth use and HIV risk factors. Mediation models examined pathways from childhood sexual abuse to meth use to HIV risk behaviors.

Results: Meth use in the past 4 months was more common among Coloured than Black persons (10.5% vs. 3.5%, p <.001). Meth use was related to a history of childhood sexual abuse and recent sexual assault (all p <.001). Among both men and women, meth users were more likely than non-users to have had multiple sex partners, engaged in sex trade, and been diagnosed with a sexually transmitted infection (STI) in the past 4 months (all p <.01).

Meth was also associated with unprotected intercourse among women and HIV diagnosis among men (all p <.01). Support was found for a structural equation model in which meth use mediated significant relations between childhood sex abuse and five sex risk factors.

|                    | Women          | Men              |
|--------------------|----------------|------------------|
|                    | Meth (n = 95)  | No Meth (n = 1,360) | AOR   | 95% CI     | Meth (n = 117) | No Meth (n = 1,756) | AOR   | 95% CI     |
| Multiple partners  | 28.4%          | 18.9%            | 2.42** | 1.46 – 4.01 | 56.4%          | 44.2%            | 1.79** | 1.18 – 2.71 |
| Unprotected sex    | 66.3%          | 42.6%            | 2.45** | 1.56 – 3.84 | 60.0%          | 48.0%            | 1.45   | 0.98 – 2.17 |
| “Sold” sex         | 16.8%          | 4.2%             | 6.34** | 3.26 – 12.35 | 31.6%          | 8.1%             | 4.64** | 2.96 – 7.27 |
| “Bought” sex       | 6.3%           | 2.4%             | 3.45** | 1.31 – 9.06  | 28.2%          | 8.7%             | 4.80** | 3.03 – 7.61 |
| Sexually transmitted infection | 11.6% | 4.4% | 3.84*** | 1.84 – 8.02 | 15.5% | 5.9% | 2.95*** | 1.66 – 5.36 |
| HIV diagnosis (lifetime) | 8.2% | 8.3% | 1.33 | 0.55 – 3.23 | 15.2% | 6.1% | 3.79*** | 1.95 – 7.36 |

Associations between meth use and HIV sexual risk.
J.R. Lama 1, P. Gonzales 1, R. Cabello 2, G. Sal y Rosas 1 and higher education level. This behavior was independently associated with high school or higher education (OR 2.77; 95% CI 1.34–3.86); self-identification as sex worker (OR 2.29; 95% CI 1.39–3.77); and self-identification as bisexual or heterosexual (OR 2.77; 95% CI 1.34–5.75).

Conclusion: Tailored strategies to reduce risky sex behavior associated with drug consumption are urgently needed among MSM in Peru and must target subpopulations at the highest risks.

Figure 1. Mediation model depicting mediated effects of childhood sexual abuse on multiple sexual risk behaviours through meth [Mediation model].

behaviors; sold sex, bought sex, STI, unprotected sex, and multiple partners were significantly predicted (R² = .21, .12, .08, .04, .02, respectively).

Conclusion: Meth users are at increased risk for HIV transmission due to high risk sexual behaviors and being in violent relationships. There is an urgent need to provide targeted HIV prevention and substance abuse treatment to meth users living in Cape Town.

THAC0305
Concurrent drug use and sexual risk behaviour among men who have sex with men (MSM) in Peru
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Background: Understanding concurrent drug consumption and unprotected anal intercourse (UAI) behavior among MSM, would contribute to develop tailored interventions for HIV prevention.

Methods: A HIV Sentinel Surveillance was conducted in five cities of Peru in June–October 2011. In this survey, MSM with high-risk behaviors who were unaware of their HIV serostatus, participated for the assessment of HIV and syphilis status, and demographics and sexual behavior patterns using computer-assisted self-interview. We report socio demographic, sexual risk behaviors, and other characteristics for not using a condom during anal sex associated drug consumption. A multinomial adjusted logistic regression analysis was conducted to assess potential associations between concurrent drug consumption and UAI behavior with other factors.

Results: Among 5,575 participants, 800 (14.3%) reported concurrent drug consumption and UAI behavior in the last three months. Of them, 43.3% were < 25 year-old and 86.6% had high school or a higher education level. This behavior was independently associated with high school or higher education (OR 2.77; 95% CI 1.34–3.86); self-identification as sex worker (OR 2.29; 95% CI 1.39–3.77); and self-identification as bisexual or heterosexual (OR 2.77; 95% CI 1.34–5.75).

Conclusion: Tailored strategies to reduce risky sex behavior associated with drug consumption are urgently needed among MSM in Peru and must target subpopulations at the highest risks.

THAC0403
Predictors of dropping out of methadone maintenance treatment in China: a six-year cohort study
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Background: China initiated Methadone Maintenance Treatment (MMT) program in 2004, serving more than 343,000 clients by 2011. High dropout rate was one of the special challenges that needed to be addressed urgently. The aim of this study is to assess MMT clients’ dropout rate and to identify factors associated with dropout over the six-year period.

Methods: A prospective cohort study was conducted in eight MMT clinics of China from March 2004 to June 2010, involving 1511 drug users who were enrolled in MMT program in 2004. Dropout and its predictors were examined using Chi-square tests and Cox Proportional Hazards regression models.

Results: Over the six-year follow-up period, 972 (64.3%) clients dropped out of treatment and clients were more likely to leave treatment within 1.5 years after enrollment. The leading cause of dropout was being arrested (48.7%), followed by emigration/being out of town for work (10.5%) and self-withdrawn (10.3%). Adjusting Hazard Ratio (HR) indicated that clients with high daily dose (>60mg) (P < 0.0001, HR = 0.38, 95% Confidence Interval (CI): 0.29–0.51), having relatives receiving MMT (P = 0.027, HR = 0.72, 95% CI: 0.54–0.96), and higher urine morphine positive result (P < 0.001, HR = 0.63, 95% CI: 0.52–0.76) were less likely to drop out, whereas clients with needles sharing behaviors, and frequent contact with current drug users had higher risk of dropout over the six-year period (P < 0.05).

Conclusion: Specific interventions to decrease dropout are needed to focus on clients with lower daily dose, sharing needles with others and more frequent contact with current drug users. The preventive role of family support on dropout should be emphasized.

C9 - Epidemiology of HIV in male and female sex workers

THAC0501
High and disproportionate burden of HIV among female sex workers in low- and middle-income countries: a systematic review and meta-analysis
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Background: Female sex workers (FSW) have long been known to be a most-at-risk population (MARP) for HIV secondary to biological, behavioral, and structural risk factors. However, three decades into the HIV pandemic, there remains a limited understanding of the burden of HIV among these women.

Methods: This study included a systematic review of HIV prevalence data among FSW from low and middle income countries published between January 1st, 2007, and June 25, 2011. In addition, meta-analyses were completed using the Mantel-Haenzel method with a random-effects model characterizing an odds ratio (OR) for the HIV prevalence among FSW compared to that of all reproductive-age women.

Results: Data from 102 studies representing 99,878 female sex workers across 50 countries were included in the analyses. The overall HIV prevalence was 11.8% (95% CI 11.6–12.0) with a pooled OR for HIV infection of 14.1 (95% CI 10.5–19.0) with wide intraregional ranges in the pooled HIV prevalence and OR for HIV infection. In 25 countries with medium and high background HIV prevalence, 32.0% (95% CI 31.0–32.1) of 27009 women were HIV-positive and the OR for infection was 11.9 (95% CI 9.3–15.2).

Conclusion: These findings highlight that though there is a dearth of data characterizing HIV risk among FSW, where studied, burden of disease is disproportionately high. These data suggest an urgent need to scale up access to quality HIV prevention programming including considerations of the legal and policy environments in which sex work operate, and the critical role of stigma, discrimination and violence targeting FSW.

Figure 1. SW Meta-Analysis.
Background: Despite substantial data globally suggesting expansion of sex work markets in settings with recent political, economic and social transitions, there exists almost no data on HIV prevalence among SWs in post-conflict settings, particularly in sub-Saharan Africa. Of further concern, given increasing efforts to criminalize HIV and sex work in much of sub-Saharan Africa, there remains an important need to understand the HIV prevention and treatment needs of sex workers.

Methods: In 2011, 400 young women SWs (>=14 years of age) completed baseline interview-administered questionnaires and confidential HIV testing. SWs were recruited through extensive peer outreach (current/former SWs), ethnographic mapping and time-location sampling to street and indoor sex venues. Bivariate and multivariate analyses were conducted to examine associations with HIV seropositivity.

Results: Of a total of 400 young women SWs, the median age was 21 years (IQR15–26). The HIV seroprevalence was 34% (136), of whom 59% (80) were new HIV seroinfections, and 32% (44) were on ART. The majority (96%) solicited clients in bars, 41% (165) in lodges, and 35% (183) along truck stop. A high number (56%, 222) of SWs reported difficulty accessing condoms in the last 6months. HIV seropositivity was associated in bivariate analysis with supporting dependent children (OR = 3.30, 1.57–6.89). In multivariate analyses, HIV seropositivity was associated with older age (AOR = 1.18, 95% CI 1.10–1.26), lower sex work income (AOR = 0.99, 0.99–0.99) and reduced likelihood of having a ‘sugar daddy’ (AOR = 0.49, 0.25–0.99).

Conclusion: Young women SWs are experiencing an alarming rate of HIV infection in Northern Uganda, with more than half unaware of their HIV seropositivity status. These data suggest critical gaps in HIV prevention, treatment and care services and an urgent need for social and structural HIV interventions that support and reach isolated young women SWs, including reducing stigma, policy reform, and peer-led outreach initiatives.

C10 - Epidemiology of HIV in men having sex with men (MSM)

MOAC0101

Equal behaviors, unequal risks: the role of partner transmission potential in racial HIV disparities among men who have sex with men (MSM) in the US

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Background: Differences in individual risk behavior do not explain the large disparities in HIV prevalence and incidence between black and white MSM in the US. Patterns of partner selection, virologic suppression in HIV-positive sex partners, and unprotected anal intercourse (UAI) may jointly contribute to these disparities, but are not well understood.

Methods: The Involvement study is an ongoing cohort of black and white MSM in Atlanta designed to evaluate individual, dyadic, and community level factors that might explain HIV disparities. Participants are recruited from community-based venues, tested for HIV, and surveyed. We used Monte Carlo simulation with data about

patterns of sexual partnering, UAI, and levels of virologic suppression among MSM in Atlanta to estimate how frequently black and white HIV-negative MSM would have UAI with a sex partner with transmission potential (viral load >500 copies/ml).

Results: Among 556 MSM recruited to-date, the 12-month median number of UAI partners was 2 for both black and white men (p = 0.19). Based upon HIV prevalence, viral-load estimates and reported partnership characteristics, the estimated average annual probabilities (95% CI) of having =1 UAI partner with transmission potential were 0.37 (0.32, 0.43) for black and 0.20 (0.15, 0.24) for white MSM (p < .0001). The estimated number of UAI partners to have a 50% chance of having a UAI partner with viral load >500 copies/ml was 3 for black and 7 for white MSM.

Conclusion: HIV-negative black MSM have comparable risk behaviors, but have a substantially higher likelihood of encountering a UAI partner with viral load >500 copies/ml. Our results suggest a limited ability of behavioral interventions to eliminate racial disparities, and support the need to increase HIV testing with linkage to care and antiretroviral treatment of all HIV-positive MSM to reduce the risk of HIV transmission from sex partners.

MOAC0103

Foreign location of birth and time since immigration are associated with HIV status among Latino MSM in the United States

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Background: In the United States, Latino men who have sex with men (MSM) are disproportionately affected by HIV. However, little is understood about variations in HIV risk by location of birth and time since immigration for foreign-born MSM. We assessed differences in HIV prevalence among Latino MSM by these characteristics.

Methods: For the National HIV Behavioral Surveillance System (NHBS) among MSM, venue-based sampling was used to recruit men. In 20 cities in the continental United States, men were interviewed and tested for HIV infection. We analyzed data for Latino men who reported 1 male sex partner in the past 12 months. We compared HIV prevalence for three groups (U.S.-born, foreign-born who immigrated 5y ago, and foreign-born who immigrated
We interviewed and tested 1734 Latino MSM. HIV prevalence was highest among foreign-born MSM who immigrated > 5y ago (see table). Among HIV-positive Latino MSM, 43% were unaware of their infection; this did not vary by location of birth or time since immigration. In multivariate analysis including age and income, HIV infection was more prevalent among foreign-born MSM who immigrated > 5y ago and U.S.-born Latino MSM, both compared with persons who were foreign-born and immigrated > 5y ago. HIV prevalence was also associated with increasing age and income ≤ $20,000.

Conclusion: Lower HIV prevalence among foreign-born Latino MSM shortly after immigration contrasts with higher HIV prevalence among foreign-born Latino MSM > 5 years after immigration and suggests a critical window of opportunity for HIV prevention. Prevention activities among Latino MSM should prioritize those with low income, who are at particular risk for HIV infection.
in HIV prevalence among MSM ages 23–29y of borderline significance (p = 0.07). HIV testing increased substantially (p < 0.0001 for both age groups, Figure 2). However, the proportion (78%) of HIV-infected MSM previously unaware of their infection did not change over time; among these, 47% had been tested in the past 12 months.

Conclusion: Among young MSM, high HIV prevalence and proportion previously unaware of their infection are consistent with national trends. Gains in HIV testing among young MSM is encouraging, but stable proportions unaware of their infections suggest that more, and perhaps more frequent, HIV testing is needed, consistent with CDC guidelines. Getting more young MSM tested, aware of their infection, and into appropriate care would help prevent ongoing transmission.

Methods: Between 7/09 and 10/10, BMSM were enrolled in 6 U.S. cities to evaluate feasibility of a multi-component prevention intervention. This analysis focuses on the correlates of being newly diagnosed with HIV, including multivariable logistic regression. HIV testing was performed at study sites; central confirmation of results is underway.

Results: HPTN 061 enrolled 1553 BMSM, whose median age was 39; 43% self-identified as gay/homosexual, 41% bisexual, 3% transgender, 10% straight/heterosexual. Of 96% who agreed to be tested, 10% indicated they were previously HIV-infected (PHIV), while 12% were newly diagnosed with HIV (NHIV). Compared to PHIV, NHIV were younger less likely to use marijuana poppers stimulants or inject drugs reported less internalized homophobia and lower levels of religious affiliation NHIV were more likely to be diagnosed with syphilis and anogenital gonorrhea/chlamydia than PHIV, and more likely to be diagnosed with syphilis or anogenital chlamydia than HIV-uninfected BMSM. Compared to HIV-uninfected BMSM, NHIV BMSM were more likely to be older unemploy engaged in unprotected anal intercourse have multiple bacterial STDs, and were more likely to come from cities other than San Francisco.

Conclusion: Structural, behavioral, and biological factors (e.g. unemployment, unprotected anal sex, and STDs, but not increased substance use) are associated with new infections among American BMSM, who differ behaviorally from men who have previously been diagnosed. Given the high rates of HIV infection among BMSM, culturally-tailored programs that encourage repeated HIV/STD testing, engagement in care, and innovative prevention strategies addressing current risks are urgently needed to decrease further spread.
estimates in this group are needed to appropriately target prevention efforts.

**Methods:** In 2009–10, HPTN 061 recruited BMSM in Atlanta, Boston, Los Angeles, New York City, San Francisco and Washington D.C. for a feasibility study of a multi-component intervention to reduce HIV infection. Participants reporting ≥1 episode of unprotected anal intercourse with a man in the past six months were evaluated at baseline, 6 and 12 months. HIV status at enrollment was based on real-time testing performed at study sites and confirmatory testing at the HPTN Network Laboratory. HIV incidence based on HIV seroconversion was calculated as number of events/person-years. Confidence intervals were calculated using exact methods.

**Results:** Of 1553 BMSM enrolled, 174 reported a prior HIV diagnosis and 46 refused HIV testing or a specimen was not available at baseline. Of those without a prior HIV diagnosis (n = 1333), 1168 were HIV-uninfected, and 165 (12.4%) were newly diagnosed at baseline (including 3 with acute HIV infection). Among the 1168 HIV uninfected men at baseline, 26 acquired HIV infection during follow up for a 2.8% annual HIV incidence rate (95% CI: 1.8–4.1%). HIV incidence was higher among men <30 yrs (5.9%; 95% CI: 3.6–9.1%) compared men >30 yrs (1.0%; 95% CI: 0.4–2.2%), men identifying as exclusively gay/homosexual (5.0%; 95% CI: 2.6–8.8%) compared to bisexual (1.5%; 95% CI: 0.4–3.7%) and men reporting unprotected receptive anal sex (4.9%; 95% CI: 3.0–7.4%) compared to those not (1.0%; 95% CI: 0.3–2.4%).

**Conclusion:** In the largest cohort of prospectively-followed BMSM in the US, HIV incidence was high, particularly among young and gay-identified BMSM. Targeted and tailored culturally appropriate combination HIV prevention strategies incorporating behavioral, social and biomedical based interventions are urgently needed to lower these rates.

**THAC0302**

**Men who have sex with men and the HIV epidemic in Morocco: results from a respondent-driven sampling study**

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**Background:** HIV prevalence in the general population in Morocco is below 1%. There is currently no reliable data documenting HIV among men who have sex with men (MSM) in Morocco. This population is hard to reach due to social stigma, discrimination and the illegal status of male-to-male sex in Morocco. From November 2010 to March 2011, two integrated behavioural and biological surveillance (IBBS) surveys were conducted (Marrakech, Agadir), among MSM in Marrakech and Agadir to obtain measure HIV and syphilis prevalence and associated risk behaviors.

**Methods:** Using Respondent-Driven Sampling (RDS), 669 MSM (346 in Marrakech and 323 in Agadir) were enrolled in the study. Respondents were males aged 18 and above who reported to have had anal sex with another male in the past six months. Consenting MSM completed a behavioral questionnaire and were tested for HIV and syphilis (venous blood). Weighted analysis was performed with Respondent Driven Sampling Analysis Tool (RDSAT) Version 6.0.

**Results:** The median age of sexual debut for MSM was at 16 years. HIV prevalence among MSM in Agadir was 5.6% and 2.8% in Marrakech; prevalence of syphilis was 7.0% in Agadir and 10.8% in Marrakech. Among MSM who tested positive for HIV, 31.6% in Agadir and 56.4% in Marrakech were co-infected with syphilis. MSM reported multiple types of sexual partners, including occasional and commercial. Only 27.6% of MSM in Agadir and 17.4% of MSM in Marrakech reported always using a condom with any male partner during anal sex in the past six months.

**Conclusion:** MSM are at a high risk for HIV and other sexually transmitted diseases. Current prevalence of HIV in MSM is higher than the general population. These findings provide appropriate evidence to support the focus on addressing HIV among MSM in the National Strategic Plan 2012–2016 on HIV of Morocco.

**THAC0303**

**The recent impact of MSM on the prevalence of HIV-1 infection among young men in Thailand**

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**Background:** Thailand is a country with a continuing generalized HIV epidemic. The Royal Thai Army conscripts represent a 10% random sample of 21 year old men from throughout the country. Thai military conscripts are representative of the young population of Thai Men. We evaluated the prevalence and risk factors for HIV infection among the RTA conscripts inducted in May 2011.

**Methods:** A cross-sectional study was conducted. All ~40,000 male conscripts inducted in May 2011 were invited to participate in the study and to provide blood sample for HIV testing. A self-administered questionnaire was used.

**Results:** Of 38,123 men who provided blood samples, 190 (0.50%) men were HIV positive. There were 35,595 (93.36%) men who completed the questionnaire information including 159 (0.45%) HIV-positives. Of 159 HIV positive men, 35.9% 29.1, % and 2.0% reported MSM behavior, sex with female sex workers and injection drug use, respectively. The independent risk factors [adj.OR,95%CI] for HIV infections were lower education [1.66[1.11–2.50]], type of actual sexual relation [bisexual:1.27(0.67–2.41)/exclusive MSM:3.07[1.29–7.27]], sexual desire [with both sex:11.32[4.49–29.09]/with only sex:7.45[3.21–17.19]], and number of life time sexual partners [>6[1.51[1.04–2.20]],. Among 2,271 (7.1%) MSM, the independent risk factors for HIV infection were graduate education level [3.51[1.09–11.32]], sexual roles [versatile:7.19[3.40–15.21]/bottom:10.77[3.42–33.89]], and sex in exchange for money [1.97[1.02–3.81]]. The prevalence of HIV infection of MSM was comparable in urban (3.2%) and rural (2.1%) areas.

**Conclusion:** Sex between men was the major risk factor for HIV infection in young Thai men. The other risk factors included education level, number of sexual partners and sex in exchange for money. The public health interventions for HIV prevention especially among MSM are urgently needed both in urban and rural areas.
Need for innovative intervention strategies to reduce HIV transmission among men who have sex with men in Andhra Pradesh, India: following a large-scale HIV prevention intervention

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Background:
HIV sentinel surveillance data for Andhra Pradesh (AP) showed an increasing HIV prevalence among men who have sex with men (MSM) from 10.4% in 2006 to 23.7% in 2008. Avahan, the India AIDS Initiative of the Bill & Melinda Gates Foundation implemented a program focusing on MSM starting in 2004.

Methods:
Two rounds of cross-sectional bio-behavioral survey were conducted in four districts of AP in 2006 (R1) and 2009 (R2) as part of the Avahan evaluation. A two-stage time location cluster sampling method was adopted for both rounds to select men aged 18 years or older who reported any type of sex with another male in the last past month. Following informed consent, behavioral information was collected through structured questionnaires, blood and urine specimens were tested for HIV and other STIs.

Results:
A total of 1,621 MSM in R1 and 1,608 in R2 were recruited. Between two rounds, there was a significant increase in proportion of MSM reporting consistent condom use with regular male partners (R1:31.9%; R2:54.6%, p <0.001) and with

| Table 1. Risk factors for HIV infection |
|----------------------------------------|
| Characteristic                        | Total N | HIV + (%) | Crude OR (95%CI) | Adj. OR (95%CI) |
|----------------------------------------|
| Type of sexual relation                |         |           |                 |               |
| No                                     | 29688   | 89 (0.3)  | 1               | 1             |
| Bi sexual                              | 1930    | 26 (1.3)  | 4.54 (2.93–7.05)| 1.27 (0.67–2.41)|
| Exclusive MSM                          | 339     | 32 (9.4)  | 34.67 (22.79–52.73)| 3.07 (1.29–7.27)|
| Sexual desire                          |         |           |                 |               |
| Sex with women only                    | 35041   | 105 (0.3) | 1               | 1             |
| Sex with both men and women            | 318     | 23 (7.2)  | 25.94 (16.29–41.32)| 11.09 (5.35–22.98)|
| Sex with men only                      | 180     | 28 (15.6) | 61.29 (39.23–95.77)| 25.65 (10.79–61.02)|

| Table 2. Risk factors for HIV infection in MSM |
|-----------------------------------------------|
| Characteristic                              | Total N | HIV + (%) | Crude OR (95%CI) | Adj. OR (95%CI) |
|----------------------------------------------|
| Education (Yrs)                             |         |           |                 |               |
| None-9                                       | 1470    | 25 (1.7)  | 1               | 1             |
| Graduate                                     | 104     | 11 (10.6) | 6.84 (3.26–14.32)| 3.51 (1.09–11.32)|
| Sexual role for sex with men                 |         |           |                 |               |
| Top                                          | 1192    | 12 (1.0)  | 1               | 1             |
| Bottom                                       | 62      | 5 (8.1)   | 8.63 (2.94–25.31)| 10.77 (3.42–33.89)|
| Sex in exchange for money                   |         |           |                 |               |
| No                                           | 1527    | 33 (2.2)  | 1               | 1             |
| Ever                                         | 680     | 24 (3.5)  | 1.66 (0.97–2.83) | 1.97 (1.02–3.81) |

THAC0304

Need for innovative intervention strategies to reduce HIV transmission among men who have sex with men in Andhra Pradesh, India: following a large-scale HIV prevention intervention

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Background: HIV sentinel surveillance data for Andhra Pradesh (AP) showed an increasing HIV prevalence among men who have sex with men (MSM) from 10.4% in 2006 to 23.7% in 2008. Avahan, the India AIDS Initiative of the Bill & Melinda Gates Foundation implemented a program focusing on MSM starting in 2004.

Methods: Two rounds of cross-sectional bio-behavioral survey were conducted in four districts of AP in 2006 (R1) and 2009 (R2) as part of the Avahan evaluation. A two-stage time location cluster sampling method was adopted for both rounds to select men aged 18 years or older who reported any type of sex with another male in the last past month. Following informed consent, behavioral information was collected through structured questionnaires, blood and urine specimens were tested for HIV and other STIs.

Results: A total of 1,621 MSM in R1 and 1,608 in R2 were recruited. Between two rounds, there was a significant increase in proportion of MSM reporting consistent condom use with regular male partners (R1:31.9%; R2:54.6%, p <0.001) and with

Table 1. Multivariate analysis of selected biological and behavioral outcomes compared between R1 in 2006 (reference group) and R2 in 2009 among MSM in Andhra Pradesh, India (N = 1,621 in R1 and 1,608 in R2)

| Outcomes                                      | AOR* | 95% CI |
|-----------------------------------------------|------|--------|
| HIV prevalence                               | 0.94 | 0.6–1.3 |
| High Titer Syphilis (RPR ≥ 1:8)              | 0.98 | 0.5–2.0 |
| Urethral Chlamydia and/or urethral Gonorrhea  | 0.68 | 0.2–2.0 |
| Consistent condom use with regular male partners | 44.2 | 21.9–89.1 |
| Consistent condom use with other non-commercial male partners | 28.3 | 17.5–46.5 |
| Last time condom use with male partners from whom they bought sex | 22.1 | 6.7–71.9 |
| Last time condom use with male partners to whom they sold sex | 1.59 | 0.80–3.2 |

*Adjusted Odds Ratio on socio-demographic factors such age, literacy, marital status, occupation, self-reported sexual identity.
other non-commercial male partners (R1:13.1%; R2:78.5%, p < 0.001). Significant increase also was observed in last time condom use with male partner from whom sex services were bought (R1:72.8%; R2:96.9%, p < 0.001). No significant changes were seen in HIV prevalence (R1:17.3%; R2:21.4%, p = 0.100), high titer syphilis (R1:3.4%; R2:4.0%, p = 0.376), urethral chlamydia and/or urethral gonorrhea (R1:1.8%; R2:1.4%, p = 0.634) between rounds. The proportion of MSM exposed to interventions increased between the two rounds (R1:59%; R2:76%, p < 0.001), as the proportion of MSM reporting ever having undergone an HIV test (R1:12.1%, R2:78.1%, p < 0.001).

Conclusion: Despite increase in condom use and exposure to HIV prevention services, HIV and STI prevalence show no significant change. There is need for more investigation and operation research to identify new and innovative approaches for reducing HIV transmission among MSM in Andhra Pradesh.

HIV prevalence, sexual risks and HIV knowledge among men who have sex with men (MSM) in Malawi: understanding risks among a stigmatized population and opportunities for interventions

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Background: Malawi has a generalized HIV epidemic with approximately 11.0% of adults living with HIV, though preliminary data highlight significant HIV-related vulnerabilities among key populations, such as MSM. There is limited understanding of vulnerabilities among MSM; this study aimed to fill this gap and provide population-based estimates of HIV prevalence and associations of infection among MSM in Malawi.

Methods: 339 men reporting anal sex with another man in the previous year were accrued into a respondent-driven-sampling study from August 2011-March 2012 in Blantyre. Study activities included a structured survey instrument and biological assessment of HIV and syphilis.

Results: Participants were a mean age of 25.1yrs. (range: 18–49), 46.6% were unemployed, over half were gay-identified (61.9%), and 10.3% (35/339) were currently married to a woman. Participants reported a mean of 3 male sex partners in the last 12mo. (range: 1–50). Concurrent relationships were common 30.4% (99/326) reported recent partnerships with two or more men and 14.7% (48/306) reported concurrent partnerships that included at least one female. HIV prevalence was 14.8% (49/330); among those with HIV infection, 91% (45/49) were unaware of their HIV status and 39.9% (19/39) had never tested for HIV. Nearly 60% (176/304) reported taking PrEP. PrEP may be impacted by drug use and sexual risk behaviors. Future studies are needed to understand how non-injection drug use may impact PrEP use.

Conclusion: As of May, 2012, the changing government in Malawi publicly announced intention to decriminalize homosexuality. The data here reinforce the need to take advantage of this opportunity to provide services to MSM, given the limited HIV-related knowledge and high-risk practices. This study demonstrates that MSM are an important population in Malawi’s HIV epidemic and deserve targeted HIV prevention services.

Willfulness to take daily pre-exposure prophylaxis (PrEP) among MSM in two HIV epicenters in the United States

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Background: We examined knowledge, attitudes, and practices toward use of daily PrEP among MSM and factors associated with their willingness to take PrEP if available and offered for free or covered by health insurance.

Methods: Between August–December 2011, MSM in two U.S. metropolitan areas heavily impacted by HIV (Miami, Florida and Washington, D.C.) were recruited and interviewed through venue based sampling for the CDC National HIV Behavioral Surveillance study. Multivariable logistic regression analysis assessed demographic, socioeconomic, drug use and sexual risk correlates of being very willing to take PrEP for each city.

Results: The samples included 321 in Miami (median age = 29.18 years, 29.18% black, 10% white, 71% Hispanic, 1% Other) and 323 in Washington D.C. (median age = 32, 28% black, 49% white, 13% Hispanic, 10% Other). Fifteen percent of men in Miami and 30% in Washington D.C. had heard information about PrEP, few knew anyone who had taken PrEP (3% in both cities), and none reported having taken it themselves. Almost half (49%) of MSM in Miami and almost two-thirds (61%) in Washington D.C. reported they would be willing to take PrEP. In Miami, only non-injection drug use in the past year was associated with decreased willingness to use PrEP (OR = 0.59, 95% CI [0.36, 0.96]). In Washington, D.C., >33 years of age (OR = 0.45, 95% CI [0.28, 0.74]) and having fewer sexual partners (OR = 0.57, 95% CI [0.33, 0.98]) were associated with decreased willingness to use PrEP; non-injection drug use (OR = 1.67, 95% CI [1.02, 2.63]) was associated with increased willingness to use PrEP.

Conclusion: Awareness and use of PrEP in these two US HIV epicenters is low; innovative strategies are needed to inform and educate MSM about this new prevention strategy. Willfulness to use PrEP may be impacted by drug use and sexual risk behaviors. Future studies are needed to understand how non-injection drug use may impact PrEP use.

The MSM population in a conservative environment: Egypt

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**C11 - Epidemiology of HIV in migrants**

MOPDC0203

**From assessment to action: HIV in migrant populations in Europe**

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**Background:** Migrant populations from countries with generalised HIV epidemics represent a considerable proportion of the heterosexually acquired cases of HIV/AIDS in EU/EAE (European Union/ European Economic Area) countries. A better understanding of the epidemiology of HIV among migrants is essential to tailor HIV prevention and treatment programmes.

**Methods:** Results from European HIV/AIDS surveillance data from 2010 and qualitative surveys on national HIV programmes and policies were used to assess the situation of HIV in migrant populations.

**Results:** Overall, one-third of the heterosexually acquired HIV cases were diagnosed in individuals originating from countries with generalised epidemics and this proportion varies by country, but is >60% in Belgium, Sweden, Malta, and the UK. Studies in France, Spain and the UK describe higher prevalence of late HIV diagnosis (CD4 count < 350 cells/mL at HIV diagnosis) in migrants compared to non-migrants and in ethnic minorities compared to the non-minority population. Half of EU/EAE countries report that they have legal, regulatory and policy barriers for migrants to access HIV treatment, care and support. Seventy-five percent of countries indicated that migrants are an important subpopulation in the national response to HIV. However, only 40% collect information on the uptake of HIV testing and only 50% on access to ART among migrants.

**Conclusion:** Evidence suggests that, in some European countries, migrants from countries with generalised HIV epidemics are disproportionally affected by HIV and do not access testing or treatment services as readily as other populations. There is a need for concerted action at a European level to gather better evidence for decision-making and to develop better measures of HIV transmission among migrants after arrival to the EU/EAE in order to improve HIV prevention resource allocation. There is also a need for strong political leadership in order to further develop and expand programmes for migrants from countries with generalised HIV epidemics.
TUAC0201

Evaluation of presumptive treatment recommendation for asymptomatic anorectal gonorrhoea and chlamydia infections in at-risk MSM in Kenya

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Background: In 2011, the World Health Organization (WHO) recommended that at-risk MSM (reporting unprotected anal intercourse in the last 6 months, partner with STI or multiple partners) should be presumptively treated for asymptomatic anorectal N. gonorrhoeae (NG) and C. trachomatis (CT) infections. We evaluated this recommendation amongst a large group of MSM sex workers in Coastal Kenya.

Methods: We assessed the presence genitourinary and rectal symptoms, and determined the prevalence and 3-month incidence of urethral and rectal NG- and CT- infections by NAAT-screening of urine and rectal swab samples collected from at-risk MSM followed in a cohort study in Coastal Kenya. Men with syndromic or NAAT-confirmed received cefixime (400 mg stat) and doxycycline (100 mg, 7 days), risk reduction counseling, and advice on partner treatment.

Results: Of 277 at-risk MSM (97% of total meeting WHO criteria), 38 (13.7%, 95% confidence interval (CI) 9–18) had asymptomatic infections, including 28 (10.1%, 95% CI 7–14) who had asymptomatic anorectal NG- or CT. Only 4 (1.4%, 95% CI 0–4) men had symptomatic infections, including 3 that were NAAT-confirmed (2 NG- and 1 NG-CT co-infection). Of 214 at-risk MSM re-screened at a median 93 days (Inter quartile range 84–103), 22 (10.3%) had an asymptomatic NG- or CT-infection, including 11 men who were treated at baseline. The 3-month incidence of any NG or CT infection was 37.0 (95% CI 24.8–55.3); any NG-infection, 12.3 (95% CI 6.2–24.7) and any CT-infection 27.8 (95% CI 17.5–44.1) per 100 person-years.

Conclusion: For every 10 at-risk MSM meeting criteria for presumptive treatment, 1 asymptomatic anorectal infection would be treated in this population. Upon re-screening at 3 months, 1 out of 10 at-risk MSM had asymptomatic NG- and CT- infections. Periodic presumptive treatment every 3 months should be considered for at-risk MSM in the absence of NAAT screening.
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Background: Persons living with HIV/AIDS (PLWHA) who acquire new STDs pose a risk for enhanced transmission of both HIV and STDs. Some state and local STD and HIV programs prohibit data sharing that would identify these individuals due to concerns with data security and confidentiality. Significant resources are dedicated to partner services (PS) for syphilis cases however, due to resource limitations, few if any gonorrhea (GC) cases in high morbidity areas receive this intervention.

Objective: To describe the frequency of HIV co-infection among gonorrhea cases in 4 cities/regions in the US with varied GC and HIV epidemiology.

Methods: A probabilistic method was used to match the HIV and STD surveillance databases at the New York City Department of Health (NYC), Department of Health, Washington DC (DC), Miami/Dade County Health Department (MDC), and Arizona Department of Health Services (AZ). Person and diagnosis events from the matched HIV-STD datasets included 2000–2008.

Results: During 2000–2008, 4.6% (9,471/205,689) of reported GC cases occurred among persons with previously diagnosed (eg. preexisting) HIV NYC (5.5%, 5,930/107,786), DC (7.3%, 1,312/17,910), MDC (4%, 1,504/40,214), and Arizona Department of Health Services (AZ). Person and diagnosis events from the matched HIV-STD datasets included 2000–2008.

Overall, white male GC cases had the highest HIV co-infection in each jurisdiction NYC (22%, 592/2,680), DC (11% 1,000/9,540), MDC (11%, 339/3,080), and AZ (7%, 397/5,501). The overall HIV-GC co-infection rates increased over the study period from 3% (367/12,314) to 7% (752/10,553) in NYC, 6.4% (142/2,211) to 6.7% (155/2,302) in DC, 2% (91/3,917) to 4% (165/4,265) in MDC, and 0.7% (31/4,400) to 3% (91/3,486) in AZ.

Conclusion: Retrospective data integration identified many co-infected HIV/GC cases, and indicated HIV co-infection rates are increasing. Real time access to integrated HIV and STD surveillance would allow better targeting of public health interventions to subgroups of the population posing highest risk for transmitting HIV in their jurisdictions. Local staffing patterns and effectiveness would need to be evaluated to determine the feasibility of interventions such as integrated PS.

Table 1. Demographics Stratified by Incident STI

|                          | Total Cohort | ≥1 STI | No STI | Bivariate p-value |
|--------------------------|--------------|--------|--------|-------------------|
| **N**                    | 81           | 25     | 56     |                   |
| **Median Age at Diagnosis (IQR)** | 25 (21–33)  | 24 (21–30) | 25.5 (21–35.5) | 0.3 |
| **Sexual Risk Group**    |              |        |        |                   |
| Female                   | 9            | 11.1   | 2      | 8.0              | 7     | 12.5 | 0.2 |
| Heterosexual Male        | 10           | 12.3   | 1      | 4.0              | 9     | 16.1 |       |
| MSM                      | 62           | 76.5   | 22     | 88.0             | 40    | 71.4 |       |
| **Race/Ethnicity**       |              |        |        |                   |
| Black                    | 47           | 58.0   | 16     | 64.0             | 31    | 55.4 | 0.3 |
| Non-Black                | 33           | 40.7   | 8      | 32.0             | 25    | 44.6 |       |
| Missing                  | 1            | 1.2    | 1      | 4.0              | 0     | 0.0  |       |
| **STI Diagnosis within 8 weeks Before AHI Diagnosis** | | | | |
| Yes                      | 27           | 33.3   | 15     | 60.0             | 12    | 21.4 | 0.0007 |
| No                       | 54           | 66.7   | 10     | 40.0             | 44    | 78.6 |       |
| **Ever On ART**          |              |        |        |                   |
| Yes                      | 74           | 91.4   | 21     | 84.0             | 53    | 94.6 | 0.1 |
| No                       | 7            | 8.6    | 4      | 16.0             | 3     | 5.4  |       |
| **On ART within 45 Days**|              |        |        |                   |
| Yes                      | 62           | 76.5   | 17     | 68.0             | 45    | 80.4 | 0.2 |
| No                       | 19           | 23.5   | 8      | 32.0             | 11    | 19.6 |       |
C15 - Epidemiology of viral hepatitis and HIV co-infection

TUAC0501
Use of rapid testing to prospectively identify HCV co-infection in populations with high HIV prevalence

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Background: A rapid HCV test was recently approved and CLIA-waived by FDA and is now being deployed to identify HCV infection in populations at risk for both HIV and HCV. The presence of HIV co-infection has been reported previously to reduce sensitivity of some HCV antibody tests. We report here on the results of a study of the efficacy of a rapid HCV test in identifying HCV infection in HIV positive and HIV negative cohorts.

Methods: A total of 1660 subjects at risk for HCV infection, or with signs and/or symptoms of hepatitis, were prospectively tested by the OraQuick® HCV Rapid Antibody Test using fingerstick blood. Of these, 444 (26.7%) self-reported as HIV positive upon enrollment into the study. Performance of the rapid test in HIV positive and negative cohorts was assessed by comparison with HCV status determined by laboratory testing from a contemporaneous venous blood draw, using an algorithm of EIA, recombinant immunoblot assay (RIBA®) and PCR.

Results: Of 444 HIV positive subjects, 211 (47.5%) were also HCV positive, compared to an HCV seroprevalence of 41.8% (508/1216) in HIV negative subjects. Among HIV positive subjects, intravenous drug use (49.1%) and high risk sexual behavior (39.6%) were the most prevalent risk factors. Agreement between the rapid test and laboratory tests in identifying HCV infected subjects was indistinguishable between HIV positive (98.1%) and HIV negative (98.6%) populations (p = 0.629).

Conclusion: The rapid test performed comparably to laboratory tests for prospective identification of HCV infection in at-risk subjects. Sensitivity of the OraQuick® rapid test for HCV antibodies was not compromised in HIV infected individuals. The deployment of a rapid HCV test may expand testing in populations at risk for both HIV and HCV infection and may be an important tool in raising public health awareness of HCV prevalence.

TUAC0502
Seroprevalence of HBV and HCV among children in the Kilimanjaro region of Tanzania

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Background: Data on HIV and hepatitis B virus (HBV) and hepatitis C virus (HCV) co-infection among children in Africa are scarce. We evaluated the seroprevalence of HBV and HCV among healthy HIV-uninfected children and HIV-infected children in the Kilimanjaro Region of northern Tanzania.

Methods: HBV and HCV markers were assessed on banked serum and plasma samples from HIV-negative children ages 1 month to 18 years and HIV-infected children on highly active antiretroviral therapy (HAART) a minimum of six months from 1 to 16 years of age. HBV markers included hepatitis B surface antigen (HBsAg), hepatitis B surface antibody, and hepatitis B core antibody (HbcAb). Infection was defined as a single positive HBsAg or HbcAb result. HCV infection was assessed by aHCV ELISA. Validation studies were performed on all assays prior to use and all were FDA-approved.
Results: Samples from 560 children were available for testing. Of 394 HIV-negative children, 36 (9.1%) were HBV-infected, and of 161 HIV-infected children, 33 (20.5%) were HBV-infected. Children with HIV were 2.6 times more likely to be HBV positive (95% CI 1.53, 4.29) than children without HIV (p = 0.0002). None of the 560 samples was positive for anti-HCV antibody.

Conclusion: HBV seroprevalence is high among children in the Kilimanjaro Region, with a significantly higher prevalence among HIV-infected children. Routine screening for HBV should be performed among HIV-infected children. Patients with co-infection require closer monitoring of liver transaminases due to hepatic toxicities associated with antiretroviral therapy, and must be provided with appropriate HAART which will target both viruses. Catch-up immunization with HBV vaccine should be considered for older HIV-infected children.

TUAC0503

Prevalence, incidence and determinants of HCV infections among HIV-positive MSM attending a STI clinic, 1995–2010

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Background: Since 2000 there is growing evidence that HCV has emerged as an STI among HIV positive MSM. Here we present a 15 year overview of the HCV epidemic among MSM visiting a large STI clinic in the Netherlands.

Methods: During waves of the bi-annual cross-sectional anonymous survey (1995–2010), participants were interviewed and tested for HIV and HCV antibodies. Additional HCV RNA tests were performed in all HIV-positive MSM. Determinants of HCV infection were analysed using logistic regression. HCV incidence was estimated using the window period from HCV RNA detection until HCV-antibody development. Phylogenetic analysis of obtained HCV NS5B sequences was performed to determine HCV genotype and to characterise HCV transmission networks among HIV-positive MSM.

Results: Anti-HCV prevalence among HIV-positive MSM gradually increased from 2.8% in 1995 to 3.8% in 2003 and reached its peak in 2008 (17.3%). The HCV incidence was highest in 2006 (14.0/100 PY; 95% CI 15.02–37.69) and decreased thereafter, although not significantly. Fisting in 2007/2008 was more strongly associated (aOR 2.62, 95% CI 2.02–3.51) with HCV infection than fisting in 2009/2010 (aOR 0.98, 95% CI 0.37–2.03). In addition, Chlamydia, IDU, UAI and age were independently associated with HCV. Phylogenetic analysis revealed a high degree of MSM-specific clustering from 2000 onwards. HCV prevalence among HIV-negative MSM remained stable (around 0.5%, 2007–2010).

Conclusion: HCV prevalence among HIV-positive MSM significantly increased until 2007, but appears to be levelling off in recent years. This levelling off might partly be explained by increased testing and HCV treatment uptake. The effect of fisting became less strong over time, but both risk factor analysis and phylogenetic analysis continue to support ongoing sexual transmission of HCV among HIV-positive MSM. Monitoring of HCV in both HIV-positive and HIV-negative MSM remains needed to guide prevention in order to halt this epidemic.

TUAC0504

HCV genotype and HBV co-infection associate with HCV clearance in HIV-positive subjects

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Background: Less is known about the correlates of HCV clearance in Chinese injected drug users (IDUs) who are co-infected with HIV. And it remains unknown whether HCV genotypes affect the spontaneous clearance of HCV. This study was designed to determine which factors could significantly affect the clearance of HCV and whether the genotypes could exert different influences on the clearance.

Methods: The cross-sectional survey was carried out on 528 HIV-positive IDUs patients in Yunnan Province. Their information on demographic, HIV infection route, HAART, TB and HIV coinfections, CD4 + T-cell counts, HIV and HCV viral loads, HCV genotypes, alanine aminotransferase (ALT) levels was collected from participants. Logistic regression was performed to identify the correlates for HCV clearance defined as HCV seropositive and RNA negative.

Results: 456 out of 528 HIV-infected subjects (86.4%) were identified as HCV seropositive, including 357 (78.3%) HCV RNA positive and 99 (21.7%) RNA negative. The HCV clearance was significantly associated with the presence of chronic HBV infection (p < 0.0001), higher CD4 + T-cell counts (p < 0.05) and was greatly reduced with higher ALT levels (p < 0.05). Interestingly, the clearance of HCV genotype 1 was enhanced in higher CD4 + T-cell counts (p = 0.065), whereas the clearance of HCV genotype 6 were dramatically facilitated by chronic HBV infection (p < 0.005), no significant association was identified with the clearance of genotype 3.

Conclusion: Our results suggested that the reserved host immune function and HBV competition could improve the clearance of HCV in HIV-infected subjects whereas the damage level in liver suggested the non-clearance of HCV; For the first time, we demonstrated that the clearances of different HCV genotypes were facilitated by different factors. These data have important implications for the management of HCV/HIV coinfected subjects.

C16 - Epidemiology of other diseases and HIV

MOAC0202

Impact of syndemics on people living with HIV in San Francisco

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Background: Syndemics are the presence of two or more diseases interacting synergistically to exacerbate health outcomes within a population. In San Francisco (SF), the Program Collaboration and Service Integration (PCSI) project has prioritized the integrated monitoring of syndemics among four communicable disease registries: HIV, tuberculosis (TB), Viral Hepatitis (VH), and sexually transmitted diseases (STD). We assessed the prevalence of co-occurring infections within these registries and their impact on persons living with HIV/AIDS (PLWHA).

Methods: Living SF HIV/AIDS cases were matched against seven diseases (active TB, latent TB, hepatitis B, hepatitis C (HCV), syphilis, gonorrhea, and chlamydia). Using chi-square, t-test, and Kruskal-Wallis tests, we assessed demographic, HIV health status, and neighborhood differences between those with HIV only versus HIV plus at least one co-infection.

Results: Among PLWHA, syndemics were highest among injection drug users (27%, p < 0.0001), those with very high (>=100000) viral loads (VLs) (26%, p = 0.0001), those not virologically suppressed (23%, p < 0.0001), homeless (23%, p < 0.0001), African-Americans (21%, p < 0.0001), women, transgender (both 18%, p < 0.0001), and ages 20–29 (16%, p = 0.0003). Co-infected PLWHA affected diverse geographic areas, regardless of socioeconomic status. Syndemic rates per 100000 population were highest in Castro (1219), South of Market (670), and Tenderloin (665) neighborhoods (p < 0.001) (Figure 1).

The mean VLs for PLWHA with syphilis, chlamydia, gonorrhea, HCV, or latent TB were higher than for PLWHA with HIV only (all p < 0.001). There was a significant correlation with increasing number of co-infections and increasing mean VLs (p < 0.001) (Table 1).

Conclusion: Syndemics are associated with poorer HIV health outcomes among PLWHA. We found a significant "dose-response relationship" between the number of co-infections and mean VLs. Greater numbers of co-infections, demographic subgroups, and certain geo-clusters were associated with poorer health outcomes, underscoring the need to address multiple conditions in tandem in an integrated health system.

Table 1. Syndemic Effects on PLWHA, San Francisco

| HIV and Number of Co-infections | N     | N (%) Virologically Suppressed | Chi-square p-value | Mean Viral Load | Kruskal-Wallis p-value |
|---------------------------------|-------|-------------------------------|--------------------|-----------------|-----------------------|
| HIV only                        | 13006 | 10662 (88)                    | <0.0001            | 12307           | 0.0012                |
| HIV and 1 Co-infection          | 1716  | 1219 (76)                     |                    | 15703           |                       |
| HIV and 2 Co-infections         | 303   | 198 (68)                      |                    | 62107           |                       |
| HIV and 3 or More Co-infections | 31    | 12 (45)                       |                    | 58589           |                       |

Figure 1. PLWHA Syndemics & Poverty, San Francisco.
C17 - Molecular epidemiology

MOAC0204
Using phylogenetic analysis to identify HIV transmission channels among persons newly diagnosed with HIV-1 infection in Los Angeles County, 2009–2010
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Background: Evidence for HIV transmission channels, such as between men who have sex with men (MSM), or between MSM and heterosexual females, has traditionally been obtained from epidemiological data. Newer techniques, such as phylogenetic analysis of HIV sequence data, can provide biological evidence for the transmission channels suggested by self-reports and case studies. The objective of this study was to use phylogenetic analyses to characterize HIV transmission channels in Los Angeles County (LAC).

Methods: The study population consisted of 1407 LAC cases newly diagnosed with HIV-1 in 2009 and 2010 for whom genetic sequencing data (pol region) derived from a specimen obtained within 3 months of diagnosis was available. To identify transmission clusters, phylogenetic reconstruction was performed using a neighbor-joining tree based on the Kimura-2 parameter model, and 1000 bootstrap replications. Transmission clusters were defined as sequences that had a common node of bootstrap values greater than 95% and average genetic distance lower than 0.015 nucleotide substitutions per site.

Results: Sixteen clusters, representing 49 cases, were identified. Each of these clusters comprised 3–4 cases. All were subtype B. Of the cases within these clusters, 86% were male, 49% were older than 30 years, 47% were Hispanic, 60% were US-born and 67% were MSM. We identified 4 distinct clusters, namely "MSM Only" (56%), "MSM/ IDU" (6%), "MSM/ Female or Male Heterosexual" (6%) and finally "IDU/HET female" (6%).

Conclusion: The results of our phylogenetic analysis provide biological evidence for the major HIV transmission channels that have previously been established by traditional epidemiological data. While this method is still relatively new and standardized criteria for cluster identification remain largely undefined, our findings demonstrate that phylogenetic analysis has potential to serve as an additional source of information to validate the descriptions of local HIV epidemics inferred from self-reported behavioral data and case studies.

C22 - Capacity building for HIV prevention research

THAC0505
Capacity building of law enforcement officers to handle sex workers in Sri Lanka
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Background: Sex workers are been arrested by police due to soliciting and selling sex under the vagrancy ordinance in Sri Lanka. There are some reports that sex workers are arrested by police while they are keeping condoms. It has been observed that there were some misunderstandings about condoms and that they are not considered as a medical device. Special training was conducted for training instructors in the police to educate this matter.

Methods: Three days participatory-based special training programme were conducted for 206 training instructors to achieve the objective in four instances. The training module was developed and included with various sessions using different education methods including role plays, group work and brain storming sessions. The pre and post test questionnaire was used to assess the difference of knowledge, attitude and willingness to support the national HIV/AIDS plan while handling sex workers

Results: Total knowledge score on HIV transmission, prevention and misconception of the police officers showed significant increase from 69.5(SD = 16.1) at pre intervention stage to post intervention stage 86.6(SD = 13.08). Total attitude score on handling sex workers with the intention of HIV prevention showed significant increase from pre intervention to post intervention (P = 0.001). Willingness to support the national HIV/AIDS plan while handling sex workers indicated significant increase from pre intervention to post intervention (P = 0.0001). All officers have positive attitude towards condoms
and knowledge about vagrancy ordinance were improved after the intervention. 

**Conclusion:** The special training was effective to improve the knowledge, attitudes about HIV/AIDS and improve the willingness to support national HIV/AIDS plan while correct handling sex workers. It is recommended to provide necessary communication materials for training instructors in island wide to carry out continuous education for police officers.

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**C23 - Measuring and modeling the HIV epidemic**

MOPDC0305

Patient migration significantly impacts estimates of engagement in HIV care and attainment of an undetectable HIV-RNA level in a cohort of newly HIV-diagnosed individuals

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**Background:** Engagement in HIV care is a dynamic process. We sought to describe engagement-in-care over time in a newly HIV-diagnosed cohort.

**Methods:** Retrospective review of engagement-in-care among newly-diagnosed HIV-infected individuals at Denver Health and University of Colorado Hospital, 2005–2009. Client-level data was obtained from three public HIV providers, two clinical trial groups, and mandated Colorado state HIV laboratory reporting databases. Engagement in care required a visit or HIV-labs in a 6-month interval. Documentation in the medical record was required for out-of-state designation.

**Results:** From 2005–2009, 616 individuals were newly HIV-diagnosed; 9% were female, 34% Hispanic, 16% Black, and 78% men who had sex with men. Within 6 months of HIV diagnosis, 76% of individuals had at least one outpatient HIV-care visit. In a missing = failure analysis, 54–58% of patients were engaged in care and 33–37% had HIV-RNA < 200 copies/ml after 2.5 years (Figure 1). However, a significant proportion of individuals moved out-of-state or expired causing an underestimate of engagement in this analysis. Within 5 years of diagnosis 14% of individuals moved out-of-state and 4% expired. Excluding these individuals, 71% of the cohort were engaged in care and 48% had HIV-RNA < 200 cps/ml 5 years after diagnosis (Figure 2). Among those engaged in care, the percentage of

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**Figure 1.** Engagement-in-care five years after HIV diagnosis.

**Figure 2.** Engagement-in-care, migration and death censored.

**Figure 3.** Percentages of individuals HIV-RNA < 200cps/ml.
THPDC0101
Sexual mixing patterns between men who have sex with men in southern India: implications for modelling the HIV epidemic and predicting the impact of targeted oral pre-exposure prophylaxis

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**Background:** In southern India, the identity of men who have sex with men (MSM) is closely related to role taken in anal sex, but little is known about sexual mixing between identity groups. Both role segregation and assortative (within-group) mixing are known to affect HIV epidemic size in other settings. This study aimed to explore how different mixing patterns affect estimated HIV trends and intervention impact for MSM in Bangalore.

**Methods:** Deterministic models describing HIV transmission between three MSM identity groups (mostly insertive panthis/bisexuals (PB), mostly receptive kothis/hijras (KH) and versatile double deckers (DD)), were parameterised with data collected in Bangalore for the evaluation of the Avahan intervention. These models were used to explore four different mixing patterns (table). 300,000 randomly

| Mixing pattern       | How mixing was determined                                                                 | Number of fits | Median Q* for fits |
|----------------------|-------------------------------------------------------------------------------------------|----------------|--------------------|
| Maximum assortative  | KH, DD, PB all have as many acts with members of the same group as constraints allow.       | 108            | 0.16               |
| Setting plausible    | DD have as many acts with other DD as constraints allow. KH have as many acts with PB as constraints allow and vice versa. | 159            | 0.00               |
| Proportionate        | Receptive acts distributed between groups in proportion to the number of insertive acts offered by each group. | 301            | −0.16              |
| Disassortative       | PB and DD have as few acts with members of the same group as constraints allow.              | 430            | −0.40              |

*measures assortativeness of mixing in the whole population. 1 = completely assortative; −0.5 = completely disassortative.
C24 - Measuring and modeling the effect and impact of HIV prevention interventions

THAC0502
Modeling the impacts of a comprehensive community empowerment-based, HIV prevention intervention for female sex workers in generalized and concentrated epidemics: infections averted among sex workers and adults

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Background: Sex workers have endured a high burden of HIV infection across concentrated and generalized HIV epidemics, with a range of interventions implemented to varying degrees of success. A comprehensive, community empowerment-based HIV prevention intervention emphasizes sex worker mobilization to address structural factors related to sex worker rights and HIV risk, and typically includes peer education, condom social marketing, and STI/HIV screening and treatment. Meta-analysis demonstrated a 51% reduction in inconsistent condom use among female sex workers (FSWs) associated with such interventions. We used a deterministic model (Goals) to model the impact on HIV among FSWs and the adult population, when the community empowerment interventions were scaled up among FSWs in Kenya, Thailand, Brazil, and Ukraine.

Methods: Models were parameterized with published data or provided by country experts and calibrated against UNAIDS estimations. The intervention was increased from baseline coverage over a 5-year period (5–65% coverage in Kenya and Ukraine; 10–70% in Thailand and Brazil), while other HIV interventions were held constant. Impacts are observed from 2012–2016 and compared to status quo, when all interventions are held constant.

Results: Increasing intervention coverage among FSWs in Brazil averted 1,830 infections among FSWs and 4,740 among adults between 2012–16, compared to status quo. Increased coverage averted a cumulative 10,800 FSW and 20,680 adult infections in Kenya. In Thailand, 220 FSW and 730 adult infections were cumulatively averted. A cumulative 2,220 infections among FSWs and 6,920 infections among adults are averted with increased coverage in Ukraine. Impacts vary and were influenced by HIV prevalence in different risk groups, risk behaviors, and population size.

Conclusion: The community empowerment intervention for FSWs demonstrated impacts among sex workers and the adult population across these distinct settings. Findings confirm the centrality empowerment in prevention strategies, as the intervention is rights affirming and may require fewer resources, compared to other interventions.

THAC0504
Impact of behaviour change communication targeting the bridging population of clients of female sex workers in India

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Background: Clients of female sex workers (FSW) is key group in India’s HIV prevention programme due to their bridging role in HIV transmission to women in the general population. With limited evidence on intervention effects, we evaluate the impact of Avahan’s behaviour change communication strategy on consistent condom use among clients of FSW.

Methods: We analyzed data from 2009 Integrated Biological and Behavioural Assessment survey among clients of FSWs sampled at
FRLBC05
Combination interventions for the prevention of HIV among injection drug users: a complex systems dynamics model

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Background: Although combination prevention strategies are receiving growing attention, there is little evidence to inform their implementation, particularly for injection drug-using (IDU) populations. We constructed a complex systems dynamic model to assess various strategies for reducing HIV transmission among IDU.

Methods: We modeled HIV transmission in a dynamic network of IDU and non-IDU over a thirty-year time period (1992–2021). In the model, “agents” engage in risk behavior and interact with simulated prevention interventions (i.e., needle and syringe exchange programs [NSP], HIV testing, antiretroviral treatment [ART], substance abuse treatment). The model was constructed to represent the adult New York metropolitan statistical area (MSA) population, and calibrated by comparing HIV prevalence and incidence against historical validated MSA-level data. We obtained annualized incidence estimates from Monte Carlo simulations to examine the consequences of different intervention scenarios on a hypothetical population of 150,000.

Results: The model closely approximated published 1992–2011 data for HIV prevalence and incidence among IDU. Under current scenarios, HIV incidence among IDU residing in the New York MSA is estimated to be 3.7 per 1000 (95% CI 1.0–6.3 per 1000) in 2021. Scenarios in which coverage of only one intervention was increased resulted in decreased HIV incidence at 2021, with expanded NSPs showing the lowest incidence rate (2.4 per 1000), followed by increased substance abuse treatment availability (2.8 per 1000), earlier initiation of HAART and improved adherence (2.9 per 1000), and increased access to HIV testing (3.5 per 1000). Combining all scenarios resulted in the largest absolute reduction in HIV incidence (1.7 per 1000, 95% CI 0.3–3.9 per 1000) by 2021.

Conclusion: Our results demonstrate that combination interventions have the greatest potential to reduce HIV transmission among IDU. Although further research is required to determine cost-effectiveness, combining and bringing to scale existing evidence-based interventions may well be a highly effective strategy to reduce new infections.

MOPDC0102
Modeling the impact of focused strategies on the cost and effectiveness of TLC-Plus (or ‘Test and Treat’) in New York City

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Background: The recent HIV Prevention Trial Network (HPTN) study052 strengthens the evidence base for HIV treatment as a prevention strategy. We developed an operations research model of HIV prevention, with conservative effectiveness assumptions, to assist decision-making by public health authorities. We evaluated whether focused deployment of the “test and treat” strategy (i.e., TLC-Plus) among various populations would be cost-effective.

Methods: Using an epidemic compartmental model of HIV transmission, we simulated implementation of TLC-Plus strategies, including immediate anti-retroviral therapy (ART). We evaluated the impact of deployment among different populations. Outcomes included the number of infections averted over 20 years compared to the base case (no intervention) and the cost per infection averted. Base case assumptions regarding HIV testing and the proportion infected but undiagnosed were varied as a sensitivity analysis. We assume that a baseline proportion (89%) of HIV-infected persons are diagnosed; we make realistic assumptions about linkage to care, adherence, and retention in care.

Results: Generalized implementation of a TLC-Plus strategy averted 19% of new infections (from 59,109 to 47,690) over 20 years with a cost-per-infection averted of US$1.56 million. Focused deployment of the prevention package to specific populations reduced the absolute number of infections averted but often resulted in a program with favorable value, defined as a cost-per-infection averted ≤US$360,000. A TLC-PLUS intervention with a budget of approximately $22 million per year could prevent 5% of infections over 20 years (compared to base case), whereas a budget of ~US$1 billion per year would be required to attain the maximum prevention impact.

Conclusion: Focusing TLC-Plus strategies on specific high prevalence populations or neighborhoods may be more favorable than generalized implementation given the lower cost per infection averted and current budget limitations. The model supports ongoing efforts to focus scale-up of TLC-Plus and early ART initiation for all persons newly-diagnosed with HIV.

TUPDC0302
Perceptions and attitudes about PrEP among seronegative partners and the potential of sexual disinhibition associated with the use of PrEP
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Background: Preejaculation prophylaxis (PrEP) is a promising biomedical strategy to reduce HIV transmission. However, many caveats such as the potential risk of sexual disinhibition and non-compliance need to be considered. The objective of this survey was to explore the sociodemographic and behavioral factors associated with the adoption of PrEP among both MSM and heterosexual seronegative partners.

Methods: Pre-piloted self-administered survey was conducted among seronegative partners in a Ryan White Clinic in South Carolina from 2010–2011. Bivariate and multivariable analyses were used to explore the data.

Results: A total of 89 seronegative partners completed the survey. The median age was 42 years (IQR 32–50) and a majority were males (56%), blacks (70%) and heterosexual (74%). A majority of respondents were willing to use PrEP, if available (94%); however, 26% suggested that they would be more likely to have unprotected sex with HIV-positive partner while using PrEP and 27% suggested that it will be difficult to take daily dose of PrEP and consistently use condoms as well. Multivariable results suggested that ‘inconsistent use of condom with HIV-positive partner after knowing their status’ was more likely among males (aOR 10.43, 95% CI 2.67–40.79 and those with lower education (aOR 6.09; 95% CI 1.59–23.41), whereas it was less likely among those of older age (aOR 0.70; 95% CI 0.52–0.94) and MSM as compared to heterosexuals (aOR 0.21; 95% CI 0.05–0.87); and perception ‘condom is no longer needed while taking PrEP’ was more likely among those who did not use condom during last sexual intercourse (aOR 7.45; 95% CI 1.57–35.45) and less likely among those with higher HIV knowledge score (aOR 0.43; 95% CI 0.23–0.78).

Conclusion: There is high acceptability among seronegative partners for PrEP. However, there is a substantial risk of sexual disinhibition and non-compliance while using PrEP that may be reduced by ongoing education.

Background: HIV transmission among injecting and non-injecting drug users (IDU, NIDU) is a significant public health problem. Continuing propagation in endemic settings and emerging regional outbreaks have indicated the need for comprehensive and coordinated HIV prevention. We describe the development of a conceptual framework and calibration of an agent-based model (ABM) to examine how combinations of interventions may reduce HIV transmission among drug-using populations.

Methods: A multidisciplinary team of researchers from epidemiology, sociology, geography, and mathematics developed a conceptual framework based on prior ethnographic and epidemiologic research. An ABM was constructed and calibrated through an iterative design and verification process. In the model, ‘agents’ represent IDU, NIDU, and non-drug users who interact with each other within risk networks, engaging in sexual and, for IDUs, injection-related risk behavior over time. Agents also interact with simulated HIV prevention interventions (e.g., syringe exchange programs, substance abuse treatment) and initiate antiretroviral treatment (ART) in a stochastic manner. The model was constructed to represent the New York metropolitan statistical area (MSA) population, and calibrated by comparing output trajectories for various outcomes (e.g., IDU/NIDU prevalence, HIV prevalence and incidence) against previously validated MSA-level data.

Results: The model closely approximated HIV trajectories in IDU and NIDU observed in New York City between 1992 and 2002, including a steady decrease in HIV prevalence among IDUs. Exploratory results are consistent with empirical studies demonstrating that the effectiveness of a combination of interventions, including syringe exchange expansion and ART provision, dramatically reduced HIV prevalence among IDUs during this time period.

Conclusion: Complex systems models of adaptive HIV transmission dynamics can be used to explore the collective benefits of hypothetical combination prevention interventions. Future work will seek to inform novel strategies that may lead to more effective and equitable HIV prevention strategies for drug-using populations.

Background: Monitoring and evaluation of prevention programs in urban centers often disregard population transience and demographic shift. These factors are often confounding variables, and need to be properly addressed to form a clear picture on intervention efficacy over long periods of time. In DC, we investigate the efficacy of prevention programs as a factor of HIV/AIDS rates in the city, to determine the proportion of rate change in HIV attributed to gentrification alone.

Methods: Ordinary Least Squares spatial regression was used to determine the relationship between HIV/AIDS rates in each neighborhood by gentrification index. Other explanatory variables such as mode of transmission and ethnicity were excluded from the analysis due to high levels of spatial autocorrelation. The resulting regression was a bivariate comparison between gentrification and HIV/AIDS rates. Mapping and data analysis were conducted in ArcGIS® and R™ respectively.

Results: 676 cases (representing 64% of all cases in 2010) were mapped across 39 neighborhoods. The bivariate model created by Ordinary Least Squares spatial regression reported a R2 value of 32%. The correlation coefficient of r = 0.51 shows a significant positive association between gentrification and HIV rates (p < 0.05).

Conclusion: Approximately 33% of the variation in neighborhood rates of HIV/AIDS in DC can be explained by gentrification and demographic shift alone. Thus, gentrification is a significant factor in explaining how HIV/AIDS rates vary by neighborhood. The findings...
C25 - New HIV testing and diagnostic strategies

TUAC0304

Dentists’ willingness to offer oral HIV rapid testing: results from a nationally representative survey

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Background: Identification of undiagnosed persons with HIV infection is a public health challenge. The 2006 CDC guidelines recommend wide spread screening in a variety of health care settings. Prior research highlights the potential of the dental care setting as a promising venue for HIV screening of otherwise untested individuals.

Methods: We performed a nationally representative survey of general dentists which examined barriers and facilitators to offering oral HIV rapid testing at chair side (n = 1802, 70% response rate). Sixty-three percent of dentists indicated they were somewhat or very willing to rapid testing in the next year. We examined dentists’ willingness to perform such testing using multivariable logistic regression controlling for potential confounders (age, gender, and race/ethnicity).

Results: Dentists’ willingness to offer rapid testing in the next year was positively associated with dentists’ positive attitude regarding patient acceptance of testing (AOR = 3.5; CI 2.7, 4.3). Agreement with the statement “my colleagues’ perception of me as a health care provider would improve” was also positively associated with willingness to offer testing (AOR = 2.7 for each unit increase in 4-point agreement scale; CI 2.2, 3.2). Finally, dentists’ agreement with the importance for all persons at high risk to get tested for HIV annually was positively associated with willingness to offer testing (AOR = 1.7 for each unit increase in 4-point agreement scale; CI 1.4, 2.0).

Conclusion: Dentists appear potentially willing to perform HIV screening within general practice settings. Patients’ and colleagues’ perceptions appear important in shaping dentists’ attitudes and likely behavior concerning this service. These findings may inform the targeting of patient and provider behavior change interventions.

Table 1. Testing history mother and HIV-ELISA test results

| Testing history of mother | Number of mothers | Positive HIV ELISA result in infant |
|---------------------------|-------------------|-----------------------------------|
| Never tested              | 179 (3%)          | 17 (9.5%)                         |
| Negative HIV test before this pregnancy | 277 (5%) | 19 (6.9%)                         |
| Negative HIV test result during the pregnancy | 4,353 (79%) | 171 (3.9%)                        |
| Positive HIV test (any time) | 607 (11%) | 561 (92.4%)                       |
| Don’t know                 | 45 (1%)           | 11 (24.4%)                        |
| No answer                  | 83 (1%)           | 15 (18.1%)                        |
| Total                      | 5,545 (100%)      | 794 (14.3%)                       |

THAC0102

More HIV positive infants and mothers identified through HIV testing in immunization clinics

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Background: In July 2011, Malawi initiated Option B-plus, in which all HIV-positive pregnant women are offered lifelong ART, regardless of clinical stage or CD4 count. From August-December 2011, we evaluated Malawi’s national PMTCT program through an immunization clinic surveillance project designed to obtain population-based vertical transmission rates.

Methods: Infants <3 months old and their care-givers (primarily mothers) attending the first immunization visit at one of 53 randomly-selected immunization clinics in four Malawi districts were invited to participate and surveyed on maternal HIV testing and PMTCT experience. Infant dried blood spots (DBS) were tested by ELISA to determine maternal seropositivity (HIV-exposed). We compared mothers’ responses about previous HIV testing with the results of the ELISA test to establish the additional number of infants and mothers in need of HIV care that could be identified if HIV testing was introduced in immunization clinics.

Results: 5,545 linked DBS samples and surveys were collected. The reported uptake of HIV testing during pregnancy was high; 89% of women either tested during their pregnancy or already knew their HIV (infected) status. The detailed testing history of the mothers and the ELISA results of the infants are given in the table. In addition to the 607 infants that were reported to be exposed to HIV (on the basis of self-reported positive HIV-test result of the mother during or before the last pregnancy) we found 207 (an additional 34%) infants with ELISA-positive DBS in women that had never been tested or tested HIV-negative before or during the pregnancy.

Conclusion: In this population with a high uptake of HIV testing in pregnancy, testing infants in immunization clinics increased case-finding of HIV-infected infants (and mothers) by 34%. HIV testing in immunization clinics could be effective in increasing identification of infants and mothers in need of HIV care.
TUPDC0101
Tracing sexual contacts of HIV-positive individuals in Taizhou, eastern China
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Background: More than 400,000 persons living with HIV in China are estimated to be unaware of their infections, in spite of tremendous efforts in scaling up HIV testing. Identifying persons with undiagnosed HIV infection and linking them to medical care and prevention services continues to be a priority for HIV prevention and control. This study was to identify new HIV infections by tracing sexual contacts of HIV-infected cases and to elucidate sexual network characteristics among them and their sexual contacts.

Methods: All newly reported HIV cases from 2008–2010 in Taizhou Prefecture were invited to participate in a contact tracing survey. Each HIV positive participant was to provide detailed contact information up to a maximum of eight sexual contacts. This group was approached for voluntary HIV counseling and testing. This process was repeated until no more sexual contacts were reported or tested positive.

Results: A total of 463 HIV cases were newly reported during this study period. Among them, 398 (86.0%) HIV cases participated in the survey and served as “index cases”; including an initial 290 cases who were identified from routine surveillance programs and 108 cases from the contact tracing survey. Of the total of 1,403 contactable sexual contacts, 320 (22.8%) received HIV testing and 125 (39.1%) tested positive for HIV. Willingness to receive HIV testing was high among spouses and long term heterosexual or homosexual partners but extremely low among casual and commercial sex partners of index cases. Consistent condom use was rare for all participants. A total of 290 independent sexual network components were constructed, with high complexity.

Conclusion: Contact tracing is useful for identifying new HIV infections from spouses or long term sexual partners of HIV-infected individuals. The complicated sexual networks existing between and beyond HIV-infected persons provide opportunities for rapid spread of HIV in such areas.

THPDC0103
Faster and integral HIV diagnosis among MSM in the HIV/AIDS program of Mexico City (HIVPMC): necessary but not sufficient
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Background: Men who have sex with men represent the majority of clients receiving HIVPMC/VCT services. In 2010 HIVPMC/Condesa Clinic started a faster one-stop HIV/STI diagnosis during the first VCT visit based on rapid HIV test and parallel EIA for HIV/STI diagnosis. The laboratory also supports provider-initiated HIV testing activities among inmates, street male sex workers, and other groups at risk.

Results: A total of 463 HIV cases were newly reported during this study period. Among them, 398 (86.0%) HIV cases participated in the survey and served as “index cases”; including an initial 290 cases who were identified from routine surveillance programs and 108 cases from the contact tracing survey. Of the total of 1,403 contactable sexual contacts, 320 (22.8%) received HIV testing and 125 (39.1%) tested positive for HIV. Willingness to receive HIV testing was high among spouses and long term heterosexual or homosexual partners but extremely low among casual and commercial sex partners of index cases. Consistent condom use was rare for all participants. A total of 290 independent sexual network components were constructed, with high complexity.

Conclusion: Contact tracing is useful for identifying new HIV infections from spouses or long term sexual partners of HIV-infected individuals. The complicated sexual networks existing between and beyond HIV-infected persons provide opportunities for rapid spread of HIV in such areas.

Table 1. Prevalence percent of HIV, Hepatitis B and C and Syphilis among 7,382 men who answered a risk questionnaire

|            | HIV | HbsAg+ | Anti-HCV+ | Anti-Tp+ | VDRL+ |
|------------|-----|--------|-----------|----------|-------|
| Heterosexual (25%) | 6%  | 1%     | 1%        | 1%       |       |
| MSM (75%)  | 19% | 3.7%   | 1%        | 6%       |       |

Note: Transgender MtW showed 22% HIV prevalence. Men who did not answer risk questionnaire (n = 943) showed 25.6% HIV prevalence.

Table 2. Prevalence percent of HIV, Hepatitis B and C and Syphilis among 2,654 women who answered a risk questionnaire

|            | HIV | HbsAg+ | Anti-HCV+ | Anti-Tp+ | VDRL+ |
|------------|-----|--------|-----------|----------|-------|
| MSM (75%)  | 3%  | 0.1%   | 0.3%      | 0.7%     |       |

Note: Women who did not answer risk questionnaire (n = 718) showed 2.1% HIV prevalence. HIV/STI prevalence in 12,697 VCT clients in Mexico.

Methods: During 2011, 8,325 men and 4,372 women were tested. Since the fall 2011, initial CD4 counting in HIV+ clients, also done at first visit, favoured a rapid HIV infection staging. In 2012 HIV viral load analysis, required in Mexico for ART initiation, was added to the first laboratory visit studies.

Results: The integral HIV/STI diagnosis at the first VCT visit reduced the time elapsed, between the first HIV detection with a rapid test or ELISA and completion of laboratory studies necessary for starting ART. The attendance of vulnerable groups to VCT at Condesa Clinic increased by 51% during 2011. Sixty percent of new detected PLWHIV did not return for follow up and treatment as shown by the national HIV database SALVAR.

Conclusion: Until recently the lack of a fast diagnosis contributed to late ART initiation, thus favoring HIV transmission and increased incidence of morbidity and mortality. A new fast and Integral HIV/STI diagnostic approach promoted HIV VCT, increasing testing demand while reducing desertion related to laboratory delays. This model should be expanded to HIV clinics in other states showing similar epidemic trends. However, now we have clear evidence of the number of non-returning patients which points to the need for focused specific actions to promote opportune ART access. Additionally to individual post-test counseling, innovative personalized follow-up could be also addressed in non returning patients.

C26 - Methods for detecting recent HIV infections

MOAC0203
HIV incidence determination in clade B epidemics: a multi- assay approach
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Note: Transgender MtW showed 22% HIV prevalence. Men who did not answer risk questionnaire (n = 943) showed 25.6% HIV prevalence.
C29 - Determining HIV incidence

FRLBX02
Estimating national HIV incidence from directly observed seroconversions in the Swaziland HIV Incidence Measurement Survey (SHIMS) longitudinal cohort

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Background: Swaziland has the highest estimated national HIV prevalence rates in the world. The Swaziland HIV Incidence Measurement Survey (SHIMS) provides the first national-level HIV incidence estimates based on prospectively observed seroconversions among participants in a population-based longitudinal cohort.

Methods: A nationally representative sample of men and women, age 18–49, underwent household-based, rapid HIV testing from December 2010–June 2011, including counseling to reduce HIV infection risk. Socio-demographic and behavioral characteristics were also assessed through a questionnaire survey. HIV-uninfected individuals were invited to enroll in a cohort and retested for HIV and surveyed again approximately six months later. Longitudinal incidence was calculated as events/person-years (PY) × 100%.

Results: A total of 18,154 men and women, representing approximately 7% of the adult population, were surveyed, and 11,944 tested HIV-negative and enrolled in the cohort. Among these, 10,949 (91.7%) were retested for HIV after a mean follow-up of 6.5 months, resulting in 6,054 PY of observation. There were 146 seroconversions, resulting in a weighted, national HIV incidence estimate of 2.4% (95% CI, 2.1–2.7%). Incidence was higher in women (3.1%) than in men (1.7%), overall, and was highest among women 20–24 yrs (4.2%) and men 30–34 yrs (3.1%).

Conclusion: The highest HIV incidence rate (4.2%) in Swaziland is among women 20–24 yrs. Among men, the peak HIV incidence rate (3.1%) occurs among those 10 years older. Study-related risk reduction counseling may have extraneously altered participants’ risk behaviors and affected the observed incidence rates. These findings reinforce the need for effective HIV prevention interventions, such as voluntary medical male circumcision, which provides a direct protection against HIV acquisition for men and an indirect protection for women. As HIV prevalence may remain high independent of HIV incidence rates, efforts to diagnose and treat persons already HIV-infected with antiretroviral therapy, are also paramount to curb Swaziland’s severe HIV epidemic.

MOPDC0206
Incorporating incidence surveillance as part of national HIV surveillance in the United Kingdom: closer tracking of transmission

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Background: HIV in the United Kingdom is concentrated in distinct population sub-groups. Monitoring changes in transmission patterns among these groups informs prevention and testing efforts. We
present HIV new diagnoses and alongside novel incidence surveillance data in England and Northern Ireland.

**Methods:** National surveillance of new diagnoses in adults in England and Northern Ireland between January 2009 and June 2011 linked an avidity test. The Recent Infection Testing Algorithm (RITA) utilises the avidity result adjusted for baseline CD4 count and AIDS diagnosis to identify infections that probably acquired in the preceding 6 months.

**Results:** 14,682 adults were diagnosed with HIV over the period. 45% were men who have sex with men (MSM), 51% were heterosexual, and 2% were IDUs. One in ten was aged 15–29, 33% aged 25–34, 42% aged 35–49, and 15% aged 50+. Over the 30 months, new diagnoses in MSM increased as heterosexuals declined. A RITA result was available for 33% (4,877) of new diagnoses (these persons had similar demographic characteristics compared to those not tested). Overall, one in six (15%) had recently acquired their infection. Recent infection was more common in younger adults (25% persons aged 15–24 and 20% persons aged 25–34). MSM had the highest proportion of recent infections (23%), followed by heterosexuals (10%) and people who inject drugs (4%). One in three (31%) MSM aged under 35 acquired their infection recently, compared to one in seven (13%) aged over 50. Among heterosexuals, 20% of women aged 15–24 and 15% of men aged 25–34 had recently acquired their infection.

**Conclusion:** Surveillance data on new HIV diagnoses coupled with results from RITA indicate high rates of ongoing transmission among MSM, particularly in young MSM. Transmission patterns among young heterosexuals must also be observed closely and in the context of testing patterns.

**C30 - Measuring and modeling the impact of treatment for prevention**

**THAC0203**

The prospects of elimination of HIV with test and treat strategy

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**Background:** In recent years there was much debate in the public health community about the prospects of eliminating HIV from high endemic countries by a test and treat strategy. This strategy entails regular HIV testing in the entire population and starting antiretroviral treatment (ART) immediately in all who are found to be HIV infected. The rationale for this approach is the strongly reduced probability of onward transmission when the viral load in blood is reduced to undetectable levels by successful ART.

**Methods:** We investigated under what conditions of testing coverage and adherence to treatment elimination of HIV is feasible. We extended the model by Granich et al. (2009) to incorporate a more accurate description of disease progression and variable infectivity. This deterministic compartmental model describes the progression of HIV infection through a series of 3 stages. We used data from the CASCADE study to estimate survival distributions with and without therapy (ART) has been suggested to eliminate HIV in high-endemic levels.

**Conclusion:** Treatment as prevention for HIV in South Africa: different models show consistency in occurrence, but difference in timing of elimination and the overall impact of the intervention

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**Background:** Treating all HIV infected patients with antiretroviral therapy (ART) has been suggested to eliminate HIV in high-endemic
countries. However, the predicted impact of this universal test and treat (UTT) intervention has not been confirmed using different models.

**Methods:** We developed 9 different models of the South African HIV epidemic in a stepwise approach of increasing complexity and realism (Figure 1). The simplest model resembles the deterministic model by Granich et al., while the most detailed model is a stochastic microsimulation model (STDSIM), which, among others, includes sexual networks and different HIV stages. Similar to Granich et al., we examined the impact and cost-effectiveness of a UTT intervention of annual screening and immediate ART for HIV infected adults (aged 15+) starting in 2012 and scaled-up to 90% coverage in 2019.

**Results:** The predicted impact of UTT on the HIV prevalence in South Africa differs substantially between the simplest and most detailed model, yet both models predict elimination of HIV (Figure 2). Surprisingly, the current ART roll-out of treatment at \( \leq 350 \) cells/\( \mu L \) is already having such a substantial impact on incidence, that it will drive HIV into an elimination phase at around 2050, even without UTT. However, UTT is still cost-effective as many additional life-years will be saved (Figure 3).

Figure 1. Stepwise approach of model development.

Figure 2. Epidemiological impact of UTT.
Figure 3. Cost, impact, and cost-effectiveness.
Conclusion: Our results confirm previous conclusions that the HIV epidemic in South Africa can be eliminated through a strategy of universal testing and treatment at 90% coverage. However, models that capture more details underlying the HIV transmission dynamics show that elimination is more likely to occur at a later point in time. Also, UTT is a cost-effective intervention, but less efficient in reducing infection than previously predicted because the current ART treatment policy in South Africa alone will already drive HIV into elimination.

FRLBC01
The cost-effectiveness of treatment as prevention: analysis of the HPTN 052 trial
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Background: HPTN 052, a multi-country randomized trial, showed that early ART initiation produced a 96% reduction in HIV transmission among serodiscordant couples. Using an HIV

| Initially-infected cohort | New transmissions |
|---------------------------|-------------------|
| Survival (%)  | Life expectancy (months) | Costs (2011 USD) | Transmissions/Index case (A%) | LMs lost due to transmissions | Cost increase due transmissions | Overall ICER (S/YLS) |
| South Africa | | | | | | |
| 5-year Horizon | | | | | | |
| Delayed ART | 84 | 52* | 4,400 | 0.05 (-) | 0.10 | 80 | – |
| Early ART | 93 | 55* | 4,600 | 0.02 (-59%) | 0.03 | 30 | 700 |
| Lifetime Horizon | | | | | | |
| Delayed ART | – | 162 | 16,100 | 0.14 (-) | 7.19 | 1,180 | – |
| Early ART | – | 184 | 18,400 | 0.15 (+6%) | 4.48 | 1,190 | 1,200 |
| India | | | | | | |
| 5-year Horizon | | | | | | |
| Delayed ART | 52* | 1,700 | 0.04 (-) | 0.07 | 30 | – |
| Early ART | 94 | 55* | 1,700 | 0.02 (-57%) | 0.02 | 10 | 2,900 |
| Lifetime Horizon | | | | | | |
| Delayed ART | – | 177 | 9,400 | 0.14 (-) | 5.41 | 980 | – |
| Early ART | – | 193 | 11,300 | 0.15 (+3%) | 3.6? | 730 | 1,300 |

Cost, clinical impact, and cost-effectiveness of early and delayed ART initiation strategies. All cost and life expectancy results are presented per initially-infected patient; values are discounted at a rate of 3% annually.

*Life expectancy at a 5-year horizon indicates the average length of survival through 5 years.

LMs, life months; ICER, incremental cost-effectiveness ratio; YLS, years of life saved.
microsimulation model (CEPAC-International), we project the clinical impact, costs, and cost-effectiveness of early ART.

**Methods:** Per the 052 protocol, we compare two ART initiation strategies—early (at presentation-to-care) vs. delayed (CD4 < 250/μl). Each strategy is modeled in South Africa (RSA) and India using trial-derived data: mean age 33.8 y, mean CD4 449/μl (± 120/μl), 42% (RSA) and 67% (India) male, 0.103/1.483 transmissions/100PY while virologically suppressed/unsuppressed. ART strategies are applied consistently to transmitted and index cases. Outcomes include first-order HIV transmissions, survival, costs, and cost-effectiveness. We designate early ART very cost-effective or cost-effective if its cost-effectiveness ratio is <1x or <3x per capita GDP (GDP=$8,100 [RSA]; $1,400 [India]).

**Results:** In RSA, early ART increases survival, prevents costly OIs (partially offsetting ART costs), averts early transmissions, and is very cost-effective over both 5-year ($700/YLS, Table) and lifetime horizons ($1,200/YLS, Table). In India over a 5-year horizon, early ART increases survival and averts transmissions. Because ART is expensive relative to other medical treatment in India (Figure), OI prevention offsets fewer ART costs. Early ART, however, is cost-effective ($2,900/YLS, Table); over a lifetime horizon, it becomes very cost-effective ($1,300/YLS, Table). In sensitivity analyses in both countries, early ART remains very cost-effective over a lifetime horizon under a wide range of assumptions regarding the clinical and preventive efficacy of ART. Consideration of second-order transmissions increases the clinical and cost benefits of early ART.

**Conclusion:** Early ART averts HIV transmissions over shorter horizons, but increased survival attenuates this effect over time. Over 5 years, early ART is cost-effective in India and very cost-effective in RSA; in both countries, early ART is very cost-effective over a lifetime horizon.

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**Background:** Recent studies have demonstrated large effects of ART in reducing HIV transmission. This study builds on these findings to examine the impact and cost of alternative treatment strategies in a variety of epidemic settings.

**Methods:** We developed a model that tracks the HIV-adult population by CD count and estimates new HIV infections as a function of the current force of infection modified by changes in the CD4 count distribution of the HIV-infected population and the proportion on ART. We applied the model to eight countries in Sub-Saharan Africa.

We used the model to evaluate several treatment strategies—scaling up coverage to 80% with eligibility at CD4 < 350, adding pregnant women CD4 < 500, adding sero-discordant couples CD4 < 500, adding 80% of those CD4 < 500, and adding 80% of CD4 > 500. We modeled a range of costs per patient from constant to declining according to the goals of the Treatment 2.0 initiative.

**Results:** Figure 1 shows that each addition to the eligible population contributes to averting additional infections. Cost per infection averted ranges from $3600 to $11,000, Table 1. It is lowest for expanding treatment to all those with CD4 counts below 350, intermediate when treatment is expanded to 350–500, and highest for strategies that include treating people with CD4 counts > 500. The number of years of treatment per infection averted (Figure 2) varies from a low of 3.3 (< 350 in Uganda) to a high of 20 (treating pregnant women > 500 in South Africa).

**Conclusion:** Expanding treatment coverage can make a significant contribution to prevention efforts and will be cost-effective in most settings.

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**Table 1. Incremental Cost per Infection Averted**

| Treatment Strategy                              | Constant Cost per Patient | Declining Cost per Patient |
|-------------------------------------------------|---------------------------|---------------------------|
| ART for CD4 < 350                               | $5,200                    | $3,600                    |
| Plus HIV + Pregnant Women CD4 < 500             | $5,700                    | $4,200                    |
| Plus HIV + Pregnant Women CD4 > 500            | $8,700                    | $5,100                    |
| Plus Sero-Discordant Couples CD4 < 500         | $9,600                    | $4,200                    |
| Plus CD4 < 500                                  | $7,800                    | $4,400                    |
| Plus CD4 > 500                                  | $10,900                   | $5,800                    |
settings if costs per patient continue to decline. Results are most sensitive to assumptions about the effects of ART in reducing infectiousness in national programs and future reductions in costs per patient.

Figure 1. Infections Averted, 2012–2025.

Figure 2. Person-Years of ART per Infection Averted.

MOPDC0103
Modelling potential preventive impact of expanded antiretroviral therapy, early antiretroviral therapy for serodiscordant couples and harm reduction interventions in a concentrated epidemic in Viet Nam
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Background: Few studies have examined the preventive effect of expanding antiretroviral therapy (ART) in Asian epidemics. Viet Nam has a concentrated epidemic with the highest HIV prevalence observed in people who inject drugs (PWID). Viet Nam aims to maximize the survival and preventive benefits of ART and plans an operational provincial pilot. Optimal targets and strategy need to be identified to achieve the goal.

Methods: We constructed a mathematical model (deterministic transmission model) to explore the effects of expansion of ART, early ART for serodiscordant couples irrespective of CD4 count and harm reduction interventions on the concentrated epidemic in Viet Nam. HIV prevalence trends and population size of PWID, female sex workers (FSWs) and their male clients, men having sex with men (MSM) and low risk women in Can Tho province, Viet Nam, were used in the model.

Results: Compared to the current ART scenario (50% coverage, CD4 at ART initiation at 100 cells/mm3), achieving 80% ART coverage at CD4 threshold at 350 cells/mm3 will lead to approximately 20% reduction in new HIV infection annually, and biannual testing and immediate ART with 80% coverage will lead to 38% reduction. Early ART for serodiscordant couples potentially reduces annual HIV incidence in low risk women over 40% if high coverage is achieved. Opioid substitution therapy (OST) and needle syringe program (NSP) for PWID will reduce new infection in all the subpopulations.

Conclusion: Our modelling suggests that ART, combined with NSP and OST for PWID, could have a major impact on Viet Nam’s HIV epidemic. National programs should consider further expansion of ART and earlier ART initiation to enhance ART’s preventive impact. It is essential to address access barriers for key affected populations (e.g. discrimination, punitive policies) and to employ approaches that respect people’s rights during this expansion.

MOPDC0106
Sustained treatment as prevention: continued decreases in unprotected sex and increases in virological suppression after HAART initiation among participants in HPTN 052
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Background: HPTN 052 demonstrated a 96% decrease in HIV transmission when infected persons in serodiscordant relationships initiated HAART at study entry compared to those randomized to delayed treatment. However, this benefit could be attenuated if HIV-infected participants subsequently increased unprotected sex with- out virological control.

Methods: Between 06/2007 and 05/2010, 1763 HIV serodiscordant couples were enrolled in 9 countries in Africa, Asia and the Americas, and followed for a median of 2 years. The current analyses compared the sexual behavior of HIV-infected participants before and after they initiated HAART, and examined trends to evaluate whether risk taking changed over time by GEE models.

Results: At enrollment, 4.0% of HIV-infected participants in the early treatment group (E) and 5.7% in the delayed arm (D) self-reported unprotected vaginal intercourse (UVI) with their primary partner within the past week. At 3 months, 2.9% of E participants did, compared to 3.0% of D participants (p = 0.9). Over 2 years, UVI decreased among all participants (β = −0.015, p = 0.04), and the time trend was similar in both arms. Participants engaging in UVI were more likely to be female (AOR = 1.6, 95% CI 1.1–2.4), from South America vs. Asia, AOR = 16.0, 95% CI 8.2–31.3), from Africa vs. Asia(AOR = 8.8, 95%CI 5.0–15.6), use substances (AOR = 2.2,95% CI 1.3–3.9), and have a lower viral load at enrollment (AOR = 0.7, 95% CI 0.6–0.9). After 2 years, 91% of E participants were virologically suppressed, compared with 22% of D participants. Self-reported unprotected anal intercourse was uncommon (< 0.3% at baseline, and no change over time). Only 21% of participants on HAART who engaged in UVI or UAI had detectable plasma viremia.

Conclusion: Participants randomized to early HAART and those who subsequently initiated HAART did not increase risk taking over several years. The decrease in sexual risk taking, coupled with effective virologic suppression, suggest that earlier initiation of HAART could have sustained effects in decreasing HIV transmission.

C35 - Behavioural surveillance

MOPDC0205

Sexual behaviour trends by gender in a rural South African population-based cohort during the era of scaled-up access to VCT and ART, 2005 – 2010

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Background: In rural KwaZulu-Natal, HIV incidence has been high and changed little even while HIV testing uptake has increased dramatically over the past six years. We examine population-level trends in sexual risk behavior over the period 2005–2010 in a general-population cohort.

Methods: We report trends in sexual behaviour indicators from 2005 to 2010 for men and women aged 17–49, based on annual sexual behaviour surveys collected by the Africa Centre Demographic Information System (ACDIS). Indicators include the proportion ever had sex, the average number of sexual partners in the past year, the

Table A. Survey participation and knowledge of HIV status

|        | 2002       | 2006       | 2007       | 2008       | 2009       | 2010       |
|--------|------------|------------|------------|------------|------------|------------|
|        | Men        | Women      | Men        | Women      | Men        | Women      | Men        | Women      | Men        | Women      |
| Number of residents aged 17–49 | 10240 13667 | 10152 13574 | 10452 14133 | 10508 14217 | 10433 13964 | 11084 14856 |
| Number of survey participants (%) | 4339 (54%) | 7413 (42%) | 4091 (40%) | 6903 (51%) | 2698 (26%) | 5433 (38%) | 2370 (23%) | 4367 (31%) | 2499 (24%) | 5437 (39%) | 2780 5485 |
| Number with complete sexual behaviour data (%) | 3881 (89%) | 6559 (88%) | 3672 (90%) | 6339 (92%) | 2513 (93%) | 5019 (92%) | 2047 (63%) | 3999 (92%) | 1507 (60%) | 3404 (63%) | 1790 3319 |
| Unadjusted % knows HIV status (95% CI) | 26% (24–27%) | 45% (44–47%) | 26% (25–28%) | 51% (50–53%) | 28% (26–30%) | 59% (57–60%) | 46% (44–48) | 74% (72–75%) | 46% (44–48) | 74% (72–75%) | 51% 77% |
| Adjusted % knows HIV status (95% CI) | 29% (27–30%) | 47% (45–48%) | 30% (28–32%) | 53% (52–55%) | 33% (30–35%) | 61% (59–62%) | 46% (45–51) | 73% (73–76%) | 54% (50–54%) | 76% (76–79%) |
point-prevalence of concurrent sexual partnerships, and condom use at last sex with regular and casual partners. Trends are compared between groups defined by HIV status, knowledge of HIV status, and by other population characteristics. Unadjusted trends and trends adjusted for varying survey participation (A) are presented. Missing data in completed surveys is adjusted for using multiple imputation incorporating demographic, socioeconomic, behavioural and health variables from the ACDIS. Responses are weighted by sex/age/education/location strata to adjust for survey non-participation.

Results: Reported sexual risk behaviours may have declined in men and women over 2005–2010, but the decline is less pronounced than would have appeared without adjusting for missing data and survey participation (Figure A). Increases in reported condom usage have been greater than reductions in numbers of sexual partners. For both sexes, reported condom usage with regular partners increases more amongst those who know they are HIV-positive than those who have tested HIV-negative (Figure B).

Conclusion: These population trends in self-reported sexual behaviour suggest that some behaviour change occurred between 2005-2010 in the general population. Changes occurred in both those living with and without HIV, but the data suggest that greater changes occurred in those who reported knowing they were HIV positive. The full presentation will also include results of sub-group analyses.
**C36 - Surveillance of HIV drug resistance**

**MOAC0303**

The World Health Organization’s HIV drug resistance early warning indicators: results from 50 countries 2004–2009

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**Background:** The World Health Organizations HIV drug resistance (HIVDR) Early Warning Indicators (EWIs) monitor clinic factors associated with HIVDR. For this analysis, we selected three EWIs strongly associated with risk factors for HIVDR monitored in 21, 28, and 6 countries respectively in 2004–2009.

The first EWI monitors antiretroviral drug (ARV) pick-ups and ascertains if they are on-time or late. The second monitors ARV supply continuity at clinic pharmacies, monitoring whether stock-outs occur of routinely-used ARV annually. The third monitors whether HIV RNA (VL) is suppressed in cohorts of patients 12 months after ARV start. Targets were, respectively, >90% of patients picking up ARV on-time, 100% ARV supply continuity at clinics, and >70% of patients with suppressed VL.

**Methods:** Results were analyzed by all countries. The total number of clinics meeting the target in countries in each year was summed and two-sided 95% exact binomial confidence were calculated using SAS version 9.2 (SAS Institute, Cary, NC).

**Results:** On-time ARV pick-ups of 354 clinics in 21 countries, 17.0% (95% confidence intervals [CI] 13.0–21.1) met the target. ARV supply continuity of 719 clinics in 28 countries 65.0% (CI: 61.4–69.0) met the target. VL suppression of 46 clinics in 6 countries, 84.7% (CI: 49.6–93.7) met the target.

**Conclusion:** EWI results identify “on-time ARV pick-up” as a major challenge for patients and a potential HIVDR risk factor. Methods to improve on-time ARV pick-up (e.g. adherence and patient tracing interventions) and ARV supply chains may need to be prioritized by national ARV programs to prevent HIVDR emergence. In the reporting period, very few clinics in very few countries had resources to monitor VL, which is an important indicator of HIVDR development.

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**C40 - Monitoring and evaluation of HIV prevention, care and treatment**

**MOAC0302**

Effects of patient tracing on estimates of lost to follow-up, mortality and retention in antiretroviral therapy programs in low- and middle-income countries: a systematic review

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**Figure 1. Percentage of Clinics Meeting World Health Organization EWI targets in Africa, Asia, and Latin America and the Caribbean (LAC).**

**Table 1. Summary estimates with and without tracing**

| Outcome of interest | With tracing | Without tracing | P valueb |
|---------------------|--------------|----------------|----------|
| LTFU                | 25: 62791    | 29: 124875     | <0.001   |
| Mortality           | 28: 62791    | 25: 113693     | 0.006    |
| Sopped ART          | 13: 43975    | 7: 10841       | 0.5      |
| Transfer out        | 5: 6945      | 7: 6195        | 0.6      |
| Retention on ART    | 25: 62791    | 25: 113693     | 0.04     |
| Retention at origin | 25: 62791    | 25: 113693     | 0.02     |

**Notes:**
- LTFU, lost to follow up; ART, antiretroviral therapy.
- Comparing summary estimates for the 2 groups of studies (tracing and non-tracing) by Wilcoxon rank -sum test for medians or student’s t test for weighted means.

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Abstracts of the XIX International AIDS Conference
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Background: Lost to follow-up (LTFU) of patients receiving antiretroviral therapy (ART) programs in low-middle income countries (LMICs) is an important driver of clinical outcomes. Physical tracing to re-engage patients is increasingly common yet data describing the impact of this activity on LTFU, mortality and retention are limited.

Methods: We systematically searched for studies in LMIC programmatic settings via MEDLINE (2003-2011) and abstracts from HIV conferences (2009-2011). Included studies reported the proportion LTFU 12-months after initiation and tracing activities were determined from the studies or contacting study authors. Studies were classified as tracing studies if physical tracing was available for the majority of patients. Summary estimates from the 2 groups of studies (tracing and non-tracing) for LTFU, died, stopped, transferred out, and retained on ART were determined. These were medians and interquartile range if estimates were non-normally distributed, or weighted mean if normally distributed with weighting of each proportion by the inverse of its variance. Summary estimates were compared by Student’s t-test, or Wilcoxon rank-sum test as appropriate.

Results: 261 papers and 616 abstracts were identified of which 39 studies comprising 54 separate cohorts (n/C30187,666) met inclusion criteria. Treatment programs with tracing activities had lower estimated LTFU (7.6% vs. 15.1%; p<.001) and higher estimated mortality (10.5% vs. 6.6%; p<.006), retention on ART (80.0 vs. 75.8%; p=.04) and retention at original site (80.0% vs. 72.9%; p=.02) (Table).

Conclusion: Key indicators of HIV program success in LMICs are associated with tracing activities. Knowledge of patient tracing activities is therefore critical when interpreting program outcomes of LTFU, mortality and retention. The halving of the proportion LTFU in programs with tracing activities was only partially explained by a greater ascertainment of mortality and transfer, as reflected by improved ART retention. These data suggest that tracing result in real improvements in patient outcomes, rather than better ascertainment of negative outcomes alone.

MOAC0304
CD4 criteria improves the sensitivity of a clinical algorithm developed to identify viral failure in HIV-positive patients on first-line antiretroviral therapy
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Background: Routine viral load monitoring of patients on antiretroviral therapy (ART) is neither affordable nor available in most resource-limited settings. We used data from an electronic patient management system to develop an algorithm to identify patients at risk of viral failure using a combination of accessible and inexpensive markers.

Risk score* OR (95% CI) p value Risk category** OR (95% CI) p value
≥6 vs. <6 1.79 (1.09–2.95) 0.022 Low 2.12 (1.60–2.80) <0.0001
≥5 vs. <5 1.56 (1.10–2.21) 0.014 Medium 4.37 (3.19–5.97) <0.0001
≥4 vs. <4 1.34 (1.05–1.71) 0.019 High 10.7 (6.58–17.4) <0.0001
≥3 vs. <3 1.25 (1.03–1.51) 0.025
≥2 vs. <2 1.61 (1.31–1.98) <0.0001
≥1 vs. <1 1.43 (1.05–1.96) 0.025

ROC C sttistic *=0.63; ** =0.59; CD4 criteria included in these results. Odds ratio estimates of viral failure.

Figure 1. Kaplan Meier curves and log-rank tests for time to viral failure using the predictor risk score (A) or risk category (B) (Time to viral failure by risk score and category.)
Methods: We analyzed data from HIV-positive adults initiated on ART at Themba Lethu Clinic, South Africa between April 2004–February 2010. Viral failure was defined as 2 or more consecutive HIV-RNA viral loads >400 copies/ml following suppression below ≤400 copies/ml. We used Cox-proportional hazards models to calculate hazard ratios (HR) and 95% confidence intervals (CI). Weights for each predictor associated with viral failure were created as the natural logarithm of the adjusted HR and categorized into low, medium and high risk groups. We assessed the diagnostic accuracy of predictor scores and risk categories, with and without CD4 criteria (CD4 <100cells/mm³; CD4 < baseline CD4; drop in CD4 >30%), using sensitivity, specificity, positive and negative predictive value.

Results: Of 7369 patients, 922 (12.5%) experienced viral failure at a rate of 39.7/100 person-years. In our model for predictor scores, the following each received a weight of 1: baseline or current CD4 <100cells/mm³; baseline WHO stage III/IV; albumin <25g/L; diastolic blood pressure < 70mmHg; MCV <100fL; worsening WHO stage, suboptimal adherence and new condition/symptom. Odds ratio estimates and Kaplan Meier curves showed discrimination of viral failure by risk score or risk category (Table 1; Figure 1). However, the sensitivity/specificity of the risk score (≥4 vs. <4) or risk category (medium vs low/no risk) with CD4 criteria was 24.4%/88.6% and 21.1%/89.4%, respectively. The sensitivity/specificity without CD4 criteria was 12.3%/95.8% and 11.8%/95.9%, respectively.

Conclusion: The algorithm may be a feasible and useful screening tool for resource-limited settings to identify patients at risk of treatment failure allowing more frequent monitoring or targeting for laboratory testing.

MOAC0305
Retention and risk factors for attrition among adults in antiretroviral treatment (ART) programs in Tanzania, Uganda and Zambia

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Background: Patient retention in antiretroviral therapy (ART) care is a major challenge in sub-Saharan Africa and a key indicator of program quality. We assessed ART retention and predictors of attrition (death or loss to follow-up) in ART clinics in Tanzania, Uganda and Zambia.

Methods: We conducted a retrospective cohort study among adults (≥18 years) starting ART during 2004–2010. Eighteen health facilities, six per country, were purposefully selected. At each facility, 250 adult patients were randomly selected for inclusion. Patients who visited clinics at least once during the 90 days before data abstraction were defined as retained. Data on individual-and program-level risk factors for attrition were obtained through chart review and clinic manager interviews. Kaplan-Meier curves for retention across study sites were created. Predictors of attrition were assessed using a multi-variable Cox-proportional hazards model, adjusted for site-level clustering. Missing data were handled using the missing indicator method.

Results: From 17 facilities, 4,147 patients were included. The retention proportion ranged from 52.0% to 96.2% at one year, from 39.7% to 93.8% at 2 years, from 32.7 to 90.4% at 3 years, and from 25.8% to 90.4% at 4 years (Figure 1).

Figure 1. Proportion of patients retained in the ART program.
Preliminary multivariate analysis (Table 1 and Table 2) of characteristics at ART initiation showed that younger age, male sex, higher WHO stage, loss > 10% of bodyweight, lower CD4 cell count, poor functional status, and later calendar year of ART initiation, were independent risk factors for higher attrition. Sites offering ART dispensing in the community had significantly less attrition than those offering ART only in clinics.

**Conclusion:** In countries studied, patient retention to ART care worsened over time especially among certain groups. Key interventions for males, younger persons and those with poor clinical indicators are necessary. Increased use of community outlets for ART drug dispensing could improve retention.

**Patient baseline characteristics.**

| Number of facilities | Number of patients | Adjusted Hazard Ratio (95% CI) | P-value |
|----------------------|--------------------|-------------------------------|---------|
| Total                | 17                 | 4147                          |         |
| ARV drug dispensing  |                    |                               | 0.006   |
| in community         |                    |                               |         |
| No                   | 12                 | 2942                          | 1       |
| Yes                  | 5                  | 1205                          | 0.38 (0.21, 0.68) |

**Program characteristics.**

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**Conclusion:** In countries studied, patient retention to ART care worsened over time especially among certain groups. Key interventions for males, younger persons and those with poor clinical indicators are necessary. Increased use of community outlets for ART drug dispensing could improve retention.

**HIV clinical and program outcomes among older patients with HIV enrolled in HIV care and initiating ART in sub-Saharan Africa**

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**Background:** HIV disease outcomes in older PLWH are inferior in developed countries, but limited data are available from resource-limited settings.

**Methods:** We used routinely-collected data on adults enrolled in HIV care from 01/05–12/10 at 199 clinics supported by ICAP-Columbia University in Kenya, Mozambique, Rwanda, & Tanzania to compare baseline characteristics and outcomes of older (>50 years) and younger (15–49 years) adults. We assessed baseline differences using descriptive statistics, retention using Cox models, and CD4+ response after ART initiation with repeated-measures regression. Adjustments made for country, facility type & location, ART initiation year, sex, and baseline CD4+ cell count (for CD4 response).

**Results:** 392,159 adults 15 years enrolled in HIV care, of whom 38,341 (10%) were >50 years; and 179,894 initiated ART, 20,337 (11%) of whom were >50 years. Compared to 15–49 year olds, older patients were more likely to be male (50% vs. 32%, p < .0001), and have lower CD4+ count at enrollment into care (median cells/mm³ 224 vs. 263, p < .0001) but similar (though statistically different) CD4+ at ART initiation (163 vs. 157, p = .0001). Older adults had higher mortality than younger adults one year after enrollment (HRadj 1.27, 95% CI:1.19–1.35) and ART initiation (HRadj 1.13, 95% CI:1.05–1.22), but lower loss to follow-up (one year after enrollmentHR adj 0.76, 95% CI:0.72–0.79; after ART initiation HR adj 0.80, 95% CI:0.75–0.84). Among 92,467 (51%) ART

**Figure 1.** Proportion of newly enrolling and active adult patients who are ≥50 years of age, 2005–2010.
| Study Population | Overall | 50 years and older | 15–49 years | P-value for difference | Overall | 50 years and older | 15–49 years | P-value for difference |
|------------------|---------|--------------------|-------------|------------------------|---------|--------------------|-------------|------------------------|
| Total Population (% of total) | 392,159 (100%) | 38,341 (10%) | 353,818 (90%) | 179,894 (100%) | 20,337 (11%) | 159,557 (89%) | .0001 |
| Percent male | 33% | 50% | 32% | 36% | 50% | 34% | <.0001 |
| Median (IQR) CD4 cell count at enrollment/ ART initiation (cells/mm³) (Percent missing CD4 count) | Overall | 259 (117–460) (49%) | 224 (109–400) (47%) | 263 (118–466) (50%) | 158 (75–240) (33%) | 163 (88–242) (33%) | 157 (74–240) (33%) | <.0001 |
| Male | 216 (89–401) (48%) | 204 (95–376) (46%) | 218 (88–406) (48%) | 144 (61–226) (32%) | 151 (77–231) (32%) | 140 (59–225) (32%) | <.0001 |
| Female | 283 (134–488) (50%) | 245 (126–425) (47%) | 286 (135–493) (50%) | 167 (85–246) (34%) | 174 (101–252) (34%) | 166 (83–246) (34%) | <.0001 |
| Percent with WHO stage III or IV at enrollment/ART initiation (Percent missing WHO stage) | Overall | 47% (28%) | 53% (24%) | 46% (28%) | 64% (43%) | 66% (41%) | 63% (43%) | <.0001 |
| Male | 55% (28%) | 55% (25%) | 55% (29%) | 70% (43%) | 67% (41%) | 70% (44%) | <.0001 |
| Female | 43% (28%) | 51% (23%) | 42% (28%) | 60% (43%) | 64% (40%) | 60% (43%) | <.0001 |
patients with both baseline and follow-up CD4+ counts, average 12-month CD4+ count for older adults was 15.9 cells/mm<sup>3</sup> lower than for younger adults (p = 0.006) after adjustment for variables above.

**Conclusion:** About 10% of patients enrolling in care and initiating ART in a diverse and large sample of clinics in four sub-Saharan Africa countries were ≥ 50 years. Compared to younger adults, older adults were significantly more likely to be male, experience less LTF, but have higher mortality and smaller CD4+ count response after ART initiation.

**MOPDC0301**

The United Kingdom’s National Health Service (NHS) provides excellent access to high quality HIV care: results from a national cohort

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**Background:** Early diagnosis of HIV and prompt access to antiretroviral therapy (ART) are critical in ensuring optimal care for HIV patients. We produce key indicators aimed at monitoring access, and the quality of care delivered, to adults living with HIV in the UK.

**Methods:** Analyses of national surveillance data included linking reports of newly diagnosed adults to annual surveys of adults accessing HIV care and laboratory CD4 data. Deaths reports were linked from the Office for National Statistics. Proportions are presented among adults with relevant information available. Data are rounded to the nearest 100.

**Results:** Late diagnosis: 6,600 were newly diagnosed in 2010, of whom half were diagnosed late (CD4 < 350 per mm<sup>3</sup>) in 2010 (heterosexual men 65%, women 58% and men who have sex with men (MSM) 39%) and 28% had CD4 < 200. Late presenters had 10-fold increased risk of dying within a year compared to those diagnosed promptly (4% vs 0.4%).

Prompt integration into care: Using the first CD4 count as a proxy, overall 98% of 6,600 adults newly diagnosed in 2010 were integrated into HIV care within 3 months, with little difference across exposure groups.

Immunological response: Among 53,400 adults receiving care for more than a year by 2010, 81% had a CD4 > 350 regardless of ART (heterosexual men 74%, women 82% and MSM 85%)

Viral suppression. Among 6,000 adults who started ART in 2009, 85% remained on treatment and had undetectable viral load by 2010 (heterosexual men 84%, women 85% and MSM 89%).

**Conclusion:** We have developed robust measures of patient care from routine surveillance data, enabling comparisons overtime and between population groups. The NHS provides excellent access to high quality HIV care regardless of patient characteristics, contrasting with other high-income countries. Expanding testing to reduce late diagnosis remains vital in improving the life expectancy of HIV patients.

**MOPDC0303**

Linkage, retention, ART use and viral suppression in four large cities in the United States

Figure 2. Median CD4 increase after ART initiation.
Figure 1. Percentage of estimated number of HIV-infected persons* in stages of the continuum of HIV care in four large United States cities through December 2009 compared to national estimates; Chicago, Philadelphia, Los Angeles and San Francisco.

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Background: Successful HIV treatment involves timely linkage to medical care, ongoing engagement in care, and adherence to effective HIV treatment regimens. Compared to national data, large urban areas may have significant variation in the level of successful engagement of PLHA in care and treatment. Identification of these differences can help reduce HIV disease transmission, morbidity and mortality.

Methods: HIV case surveillance data from Chicago, Los Angeles County(LA), Philadelphia and San Francisco(SF) were used to compare linkage to care (=1 CD4 or VL test within 3 months of diagnosis) among adults with a new HIV diagnosis in 2009. The proportion who have accessed care (=1 CD4/VL test in 2009) was calculated for the estimated total HIV-infected adults, including those unaware and those reported with HIV infection, living in 2009. City estimates from the Medical Monitoring Project(MMP) were applied to the number of HIV infected individuals to calculate the percentage who were on ART, and among those on ART, the percentage virally suppressed (most recent VL ).

Results: The proportion of newly-diagnosed persons linked to and engaged in care was significantly higher in LA and SF compared to Chicago and Philadelphia (p < .01; Figure 1). Among HIV-infected adults, 47% in LA and 50% in SF were on ART, compared with Chicago(26%), Philadelphia(34%), and the U.S. overall(36%). In addition, viral suppression was achieved among 46% of individuals in SF, 41% in LA, 27% in Philadelphia, and 22% in Chicago.

Across all cities, a higher percentage of Whites compared to Blacks who accessed care were on ART and were virally suppressed (range91%–94% vs. 83%–85%) and (88%–100% vs. 74%–84%) respectively.

Conclusion: Data from these cities highlight discrepancies in progress towards universal HIV care, and help identify effective regional interventions that promote access to care and treatment. Targeted programs and funding are needed to ensure care and eliminate racial/ethnic disparities.

MOPDC0304

Factors associated with achieving viral suppression among newly diagnosed HIV/AIDS cases in the Washington, D.C. Willis1, A. Castel1, A. Griffin2, T. West2, I. Shaikh2 and G. Pappas3
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Background: The District of Columbia Department of Health (DCDOH) has supported HIV test and treat activities by increasing the number of tests performed and emphasizing earlier linkage to care. Data on the impact of these efforts on viral suppression (VS) and continuity of care are limited. This analysis sought to identify factors associated with VS among newly diagnosed HIV-infected persons.

Methods: HIV-infected persons diagnosed from 2006–2007 were identified in the DCDOH HIV/AIDS surveillance database. Cases with an initial detectable viral load (VL) followed by at least one additional VL test prior to 12/31/10 were included. VS was defined as VL <400 copies/mL. Bivariate analyses and multivariate logistic regression were performed to detect differences between those who were VS and those who were not. Among VS cases, Cox proportional hazards ratios and Kaplan-Meier survival analysis were conducted to identify predictors of VS.

Results: Of 988 newly diagnosed cases, 66% achieved VS prior to 12/31/10. VS cases were significantly more likely to be ≥50 years of age at diagnosis (19% vs. 11%, p = 0.008) and in continuous care, defined as 2 visits 3 months apart within 12 months (32% vs. 22%, p = 0.002). Cases concurrently diagnosed with AIDS were also more likely to achieve VS (73% vs. 62%, p < .0001). Multivariate logistic regression revealed that MSM (aOR 1.62, 95% CI 1.1,2.4) were significantly more likely to achieve VS than heterosexuals. Among those achieving VS, survival analysis found that those ≥50 years of age at diagnosis (aHR 1.44 95% CI 1.2, 1.8), those linked to care...
within 3 months (aHR 1.35 95% CI 1.1, 1.6), and those in continuous care (aHR 1.73 95% CI 1.5,2.1) were significantly more likely to achieve VS.

Conclusion: These findings demonstrate the importance of earlier linkage and continuity of care in achieving viral suppression and highlight the need for more navigation programs targeted to HIV-infected persons.

WEPDC0202

Evaluation of a behaviour change communication programme to reduce concurrent sexual partnerships in Botswana

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Background: The evidence linking concurrent sexual partnerships (CP) to HIV transmission prompted the Government of Botswana to launch a National Campaign in 2009 to reduce CP. The campaign aimed to increase risk perceptions associated with concurrent partnerships and to reduce CP.

Methods: This study tested whether exposure to campaign messages among targeted adults aged 18–35 (a) reduced concurrent partnerships, (b) increased risk perceptions associated with CPs, and (c) reduced behavioral factors known to be associated with CP. A national cross-sectional survey was conducted in 2011 using a two-stage cluster sampling. Individuals were randomly sampled from households within enumeration areas (n = 1237 adults). Coarsened exact matching was used to create statistically equivalent groups of exposed and non-exposed individuals, based on radio/TV ownership and place of residence. Logistic regression was used on the matched sub-sample (n = 1138) to ascertain the effect of intervention exposure, accounting for gender, education, occupation, and age.

Results: Half of the respondents were female; 90% were single; 66% had secondary education; 26% had tertiary education; 11% reported having CP in the past 6 months; and 69% were exposed to at least one intervention message. Exposure to campaign messages was associated with increased risk perceptions associated with CP (OR = 1.49; 95%CI = 1.11–2.01). There was no impact of the campaign message on reducing CP. However, exposure was associated with increased self-efficacy for condom use (OR = 1.38; 95% CI = 1.02–1.88) and HIV testing (OR = 1.6; 95% CI = 1.06–2.42). In additional analysis, those who reported having CP were more likely to use condoms consistently (OR = 2.3; 95%CI = 1.7–3.1).

Conclusion: We found positive impacts of the intervention on increased risk perception and condom self-efficacy. CP is rooted in deeply entrenched social norms and thus may require a longer intervention period to see a reduction. The finding that CP was associated with condom use suggests that combined intervention messages would be more appropriate than a stand-alone CP message.

C41 - Monitoring and evaluation (other)

TUAC0205

Evaluating the use of HIV surveillance data for initiating partner services in Houston, Texas, U.S.

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Background: Notifying partners about HIV exposure is an important component of HIV prevention. CDC recommends programs should use surveillance data and disease reporting systems to identify newly diagnosed persons. Texas law mandates that local health departments elicit partners, notify them of possible exposure to HIV, and offer HIV counseling and testing. In Houston, the HIV/STD Surveillance Program coordinates with HIV/STD Prevention Program to identify persons with HIV infection and provide Partner Services (PS). These activities can prevent the spread of disease and improve individual health as well as the health of the community.

Methods: Using HIV surveillance data from the HIV registry, the Houston HIV/AIDS Surveillance Program identified individuals newly diagnosed with HIV. These patients were referred to HIV Prevention Program to conduct Partner Services. Partners identified were contacted by Disease Intervention Specialists and confidentially notified of possible exposure. Using prevention data from the STD registry, patient and partner outcome information were generated. Numbers of patient interviews and number of partners notified and tested were tabulated.

Results: Using the HIV surveillance data, the number of HIV positive patients referred for PS increased from 78% in 2005 to 96% in 2008. The percentage of providers who “opt-out” of health department-based PS has decreased from 22% to 4%.

From Prevention data, the number of patients interviewed increased from 521 in 2005 to 1,299 in 2010. More significantly, the percentage of partners notified has increased from 57% to 79% and the number of partners tested increased from 74% to 92%.

Conclusion: Using HIV Surveillance data for initiating Partner Services has proven to be an effective tool for HIV prevention activities. However, using surveillance data to initiate PHFU should be guarded with strict protocol to avoid inadvertent breaches in confidentiality.

MOPDC0302

Trends in antiretroviral therapy use, HIV RNA plasma viral load and CD4 T-lymphocyte counts at death among HIV-positive persons in care in the United States, 2000–2008

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Background: The US National HIV/AIDS Strategy targets for 2015 include “improving health outcomes for people living with HIV.” The objective of this study was to demonstrate the changing national
trends in HIV treatment and outcomes among adults in HIV care using the North American AIDS Cohort Collaboration on Research and Design (NA-ACCORD).

**Methods:** We analyzed data from HIV-infected adults in the NA-ACCORD with ≥1 plasma HIV RNA viral load (HIV VL) or CD4 T-lymphocyte (CD4) count measured in an HIV clinical setting in any calendar year from 1/1/2000 to 12/31/2008. Annual percentages of antiretroviral therapy use (ART), suppressed HIV VL, and median age and CD4 count at death were estimated. χ² statistics were used to compare percentages within a calendar year; generalized linear models with generalized estimating equations were used for comparison across calendar years.

**Results:** 45,529 HIV-infected adults received care in an NA-ACCORD-participating US clinical cohort from 2000 to 2008. From 2000 to 2008, the percentage of participants using combination ART increased from 73% to 83% (p < 0.01). In 2008, protease inhibitor-based (37%) and non-nucleoside reverse transcriptase-based (57%) regimens were the most commonly prescribed initial combination ART among treatment-naïve adults (p < 0.01). The percentage with suppressed HIV VL (≤ 2.7 log10 copies/mL) increased from 46% in 2000 to 72% in 2008 (p < 0.01) (Figure 1). Among 4,417 participants who died, median age at death increased from 44 to 50 years (p < 0.01) while the CD4 count at death more than tripled to 209 cells/µL (p < 0.01). (Figure 2). The percentage with suppressed HIV VL (< 0.5 per 1,000 births) increased from 40% of HIV-positive pregnant women in 2005 to 92% in 2010, (P < 0.001). The percentage of pregnant women diagnosed with syphilis who receive appropriate treatment range from 50% to 100%. Pregnant women having at least one visit with a skilled ANC attendant raised from 60% to 95%, (P < 0.001).

**Conclusion:** From 2000-2008, increases were observed in the percentage prescribed combination ART, the percentage who achieved a suppressed HIV VL, and the median age and CD4 count at death. Our data show improved control of HIV with contemporary management in the US and the utility of NA-ACCORD for monitoring these trends.
al, service delivery, technical, and community involvement. A mean aggregate quality score was computed in each area and also by type of provider, intervention, and setting to assess levels and trends of quality of STI care provision.

**Results:** Analysis of 290 clinic assessment records for a total of 227 preferred private providers showed progressively increasing trends in all quality areas of assessment irrespective of provider, setting, and intervention type. The average quality score increased from 39.5 in 2007 to 62 by 2011. Non-allopathic and private providers in rural settings showed consistently lower quality scores than allopathic and urban providers, respectively. However, the difference was not statistically significant. An overall 1.5-fold improvement in the quality score was observed, with scores consistently above 78% in the last three years.

**Conclusion:** Through continuous supportive supervision it is possible to ensure quality of STI care provided by private providers in HIV interventions with FSWs and MSM.

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**C43 - Surveillance and monitoring of HIV/hepatitis C (HCV) co-infection**

**MOAC0402**

A critical need to scale-up of HIV prevention and harm reduction services for people who inject drugs in Tanzania: Results from a HIV and hepatitis C prevalence study in Dar es Salaam, Tanzania 2011

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**Background:** The number of people who inject drugs (PWID) has grown substantially in Tanzania, with increasing significance for HIV control. We determined HIV and hepatitis C (HCV) prevalence, service access and risk behaviours among PWID in Temeke District, Tanzania.

**Methods:** Researchers administered a quantitative survey alongside analyses of service access and risk behaviours.

**Results:** 267 PWID (87% males) reported a median injecting duration of five years (IQR = 3–9). HIV prevalence was 34.8% (95%CI = 29.1–40.9); 29.9% (95%CI = 24.0–36.2) among males and 66.7% (95%CI = 49.0–81.4) among females. HCV prevalence was 27.7% (95%CI = 22.4–33.5) and similar for males and females. HIV/HCV co-infection prevalence was 16.9% (95%CI = 12.6–21.9); 15.2% (95%CI = 10.8–20.4) among males and 27.8% (95%CI = 14.2–45.2) among females. Most (73%) positive HIV tests were previously undiagnosed. Over half PWID (53%) had no HIV testing history and 76% had not tested in the past two years. One-third of PWID (34%) reported not knowing where to access HIV testing. Two-thirds (66%) had not heard of HCV and 98% had never tested for HCV.

Common sharing behaviours included injecting with a used syringe (42%) and sharing other equipment (17%) or mixing containers (14%). Nearly one-third (30%) of HIV positive PWID reported recent unprotected sex. About half PWID reported having not received condoms (52%) or clean injecting equipment (54%) in the past 12 months.

**Conclusion:** HIV prevalence among PWID in Temeke was substantially higher than population estimates (7% males, 10% females). Low HCV awareness and high HIV/HCV co-infection prevalence raise concerns for accelerated HCV disease progression and future liver disease burden in this population. Injecting and sexual risk behaviours, undiagnosed HIV and HCV, and limited access to testing, condoms and clean injecting equipment demand urgent scaling up of prevention and treatment services targeting PWID in Tanzania.

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**THAC0103**

Will your partner be attending? Involving men in the prevention of mother-to-child transmission of HIV in antenatal care clinics in Iringa, Tanzania

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**Background:** HIV prevalence among Tanzanian adults is 6%; with mother-to-child HIV transmission (MTCT) accounting for one in ten infections. Men play a decisive role in women’s utilization of health services, but male involvement with their partners in the prevention of MTCT (PMTCT) program is low. To address this issue, the ACQUIRE Project Tanzania (ATP) has supported the Ministry of Health and Social Welfare since 2008 to involve men in antenatal care (ANC) services in Iringa, the region with the country’s highest HIV prevalence (16%). Interventions include partner invitation letters, posters encouraging male attendance, prioritizing clients accompanied by partners, improving couple counseling rooms, training providers on PMTCT couple counseling, and engaging villages to develop local strategies. This evaluation assesses uptake of PMTCT services by pregnant women and their partners before and after interventions began.

**Methods:** A repeated cross sectional study was conducted in 354 facilities in Iringa, Tanzania between 2008 and 2011. Facility-level data on PMTCT service uptake were collected to assess partner HIV testing before and after male involvement interventions. Data were analyzed using descriptive statistics.

**Results:** The number of ANC partners tested annually for HIV increased from 1,746 in 2007/08 to 10,559 in 2008/09, and 20,758 in 2009/10. Prior to interventions 7% of ANC partners were tested; after interventions 30% of partners tested in 2008/09, 40% in 2009/10 and 50% in 2010/11. While the number of partners tested increased the proportion testing positive decreased below the regional rate from 16% in 2007/08 to 10% in 2010/11. Male participation was higher in facilities with strong community support; for example, up to 80% of ANC clients at Mtwango Dispensary were accompanied by partners consenting to test.

**Conclusion:** Locally initiated interventions on male involvement are crucial for the reduction of MTCT and men can be engaged to utilize and support PMTCT services.

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**THAC0104**

HIV seroconversion during pregnancy and mother-to-child HIV transmission: data from the Enhanced Perinatal Surveillance Project, United States, 2005–2010
The 2010 WHO PMTCT guidelines highlight the importance of CD4 testing for all pregnant HIV+ women, and strongly recommend lifelong antiretroviral therapy (ART) for everyone with CD4 <350 cells/mm³. We examined 2009 and 2010 national data in India, where an estimated 43,000 HIV-positive pregnant women require PMTCT services annually, to assess CD4 testing practices and inform programme policy.

Methods: Antenatal HIV testing data were routinely collected from HIV Integrated Counselling and Testing Centres (ICTCs). ICTC and ART centre records in each state were abstracted to evaluate the number and proportion of HIV-infected pregnant women who received CD4 testing, proportion with CD4 count <350 cells/mm³, and number initiated on ART.

Results: Of 5,807,778 pregnant women tested across India in 2009, 18,692 (0.32%) were detected HIV-positive. Among HIV+ pregnant women, 10,192 (54.5%) received CD4 testing, of whom 3,082 (30.2%) had a CD4 count <350 cells/mm³. In 2010, 16,204 (0.24%) of 6,877,617 tested pregnant women were detected HIV-positive. Among these, 9,917 (61.2%) received CD4 assessment, and 3,934 (39.7%) had a CD4 count <350 cells/mm³. In 2010, 2,292 pregnant women started lifelong ART, representing 58% of those with CD4 <350 cells/mm³.

Conclusion: Among those tested, approximately 40% of pregnant HIV+ women in India require ART for their own health. However, almost 40% of detected women did not receive timely CD4 assessment or linkage to treatment. In light of these data, the Indian national programme has opted to provide a single maternal triple antiretroviral prophylaxis regimen to all HIV+ pregnant women, irrespective of CD4 count. This “test and treat” approach can be initiated before CD4 results are known, potentially reducing losses to follow-up and delays in ART initiation. Expansion of CD4 assessment remains a high priority in India, as CD4 results will still guide maternal ART duration (lifelong vs. until cessation of breastfeeding).
Couple counseling increases antiretroviral (ARV) uptake by pregnant women: a case report in Zambia Defense Force health facilities

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**Background:** Zambia has established the Prevention of Mother to Child Transmission of HIV (PMTCT) programme to reduce the burden of vertical HIV transmission. More than 90 percent of women attending antenatal care services (ANC) are tested for HIV, though only 10 percent of couples in Zambia have tested for HIV together. Encouraging couples to undergo HIV testing and counseling together bypasses barriers associated with disclosure and facilitates adherence to ARVs.

**Methods:** Following the revision of the PMTCT guidelines which strengthened recommendations for couple counseling, job aids were provided to health care providers. Mentorship was provided to health care workers to change their attitudes and improve their skills in couple counseling. Data management tools were provided and providers were trained on completion.

**Results:** 2,579 pregnant women and their partners from 7 sites were counseled and tested together between 2009 and 2011 compared to the previous years (2005-2008) when none of the pregnant women came with their spouses in the same sites. During the same period (2009 to 2011) the number of women taking ARVs for prophylaxis increased by 20% between 2009 and 2010. The majority of pregnant women are now being counseled and tested together with their partners during their first visit to the antenatal clinic.

**Conclusion:** Couple counseling is a good strategy to encourage ARVs uptake by pregnant women. Health care workers should be given the necessary knowledge and skills to address couple counseling and testing.

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### C46 - Male and female condoms and other physical barriers

**WEPDC0201**

Efficacy of a randomized intervention trial promoting female condom use among female South African tertiary students

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**Background:** Relatively few systematic intervention studies have tested the efficacy of female condom (FC) promotion. We compared the efficacy of an enhanced two-session cognitive-behavioral intervention versus a single-session 'basic' intervention to promote the FC among female students at a South African tertiary institution.

**Methods:** A total of 296 women students were randomized to either the two-session (N = 147) or one-session (N = 149) intervention. Both arms received HIV/STI/pregnancy prevention information in group settings, including information on FC use and modeling of FC insertion. The two-session additionally covered partner negotiation, communication and negotiation skills.

### Table: Efficacy of a randomized intervention trial promoting female condom use among female South African tertiary students

| Intervention Effect | One-Session | Two-Session |
|---------------------|-------------|-------------|
| Outcomenumber of vaginal intercourse occasions unprotected by either male or female condoms | | |
| Mean | p-value | Mean | p-value | Y | p-value |
| Baseline | NA | NA | NA | NA | NA |
| FU1 | 12.68 | -.63 | .02 | 2.29 | -.90 | <.0001 | .27 | .44 |
| FU2 | 5.02 | -.93 | <.0001 | 2.24 | -.92 | <.0001 | .01 | .97 |
| Outcomenumber of female condom used | | |
| Mean | p-value | Mean | p-value | Y | p-value |
| Baseline | .02 | NA | NA | .15 | NA | NA | NA |
| FU1 | 2.43 | 4.91 | <.0001 | 2.40 | 2.82 | <.0001 | .20 | .09 |
| FU2 | 1.04 | 4.06 | <.0001 | 1.78 | 2.54 | <.01 | 1.52 | .18 |

Effects of a One vs. Two-Session FC Intervention.
FC insertion practice, and personal goal-setting to achieve HIV/pregnancy prevention. Both groups had access to male and female condoms. Intervention effects were assessed at 2.5 and 5 months post-intervention. Data were analyzed using GLM, with GEE to adjust for within-subject correlation.

**Results:** Both groups reported significant reductions in the number of vaginal intercourse occasions unprotected by either male or female condoms from baseline to the 2.5 and 5-month follow-ups. There were no differences between groups at either time point. Similarly, the number of FCs used increased significantly in both groups at first and second follow-ups; differences between groups again were non-significant at both time points.

**Conclusion:** These findings suggest that both interventions decreased unprotected sex and increased the number of FCs used. The shorter, single-session group-based intervention, which could easily be delivered in a clinic waiting room, holds promise in resource-constrained settings. The relatively short follow-up period does not allow us to rule out the possibility of differential longer-term effects between groups.

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**C47 - Harm reduction, including reduction of unsafe injecting and other approaches**

**THAC0503**

Cost-effectiveness of combined sexual and injection risk reduction interventions among female sex workers who inject drugs in two very distinct Mexican-U.S. border cities.

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![CE Acceptability Curve for Ciudad Juarez.](image-url)
Background: We evaluated the cost-effectiveness of combined single brief interventions (Mujer Mas Segura, MMS) to promote safer-sex and safer-injection practices among injecting female sex workers (FSW-IDUs) in Tijuana (TJ) and Ciudad Juarez (CJ) Mexico. Data were from an RCT conducted between 2008–2010 coinciding with a period of expansion of needle exchange (NEP) in TJ, but not in CJ.

Methods: A Markov model was developed to estimate the incremental cost per quality adjusted life years gained (QALYs) over one-year and lifetime-time horizons among a hypothetical cohort of 1,000 FSW-IDUs comparing standard prevention strategies in Mexico to each individual intervention component and the combined MMS intervention. We applied a societal perspective, an annual discount rate of 3% and currency adjusted to 2012 USD. A multivariate sensitivity analyses was performed to explore model robustness.

Results: For CJ, over a one-year time horizon, the individual safer-sex intervention was cost-effective at $1,510 ($80/C1) per QALY gained, the combined intervention was not cost-effective at more than 3 times the Mexican GDP per capita. Over a lifetime, both the safer-sex and combined MMS interventions were not cost-effective compared to the single safer-sex intervention. However, the safer-sex intervention was highly cost-effective at $1,964 ($120–$8,343) and $783 ($104–$9,500) per QALY gained for one-year and lifetime, respectively.

Conclusion: In the absence of expanded NEP in CJ, the combined-MMS is highly cost-effective over a lifetime. In contrast, in TJ where NEP expansion suggests that improved access to sterile syringes at the community-level significantly reduced injection-related risks, the combined MMS was effective with no significant added benefit from the safer-injection component of MMS. Analyses taking into account the cost of NEP expansion in TJ are pending.

C49 - Male circumcision

TUAC0401

What women think about male circumcision: perceptions of female partners of recently circumcised men in Nyanza province, Kenya

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Background: As medical male circumcision services are scaled up in sub-Saharan Africa, understanding circumcision’s impact on sexual satisfaction, attitudes and behavior of female partners of recently circumcised men is crucial to women’s well-being and program success.

Methods: We conducted a longitudinal study of behavioral risk compensation following circumcision among 18–35 year-old men in Western Kenya. Men circumcised during the study were asked to refer their female partners to be interviewed for the study.

Results: We recruited 101 women (median age 21; IQR 19–24) who were in a relationship with the referring man before and after his circumcision. All female participants reported being satisfied with their partner’s decision to become circumcised and his sexual performance after circumcision. Ninety-six percent were satisfied with the appearance of partner’s penis and 91% reported enjoying sex more after circumcision. Most women (84%) reported having no or small chance of getting HIV; 38% attributed this low risk to their partner’s new circumcision status. Eighty-eight percent felt more protected from sexual diseases after their partners’ circumcision. Overall, women and men held similar beliefs about circumcision. However, attitudes that could potentially lead to risk compensation were reported more frequently by women than men; now that circumcision is available, condom use is less necessary (7% men, 35% women, OR = 7.00; 95%CI 2.93–16.73); I am less worried about HIV (16% men, 36% women, OR = 2.88; 95%CI 1.47–5.65); I am more likely to have more than one partner (6% men, 18% women, OR = 4.42; 95%CI 1.42–13.75); I am more likely to have sex without a condom (6% men, 18% women, OR = 3.33; 95%CI 1.26–8.78).

Conclusion: Women have favorable attitudes toward male circumcision. While men are counseled about the partial protection of circumcision against HIV during the procedure, they do not appear to share this information with their partners. There is need to target women with education on male circumcision.

TUAC0402

The efficacy of medical male circumcision against HIV acquisition at 66 months post-procedure in Kisumu, Kenya

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Background: In 3 randomized trials, medical male circumcision (MMC) reduced HIV acquisition in heterosexual men in sub-Saharan Africa by ~60%. At the end of the trials men initially randomized to control (delayed circumcision) were free to become circumcised. Men may choose circumcision differentially, which may confound observed efficacy. We estimated the 66-month efficacy of MMC against HIV among men retained in he Kisumu randomized trial, accounting for time-varying confounding and loss to follow-up.

Methods: From 2002–2005, 2,784 men aged 18–24 were enroled and randomized 1:1 to immediate circumcision or control. At trial end in December 2006, control men were offered free circumcision. Follow-up continued through September 2010. HIV status, STIs, and behavior were assessed at baseline and 6-month intervals thereafter. Cox proportional hazards regression incorporating time-dependent inverse probability of treatment weights (IPTW) generated through marginal structural modeling estimated the efficacy of circumcision on HIV risk.
Results: The cumulative 66-month HIV incidence was 7.21% (95% CI 5.90–8.75%) among circumcised men, 10.9% among uncircumcised men. The crude hazard ratio (HR) of HIV seroconversion for circumcised vs. uncircumcised men was 0.38 (95% CI 0.25–0.55). In conventional Cox regression adjusted for variables significant at the p < 0.05 level (age, condom use, incident HSV-2, GUD, penile injuries, incident gonorrhea or chlamydia), the HR was 0.46 (95% CI 0.31–0.69). In IPTW-adjusted multivariable Cox regression, the HR was 0.43 (95% CI 0.26–0.71).

Conclusion: The efficacy of MMC was sustained at 57% at 66 months, similar to overall findings of the 3 trials under conditions of randomization (58% at 24 months). The effectiveness of circumcision against HIV acquisition in program implementation may vary due to differential selection of circumcision. These findings provide the best evidence to date of the long-term efficacy of circumcision against HIV acquisition.

TUAC0403
Decrease of HIV prevalence over time among the male population of Orange Farm, South Africa, following a circumcision roll-out (ANRS-12126)
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Background: The effect of the roll-out of voluntary medical male circumcision (VMMC) in Southern and Eastern Africa on HIV prevalence is unknown. Three years after the beginning of the Orange Farm (South Africa) VMMC roll-out (ANRS-12126), the project’s impact on HIV prevalence over time was assessed.

Methods: Two cross-sectional surveys were conducted, one in 2007–2008 (n = 1971), before the beginning of the roll-out, and one in 2010–2011 (n = 3268). The response rates exceeded 80%. Male residents aged 15 to 49 were randomly sampled, interviewed, assessed for circumcision status, counselled and tested for HIV. Blood samples were tested for HIV and for recent HIV infection using the BED assay. Prevalence ratios (PR) were calculated using multivariate (pPR) and propensity score weighted (wPR) Poisson regression models to assess the association of HIV prevalence and recent HIV infections with time and circumcision status. Covariates comprised age group, ethnic group, religion, having children, alcohol consumption, education level, age at first sexual intercourse, marital status and occupation.

Results: In three years, male circumcision prevalence standardized on age increased from 17.0% to 53.9%. In the 2007–2008 and 2010–2011 surveys, the propensity weighted effect of circumcision status on HIV prevalence was wPR = 0.37 (95% CI 0.19–0.58) and pPR = 0.48 (95%CI0.35–0.65), respectively. HIV prevalence standardized on age decreased from 12.5% to 9.3%, aPR = 0.74 (95% CI 0.60–0.91), among participants aged 15 to 49, and from 6.2% to 4.2%, aPR = 0.64 (95% CI 0.49–0.85), among participants aged 15 to 29. Propensity analyses showed that the intervention avoided 536 (95% CI 135–1318) HIV infections in 2011 among the 52,000 adult men living in Orange Farm.

Conclusion: This study shows for the first time that the roll-out of VMMC in Africa can, if successfully promoted, lead to a decrease of HIV prevalence over time, detectable three years after its onset.

TUAC0404
Randomized controlled trial of the Shang Ring versus conventional surgical techniques for adult male circumcision in Kenya and Zambia
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Background: Male circumcision (MC) reduces men’s risk of HIV infection, but conventional techniques require a high degree of surgical skill. The Shang Ring provides a minimally-invasive, simpler and faster approach that requires neither hemostasis nor suturing and potentially reduces training time. Trial objectives were to compare pain, acceptability, safety and ease of use of the Shang Ring versus conventional techniques.

Methods: The Shang Ring consists of inner and outer rings, with eversion of the foreskin over the inner ring before application of the outer ring and excision of the foreskin from the underside. Ring removal is done one week later. We conducted a randomized controlled trial of the Shang Ring versus conventional MC techniques and compared pain, acceptability, safety and ease of use between the Shang Ring and conventional techniques.

Results: We circumcised 200 men at each site. The duration of Shang Ring procedures was significantly shorter at both sites (p < 0.0001), with medians of 7 versus 20 minutes. At the two-day visit, pain was similar between groups at both sites. Adverse event rates were 3% among both study groups. At the 60-day visit, more men in the Shang Ring group were “very satisfied” with cosmetic appearance, 97% vs 70% (p < 0.01) in Kenya, and 96% vs 85% (p < 0.02) in Zambia. Regarding ease-of-use, five of six clinicians had a “strong preference” for the Shang Ring and considered it “much easier” to use, and none preferred the conventional technique.

Conclusion: Scale-up of MC in Africa should be easier when providers begin routine use of devices such as the Shang Ring.

TUAC0405
One arm, open label, prospective, cohort field study to assess the safety and efficacy of the PrePex device for scale-up of non-surgical circumcision when performed by nurses in resource-limited settings for HIV prevention
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Background: Male circumcision (MC) reduces men’s risk of HIV infection, but conventional techniques require a high degree of surgical skill. The Shang Ring provides a minimally-invasive, simpler and faster approach that requires neither hemostasis nor suturing and potentially reduces training time. Trial objectives were to compare pain, acceptability, safety and ease of use of the Shang Ring versus conventional techniques.

Methods: The Shang Ring consists of inner and outer rings, with eversion of the foreskin over the inner ring before application of the outer ring and excision of the foreskin from the underside. Ring removal is done one week later. We conducted a randomized controlled trial of the Shang Ring versus conventional MC techniques and compared pain, acceptability, safety and ease of use between the Shang Ring and conventional techniques.

Results: We circumcised 200 men at each site. The duration of Shang Ring procedures was significantly shorter at both sites (p < 0.0001), with medians of 7 versus 20 minutes. At the two-day visit, pain was similar between groups at both sites. Adverse event rates were 3% among both study groups. At the 60-day visit, more men in the Shang Ring group were “very satisfied” with cosmetic appearance, 97% vs 70% (p < 0.01) in Kenya, and 96% vs 85% (p < 0.02) in Zambia. Regarding ease-of-use, five of six clinicians had a “strong preference” for the Shang Ring and considered it “much easier” to use, and none preferred the conventional technique.

Conclusion: Scale-up of MC in Africa should be easier when providers begin routine use of devices such as the Shang Ring.
Background: The Rwanda national goal is to offer voluntary male circumcision (MC) to 2 million men within 2 years to decrease HIV incidence by 50%, this can only be achieved if nurses can safely and effectively perform the MC procedure, as there are not enough physicians in the country. The PrePex non-surgical MC device was studied for safety and efficacy when MC is performed by nurses. Safety was defined as under 2% AEs.

Methods: The study was conducted in Kanombe Hospital, Kigali Rwanda with ethics approval. 10 nurses with no previous knowledge on the PrePex device were formally trained for 3 days on the PrePex MC. 575 adult males were enrolled in the study and distributed between 5 teams of 2 nurses each. Fig1 presents the PrePex MC method.

Results: All 575 male subjects (100%) achieved the endpoint of complete circumcision with glans fully exposed. There were 2 device related moderate AE (rate of 0.35%) and 2 non-related AE (rate of 0.35%), detailed in Table1. All AEs were easily resolved with simple intervention. The average procedure time in the last 125 subjects was 2 minutes and 51 seconds (SD 1 minute 11 seconds) for placement and removal time combined.

Conclusion: Our study validated that task shifting MC from physicians to nurses when using the PrePex device is safe and effective. The procedure was bloodless, required no injected anesthesia, no sutures and was performed in a standard consultation room. The study further validated the effectiveness of our PrePex training program for nurses. Rwanda intends to implement PrePex into its national HIV prevention program. PrePex has the potential to facilitate rapid, safe, non physician MC scale-up programs for HIV prevention, an imminent need in Sub Saharan Africa where physicians are a limited resource.

MOPDE0104
Service delivery trends in Kenya's voluntary medical male circumcision scale-up from 2008–2011
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Background: Three randomized controlled trials demonstrated a 60% protective effect of voluntary medical male circumcision (VMMC) on HIV acquisition in men from heterosexual sex. Kenya has adopted a national strategy to provide VMMC services to 80% of uncircumcised males aged 15–49 years.

Methods: Sites providing VMMC in Kenya as part of the President’s Emergency Plan for AIDS Relief (PEPFAR) routinely report on program indicators. We performed a secondary analysis on VMMC data from 2008–2011 and disaggregated by age, cadre of provider, adverse event type, and adverse event severity.

Adverse Event Details.
Male circumcision in Swaziland: demographics, behaviours and HIV prevalence

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Background: In 2006, the estimated prevalence of circumcised men in Swaziland was 8%. Between 2007 and 2011, approximately 35,000 men underwent voluntary medical male circumcision, including 11,000 men circumcised in 2011 during a national HIV prevention campaign, “Soka Uncobe”. The Swaziland HIV Incidence Measurement Survey (SHIMS), a nationally representative, household-based survey of men and women in Swaziland, conducted independently from the circumcision campaign, assessed health behaviors and HIV prevalence.

Methods: Between December 2010 and June 2011, SHIMS participants were surveyed about demographic, clinical and behavioral factors, including self-reported circumcision status by men. All participants underwent HIV testing.

Results: Of 18,212 adults surveyed in SHIMS, 7075 (39%) were men and 16% (1105/7075) were circumcised. Median age at circumcision was 20 y (interquartile range [IQR] 8, 17), median time since circumcision was 1.1 y (IQR 0.6-8.0), and 172 men (16%) reported circumcision in the prior 6 months. Prior HIV testing was more commonly reported by circumcised compared to uncircumcised men (77% vs. 49%, p < 0.001). Circumcised men were slightly more likely than uncircumcised men to report always using a condom in the prior 6 months (39% vs. 33%, p = 0.003) and the number of reported sex partners in the prior 6 months did not differ (1.4 vs. 1.5).

Conclusions: Male circumcision may be an innovative approach to provide HIV testing to sexual partners of VMMC clients.
tions in syphilis incidence among MSM. These findings support recommendations that syphilis can be controlled among MSM by sustaining high frequency testing, with important implications for HIV control among MSM.

**TUPDCO102**

**Partner notification outcomes for MSM and heterosexuals with STI/HIV: challenges at different stages**

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**Background:** Partner notification (PN) is seen as a vital tool to break HIV/STI transmission chains. In the Netherlands, studies assessing PN effectiveness are lacking. Evaluation of current PN practices is needed to develop new PN interventions.

**Methods:** PN outcomes were collected through a newly developed registration form from index patients with HIV, syphilis, and gonorrhea visiting five STI centers in 2010–2011. PN outcomes (partners being at risk, notifiable, notified, tested, and case-finding effectiveness (CFE: detected infections/number of partners with a test result)) were compared between men having sex with men (MSM) and heterosexuals.

**Results:** Of all index patients newly diagnosed with HIV/STI (N = 282) for whom PN was indicated, 221 MSM and 55 heterosexuals reported respectively 1,332 and 93 partners at risk. Proportions of notifiable partners (MSM42%, N = 555; heterosexuals90%, N = 84; p < 0.001) and notifiable partners being notified (89%, N = 494 vs 75%, N = 63; p < 0.001) differed significantly between MSM and heterosexuals. The overall CFE was 43% for MSM and 33% for heterosexuals with the largest difference found for HIV (MSM12%, heterosexuals3%).

**Conclusion:** The major challenge in PN among MSM remains the large proportion of unnotifiable (often anonymous) partners. Among heterosexuals, the actual notification of partners was more difficult. Anonymous Internet-based PN, could improve both capability (reachability of unnotifiable partners) and ability (facilitation of the actual notification process) to notify partners.

**TUPDCO106**

**Sexually transmitted disease diagnoses associated with exchange sex among Hispanic migrant men who have sex with men in the United States**

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**Background:** In 2010, Hispanic migrants accounted for 37% of the total Hispanic population in the U.S. Relatively little is known about the high-risk sexual behaviors that may place Hispanic migrant men who have sex with men (HM-MSM) at risk for infection with sexually transmitted diseases (STDs).

**Methods:** During 2005–2007, 2576 Hispanic migrants were surveyed at three community-based organizations offering services to migrant communities in five states with small Hispanic populations. Participants reported demographic characteristics, sexual risk behaviors, migration patterns, and STD diagnoses (syphilis, Chlamydia and gonorrhea) in the past year. Factors associated p < 0.05 with an STD diagnosis in the past 12 months among HM-MSM in bivariate analyses were included in a multivariate logistic regression model.

**Results:** Of 1550 Hispanic migrant men surveyed who reported having sex in the past 12 months, 353 (23%) reported sex with a man. Of these 353 men, 26% reported being married, 46% self-identified as being heterosexual, and 21% as bisexual. In the past 12 months, 58% reported anonymous sex, 57% reported having sex under the influence of alcohol or drugs, 40% reported unprotected receptive anal sex, and 8% reported receiving money or goods for sex. Twenty-nine (8.2%) men received an STD diagnosis. Only marital status and receiving money or goods for sex were significantly associated with the outcome variable in bivariate analyses. In the multivariate logistic regression model, men who reported receiving money or goods for sex had increased odds of an STD diagnosis (adjusted odds ratio = 3.1, 95% confidence interval = 1.1–8.7); marital status was not significantly associated with STD diagnosis.

**Conclusion:** The prevalence of sexual risk behaviors and STD diagnoses was high in this population. STD prevention interventions tailored to non-gay identifying MSM are needed for HM-MSM. Work is needed to understand factors contributing to participation in exchange sex among HM-MSM.

**C51 - Pre-exposure and post-exposure prophylaxis**

**TUAC0102**

**PreP has high efficacy for HIV-1 prevention among higher-risk HIV-1 serodiscordant couples: a subgroup analysis from the Partners PrEP Study**

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**Background:** Antiretroviral pre-exposure prophylaxis (PrEP) for HIV-1 prevention was highly effective in reducing HIV-1 acquisition by HIV-1 uninfected partners in African heterosexual HIV-1 serodiscordant couples in the Partners PrEP Study (efficacy67% for oral TDF PrEP and 75% for oral FTC/TDF PrEP). In that study, the placebo arm incidence was 2%/year. However, PrEP was not effective in two studies among high-risk African women (incidence 5-6%/year) leading some to hypothesize that PrEP would not have efficacy in high-incidence subpopulations.

**Methods:** The Partners PrEP Study is a randomized, three-arm trial of daily oral TDF and FTC/TDF PrEP provided to HIV-1 uninfected members of serodiscordant couples from Kenya and Uganda. At enrollment, HIV-1 infected partners were not eligible for antiretroviral therapy under national guidelines. We assessed the efficacy of PrEP among the subset of couples who had higher baseline risk
characteristics. Higher-risk couples were defined using a previously-reported risk score composed of baseline factors associated with HIV-1 transmission (Kahle CROI 2012), including age of the HIV-1 uninfected partner, number of children together, circumcision status of the male HIV-1 uninfected partner, married and/or cohabiting, self-reported unprotected sex, and plasma HIV-1 RNA concentrations in the HIV-1 infected partner.

**Results:** Among 4747 HIV-1 serodiscordant couples in the Partners PrEP Study, 1085 (22.9%) were classified as higher-risk. HIV-1 incidence was 5.0/100 person-years (95% CI 3.3–7.2, 28 transmissions) among those assigned placebo, 1.3/100 person-years (95% CI 0.5–2.8, 7 transmissions) among those assigned TDF PrEP, and 1.1/100 person-years (95% CI 0.4–2.4, 6 transmissions) among those assigned FTC/TDF PrEP, resulting in an estimated PrEP HIV-1 protection efficacy of 72% for TDF PrEP (95% CI 35-88%) p = 0.02) and 78% for FTC/TDF PrEP (95% CI 46–91%, p = 0.006).

**Conclusion:** PrEP provided substantial protection against HIV-1 acquisition for higher-risk HIV-1 serodiscordant couples. Higher-risk HIV-1 serodiscordant couples could be a priority population for PrEP implementation.

**TUAC0302**

**Anticipated risk compensation with pre-exposure prophylaxis use among North American men who have sex with men using an internet social network**

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**Background:** The iPrEx study demonstrated that pre-exposure prophylaxis (PrEP) can reduce HIV incidence among at-risk men who have sex with men (MSM). However, risk compensation (RC) could negate the benefits of PrEP.

**Methods:** After the release of iPrEx results, North American members (n = 5035) of an Internet social network for MSM completed an online survey regarding PrEP. Demographics, sexual risk behaviors, PrEP interest, and anticipated RC with PrEP use were assessed through self-report. Multivariable logistic regression procedures adjusted for age, race/ethnicity, and education examined the association between sociodemographic variables, sexual risk behaviors and anticipated RC.

**Results:** The mean age was 39 (SD = 12.8), 90% were from the US, 84% were homosexual/gay and 84% were white. Ninety-three percent completed some college, 68% earned $30,000/year, 25% had a history of depression, and 5% had received substance abuse treatment. Sixty-one percent indicated unprotected anal intercourse with ≥1 male partner in the prior 3 months (UAI-3), and 24% reported UAI after ≥5 drinks. On a scale of 1 (no risk) to 10 (high risk), the average self-perceived risk of HIV acquisition was 3.3 (SD = 2.3). Seventy-five percent reported interest in using PrEP. While using PrEP, 20% anticipated they would decrease condom use for insertive anal sex, whereas 14% indicated they would for receptive anal sex. Factors associated with increased odds of anticipated RC for insertive anal sex were UAI-3 (aOR = 1.57; 95% CI 1.16–2.13; p = 0.004), UAI after ≥5 drinks (aOR = 1.43; 95% CI 1.09-1.88; p = 0.01) and increased self-perceived risk of HIV acquisition (aOR = 1.10; 95% CI 0.51-2.17; p = 0.0003).

**Conclusion:** A substantial minority of MSM using an Internet social network anticipate increased unprotected anal sex with PrEP use. Interventions to minimize risk compensation are warranted.

**TUAC0303**

**Acceptability of HIV pre-exposure prophylaxis (PrEP) with Truvada among men who have sex with men (MSM) and male-to-female transgender persons (TG) in northern Thailand**

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**Background:** Northern Thailand has a high burden HIV epidemic among MSM and TG. Oral PrEP with Truvada has demonstrated efficacy in preventing HIV among MSM in Chiang Mai, Thailand - an iPrEx trial site. Determinants of PrEP acceptability are needed to gauge the potential uptake of this prevention strategy.

**Methods:** From January to February 2012, 238 MSM and TG participants, who self-reported as HIV-infected or of unknown status, completed a self-administered survey on hand-held computers. Participants were recruited by venue-day-time sampling and asked to rate their likelihood of using PrEP at 50% efficacy. PrEP acceptability was defined as “very likely” to use PrEP. Odds ratios and 95% CIs were calculated to identify determinants of acceptability.

**Results:** 131 MSM and 107 TG responded, with mean ages of 23.7 and 21.8, respectively. 29% of MSM and 34% of TG had unprotected anal sex with a male/TG partner in the past 6 months. Prior awareness of PrEP was high, at 66% among both MSM and TG. 41% of MSM and 37% of TG were “very likely” to use PrEP; including respondents who were “somewhat likely” to use PrEP, the rates increased to 75% and 77% of MSM and TG, respectively. Among MSM, factors associated with PrEP acceptability included a prior history of STIs (AOR 3.9; 95% CIs 1.6-9.8) and strong confidence in PrEP effectiveness (AOR 5.0; 95% CIs 1.3-19.0).

**Conclusion:** PrEP acceptability was higher among MSM and TG who were aware of their HIV/STI risk and of PrEP, among those who had strong medication management skills and private insurance. These findings suggest that knowledge of PrEP and perceived HIV risk, as well as financial support for PrEP, are important determinants of uptake.

**FRLBC03**

**Method of hormonal contraception is associated with lower tenofovir concentration in healthy women (MTN-001): implications for pre-exposure prophylaxis**
The objective of this study is to determine if the TFV and TFV diphosphate (TFV-DP) concentrations are influenced by hormonal contraceptive use.

**Methods:** This is a secondary data analysis of an open labeled, 3-period crossover study of three different daily TFV regimens, each for 6 weeks (oral 300mg TFV disoproxil fumarate [TDF], vaginal 1% TFV gel [40mg], or both). The study involved 144 healthy, HIV-negative women, self-reporting use of effective contraception enrolled at 4 US and 3 African sites. Serum TFV and peripheral blood mononuclear cell (PBMC) TFV-DP concentrations were determined using validated LC-MS/MS methods. Noncompartmental methods were used to estimate peak concentration (Cmax), area under the concentration-time curve (AUC), and pre-dose concentration (Ctau) which were expressed as median and IQR. Wilcoxon rank sum test was utilized to compare contraceptive groups.

**Results:** After oral TFV dosing, hormonal contraceptive use (oral and injectable) was associated with 240% decreased PBMC TFV-DP Ctau (p = .014), 24% decreased PBMC TFV-DP Cmax (p = .008), and 22% decreased PBMC TFV-DP AUC (p = .035) (Table 1). Injectable contraception use was associated with decreased serum TFV Cmax (42%, p = .018), Ctau (210%, p = .001), and AUC (54%, p = .012) and PBMC TFV-DP Ctau (350%, p = .01). Vaginal TFV dosing was associated with a significant reduction of serum TFV Ctau in injectable contraceptive users (1040%, p = .000) while the remaining PK parameters were not statistically different.

**Conclusion:** Use of hormonal contraception is associated with decreased serum and intracellular TFV concentrations. Multivariate population pharmacokinetic analyses are essential to evaluate potentially confounding covariates, like adherence, which, like contraceptive use type, are associated with geographic and racial differences in other analyses. The magnitude of these drug concentration differences could partially explain PrEP trial outcomes.

### Table 1: Matrix/Moiet/Parameter Units median (IQR) median (IQR) % difference p-value

| Matrix/Moiet/Parameter | ORAL TFV DOSING | HORMONAL CONTRACEPTION | NON-HORMONAL CONTRACEPTION | % difference | p-value |
|------------------------|-----------------|------------------------|---------------------------|--------------|---------|
| Serum TFV Cmax         | ng/mL           | 321.3 (243.7–383.3) | 354.9 (283–463.6)         | 10           | .20     |
| Serum TFV Cpre-dose    | ng/mL           | 56.1 (23–86.7)        | 88.2 (59.1–124.8)         | 57           | .001    |
| Serum TFV AUC          | ng/mL/hr        | 1337 (1051.8–1602.8)  | 1587.8 (1276.8–1903.5)    | 19           | .017    |
| Serum TFV Tmax         | hours           | 1 (0.97–1.1)          | 1.02 (0.97–1.2)           | –            | .72     |
| PBMC TFV-DP Cmax       | fmol/10^6 cells | 46 (20.5–60.5)        | 57 (39–112.5)             | 24           | .008    |
| PBMC TFV-DP Cpre-dose  | fmol/10^6 cells | 10.2 (0–32.6)         | 24.6 (10.8–50.7)          | 240          | .014    |
| PBMC TFV-DP AUC        | fmol/10^6 cells/hr | 272.1 (82.6–361.7) | 332.5 (186.3–474.2)       | 22           | .035    |
| PBMC TFV-DP Tmax       | hours           | 3.9 (1.4–6.0)         | 4.1 (2.1–7.9)             | –            | .19     |

TFV concentrations in peripheral blood.

### Table 2: Matrix/Moiet/Parameter Units median (IQR) median (IQR) % difference p-value

| Matrix/Moiet/Parameter | ORAL TFV DOSING | HORMONAL CONTRACEPTION | NON-HORMONAL CONTRACEPTION | % difference | p-value |
|------------------------|-----------------|------------------------|---------------------------|--------------|---------|
| Tissue TFV             | ng/mg           | .04 (0–0.24)           | 0 (0–0.21)                | –            | .6      |
| Tissue TFV-DP          | fmol/mg         | 0 (0–0)                | 0 (0–13.1)                | –            | .18     |
| Cervicovaginal lavage  | ng/mL           | 269.4 (0–9261.3)       | 170.5 (0–10341.9)         | 58           | .57     |
| Endocervical Cytobrush | fmol/10^6 cells | 0 (0–0)                | 0 (0–0)                  | –            | .95     |

TFV concentrations at genital tract sites.

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**Background:** HIV pre-exposure prophylaxis (PrEP) clinical trials using oral and vaginal preparations of tenofovir (TFV) in women reported inconsistent effectiveness. The objective of this study is to determine if the TFV and TFV diphosphate (TFV-DP) concentrations are associated with geographic and racial differences in other analyses. The magnitude of these drug concentration differences could partially explain PrEP trial outcomes.

**FRLBX04**

**Pre-exposure prophylaxis (PrEP) will have a limited impact on the prevalence of HIV-1 drug resistance in sub-Saharan Africa: comparison of mathematical models**

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Background: Pre-Exposure Prophylaxis (PrEP) with tenofovir and emtricitabine can prevent new HIV-1 infections. There is a concern that use of PrEP could increase HIV-drug resistance resulting in loss of future treatment options. Mathematical modelling has been used to estimate the impact of PrEP on drug resistant HIV-1. We compared existing mathematical models that studied drug resistance after implementation of PrEP to determine key areas of consensus and discrepancy across models.

Methods: We evaluated standardized outcomes from three independent mathematical models that determined the impact of PrEP on the HIV-(drug resistance) epidemic in heterosexual populations in sub-Saharan Africa. All models assumed that PrEP was used in areas where antiretroviral therapy was available. The HIV prevalence ranged between 8 and 17%. All models assumed that people using PrEP received a HIV-test every 3-6 months. The models varied in structure and parameter choices for PrEP coverage (5 to 30% of the general population), efficacy of PrEP (at different adherence levels), the rate by which HIV drug resistance emerges and is transmitted, and the negative impact of PrEP failure on future treatment.

Results: All models predicted that the prevalence of HIV drug resistance will increase in the coming 20 years (up to 30% of those infected), which was mostly explained by expanded access to antiretroviral therapy (a proportion of people with drug resistance will have viral suppression as they switched to second line). Of all infections involving HIV drug resistance after 20 years, 50% to 63% were ascribed to antiretroviral therapy, 33% to 48% to transmission in individuals who were infected, which was mostly explained by expanded access to antiretroviral therapy (a proportion of people with drug resistance will have viral suppression as they switched to second line). Of all infections involving HIV drug resistance after 20 years, 50% to 63% were ascribed to antiretroviral therapy, 33% to 48% to transmission in infected individuals. Of all infections involving HIV drug resistance after 20 years, 50% to 63% were ascribed to antiretroviral therapy, 33% to 48% to transmission in infected individuals. Of all infections involving HIV drug resistance after 20 years, 50% to 63% were ascribed to antiretroviral therapy, 33% to 48% to transmission in infected individuals.

Conclusion: Mathematical models that varied substantially in structure and parameter choices predicted that HIV drug resistance will increase over a period of 20 years. The models predicted that HIV-1 drug resistance resulting from antiretroviral therapy far exceeds that from PrEP.

TUPDC0305
Experience of a NYC hospital with non-occupational post-exposure prophylaxis (nPEP)

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Background: Non-occupational post exposure prophylaxis (nPEP) to HIV has been available for over a decade. Few institutions have a coordinated system for providing this service. Since 2009, St. Luke’s Roosevelt Hospital (SLR) has provided nPEP in its 2 emergency departments and 3 affiliated outpatient clinics (Centers for Comprehensive Care, CCC). As of 2010, SLR adopted an nPEP protocol developed by the NYC Department of Health through a funded grant.

Methods: An extensive, retrospective chart review was conducted to describe the characteristics of adult patients who received nPEP in the ED and affiliated outpatient clinics from 12/2009 to 2/2012. Characteristics of patients who undertook nPEP and completed follow-up were compared using Fisher Exact and Wilcoxon tests. Factors associated with completing the nPEP course were analyzed using multivariate logistic regression.

Results: 216 unique encounters occurred for nPEP (median age = 29; range = 18-62). 34 encounters were from 13 patients with repeat nPEP visits (mean = 2; range 2-3). 138 patients initially presented in ED (64%). Majority were male (n = 180; 83%), white (n = 99; 46%), and insured (n = 134; 63%).133 of male patients (65%) reported sex with other men as their HIV risk exposure. Median time from exposure to presentation was 24 hours (range1-74 hours). 116/138 (84%) patients referred to the CCC completed 4-week follow-up. 109/116 (94%) patients completed the 28-day nPEP course. For patients...
who completed nPEP, there were no significant differences seen by race ($p = 0.67$), age ($p = 0.85$), gender ($p = 0.70$), insurance status ($p = 0.31$), time from exposure to presentation ($p = 0.16$), HIV testing history ($p = 0.76$), and HIV status of partner ($p = 0.06$). There was one patient that sero-converted after initiating nPEP 32 hours post exposure.

**Conclusion:** nPEP is a chemo-prophylaxis intervention that can prevent HIV acquisition and transmission and provides additional opportunities for synergistic, behavioral interventions. A multidisciplinary approach is necessary to coordinate care, follow-up, and supportive counseling.

**TUPDC0306**

**Project PrEP Talkan in-depth qualitative analysis of PrEP acceptability, expectations and risk compensation beliefs among United States MSM**

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**Background:** Recent evidence suggests that oral pre-exposure prophylaxis may help reduce HIV incidence among men who have sex with men. Surveys indicate that MSM may be willing to use PrEP, but our understanding of the expectations and beliefs that drive these attitudes is incomplete. This formative qualitative study aimed to identify factors that influence willingness to use PrEP, risk compensation beliefs, and conceptions of PrEP efficacy among US MSM.

**Methods:** This study planned 6-8 semi-structured focus groups, each including 4-6 men. Participants were recruited from metropolitan Providence, RI in 2011-12. Inclusion criteria were the following: biological male, aged 18+, self-reported negative or unknown HIV status, and self-reported unprotected anal sex with a man of positive or unknown HIV status in the past 6 months. Discussions were audio-recorded, transcribed, and thematically analyzed to identify factors influencing PrEP acceptability, risk compensation beliefs, and understandings of efficacy.

**Results:** Preliminary analyses suggest that willingness to use PrEP varies and depends on a range of personal and contextual factors. Participants described how PrEP might benefit segments of the MSM population at highest risk, including men “on the down low,” incarcerated men, low-income men, and men with HIV-positive partners. Benefits included increased intimacy with current partners, risk-reduction for subsequent or concurrent HIV-negative partners, and reduced worry during sex. But participants voiced serious concerns about incomplete efficacy, side effects, interaction with other drugs or alcohol, cost, insurance coverage, FDA approval, availability, adherence, and potential behavioral impacts. Many were concerned that PrEP could prompt increased sexual risk-taking across the MSM community. Participants also reported divergent understandings of partial efficacy, emphasizing uncertainty about how generalized estimates of efficacy would apply to individuals.

**Conclusion:** Willingness to use PrEP among MSM is multifaceted, and in-depth exploration identifies key concerns that affect PrEP acceptability. Results can assist in developing supportive interventions for men contemplating PrEP use.
Results: CVL levels were constant (1400 +/− 960ng/mL tenofovir, 6300 +/− 860ng/mL maraviroc) for the duration of the study, indicating that sustained release without initial burst was achieved. Tissue levels were 1460 +/− 527ng/g tenofovir, 312 +/− 376ng/g maraviroc. Plasma levels were 9 +/− 8ng/mL tenofovir, 0.2 +/− 0.2ng/mL maraviroc (Figure 2).

Conclusion: Using our novel IVR platform, we demonstrated the ability to deliver a combination of tenofovir and maraviroc in a controlled and sustained manner for up to 28 days in sheep. This opens the door for use of this ARV IVR to protect women from HIV infection.

WEPDC0102
Sustained-release saquinavir from an intravaginal ring in sheep
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Background: Our goal is to prevent HIV transmission by developing coitally-independent, woman-controlled methods based on intravaginal rings (IVRs) delivering antiretroviral (ARV) microbicides. Our novel pod-IVR technology consists of a nonmedicated silicone ring that holds drug “pods” in place (Figure 1). Saquinavir, the first FDA approved protease inhibitor, holds significant potential for use as a microbicide due to its potency and mode of action. Here we describe a sheep study showing 28 days of saquinavir release from our pod-IVRs.

Methods: IVR blanks containing preformed cavities were fabricated by injection molding using liquid silicone resin (LSR). Three delivery windows per cavity, chosen to provide the target saquinavir release rate, were fashioned mechanically in each cavity. Saquinavir pods were placed in the cavities, which were back-filled with LSR, allowing controlled release of saquinavir by diffusion through the delivery windows into vaginal fluid. Rings were evaluated for 28 days in 3 sheep. Blood and cervicovaginal lavage (CVL) samples were collected at predetermined time points throughout the study, and tissue samples were collected on Days 14 and 28. Sample analysis was performed by LC/MS using in-house methods.

Results: CVL levels were constant (51 +/− 24 ng/mL) throughout the study, indicating sustained release without initial burst. Tissue levels averaged 2700 +/− 1400 ng/g (Figure 2).

Conclusion: Using our novel pod-IVR platform, we demonstrated the ability to deliver saquinavir, a potent protease inhibitor, in a controlled and sustained manner up to 28 days in sheep. This opens the door for use of this ARV in future microbicide products to protect women from HIV infection.

Figure 1. (A) IVR platform showing 4 drug pods. (B) Side view of pod in ring. (C) Cutway drawing of pod (4) in an IVR (1) with drug delivery window (3) and backfill of silence (2) to hold pod in place.

Figure 2. Concentrations in 3 sheep.

WEPDC0104
Sustained release raltegravir from an intravaginal ring in sheep
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Background: Our goal is to prevent HIV transmission through development of coitally-independent, woman-controlled methods based on intravaginal rings (IVRs) delivering antiretroviral (ARV) microbicides. Our novel pod-IVR technology consists of an unmedicated ring support holding the drug delivery “pods” in place (Figure 1). Raltegravir, the first FDA-approved integrase inhibitor, holds significant potential for use as a microbicide due to its potency and mode of action. Here we describe studies showing 28 days of release of raltegravir from our pod-IVRs in sheep.

Figure 1. (A) IVR platform (B) Side view of “pod” in ring (C) Cutway drawing of pod (4) in an IVR (1) with drug delivery window (3) and backfill of silence (2) to hold pod in place.
The PK profile of oral MVC (44 mg/kg) was evaluated at first dose in plasma and rectal secretions in 12 macaques. Half-life of CCR5-bound MVC was measured using a MIP1-β internalization assay. Relationship between MVC concentration, CCR5 occupancy, and protection from infection was evaluated in vitro. Efficacy of MVC in preventing rectal virus transmission was investigated using a macaque model consisting of weekly SHIV162p3 exposures. Six macaques received a dose of MVC 24h before each virus exposure and a second dose 2h thereafter. Four untreated macaques were controls. Infection was monitored by serology and PCR.

**Results:** MVC PK profile in macaques was similar to humans. MVC concentrations peaked at 2h in plasma (median = 451 ng/ml) and at 5–48h in rectal secretions (median = 2,329 ng/ml). MVC AUC0-24h in rectal secretions was 7.5 times as high as in plasma (median = 12,720 and 1,685 ngahu/ml, respectively). At day 4, MVC concentration in rectal secretions (median = 44 ng/ml) was 21.8 times as high as the IC50 value, and was sufficient to fully occupy CCR5 in PBMCs. The half-life of CCR5-bound MVC in PBMCs was 2.6 days. Despite this favorable PK profile, 5/6 animals receiving MVC were infected during 5 rectal SHIV exposures as did 3/4 controls.

**Conclusion:** We identified a dose of MVC that results in local and systemic drug exposures comparable to humans receiving 300 mg. Despite high and durable MVC concentrations in rectal secretions, MVC did not prevent SHIV infection in macaques. This model suggests that higher MVC concentrations are needed for rectal protection and highlights the need to better understand the mechanism of low efficacy and identify protective MVC regimens.

**Methods:** IVR blanks containing preformed cavities were fabricated by injection molding using liquid silicone resin (LSR). Three delivery windows per cavity, chosen to provide the target raltegravir release rate, were fashioned mechanically in each cavity. The raltegravir pods were placed in the cavities, which were back-filled with LSR, allowing controlled release of raltegravir by diffusion through the delivery windows into the vaginal fluid. Rings were evaluated in vivo using 4 sheep for 28 days. Blood and cervicovaginal lavage (CVL) samples were collected at predetermined timepoints throughout the study and tissue samples were collected at day 28. Bioanalysis of these samples was carried out by LC/MS using methods developed in house.

**Results:** The CVL levels were constant (257+/−250 ng/ml) for the duration of the study indicating that sustained release without initial burst was achieved. Tissue levels were 55+/−83 ng/g. Plasma levels were below 3.5 ng/ml for all samples (Figure 2).

**Conclusion:** Using our novel pod-IVR platform, we demonstrated the ability to deliver raltegravir, a potent integrase inhibitor, in a controlled and sustained manner over 28 days in sheep. This opens the door for use of this ARV in future microbicide products to protect women from HIV.

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**WEPDC0105**

**High maraviroc concentrations in rectal secretions after oral dosing do not prevent rectal HIV transmission in macaques**

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**Background:** MVC is a potent CCR5 co-receptor antagonist that is being considered for pre-exposure prophylaxis for HIV prevention. We evaluated in macaques the pharmacokinetic (PK) profile of MVC and assessed efficacy of MVC in preventing rectal SHIV transmission.

**Methods:** The PK profile of oral MVC (44 mg/kg) was evaluated at first dose in plasma and rectal secretions in 12 macaques. Half-life of CCR5-bound MVC was measured using a MIP1-β internalization assay. Relationship between MVC concentration, CCR5 occupancy, and protection from infection was evaluated in vitro. Efficacy of MVC in preventing rectal virus transmission was investigated using a macaque model consisting of weekly SHIV162p3 exposures. Six macaques received a dose of MVC 24h before each virus exposure and a second dose 2h thereafter. Four untreated macaques were controls. Infection was monitored by serology and PCR.

**Results:** MVC PK profile in macaques was similar to humans. MVC concentrations peaked at 2h in plasma (median = 451 ng/ml) and at 5–48h in rectal secretions (median = 2,329 ng/ml). MVC AUC0-24h in rectal secretions was 7.5 times as high as in plasma (median = 12,720 and 1,685 ngahu/ml, respectively). At day 4, MVC concentration in rectal secretions (median = 44 ng/ml) was 21.8 times as high as the IC50 value, and was sufficient to fully occupy CCR5 in PBMCs. The half-life of CCR5-bound MVC in PBMCs was 2.6 days. Despite this favorable PK profile, 5/6 animals receiving MVC were infected during 5 rectal SHIV exposures as did 3/4 controls.

**Conclusion:** We identified a dose of MVC that results in local and systemic drug exposures comparable to humans receiving 300 mg. Despite high and durable MVC concentrations in rectal secretions, MVC did not prevent SHIV infection in macaques. This model suggests that higher MVC concentrations are needed for rectal protection and highlights the need to better understand the mechanism of low efficacy and identify protective MVC regimens.

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**TUAC0103**

**Lack of effectiveness of antiretroviral therapy (ART) as an HIV prevention tool for serodiscordant couples in a rural ART program without viral load monitoring in Uganda**

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**Background:** Clinical trials have demonstrated antiretroviral therapy (ART) is highly efficacious in preventing HIV transmission among sero-discordant couples. We examined the effectiveness of ART as prevention in a rural program in Uganda where viral load (VL) testing is not available.

**Methods:** We conducted a cohort study of HIV sero-discordant couples aged ≥18 years, where the positive partner was a client of The AIDS Support Organization in Jinja, Uganda. In one group of couples the positive partner was eligible for ART because of CD4 cell count ≤250 cells/μl or a WHO Stage III or IV disease. In the second group, the infected partner was not yet ART-eligible. Both groups received regular HIV risk-reduction counseling and condoms. The uninfected partner was HIV tested every three months. We conducted VL testing and genotyping of transmitted viruses.

**Results:** A total of 586 couples were enrolled, of which 352 (60%) of the positive participants received ART during the study. The median duration of ART-use at enrolment was 2.5 years and the median duration of follow-up was 1.3 years. ART couples were older than
non-ART couples (median 42 vs. 40 years for men; 36 vs. 33 years for women; \( p < 0.001 \), for both). ART couples were more likely to report condom-use at last sex (74% vs. 66%; \( p = 0.038 \)) and had longer duration in relationships than non-ART couples (median 12 vs. 9 years; \( p = 0.003 \)). There were no differences between the two groups in terms of male circumcision status, polygymy status, pregnancy intentions or injectable contraception-use. We found 9 new infections among partners of ART participants and 8 new infections in partners of non-ART participants, for an incidence rate ratio of 1.16 (\( p = 0.564 \)).

**Conclusion:** ART-use was not associated with reduced risk of HIV transmission in sero-discordant couples in a rural program in Uganda without VL testing.

### MOPDC0104

**Treatment as prevention in a country with high ART coverage: the Namibia example**

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**Background:** A recent randomized control trial demonstrated that antiretroviral therapy (ART) can reduce the sexual transmission of HIV among sero-discordant couples by over 95%. We assessed the trends in HIV incidence and ART coverage in Namibia, and project the coverage of ART through 2015 under WHO-recommended eligibility criteria and an alternative criterion of a CD4 level below 500 per mm\(^3\).

**Methods:** ART data was obtained from the electronic Patient Management System (ePMS) for people receiving HAART, PMTCT data from the HIS and HIV prevalence among pregnant women from biennial ANC sentinel surveillance. These data were used in Spectrum software to estimate the number of people newly infected with HIV and the number of people eligible for ART. ART coverage was projected per WHO-recommended ART eligibility criteria (including CD4 < 350) and an alternative criterion of CD4 < 500 per mm\(^3\).

**Results:** Namibia has rapidly scaled up ART to 92,134 by March 2011, corresponding to 84% (76%–97%) of those eligible per the 2010 WHO treatment guidelines. If the eligibility threshold is increased to 500 CD4 cells per mm\(^3\) in 2012, the number of adults eligible for ART is estimated to increase by 20% (Figure 1). There has been a rapid decline in new HIV infections from 23,000 (19,000–29,000) in 2000/01 to 9,000 (6,000–13,000) in 2000/11, a 61% reduction. At the current rate of scale up, Namibia targets 150,000 people on ART by 2015/16 which corresponds to > 85% of eligible people per WHO-recommended criteria and > 80% per an alternative CD4 < 500 ART criterion.

**Conclusion:** In Namibia, ART coverage has reached high levels and incidence is declining rapidly in the past decade. Namibia is ready to further expand ART to reduce morbidity and mortality and realize the target of a 50% reduction in sexual transmission by 2015, resulting from the scale-up of prevention and treatment programmes.

### MOPDC0105

**Antiretroviral therapy for prevention of HIV transmission in HIV-discordant couples: a systematic review of the observational literature**

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![Figure 1. Adults and children receiving ART and estimate numbers of people eligible per CD4 < 350 and CD4 < 500 criteria, 1990–2016.](image-url)

![Figure 2. Trends in number of new infections and people receiving ART in Namibia, FY 2000/01 to 2012/11.](image-url)
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**Background:** HPTN 052 provided clear evidence that early antiretroviral therapy (ART) in HIV-infected partners in serodiscordant couples decreases the risk of sexual transmission (RR = 0.04). Before HPTN 052, ecological studies and models suggested that sexual transmission was lower in discordant couples in which the infected partner was on ART. To estimate ART effectiveness from the observational literature, we conducted a systematic review.

**Methods:** We used standard Cochrane methods to search electronic databases and conference proceedings without language limits and identified cohort and case-control studies of ART use in HIV-discordant couples. Two authors independently examined all identified studies and abstracted data using a standardized form.

**Results:** We retrieved 1814 references from which 24 were potentially eligible. Seven observational studies met our inclusion criteria. These studies identified 436 episodes of HIV transmission, 71 among treated couples and 365 among untreated couples. The summary rate ratio was 0.34 [95% CI 0.13, 0.92], with substantial heterogeneity (I² = 73%). After excluding two studies with inadequate person-time data, we estimated a summary rate ratio of 0.16 [95% CI 0.07, 0.35] with no noted heterogeneity (I² = 0%). We performed subgroup analyses to see if the effect of ART on prevention of HIV transmission differed by the index partner’s CD4 cell count. Among couples in which the infected partner had \( \geq 350 \) CD4 cells/µL, we estimated a rate ratio of 0.02 [95% CI 0.00, 2.87]. In this subgroup, all 61 transmissions were in untreated couples. Tests for interaction between CD4 subgroups and infection risk were not significant.

**Conclusion:** HPTN 052 has proven that ART is a potent intervention for prevention of HIV in discordant couples in which the index partner has between 350 and 550 CD4 cells/µL. The earlier observational literature is supportive of the findings of HPTN 052, although the estimated effectiveness is eight-fold less than that found in the trial.

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**C58 - Combination of prevention and treatment of HIV**

**TUAC0301**

HIV-negative and HIV-positive gay men’s attitudes towards antiretroviral-based prevention/similar attitudes to pre-exposure prophylaxis (PrEP) but greater scepticism among HIV-negative men about ‘treatment as prevention’

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**Background:** In Australia, debate continues about how to make best use of antiretroviral-based prevention or ‘treatment as prevention’. We assessed the attitudes towards antiretroviral-based prevention, including PrEP, of Australia’s primary affected population—gay men. We analysed whether HIV-positive and HIV-negative men held different attitudes to PrEP and HIV treatments.

**Methods:** A national, online cross-sectional survey was conducted in April–May 2011. The survey included 29 attitudinal items about PrEP, medicines, condoms and HIV treatments. Differences between the mean scores for each attitudinal item were assessed with ANOVA. Multiple linear regression (MLR) was used to identify independent differences in attitudes between HIV-positive and HIV-negative men.

**Results:** 1041 men were included in the analysis (88.3% HIV-negative and 11.7% HIV-positive). The mean age was 33.3 years (SD = 10.8; range 18–69). Most of the sample (94.8%) identified as gay and a minority (4.3%) as bisexual. HIV-positive and HIV-negative men agreed on 13 items, such as PrEP is effective in preventing HIV, that MLR analysis indicated nine independent differences in attitudes between HIV-positive and HIV-negative men.

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**C57 - Approaches to improving adherence to prevention interventions**

**MOPDC0306**

Using surveillance data to identify HIV-positive persons out-of-care (OOC) in New York City (NYC) and offer linkage to care and HIV partner services

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**Background:** Persons living with HIV (PLWH) require regular medical care to achieve a consistently suppressed viral load (VL) and its associated benefits of reduced morbidity, mortality, and probability of sexual transmission to HIV-uninfected partners. Only 51% of PLWH in the US, however, are retained in care. In 2008, the NYC health department began using its HIV Surveillance Registry (HSR) to identify OOC PLWH, re-engage them in care, and offer partner services.

**Methods:** A CD4 or VL report in HSR was considered a proxy for receipt of care. PLWH were considered OOC and prioritized for outreach if lacking care during the previous 9 months and had a NYC residential address at last report in HSR. Located OOC persons were offered partner and linkage-to-care services. Reasons for OOC were ascertained, and partners were notified and tested for HIV. Return-to-care was confirmed using HSR.

**Results:** From 7/2008 to 12/2010, 797 PLWH were prioritized for outreach; 14% were never located. Of 689 who were traced, 229 (33%) were actually current to care in NYC, 30 (5%) had moved or were incarcerated, 16 (2%) had died, and 414 were verified OOC. Most verified OOC were black or Hispanic (97%), US-born (73%), male (55%), or 40–49 years old (42%). Once located, 327/414 (79%) expressed willingness to return to care and received clinic appointments; 237/327 (72%) were confirmed as having returned to care. Among the 161 who provided reasons for being OOC, the most commonly reported was “felt well” (41%). Only 52/414 (16%) OOC PLWH named partners; 40 (62%) of 65 named partners were traced, and 3 (13%) of 22 partners with unknown or negative HIV serostatus were newly-diagnosed with HIV.

**Conclusion:** Health department-based outreach initiatives utilizing surveillance registries can successfully re-engage OOC PLWH in medical care, but partner notification among OOC may yield few new HIV diagnoses.
that taking HIV treatments was straightforward and HIV-negative men were more sceptical about whether HIV treatment or an undetectable viral load prevented HIV transmission.

Conclusion: Australian HIV-positive and HIV-negative gay men have mixed attitudes towards PrEP and HIV treatments. Despite doubts, HIV-negative men in particular are keen to see PrEP made available. There are intriguing differences related to ‘treatment as prevention’ while HIV-positive men are enthusiastic about the benefits of HIV treatment, HIV-negative men remain sceptical about the effectiveness of HIV treatment in preventing transmission.

**C59 - HIV counselling, testing and diagnostic strategies**

**TUAC0105**

**The critical role of social cohesion on uptake of HIV testing and ART in Zambia**

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Background: It has been documented that being HIV positive put the social safety net under strain preventing people from accessing HIV care. Yet, to date, the scope of epidemiological research on this topic remains limited. We tested the hypothesis that family and community cohesion were associated with uptake of HIV testing and treatment.

Methods: This research uses data from a randomized cross-sectional study of 2443 individuals sampled in communities and ART clinics in rural and urban Zambia. Associations were examined using a two step multivariable logistic regression approach. Initially independent thematic models, adjusted for sociodemographic variables, were created to examine the effect of social support, stigma, poverty and beliefs. Variables with p < 0.2 in the thematic models were included in a comprehensive multivariable model for each outcome.

Results: 978 participants (53% women and 44% men) in the community reported to be tested for HIV. A total of 691, including those attending the clinics, reported to be on ART (64% women and 36% men). In the final comprehensive models, adjusted for all covariates, the risk of not being tested was associated with poor community engagement (OR = 1.5 95% CI = 1.12–1.91), low attendance of religious services (OR = 1.3 95% CI = 1.08–1.47), problems with the neighbors (OR = 1.2 95% CI = 1.06–1.32) and living in urban areas (OR = 2.8 95% CI = 2.06–3.61). Protective factors were being women and married. The strongest predictors for non-uptake of ARVs were domestic violence (OR = 1.3 95% CI = 1.04–1.65) and trust in traditional medicines (OR = 1.8 95% CI = 1.33–2.47). Being widowed or divorced showed a statistically significant protective effect. Anticipated social stigma (OR = 1.2 95% CI = 1.08–1.36) was a significant risk factor for testing in the thematic model but the effect did not hold when adjusted to all covariates. Stigma was not associated with uptake of ARVs.

Conclusion: Community engagement and community cohesion were important predictors for uptake of HIV testing while family cohesion and trust in traditional medicines played a bigger role for treatment initiation. Targeted community programs to improve social cohesion on community and family levels can play a critical role in increasing access to HIV/AIDS services.

**THAC0405**

**Peer-delivered HIV testing and counseling among people who inject drugs in Bangkok, Thailand**

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Background: HIV testing is a core component of global efforts to control the HIV epidemic, although in some settings testing rates remain unacceptably low. In response, several countries have adopted peer-delivered HIV testing as a means of increasing access to testing. However, little is known about the acceptability of peer-delivered testing and counseling among people who inject drugs (IDU).

Methods: Using data derived from the Mitsanpan Community Research Project in Bangkok, Thailand between July and October 2011, three multivariate logistic regression models were constructed to identify factors associated with willingness to receive peer-delivered pre-test counseling, rapid HIV testing, and post-test counseling.

Results: Among our sample of 350 IDU, 44%, 38%, and 37% were willing to receive peer-delivered pre-test counseling, rapid HIV testing, and post-test counseling, respectively. In multivariate analyses, factors associated with peer-delivered pre-test counseling included male gender (adjusted odds ratio [AOR] = 0.52), binge use (AOR = 2.39), and experiencing barriers accessing health services (AOR = 4.86) (all p < 0.05). Factors associated with rapid HIV testing included binge use (AOR = 2.23), incarceration (AOR = 2.35), avoiding HIV tests (AOR = 0.32), experiencing barriers accessing health services (AOR = 4.86), and having been to the Mitsanpan Harm Reduction Center (AOR = 1.76) (all p < 0.05). Lastly, binge use (AOR = 2.49), incarceration (AOR = 1.98), and avoiding HIV tests (AOR = 0.26) (all p < 0.05) were significantly associated with peer-delivered post-test counseling.

Conclusion: We found that a substantial proportion of Thai IDU were willing to receive peer-delivered HIV testing and counseling. Individuals engaged in high intensity drug use, with a history of incarceration, and those experiencing barriers to health care were most willing to access peer-delivered HIV testing services. These findings highlight the potential of peer-delivered testing to complement existing HIV testing programs that serve IDU.

**C61 - Prevention for the general population**

**WEPDC0203**

**Changes in HIV testing and condom use in Malawi: longitudinal findings at midterm from the Malawi BRIDGE II Project**

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Background: HIV testing is a core component of global efforts to control the HIV epidemic, although in some settings testing rates remain unacceptably low. In response, several countries have adopted peer-delivered HIV testing as a means of increasing access to testing. However, little is known about the acceptability of peer-delivered testing and counseling among people who inject drugs (IDU).

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Conclusion: We found that a substantial proportion of Thai IDU were willing to receive peer-delivered HIV testing and counseling. Individuals engaged in high intensity drug use, with a history of incarceration, and those experiencing barriers to health care were most willing to access peer-delivered HIV testing services. These findings highlight the potential of peer-delivered testing to complement existing HIV testing programs that serve IDU.
Background: With 14.5% HIV prevalence, the southern region of Malawi is in urgent need of theoretically informed campaigns to promote behavior change. Since 2010, the BRIDGE II Project has run a mass media campaign with a potential national listenership of 70% in conjunction with community-based and interpersonal communication interventions that facilitate behavioral choices around HIV prevention in over 340 BRIDGE II communities in 11 districts in southern Malawi. We present midterm evaluation results on two key outcomes promoted by the campaign—condom use and HIV testing.

Methods: A first-of-its-kind household-based longitudinal study was conducted in December, 2011 among 685 adults (56% female, average age = 30.2 years, SD = 10.9), two years after they were first interviewed before the campaign began. The longitudinal panel was selected on the basis of a stratified (by intervention or control) random sample.

Results: Those who remained in the sample were less educated (p < .01) and poorer (p < .05) than those who dropped out. Compared to baseline, there was a 25.8% increase in HIV testing (p < .001) and 5.9% increase in condom use (p = .054) at midterm. Exposure to a key program component—the “Tasankha” (“We have decided”) message—was associated with testing (r = 14, p < .001) and increase in condom use (r = .10, p < .05). Exposure to the reality radio program “Chenicheni Nchiti” (We have decided) was associated with condom use (r = .10, p < .05), but not with changes in HIV testing.

Conclusion: HIV testing and condom use significantly improved at midterm, in comparison to baseline, and exposure to the BRIDGE II programs was significantly associated with these outcomes. Multiple sexual partnerships, another intervention-targeted outcome, were too few to analyze in this study. Further analyses will explore the role of interpersonal discussion and community mobilization activities in propagating intervention messages. Overall, mass media messages, coupled with community activities, appear to show promise in the fight against AIDS.

C62 - Prevention for youth and adolescents

WEAC0102

Transactional sex in South African youth predicted by primary caregiver HIV/AIDS and extreme socio-economic vulnerability: multisite studies

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Background: Identifying drivers of transactional sex amongst youth is essential for HIV-prevention. Whilst some suggest this is normative in Southern Africa, we test a competing hypothesis of familial-level risk factors.

Figure 1. Predictors of transactional sex: multisite study.

WEAC0105

Education and HIV/AIDS in western Kenya: results from a randomized trial assessing the long-term biological and behavioural impact of two school-based interventions

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Background: Between 2003 and 2006, a large randomized trial was conducted with 328 schools in Western Kenya to compare the effectiveness of two programs conducted either in isolation or combined: 1) training three teachers per primary school on the national HIV/AIDS curriculum; and 2) providing free school uniforms to students in grades 6 and above to reduce dropout rates. We assess the long-term impact of these two programs on transmission of Herpes Simplex Virus type 2 (HSV-2).

Methods: The sample includes 19,310 youths enrolled in grade 6 in 2003 in one of the 328 primary schools. A cross-sectional survey to measure HIV and HSV-2 prevalence and behavioral outcomes was administered between February 2009 and March 2011, six to eight years after the interventions. During a first wave of surveying, 54% of the youths could be successfully surveyed. Of the remainder, 29% were randomly selected for “intensive tracking”, and 81% of those were successfully surveyed. We use sampling weights to account for this sampling strategy.

Results: The HIV prevalence was 0.17% among males (average age: 20.33) and 1.56% among females (average age: 19.93). The HSV-2 prevalence was 7.14% among males and 11.79% among females.

Conclusion: The national HIV/AIDS curriculum for primary school students in grades 6 and above to reduce dropout rates. We assess the long-term impact of these two programs on transmission of Herpes Simplex Virus type 2 (HSV-2).

WEAE0404

Active program participation and HIV risk reduction among urban youth: findings from the Complementary Strengths Research Partnership

Table 1. Correlations among measures at baseline

| RISK REDUCTION | TEPPS | FAMILY CONNECTEDNESS | SCHOOL CONNECTEDNESS | AGE | MEIM | HOURS | DURATION |
|----------------|-------|----------------------|----------------------|-----|------|-------|----------|
| RISK REDUCTION | 1.00  |                      |                      |     |      |       |          |
| TEPPS          | .257* | 1.00                 |                      |     |      |       |          |
| FAMILY         | .140* | .294**               | 1.00                 |     |      |       |          |
| CONNECTEDNESS  |       |                      |                      |     |      |       |          |
| SCHOOL         |       |                      |                      |     |      |       |          |
| CONNECTEDNESS  |       |                      |                      |     |      |       |          |
| AGE            |       |                      |                      |     |      |       |          |
| MEIM           |       |                      |                      |     |      |       |          |
| HOURS          |       |                      |                      |     |      |       |          |
| DURATION       |       |                      |                      |     |      |       |          |

*p <.05; **p <.01.
C63 - Prevention addressing gender inequalities

WEAD0105
Response to conditional cash transfers: prevention of HIV infection in wives in Pakistan
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Background: Timely disclosure of HIV status amongst HIV discordant couples is important to prevent new infections. In Pakistan, a combination of patriarchal norms and individual level financial constraints, limit VCT for wives of positive men. We explored the response to conditional cash transfer on disclosure, condom use and VCT compared to baseline.

Methods: Using clinic records we identified sexually active married men receiving care > 6 months who had 1) not disclosed their status to their spouses, 2) their spouses had received no VCT. Baseline condom use among the presumed serodiscordant couples was recorded from initial visit/counseling notes. CCT covered travel/accommodation (US $ 14) to bring the spouse for VCT and encouraged the men to voluntarily disclose status beforehand. Study participants completed a questionnaire on demographics, counseling history, duration of HIV, and reasons for absent disclosure/spouse VCT.

Results: 138 men (60%) had spouses with unknown/never tested status. In this group baseline disclosure to wife was 29%, condom use 8%, median duration of clinic visits 14.3 months. 38% men reported travel costs as the main reason for lack of spouse VCT. From the138 men; 94(68%) men received CCT, which was < 20% of their monthly income. 53 (56%) brought their spouses for VCT; 19 (20%) reported testing elsewhere, and 22 (24%) did not comply. CCT improved disclosure of HIV status 62% (p < 0.05), and condom use 13% (p < 0.08). Factors associated with positive response to CCT were men < 50 years, good ART compliance, and prior self-disclosure of status to one family member (p < 0.05).

Conclusion: A targeted, low cost CCT ($14) can potentially help avert HIV infections in wives of positive men through promoting VCT and disclosure. Further studies are needed to review effectiveness, spillover, ethical aspects, and sustainable means to overcome financial and social constraints among this most vulnerable group of women.

C64 - Prevention for people who use drugs

THAC0401
The cost-effectiveness of needle-syringe exchange programs in Eastern Europe and Central Asia: costing, data synthesis, modeling and economics for eight case study countries
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Background: To evaluate the impact and cost-effectiveness of needle-syringe exchange programs (NSEPs) in Eastern Europe and Central Asia (EECA) in preventing HIV and hepatitis C virus (HCV) infections among injecting drug users (IDUs).

Methods: A data triangulation process was conducted across eight countries in EECA. This informed a health economic analysis incorporating a mathematical model of HIV and HCV transmission and disease progression among IDUs. We compared the epidemiological outcomes and costs of NSEP coverage with scenarios of no NSEPs, with counterfactual receptive sharing determined based on an empirical relationship of associations with syringe availability in each country. Outcomes included numbers of HIV and HCV infections among injecting drug users (IDUs).

Results: There were substantially increased financial investments in NSEPs over 2005–2010. The average number of needle-syringes distributed, and proportion of IDUs reached, across all eight countries increased by more than 300%. For all eight countries,
the reported level of receptive sharing decreased with increases in the per capita distribution of needle-syringes. NSEPs were estimated to avert 10–40% of HIV infections across the eight countries; a lower percentage of HCV infections were averted (~5–25% for six countries and slightly higher in two countries). NSEPs were found to already be cost-saving or cost-effective, with respect to HIV alone in the short-term, in four of eight countries, borderline cost-effective in two countries, but not yet cost-effective in two countries. When considering the additional health benefits of averted HCV infections, or the lifetime benefits of HIV infections averted, NSEPs were very cost-effective to cost-saving in all countries.

Conclusion: There is strong evidence that NSEPs have been effective in reducing risk, leading to reduced HIV and HCV infections averted, and are a very cost-effective public health strategy in EECA.

THAC0402
Switching people who inject drugs from high dead space to low dead space syringes as a structural intervention to prevent injection-related HIV epidemics

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Background: HIV continues to spread among people who inject drugs (PWID). Previous studies have demonstrated that high dead space syringes (HDSS) retain over 1000 times more blood after use and rinsing than low dead space syringes (LDSS) retain. In mathematical models, this difference was sufficient to prevent or reverse injection-related HIV epidemics. The models are supported by an ecological study that examined syringe type and HIV prevalence in over 50 areas and found that PWID used HDSS in every area where HIV prevalence among PWID exceeded 6%. Bio-behavioral surveys have linked sharing HDSS but not LDSS to prevalent HIV infection. An historical case study demonstrated that PWID will change from HDSS to LDSS. Taken together these studies suggest that a structural intervention to switch PWID from HDSS to LDSS could greatly reduce HIV transmission through syringe sharing and enhance comprehensive HIV prevention efforts for PWID. However, the barriers to such an intervention and strategies for overcoming them have not been fully explored.

Methods: We contacted harm reduction organizations, PWID, drug user groups, researchers and international organizations (e.g. WHO, UNAIDS, etc.) to identify barriers to changing PWID from HDSS to LDSS. We also contacted syringe manufacturers to explore the feasibility of overcoming the barriers that we identified.

Results: Major barriers to switching from HDSS to LDSS wereLDSS are not available in a variety of sizes; PWID prefer detachable needles; they may be too expensive; and PWID may be resistant to change. These are shown in Table 1.

Conclusion: Based on these findings, we developed a series of steps for implementing a multi-level structural intervention for transitioning PWID from HDSS to LDSS. The intervention will require working with policy makers and funders, syringe manufacturers, NSP, PWID service providers, harm reduction organizations and PWID.

Table 1. Major barriers to switching PWID from HD

| Barrier                                      | Feasible Solution                                      |
|----------------------------------------------|--------------------------------------------------------|
| LDSS are not available in larger sizes (i.e. >1 ml) | Manufacturers are willing and able to produce LDSS in larger sizes |
| LDSS do not have detachable needles           | One manufacturer produces low dead space needles that will fit on standard syringes |
| LDSS are more expensive than HDSS             | This is true in some areas but not others. Major purchasers could negotiate comparable prices |
| PWID will be resistant to change              | Behavioral change communications to emphasize benefits of LDSS (e.g. do not waste drugs) |

THAC0404
Effects of an HIV/AIDS peer prevention intervention on sexual and injecting risk behaviours among injecting drug users (IDU) and their risk partners in Thai Nguyen, Vietnam: a randomized controlled trial

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Background: Globally, 30% of new global HIV infections involve injecting drug users (IDUs) and in many countries, including Vietnam, the HIV epidemic is concentrated among IDUs. We conducted a randomized controlled trial to evaluate whether a community-based network-oriented behavioral peer intervention could reduce injection and sexual HIV risk behaviors among IDUs and their network members.

Methods: 419 HIV-negative index IDU aged 18–49 years and 516 of their injecting and sexual network members were enrolled in this randomized controlled trial in Thai Nguyen, Vietnam. Each index participant was randomly assigned to receive a series of six small group peer educator-training sessions and two 6-month booster sessions in addition to HIV testing and counseling (HTC) (intervention; n = 210) or HTC only (control; n = 209). Follow-up was conducted at 3, 6, 9 and 12 months post-intervention.

Results: The proportion of unprotected sex dropped significantly from 49% to 27% between baseline and 3-month visit among index-nonindex pairs. However, at 12 months, post-intervention, intervention participants had a 14% greater decline in unprotected sex relative to the control (Wald test = 10.8, df = 4, p = .03). This intervention effect was fully accounted for by trial participants who had baseline and 12-month visits but missed some in-between visits, and for whom the control subjects were significantly more
likely to report unprotected sex at 12 months compared to intervention subjects. The proportion of observed needle-sharing dropped significantly between baseline and visit 1 (14% vs 3%) and persisted until 12 months but there was no difference across trial arms (Wald test \( \chi^2 = 3.74, df = 3, p = 0.44 \)).

**Conclusion:** Decreased sexual and injecting risk behaviors noted in all arms between baseline and visit 1 may be associated with the HTC received by all participants. Missing some intermittent visits may account for higher reported unprotected sex among control participants at 12 months.

### FRLBC06
**Heroin scarcity in coastal Kenya: consequences for persons who inject drugs (PWID) and national and provincial response to the crisis**

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**Background:** In December 2011, major heroin traffickers in Kenya were publicly named, resulting in a government crackdown pre-

### Table 1. Thematic data on drug use

| Drugs | BEFORE | DURING | AFTER |
|-------|--------|--------|-------|
| Change in type of drug | heroin | bugzii (rohypnol), valium (diazepam), marijuana | heroin |
| How used | smoke, inject | smokers shifted to injecting | once begun injecting, continued |
| Cost | 40–200 shillings | 90–600 shillings | ~ 200 shillings |
| Quality | white crest, brown | adulterated white (pambha), mixed with chalk, cement, aspirin, etc. | back to pre-shortage quality |
| Where used | at home, maskanis (drug using sites) | more hidden spots including in fields/bush, prison | Maskanis, new hidden spots, fields/bush, home, prison |

### Table 2. Thematic data on drug use consequences

| Consequences | BEFORE | DURING | AFTER |
|--------------|--------|--------|-------|
| Sungu sungu perpetrated violence (community vigilantes) | community member organized violence against PWID | Beatings continued | Beatings continued, burning of maskanis |
| Withdrawal | Happens, constant awareness that if they miss a does the feeling of “tackiness” might descend into “arosto” (withdrawal) occurs | Severe (vomiting, body aches, diarrhea, etc.) Drove people to search for heroin day and night and across the region | Not such a concern, plenty of heroin |
| Overdose | frequently mentioned, tendency to overdose due to prolonged withdrawal | many immediately after heroin back on street and limited use during shortage |
| Relapse | High | Extreme, nearly entire population of users |
| Stigma | Family and neighbors ostracize them | Still high, but willingness to respond to their needs and welcome them home when they are sick | Increased as families and neighbors disappointed in their relapse. They hid use for as long as possible, but heroin use “is like a pregnancy, you can only hide it so long and then everyone knows and they judge you.” |
cipitating an acute heroin shortage in Kenya’s Coastal region in December 2010–May 2011. The estimated population of people who inject drugs (PWID) in Coastal Kenya is 26,667 with 18.3% HIV prevalence. The purpose of this study was to examine the impact of the shortage on drug use, HIV risk practices and health of PWID.

Methods: Cross-sectional rapid assessment methodology was used. Key informant interviews (N = 57 male PWID, 23 female PWID) and focus group discussions (N = 41 male PWID, 23 female PWID) in 12 cities were conducted in March 2012 and analyzed using ATLAS.ti. Addiction treatment services, detoxification and treatment administered during and after the period of heroin scarcity were reviewed.

Results: Consequences of heroin scarcity included withdrawal, increased heroin prices, decreased purity, shift from smoking to injecting, increased syringe sharing and violence against PWID (Table 1 & Table 2). Prices dropped after the crisis with heroin supply returning. HIV risk behaviors continued and overdose occurred.

Treatment with methadone was not available during shortage. The Kenyan government led an emergency response involving other civil society and emergency organizations. Codeine was procured and staff trained for the management of acute opioid withdrawal. Initially, demand soared and new admissions decreased overtime (Figure 1).

Conclusion: The heroin shortage in Coastal Kenya drove PWID to increase HIV risk behaviors and many sought treatment. Codeine is a weak opioid and doses provided were low for heroin addicts, resulting in many discontinuing detoxification before treatment was completed. Heroin became increasingly available and rapid relapse to heroin use occurred. The crisis for PWID continues in the absence of needle and syringe programs (NSPs) and medically assisted treatment (MAT). The Kenyan Government is now making plans for NSP and MAT policy and program implementation.

Figure 2. Clients Accessing Drug Addiction Services.

C66 - Prevention for men who have sex with men (MSM)

TUPDC0304

Use of a rapid HIV home test to screen potential sexual partners prevents HIV exposure in a high-risk sample of MSM

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Background: The FDA is considering licensing OraQuick, a rapid, oral fluid, HIV antibody test that provides results in 20 minutes, for over-the-counter sale (“home test” or HT). We studied whether HIV-uninfected, non-monogamous gay and bisexual men living in New York City who never or rarely use condoms would test their partners prior to receptive anal intercourse (RAI) as a harm-reduction approach.

Methods: After baseline assessment and self-testing in our offices, participants received 16 HT kits to take home as an option to use with sex partners for three months, after which they were interviewed.

Results: Of the ethnically diverse 32 men enrolled, 28 completed all study procedures and 27 used HT kits before intercourse with approximately 100 partners. Kits were used at participants’ and partners’ homes and occasionally in public places. Nine sexual partners were found to be infected; five of them were unaware of their status. Participants showed empathy for partners found to be infected; no sexual intercourse took place after someone’s infection was detected. A majority of participants said that having HT kits and using them shifted their own perceptions of risk and led to changes in their risk practices. Very few problems occurred related to HT use.
Most participants expressed a strong desire to continue using the test and frustration that they could not buy it freely. Testing had high acceptability among ethnic minority participants and ethnic minority sex partners.

**Conclusion:** MSM at high risk can use HT to screen sexual partners, and many partners will agree to take the test. Use of HT results in detection of previously unknown infections and avoidance of HIV exposure. Making HT available within networks where high-risk sexual practices are common may be a cost-efficient and effective way to identify previously undetected cases. HT may become an important harm reduction technology.

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**THPDC0105**

Switzerland has developed a new strategy to break the chains of new HIV infections among gay men and other MSM

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**Background:** Willing to understand what drives the HIV epidemic among MSM in Switzerland, the Swiss Federal Office of Public Health (SFOPH) commissioned the development of a mathematical model (MM). On the basis of its results, the SFOPH developed an Urgent Action Plan in order to break the chains of new HIV infections among MSM.

**Methods:** The MSM epidemic was remodeled from 1980 to 2010 on the basis of data coming from the Swiss Gay Survey, the Swiss HIV Cohort and the SFOPH surveillance system. Furthermore, the MM developed scenarios on how the HIV epidemic could evolve depending on the changes that were made in the HIV prevention work among MSM.

**Results:** According to the MM, in 2010, “only” 13% of the infected MSM were unaware of their HIV infection yet were the origin of 80% of the new infections. Moreover, the MM indicates that the average time to diagnose is only 2.2 years. Finally, if nothing changes, the number of MSM needing antiretroviral treatment would double in the following ten years.

**Conclusion:** The small proportion of MSM that seem to be the origin of most new transmissions tend to indicate that the spread of HIV is mainly driven by Primary HIV Infection (PHI) among MSM. Based on this result, the SFOPH developed an Urgent Action Plan organised in three action fields. The first action field aims to reduce the MSM community viral load to the lowest level as possible by breaking the chains of PHI with a one month campaign, called Break the Chains, repeated every year. The second action field tends to reduce the time between infection and diagnosis to 12 months and encourage non monogamous MSM to seek VCT for HIV, Syphilis, Gonorrhea, Chlamydia and Hepatitis. The third action field concentrates on avoiding HIV and STI transmissions to steady partners.

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**C67 - Prevention for transgenders**

**THPDC0203**

HIV testing among transgender persons funded by the Centers for Disease Control and Prevention in the United States, Puerto Rico and U.S. Virgin Islands, 2008–2009

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**Background:** Recent studies indicate high rates of HIV infection among transgender persons in the United States. However, the scarce availability of national surveillance data on transgenders limits our understanding of HIV’s impact on this population. This study describes the patterns of HIV testing events among transgenders served in CDC-funded HIV prevention programs nationally.

**Methods:** In 2008, CDC launched an expanded set of National HIV Monitoring and Evaluation (NHM&E) testing data requirements that included a gender variable, with an option for a transgender category. Using 2008–2009 NHM&E testing data, we conducted descriptive analyses to examine the number of testing events, newly identified confirmed HIV positivity, and socio-demographic and risk characteristics of HIV testing among self-identified transgenders.

**Results:** Of the 5,522,889 CDC-funded HIV testing events reported in 2008–2009, 7,620 (0.14%) were conducted among transgenders. HIV positivity was higher among transgenders (2.6%) than males (1.0%) or females (0.3%). Blacks (31%) and Hispanics (28%) accounted for larger proportions of transgender testing events than whites (25%). Similarly, the highest HIV positivity was among blacks (4.6%) and Hispanics (2.6%) compared to whites (0.6%). While more testing events were conducted among those 20–29 years (45.9%), the highest HIV positivity was among those aged 40–49 years (2.9%).

**Conclusion:** NHM&E data indicate that transgender testing events represent a small percentage of the overall testing events but have higher levels of HIV positivity than male and female testing events. HIV testing and positivity varied by race, ethnicity, and age. These findings underscore a great need for expanding targeted HIV prevention services that are responsive to the needs and socio-demographic characteristics of transgender persons.

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**THPDC0204**

Transgender in Tamil Nadu are still highly vulnerable to HIV and STIs: findings from bio-behavioral surveys

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**Background:** Transgender persons (TG) face considerable marginalization and are at significant risk of HIV. The Avahan program included TG as a key focus population for the prevention interventions implemented since 2004 in India. The evaluation of this intervention included two rounds of bio-behavioral surveys for tracking outcomes among TG in Tamil Nadu.

**Methods:** Cross sectional bio-behavioral surveys termed Integrated Behavioral and Biological Assessments (IBBA) were conducted in 2006 (R1) and 2009 (R2). Those who self-identified as TG, 18 years and older, were sampled using probability based sampling methods across five districts in Tamil Nadu. After voluntary consent, face-
to face interview was used to collect behavioral risk information and blood and urine samples were collected to test for HIV and STIs.

Results: 807 Transgender were interviewed during both rounds of IBBA. The decrease of HIV prevalence among TG between R1 and R2 was not significant12% and 9.8% (p<0.49), respectively. However, prevalence of lifetime syphilis (any RPR and TPHA positive) decreased significantly from 16.6% in R1 to 4.2% in R2 (p<0.001). Proportion of respondent who reported having been contacted by program peer educators increased between R1 and R275% and 83% (p=0.02), respectively, whereas reported visits to program STI clinics decreased from 75% in R1 to 45% in R2 (p=0.00). No significant change was observed in reported consistent condom use (CCU) with regular male partners (34% in R1 and 47% in R2; p=0.06), but the proportion of TG who reported last time condom use with paying partners decreased from 93% in R1 to 80% in R2 (p<0.001). About 61% of TG reported CCU with paying partners in R2.

Conclusion: Increased peer contacts did not result in improved condom use. Innovative behavior change communication strategies and structural interventions are required to increase access to services among TG for reducing vulnerabilities to HIV and STIs.

C70 - Preventing transmission from people living with HIV

MOAC0201
Predictors for high vireamia among a treatment-naïve national HIV cohort in the United Kingdom
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Background: Viral load is established as the key predictor for HIV transmission; patients adherent to treatment have a negligible transmission risk. In the UK, HIV care is free, and 82% of diagnosed adults receive treatment. We describe the distribution of viral loads and determine the predictors for high vireamia among a treatment-naïve cohort to target groups for prevention.

Methods: Data are taken from HIV positive adults accessing care in the UK in 2010. Patients diagnosed during 2010 were categorised as “recently-infected” (through linkage to avidity test results), “late diagnosed” (CD4 count <350 within three months of diagnosis) and “other”. High vireamia was defined as >40,000 copies/mL (in line with the upper quartile of the treatment-naïve population). Untreated patients with missing vireamia data (2,343), and those receiving treatment before 2010 (1,543) were excluded; the demographic profile of the included and excluded patients didn’t differ. Multivariate analysis was conducted to identify predictors for high vireamia.

Results: Overall, 8,486 patients were treatment naïve and had a median viral load of 10,494 copies/mL (inter-quartile range (IQR): 1,600–42,223); this compares to 39 (IQR:39–49) among the treated population. The number and proportion of patients with high vireamia are presented by risk-group in Figure 1.

Predictors for high vireamia include: recent HIV infection (Adjusted Odds Ratio (AOR) 2.8, 95% CI 2.1–2.7) and late diagnosis (AOR 2.1, 95% CI 1.7–2.6), sex between men (AOR 95% CI 2.4–4.0), and sex with men (AOR 95% CI 2.1–3.7) reference[2].

Conclusion: Predictors of high vireamia provide a useful prevention tool. The near three-fold risk of high vireamia among the recently-infected (compared to those diagnosed <2010) highlights the importance of prompt partner notification. Similarly, elevated vireamia in those diagnosed late-particularly those with CD4 <200—demonstrates rapid ARV is critical not only clinically, but also for prevention.

THAC0201
The threshold for an ART secondary prevention effect on HIV transmission among men who have sex with men (MSM) has not been reached in the UK despite high treatment uptake
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Background: Studies of HIV-infected people show the great efficacy of anti-retroviral therapy (ART) at preventing HIV transmission to uninfected sexual partners. High ART uptake may produce an additional secondary fall in population transmission through reducing ‘community viral load’. In the UK, HIV care is free and 95% of the diagnosed HIV-infected are established and retained in care.

Methods: HIV surveillance data, and sequential Bayesian multi-parameter evidence synthesis (s-MPES), which combines direct and indirect information from multiple sources, was used to measure the recent trend in the number and proportion of diagnosed HIV-infected MSM who were infective (viral load >1500 copies/mL) and estimate the number and proportion of undiagnosed HIV-infected MSM who were infective. These combined trends were related to indicators of HIV incidence and the trend in HIV incidence estimated through an s-MPES extension. Data relate to 2006-10 in the United Kingdom.

Results: In 2010, an estimated 40,100 MSM were HIV-infected; 74% were diagnosed and in these, ART uptake was 80%. Between 2006 (when ART uptake was 71%) and 2010, the overall proportion of infective MSM decreased from 47% to 35%, while the number infective remained around 14,000. Estimated annual MSM HIV incidence from 0.5% in 2002 to 0.9% in 2008. In 2010, 62% of
the estimated infective were undiagnosed, 33% were diagnosed but untreated, and 5% were on ART.

Conclusion: Optimal ART uptake in recent years, consistent with clinical guidelines, has led to a fall in the proportion infective without any apparent effect on numbers infective or on the estimated HIV transmission rate. High ART uptake may moderate but not control HIV transmission in MSM, and behavioural interventions and increased testing remain a prevention priority.

TUPDCO203
Four years after the Swiss Statement: transmission risk decision making in sero-different stable couples
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Background: Stopping transmission of HIV to stable partners is a main focus of positive prevention initiatives. In January 2008, the Swiss Commission on AIDS issued a statement indicating that positive individuals with effective antiretroviral treatment and without STD's are not considered sexually infectious. At the same time the importance of the negative partner’s decision about precautions such as condom use was emphasized. The aim of this qualitative study was to explore how negative partners, living in stable sero-different partnerships, make everyday decisions about dealing with the HIV transmission risk.

Methods: The Study was conducted at one center of the Swiss HIV Cohort Study (SHCS). At medical consultations, patients were asked to provide written study information to their stable partners. Partners willing to participate were recruited consecutively. Open ended interviews were conducted with each participant and transcribed verbatim. Transcripts were analyzed using thematic analysis according to Brown and Clark (2006).

Results: Ten Caucasian women and seven men, born in different European countries, gave insight views on how they deal with their perceived HIV transmission risk. The mean age in this group was 43.3 years (range 29-66y). The duration of their relationship ranged from 2-24 years. Lifestyles and sexual preferences were diverse. Participants experienced significant changes between phases of relative security and insecurity associated with the possible risk of HIV transmission. To deal with feelings of insecurity, different types of decision making were described: a) condom commitment; b) role governed commitment; c) flexible adaption and d) incongruent adaption.

Conclusion: To our knowledge this is one of the first studies focusing perceptions of negative partners in sero-different couples after the Swiss statement. Participants narratives provided insights into different decision making strategies, which provide guidance for individualized counseling and systematic prevention interventions.

WEPDCO205
Effectiveness of behavioral interventions on unprotected sex among people living with HIV: a system review and meta-analysis
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Background: To perform a systematic review and meta-analysis of the effectiveness of behavioral interventions on unprotected sex among people living with HIV/AIDS (PLWHA).

Methods: Randomized clinical trials of behavioral interventions among adult PLWHA published as of November 2011 were identified by systematically searching nine electronic databases and by cross-referencing. The main study outcomes of interest were unprotected virginal and/or anal intercourse (UVAI). Summary difference of standardized mean differences (SMD) between groups, which was defined as the effect sizes (ES), in both fixed and random effects models were calculated. Becker's strategy was used to adjust for any differences between groups at baseline. When studies reported dichotomous outcomes, odds ratios were transformed into SMDs using Cox transformation. Heterogeneity of studies was estimated by I² statistic. Begg and Mazumdar rank correlation tests and Egger’s tests of the intercept were employed to assess indications of publication bias.

Results: A total of 10,745 PLWHA from 19 studies of behavioral interventions were included into meta-analyses. Thirteen reported
UVAI with any sexual partners, and ten reported UVAI with HIV negative or unknown status sexual partners (HNUP). Lower likelihood of UVAI was observed in the intervention groups compared with control groups either with any sexual partners (mean ES = 0.22; 95% CI = 0.32, 0.11) or with HNUP (mean ES = 0.13; 95% CI = 0.22, 0.04). Null heterogeneity was observed across trials. No publication bias was found (Kendall tau = 0.10; P = 0.63; Egger’s t value = 0.15; P = 0.88). Short-term interventions with ≤10 months of follow up were effective in reducing UVAI (1–5 months −0.27 [−0.45, −0.10]; 6–10 months −0.18 [−0.30, −0.07]), while long-term effectiveness was not statistically significant (11–15 months −0.13 [−0.34, 0.08]; >15 months −0.05 [−0.43, 0.32]).

Conclusion: Our meta-analyses confirmed that short-term behavioral interventions are effective in reducing UVAI among HIV-positive individuals irrespective of the type of sexual partners, while the long-term impact is uncertain.

Figure 2. Unprotected sex with HIV-negative sexual partner.
rural population, has the highest number of PLHAs (2007) (0.5 million), and high HIV prevalence among pregnant women (>1%) and female sex workers (9.74%) (HSS 2007).

Methods: The HIV/AIDS prevention component was integrated with the public sector’s largest community based Health and Nutrition Program (HNP) involving women Self Help Groups (SHGs), aimed at empowering rural women on HIV/AIDS prevention and reducing stigma. Three innovative modules developed in story form with flipcharts, addressed social norms, gender, personal hygiene, reproductive health, foetal sex determination, fertilization, HIV and stigma and discrimination. Master trainers trained state and district level HNP staff, who trained sub district level staff, who in turn trained SHG women at village level.

Results: 3,244 HNP state and district level staff were trained, reaching 438,622 (86%) of SHG women in rural areas. More than 40,000 SHG women who perceived themselves at risk for HIV got tested. HIV/AIDS health resource directories were developed for all 23 districts in AP. Case studies (150) were shared at state/district advocacy meetings. Indira Kranti Patham-Society for Elimination of Rural Poverty (IKP-SERP) has planned a phased scale up of this project across AP in 2012.

Conclusion: With reductions in funding globally for HIV/AIDS programs, integration of HIV prevention within existing community based programs will support sustainability, community ownership, gender issues and in achievement of millennium development goals.

C76 - Structural interventions for HIV prevention

THAC0301

Structural determinants in MSM HIV prevention: environmental and structural factors predict internalised homonegativity in men who have sex with men (MSM): findings from the European MSM internet survey (EMIS) in 38 countries

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Background: Varying patterns of policy and cultural disadvantage among sexual minorities have recently been pointed to as implicated in their poorer health outcomes, relative to the heterosexual majority. We examined the predictors of internalised homonegativity (IH) within a macro-meso-micro framework, using various data sources, to help disentangle the complex influences perpetuating homonegative internalisations among European MSM.

Methods: EMIS is a collaborative study across 38 countries which during summer 2010 recruited over 180,000 MSM via Internet sites. The survey included a culturally stable form of the IH scale and various beliefs and behavioural variables. Additionally, to broaden the view of macro and meso environment at the level of individual men with respect to IH, we combined country-level data from the World Economic Forum, LGB status list, and European Values Survey.

Results: The analyses included 38 countries and 144,177 MSM with a valid IH score, which varied across Europe, with the highest scores found in Southeast Europe. In multivariate analyses, at the societal structure of rule-systems, higher IH was predicted by the absence of legal rights (β = 0.37 to 0.42). At the meso-level, IH was predicted by cultural values regarding homosexuality (β = 0.16). At the individual level, greater homonegative internalisation was found among those men who perceived they could not access PEP and HIV and STI testing in their country (β = 0.21 to 0.22). Higher IH, in turn, was associated with not testing for HIV and STIs (β = 0.70 to 0.57).

Conclusion: As possibly the first multi-level study, EMIS shows that a homonegative structural and social climate appears to have pervasive effects on MSM’s evaluation of the self, and greater IH in turn affect men’s levels of HIV precautionary behaviours. In addition to the human rights aspect, the EMIS results suggest that improved affirmative policy environments will have positive health impacts on MSM populations.

TUPDE0102

Conditional cash transfers improve birth registration and school attendance amongst orphans and vulnerable children in Manicaland, Zimbabwe

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Background: Cash transfer programmes with (CCT) and without (CT) conditions may improve the well-being and development of orphans and other children made vulnerable by HIV (OVC) in sub-Saharan African populations but evidence of effectiveness in Africa remains limited.

Methods: Cluster-randomised controlled trial in eastern Zimbabwe, with 30 clusters divided into ten socio-economically matched triplets. One cluster from each triplet was randomly assigned to each of three study arms-CT, CCT or control. Vulnerable households in the CT and CCT arms received bimonthly payments of $18 plus $4 per child for up to a maximum of 3 children. In the CCT arm, a 10% penalty was applied where households failed to comply with conditions regarding birth registration, immunisation and school attendance. We investigated the health, education and social effects of cash transfers.

Results: 9,811 children aged 0–17 years living in vulnerable households were recruited. After adjustment for cluster and baseline covariates, the CT programme reduced the proportion of children aged 0–4 years without birth certificates (–4.8%; 95%CI −13.3% to 3.8%) and with incomplete vaccination records (–2.1%; –10.7% to 6.5%) and the proportions of children aged 6–12 years (–7.4%, –15.4% to 0.6%) and 13–17 years (–8.5%, –15.0% to –2.0%) attending school less than 80% of days in the last month. The CCT programme produced larger, and more frequently statistically significant, reductions in the primary outcomes reduced the proportions of children aged 0–4 years without a birth certificate (–16.8%; –24.9% to –8.7%) and with incomplete vaccination records (–4.1%; –12.3% to 4.1%), and the proportions of children aged 6–12 years (–8.1%; –17.0% to –0.7%) and 13–17 years
Conclusion: Cash transfers, particularly conditional transfers, increased birth registration and school attendance in a low income, high HIV prevalence setting.

C83 - Reproductive choices and maternal health

WEAC0103

The next generation: perinatally infected adolescents and their reproductive health

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Background: With advances in the treatment of HIV, vertically infected young women are surviving into adulthood. Like other teens, many are sexually active at an early age, have multiple sexual partners, and use condoms inconsistently or infrequently. These young women face possible pregnancy and the risk of second generation mother-to-child transmission.

Methods: This was a retrospective review of the medical records of perinatally infected young women, followed longitudinally in a comprehensive university based Pediatric AIDS Program. Data related to reproductive health decisions, demographic and health variables were examined.

Results: 89 perinatally infected young women between the ages of 12–25 were seen between July 1, 2006 and December 31, 2010. Among this cohort there were a total of 44 pregnancies resulting in 26 live births, 10 terminations and 9 miscarriages. All exposed infants were HIV negative. Eight women were in committed relationships at the time of their pregnancy; three of the pregnancies were planned. Among the 42 pregnancies, only 6 partners (13.6%) were aware of the mother’s HIV status at the time of pregnancy. Sixteen percent of the mothers of girls who became pregnant were alive as compared with 36% of the mothers of young women who did not become pregnant during the interval.

Conclusion: In this group of young women with perinatally transmitted HIV infection none of their infants were infected with HIV, indicating good adherence with HAART during pregnancy. The low rate of disclosure to partners is a serious issue with public health implications. Challenges of negotiating relationships for young women will be discussed. Demographic variables including as age, education, mother’s vital status, will be examined as predictors of pregnancy. Future prospective studies will be discussed including evaluation of early counseling and support to this group of women.

THAC0101

Unplanned pregnancy in the 2011 Botswana Antenatal Clinic Sentinel Surveillance

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Background: In Botswana, over 30% of pregnant women are HIV-positive. The 2007 Botswana Family Health Survey showed that 51% of women used some form of contraception, predominantly condoms. Preventing unintended pregnancies is the second prong of the WHO four-prong approach to a comprehensive prevention of mother-to-child transmission (PMTCT) program. We used data from the 2011 Botswana Antenatal Clinic Sentinel Surveillance to determine the number of, and factors associated with unplanned pregnancies.

Methods: Pregnant women aged 15–49 years presenting for the first time to one of 262 selected antenatal clinics in all 24 health districts from August 1 through October 28, 2011 were included. Blood routinely drawn for routine antenatal care was tested for HIV using a two-test algorithm. A one-page form was completed for all participants that included demographic information, gravidity, HIV testing history, and planned pregnancy (“Was this pregnancy planned?”). Logistic regression analysis was used to determine factors associated with unplanned pregnancy, adjusted for linear and quadratic effects of age and for health district.

Results: Of the 6745 participating women, 6667 (98.8%) responded to the planned pregnancy question. Of these, 3383 (51%) reported that the current pregnancy was unplanned. Women aged 15–19 years and 40–49 years reported the highest rates of unplanned pregnancy (68% and 67%, respectively). Unplanned pregnancies were higher among HIV-positive (56%) than HIV-negative women (49%). In a multivariable model, unplanned pregnancy was associated with unemployment (odds ratio (OR) = 1.29, 95% confidence interval (CI) = 1.15–1.44), being unmarried (OR = 2.17, 95% CI = 1.81–2.60), having two or more previous pregnancies (OR = 1.83, 95% CI = 1.60–2.10), and having a previous positive test for HIV (OR = 1.73, 95% CI = 1.51–1.99).

Conclusion: The higher proportion of unplanned pregnancies among those who knew they were HIV-positive prior to the survey and among multigravid women suggest that current family planning services need to be strengthened as part of the Botswana PMTCT program.

THAC0106

Where do women who deliver at home fall through cracks in the PMTCT continuum of care services? A retrospective study of service uptake among mothers who delivered at home in Zimbabwe

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Background: Uptake and retention of mothers and babies along the PMTCT continuum of care services (Figure 1) is vital for preventing HIV transmission. Home delivery limits PMTCT programme coverage. Over one third of women in Zimbabwe deliver at home. Mothers who delivered at home were interviewed retrospectively regarding health service uptake to identify potential gaps for intervention in the PMTCT service continuum.

Methods: In June 2011, mothers in Mashonaland Central province who delivered at home in the previous 12 months were enrolled in this descriptive retrospective study. A minimum sample of 351 women was interviewed using a structured questionnaire following written consent. Sample size was determined using EPI Info Stat-Cal software and data entered and analysed using EPI Info and SPSS.
Results: Of 355 women interviewed, 80.2% booked for antenatal care (ANC), though 163 (57.2%) made their first ANC booking after 20 weeks. 277 tested for HIV (78%) while pregnant and 15 of the 20 who reported testing positive were enrolled in a PMTCT programme. The vast majority (89%) of women said their home birth was unplanned and 74.6% reported booking for delivery at a health facility, though 47 women (13.2%) reported zero uptake for any antenatal or intrapartum services. 313 (88.2%) attended post-natal check-ups for their baby, but only 36.1% did not for themselves. 70.4% of women (250) received no post-natal counselling.

Conclusion: The majority of mothers who delivered at home demonstrated high levels of service uptake during antenatal and postpartum parts of the PMTCT continuum. Strategic efforts required to correct gaps and missed opportunities to provide PMTCT services through routine maternity care include support for early ANC booking, overcoming barriers to facility birth at time of delivery, and ensuring post-natal care and counselling for all mothers. Further study and outreach is required to access and mobilise the ‘zero uptake’ mothers for health service uptake.

TUPDC0202
Safer conception options for HIV serodiscordant couples in the United States: experience of the National Perinatal HIV Hotline and Clinicians’ Network
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Background: Approximately 50% of the estimated 140,000 heterosexual HIV serodiscordant couples in the United States desire children. Serodiscordant couples and their providers may not know the range of options to help reduce the risk of HIV transmission to the uninfected partner during conception attempts. Moreover, many couples lack access to assisted reproduction technologies, such as sperm washing and in vitro fertilization. To help address these gaps in knowledge and access, the National Perinatal HIV Hotline and Clinicians’ Network provide consultation and referral to clinicians and serodiscordant couples in the United States seeking safer conception options.

Methods: Calls to the National Perinatal HIV Hotline and Clinicians’ Network from clinicians and patients seeking information and referral for safer conception options were analyzed to determine the number of calls, the direction of serodiscordance in the couple, and the types of question asked.

Results: From 2006 to 2011, there were 152 calls regarding conception for serodiscordant couples, 68 from patients and 84 from clinicians. Call volume increased significantly over time (p value for trend < 0.001, Figure 1). 63% requested referrals for assisted reproduction. 34% sought risk reduction options when assisted reproductive technologies were unavailable or unaffordable, including pre-exposure prophylaxis (PrEP) and timed intercourse (Figure 2). A majority of the calls (83.6%) related to HIV−/ male/HIV+ female couples (Table 1).

Conclusion: The Perinatal HIV Hotline and Clinicians’ Network is increasingly utilized by clinicians as a resource for expert advice on periconception HIV risk reduction options and by HIV-affected couples seeking access to providers supportive of their reproductive health decisions. Providing safer conception options to serodiscordant couples is a critical component of promoting the reproductive rights of HIV-affected couples in the United States.
Abstract Coding Guide

Example: MOAA01 = (Weekday) MO – (Session type) AA – (Session order) 01

Weekdays: SU (Sunday), MO (Monday), TU (Tuesday), WE (Wednesday), TH (Thursday), FR (Friday)

Session types: oral abstract sessions — AA (Track A), AB (Track B), AC (Track C), AD (Track D), AE (Track E), AX (Cross-Track), LBA (Late Breaker Track A), LBB (Late Breaker Track B), LBC (Late Breaker Track C), LBD (Late Breaker Track D), LBE (Late Breaker Track E), LBX (Late Breaker Cross-Track); oral poster discussions sessions — PDA (Track A), PDB (Track B), PDC (Track C), PDD (Track D), PDE (Track E), PDX (Cross-Track)

Session order: 01, 02, 03, 04, etc.