



Reviews

in Antiviral Therapy
INFECTIOUS DISEASES

3
2014

JOURNAL OF ABSTRACTS AND CONFERENCE REPORTS FROM INTERNATIONAL WORKSHOPS ON INFECTIOUS DISEASES & ANTIVIRAL THERAPY

Abstract Book

8th International Workshop on HIV Treatment, Pathogenesis
and Prevention Research in Resource-Poor Settings

INTEREST

5 - 9 May 2014, Lusaka, Zambia

**8th International Workshop on HIV Treatment,
Pathogenesis and Prevention Research in
Resource-Poor Settings
INTEREST**

**Abstracts
Oral presentations**

Abstract: O_01**The Continuum of HIV Care in Zimbabwe**

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Introduction: Monitoring of each step in the continuum of HIV care and treatment from HIV diagnosis to viral load suppression is critical to improving the health status of people living with HIV (PLHIV) and to enhancing prevention of HIV transmission through treatment.

Methods: We searched published literature (PubMed), conference abstracts, grey literature, and national program data and compiled available information on the continuum of HIV care in Zimbabwe.

Results: There were an estimated 1,208,617 PLHIV age ≥ 15 years in Zimbabwe in 2012 (Spectrum, 2012). Among PLHIV age 15-49 years, 63.7% had ever been tested for HIV (Demographic Health Survey, 2010-11), but many of them may have last tested HIV negative, so the proportion of PLHIV who have ever been diagnosed is not known and is likely to be lower than the proportion of PLHIV ever tested. The proportion linked to care after HIV diagnosis is not monitored at the national level. With an estimated 857,842 PLHIV age ≥ 15 years eligible for antiretroviral treatment (ART) at a CD4 lymphocyte count < 350 cells/mm³ in 2012 (Spectrum, 2012) and 574,701 PLHIV age ≥ 15 years enrolled in the national antiretroviral treatment ART program (June 2013), adult ART coverage of those eligible is 67.0%, while ART coverage of all adult PLHIV (including those with higher CD4 counts) is 47.5%. Median retention in care at 12 months after ART initiation in 2012 was 86% (and $< 75\%$ at 23% of facilities) (national Early Warning Indicator [EWI] survey, 2012). Adherence to ART is not well documented at the national level. Documented viral load (VL) suppression among PLHIV on ART (< 1000 copies/mL at 12 months after ART initiation) was 62.4% overall and 89.5% among those retained in treatment (national HIV Drug Resistance Survey, 2009-11). Taken together,

overall rates of VL suppression in adult PLHIV Zimbabwe may be roughly estimated at 30%: (number of adults on ART x VL suppression prevalence)/number of adult PLHIV. This estimate must be interpreted with caution, given diverse sources and quality of data, which include program data with important limitations.

Conclusions: Characterization of the continuum of HIV care in Zimbabwe indicates that, while there was high access to ART for adult PLHIV with a CD4 count < 350 cells/mm³, the overall rate of VL suppression in adult PLHIV may be only about 30%, which is comparable to results in well-resourced setting. Critical data gaps include unknown rates of: 1) HIV diagnosis among PLHIV, 2) linkage to HIV care among diagnosed PLHIV, and 3) adherence to ART. Substantial attrition in each step of the continuum of care is documented or may be inferred. Steps to improve overall VL suppression include ongoing efforts to: expand HIV testing; raise the threshold for CD4+ lymphocyte count eligibility to < 500 ; offer ART to all pregnant women, PLHIV in serodiscordant relationships, and HIV-infected members of key populations; implement interventions to enhance linkage, retention, and adherence; optimizing ART; and carefully monitor with quality improvement at each step in the continuum of care from the facility level to national level.

No conflict of interest

Abstract: O_02**The relationship between adherence to clinic appointments and year-one mortality for HIV infected patients at a Referral Hospital in Western Kenya***K. Muthusi¹, B. Burmen¹**¹Kenya Medical Research Institute/Centers for Disease Control Research and Public, HIV Implementation Science and Services, Kisumu, Kenya*

Introduction: HIV-infected persons must adhere to out-patient clinic appointments, an objective proxy for self-reported adherence to treatment, to optimize their treatment outcomes. The Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) in Western Kenya maintains clinic diaries, daily list of defaulters, tracker cards and has defaulter-tracing systems to retain patients in care as per the national guidelines. We examined the relationship between adherence to HIV clinic appointments and year-one mortality rates for newly enrolled HIV-infected patients at the JOOTRH HIV clinic.

Methods: A retrospective review of medical charts and appointment diaries was done for all newly enrolled HIV-infected patients aged ≥ 15 years enrolled, between January 2011 and December 2012. Each patient was followed up for a period of one year or until death. Mortality data, where available, was obtained from medical charts and defaulter-tracing registers. Patients were considered defaulters if they missed their scheduled appointment by ≥ 3 days. Alternating logistic regression was used to determine socio-demographic and clinical factors associated with defaulting clinic appointments. Chi-square statistics were used to compare year one mortality rates of defaulters to that of non-defaulters. Cox proportional hazards were used to estimate hazard ratios associated with mortality.

Results: Of the 582 enrolled patients, 347 (60%) were female, 516 (89%) were aged ≥ 24 years, 44 (8%) had attained secondary or higher level of education and 477 (82%) were eligible for ART within one month of enrollment.

All ART-eligible patients (477; 100%) were initiated on ART during the follow up period. Two hundred and fifty eight patients (44%) were categorized as defaulters. Defaulters did not differ from non-defaulters by age, gender and CD4 categories. However, defaulters were more likely to, have attained secondary or higher level education (11% vs. 5%, $p=0.0073$), be smokers (6% vs. 2%, $p=0.0245$) and were less likely to have disclosed their positive HIV status compared to non defaulters (52% vs. 59%, $p=0.0250$). Once categorized as defaulters at one visit, patients were more likely to default at future visits (OR 1.4; 95% CI 1.12-1.77, $p=0.0035$) especially those who, were unemployed (OR 1.43; 95% CI 1.07-1.91, $p=0.014$), had not disclosed to their status (OR 2.17; CI 1.42-3.3, $p=0.0003$) and smokers (OR 2.22; CI 1.31-3.76, $p=0.003$).

Nineteen patients (3%) died during the follow up period. The proportion of deaths and risk of death was higher among defaulters compared to non-defaulters (5 % vs. 2%, $p<0.0001$ and HR 3.12; 95% CI 1.2-8.0, $p=0.0175$, respectively). When adjusted by rate of patient default, the hazard ratio for death for defaulters vs. non-defaulter was 4.05 (95% CI 1.38-11.81, $p=0.0105$) for 4-60 cumulative elapsed days after all clinic appointments, while at 60+days was 4.98 (95% CI 1.45-17.09, $p=0.0108$).

Conclusions: Despite instituting measures to improve patient adherence, lower appointment adherence levels were observed. An inability to verify outcomes of all lost-to-follow-up patients and short duration of follow up on ART limited this analysis. Efforts should be directed to improve patient education and institute patient-driven measures to increase adherence to clinic appointments which is directly related to patient survival.

No conflict of interest

Abstract: O_03**ARV uptake and seroincidence by ARV status among HIV discordant couples in Copperbelt province, Zambia**

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Background: Zambian National Guidelines recommend antiretrovirals (ARVs) for HIV+ individuals in discordant relationships. Though 'treatment as prevention' (TasP) efficacy has been established, effectiveness, including acceptability and adherence in discordant couples, has not been evaluated. In the context of high HIV prevalence and ARV costs, limited ARV access, and declining budgets, the question of TasP effectiveness is critical.

Methods: Couples' Voluntary HIV Counseling and Testing (CVCT) services were provided in Copperbelt province with Canadian International Development Agency funding from August 2010-March 2013. History of prior testing, pregnancy, and ARV use data was collected. ARV referrals were provided to HIV+ partners not on treatment. In 2011, quarterly follow-up was instituted. We evaluated ARV uptake and calculated HIV seroincidence by ARV status for discordant couples.

Results: 6479 discordant couples had ARV information at their initial visit. Among all HIV+ partners and HIV+ pregnant women previously tested, roughly 70% were not on ARVs at their first CVCT visit. Almost 20% of discordant couples had at least one follow-up visit, and those on ARV at baseline were more likely to return for follow up. One in four discordant couples who were not on ARV at the time of CVCT had initiated ARV at follow-up. Excluding two sequence-confirmed unlinked seroconversions, there were 33 seroconversions in 992 couple-years (CY)

(3.8/100CY; 95%CI: 2.1-6.3). Seroincidence by ARV status was: 2.0/100CY (95% CI: 0.7-4.7) for those on ARV and 7.3/100CY (95%CI: 3.3-13.8) for those not on ARV.

Discussion: Though HIV+ individuals in discordant relationships are referred for ARVs, ARV uptake is low. ARV effectiveness in our cohort is much lower than ARV efficacy in randomized trials, likely due to access and adherence issues. Given reduced HIV transmission rates in discordant couples after CVCT irrespective of ARV, CVCT with follow-up testing for discordant couples should be provided and promoted in government clinics.

No conflict of interest

Abstract: O_04**Short-term safety profile of Atazanavir/ritonavir-based second-line therapy among HIV-infected adults in Zambia**

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Introduction: Atazanavir/ritonavir (ATV/r) has been recommended by the World Health Organization as part of second-line combination antiretroviral therapy (cART) in HIV-infected patients aged 6 or above. In 2013, the Zambia HIV treatment program introduced ATV/r as an alternative protease inhibitor (PI) to lopinavir/ritonavir (LPV/r) because of its gastrointestinal tolerability, lipid profile and once-daily dosing. However, data about the safety and tolerability of ATV/r-containing regimens in sub-Saharan Africa are sparse. We thus sought to establish the safety of ATV/r based regimens in the adult HIV infected Zambian patients failing first line cART.

Material and methods: We evaluated clinical and laboratory events among HIV-infected adult patients initiating ATV/r-based second-line cART at the University Teaching Hospital in Lusaka, Zambia between November 2012 and February 2014. We used multivariable

logistic regression to assess risk factors for hyperbilirubinemia, a well-recognized adverse event of ATV/r.

Results: Among 103 patients on an ATV/r-based regimen, 44 (43%) had not been exposed to LPV/r previously. 59 (57%) were initiated on ATV/r due to suspected LPV/r-related side-effects, including gastrointestinal intolerance (n=32) and hyperlipidemia (n=12). Median follow-up on ATV/r was 8 months (interquartile range: 6,11). Following initiation of ATV/r, the vast majority did not report side effects (n=89, 86%). Among those with side effects, jaundice was the predominant complaint (n=8, 8%). Overall, hyperbilirubinaemia was the most common adverse event (n=19, 18%, with a range of 27.5 to 141 $\mu\text{mol/L}$) and it was not associated with age (Hazard Ratio (HR): 1.02, 95% confidence Interval (CI) 0.98, 1.06), gender (HR: 0.82, 95% CI: 0.31, 2.14) or with elevated transaminases (HR: 0.92, 95%CI: 0.41, 1.87). Only one patient had his ATV/r-containing regimen stopped, with a chief complaint of severe abdominal pain (n=1, 1%).

Conclusion: ATV/r-based regimen appeared to be well-tolerated in our study population. Hyperbilirubinemia was the most frequently observed adverse event, though it did not prompt discontinuation of this drug. Continued safety and tolerability monitoring of ATV-based regimens is needed in African settings, particularly for longer observation periods. Direct comparisons with other PI-based combinations are urgent.

No conflict of interest

Abstract: O_5**Clinical implementation of HIV-1 resistance testing on dried blood spots in a rural South African Setting**

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Introduction In resource-limited settings (RLS), HIV-1 treatment using antiretroviral therapy (cART) has expanded greatly, while resistance monitoring is often unavailable, mainly due to high transportation costs. In these settings, retrospective analyses have shown that rapid accumulation of resistance can occur in patients failing treatment, highlighting the need for genotypic resistance testing in these patients. HIV-1 Drug resistance (HIVDR) Genotyping using dried blood spots (DBS) as a sampling method minimizes transportation costs and could therefore be a cost-effective solution to this problem. In this study, HIVDR genotyping using DBS was implemented in clinical practice in a rural clinic in Limpopo, South Africa where >3600 HIV-1 infected individuals have initiated cART since 2003.

Methods HIV-1 infected individuals receiving cART were monitored by yearly viral load assay and CD4+ T-cell count. Upon determination of virological failure (log₁₀ VL >3.0 copies/ml after initial suppression <400 copies/ml), DBS samples were prepared by spotting EDTA whole blood on filter cards, and shipped by standard mail to a WHO reference laboratory for HIVDR genotyping in the Netherlands. Viral nucleic acids were isolated using the NucliSENS MiniMAG magnetic extraction kit, amplified and genotyped using an assay targeting the protease (PR) and reverse transcriptase (RT) region of HIV-1. Samples that failed to amplify for PR-RT were analysed using an RT-only assay. Resistance analysis was performed using HIV-GRADE. Mutations were assessed according to the 2011 IAS guidelines.

Results DBS-based resistance testing was performed on 194 HIV-1 infected individuals experiencing virological failure. They were primarily female (64%), 18-68 (median 37) years of age, and receiving therapy for 0.6-9.6 (median 2.4) years. Upon failure 84% received first-line therapy. Genotypic analysis was successful in 93.8% of cases, of which 82.4% showed drug resistance mutations. The prevalence of nucleoside reverse transcriptase inhibitor (NRTI) mutations was 70.9%. M184V was observed in 114 cases (62.6%) and K65R in 51 cases (28.0%). Mutations to non-NRTI (NNRTI) were seen in 76.9%, with the most common being K103N (n=72; 39.6%), Y181C (n=46; 25.3%), V106M (n=42; 23.1%) and G190A (n=32; 17.6%). Protease genotyping was successful in 152 cases. PI mutations were encountered in seven individuals (7/152; 4.6%) of whom two received protease inhibitor (PI)-based regimen. PI mutations consisted of M46IL (n=4), I47V (n=1), I54V (n=1), L76V (n=1), N83D (n=1) and I84V (n=1). PI mutation prevalence in patients receiving second-line therapy was 6.5% (2/31).

Conclusions HIVDR Genotyping on DBS was successfully implemented in clinical practice. Success rate was high, demonstrating that DBS sampling could expand access to HIVDR genotyping in rural settings. Resistance to NNRTIs and NRTIs was observed frequently, while PI resistance was limited. Of patients on a PI-based regimen and experiencing virological failure, only 6.5% harboured PI resistance mutations. The high rates of NRTI and NNRTI resistance highlight that HIVDR Genotyping could be a useful clinical tool in RLS, enabling informed selection of a follow-up regimen. In contrast, the low rate of PI resistance in this sample suggests that routine HIVDR Genotyping should be limited to the RT region, thereby reducing costs and processing time.

No conflict of interest

Abstract: O_06**Incremental costs of implementing automated ELISA systems for early Cryptococcal antigenaemia detection at a high-volume public-sector laboratory in South Africa**

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Background: Cryptococcal meningitis (CM) is a major cause of HIV-related morbidity and mortality in Africa and could be prevented by screening patients for sub-clinical cryptococcal antigenaemia (CRAG) using the lateral flow assay (LFA)(IMMY, Norman, OK) followed by fluconazole treatment. The LFA was performed as a reflex test in remnant CD4 samples with a count <100 cells/μl. The daily LFA volumes at a busy CD4 laboratory in Johannesburg (exceeding 150 per day) posed significant workflow and transcriptional (quality) challenges. In response, a semi (SA) and fully-automated (FA) CRAG enzyme immunoassay (EIA) has been validated. This paper reports a cost analysis for these assays.

Methods: Using standard ingredients-based costing techniques, a cost model for EIA and LFA CRAG testing was established to assess the annual equivalent costs and cost per test

result. Management, laboratory infrastructure, transport of samples, external quality assessment, medical waste management, data and information management systems, were assumed to be the same for both types of testing and therefore excluded from the analysis. Instrument failure, instrument downtime, and testing errors were also excluded from the analysis due to limited data. Costs for equipment, staffing for test processes, reagents and test consumables were collected from suppliers. Test volumes were actuals for the financial period 2013/14. For EIA-based testing, the two-hour run time was excluded from labor costs as it was assumed that laboratory staff would be able to perform other tests during this interval. Costs were collected in ZAR and are reported in 2014 USD, at an exchange rate of 10.80.

Results: For the financial period 2013/14, 394k CD4 tests were performed by the National Health Laboratory Service (NHLS) with a count ≤100 cells/ul. The LFA cost per result was \$4.02 (R43.42), compared to \$4.69 (R50.76) and \$4.64 (R50.17) for the SA and FA EIA assays respectively. The incremental costs for the EIA assays was between \$0.62 (R6.74) and \$0.68 (R7.33). The total annual equivalent costs for the LFA was \$155k, compared to \$181k (SA) and \$179k (FA). For the LFA, reagents contributed \$3.04 (76%) compared to \$3.97 (85%) for both EIA assays. Staffing contribution reduced from \$0.92 (23%) for the LFA to between \$0.45 (10%) and \$0.50 (11%) with the EIA assays. Equipment contributed \$0.22 (5%) for both EIA assays, which was higher than \$0.06 (1%) for the LFA.

Conclusion: The CrAg EIA reported lower staffing costs, due to automation, but had higher reagent and equipment costs per test. Automation of testing in the context of higher workload offers significant benefit by streamlining service efficiency and reducing turn-around-times in CD4 laboratories, especially in the context of reflexed testing. Further, automated EIA-based systems improved workflow, quality and reduced transcriptional aspects that could not be factored into the final costing but with obvious benefits to testing. It is also anticipated that, in the context of a national programme, economies of scale will act to reduce current reagent costs of the EIA system.

No conflict of interest

Abstract: O_07**Cost-per-HIV infection averted by couples' HIV counseling and testing (CVCT) in government clinics in Copperbelt, Zambia**

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Introduction: One in four HIV infected Africans have been identified and less than half of HIV+ Africans with CD4<200 have been reached by antiretroviral therapy (ARV) programs. WHO estimates that each new ARV patient corresponds to two new HIV infections. Unfortunately, more than half of donor budgets are spent on ARV treatment while 20% is allocated to prevention and less than 5% is committed to HIV testing and counseling. We present a cost – per – infection – averted model for CVCT in a Canadian International Development Agency (CIDA) funded program in Copperbelt, Zambia.

Methods and Results: Total costs of CVCT were \$56/couple for 68,000 couples over 30 months. This included overhead (13%), training in counseling, rapid HIV testing, data recording and reporting and promotions (8%), salaries for counselors, promotional agents, and trainers (38%), salaries for monitoring and evaluation staff (12%), training, promotional and data recording materials and equipment (11%), vehicle fuel and maintenance (3%), and administrative supplies (12%). HIV tests were provided through government channels but stock-outs were common and required purchase of backup kits (3%). Conservative effect sizes were estimated at 50% reduction in new infections with five-year duration of impact. Assumptions included 100% efficacy of ARV-as-prevention among HIV+ meeting clinical criteria for treatment. Sensitivity

analyses varied incidence rates among discordant and concordant HIV- couples.

Conclusion: The cost per HIV infection averted by CVCT in this high prevalence southern African country ranges from \$200-\$500. In comparison, the cost of treatment-as-prevention (TasP) in discordant couples is >\$5000 per year per infection averted even if 100% efficacy is assumed. Although CVCT is cost-effective and WHO recommended, very little funding has been directed towards this intervention and as a result more than 95% of discordant couples in Africa do not know their HIV status. This unique program funded by CIDA confirms the feasibility of rapid expansion of CVCT services in government health facilities in a high-prevalence low resource setting. CVCT should be widely disseminated in Africa.

No conflict of interest

Abstract: O_08**Overlap of high risk behaviors in men injecting drugs among high risk men for HIV in Ghana**

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Introduction: Ghana's key population strategy references the importance of HIV prevention and care among people who inject drugs (PWID). However, very little is known about injection drug use as an HIV risk factor in Ghana. In 2011, a Behavioural Surveillance Survey (BSS) was conducted among high-risk men to identify and describe key socio-demographic characteristics and HIV-related risk behaviors. Questions were included on illicit drug use. A two stage probability proportional to size sampling (PPS) approach was used to select 5,848 men from six main occupations; truck drivers and their assistants, artisans, truck pushers, uniformed services personnel, port workers and miners. Face-to-face individual anonymous interviews were conducted by trained interviewers and collected data on demographics and high-risk behaviors for HIV. Bivariate analysis was conducted based on BSS indicators and a report prepared.

Materials & Methods: To better understand characteristics of PWID and risk factors associated with injecting drug use among BSS participants, secondary data analysis of the BSS data was carried out among respondents who reported to have injected drugs in the past 12 months. Variables of interest included occupation, age, education and indicators of sexual behavior. Bivariate and multivariate analysis and tests of significance of results were done (Logistic regression with backward elimination and Goodness of Fit (Hosmer-Lemeshow Chi2 test)). Results were significant at $P < 0.05$.

Results: Of the 5,848 sampled men, 8% (467) reported to have injected drugs 12 months before the study. The median age of PWID

was 30 years, and the majority (73%) had achieved middle school level education or above. Truck Pushers were statistically significantly more likely to inject drugs compared to men in other occupations. Nearly half of the respondents (46%) had had sex with a female sex worker (FSW) in the past 12 months and 226 (53%) had sex with a casual partner within the same period. Condom use during commercial and casual sex at last sex was low at 46% and 25% respectively. Comprehensive knowledge of HIV was low (37% of respondents answered all 4 questions correctly); only 23% had ever tested for HIV and knew their status. Respondents who had had sex with a female sex worker and those who had casual sexual partners in the last 12 months were statistically significantly more likely to inject drugs compared to those who did not engage in these sexual behaviors ($P < 0.05$). In addition, respondents who had unprotected commercial or casual sex in the previous 12 months were statistically significantly more likely to inject drugs compared to those who used condoms ($P < 0.05$). Use of alcohol before sex was also significantly associated with injecting drugs ($P < 0.05$).

Conclusions: These findings provide evidence that a population of PWID exists in Ghana and engage in multiple risk behaviors. It is recommended that the government of Ghana conduct a population-size estimate and a bio-behavioral surveillance survey specific to PWID as part of the country's routine HIV surveillance. Furthermore, there is urgent need to design and implement addictions mitigation and HIV prevention and care interventions for PWID in Ghana.

No conflict of interest

Abstract: O_09**One is not enough – using non-traditional approaches to reach msm with hiv prevention, testing and counseling and care**

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Introduction: Deep-rooted social stigma towards men who have sex with men (MSM) impacts their ability to access critical HIV information and services. HIV prevalence among the MSM in Ghana is high (17.5%), with highest rate in Accra (34.3%) (CDC 2012). Less than half (44.8%) of MSM surveyed had been reached by HIV prevention services in the past year. From 2011-2012, the USAID/Ghana SHARPER project implemented by FHI360, reached MSM solely through conventional peer education and outreach. This entailed training MSM to provide face-to-face education and information on HIV prevention, care and treatment as well as promote/strengthen referrals to HIV-related services and commodities. In 2013, SHARPER piloted three new approaches to reach high risk, hard-to-reach networks of MSM with HIV behavior change strategies and increase access to HTC and care, to complement its peer education efforts. These approaches included, reaching MSM through the social media (MSM.net), social networks testing (SNT) and outreach to male sex workers' (MSWs) networks.

Materials and Methods: SNT was piloted in Greater Accra and Ashanti regions using 'seeds' - MSM who test HIV-positive or are at high risk of HIV acquisition and who have never been contacted through peer education or social media. The seeds then referred their peers for HTC. To reach MSW, four establishments where MSM provide sex services to male clients; and two pimps operating a network of MSWs and clients through telephone were identified. SHARPER was granted access to two MSW's brothels and one MSW network. Between December 2012 and July 2013, three HIV prevention interventions including HTC were held with these groups. Pimps invited participants from

their networks of MSWs and clients to the events. Reaching MSM through the social media (MSM.net) involved FHI360/Ghana contracting two MSM community liaison officers (CLOs) in Accra and Kumasi, to reach MSM through different ICT platforms such as Facebook, WhatsApp and Badoo using smart phones and laptops.

Results

Through MSM.net, 5,389 MSM were contacted by the CLOs with HIV prevention education and referred for clinical services and commodities compared to 12, 985 MSM reached by 95 peer educators using the traditional method. Through SNT, 159 MSM were recruited. Of these 29% (46) tested HIV positive and 100% were enrolled in HIV care. The MSW outreach activities reached 158 MSW and their clients, of which 16% tested HIV-positive and enrolled in HIV care services. Both strategies were significantly better at reaching MSM who were more likely to be HIV positive compared to traditional peer education where 8.5% (1,100) of MSM tested positive.

Conclusion

Non-traditional approaches; SNT, MSM.net and MSW interventions are tapping into populations with a much higher risk of HIV compared to those reached by peer education. Traditional peer education interventions reach younger and lower-risk MSM compared to these strategies. Rather than a standalone approach for HIV intervention with MSM that seek to increase HTC service uptake, a combination of complementary approaches will tap into different networks of MSM populations increasing both uptake and chances of reaching a wide range of high risk networks.

No conflict of interest

Abstract: O_10**Estimating the association between duration of HAART before delivery and low infant birthweight using data from the Zambian Electronic Perinatal Records System**

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Introduction: The impact of HAART on low infant birthweight (LBW) remains controversial. Analysis of routinely collected program data could provide additional insight; however, methodological issues such as missing data have limited their impact to date.

Methods: Using data from the Zambian Electronic Perinatal Record System, we investigated the association between timing of HAART initiation and LBW among women who were HAART-naïve, eligible for treatment (CD4 count ≤ 350), and delivered between 2009-2013. Duration on HAART was categorized as ≤ 8 , 9-20 or 21-36 weeks on HAART before delivery and compared to those who were eligible but never initiated treatment. To assess the impact of missing data, we investigated predictors of missing HAART initiation date and performed multiple imputation for missing dates. Log-binomial regression was used to estimate risk ratios (RR) for the association between duration on HAART and LBW and adjusted for multiple confounders. WHO clinical stage and viral load information was not available. Preterm delivery was not included as a confounder because we hypothesized that it mediates the effect of duration on HAART and LBW. We performed 2 analyses; complete case and including imputed HAART initiation dates.

Results: Of 50,629 HIV+ pregnant women 9,270 met the inclusion criteria for the complete case analysis. HAART initiation date was missing for an additional 2,291 (40%) women on HAART who met inclusion criteria. In the complete case analysis, the majority of women, 5,746 (64%) never initiated HAART and duration of HAART 9-20 weeks was the most common (18%) length of time on HAART. Overall, LBW occurred in 1,264 (14%) of births. Significant predictors of missing HAART initiation date included indicators of health status (hemoglobin and tuberculosis) and engagement in care (no syphilis screening and >1 ANC visit). In the complete case analysis, RRs for 21-36 and 9-20 weeks on HAART were below the null, while ≤ 8 weeks on HAART was associated with a slight increased risk of LBW. However no associations were statistically significant. In the imputed data analysis, RRs for 21-36 and 9-20 weeks on HAART moved closer to the null and the RR for ≤ 8 weeks on HAART increased and became significant (Table 1). This association may be due to the higher number of preterm births among women on HAART for ≤ 8 weeks (18% compared to 13% HAART 9-20 weeks and 1% HAART 21-36 weeks).

Conclusions: When complete case analysis was performed, we found no significant association between HAART duration and risk of LBW. However, in sensitivity analyses that considered imputed data, ≤ 8 weeks of HAART prior to delivery was associated with an increased risk. Future work using observational data is needed to investigate the relationship between HAART and LBW and should include investigating the impact of missing data.

No conflict of interest

Abstract: O_11**Using a regression discontinuity (RD) approach to investigate the effect of combination antiretroviral therapy (cART) in pregnancy on birth outcomes in Zambia**

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Background: Observational studies suggest a possible association between cART and adverse birth outcomes. Residual unobserved confounding limits observational data analyses, making it difficult to determine causality. Regression Discontinuity can minimize such confounding when the probability of being treated depends on an arbitrary threshold. With this quasi-experimental approach we leveraged the CD4+ treatment threshold for cART in pregnancy to examine possible associations between cART and birth outcomes.

Materials and Methods: Using the Zambian Electronic Perinatal Record System (ZEPRS), we identified newly diagnosed HIV-infected pregnant women in Lusaka, Zambia, with CD4+ counts in a narrow window (+/- 50 cells/ μ L) around the treatment threshold of 350 cells/ μ L. Following the RD approach, we modeled the association of cART initiation in pregnancy with birth weight (BW), low birth weight (LBW; <2500g), and stillbirth (SB) by calculating the impact of crossing the CD4+ threshold on the outcome (intention to treat estimator) and dividing the coefficient by the impact of crossing the cART initiation threshold to obtain the as-treated estimate, which accounts for non compliers and cross-overs. For both models we used local linear regressions weighted with uniform Kernel, controlling for CD4+ trends, calendar year, age, parity, socioeconomic status, timing of first

antenatal care visit (ANC), and obstetrical risk factors. This approach does not require cART uptake and outcomes to be unconfounded. We also conducted sensitivity analyses with wider and narrower CD4+ windows: +/-75 and +/-35 cells/ μ L.

Results: Between Jan-2009 and May-2013, 3,660 of 31,795 (12%) newly diagnosed HIV-infected pregnant women had CD4+ counts of 300-400 cells/ μ L, including 1,924 at 301-350 and 1,736 at 351-400. When stratified by CD4+ category, the women did not statistically differ according to age, socioeconomic status, parity, gestational age at first ANC, and obstetrical risk factors. Although they were more than twice as likely to initiate cART compared to those with CD4+ 351-375 (37% vs. 15%, $p < 0.001$), women with CD4+ 300-350 cells/ μ L did not have worse birth outcomes. Both the intention to treat and the as-treated indicators suggest that cART initiation is associated with a statistically insignificant decrease in probability of LBW (-0.04, 95% CI: -0.53 to 0.45 for the as-treated) and of stillbirth (-0.13, 95% CI: -0.38 to 0.13) and a similarly insignificant increase in birth weight (396 grams, 95% CI: -345g to 1137g). Sensitivity analyses using wider and narrower CD4+ windows had similar results.

Conclusions: cART initiation during pregnancy was not associated with increased risk of adverse birth outcomes among HIV-infected pregnant women with CD4+ counts within a 50 cell/ μ L-window around the treatment threshold. In the absence of randomized trial data, quasi-experimental methods such as RD may be used to minimize confounding common in observational studies.

No conflict of interest

Abstract: O_12**Characteristics and outcomes of HIV-infected pregnant women accepting combination ART for PMTCT in Zambia**

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Background: In 2013 the World Health Organization recommended that all HIV-infected pregnant and breastfeeding women initiate lifelong combination antiretroviral therapy (ART) to prevent vertical transmission and improve maternal health. In Zambia, there are few data describing the uptake of such services in antenatal and postnatal settings.

Materials & Methods: From 2008 to 2011, we offered universal combination antiretroviral regimens to HIV-infected pregnant and breastfeeding women at the Adult Infectious Disease Centre associated with the University Teaching Hospital in Lusaka. This pilot program extended beyond the HIV care and treatment guidelines operant at the time (treatment of only those with CD4 count \leq 350 cells/ μ L or WHO Stage 3 or 4). In this analysis, we describe characteristics associated with antenatal ART initiation stratified by CD4 count ($>$ or \leq 350 cells/ μ L), as well as factors associated with postnatal ART initiation. We also compare pregnancy and HIV outcomes between those who started antenatal ART and those who did not. Outcomes include mode of delivery, infant birth weight, newborn vital status, Apgar scores, NICU admission, infant feeding method, and infant HIV status at 6 weeks and 6 months.

Results: 353 HIV-infected women with pregnancy outcomes were included in the analysis cohort. 70 (19.8%) women had initiated ART prior to enrollment in antenatal or postnatal care. Among 283 women who were ART naïve, 169 (59.7%) had a CD4 count \leq

350 cells/uL, making them eligible for ART according to Zambian national guidelines. Of these, 144 (85.2%) initiated treatment. The remaining 114 women with CD4 count $>$ 350 cells/uL were also offered ART. In this group, 88 (77.2%) women initiated treatment. Of the 51 women who declined antenatal ART, 25 (49.0%) initiated treatment after delivery. For those women with CD4 count \leq 350 cells/uL, higher gravidity was the only characteristic that we identified to be associated with starting antenatal ART ($p < 0.05$). For those women with CD4 count $>$ 350 cells/uL, the median maternal weight was significantly higher in those starting antenatal ART than those who did not (71.0 vs. 63.5 kg; $p < 0.05$). For those who declined antenatal ART, a recent CD4 count \leq 350 cells/uL was the only factor associated with starting postnatal ART ($p < 0.05$). Most pregnancy and HIV outcomes did not differ among women on and not on ART stratified by CD4 count ($>$ or \leq 350 cells/ μ L). For women with CD4 count \leq 350 cells/uL, those who started antenatal ART were more likely to formula feed compared to those not on ART (33.1% vs. 13.0%; $p = 0.05$). In comparison, 178 (66.7%) of 267 women chose breastfeeding at delivery, while 89 (33.3%) chose formula.

Conclusions: In this cohort, CD4 count \leq 350 cells/uL was associated with increased ART initiation. It is important to adapt community- and facility-based PMTCT messaging so that all pregnant and breastfeeding women understand the benefits of starting ART.

No conflict of interest

Abstract: O_13**Safety and efficacy of darunavir/ritonavir in treatment-experienced pediatric patients aged 3 to <6 Years: Week 48 analysis of the ARIEL trial**

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Background: In the primary 24-week analysis of the open-label, single-arm, Phase II ARIEL (TMC114-TiDP29-C228; NCT00919854) trial, darunavir/ritonavir plus an optimized background regimen (OBR) was effective in treating HIV-1-infected treatment-experienced children, with no new safety concerns versus adults. The 48-week safety and efficacy outcomes are reported.

Methods: Children aged 3 to <6 years, weighing 10 to <20kg, were on an antiretroviral regimen for ≥12 weeks, had an HIV-1 RNA >1000 copies/mL and <3 darunavir resistance-associated mutations (RAMs) at screening. Patients received darunavir oral suspension (100mg/mL) plus ritonavir 20/3mg/kg twice-daily with an investigator-selected optimized OBR. After pharmacokinetic analysis at Week 2 and Data and Safety Monitoring Board recommendations, patients weighing <15 kg received darunavir/ritonavir 25/3mg/kg twice-daily. Patients weighing 15 to <20kg received darunavir/ritonavir 375/50mg twice-daily.

Results: This analysis includes 21 patients (47.6% male; median age at screening 4.4 years) from 10 sites. Baseline mean log¹⁰ plasma HIV-1 RNA was 4.34 copies/mL and median CD4 cell count was 927 cells/mm³ (median CD4% 27.7%). There was a median of 0 primary protease inhibitor (PI) RAMs, 4 secondary PI RAMs, 0 darunavir RAMs, 1

NRTI RAM and 1 NNRTI RAM. Outcomes are summarized (Table). There were no adverse events (AEs) ≥grade 2 considered possibly related to darunavir. Two patients had grade 4 AEs (stenosing tenosynovitis and asthmatic crisis), both considered serious but not treatment-related. All laboratory abnormalities were grade 1 except for one grade 3 neutropenia (present at baseline; not treatment-related). The Week-48 virologic response was high (81.0%). There were 3 (14.3%) virologic failures (VFs) (2 never suppressed; 1 rebounder). Of the 2 VFs with paired baseline/endpoint genotypes, neither developed PI nor NRTI RAMs.

Parameter: n (%)**Overall Week 48 safety analysis (N=21)**

Total discontinuations: 1 (4.8%)

- Discontinuations due to AEs* 1 (4.8%)

1 or more AE (regardless of cause or severity): 20 (95.2%)

Most common AEs[†]

- Upper respiratory tract infection: 6 (28.6%)
- Diarrhea: 5 (23.8%)
- Tinea capitis: 5 (23.8%)
- Cough: 5 (23.8%)

1 or more AE at least possibly related to darunavir:[‡] 1 (4.8)

Efficacy (N=21)

HIV-1 RNA <50 copies/mL (ITT-TLOVR)

- Week 24: 12 (57.1%)
- Week 48: 17 (81.0%)

Mean (SE) change from baseline to Week 48 in CD4 cell count, cells/mm³ (NC=F): 187 (76.7%)

Mean (SE) change from baseline to Week 48 in CD4 cell count, % (NC=F): 4 (1.3%)

*Occurred ≤ Week 24 and due to grade 2 vomiting, considered very likely related to ritonavir; [†]Occurring in >4 patients, regardless of severity or causality; [‡]ECG QT prolonged (QTcF was normal); AE = adverse event; ITT TLOVR= intent-to-treat, time-to-loss-of-virologic response; SE = standard error; NC=F = non-completer = failure

Conclusion: Treatment-experienced HIV-1-infected children aged 3 to <6 years receiving darunavir/ritonavir plus an OBR showed a high virologic response and a favorable safety profile after 48 weeks.

Financial relationship(s): A. Hendricks, T.N. Kakuda, E. Lathouwers, M. Opsomer, T. Van de Castele, F.L. Tomaka are employees of Janssen

**8th International Workshop on HIV Treatment,
Pathogenesis and Prevention Research in
Resource-Poor Settings
INTEREST**

**Abstracts
Poster presentations**

Abstract: P_01*Antiretroviral treatment scale up***Financing Anti-Retroviral Therapy Services in Nigeria: A New Agenda for an Emerging Economy***O. Omole¹, P. Ugwi²*¹*Obafemi Awolowo University, Maternal Health Plus Project. Institute of Public Health, Ile Ife, Nigeria;*²*University of Iowa, Health Policy, Iowa City, USA*

Objectives : Nigeria has the second largest burden of HIV disease in the world with an estimated 3.4 million people infected and a reported prevalence of 3.1%. Unfortunately, estimates suggest that only about 400,000 people are on Anti Retro Viral Therapy (ART) coverage while 1.5 million people need ART's. Majority of the funds that ensure access to ART comes from international donors and partners. In recent times, donors have begun to shift their emphasis from vertically structured programs to horizontally structured programs. They are also demanding more country ownership of programs. These changes comes at a time when Nigeria is undergoing an economic transition as an emerging market characterized by a massive increase in revenue from oil, increasing middle class, increased manufacturing and the consumption of luxury goods. This paper analyses the effect of this economic shift and its impact on ART funding.

Methods The paper proposes 5 scenarios for sustainable innovative domestic financing for ART (1) Crude oil production tax (2) Alcohol/Champagne excise tax (3) Private Jet levy (4) Complete local production of anti retroviral drugs (5) National Endowment fund for ART

Results As the Nigerian economy grows, the sources of domestic funding for ART programs are enormous. The proposals above aim to take advantage of the 'uniqueness' in the Nigerian economic space. This could invariably increase the much needed access to ART treatment and reduce dependence on donors. In the medium to long term, these additional funds can also be used in HIV prevention and

behavior change interventions that would have more long-term benefits for the health system.

Conclusions In adopting any/all of the above strategies, health policymakers in Nigeria need to ensure that ART programmes are more cost-effective and deliver better value for money. There is also an urgent need to cut waste and leakages and ensure proper monitoring and evaluation. Funding for ART must avoid the 'silo' mentality but rather work synergistically to strengthen the wider health system . Political buy in is needed to ensure proper governance and implementation of these proposals.

*No conflict of interest***Abstract: P_02***Antiretroviral drug trials and regimens (1st, 2nd and 3rd line)***Efficacy of once-daily darunavir in PI-naïve, NNRTI-experienced patients in the ODIN trial***M. Mathe¹, A.M. Geretti², A. Hill³, Y. van Delft⁴, P. Mohammed⁵*¹*Sebokeng Hospital, Folateng Ward, Johannesburg, South Africa;* ²*University of Liverpool, Institute of Infection & Global Health, Liverpool, United Kingdom;* ³*Janssen, Biostatistics & Programming, High Wycombe, United Kingdom;* ⁴*Janssen Global Public Health, Medical Affairs, Tilburg, The Netherlands;* ⁵*Janssen Global Public Health, Medical Affairs, High Wycombe, United Kingdom*

Background: In many settings, including low and middle-income countries, PI-based regimens are normally recommended after failure of first-line NNRTI-based treatment, but outcome data are limited. A sub-analysis of the ODIN trial was performed to evaluate the efficacy of darunavir/ritonavir (DRV/r) 800/100 mg OD vs. 600/100 mg BID in patients who were NNRTI- experienced but PI-naïve.

Methods: ODIN was a phase III, 48-week, open-label study comparing DRV/r OD vs. BID in treatment-experienced patients failing current treatment, but with no DRV resistance-associated mutations (RAMs) at screening. Patients with no DRV RAMs and receiving stable ART for ≥ 12 weeks were randomized to DRV/r 800/100 mg OD or DRV/r 600/100 mg BID plus an optimized background regimen consisting of ≥ 2 NRTIs. Of the 590 patients randomized, 272 (46%) were NNRTI-experienced but PI-naïve at baseline.

Results: Overall, 272 patients received DRV/r OD (n=135) or BID (n=137) plus ≥ 2 optimised NRTIs. The mean age was 39 years; mean weight was 69kg; 35% were female; 27% were Black, 24% Caucasian, 26% Oriental/Asian, 19% Hispanic and 4% other races; 17% were recruited in South Africa; and 48% had non-B HIV-1 subtypes. Mean baseline plasma HIV-1 RNA load was 4.10 log₁₀ copies/ml; median CD4 cell count was 258 cells/ μ l. At Week 48, 111/135 (82%) of DRV/r OD and 109/137 (80%) of DRV/r BID patients achieved a HIV-1 RNA load <50 copies/mL (Intent-to-treat/time-to-loss of virological response). Response rates for HIV-1 RNA load <400 copies/mL were 118/135 (87%) and 115/137 (84%) for DRV/r OD and DRV/r BID respectively. No patient developed primary PI RAMs.

Conclusion: DRV/r 800/100 mg OD in combination with ≥ 2 optimised NRTIs led to virological suppression <50 copies/mL in 82% of NNRTI-experienced, PI-naïve patients by Week 48. No patient developed treatment-emergent PI resistance.

Conflict of interest ; Y. van Delft and P. Mohammed are employees of Janssen (which developed the drug darunavir). A. Hill has received consultancy fees from Janssen.

Abstract: P_03

Antiretroviral treatment toxicities

Incidence of ART-related nephrotoxicity among HIV-infected patients with Low Body Mass Index in Brazzaville, Congo

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Background: The sought to determine the incidence, risk factors, and outcome of antiretroviral therapy (ART)-related nephrotoxicity in HIV infected patients with low Body Mass Index (BMI) on outpatient follow-up in Brazzaville, Congo

Methods: All patients with low BMI (BMI < 18.5kg/m²) enrolled at the Ambulatory treatment center in Brazzaville, Congo from January 2009 to December 2010 and were initiated on ART and had regular follow up serum creatinine values available were included in this prospective cohort study. Estimated Glomerular filtration rate (eGFR) was assessed using the Modification of Diet in Renal Disease equation (MDRD). Factors associated with ART-related nephrotoxicity (eGFR decrease by 25% compared to baseline or a 0.5mg/dL increase in serum creatinine (Scr) above baseline maintained on two consecutive measurements) were analyzed using Cox regression.

Results: Overall, 126 patients (71.4% female) were included. At the time of starting ART, median values were: age: 38 years [IQR=33-45.35], weight: 45kg [IQR=42-49], CD4 count: 126 cells/ μ l [IQR=29-228], Scr: 0.9mg/dl [IQR=0.75-1.13], and eGFR: 73ml/min/m² [IQR=59-88]. Seventy-six patients were on AZT+3TC+EFV (46/76) or NVP (30/76), 30 on TDF+FTC+EFV (27/30) or LPV/r (3/30), 17 on D4T+3TC+EFV (12/17) or NVP (5/17) and 3 on ABC+3TC+EFV. Median duration of follow-up on ART was 23 months [IQR=10-24], during this period, 13 patients met the criteria for ART-related nephrotoxicity (incidence 10.3%), 7% died, 16% were lost to follow-up and 4% were transferred-out. The estimated probability of nephrotoxicity was 3.03%, 5.4%, 7.31%, 9.1%, 1.7% and 2.5% at 1, 3, 6, 12, 18, and 24 months respectively. Median time to the development of ART-related nephrotoxicity was 10 months [IQR=5-13]. Among patients who were on TDF-based regimen, 8% developed nephrotoxicity. Patients with normal

renal function (eGFR 90ml/min/m²) were at greatest risk of nephrotoxicity (aHR 3.18; 95%CI: 1.01-10.04).

Conclusions: The incidence of ART-related nephrotoxicity is high in our cohort of patients with low BMI. Patients with normal renal function were also at higher risk. There is a need to monitor renal function more closely especially in patients with low BMI.

No conflict of interest

Abstract: P_04

Antiretroviral treatment toxicities

New onset seizure in HIV+ zambian adult: high mortality and poor lumbar puncture uptake signal the need for public education

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Background: Acute seizures and HIV are both common in sub-Saharan Africa. Prior to the availability of antiretrovirals, most seizures in HIV+ individuals were from opportunistic infections. Lumbar puncture (LP) is clinically indicated in HIV-positive individuals with new-onset seizure, but anecdotal reports indicate poor acceptance of this generally safe procedure.

Methods: We describe the clinical characteristics of adult patients presenting with seizure and a known or probable diagnosis of HIV in Zambia, LP acceptance among HIV-positive patients, determinants of LP acceptance, and mortality in this cohort.

Results: Of 351 screened patients, 320 were HIV-positive (91.2%). 268 (83.8%) presented with new onset seizure. Of these, 114 (42.5 %) were female; the mean age was 36.8 years. 69.2% were diagnosed with HIV <12 months before the seizure; 79 (29.5%) were diagnosed during seizure evaluation. 118 (46.1%) had significant disability, with a Karnofsky score <50. Only 160 (59.9%) HIV-positive patients with new-onset seizure consented to an LP; 47 (17.5%) died during their admission. Patients with a Karnofsky score <50 (p=0.046) were more likely to have an LP; younger age (p=0.13), gender (p=0.74), duration of HIV diagnosis (p=0.56) and HIV diagnosis at seizure presentation (p=0.46) were not predictive of LP acceptance. Those with a low Karnofsky were more likely to die (p=<0.001). Being female was also a risk factor for mortality (p=0.02).

Conclusion: HIV-positive patients admitted with new-onset seizure have a high mortality rate. CSF studies are critical for the assessment of new-onset seizure, yet LP acceptance is low in this setting. Additional investigation into low LP acceptance is essential and interventions may be warranted.

No conflict of interest

Abstract: P_05*Health systems and HIV***Integrating couple's voluntary HIV counseling and testing into government clinics: current status and future opportunities for male involvement in Ndola, Zambia**

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Introduction: The Ministry of Health in Zambia has endorsed couples' voluntary HIV counseling and testing (CVCT) and has instructed government clinics to provide HIV testing to partners of antenatal care (ANC) clients and clients of other clinic services. We describe the transition of CVCT from NGO-sponsored stand-alone and weekend services to integrated weekday services in government clinics in Ndola, Zambia from 2011-2013 for a Canadian International Development Agency (CIDA) funded CVCT project.

Methods: Data were extracted from government-issued logbooks in ANC and voluntary counseling and testing (VCT) services in government clinics. CVCT procedures were documented through observation and counselor interviews.

Results: The transition of CVCT from weekend to integrated weekday services in government clinics in Ndola shows a steady increase in attendance from 2011-2013 with large variations between clinics and from quarter to quarter. Over the three-year period, the monthly average number of couples tested at the VCT clinics on weekdays rose from 3.7 to 7.0 per month while the average for ANC clinics rose from 13.1 to 16.5 per month. Obstacles to CVCT included low participation of men in ANC, difficulty procuring test kits for

male partners of ANC clients, lack of staff trained to test and counsel couples jointly, limited space to accommodate couples, and non-uniform recording of CVCT in ANC and VCT logbooks. Promotional efforts were sporadic and poorly documented.

Conclusions: This study identified several challenges for integrating CVCT into routine weekday ANC and VCT services in Ndola government clinics. Recommendations to address these challenges are: implement standardized data recording instruments, increase training of counselors and nurses in CVCT, prioritize clients attending with partners, and expand community sensitization using proven models. A focused and sustained effort will be required to reach a meaningful number of couples with CVCT in routine clinic services and establish CVCT as a social norm.

No conflict of interest

Abstract: P_06*Health systems and HIV***How task shifting in HIV services delivery has impacted on a patient-centred health system in a low and middle income country: case of Mali**

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Background: So many low and middle income countries (LMICs) are facing a critical shortage of health workforce, creating a major bottleneck for scaling up health services and achieving health systems goals. In order to address this shortage, many LMICs have been implementing various forms of task-shifting strategies. Task shifting has been widely used in Sub Saharan Africa, covering a variety of health services. While the impact of task shifting on quality of care and clinical

outcomes have been demonstrated in several studies, evidence on its impact on the health system as a whole is limited. This study explored health system effects using task shifting for HIV in Mali as a case study.

Methods: We used a case study approach, using mixed qualitative and quantitative methods. Data sources included document reviews, and reviews of available data and records, as well as interviews with key informants and health workers.

Results: Our analysis highlighted the importance of differentiating between two types of system-level effects. The first are effects due to health system barriers, for example the unavailability of medicines and supplies, generating a series of effects on the various components of the health system. The second are effects inherent to task shifting itself, such as job satisfaction or better access to health services. A wide range of effects was identified and discussed. Among the system-level effects that we found are positive, mostly unintended, effects and synergies such as increased health workers' sense of responsibility and worthiness, using the newly acquired skills in other non-HIV tasks, as well as improved patient-provider relationships. Among the negative unintended effects is staff frustration due to lack of medicines and supplies or lack of the necessary infrastructure to be able to perform the new tasks.

Conclusion: Finally, our study revealed several design and implementation issues that are preventing the strategy from achieving its full impact. This highlights the importance of systematically thinking through and anticipating these problems during the design and early implementation phases of the strategy. It also highlights the importance of political and financial commitments at the national level, to ensure the sustainability of the strategy and the achieved coverage levels.

No conflict of interest

Abstract: P_07

High risk populations: epidemiology and prevention

HIV Incidence in a Cohort of women at higher risk in Beira, Mozambique: Prospective study 2009-2012

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Introduction: HIV is prevalent in Sofala Province, Mozambique. To inform future prevention research, we undertook a study in the provincial capital (Beira) to measure HIV incidence in women at higher risk of HIV and assess the feasibility of recruiting and retaining them as research participants.

Material & Methods: Women age 18–35 were recruited from schools and places where women typically meet potential sexual partners. Eligibility criteria included HIV-seronegative status and self-report of at least 2 sexual partners in the last month. History of injection drug use was an exclusion criterion, but pregnancy was not. Participants were scheduled for monthly follow-up for 12 months, when they underwent face-to-face interviews, HIV counseling and testing, and pregnancy testing.

Results: 387 women were eligible and contributed follow-up data. Most were from 18–24 years old (median 21). Around one-third of participants (33.8%) reported at least one new sexual partner in the last month. Most women (65.5%) reported not using a modern method of contraception at baseline. Twenty-two women seroconverted for a prospective HIV incidence of 6.5 per 100 woman-years (WY; 95% confidence interval (CI): 4.1–9.9). Factors

associated with HIV seroconversion in the multivariable analysis were: number of vaginal sex acts without using condoms with partners besides primary partner in the last 7 days (hazard ratio (HR) 1.7; 95% CI: 1.2–2.5) and using a form of contraception at baseline other than hormonal or condoms (vs. no method; HR 25.3; 95% CI: 2.5–253.5). The overall retention rate was 80.0% for the entire follow-up period.

Conclusions: We found a high HIV incidence in a cohort of young women reporting risky sexual behavior in Beira, Mozambique. HIV prevention programs should be strengthened. Regular HIV testing and condom use should be encouraged, particularly among younger women with multiple sexual partners.

No conflict of interest

Abstract: P_08

High risk populations: epidemiology and prevention

HIV disease progression compared by linkage status in Rwanda and Zambia

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Introduction: Recently HIV infected individuals are followed up at Rwanda Zambia HIV Research Group (RZHRG) sites to establish markers of disease progression. Here we compare disease progression between seroconverters infected by their spouses (linked transmission) to those infected by non-spousal partners (unlinked transmission) where a greater fraction of individuals are infected by multiple virus variants.

Method: Seroconverters (SC) were identified from HIV discordant couples enrolled from the Couples' VCT program into a prospective cohort study. Linkage of transmission was established by comparing viral DNA sequences in the SC to that of the suspected index partner. SCs were followed up to six years to collect clinical and laboratory data. Data analysis using STATA was done on CD4 and viral load trajectories and a comparison of disease progression with respect to time to endpoints of CD4 \leq 350 cells/mL and initiation of ARVs in the linked and unlinked groups. Log rank test of equality for survival function was performed for each endpoint and p-values calculated.

Results: From February 2006 to December 2011, 88 unlinked and 225 linked transmissions were identified. Across all RZHRG sites, males represented 51% of the unlinked and 56% of the linked group. Mean age at seroconversion was 33 years in both groups and 69% of HIV transmissions were acute infections (identified within 90 days of infections). Mean CD4 count and viral load at specified time points during a six year follow up period of the two groups were similar. Disease progression in the two groups (CD4 \leq 350cell/uL or initiation of ARVs) showed no significant difference (p=0.21 and p=0.26 respectively).

Conclusion: Despite the fact that previous studies have shown that there is faster disease progression in individuals who were infected by multiple genetic variants from their partner, we show here that linkage status does not predict HIV disease progression in HIV seroconverting couples.

No conflict of interest

Abstract: P_09*High risk populations: epidemiology and prevention***Low level of knowledge of HIV status in Eastern and Southern Africa among young people : A concern for the HIV control programmes***O. Adetokunboh¹**¹Stellenbosch University, Division of Community Medicine, Cape Town, South Africa*

Background: About 3 million young people aged between 15 to 24 years are currently living with HIV in Eastern and Southern Africa. This makes the region the one with the highest number of youths living with HIV. HIV testing and counseling is an essential aspect of HIV prevention, care and treatment as it has been proven to be associated with a remarkable reduction in transmission risk behaviour. HIV testing and counseling is a component of behavioural interventions and is essential for targeting specific populations such as children , adolescents and young people. The knowledge of an individual HIV status will help HIV-negative individuals to make risk reduction decisions in order to remain HIV free. In the same vein, HIV infected individuals will take action that are protective especially to their sexual partners, and to seek care and treatment on time. Young people are vulnerable to HIV and other sexually transmitted infections due to peer pressure, the urge to experiment and exposure to psychoactive drugs and alcohol. This study seeks to assess the awareness and correct knowledge of HIV status in Eastern and Southern Africa among young people in the last ten years.

Methods: This study used secondary data obtained from the demography and health surveys carried out in the last ten years (2004 - 2014) in 15 Eastern and Southern African countries. The variable analysed was the percentage and number of women and men aged between 15-24 and 15- 19 years respectively, who has ever tested for HIV and received their results. The analysis was done with Stata IC version 12.

Results: A total of 98,860 individuals were interviewed with 66.0% of them being women. Among the 15-24 years individuals, 43.0% (95% CI 35.0–51.1) of women and 26.7% (95% CI 19.0–34.4) (p= 0.0000) of the men reported to have had HIV testing done in the past and received the test results. Among the women aged 15 -19, 29.6% (95% CI 22.3 – 36.9) and men , 18.8% (95% CI 11.5 – 26.2) (p=0.0000) have also done and received the results of HIV test. Uganda recorded the highest percentage among women of 15- 24 years at 61.5% while Madagascar had the lowest at 11.2%. Among the men of 15-24 year, Swaziland recorded 52.3% while Madagascar had 6.7%.

Conclusion: Many of the young people in Eastern and Southern Africa are not aware of their HIV status thereby casting a big doubt on the prevention and control HIV among the next generation of these vulnerable individuals. Adolescents have lesser knowledge of their HIV status and men are far behind as well compared to their women counterparts. There is need to adopt new and realistic approaches toward HIV testing provision and education among the adolescents and youths in order to increase coverage, and to identify reasons for this low level of knowledge of HIV status.

*No conflict of interest***Abstract: P_10***HIV/hepatitis virus co-infection***Human immunodeficiency virus type 1 (HIV-1) and hepatitis B virus (HBV) infections among injecting drug users in Malindi, Kenya***D. Kerosi¹, R. Lwembe², W. Ochieng², N. Budambula¹, O. Saida²**¹Jomo Kenyatta University of Agriculture and Technology, Botany, Nairobi, Kenya; ²Kenya Medical Research Institute, Center for virus research, Nairobi, Kenya*

Introduction: The population of injecting drug users (IDUs) is growing at an alarming rate in the developing world. Expensive treatment options, low income and inaccessible health facilities in remote locations pose significant risks for HIV-1 and other viral infections, threatening to reverse the benefits of antiretroviral treatments. We aimed to determine the prevalence of both HIV and hepatitis B virus (HBV) mono and co infections among intravenous drug users in Malindi, Kenya.

Materials & Methods: Five milliliters of venous blood drawn from each consenting adult IDU was used to test for HBV surface antigen (HBsAg) and HIV-1 antibodies using Hapanostika and Vironostika kits respectively. The serological results were confirmed by PCR reactions.

Results: A total of 92 IDUs were studied. Out of 92 IDUs, 50 (54.4%) were males while 42 (45.7%) were females. Forty nine (53.3 %) of males and 42 (45.7%) of females were infected with HIV-1, whereas 7 (7.6%) of males and 6 (6.5%) of females were infected with HBV. Six (12%) of males and 6 (12%) of females were infected with both HIV and HBV. The prevalence of HIV-1 and HBV among all IDUs was 98.9% and 14.2% respectively. The overall prevalence of HIV and HBV co-infection among the IDUs was 13 %.

Conclusion: Our findings demonstrate increased prevalence of HIV and HBV mono and co-infections among the high risk injecting drug users in Malindi, both among males and females. Disease management programs targeting these demographics should therefore be designed to capture multiple viral infections in order to improve treatment outcomes. Further studies should look at drug resistance and viral diversity among similar populations.

No conflict of interest

Abstract: P_11

HIV/hepatitis virus co-infection

Chronic hepatitis B virus (HBV) co-infection is associated with

renal impairment among Zambian HIV-infected adults

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Background: Chronic HBV infection is associated with the development of a variety of renal diseases; however, there are few data on the prevalence of renal impairment in the setting of HIV/HBV co-infection, particularly in sub-Saharan Africa (SSA) where an estimated 3 million co-infected individuals live. The World Health Organization (WHO) recommends that HIV/HBV co-infected adults receive a tenofovir-containing antiretroviral regimen. Tenofovir is potentially nephrotoxic and there are no guidelines for the management of HIV/HBV when co-morbid renal disease is present. To assess the frequency of this scenario, we analyzed the prevalence of renal impairment in HIV-infected adults in Zambia stratified by HBV status.

Materials & Methods: Using routine program data from public-sector HIV clinics in Zambia's capital Lusaka, we identified adult patients (age 16+ years old) who were screened for HBV according to Zambian Ministry of Health guidelines with a hepatitis B surface antigen test (HBsAg) at enrollment into HIV care. HBsAg testing was performed using an enzyme-linked immunoassay at a central laboratory. We excluded patients without available creatinine measurements at enrollment. Stratified by HBV status, we calculated the baseline creatinine clearance (CrCl) using the CKD-EPI formula and determined the proportion of patients with CrCl <50 ml/min, the threshold at which tenofovir should be avoided if possible per WHO guidelines. We compared patient characteristics with the outcome (e.g., CrCl <50 ml/min) using the Chi square test for categorical variables and the Wilcoxon rank sum test for continuous ones. Using multivariable logistic regression we analyzed the association of HBV co-infection with CrCl <50 ml/min, adjusted for age, sex, CD4+ count, and WHO disease stage.

Results: During 2011-2012, 4,128 HIV-infected adults who enrolled in a Lusaka District ART clinic were tested for HBV co-infection as part of a routine screening. Of these, 4,085 (99%) had available creatinine measurements and were included in analyses. Within the analysis cohort, the median age was 33 years (interquartile range, 28-40), 57% were women, and 491 (11.9%) were HBV co-infected. The median CrCl was 113 ml/min (interquartile range, 95-130) and 111 patients (2.7%) had CrCl <50 ml/min. Compared to HBV-uninfected patients, those with HBV co-infection were twice as likely to have CrCl <50 ml/min (5.3% vs. 2.4%, $P<0.001$). Other factors associated with renal impairment were increased age, male sex, CD4+ count <200, and WHO stage 3 or 4 disease (all $P<0.001$). After adjustment for these factors, HBV co-infection remained associated with having renal impairment (adjusted odds ratio 2.0, 95% confidence interval 1.2-3.2).

Conclusions: In this cross-sectional analysis, HBV co-infected patients had twice the odds of CrCl <50 ml/min, although the prevalence of moderate or severe renal impairment was low overall. In resource-limited settings where access to specialty care is limited, guidelines on the care of HIV/HBV patients with renal impairment are needed.

No conflict of interest

Abstract: P_12

HIV prevention

Strategies to Scale-up Voluntary Medical Male Circumcision (VMMC) in Chikuni, Southern Province, Zambia

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Background: Chikuni Mission Hospital is a rural health facility in Monze district in Southern Province of Zambia with a catchment population of 25,000. Male Circumcision (MC) is not part of the culture of the Tonga people who are the main tribe in the province. With evidence showing that Voluntary Medical Male Circumcision (VMMC) can offer protection from HIV up to 60%, Chikuni started implementing VMMC in June 2011 with its own resources. Challenges faced in the initial stages included resistance because it was not culturally acceptable and limited funding leading to low coverage with only 151 circumcised from June 2011 to September 2012.

Materials and Methods

Below are strategies that were used to scale-up VMMC:

- Orientation of Community leaders in VMMC demand creation
- Sensitization of the community through the Community radio station
- Use of Drama groups
- Intensified outreach services
- Integration of HIV Testing and Counseling in VMMC

Results

- The number of men circumcised correlated with the number of men reached;
- The number of MCs done increased from 151 from June 2011 to September 2012, to 1,098 from October 2012 to December 2013

Conclusion: Community involvement, use of mass media, intensified outreach services with adequate funding is critical in scaling-up VMMC uptake.

No conflict of interest

Abstract: P_13

HIV prevention

From 0 to 68K: Rapid expansion of couples voluntary counseling and testing in the Copperbelt province of Zambia

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Introduction: The majority of new HIV infections in Africa are acquired from a spouse. Couples' Voluntary Counseling and Testing (CVCT) is a cost-effective and evidence-based intervention that reduces HIV and sexually transmitted infections and is an entry-point for other services, including family planning; antiretroviral therapy; male circumcision; and PMTCT. The Canadian International Development Agency funded the PATH Arise Program to implement cost-effective HIV prevention approaches in high-risk populations. We describe the rapid expansion of CVCT throughout the densely populated Copperbelt Province of Zambia.

Methods: The expansion was phased: Ndola (August 2010), Kitwe (March 2011), Chingola (October 2011), Luanshya (May 2012). Advocacy and needs assessments were followed by training in promotions, counseling, rapid HIV testing, and data reporting. CVCT was provided on weekends, when clinics were less crowded and staff could dedicate their time. Couples participated in group pre-test educational session, followed by private pre- and post-test counseling with mutual disclosure of HIV test results.

Results: In 32 months, we conducted 314 trainings, opened 53 new CVCT clinics, and provided CVCT to 68,321 couples. 6552 discordant couples received counseling to prevent transmission to their spouse. CVCT expansion was characterized by a rapid uptake of services as new clinics were opened.

Conclusion: Our goal to test 68,000 couples where services did not previously exist was ambitious, but attainable. Rapid expansion is possible with support at the provincial and national levels; promotions at the district and community level; a dedicated multidisciplinary training team; and monitoring and evaluation to ensure high quality services.

No conflict of interest

Abstract: P_14

HIV prevention

The effects of Education sector decentralisation and devolution on HIV and sexual health education outcomes in youth in Zambia

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Background: Zambian HIV and sexual health education (H-SHE) policy prescribes that schools integrate HIV transmission, prevention and risk reducing life-skills in their curricula. Education sector devolution, decentralisation and privatisation have resulted in individual schools determining their own H-SHE curriculum content within the broader national guidelines. This paper examines the effect of decentralisation and devolution on H-SHE outcomes in different school types.

Methods: The data derives from a cross-sectional survey (n=235) of youth aged 10-24 attending institutions of learning in Lusaka in 2006. Schools were categorised by service provider, these included state-run high and basic, private, charity and faith-based. H-SHE outcomes included H-SHE delivery at schools; lack of H-SHE knowledge; HIV transmission awareness; pressure to have sex; prevalence of sex. Multivariate analysis controlling for sex, age and social economic status was undertaken.

Results: Risk factors: The results of the analysis indicate that participants from charity-run schools were 6.1 times more likely to have had sex than students in a state-run high school ($p < .05$). Participants in the state-run high school faced significantly more pressure

to have sex ($p < .05$) as well as having a higher perceived prevalence of sex among peers ($p < .001$) when compared with the faith-based school.

H-SHE outcomes: Participants in the private school were significantly more likely to report the school as a primary source of information about H-SHE ($p < .01$) compared to other school types. The most significant Chi-square value (36.91, $p < .001$) among variables related to lack of education in H-SHE was in contraception. High school students were the least uneducated in H-SHE compared to all other school types, although it appears with the exception of State-run basic schools, that this relationship is moderated by age ($p < .05$).

HIV transmission Knowledge: Participants at charity-run schools were less aware of modes of transmission for HIV ($p < .01$) compared to all other school types.

Conclusion: There is a need for a stronger sector wide approach and more state standardisation, regulation and monitoring and evaluation of H-SHE to decrease varied outcomes between different types of schools. Targeted interventions for children in lower SES charity schools is also recommended.

No conflict of interest

Abstract: P_15

Laboratory monitoring, including low cost technologies

Method development for the simultaneous determination of the antiretroviral combination drugs (lamivudine and zidovudine) in pharmaceutical formulations using HPTLC

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Introduction: The HPLC method which was in use so far required a costly gradient elution

system and more time to equilibrate the column from one analytical run to another. In addition to that the internal standard (Finasteride) used to assay of the drug is not commercially available (Aldrich–Sigma and Merck). Therefore, we are reporting for the first time an HPTLC method for the simultaneous determination of lamivudine and zidovudine in pharmaceutical formulation, which is relatively time as well as cost effective. Further, the application of this method could be extended to the analysis of the above drugs (spiked) in human plasma.

Material and Method: Lamivudine and zidovudine (both from GlaxoSmithKline) reference standards were kindly supplied by drug administration and control authority (DACA), Addis Ababa, Ethiopia, and used without further treatment. HPLC grade methanol (Fisher Scientific-Leicestershire, UK), HPLC grade chloroform (BDH Laboratory Supplies, Poole, BH 15 1TD, England), analytical grade toluene (E. Merck-Darmstadt, Germany) and were purchased from FARMID, Ethiopia.

Samples were spotted in the form of bands having 6 mm width with a Camag 100 μ l sample (Hamilton, Bonaduz, Switzerland) syringe on precoated silica gel glass Plate 60 F₂₅₄ (10 cm \times 10 cm) with 200 μ m thickness (E. Merck, Darmstadt, Germany) using a Camag Linomat V (Switzerland) sample applicator. A total of 15 ml of mobile phase consisted of toluene–chloroform–methanol (1:6:3, v/v/v) was used per chromatography. Method was validated in compliance with International conference on harmonization (ICH) guidelines.

Result: For the linearity test the second order polynomial fit was found to be more suitable, its residuals plot showed a much better fitting than that of linear model, indicating good correlation ($r = 0.9998$ and 0.9998 and $r^2 = 0.9997$ and 0.9996 for lamivudine and zidovudine respectively). Satisfactory recoveries ranging from 98.68 to 100.73 for lamivudine and from 98.56 to 100.61 for zidovudine were obtained using the proposed method. Small coefficient of variation ($\leq 1.41\%$, for both drugs) indicated that the method provides sufficient accuracy. The low coefficient of variation values ($< 2\%$) for the precision study showed that the reproducible performance of the method as well as the instrument. The limit of detection and limit of quantification of the proposed method were 3.06 and 3.34 ng/spot and 9.28 and 10.13

ng/spot for lamivudine and zidovudine, respectively. For the parameters chosen to evaluate robustness of the method; the coefficient of variation was found to be less than 2%, indicated robustness of the method. The proposed method was applied to the determination of lamivudine and zidovudine in commercial tablets of Combivir[®]. Six replicate determinations were made. Satisfactory results were obtained for both drugs and were in a good agreement with the label claims. The low values of coefficient of variation indicated the suitability of the proposed method for routine analysis of lamivudine and zidovudine in pharmaceutical dosage forms.

Conclusion: The developed HPTLC method provides simple, precise and accurate analysis method for the simultaneous determination of lamivudine and zidovudine in pharmaceutical formulations. A good separation of analytes was achieved using toluene:chloroform:methanol (1:6:3, V/V) as a mobile phase on precoated silica gel 60 F₂₅₄ plates. The recovery of active ingredients in drug formulations was $\geq 98.56\%$ with $\leq 1.41\%$ relative standard deviation, which indicated that the method is suitable to quantify the studied drugs in pharmaceutical formulations without any interference from excipients.

No conflict of interest

Abstract: P_16

Laboratory monitoring, including low cost technologies

Improvement of ART data management in a rural health center by 5S approach in Zambia

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Background: The Government of Zambia has been committed to bringing antiretroviral therapy (ART) as close to the community as possible. The recent expansion of ART services has, however, brought substantial workload to health workers, and it causes the poor data documentation and management on ART service in the rural health centers.

Description: Site; Chilala Rural Health Center in Kalomo district, Southern Province, Zambia.

Problems; The Center could not grasp the number of ART clients, pre-ART cases, lost to follow-up and dead cases and not report to district health office. Moreover, ART clients had to wait for a long time as it was difficult for the staff to look for the patient files which were ordered in unsystematic way. **Intervention;** 5S (Sort, Set, Shine, Standardize and Sustain) approach was introduced to improve the ART data management of the center. It took for five days for 7 persons including the district health officers. All existing patient files were categorized into 6 groups; Current case on ART, Pre-ART case, lost to follow-up, dead case, Trans-In and Trans-out. In each group, the files were ordered based on the ART number. After that, both the health staff and volunteers were oriented on how to fill in the patient files, ART registers, appointment book, and were oriented on what to do before and after the ART day.

Results; After the clean-up, recounting, filing of ART patient files, the staff grasped the current ART figures; Cumulative cases 452, Current on ART 246, Pre-ART 83, Died 83. 44 files of the self-transfer were closed. In addition, they realized the duplication of patient file and the self-transfer cases without any notice. The workload of looking for the patient files was declined and, as a consequence, the waiting time of ART clients were shorten.

Lesson Learned: By 5S approach, the improvement of ART data management was possible in a rural health center although the limited human resource was a big challenge there. It could help to facilitate the accuracy of reporting and to improve the patient satisfaction by shortening their waiting time.

Conclusions: 5S approach is applicable to other rural health centers facing the same problems to improve ART data management. The careful monitoring is important to see the sustainability after the intervention.

No conflict of interest

Abstract: P_17

Laboratory monitoring, including low cost technologies

BD FACSPresto™ Near Patient CD4 Counter: mini-validation against reference methodology (PLG/CD4) in South Africa

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Background: To ensure full CD4 service coverage, the National Health Laboratory Service (NHLS) has undertaken to include Point-of-Care (POC) technologies into the existing laboratory network to supplement and consolidate current services to public health facilities. The BD FACSPresto™ Near Patient CD4 Counter was made available to the reference CD4 testing laboratory for comparison against the BD FACSCount™. The system was also tested against the NHLS predicate Pan-Leucogate CD4 methodology. The aim of this study is to share the preliminary correlation data of the BD FACSPresto™ Near Patient CD4 Counter against the Beckman Coulter MPL/CellMek reference system and the BD FACSCount™ (manufacturer reference system).

Methodology: 47 random EDTA samples from the routine CD4 laboratory were prepared on the Beckman Coulter MPL flow cytometer, using the automated CellMek preparation system. For BD FACSPresto™ Near Patient CD4 Counter sample analyses, the EDTA

blood was manually pipetted into a cartridge system that uses dried fluorescently labelled antibodies; left to incubate for 18 minutes before analysis. Samples for analysis on the BD FACSCount™ were prepared according to manufacturers guidelines. Statistical analyses was done with GraphPad Prism 6 software and included the percentage similarity with correlating coefficient of variation (CV) for absolute CD4 (#CD4) count and CD4 percentage (CD4%) of lymphocytes between platforms. 1-way ANOVA with Kruskal-Wallis non-parametric post-testing was done, with detailed comparison between platforms using linear regression, non-parametric Spearman correlation and Bland-Altman analysis.

Results: Of the 47 samples tested, 42 produced results on the BD FACSPresto™ Near Patient CD4 counter. Two samples failed internal QC checks and three did not give a result due to the lower detection limit of the instrument (<50cells/μl). The FACSCount™ resulted 44/47 samples for a #CD4 and 41/47 gave a CD4%. One-way ANOVA analysis showed no statistically significant differences between the three platforms for both #CD4 and CD4% ($p > 0.05$). % Similarity analysis comparing PLG/CD4 method to the BD FACSPresto™ showed agreement of 109 and 106% with CV values of 9.3 and 5.8% for #CD4 and CD4% respectively (4 outliers observed). Similar comparison of FACSCount™ vs. FACSPresto™ ($n=41$) identified the same 4 clinically insignificant outliers (counts > 100cells/μl). Bland-Altman analyses confirmed the observed slight over-estimation of #CD4 and CD4% values by the FACSPresto™ instrument vs. PLG (-47.2 ± 46.4 for #CD4 and -1.8 ± 1.3 for CD4%) and FACSCount™ (-20.3 ± 44.7 for #CD4 and -2.3 ± 1.6 for CD4%). Linear regression/correlation analyses confirmed good overall agreement between platforms (best fit values and/or r^2 of > 0.95).

Conclusion: The BD FACSPresto™ Near Patient CD4 Counter performed well under stringent laboratory conditions compared to the reference PLG/CD4 test platform and the BD FACSCount as reference, providing clinically acceptable results performed on EDTA venous blood pipette-filled cartridges. Additional validations are needed to confirm these results with a bigger cohort and to assess the impact of fingerstick sampling on instrument accuracy and precision.

No conflict of interest

Abstract: P_18

Laboratory monitoring, including low cost technologies

Testing platforms for early detection of cryptococcal antigenemia in high volume CD4 testing laboratories in South Africa

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Background: Cryptococcal meningitis (CM) is the fourth leading cause of death in HIV positive patients. Reflexed testing for cryptococcal antigen (CrAg) in HIV positive patients, with CD4 counts <100 cells/μl, was proposed to facilitate early detection of cryptococcal infection, and with proper treatment intervention, prevent unnecessary related patient morbidity and mortality. A Lateral Flow Assay (LFA) (IMMY Mycologics, USA), developed as a point of care (POC) test, is currently undergoing pilot testing in two CD4 laboratories. Use of a manual LFA test in high volume automated laboratories processing more than 1000 samples per day (> 100 manual LFA tests per day) is however cumbersome. Automated systems are thus needed to reduce labour intensive components, and address other challenges related to high volume testing (i.e. transcriptional errors, quality control). The aim of this study was to compare performance of kits and systems expediting higher throughput, i.e. ELISA-based methods to the LFA (reference method).

Methods and Materials: Patient samples were collected from the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) CD4 Laboratory (131 and 80 respectively) and an additional 40 quality control panel samples obtained from the National Institute of Communicable Diseases (NICD). Samples were tested and results compared, using the IMMY LFA, the IMMY Alpha CrAg EIA (manually and semi- and fully automated ELISA platforms) and the Meridian Premier Cryptococcal Antigen ELISA assay (on fully automated platform). Sensitivity and specificity was calculated per platform/kit.

Results: Initially, 131 samples were tested with the IMMY LFA vs. manual IMMY EIA assay. 13/131 patients tested positive (11%) using the LFA, while only 12/13 tested positive with the manual EIA (sensitivity of 92%, specificity of 100%). Random samples were used for reproducibility (6 samples repeated 10 times) and 7 samples tested in duplicate. Forty samples from the QC panel were analysed with LFA vs. manual EIA, and on the semi-automated Titertek Berthold Crocodile mini-Workstation platform, revealing a 100% specificity and sensitivity. The fully automated platform (Adaltis NexGen four) was used (n=80) with both the IMMY EIA and Meridian Elisa plates/reagents. The IMMY and Meridian EIA had 100% sensitivity with 96.1% and 97.4% specificity respectively compared to the LFA. Two samples tested positive across the 3 platforms, while an additional 3 samples tested positive with the IMMY EIA (2 confirmed positive with Meridian EIA, but negative for LFA). One sample gave an indeterminate (greyzone) result on IMMY EIA, with concurrent negative result on both LFA and Meridian EIA. These samples were sent for culture and although no growth was reported, it does not imply that these samples were negative for CrAg.

Conclusion: The results showed that ELISA assays can be reliably used for automated Cryptococcal antigen detection, with equivalent sensitivity and specificity to the LFA currently used for pilot reflexed testing. Semi-or fully automated platforms will enable reliable, accurate, and easy to quality control medium-to-high volume reflexed CrAg testing as a supplemental platform for LFA testing in a national early detection program

No conflict of interest

Abstract: P_20*Operational research on HIV programs***Does sending of HIV-positive test results via sms from reference laboratories reduce the time of starting art in children? the ZPCT II experience***F. Hainde Mwanahamuntu¹, P. Kasonde¹, L. Chitembo², N. Chishinga¹, J. Mukundu¹, M. Welsh¹**¹FHI360, ZPCT II, Lusaka, Zambia; ²UNICEF-Zambia, Health and Nutrition, Lusaka, Zambia*

Background: Dry blood spot specimens for children aged below 18 months are sent from health facilities to three reference laboratories in Zambia through a courier system for HIV-DNA-PCR testing and results sent back through the same system. A mHealth strategy in Zambia called Program Mwana has shown that using phone **Short Message Service** (SMS) reduces the turnaround time (TAT) of receiving HIV test results at the health facilities from the reference laboratories; from 44.2 days when only the courier system was used to 26.7 days when Program Mwana was introduced. However, there is limited information on how this reduced TAT affects the time it takes to start HIV-infected children on antiretroviral therapy (ART). Starting children on ART on time is important because it reduces the risks of morbidity and mortality associated with HIV. Therefore, the Zambia Prevention Care and Treatment Partnership (ZPCT II), a USAID-funded project, conducted a study to determine the time it takes to initiate children aged below 18 months on ART following the receipt of these HIV test results through SMS.

Material and Methods: We carried out a retrospective review of case records of HIV-positive children that received their HIV test results through SMS in 11 ZPCT II-supported health facilities that had a high rate of Mother to child transmission of HIV. Between January and December 2013, we recorded the time it took to initiate children on ART; from the date

the SMS HIV result was received to the date when ART was started. We considered 60 days and below in this setting as an acceptable period in which a child should be initiated on ART following the receipt of the HIV-positive results. We used the one-sample Wilcoxon signed rank test to test the hypothesis that the median time to ART initiation across the health facilities was 60 days.

Results: We found 119 records of HIV-positive children that received their results through SMS. The period of receiving SMS results and initiation of ART for each child varied in the period between January and December 2013. Of these 119 children, 34 (28.6%) were initiated on ART. The median time to ART initiation of these 34 children was 24.5 days (interquartile range: 13 - 89); indicating an acceptable time of initiating ART following the receipt of SMS HIV results, $p = 0.0576$.

Conclusions: Sending HIV test-results through SMS to health facilities has the potential to reduce the time it takes to initiate children on ART. There may be need to compare this SMS strategy of sending HIV results with the existing courier system to determine if it better in starting children on ART on time before it is adopted and deployed to a larger scale.

*No conflict of interest***Abstract: P_21***Operational research on HIV programs***Evaluation of turnaround time in early infant diagnosis at Kiambu district hospital, Kenya***A. Njoroge¹, C. Kerubo², S. Munene³, E. Mugambi², J.O. Mecha²**¹University of Nairobi/University of Washington, Clinical*

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Introduction: Early diagnosis of pediatric HIV infection and initiation of care contributes to the 4th prong of achieving prevention of maternal to child transmission (PMTCT). In Kenya, there is a national referral system where peripheral sites collect dried blood spot samples (DBS) on filter papers from HIV exposed infants and send these to the national reference laboratory for HIV DNA PCR (*polymerized chain reaction*) testing for confirmatory diagnosis. In Kiambu District hospital, a peripheral site in Central Kenya, prolonged turnaround time of DBS tests was identified as a barrier to timely early infant diagnosis. Mothers of HIV exposed infants were referred from the PMTCT clinic to the laboratory for DBS collection. The laboratory staffs were responsible for collection, packaging and sending of samples. The optimum time between collection and packaging is 24 hours. Due to heavy workload and frequent staff rotation, there was a prolonged batch period, where samples were collected but not sent immediately.

Materials & Methods: University of Nairobi Central Province Response Integration Strengthening Sustainability Project (CRISSP); a CDC- funded local implementing partner supporting HIV prevention, care & treatment services rolled out a technical capacity assistance program to support improvement in service delivery at Kiambu district hospital. From Jan to June 2013, the PMTCT clinic was visited by a program officer at least once every week. During the visits, the officers trained all nurses and clinicians in the clinic on the proper technique of collection, packaging and sending of DBS samples. It was also agreed that to increase ownership, this would be done at the clinic level. The objective of this operational evaluation was to assess the impact of continuous technical assistance (mentorship) of site staff by project program officers on batch time. Sample batching was compared between Jan to June 2012 and 2013.

Results: 55 samples in 9 batches and 64 samples in 13 batches were obtained and sent in 2012 and 2013 respectively. The median batch-time in 2012 was 9.4 (± 6) days and 7.5 (± 5) in 2013.

For batches in 2012, the inter-quartile range (IQR) for batch-time was 6.27 days, which reduced to 3.15 days in 2013. ($p=0.05$).

In an analysis excluding batches collected in Jan 2013 (*due to a national nurses strike*), the median batch time reduced to 7.3 (± 4) days. The difference in batch-time IQR was 3.2 days ($p<0.01$).

Conclusion: We conclude that sustained mentorship with proactive approach is effective in increasing efficiency of existing systems and improving service delivery in HIV care.

No conflict of interest

Abstract: P_22

Operational research on HIV programs

Follow-Up HIV testing for couples counseled in Ndola, Zambia

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Introduction: We describe predictors of follow-up testing for discordant (M+F- and M-F+), and concordant negative (M-F-) couples seeking joint voluntary HIV counseling and testing in Ndola, a densely populated city in the Copperbelt region of Zambia where cohabiting couples account for an estimated two-thirds of incident HIV infections.

Methods: Demographic data were collected from couples' voluntary HIV testing and counseling (CVCT) and follow-up testing services implemented in government clinics with Canadian International Development Agency funding. We calculated follow-up testing rates by serostatus and compared rates

before and after introduction of a Good Health Package (GHP).

Results: The follow-up testing rate from May 2011 to December 2012 was 24.5% for discordant couples and 12.2% for M-F-couples. Multivariate predictors of follow-up included increasing man's (aOR=1.02 per year) and woman's (aOR=1.02) age and either partner being HIV+ (men: aOR=2.57; women: aOR=1.89). The man (aOR=1.29) and the couple (aOR=1.22) having been previously tested for HIV were predictive of follow-up testing among concordant negative couples. Among discordant couples, M-F+ had lower follow-up rates than M+F- (aOR=0.73), and ARV use at baseline was associated with a borderline increase in follow-up (aOR 1.37, p=0.07). Introduction of a GHP increased follow-up testing among discordant (aOR=2.93) and concordant negative (aOR=2.06) couples. Most couples chose soap (91%), chlorine (10%), and deworming (9%); few couples chose screening for diabetes, hypertension, or schistosomiasis (3%).

Conclusion: A low-cost GHP including prevention, screening, and treatment for common causes of morbidity and mortality resulted in increased follow-up testing rates among HIV discordant and concordant negative couples. Overall follow-up testing rates remain low and efforts to increase these rates are necessary in order to ensure linkage to combination prevention, reduce HIV transmission within couples and identify seroconversions promptly. Further investigation of low-cost sustainable incentives and other factors influencing follow-up HIV testing for couples is needed.

No conflict of interest

Abstract: P_23

Operational research on HIV programs

Structured advocacy events and Promotions undertaken to support expansion of couples voluntary HIV counseling and testing in the Copperbelt province of Zambia

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Introduction: To achieve a long-term sustainable HIV prevention program, the Zambia Emory HIV Research Project (ZEHRP) in collaboration with the Arise Program/PATH funded by CIDA has been expanding Couples Voluntary HIV Counseling and Testing services in government and private mine clinics since October 2010 with the goals of establishing CVCT as a routine service and testing 68,000 couples over 32 months in the Copperbelt province of Zambia.

Methods: Structured advocacy and promotions activities were conducted at multiple levels. At a broader level, CVCT messages are broadcasted through mass media such as TV, radio and newspaper to raise awareness in the communities. Subsequently, strategic meetings, conferences and workshops are held with government at national, provincial and district levels and with private mining company health care providers to mobilize necessary human and other relevant resources. At the neighborhood level, district clinic promoters (DCPs) affiliated with government clinics are trained and incentivized to promote CVCT at the clinic and in the community.

Results: Between August 2010 and March 2013, ZEHRP held 467 advocacy events in 4 cities. Prior to these meetings, most stakeholders had not been aware that couples could have different HIV test results and did not know the benefits of CVCT. A total of 178 promoter trainings prepared 1945 DCPs to promote CVCT to couples in the communities. The majority of promotional events conducted by DCPs took place in clinics (30%), churches (23%) and the workplace (12%). In the same time period, a total of 68,343 couples received CVCT services in 52 government and mining clinics.

Conclusions: Successful CVCT expansion in the Copperbelt province indicates that when all

levels of government work with public and private health care providers and community leaders, Couples' testing can be successful. A multi-sectoral approach is critical to a successful promotion campaign for CVCT.

No conflict of interest

Abstract: P_24

Operational research on HIV programs

Impacts of health facility reinforcement and integration of early infant diagnosis (EID) and immunization services (EPI) in Southern Province, Zambia

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Background: Early identification of HIV positive infants is important for reducing early infant mortality in Zambia. However, it is estimated that only thirty percent of HIV-exposed infants are tested for HIV each year, and adherence to national guidelines to test mothers with unknown HIV status or re-test mothers who previously tested HIV-negative is even lower. This evaluation examined the effect of two interventions designed to support HIV testing operations at Under-5 clinics on HIV testing rates of mothers, HIV testing rates of infants, and on overall uptake of routine immunizations.

Method: The evaluation was designed as a cluster randomized evaluation. 60 study health facilities were randomized to one of three study arms (n=20 per arm):

Simple Intervention Arm: facilities received a guaranteed supply of antibody and dried blood spot (DBS) DNA PCR testing materials and a review and re-emphasis of existing testing guidelines from district health staff.

Comprehensive Intervention Arm: facilities received the Simple Intervention plus two additional components: Two training sessions on better integrating HIV-service delivery into under-5 clinics and introduction of universal, opt-out HIV testing for all previously HIV-negative or unknown status mothers bringing their babies for 6 weeks immunizations.

Control arm: facilities continued standard protocols

The following outcome variables were tracked from October 2013 through April 2014: Number of infants receiving DPT1; Number of DBS tests administered; Number of rapid tests; administered; % of rapid tests that were positive; Frequency of stock-outs of rapid test and DBS kits

Results: Mid-evaluation results from October - December 2013 are as follows:

No negative effect on the number of immunizations was detected as a result of the Comprehensive Intervention. A linear regression that controlled for baseline immunization rates, antenatal care attendance rates, distance from the district health office and time trends, shows a negligible change in DPT1 immunizations [0.6% increase, 95% CI: -12.1%, 13.4%] in Comprehensive Intervention Facilities.

Stock outs of HIV test kits are a major constraint for health facilities. Across 40 intervention facilities, the research team had to re-supply facilities in danger of stock-out 34 times for Determine test kits, 20 times for UNIGOLD test kits, and 46 times for DBS bundles in the first three months of the study.

Results on all other outcomes will be available after the end of data collection in May 2014.

Conclusions: The results from the mid-study analysis of the data demonstrate that it is feasible to introduce regular HIV service provision (such as universal 6 week testing) at under-5 clinics without negatively affecting immunization rates. To best utilize this patient touch point at under-5 clinics, attention must also be paid to improving the supply chain for HIV testing commodities.

No conflict of interest

Abstract: P_25*Operational research on HIV programs***Predictors of previous HIV testing among couples' voluntary HIV counseling and testing clients in Copperbelt province, Zambia**

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Introduction: Knowledge of HIV status and partner's HIV status increases protective behaviors and reduces transmission of HIV. Follow-up testing is critical for high-risk individuals and couples. Among couples seeking couples' voluntary HIV counseling and testing (CVCT) services, we quantified predictors of previous HIV testing reported by either study partner. We also evaluated predictors of previous joint CVCT with the study partner.

Methods: Couples seeking CVCT services funded by the Canadian International Development Agency from August 2010-March 2013 in four cities in Copperbelt province were included in this analysis.

Factors associated with previous testing were assessed using bivariate and multivariate statistics.

Results: Among 68,341 CVCT client-couples, previous HIV testing was reported by 51% of men and 69% of women. Reported previous individual HIV testing and prior CVCT with the study partner significantly increased over time from 2010-2013. Previous testing was associated with being a woman; pregnancy; cohabiting ≥ 3 months; age range 25-44 compared to age ≤ 24 ; and testing in the city of Chingola compared to the city of Ndola, controlling for year of CVCT services. The prevalence of previous joint testing with the

current study partner was 13%. Previous CVCT was associated with testing concordant negative with study partner; pregnancy; cohabiting ≥ 3 months; age >24 ; and testing in the cities of Chingola or Kitwe, controlling for year of CVCT services.

Conclusion: Though many CVCT clients had previously tested as individuals, even by 2013 few had previously tested together as a couple. Couples at risk of HIV, in particular discordant couples and concordant HIV-negative couples with concurrent partners, should be encouraged to seek follow-up testing and counseling to reinforce risk reduction. Although CVCT in this study represented de facto follow-up testing for previously tested couples, formal follow-up testing and counseling services should be part of any CVCT program.

No conflict of interest

Abstract: P_26*Operational research on HIV programs***Pre- and Post-test evaluation of a training intervention for couples' HIV counseling and testing providers in Copperbelt Province, Zambia**

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Background: With the expansion of couples' voluntary HIV counseling and testing (CVCT) in urban Zambia, there is a growing need to evaluate CVCT provider trainings to ensure that couples are receiving quality counseling and care. We sought to determine the effect of training on pre- and post-training test scores. We also evaluated predictors of pre- and post-test scores.

Methods: We collected data from 1,255 trainees operating in 67 government clinics in four Copperbelt Province districts between

2008-2013 for three different training types: CVCT, rapid HIV testing ('laboratory'), and data management. Trainings were quantitatively evaluated in a pre-post test design. Test topics included causes of HIV infection, modes of transmission, basics of CVCT, and counseling of discordant results. Pre- and post-test training scores were evaluated by provider demographics and training type. Multivariate ANCOVA determined predictors of pre- and post-test scores.

Results: Following training of 1,226 providers, the overall average test score increased from 68.8% to 83.8% ($p < 0.001$). Test scores increased significantly for every demographic group considered ($p < 0.001$), and when stratified by training type with the notable exception that test scores did not significantly increase for those with less than a high school education. In multivariate analysis, education and medical knowledge were predictive of higher pre-test scores; medical knowledge was predictive of higher post-test scores.

Conclusions: Systematic pre- and post-test assessments are critical to ensure quality services and to highlight groups who may benefit from repeated training components, particularly as task-shifting from medical to lay staff becomes more common.

No conflict of interest

Abstract: P_27

Operational research on HIV programs

The role of virus replicative capacity and protective HLA alleles in defining HIV-1 disease progression in Zambia

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Determining host and viral factors of HIV-1 pathogenesis is paramount for developing rational prevention strategies. Efforts to elucidate the contribution of both viral and host factors in defining HIV-1 infection often rely on cross-sectional viral loads (VL) or CD4 T cell counts to determine how these factors are influencing pathogenesis.

In contrast to previous studies, we studied a cohort of 127 acutely infected Zambians with longitudinal CD4 counts up to 5 years post infection as a more sensitive method to identify the long term impact of transmitted virus characteristics and novel HLA alleles associated with disease progression.

We constructed 127 chimeric viruses that contained the transmitted Gag sequence from each individual in the context of the subtype C MJ4 proviral backbone and established the in vitro replicative capacity (vRC) of each virus relative to wild-type MJ4.

We show that in individuals recently infected with HIV-1 subtype C viruses, the lowest tercile vRC exhibited a delayed loss of CD4+ T cells ($p < 0.001$) relative to moderate and high vRC viruses. This difference was independent of both set point VL and protective host immunogenetic factors. Cox proportional hazard models with an end-point defined by CD4 counts < 300 were used to identify protective and deleterious HLA alleles. HLA-B*1401, B*57, B*5801, B*81, DQB1*02, and DRB1*15 were found to provide significant protection from CD4 decline. Moreover, the effects of these alleles were found to be additive, such that individuals with 2 or more protective alleles experienced significantly slower CD4 decline.

This study of a well-characterized subtype C Zambian cohort of acutely infected individuals provides a unique opportunity to elucidate host immunogenetic and viral factors contributing to HIV-1 disease progression and suggests that both play critical roles in defining disease progression in Zambians infected with HIV-1.

No conflict of interest

Abstract: P_28

Prevention of Mother-to-Child transmission of HIV

Distance to Clinic and Uptake of “Option B” PMTCT Services in Rural Zambia

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Introduction: In rural communities, it is common for patients to live many kilometers from facilities that provide antiretroviral therapy (ART). We sought to determine whether the distance between a patient’s home and clinic affects likelihood of ART uptake during pregnancy and breastfeeding (i.e., Option B).

Material and Methods: We implemented a pilot project to offer Option B in 4 rural clinics in Zambia’s Kafue District. In each surrounding catchment area, we conducted household surveys before and after program implementation to determine population impact on infant HIV-free survival. Women who reported a delivery within the past 2 years had medical information collected and were tested for HIV. In the second round (upon which this analysis is based), we also recorded geographic coordinates of households. For this analysis, our outcomes of interest were antenatal care ≤ 4 m gestation, uptake of any PMTCT regimen, and reported use of combination antiretroviral regimens. Euclidean distance (i.e., a straight line that does not take into account topographical features) between individual households and clinics was measured using ArcGIS 10.0. Multivariable regression models were built to measure the association between clinic distance and our outcomes of interest. We also used a generalized additive model with a locally weighted regression to explore the relationship between clinic distance and Option B uptake.

Results: From Mar-2011 to Dec-2011, 2,448 mother-infant dyads were enrolled, of which 1,708 (70%) had corresponding GIS data. 771

(45%) reported an antenatal visit prior to 4 m gestation, but this early attendance was not associated with distance from the health facility ($p=0.30$). When we limited our analysis to 256 women who were HIV-positive, 168 (66%) reported using any antiretroviral drugs during pregnancy, while 102 (40%) initiated a three-drug regimen for PMTCT. Uptake of any PMTCT regimen (AOR: 0.89; 95%CI: 0.82, 0.96) and combination antiretroviral regimens (AOR: 0.88; 95%CI: 0.80, 0.96) decreased as the per-km distance to the clinic increased. The probability of initiating Option B was highest within 3 km of the health facility, after which a gradual decline was observed.

Conclusions: In this rural African setting, uptake of PMTCT regimens – including combination antiretroviral regimens – is influenced by distance to the health facility. Program models that further decentralize care into the community are urgently needed.

No conflict of interest

Abstract: P_29

Prevention of Mother-to-Child transmission of HIV

Extended nevirapine prophylaxis for infants and its impact on vertical transmission rates at 18 months, a retrospective cohort study

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Introduction: Interventions to prevent mother-to-child transmission (MTCT) of HIV in many settings are complicated by high rates of prolonged breastfeeding. In sub-Saharan Africa up to 15% of HIV infections in infants may be attributed to breastfeeding.

Objectives: To determine the MTCT rate in infants on extended nevirapine (eNVP) prophylaxis during breastfeeding at 18 months of age.

Methods: This study compares MTCT rates between prospectively followed infants receiving eNVP (June 2011 to November 2013) and a historical cohort who received single dose NVP at birth with 6 weeks of zidovudine (AZT)(January 2008 to January 2011) at three Family AIDS Care and Education Services (FACES)-supported Kenyan Ministry of Health (MOH) clinics in Nyanza Province. Bivariate analysis was done to determine differences between cohorts and infection rate.

Results: There were 645 infants analysed: 362 from the historical cohort and 283 receiving eNVP. The cumulative MTCT rate in the eNVP cohort was significantly lower than the historical cohort (eNVP: 10/182 (5.5%) vs. historical cohort: 41/183 (22.3%), $p < 0.001$) with 101(36%) eNVP infants and 178 historical (49%) lost to follow up before 18 months. Long-term follow up to 18 months shows benefits of eNVP with zero infections amongst 172 tested in this cohort between 9 and 18 months versus 5 new infections (5/148 (3.4%)) in the historical cohort, $p = 0.02$. Significant differences between the cohorts included a lower median CD4 in the historical cohort (396 (IQR 257,573) vs. 633 (IQR 468,788)) and higher rates of mixed feeding (28% historical vs. 8% eNVP). After controlling for these, the odds of overall transmission at 18 months was 94.7% lower for eNVP cohort (OR 0.053, $p = 0.005$).

Conclusion: Implemented within a MOH PMTCT program, infant eNVP prophylaxis during the breastfeeding period, combined with

appropriate ART for the mother during pregnancy, is associated with a low risk of HIV transmission.

No conflict of interest

Abstract: P_30

Prevention of Mother-to-Child transmission of HIV

Increasing enrollment and retention of HIV exposed and children living with HIV in care: a case of Mtendere, Zambia

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Background: The enrollment of HIV exposed children 0-24 months was a problem during the early years of PMTCT implementation around 2005 to 2007 at Mtendere Mission Hospital. Over 50% of the infants and children who could have been enrolled in care were missed and only identified in the out patient department or when admitted to the pediatric ward.

Materials and Methods: A clinic called 'Umoyo Clinic' (Clinic of Life) was opened within the Maternal Child Health (MCH) in 2007 to offer , a comprehensive PMTCT, care and support to all HIV exposed children and those with HIV. The goal was to follow-up all HIV exposed Children 0-24 months in order to improve quality of life, and to detect those with HIV early. Interventions used at the Umoyo clinic included;

- Integration of routine under five services including immunization
- Providing Linkages to Maternity ward, ART clinic, Pediatric unit and the Community
- Nutritional supplementation
- Provider Initiated Testing and Counseling for early identification of those with HIV
- Niverapine and Cotrimoxazole prophylaxis to all exposed children according to national guidelines

- A family centered approach

Results

- Over 1200 children (0- 24 months) have been enrolled in care since 2007
- The number of children enrolled in care was 55 from 2006 to 2007 and increased to 213 in 2008 when Umoyo clinic was opened
- Early enrollment (infants <3 months) increased from < 50% of all enrollments in the 2007 cohort to > 90% of all enrollments in the 2013 cohort
- Apart from the nutritional supplements, health education messages given in the clinic engages the care-givers to understand the care plan, therefore, contributes to retaining children in the program and promotes the enrollment and retention in care

Conclusion: Having an integrated MCH/ PMTCT program and specialized clinic such as Umoyo clinic that uses different evidence based interventions enhances enrollment and retention in care

No conflict of interest

Abstract: P_31

Prevention of Mother-to-Child transmission of HIV

Scaling up of PMTCT services through community involvement in a resource constrained setting, Chikuni, Zambia

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Background: Chikuni Mission Hospital is a rural health facility in Monze district in Southern Province of Zambia with a catchment population of 25,000. The expected number of pregnancies is at 1,350 annually. In 2011, the

Mother-to-Child Transmission (MTCT) rate was at 6%. With the move towards elimination of MTCT (EMTCT) and an AIDS free generation, intensification of PMTCT strategies was needed. A continuous running small test of change (STOC) from 2011 to 2013 was done by the Chikuni ART team to try and reduce the MTCT to <2% by 6 weeks and < 5% by 18 months of age.

Materials and Methods

Below are strategies that were used:

- Training of Traditional Birth Attendants (TBAs) in PMTCT
- Strengthening male partner involvement through male support groups
- Community sensitization in PMTCT
- Intensification of Couple HIV testing and counseling at Maternal Child Health (MCH)
- Introduced mother/baby friendly corners
- Income generating activities were established for support during complementary feeding
- HIV positive pregnant women are encouraged to enroll into PMTCT and once they deliver, the exposed babies are put on prophylaxis tested for HIV at intervals in line with the National Guidelines

Results: There was a reduction of MTCT from 6% in 2011 to < 1% in 2013 by 12 months of age.

Conclusion: Community engagement and consistent follow-up are a cornerstone towards reaching those that need care and eventually contribute towards EMTCT.

No conflict of interest

Abstract: P_32

Prevention of Mother-to-Child transmission of HIV

Is male involvement in ANC and PMTCT associated with increased facility-based obstetric delivery in pregnant women?

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Background: Obstetric delivery at a health facility among pregnant women is critical in reducing maternal and infant mortality and morbidity and facilitates interventions aimed at reducing mother to child transmission of HIV (PMTCT). FHI360, through the Zambia Prevention Care and Treatment Partnership II project adopted the 2008 Zambia national PMTCT guidelines which recommend HIV testing for couples in antenatal clinics (ANC) to improve PMTCT outcomes. This study determines the associations between male involvement in ANC and PMTCT services and the frequency of health-facility deliveries among pregnant women in general and among HIV-positive pregnant women.

Methods: We reviewed records for pregnant women that attended ANC in 10 health facilities from Central, Copperbelt, and Luapula provinces that offered HIV testing for couples in ANC and had the capacity to provide obstetric delivery. We considered women that attended ANC at these facilities between March and December 2012. Health records of the pregnant women were checked to determine if their male partners received HIV counseling and testing. The delivery and postnatal registers at the health facilities were used to determine if the women delivered at a health facility or not. Logistic regression analysis was used to estimate the odds ratios (OR) of the associations between obstetric facility delivery or postnatal visits and male involvement in ANC or PMTCT services.

Results: There were 2,007 pregnant women who attended ANC services; median age 24 years (interquartile range: 20-29). Of these 2,007 pregnant women, 310 (15.4%) were HIV-positive. Out of 220 pregnant women who attended ANC services with their male partner, 88 (40%) delivered at a health facility, while out of 1,787 pregnant women who were not accompanied by a male partner, 543 (30.4%)

delivered at a health facility; (OR 1.58, 95% CI: 1.20-2.10). Of the 220 pregnant women that attended ANC services with their male partners, 106 (48.2%) returned for a postnatal visit, while out of 1,787 pregnant women who were not accompanied by a male partner, 661 (37.0%) returned for a postnatal visit; (OR 1.53, 95% CI: 1.15 -2.03). Of the 310 HIV-positive women, 31 (10.0%) were accompanied by a male partner during ANC visits, while 279 (90.0%) were not. Out of the 31 HIV-positive women that were accompanied by a male partner, 13 (41.9%) returned for a postnatal visit, while out of 279 HIV-positive women who were not accompanied by their male partner, 115 (41.2%) returned for a post natal visit; (OR 1.03, 95% CI: 0.49-2.19).

Conclusion: The study established that male involvement in ANC among pregnant women in general is associated with more deliveries and more postnatal visits occurring at health facilities compared to those who were not accompanied. However, this was not the case among HIV-positive pregnant women. This finding shows the need to identify strategies aimed at increasing the proportion of HIV-positive women that deliver at health facilities so that the benefits of PMTCT are realized.

No conflict of interest

Abstract: P_33

Prevention of Mother-to-Child transmission of HIV

Determinants of Awareness of Preventing Mother-To-Child Transmission of HIV/AIDS among Pregnant Women in Selected Hospitals in Ghana

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Background: One of the key HIV/AIDS prevention intervention areas of Ghana's HIV/AIDS strategic framework is prevention of new infections, of which Mother-to-Child

Transmission (MTCT) is a key driver (GAC, 2005). The challenge therefore is to make Prevention of Mother-To-Child Transmission (PMTCT) services available and utilized. Pregnant women's knowledge about MTCT and PMTCT of HIV/AIDS is therefore crucial if these interventions are to achieve the desired results. This study therefore sought to evaluate pregnant women's knowledge on MTCT and PMTCT of HIV/AIDS, as well as, the determinants of the likelihood of been aware of PMTCT.

Materials and Methods: A total of 300 pregnant women attending antenatal care in three hospitals in Ghana were interviewed after they verbally consented to participate in the study. Probit regression was used to analyze the determinants of the likelihood of been aware of PMTCT of HIV/AIDS.

Results: Out of the total number of respondents (n=300), HIV positive, HIV negative and HIV status unknown respondents constituted 75 (25%), 163 (54.3%) and 62 (20.7%) respectively. Whereas nearly all respondents know about MTCT (HIV positive=100%, HIV negative= 99.39% and HIV status unknown= 98.39%) the same cannot be said of PMTCT (92%=HIV positive, 85.89%=HIV negative and 43.55%=HIV status unknown). Most respondents (64.3%) indicated that they first became aware of PMTCT from antenatal care visits. Whereas women who have ever tested for HIV/AIDS were less likely to be aware of PMTCT, the number of children, income and age of pregnant women were more likely to influence awareness of PMTCT.

Conclusions: The study shows evidence suggesting that pregnant women's awareness of PMTCT in Ghana is not universal, and generally information on PMTCT is low outside antenatal clinics. The number of children a woman has, a woman's monthly income, age and whether a woman has ever tested for HIV/AIDS are significant determinants of the likelihood of awareness of PMTCT in Ghana. It is recommended that more effort should be put into PMTCT education and sensitization programmes in Ghana, especially outside the antenatal clinics.

No conflict of interest

Abstract: P_34

Prevention of Mother-to-Child transmission of HIV

Infant HIV Outcomes at 18 Months and PMTCT service factors at Lumumba Health Centre, Kisumu, Kenya

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Background: Nearly all infant HIV infections occur through mother-to-child transmission (MTCT). Of the approximately 1.5 million children born in Kenya annually, 50,000 to 60,000 are exposed to HIV and in need of Prevention of Mother-to-Child Transmission (PMTCT) services.

Objective: To determine the HIV point prevalence among exposed infants born to HIV-infected mothers who attended a PMTCT clinic and evaluate predictors for HIV acquisition.

Methods: This study was conducted at Lumumba Health Centre in Kisumu, where approximately 80 women are seen in antenatal/PMTCT services daily. In this retrospective study, 138 HIV exposed infants (HEI) were selected randomly using STATA software from infants born within 27 months prior to the study in January 2012. Data were abstracted from HEI electronic databases, and mother and baby patient charts and registers. Infant HIV outcomes were determined based on antibody test results at 18-months postnatally. Fisher's exact test was used to examine factors predictive for HIV infection in exposed infants. Data were analyzed in Epi Info.

Results: Among 138 HEI examined, 79 (57%) were female and 59 (43%) were male. Twelve were HIV infected giving a MTCT point prevalence of 9%. Two thirds of all deliveries occurred in a hospital, 92 (67%); with the remainder occurring at home, 46 (33%). Most infants, 102 (74%) were reported to have been exclusively breast fed in their first 6 months, and the rest, 36 (26%), were reported to have been mixed fed. Of the infants studied, 99 (72%) received ARV prophylaxis, while 39 (28%) did not. Among the HIV positive infants, 8 (67%) were female and 4 (33%) were male. Home delivery, mixed feeding, and lack of infant antiretroviral (ART) prophylaxis, were significant predictors of HIV acquisition. Of the infants delivered at home, 9 (75%) were HIV positive, while among those delivered in a hospital 89 (71%) were HIV negative ($p < 0.01$). Only 2 (16%) HIV positive infants were exclusively breastfed, whereas among HIV negative infants, 100 (79%) were exclusively breastfed ($p < 0.001$). Of the HIV positive infants, 9 (75%) did not receive ARV prophylaxis while among HIV negative infants, 30 (24%) did not receive ARV prophylaxis ($p < 0.001$).

Conclusion: Findings demonstrated that infants born to HIV positive mothers are significantly less likely to acquire HIV if they are delivered in a hospital, received ARV prophylaxis, and practiced exclusive breastfeeding. Uptake of these proven preventive interventions needs strengthening to accelerate elimination of MTCT.

No conflict of interest

Abstract: P_35

Prevention of Mother-to-Child transmission of HIV

The MoMent study: client- and community-level barriers to PMTCT access and uptake in rural north-central Nigeria

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Background: Despite significant efforts, Nigeria's PMTCT service coverage for eligible women approaches about 20%. This is especially true in hard-to-reach, rural communities largely served by primary healthcare centers (PHCs). Causative factors include health system and client/community-level barriers. We summarize results of a qualitative evaluation of PMTCT access and uptake barriers among stakeholders (PMTCT users, providers, and potential enablers) living and/or working in rural North-Central Nigeria.

Materials and Methods: Focus group discussions (FGDs) and key informant interviews (KIIs) were conducted in communities and at PHCs among: PMTCT users (HIV+/HIV- pregnant/non-pregnant women), providers (clinicians/implementers), and potential enablers (male partners (MPs), community leaders (CLs) and traditional birth attendants (TBAs) in 2 high HIV burden North-Central states (prevalence 7.5 and 9%). FGDs and KIIs were transcribed and analyzed using two sets of analysts, and separately peer-reviewed by a panel of ten researchers. Finally, Nvivo 10 software was used to manage and triangulate the data.

Results: Twenty-one KIIs were conducted among providers, TBAs, and CLs; 11 FGDs (N=105), among users and MPs. Participants constituted 70% women, 29.4% and 51.6% of participants were Muslim and Christian respectively (19% did not indicate any religion), 73.5% were married, and at least 30% were

HIV+. Participants reported major barriers as follows: • Financial: cost of transportation to PHC • Variations across PHCs in provider attitudes towards HIV+ clients • Erratic drug and test kit supply: "another thing we expect is EID test, sometimes materials will delay and it is not supposed to be so. Because we are told that after 6 weeks we should come and do baby PCR. When we come they will say the material is not available; it is a big challenge. Another one is our drugs-PMTCT drugs-sometimes some women will not get and it is a big challenge." • 24/7 baby delivery services not guaranteed at PHCs • Poor client awareness of/confidence in available PHC services • Intense community-level HIV stigma PMTCT was regarded positively among all male partners, and neither religion nor TBAs were identified as major barriers.

Conclusions: As outlined by stakeholders, major client- and community-level PMTCT barriers in rural Nigeria include transportation, perceived stigma, drug/test kit stock-outs and limited community health facility service hours. PMTCT program implementers should saturate rural areas, sensitize staff/community, and strengthen primary healthcare in order to address identified barriers. Religious, male partner and TBA-related barriers are likely overestimated as causes of poor PMTCT coverage in Nigeria.

No conflict of interest

Abstract: P_36

Prevention of Mother-to-Child transmission of HIV

The MoMent study: acceptability of mentor mothers as a PMTCT intervention in rural north- central Nigeria

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Background: Nigeria bears >30% of the global PMTCT gap. A significant proportion of this gap lies in rural communities, where two-thirds of Nigeria's population lives. Mentor Mothers (MMs) are HIV-positive women with PMTCT experience, additionally trained as peer counselors, to improve access and retention for PMTCT-eligible women and infants. MMs may be a key community-based strategy for Nigeria's PMTCT scale-up in rural areas. We present findings from a qualitative evaluation of MM acceptability among individuals living and/or working in hard-to-reach communities in North-Central Nigeria.

Materials and Methods: Eleven focus group discussions (FGDs) (N=105) and 31 key informant interviews (KIIs) were conducted among current and potential PMTCT clients (HIV+ and negative pregnant and non-pregnant women), PMTCT providers (clinical and implementation), and key community members (male partners, community leaders and traditional birth attendants) in 2 high-prevalence (≥7.5%) North-Central states. FGDs and KIIs were transcribed and analyzed using two sets of analysts, and separately peer-reviewed by a panel of ten researchers. Finally, Nvivo 10 software was used to manage and triangulate the data.

Results: Out of a total of 136 participants, 15.4% were providers, 71.3% were women; 31% were Muslim, 50% Christian, while 19% did not indicate any religion. 87% of participants were married, and at least 27% of participants were HIV+. Findings were as follows: • 100% of participants indicated acceptance of MM services for themselves, spouses, families or patients; • 100% of participants indicated confidence in MM's effectiveness in PMTCT scale-up in their communities; • The highest-valued MM services/qualities were psychosocial support, living positively with HIV, PMTCT experience, and accessibility within the community. • The most consistent reservation about the MM program was regarding home visits, because of potential/perceived stigma from the community.

Conclusions: Mentor Mothers are a highly acceptable PMTCT scale-up intervention in rural North-Central Nigeria. Acceptability cuts

across gender, religion and HIV status. Mentor Mother programs may be implemented in these communities as part of PMTCT scale-up, however, fear of stigma/discrimination may impede maximal efficacy. Policy-makers, providers, and community leaders need to address HIV-related stigma while developing locally-adapted mentoring programs.

No conflict of interest

Abstract: P_37

Women and HIV

Communicating Microbicides with Women in Mind: Material Development and Assessment

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Introduction: Women continue to be disproportionately affected by HIV, despite widespread HIV knowledge and availability of condoms. In 2010 CAPRISA 004 provided proof of concept that peri-coital, vaginal use of tenofovir 1% microbicide gel can reduce HIV acquisition among women. Confirmatory results from FACTS 001 are expected by 2015. Along with product efficacy, price, and availability, women's social and sexual contexts will shape their interest in and ability to use microbicides. Communication campaigns will also play a large role in generating demand and educating women about correct use. This project, conducted in Kenya, aims to develop a communication strategy, with audience-specific materials, to assist policy-makers, program implementers and clinicians in planning for future microbicide introduction. The project comprises three phases: 1) a landscape analysis including a literature review, media scans, and a policy-level consultation; 2) development and

pretesting of messages and materials; and 3) research assessment to measure the efficacy of materials in generating interest in future microbicide use, while avoiding HIV-related stigma. Here, we present our process and select findings.

Materials & Methods: Results from Phase One led to the identification of young women, female sex workers (FSWs), and women in stable relationships as primary audiences for microbicide communication materials in Kenya. Men and health care providers were chosen as secondary audiences. Material development activities consisted of 1) 12 audience consultation workshops with target audiences; 2) a national message development workshop; 3) materials development by a Kenyan creative firm; and 4) two rounds of material pretesting, consisting of 33 focus group discussions (FGDs) in four cities. Research activities assessed material effect on interest in microbicide use, stigmatizing attitudes, and condom migration. Activities included: 1) an intercept survey with 800 men and women; 2) 12 FGDs, including pre-and post-test surveys, with FSWs and young women; and 3) 24 in-depth interviews (IDIs) with providers.

Results: The project created a minimum package of prototype materials for awareness raising (posters, TV storyboards, and radio spots), in-depth education (flip charts, an informational brochure and counseling algorithm), and digital media (website and social media concepts).

Awareness raising materials were framed in two ways. HIV-framed materials highlighted the HIV prevention benefit of microbicides, while non-HIV framed materials focused primarily on other benefits (empowerment, increased intimacy and/or sexual pleasure). Preliminary intercept survey results suggest women in stable relationships have a higher interest in future microbicide use when viewing non-HIV framed materials.

In-depth educational materials were developed for use in community and clinical settings. Preliminary IDI results suggest that the materials are effective in helping providers counsel women in different sexual contexts about microbicide use.

Conclusions: Although microbicides have been developed for HIV prevention, some audiences may also be motivated by other benefits. Policy-makers, program implementers, and clinicians will need to

strategically position microbicides so they can be used by women in a variety of sexual contexts, are not stigmatized, and do not replace condoms when condom use is feasible. This project provides a process that can be adapted by other countries and/or for other HIV-prevention products.

No conflict of interest

Abstract: P_38

Women and HIV

Feasibility of cervical cancer screening for HIV patients in rural resource constrained setting, Mtendere mission hospital, Zambia

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Background: Cervical cancer (CaCx) is the most common female neoplasm in sub-Saharan Africa, and Zambia has one of the highest mortality rates of CaCx in the World, mainly due to the high prevalence of HIV infection and an inability to either initiate or sustain cervical cancer prevention services. Since 2009, with the collaboration of the Italian NGO 'Patologi Oltre Frontiera' (APOF) a screening program for cervical cancer has been implemented at Mtendere Mission Hospital in Chirundu, a rural hospital in Southern Province of Zambia with a catchment population of 12,812.

Materials and Methods: From January 2009 to December 2013, 3,750 consecutive Pap smears were collected from women enrolled in the screening program. Participants had a median age of 32 years (15-80), mean age at

sexual debut being 17 years (8-28) and HIV positive status of 8%.

Pap smears were done at first examination and repeated after six months in low-grade lesions and/or in HIV positive women and after one year in all other cases. Local technicians performed the initial Pap smear diagnosis subsequently; positive smears cases were confirmed by APOF experts via web-based telepathology system. Women with positive Pap smear then underwent colposcopy and Large Loop Excision of the Transformation Zone (LLETZ) in case of Grade 2 / Grade 3 lesions or hysterectomy in case of localized invasive cancer.

Results: Of 3,750 Pap smears collected 8% were abnormal, but this ratio increased to 18% in HIV positive women.

A total of 1,145 colposcopies were performed with normal findings in 648 (56.6%) cases, Grade 1 lesions in 334 (29.2%), Grade 2 lesions in 158 (13.8%), and suspected cancer in 4 (0.3%).

LLETZ done were 177, with histological confirmation of high-grade lesions (\geq CIN 2) in 90 cases (50.8%).

Conclusion: Pap smears is a feasible test also in low-resource settings, allowing a constant monitoring of the HIV impact in the incidence of cervical cancer and LLETZ allows a radical treatment of the usually larger cervical lesion seen in HIV-positive women.

No conflict of interest

Abstract: P_39

Women and HIV

Characteristics associated with timely utilization of cervical cancer prevention services for women enrolled in comprehensive HIV care in western Kenya

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Introduction: The Kenya national antiretroviral therapy (ART) guidelines included cervical cancer screening and prevention (CCSP) as part of a minimum package of care for adult women living with Human immunodeficiency Virus (HIV). The Family AIDS Care and Education Services (FACES) program introduced CCSP in 2012 for all women enrolled in HIV-care in the Ministry of Health (MoH) facilities in five districts in Nyanza Province. We sought to determine factors associated with timely utilization of CCSP services following enrollment into HIV care.

Methodology: We conducted a retrospective study of women screened for cervical cancer at FACES-supported facilities in five districts of Nyanza Province. Screening was performed using visual inspection with acetic (VIA) acid and Lugol's iodine (VILI); women with positive results were referred for cryotherapy at the closest District Hospital. Time between enrollment into care and screening was measured, defining timely utilization of CCSP as screening within three months of enrollment. Logistic regression analysis was used to assess factors associated with timely screening after enrollment.

Results: We identified 416 women newly enrolled into HIV care screened between March 2012 and September 2013. Majority 307 (73.8%) were screened within three months of enrollment; median time to screening was 1 month (IQR: 0.1-3.6). Women in partnered relationships and those who traveled >30 minutes to the clinic were less likely to screen early compared to those in single relationships (OR 0.571, 95% CI 0.362-

0.90), ((A) OR 0.577 95% CI 0.338-0.984) and those who traveled <30 minutes (OR 0.598, 95% CI 0.379-0.944), ((A) OR 0.592 95% CI 0.355-0.987)) on both unadjusted and adjusted analysis respectively.

Conclusion: The majority of women accessed screening within three months of enrollment. Women in partnered relationship and distance from the health facility were barriers to timely screening. Research is required to determine the impact of male involvement on timely utilization of CCSP services.

No conflict of interest

Abstract: P_40

Women and HIV

Mother – baby pair characteristics of HIV exposed infants diagnosed HIV infected by DNA - PCR at selected health facilities in an urban setting in Kenya

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Background: The estimated HIV prevalence in Nairobi, Kenya is 8.6% with 7,300 women needing prevention of mother to child HIV transmission (PMCT) services yearly and documented incident pediatric infections among HIV-exposed children as high as 14%. The complex arrays of services needed for PMCT include maternal HIV testing; linking of HIV infected pregnant women to care services, timely initiation of antiretroviral drug interventions for HIV positive women and their exposed infants, early infant diagnosis and retention in care of mother-baby pairs. Failure in delivery of services in this cascade may contribute to HIV transmission in this setting.

Methodology: Records of infants who tested HIV positive by DNA – PCR between November 2011 and July 2013 from 40 Ministry of health primary health facilities were identified. Pre and post-delivery interventions to the mother-infant pair were retrospectively reviewed for all infants.

Descriptive analysis was used to determine proportion of infants who missed appropriate interventions.

Results: Eighty four out of 1804 (4.7%) dry blood spot (DBS) samples collected were reported as DNA – PCR positive. We analyzed information for 53 infants and their mothers who had complete records.

Mothers of 34 HIV infected infants (64%) got antiretroviral (ARV) prophylaxis out of whom 23 (68%) were engaged in care after 28 weeks gestation. Fourteen out of the 34 (41%) had disclosed their HIV status and 12 (35%) had unskilled birth attendance.

Mothers of 19 HIV infected infants (36%) did not get any ARV prophylaxis all of whom were engaged in care after 28 weeks gestation. Of this, 11 (58%) had not disclosed their HIV status and 50% of them had unskilled birth attendance. Ten of infants were mixed fed. Twenty out of 53 infants (38%) started nevirapine (NVP) prophylaxis within 6 weeks post-delivery while 19 (36%) missed NVP prophylaxis.

Twelve out of 19 infants (63%) whose mothers missed antenatal ARV drug prophylaxis did not get nevirapine prophylaxis compared to 3/34 (9%) infants whose mothers got antenatal ARV prophylaxis.

Conclusion: Early engagement in care and timely initiation of ARV prophylaxis remain key areas in elimination of mother to child HIV transmission.

No conflict of interest

Abstract: P_41

Women and HIV

Primi-gravida HIV positive women newly initiated on ART may require additional support

in HIV care: Findings from Zambia

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Background: Significant numbers of HIV positive women continue to be enrolled into HIV care and initiated on antiretroviral therapy (ART). In Zambia, where the Total Fertility Rate (TFR) is > 6, pregnancy status is an important clinical consideration in HIV care, so we conducted this analysis to examine parity among women newly initiated on ART. The aim was to better understand the populations we serve in order to refine our programmatic response.

Methods: Using a cross sectional study design, data were extracted from the Zambia Prevention Care and Treatment (ZPCT II) partnership HIV program database for the period October 2012 to March 2013 from 14 purposively selected high volume ART sites. The following characteristics were analyzed: parity, age, marital status, contraception history, educational level, baseline WHO stage and CD4 count. Multinomial logistics regression analyses were used to identify association between parity and other variables (above).

Results: A total of 467 pregnant women newly initiated on ART were included in this sample. Parity varied from zero to seven. Mean age was 28.2yrs (S.D ± 6.0), median baseline CD4 counts 271 (IQR 197–335). The age range in the sample was normally distributed with 7.1% under 20 years, 57.2% between 20-29yrs, 31.5% between 30-39yrs and 4.3% 40 years and above. Results from logistic regression showed that marital status (AOR=0.13, 95% CI= 0.02-0.92) was associated with parity, with primi-gravidas being 87 % less likely to be married as compared to higher parity women. Regarding WHO staging, we found that women with five children or less, were 76% less likely to be in WHO stage 4 as compared to grand-multiparous women (parity 6 or more) (AOR=0.24, 95% CI=0.04-0.87). Previous contraception, education level, and baseline CD4 count below 350 were not associated with parity.

Conclusion: These data suggest that primi-gravida HIV positive pregnant women who are newly initiated on ART are less likely to be married compared to women of higher parity. These women may be at greater need for enhanced HIV disclosure and treatment adherence support counseling. More research is needed to better understand the impact of parity on care and treatment support outcomes.

No conflict of interest

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