June 2018 **Issue 3**

Southern Africa HIV and AIDS Regional Exchange (SHARE) Research Digest, April—May 2018

The Southern Africa HIV and AIDS Regional Exchange (SHARE) is pleased to present the third issue of the project's research digest. The digest offers article abstracts from peer-reviewed literature related to HIV and AIDS in Southern Africa and is designed to keep you in touch with the rapidly expanding evidence base pertaining to HIV in the region.

In this issue we have assembled 72 abstracts published April through May 2018 that feature articles from Botswana (4), Lesotho (2), Malawi (7), Mozambique (5), South Africa (43), Swaziland (2), Tanzania (4), Zambia (2) and Zimbabwe (9).

Click the links below to browse by audience group:

- **ADVOCATES** – 1 abstract
  Research on human rights and HIV with recommendations for continued advocacy efforts.
- **HEALTH CARE PROVIDERS** – 19 abstracts
  Medical science and research findings that can be utilized by health care providers who serve people at risk for, or living with, HIV.
- **IMPLEMENTERS/PROGRAMMERS** – 23 abstracts
  Research and evidence to strengthen HIV programming, including implementation science.
- **LAY HEALTH WORKERS** – 4 abstracts
  All article abstracts related to lay health workers.
- **POLICY MAKERS/GOVERNMENT OFFICIALS** – 5 abstracts
  Policy briefs and research with implications around policy change or government involvement.
- **RESEARCHERS** – 20 abstracts
  Randomized controlled trials and other scientific studies and protocols related to HIV implemented in Southern Africa.

FEATURED ARTICLES

- A mixed methods study on access to HIV care and treatment for migrants between Lesotho and South Africa.

- Findings from a cross-sectional study on HIV status disclosure among postpartum women with varied intimate partner violence experiences in Zambia.

- Lessons learned from the ZENITH trial in Zimbabwe on the role of community health workers in improving HIV treatment outcomes in children.

ADVOCATES (1)

1. **Adolescent lives matter: Preventing HIV in adolescents**
   Pettifor, A., Stoner, M., et al. Curr Opin HIV AIDS. 2018.
   https://www.ncbi.nlm.nih.gov/pubmed/29528850

   OBJECTIVES: Many of the almost 2 million HIV infections that occurred globally in the last year occurred among adolescents and young people, particularly those from East and Southern Africa and within key populations. Global HIV epidemic control will require that new infections among these youth populations be curtailed. This review examines the most effective prevention approaches to reach these adolescent populations in the next 5 years.

   RECENT FINDINGS: Adolescents are in transition and are developmentally unique. They have specific needs and challenges, which if not addressed will result in less than successful interventions. Tailored, layered, combination prevention packages that take into account specific adolescent needs and involve biomedical, behavioural and structural components are recommended. These packages should be designed for and with the meaningful input of adolescents and involve their peers in their implementation and execution. Where possible, age-appropriate health and social interventions that go beyond HIV should be bundled and offered in a variety of community-based venues that are already acceptable to and frequented by adolescents.

   SUMMARY: It is urgent that we reach adolescents globally with the most effective HIV prevention approaches. HIV prevention investment in this population has immediate and longer-term benefits.

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GOVERNMENT OFFICIALS/POLICY MAKERS (5)

2. **Projected effectiveness and added value of HIV vaccination campaigns in South Africa: A modeling study**
   de Montigny, S., Adamson, B. J. S., et al. Sci Rep. 2018.
   https://www.ncbi.nlm.nih.gov/pubmed/29666455

   Promising multi-dose HIV vaccine regimens are being tested in trials in South Africa. We estimated the potential epidemiological and economic impact of HIV vaccine campaigns compared to continuous vaccination, assuming that vaccine efficacy is transient and dependent on immune response. We used a dynamic economic mathematical model of HIV transmission calibrated to 2012 epidemiological data to simulate vaccination with anticipated antiretroviral treatment scale-up in South Africa. We estimate that biennial vaccination with a 70% efficacious vaccine reaching 20% of the sexually active population could prevent 480,000-650,000 HIV infections (13.8-15.3% of all infections) over 10 years. Assuming a launch price of $15 per dose, vaccination was found to be cost-effective, with an incremental cost-effectiveness ratio of $13,746 per quality-adjusted life-year as compared to no vaccination. Increasing vaccination coverage to 50% will prevent more infections but is less likely to achieve cost-effectiveness. Campaign vaccination is consistently more effective and costs less than continuous vaccination across scenarios. Results suggest that a partially effective HIV vaccine will have substantial impact on the HIV epidemic in South Africa and offer good value if priced less than $105 for a five-dose series. Vaccination campaigns every two years may offer greater value for money than continuous vaccination reaching the same coverage level.

3. **Adolescent male circumcision for HIV prevention in high priority countries: Opportunities for improvement**
   Lane, C., Bailey, R. C., et al. Clin Infect Dis. 2018.
   https://www.ncbi.nlm.nih.gov/pubmed/29617774

   Global experts recognize the need to transform conventional models of healthcare to create adolescent responsive health systems. As countries near 80% coverage of voluntary medical male circumcision (VMMC) for those aged 15-49 years, prioritization of younger men becomes critical to VMMC sustainability. This special supplement reporting 9 studies focusing on adolescent VMMC programming and services comes at a critical time. Eight articles report how well adolescents are reached with the World Health Organization's minimum package for comprehensive human immunodeficiency virus (HIV) prevention in South Africa, Zimbabwe, and Tanzania, analyzing motivation, counseling, wound healing, parental involvement, female peer support, quality of in-service communication, and providers' perceptions, and one presents models for achieving high VMMC coverage by 2021. One important finding is that adolescent boys, especially the youngest, experience gaps in their comprehension of key elements in the World Health Organization's minimum package. Although parents, counselors, and

providers are involved and supportive, they are inadequately prepared to counsel youth, partly owing to discomfort with adolescent sexuality. At the country level, deliberately prioritizing young adolescents (aged 10-14 years) is likely to achieve national coverage targets more quickly and cost-effectively than continuing to focus on older, harder-to-reach men. The studies in this supplement point to areas where VMMC programs are achieving successes and they reveal areas for improvement. Given that prioritizing adolescents will be the best means of achieving sustainable VMMC for HIV prevention for the foreseeable future, applying the lessons learned here will increase the effectiveness of VMMC programs.

4. **Cost-effectiveness of community-based human immunodeficiency virus self-testing in Blantyre, Malawi**
   Maheswaran, H., Clarke, A., et al. Clin Infect Dis. 2018.
   https://www.ncbi.nlm.nih.gov/pubmed/29136117

   BACKGROUND: Human immunodeficiency virus self-testing (HIVST) is effective, with scale-up underway in sub-Saharan Africa. We assessed cost-effectiveness of adding HIVST to existing facility-based HIV testing and counseling (HTC) services. Both 2010 (initiate at CD4 <350 cells/μL) and 2015 (initiate all) World Health Organization (WHO) guidelines for antiretroviral treatment (ART) were considered.

   METHODS: A microsimulation model was developed to evaluate cost-effectiveness, from both health provider and societal perspectives, of an HIVST service implemented in a cluster-randomized trial (CRT; ISRCTN02004005) in Malawi. Costs and health outcomes were evaluated over a 20-year time horizon, using a discount rate of 3%. Probabilistic sensitivity analysis was conducted to account for parameter uncertainty.

   RESULTS: From the health provider perspective and 20-year time horizon, facility HTC using 2010 WHO ART guidelines was the least costly ($294.71 per person; 95% credible interval [CrI], 270.79-318.45) and least effective (11.64 quality-adjusted life-years [QALYs] per person; 95% CrI, 11.43-11.86) strategy. Compared with this strategy, the incremental cost-effectiveness ratio (ICER) for facility HTC using 2015 WHO ART guidelines was $226.85 (95% CrI, 198.79-284.35) per QALY gained. The strategy of facility HTC plus HIVST, using 2010 WHO ART guidelines, was extendedly dominated. The ICER for facility HTC plus HIVST, using 2015 WHO ART guidelines, was $253.90 (95% CrI, 201.71-342.02) per QALY gained compared with facility HTC and using 2015 WHO ART guidelines.

   CONCLUSIONS: HIVST may be cost-effective in a Malawian population with high HIV prevalence. HIVST is suited to an early HIV diagnosis and treatment strategy.

5. **Effect of ready-to-use supplementary food on mortality in severely immunocompromised HIV-infected individuals in Africa initiating antiretroviral therapy (REALITY): An open-label, parallel-group, randomized controlled trial**
Mallewa, J., Szubert, A. J., et al. Lancet HIV. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29653915

BACKGROUND: In sub-Saharan Africa, severely immunocompromised HIV-infected individuals have a high risk of mortality during the first few months after starting antiretroviral therapy (ART). We hypothesise that universally providing ready-to-use supplementary food (RUSF) would increase early weight gain, thereby reducing early mortality compared with current guidelines recommending ready-to-use therapeutic food (RUTF) for severely malnourished individuals only.

METHODS: We did a 2 x 2 x 2 factorial, open-label, parallel-group trial at inpatient and outpatient facilities in eight urban or periurban regional hospitals in Kenya, Malawi, Uganda, and Zimbabwe. Eligible participants were ART-naive adults and children aged at least 5 years with confirmed HIV infection and a CD4 cell count of fewer than 100 cells per µL, who were initiating ART at the facilities. We randomly assigned participants (1:1) to initiate ART either with (RUSF) or without (no-RUSF) 12 weeks' of peanut-based RUSF containing 1000 kcal per day and micronutrients, given as two 92 g packets per day for adults and one packet (500 kcal per day) for children aged 5-12 years, regardless of nutritional status. In both groups, individuals received supplementation with RUTF only when severely malnourished (ie, body-mass index [BMI] <16-18 kg/m(2) or BMI-for-age Z scores <-3 for children). We did the randomisation with computer-generated, sequentially numbered tables with different block sizes incorporated within an online database. Randomisation was stratified by centre, age, and two other factorial randomisations, to 12 week adjunctive raltegravir and enhanced anti-infection prophylaxis (reported elsewhere). Clinic visits were scheduled at weeks 2, 4, 8, 12, 18, 24, 36, and 48, and included nurse assessment of vital status and symptoms and dispensing of all medication including ART and RUSF. The primary outcome was mortality at week 24, analysed by intention to treat. Secondary outcomes included absolute changes in weight, BMI, and mid-upper-arm circumference (MUAC). Safety was analysed in all randomly assigned participants. Follow-up was 48 weeks.

FINDINGS: Between June 18, 2013, and April 10, 2015, we randomly assigned 1805 participants to treatment: 897 to RUSF and 908 to no-RUSF. 56 (3%) were lost-to-follow-up. 96 (10.9%, 95% CI 9.0-13.1) participants allocated to RUSF and 92 (10.3%, 8.5-12.5) to no-RUSF died within 24 weeks (hazard ratio 1.05, 95% CI 0.79-1.40; log-rank p=0.75), with no evidence of interaction with the other randomisations (both p>0.7). Through 48 weeks, adults and adolescents aged 13 years and older in the RUSF group had significantly greater gains in weight, BMI, and MUAC than the no-RUSF group (p=0.004, 0.004, and 0.03, respectively). The most common type of serious adverse event was specific infections, occurring in 90 (10%) of 897 participants assigned RUSF and 87 (10%) of 908 assigned no-RUSF. By week 48, 205 participants had serious adverse events in

both groups (p=0.81), and 181 had grade 4 adverse events in the RUSF group compared with 172 in the non-RUSF group (p=0.45).

INTERPRETATION: In severely immunocompromised HIV-infected individuals, providing RUSF universally at ART initiation, compared with providing RUTF to severely malnourished individuals only, improved short-term weight gain but not mortality. A change in policy to provide nutritional supplementation to all severely immunocompromised HIV-infected individuals starting ART is therefore not warranted at present.

6. **High uptake of antiretroviral therapy among HIV-positive TB patients receiving co-located services in Swaziland**
Pathmanathan, I., Pasipamire, M., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29768503

BACKGROUND: Swaziland has the highest adult HIV prevalence and second highest rate of TB/HIV coinfection globally. Recently, the Ministry of Health and partners have increased integration and co-location of TB/HIV services, but the timing of antiretroviral therapy (ART) relative to TB treatment-a marker of program quality and predictor of outcomes-is unknown.

METHODS: We conducted a retrospective analysis of programmatic data from 11 purposefully-sampled facilities to evaluate timely ART provision for HIV-positive TB patients enrolled on TB treatment between July-November 2014. Timely ART was defined as within two weeks of TB treatment initiation for patients with CD4<50/µL or missing, and within eight weeks otherwise. Descriptive statistics were estimated and logistic regression used to assess factors independently associated with timely ART.

RESULTS: Of 466 HIV-positive TB patients, 51.5% were male, median age was 35 (interquartile range [IQR]: 29-42), and median CD4 was 137/µL (IQR: 58-268). 189 (40.6%) were on ART prior to, and five (1.8%) did not receive ART within six months of TB treatment initiation. Median time to ART after TB treatment initiation was 15 days (IQR: 14-28). Almost 90% started ART within eight weeks, and 45.5% of those with CD4<50/µL started within two weeks. Using thresholds for "timely ART" according to baseline CD4 count, 73.3% of patients overall received timely ART after TB treatment initiation. Patients with CD4 50-200/µL or >/=200/µL had significantly higher odds of timely ART than patients with CD4<50/µL, with adjusted odds ratios of 11.5 (95% confidence interval [CI]: 5.0-26.6) and 9.6 (95% CI: 4.6-19.9), respectively. TB cure or treatment completion was achieved by 71.1% of patients at six months, but this was not associated with timely ART.

CONCLUSIONS: This study demonstrates the relative success of integrated and co-located TB/HIV services in Swaziland, and shows that timely ART uptake for HIV-positive TB patients can be achieved in resource-limited, but integrated settings. Gaps remain in

getting patients with CD4<50/µL to receive ART within the recommended two weeks post TB treatment initiation.

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HEALTH CARE PROVIDERS (19)

7. **Factors affecting adherence to antiretroviral therapy among pregnant women in the Eastern Cape, South Africa**
   Adeniyi, O. V., Ajayi, A. I., et al. BMC Infect Dis. 2018.
   https://www.ncbi.nlm.nih.gov/pubmed/29653510

   BACKGROUND: Context-specific factors influence adherence to antiretroviral therapy (ART) among pregnant women living with HIV. Gaps exist in the understanding of the reasons for the variable outcomes of the prevention of mother-to-child transmission (PMTCT) programme at the health facility level in South Africa. This study examined adherence levels and reasons for non-adherence during pregnancy in a cohort of parturient women enrolled in the PMTCT programme in the Eastern Cape, South Africa.

   METHODS: This was a mixed-methods study involving 1709 parturient women in the Eastern Cape, South Africa. We conducted a multi-centre retrospective analysis of the mother-infant pair in the PMTCT electronic database in 2016. Semi-structured interviews of purposively selected parturient women with self-reported poor adherence (n = 177) were conducted to gain understanding of the main barriers to adherence. Binary logistic regression was used to determine the independent predictors of ART non-adherence.

   RESULTS: A high proportion (69.0%) of women reported perfect adherence. In the logistic regression analysis, after adjusting for confounding factors, marital status, cigarette smoking, alcohol use and non-disclosure to a family member were the independent predictors of non-adherence. Analysis of the qualitative data revealed that drug-related side-effects, being away from home, forgetfulness, non-disclosure, stigma and work-related demand were among the main reasons for non-adherence to ART.

   CONCLUSIONS: Non-adherence to the antiretroviral therapy among pregnant women in this setting is associated with lifestyle behaviours, HIV-related stigma and ART side-effects. In order to eliminate mother-to-child transmission of HIV, clinicians need to screen for these factors at every antenatal clinic visit.

8. **HIV-associated mycobacterium tuberculosis bloodstream infection is underdiagnosed by single blood culture**
   Barr, D. A., Kerkhoff, A. D., et al. J Clin Microbiol. 2018.
   https://www.ncbi.nlm.nih.gov/pubmed/29444831

We assessed the additional diagnostic yield for Mycobacterium tuberculosis bloodstream infection (BSI) by doing more than one tuberculosis (TB) blood culture from HIV-infected inpatients. In a retrospective analysis of two cohorts based in Cape Town, South Africa, 72/99 (73%) patients with M. tuberculosis BSI were identified by the first of two blood cultures during the same admission, with 27/99 (27%; 95% confidence interval [CI], 18 to 36%) testing negative on the first culture but positive on the second. In a prospective evaluation of up to 6 blood cultures over 24 h, 9 of 14 (65%) patients with M. tuberculosis BSI had M. tuberculosis grow on their first blood culture; 3 more patients (21%) were identified by a second independent blood culture at the same time point, and the remaining 2 were diagnosed only on the 4th and 6th blood cultures. Additional blood cultures increase the yield for M. tuberculosis BSI, similar to what is reported for nonmycobacterial BSI.

9. **Pilot evaluation of a second-generation electronic pill box for adherence to Bedaquiline and antiretroviral therapy in drug-resistant TB/HIV co-infected patients in Kwazulu-Natal, South Africa**
Bionghi, N., Daftary, A., et al. BMC Infect Dis. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29642874

BACKGROUND: The introduction of Bedaquiline, the first new antimycobacterial drug in over 40 years, has highlighted the critical importance of medication adherence in drug-resistant tuberculosis (DR-TB) treatment to prevent amplified drug-resistance and derive sustained benefit. Real-time electronic dose monitoring (EDM) accurately measures adherence and allows for titration of adherence support for anti-retroviral therapy (ART). The goal of this study was to evaluate the accuracy and acceptability of a next-generation electronic pillbox (Wisepill RT2000) for Bedaquiline-containing TB regimens.

METHODS: Eligible patients were DR-TB/HIV co-infected adults hospitalized for the initiation of Bedaquiline-containing treatment regimens in KwaZulu-Natal, South Africa. A one-way crossover design was used to evaluate levels of adherence and patient acceptance of EDM. Each patient was given a Wisepill device which was filled with ART, Levofloxacin or Bedaquiline over three consecutive weeks. Medication adherence was measured using Wisepill counts, patient-reported seven-day recall, and weekly pill count. An open-ended qualitative questionnaire at the end of the study evaluated participant acceptability of the Wisepill device.

RESULTS: We enrolled 21 DR-TB/HIV co-infected inpatients admitted for the initiation of Bedaquiline from August through September 2016. In aggregate patients were similarly adherent to Bedaquiline (100%) compared to Levofloxacin (100%) and ART (98.9%) by pill count. Wisepill was more sensitive (100%) compared to seven-day recall (0%) in detecting non-adherence events ($p = 0.02$). Patients reported positive experiences with

Wisepill and expressed willingness to use the device during a full course of DR-TB treatment. There were no concerns about stigma, confidentiality, or remote monitoring.

CONCLUSION: In this pilot study patients were highly adherent to Bedaquiline by all adherence measures. However, there was lower adherence to ART by pill count and Wisepill suggesting a possible challenge for adherence with ART. The use of EDM identified significantly more missed doses than seven-day recall. Wisepill was highly acceptable to DR-TB/HIV patients in South Africa, and is a promising modality to support and monitor medication adherence in complex treatment regimens.

10. **Attrition when providing antiretroviral treatment at CD4 counts >500cells/µL at three government clinics included in the HPTN 071 (PopART) trial in South Africa**
Bock, P., Fatti, G., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29672542

INTRODUCTION: WHO recommends antiretroviral treatment (ART) for all HIV-positive individuals. This study evaluated the association between baseline CD4 count and attrition in a cohort of HIV positive adults initiating ART at three department of health (DOH) clinics routinely providing ART at baseline CD4 counts >500cells/µL for the HPTN 071 (PopART) trial.

METHODS: All clients attending the DOH clinics were managed according to standard care guidelines with the exception that those starting ART outside of pertinent local guidelines signed research informed consent. DOH data on all HIV-positive adult clients recorded as having initiated ART between January 2014 and November 2015 at the three study clinics was analysed. Attrition, included clients lost to follow up or died, and was defined as 'being three or more months late for an antiretroviral pharmacy pick-up appointment'. All clients were followed until attrition, transfer out or end May 2016.

RESULTS: A total of 2423 clients with a median baseline CD4 count of 328 cells/µL (IQR 195-468) were included of whom 631 (26.0%) experienced attrition and 140 (5.8%) were TFO. Attrition was highest during the first six months of ART (IR 38.3/100 PY; 95% CI 34.8-42.1). Higher attrition was found amongst those with baseline CD4 counts > 500 cells/µL compared to those with baseline CD4 counts of 0-500 cells/µL (aHR 1.26, 95%CI 1.05 to 1.52) This finding was confirmed on subset analyses when restricted to individuals non-pregnant at baseline and when restricted to individuals with follow up of > 12months.

CONCLUSIONS: Attrition in this study was high, particularly during the first six months of treatment. Attrition was highest amongst clients starting ART at baseline CD4 counts > 500 cells/µL. Strategies to improve retention amongst ART clients, particularly those starting ART at baseline CD4 counts >500cells/µL, need strengthening. Improved monitoring of clients moving in and out of ART care and between clinics will assist in better understanding attrition and ART coverage in high burden countries.

11. **Prevalence, incidence and correlates of low risk HPV infection and anogenital warts in a cohort of women living with HIV in Burkina Faso and South Africa**
Chikandiwa, A., Kelly, H., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29715305

OBJECTIVE: To report the prevalence and incidence of low-risk human papillomavirus infection (LR-HPV) and anogenital warts (AGW) among women living with HIV (WLHIV) in Burkina Faso (BF) and South Africa (SA), and to explore HIV-related factors associated with these outcomes.

METHODS: We enrolled 1238 WLHIV (BF = 615; SA = 623) aged 25-50 years and followed them at three time points (6, 12 and 16 months) after enrolment. Presence of AGW was assessed during gynecological examination. Cervico-vaginal swabs for enrolment and month 16 follow-up visits were tested for HPV infection by Inno-LiPA(R) genotyping. Logistic regression was used to assess risk factors for prevalent infection or AGW. Cox regression was used to assess risk factors for incident AGW.

RESULTS: Women in SA were more likely than those in BF to have prevalent LR-HPV infection (BF: 27.1% vs. SA: 40.9%; p<0.001) and incident LR-HPV infection (BF: 25.8% vs. SA: 31.6%, p = 0.05). Prevalence of persistent LR-HPV was similar in the two countries (BF: 33.3% vs. SA: 30.4%; p = 0.54), as were prevalence and incidence of AGW (Prevalence: BF: 7.5% vs. SA: 5.7%; p = 0.21; Incidence: BF: 2.47 vs. SA: 2.33 per 100 person-years; p = 0.41). HPV6 was associated with incident AGW (BF: adjusted Hazard Ratio (aHR) = 4.88; 95%CI: 1.36-17.45; SA: aHR = 5.02; 95%CI: 1.40-17.99). Prevalent LR-HPV (BF: adjusted Odds Ratio [aOR = 1.86]; 95%CI: 1.01-3.41; SA: aOR = 1.75; 95%CI: 0.88-3.48); persistent LR-HPV (BF: aOR = 1.92; 95%CI: 0.44-8.44; SA: aOR = 2.81; 95%CI: 1.07-7.41) and prevalent AGW (BF: aOR = 1.53; 95%CI: 0.61-3.87; SA: aOR = 4.11; 95%CI: 1.20-14.10) were each associated with low CD4+ counts (i.e. <200 vs. >500 cells/μL). Duration of ART and HIV plasma viral load were not associated with any LR-HPV infection or AGW outcomes.

CONCLUSIONS: LR-HPV infection and AGW are common in WLHIV in sub-Saharan Africa. Type-specific HPV vaccines and effective ART with immunological reconstitution could reduce the burden of AGW in this population.

12. **Mortality and treatment response amongst HIV-infected patients 50 years and older accessing antiretroviral services in South Africa**
Dawood, H., Hassan-Moosa, R., et al. BMC Infect Dis. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29636023

BACKGROUND: Little is known about the clinical presentation and outcomes amongst older HIV infected populations accessing ART in sub-Saharan Africa. We compared

mortality amongst HIV infected patients accessing ART that were < 50 years to those >/=50 years in Kwa-Zulu Natal, South Africa.

METHODS: We undertook a retrospective review of medical records of patients that accessed HIV services at the CAPRISA AIDS Treatment program (CAT) between June 2004 to December 2012 (N = 4003). HIV infected patients, 14 years or older were enrolled. All-cause mortality and treatment response to ART in those < 50 years to those >/=50 years were compared. A Kaplan-Meier curve and log-rank test were used to compare the cumulative probability of death between the two age groups with the primary endpoint being mortality. Statistical analysis was done using SAS (version 9.4.; SAS Institute Inc., Cary, NC, USA).

RESULTS: Of 4003 individuals, 262 (6.5%) were >/= 50 years (older group). The median age in those >/=50 years and < 50 year was 54.5 and 32.0 years, respectively. The younger group was mainly female (64.7%). There was no difference in mortality rate, between the older (6.9/100 person-years (py), 95% confidence interval (CI): 4.7-9.6) and younger group (5.3/100 py, 95% CI: 4.7-5.8) at 60 months (p = 0.137). In the multivariable model older patients had a significantly higher risk of death compared to younger patients. (hazard ratio (HR) 1.60, 95% CI: 1.08-2.39, p = 0.019). The rate of CD4+ cell count increase was higher in those < 50 years (beta = 0.34, 95% CI: 0.19-0.50, p < 0.001) with no difference in viral suppression. The older group showed significantly higher prevalence of diabetes (6.3%) and hypertension (21.5%), p < 0.001.

CONCLUSIONS: ART initiation in older HIV infected patients was associated with a higher mortality compared to those younger than 50 years. ART immunological response was less robust in older individuals. The increase in hypertension and diabetes among older patients suggests the need to restructure and integrate primary and specialized health care services into ART services.

13. **Chronic kidney disease in the global adult HIV-infected population: A systematic review and meta-analysis**
Ekrikpo, U. E., Kengne, A. P., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29659605

INTRODUCTION: The widespread use of antiretroviral therapies (ART) has increased life expectancy in HIV patients, predisposing them to chronic non-communicable diseases including Chronic Kidney Disease (CKD). We performed a systematic review and meta-analysis (PROSPERO registration number CRD42016036246) to determine the global and regional prevalence of CKD in HIV patients.

METHODS: We searched PubMed, Web of Science, EBSCO and AJOL for articles published between January 1982 and May 2016. CKD was defined as estimated glomerular filtration rate (eGFR) <60ml/min using the MDRD, Cockcroft-Gault or CKD-

EPI equations. Random effects model was used to combine prevalence estimates from across studies after variance stabilization via Freeman-Tukey transformation.

RESULT: Sixty-one eligible articles (n = 209,078 HIV patients) in 60 countries were selected. The overall CKD prevalence was 6.4% (95%CI 5.2-7.7%) with MDRD, 4.8% (95%CI 2.9-7.1%) with CKD-EPI and 12.3% (95%CI 8.4-16.7%) with Cockcroft-Gault; p = 0.003 for difference across estimators. Sub-group analysis identified differences in prevalence by WHO region with Africa having the highest MDRD-based prevalence at 7.9% (95%CI 5.2-11.1%). Within Africa, the pooled MDRD-based prevalence was highest in West Africa [14.6% (95%CI 9.9-20.0%)] and lowest in Southern Africa (3.2%, 95%CI 3.0-3.4%). The heterogeneity observed could be explained by WHO region, comorbid hypertension and diabetes mellitus, but not by gender, hepatitis B or C coinfection, CD4 count or antiretroviral status.

CONCLUSIONS: CKD is common in HIV-infected people, particularly in Africa. HIV treatment programs need to intensify screening for CKD with added need to introduce global guidelines for CKD identification and treatment in HIV positive patients.

14. **Predictors of switch to and early outcomes on third-line antiretroviral therapy at a large public-sector clinic in Johannesburg, South Africa**
Evans, D., Hirasen, K., et al. AIDS Res Ther. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29636106

BACKGROUND: While efficacy data exist, there are limited data on the outcomes of patients on third-line antiretroviral therapy (ART) in sub-Saharan Africa in actual practice. Being able to identify predictors of switch to third-line ART will be essential for planning for future need. We identify predictors of switch to third-line ART among patients with significant viremia on a protease inhibitor (PI)-based second-line ART regimen. Additionally, we describe characteristics of all patients on third-line at a large public sector HIV clinic and present their early outcomes.

METHODS: Retrospective analysis of adults (>/= 18 years) on a PI-based second-line ART regimen at Themba Lethu Clinic, Johannesburg, South Africa as of 01 August 2012, when third-line treatment became available in South Africa, with significant viremia on second-line ART (defined as at least one viral load >/= 1000 copies/mL on second-line ART after 01 August 2012) to identify predictors of switch to third-line (determined by genotype resistance testing). Third-line ART was defined as a regimen containing etravirine, raltegravir or ritonavir boosted darunavir, between August 2012 and January 2016. To assess predictors of switch to third-line ART we used Cox proportional hazards regression among those with significant viraemia on second-line ART after 01 August 2012. Then among all patients on third-line ART we describe viral load suppression, defined as a viral load < 400 copies/mL, after starting third-line ART.

RESULTS: Among 719 patients in care and on second-line ART as of August 2012 (with at least one viral load >/= 1000 copies/mL after 01 August 2012), 36 (5.0% over a median time of 54 months) switched to third-line. Time on second-line therapy (>/= 96 vs. < 96 weeks) (adjusted Hazard Ratio (aHR): 2.53 95% CI 1.03-6.22) and never reaching virologic suppression while on second-line ART (aHR: 3.37 95% CI 1.47-7.73) were identified as predictors of switch. In a separate cohort of patients on third-line ART, 78.3% (47/60) and 83.3% (35/42) of those in care and with a viral load suppressed their viral load at 6 and 12 months, respectively.

CONCLUSIONS: Our results show that the need for third-line is low (5%), but that patients' who switch to third-line ART have good early treatment outcomes and are able to suppress their viral load. Adherence counselling and resistance testing should be prioritized for patients that are at risk of failure, in particular those who never suppress on second-line and those who have been on PI-based regimen for extended periods.

15. **Acceptability and performance of a directly assisted oral HIV self-testing intervention in adolescents in rural Mozambique**
Hector, J., Davies, M. A., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29621308

INTRODUCTION: Whereas progress in HIV testing and treatment has been made globally, the UNAIDS goal of "90-90-90" is still out of sight in rural northern Mozambique. New strategies that promote testing in hard to reach groups will aid Mozambique's response to the HIV epidemic. HIV self-testing (HIVST) is recommended by the WHO as an additional approach to augment the HIV testing services available to adolescents. This study evaluates acceptability and performance of a directly assisted oral HIVST intervention for adolescents in rural Mozambique.

METHODS: Adolescents aged 16-20 years were included at schools and invited to attend the local hospital's youth friendly service for directly assisted oral HIVST. Baseline and post-test questionnaires were obtained. OraQuick Rapid HIV-1/2 Anti body test(R) was used. Results were read by the participant and by a nurse. Results were confirmed by finger prick HIV test (Determine(R) HIV 1/2 Alere and Unigold HIV Trinity Biotech) according to the Mozambican national standard.

RESULTS: Between September and November 2016, 496 adolescents were included, of which 299 performed an oral HIV self-test. 70% were first time testers. The positivity rate was 1.7%. The inter-rater agreement between adolescent and nurse was 99.6% (kappa 0.93); there were no false negative or false positive results of the oral HIV self-test. Five tests were invalid. 7.1% found the test difficult to use. Over 80% preferred directly assisted HIVST compared to the standard finger prick testing. While 20% thought it would be good to do HIVST at home, 76% preferred to do HIVST at the health centre, for reasons including increased security, privacy, and the presence of a counsellor.

CONCLUSIONS: Directly assisted oral HIVST is a feasible intervention for adolescents in rural Mozambique and showed encouraging results for first time HIV testers.

16. **Targeted HIV testing at birth supported by low and predictable mother-to-child transmission risk in Botswana**
    Ibrahim, M., Maswabi, K., et al. J Int AIDS Soc. 2018.
    https://www.ncbi.nlm.nih.gov/pubmed/29852062

    INTRODUCTION: Most African countries perform infant HIV testing at 6 weeks or later. The addition of targeted testing at birth may improve retention in care, treatment outcomes and survival for HIV-infected infants.

    METHODS: HIV-exposed infants were screened as part of the Early Infant Treatment (EIT) study in Botswana. Screened infants were >/=35 weeks gestational age and >/=2000 g at birth. Risk factors for mother-to-child transmission (MTCT) were assessed by maternal obstetric card or verbally. Risk factors included <8 weeks ART in pregnancy, last known CD4 <250 cells/mm (3), last known HIV RNA >400 copies/mL, poor maternal ART adherence, lack of maternal zidovudine (ZDV) in labour, or lack of infant post-exposure prophylaxis. Infants underwent dried blood spot testing by Roche Cobas Ampliprep/Cobas Taqman HIV-1 qualitative PCR.

    RESULTS: From April 2015 to April 2016, 2303 HIV-exposed infants were tested for HIV in the EIT study. Of these, 369 (16%) were identified as high risk for HIV infection by information available at birth, and 12 (0.5% overall, 3.25% of high risk) were identified as HIV positive at birth. All 12 positive infants were identified as high risk at the time of screening, and only 2 risk factors were required to identify all positive infants: either <8 weeks of maternal ART in pregnancy (75%) or lack of maternal HIV suppression at last test (25%).

    CONCLUSIONS: In utero MTCT occurred only among infants identified as high risk at delivery, using information available from the mother or obstetric record. Birth testing that targets high-risk infants based on maternal ART receipt is likely to identify the majority of in utero HIV transmissions, and allows early ART initiation for these infants.

17. **Age at antiretroviral therapy initiation and cell-associated HIV-1 DNA levels in HIV-1-infected children**
    Kuhn, L., Paximadis, M., et al. PLoS One. 2018.
    https://www.ncbi.nlm.nih.gov/pubmed/29649264

    BACKGROUND: The latent viral reservoir is the major obstacle to achieving HIV remission and necessitates life-long antiretroviral therapy (ART) for HIV-infected individuals. Studies in adults and children have found that initiating ART soon after infection is associated with a reduction in the size of the HIV-1 reservoir. Here we

quantified cell-associated HIV-1 DNA in early-treated but currently older HIV-infected children suppressed on ART.

METHODS: The study participants comprised of a cohort of 146 early-treated children with HIV-1 RNA <50 copies/ml enrolled as part of a clinical trial in Johannesburg, South Africa. A stored buffy coat sample collected after a median 4.3 years on ART and where HIV-1 RNA was <50 copies/ml was tested for cell-associated HIV-1 DNA levels. An in-house, semi-nested real-time quantitative hydrolysis probe PCR assay to detect total HIV-1 subtype C proviral DNA was used. Children were followed prospectively for up to 3 years after this measurement to investigate subsequent HIV-1 RNA rebound/failure while remaining on ART. Age at ART initiation, HIV-1 RNA decline prior to HIV-1 DNA measurement and other factors were investigated.

RESULTS: A gradient between age at ART initiation and later HIV-1 DNA levels was observed. When ART was started <2 months of age, the lowest levels of cell-associated HIV-1 DNA (median 1.4 log10copies/106 cells, interquartile range [IQR] 0.95-1.55) were observed compared to ART started at 2-4 months (median 1.68, IQR 1.26-1.97) or 5-14 months of age (median1.98, IQR 1.69-2.25). A low CD4 T-cell count pre-treatment predicted higher levels of HIV-1 DNA on later testing. The probability of HIV-1 RNA rebound >50 copies/ml whilst on ART within 3 years after the DNA measurement was 2.07 (95% CI: 1.352-3.167) times greater if the HIV-1 DNA level was above the median of 55 copies/106 cells.

CONCLUSIONS: Cell-associated HIV-1 DNA levels measured after more than 4 years on ART were lower the younger the age of the child when ART was initiated. This marker of the size of the viral reservoir also predicted subsequent viral rebound/treatment failure while ART was sustained. The results provide additional evidence of the benefits of prompt diagnosis and early ART initiation in newborns and infants.

18. **Trends in the relative prevalence of genital ulcer disease pathogens and association with HIV infection in Johannesburg, South Africa, 2007-2015**
Kularatne, R. S., Muller, E. E., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29617372

BACKGROUND: In South Africa, treatment of genital ulcer disease (GUD) occurs in the context of syndromic management. GUD etiological studies have been conducted in Johannesburg since 2007. We report on GUD pathogen prevalence, sero-prevalence of STI co-infections and aetiological trends among GUD patients presenting to a community-based primary healthcare facility in Johannesburg over a 9-year period.

METHODS AND FINDINGS: GUD surveys were conducted from January to April each year. Consecutive genital ulcers were sampled from consenting adults. Swab-extracted DNA was tested by multiplex real-time PCR assays for herpes simplex virus (HSV), Treponema pallidum (TP), Haemophilus ducreyi (HD) and Chlamydia trachomatis (CT).

HSV-positive DNA extracts were further subtyped into HSV-1 and HSV-2 using a commercial PCR assay; CT-positive extracts were tested with an in-house PCR assay specific for serovars L1-L3 (lymphogranuloma venereum). Sera were tested for HIV, HSV-2, and syphilis co-infections. Giemsa-stained ulcer smears were screened for Klebsiella granulomatis by microscopy. Data were analysed with STATATM version 14. Of 771 GUD specimens, 503 (65.2%) had a detectable pathogen: HSV 468 (60.7%); TP 30 (3.9%); CT L1-3 7 (0.9%); HD 4 (0.5%). No aetiological agents were detected in 270 (34.8%) ulcer specimens. Seroprevalence rates were as follows: HIV 61.7%; HSV-2 80.2% and syphilis 5.8%. There was a strong association between GUD pathogen detection and HIV seropositivity ($p < 0.001$); 68% of cases caused by HSV were co-infected with HIV. There was a significant decline in the relative prevalence of ulcer-derived HSV over time, predominantly from 2013-2015 (p-value for trend = 0.023); and a trend towards a decrease in the HIV seropositivity rate (p-value for trend = 0.209).

CONCLUSIONS: HSV remains the leading cause of pathogen-detectable GUD in South Africa. The prevalence of HIV co-infection among GUD patients is high, underlining the importance of linkage to universal HIV testing and treatment in primary healthcare settings.

19. **Operational assessment of point-of-care diagnostics in rural primary healthcare clinics of KwaZulu-Natal, South Africa: A cross-sectional survey**
Mashamba-Thompson, T. P., Sartorius, B., et al. BMC Health Serv Res. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29843711

BACKGROUND: The World Health Organization (WHO) called for new clinical diagnostic for settings with limited access to laboratory services. Access to diagnostic testing may not be uniform in rural settings, which may result in poor access to essential healthcare services. The aim of this study is to determine the availability, current usage, and need for point-of-care (POC) diagnostic tests among rural primary healthcare (PHC) clinics in South Africa's KwaZulu-Natal (KZN) province.

METHODS: We used the KZN's Department of Health (DoH) clinic classification to identify the 232 rural PHC clinics in KZN, South Africa. We then randomly sampled 100 of 232 rural PHC clinics. Selected health clinics were surveyed between April to August 2015 to obtain clinic-level data for health-worker volume and to determine the accessibility, availability, usage and need for POC tests. Professional healthcare workers responsible for POC testing at each clinic were interviewed to assess the awareness of POC testing. Data were survey weighted and analysed using Stata 13.

RESULTS: Among 100 rural clinics, the average number of patients seen per week was 2865 +/- 2231 (range 374-11,731). The average number of POC tests available and in use was 6.3 (CI: 6.2-6.5) out of a potential of 51 tests. The following POC tests were universally available in all rural clinics: urine total protein, urine leukocytes, urine nitrate, urine pregnancy, HIV antibody and blood glucose test. The average number of

desired POC diagnostic tests reported by the clinical staff was estimated at 15 (CI: 13-17) per clinic. The most requested POC tests reported were serum creatinine (37%), CD4 count (37%), cholesterol (32%), tuberculosis (31%), and HIV viral load (23%).

CONCLUSION: Several POC tests are widely available and in use at rural PHC clinics in South Africa's KZN province. However, healthcare workers have requested additional POC tests to improve detection and management of priority disease conditions.

20. **Predictors of mortality in adults on treatment for human immunodeficiency virus-associated tuberculosis in Botswana: A retrospective cohort study**
Muyaya, L. M., Young, T., et al. Medicine (Baltimore). 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29668628

Mortality in patients with human immunodeficiency virus (HIV)-associated tuberculosis (TB) is high, particularly in sub-Saharan Africa. This study aimed to compare mortality and predictors of mortality in those who were antiretroviral therapy (ART) naive to those with prior ART exposure. This retrospective cohort study was conducted in Serowe/Palapye District, Botswana, a predominantly urban district with a large burden of HIV-associated TB with a high case fatality. Between January 1, 2013 and December 31, 2013, patients confirmed with HIV-associated TB were enrolled and followed up. Kaplan-Meier and Cox proportional hazard modeling was undertaken to identify predictors of mortality, with ART initiation included as time-updated variable. Among the 300 patients enrolled in the study, 131 had started ART before TB diagnosis (44%). There were 45 deaths. There was no difference in mortality between ART-naive patients and those with prior ART exposure. In the multivariate analysis, no ART use during TB treatment (hazard ratio [HR] = 5.6, 95% confidence interval [CI] = 2.9-11; P < .001), opportunistic infections other than TB (HR = 8.5, 95% CI = 4-18.4; P = .013), age >/=60 years (HR = 4.8, 95% CI = 1.8-13; P = .002), hemoglobin <10 g/dL (HR = 2.4, 95% CI = 1.3-4.5) and hepatotoxicity (HR = 5, 95% CI = 1.6-17; P = .007) were associated with increased mortality. In the subgroup analysis, among ART-naive patients, no ART use during TB treatment (HR = 8.1, 95% CI = 3.4-19.4; P < .001), opportunistic infections other than TB (HR = 16, 95% CI = 6.2-42; P < .001), and hepatotoxicity (HR = 8.3, 95% CI = 2.6-27; P < .001) were associated with mortality. Among patients with prior ART exposure, opportunistic infections other than TB (HR = 6, 95% CI = 2.6-27; P < .001) were associated with mortality. Mortality in patients with HIV-associated TB is still high. To reduce mortality, close clinical monitoring of patients together with initiation of ART during TB treatment is indicated.

21. **A retrospective cohort study of body mass index and survival in HIV infected patients with and without TB co-infection**
Naidoo, K., Yende-Zuma, N., et al. Infect Dis Poverty. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29690932

BACKGROUND: High early morbidity and mortality following antiretroviral therapy (ART) initiation has been a distinguishing feature of ART programmes in resource limited settings (RLS) compared to high-income countries. This study assessed how well body mass index (BMI: kg/m (2)) correlated with survival among HIV infected patients with and without TB co-infection.

METHODS: We retrospectively evaluated clinical data from 1000 HIV infected patients, among whom 389 were also co-infected with TB, between January 2008 and December 2010, in KwaZulu-Natal, South Africa.

RESULTS: Among 948 patients eligible for analysis, 15.7% (149/948) were underweight (< 18.50), 55.9% (530/948) had normal BMI (>/=18.50-24.90), 18.7% (177/948) were overweight (25.00-29.00) and 9.7% (92/948) were obese (>/=30.00). Irrespective of TB status, underweight patients, had significantly higher risk of death compared to those with normal BMI at baseline (aHR = 2.9; 95% CI: 1.5-5.7; P = 0.002).

CONCLUSIONS: Irrespective of TB co-infection, low BMI correlated with mortality in HIV infected patients.

22. **HIV drug resistance patterns in pregnant women using next generation sequence in Mozambique**
Ruperez, M., Noguera-Julian, M., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29742132

BACKGROUND: Few data on HIV resistance in pregnancy are available from Mozambique, one of the countries with the highest HIV toll worldwide. Understanding the patterns of HIV drug resistance in pregnant women might help in tailoring optimal regimens for prevention of mother to child transmission of HIV (pMTCT) and antenatal care.

OBJECTIVES: To describe the frequency and characteristics of HIV drug resistance mutations (HIVDRM) in pregnant women with virological failure at delivery, despite pMTCT or antiretroviral therapy (ART).

METHODS: Samples from HIV-infected pregnant women from a rural area in southern Mozambique were analysed. Only women with HIV-1 RNA >400c/mL at delivery were included in the analysis. HIVDRM were determined using MiSeq(R) (detection threshold 1%) at the first antenatal care (ANC) visit and at the time of delivery.

RESULTS: Ninety and 60 samples were available at the first ANC visit and delivery, respectively. At first ANC, 97% of the women had HIV-1 RNA>400c/mL, 39% had CD4+ counts <350 c/mm3 and 30% were previously not on ART. Thirteen women (14%) had at least one HIVDRM of whom 70% were not on previous ART. Eight women (13%) had at least one HIVDRM at delivery. Out of 37 women with data available from the two time

points, 8 (21%) developed at least one new HIVDRM during pMTCT or ART. Twenty seven per cent (53/191), 32% (44/138) and 100% (5/5) of the mutations that were present at enrolment, delivery and that emerged during pregnancy, respectively, were minority mutations (frequency <20%).

CONCLUSIONS: Even with ultrasensitive HIV-1 genotyping, less than 20% of women with detectable viremia at delivery had HIVDRM before initiating pMTCT or ART. This suggests that factors other than pre-existing resistance, such as lack of adherence or interruptions of the ANC chain, are also relevant to explain lack of virological suppression at the time of delivery in women receiving antiretroviral drugs during pregnancy.

23. Patterns of caesarean section in HIV infected and non-infected women in Malawi: Is caesarean section used for PMTCT?
Tenthani, L., van Oosterhout, J. J., et al. BMC Pregnancy Childbirth. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29649980

BACKGROUND: Caesarean section (CS) is not recommended for PMTCT in Malawi HIV Guidelines, contrary to most high-income countries where CS is indicated if viral suppression is sub-optimal pre-delivery. We describe patterns of CS in HIV-infected and uninfected women in Malawi and explored if insight into the use of Elective CS (ECS) for PMTCT could be obtained.

METHODS: We used routinely collected data from individual medical records from 17 large health facilities in the central and southern regions of Malawi, from January 2010 to December 2013. We included data from maternity registers from all HIV-positive women, and randomly selected around every fourth woman with negative or unknown HIV status. We used multivariable logistic regressions and cluster-based robust standard errors to examine independent associations of patient- and facility characteristics with CS and ECS.

RESULTS: We included 62,033 women in the analysis. The weighted percentage of women who had a spontaneous vaginal delivery was 80.0% (CI 95% 79.5-80.4%); 2.4% (95% CI 2.3-2.6%) had a vacuum extraction; 2.3% (95% CI 2.2-2.5%) had a vaginal breech delivery; 14.0% (95% CI 13.6-14.4%) had a CS while for 1.3% (95% CI 1.2-1.4%) the mode of delivery was not recorded. Prevalence of CS without recorded medical or obstetric indication (ECS) was 5.1%, (n = 3152). Presence of maternal and infant complications and older age were independently associated with CS delivery. HIV-positive women were less likely to have ECS than HIV negative women (aOR 0.65; 95%-CI 0.57-0.74). Among HIV-positive women, those on antiretrovirals (ARVs) for >/=4 weeks prior to delivery were less likely to have ECS than HIV-positive women who had not received ARVs during pregnancy (aOR 0.81; 95% CI 0.68-0.96).

CONCLUSIONS: The pattern of CSs in Malawi is largely determined by maternal and infant complications. Positive HIV status was negatively associated with CS delivery, possibly because health care workers were concerned about the risk of occupational HIV transmission and the known increased risk of post-operative complications. Our results leave open the possibility that CS is practiced to prevent MTCT given that ECS was more common among women at high risk of MTCT due to no or short exposure to ARVs.

24. **Providers' perceptions and training needs for counseling adolescents undergoing voluntary medical male circumcision**
Tobian, A. A. R., Dam, K. H., et al. Clin Infect Dis. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29617772

BACKGROUND: The majority of individuals who seek voluntary medical male circumcision (VMMC) services in sub-Saharan Africa are adolescents (ages 10-19 years). However, adolescents who obtain VMMC services report receiving little information on human immunodeficiency virus (HIV) prevention and care. In this study, we assessed the perceptions of VMMC facility managers and providers about current training content and their perspectives on age-appropriate adolescent counseling.

METHODS: Semi structured in-depth interviews were conducted with 33 VMMC providers in Tanzania (n = 12), South Africa (n = 9), and Zimbabwe (n = 12) and with 4 key informant facility managers in each country (total 12). Two coders independently coded the data thematically using a 2-step process and Atlas.ti qualitative coding software. Results: Providers and facility managers discussed limitations with current VMMC training, noting the need for adolescent-specific guidelines and counseling skills. Providers expressed hesitation in communicating complete sexual health information-including HIV testing, HIV prevention, proper condom usage, the importance of knowing a partner's HIV status, and abstinence from sex or masturbation during wound healing-with younger males (aged <15 years) and/or those assumed to be sexually inexperienced. Many providers revealed that they did not assess adolescent clients' sexual experience and deemed sexual topics to be irrelevant or inappropriate. Providers preferred counseling younger adolescents with their parents or guardians present, typically focusing primarily on wound care and procedural information.

CONCLUSIONS: Lack of training for working with adolescents influences the type of information communicated. Preconceptions hinder counseling that supports comprehensive HIV preventive behaviors and complete wound care information, particularly for younger adolescents.

25. **Voices from the frontline: Barriers and strategies to improve tuberculosis infection control in primary health care facilities in South Africa**
Zinatsa, F., Engelbrecht, M., et al. BMC Health Serv Res. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29636041

BACKGROUND: Tuberculosis (TB) infection control at primary healthcare (PHC) level remains problematic, especially in South Africa. Improvements are significantly dependent on healthcare workers' (HCWs) behaviours, underwriting an urgent need for behaviour change. This study sought to 1) identify factors influencing TB infection control behaviour at PHC level within a high TB burden district and 2) in a participatory manner elicit recommendations from HCWs for improved TB infection control.

METHOD: A qualitative case study was employed. TB nurses and facility managers in the Mangaung Metropolitan District, South Africa, participated in five focus group and nominal group discussions. Data was thematically analysed.

RESULTS: Utilising the Information Motivation and Behaviour (IMB) Model, major barriers to TB infection control information included poor training and conflicting policy guidelines. Low levels of motivation were observed among participants, linked to feelings of powerlessness, negative attitudes of HCWs, poor district health support, and general health system challenges. With a few exceptions, most behaviours necessary to achieve TB risk-reduction, were generally regarded as easy to accomplish.

CONCLUSIONS: Strategies for improved TB infection control included: training for comprehensive TB infection control for all HCWs; clarity on TB infection control policy guidelines; improved patient education and awareness of TB infection control measures; emphasis on the active role HCWs can play in infection control as change agents; improved social support; practical, hands-on training or role playing to improve behavioural skills; and the destigmatisation of TB/HIV among HCWs and patients.

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IMPLEMENTERS/PROGRAMMERS (23)

26. Temporal evolution of HIV sero-discordancy patterns among stable couples in sub-Saharan Africa

Awad, S. F., Chemaitelly, H., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29708995

INTRODUCTION: Objective was to examine the temporal variation of HIV sero-discordancy in select representative countries (Kenya, Lesotho, Mali, Niger, Tanzania, and Zimbabwe) in sub-Saharan Africa at different HIV epidemic scales. A sero-discordant couple is defined as a stable couple (SC) in which one partner is HIV-positive while the other is HIV-negative.

METHODS: A deterministic compartmental mathematical model was constructed to describe HIV transmission dynamics. The model was pair-based, that is explicitly modeling formation of SCs and infection dynamics in both SCs and in single individuals.

The model accommodated for different forms of infection statuses in SCs. Using population-based nationally-representative epidemiologic and demographic input data, historical (1980-2014) and future (2015-2030) trends of sero-discordancy and other demographic and epidemiologic indicators were projected throughout HIV epidemic phases.

RESULTS: As the epidemics emerged, about 90% of SCs affected by HIV were sero-discordant. This proportion declined to 45%-88% at epidemic peak and stabilized as the epidemics started their natural decline. The largest reductions in sero-discordancy were in high HIV-prevalence countries. As the epidemics further declined with antiretroviral therapy (ART) scale-up, the proportion of sero-discordant couples among HIV-affected couples was projected to increase to 70%-92% by 2030. The proportion of sero-discordant couples among all SCs increased as the epidemics emerged and evolved, then peaked at 2%-20% as the epidemics peaked, and then declined as the epidemics declined to reach 0.3%-16% by 2030.

CONCLUSIONS: Sero-discordancy patterns varied with the evolution of the epidemics, and were affected by both epidemic phase and scale. The largest variations were found in high HIV-prevalence countries. The fraction of stable couples that are sero-discordant, as opposed to being sero-concordant positive, was projected to increase with ART scale-up and further HIV incidence decline over the coming two decades. These findings inform strategic planning and resource allocation for interventions among sero-discordant couples.

27. **Optimizing prevention of HIV mother to child transmission: Duration of antiretroviral therapy and viral suppression at delivery among pregnant Malawian women**
Chagomerana, M. B., Miller, W. C., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29614083

BACKGROUND: Effective antiretroviral therapy during pregnancy minimizes the risk of vertical HIV transmission. Some women present late in their pregnancy for first antenatal visit; whether these women achieve viral suppression by delivery and how suppression varies with time on ART is unclear.

METHODS: We conducted a prospective cohort study of HIV-infected pregnant women initiating antiretroviral therapy for the first time at Bwaila Hospital in Lilongwe, Malawi from June 2015 to November 2016. Multivariable Poisson models with robust variance estimators were used to estimate risk ratios (RR) and 95% confidence intervals (CI) of the association between duration of ART and both viral load (VL) >/=1000 copies/ml and VL >/=40 copies/ml at delivery.

RESULTS: Of the 252 women who had viral load testing at delivery, 40 (16%) and 78 (31%) had VL >/=1000 copies/ml and VL >/=40 copies/ml, respectively. The proportion of women with poor adherence to ART was higher among women who were on ART for

</=12 weeks (9/50 = 18.0%) than among those who were on ART for 13-35 weeks (18/194 = 9.3%). Compared to women who were on ART for </=12 weeks, women who were on ART for 13-20 weeks (RR = 0.52; 95% CI: 0.36-0.74) or 21-35 weeks (RR = 0.26; 95% CI: 0.14-0.48) had a lower risk of VL >/=40 copies/ml at delivery. Similar comparisons for VL >/=1000 copies/ml at delivery showed decrease in risk although not significant for those on ART 13-20 weeks.

CONCLUSION: Longer duration of ART during pregnancy was associated with suppressed viral load at delivery. Early ANC attendance in pregnancy to facilitate prompt ART initiation for HIV-positive women is essential in the effort to eliminate HIV vertical transmission.

28. Access to antiretroviral therapy in HIV-infected children aged 0-19 years in the International Epidemiology Databases to Evaluate AIDS (IeDEA) Global Cohort Consortium, 2004-2015: A prospective cohort study
Desmonde, S., Tanser, F., et al. PLoS Med. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29727458

INTRODUCTION: Access to antiretroviral therapy (ART) is a global priority. However, the attrition across the continuum of care for HIV-infected children between their HIV diagnosis and ART initiation is not well known. We analyzed the time from enrollment into HIV care to ART initiation in HIV-infected children within the International Epidemiology Databases to Evaluate AIDS (IeDEA) Global Cohort Consortium.

METHODS AND FINDINGS: We included 135,479 HIV-1-infected children, aged 0-19 years and ART-naive at enrollment, between 1 January 2004 and 31 December 2015, in IeDEA cohorts from Central Africa (3 countries; n = 4,948), East Africa (3 countries; n = 22,827), West Africa (7 countries; n = 7,372), Southern Africa (6 countries; n = 93,799), Asia-Pacific (6 countries; n = 4,045), and Latin America (7 countries; n = 2,488). Follow-up in these cohorts is typically every 3-6 months. We described time to ART initiation and missed opportunities (death or loss to follow-up [LTFU]: last clinical visit >6 months) since baseline (the date of HIV diagnosis or, if unavailable, date of enrollment). Cumulative incidence functions (CIFs) for and determinants of ART initiation were computed, with death and LTFU as competing risks. Among the 135,479 children included, 99,404 (73.4%) initiated ART, 1.9% died, 1.4% were transferred out, and 20.4% were lost to follow-up before ART initiation. The 24-month CIF for ART initiation was 68.2% (95% CI: 67.9%-68.4%); it was lower in sub-Saharan Africa-ranging from 49.8% (95% CI: 48.4%-51.2%) in Central Africa to 72.5% (95% CI: 71.5%-73.5%) in West Africa-compared to Latin America (71.0%, 95% CI: 69.1%-72.7%) and the Asia-Pacific (78.3%, 95% CI: 76.9%-79.6%). Adolescents aged 15-19 years and infants <1 year had the lowest cumulative incidence of ART initiation compared to other ages: 62.2% (95% CI: 61.6%-62.8%) and 66.4% (95% CI: 65.7%-67.0%), respectively. Overall, 49.1% were ART-eligible per local guidelines at baseline, of whom 80.6% initiated ART. The following children had lower cumulative incidence of ART initiation: female children ($p < 0.01$); those aged <1

year, 2-4 years, 5-9 years, and 15-19 years (versus those aged 10-14 years, $p < 0.01$); those who became eligible during follow-up (versus eligible at enrollment, $p < 0.01$); and those receiving care in low-income or lower-middle-income countries ($p < 0.01$). The main limitations of our study include left truncation and survivor bias, caused by deaths of children prior to enrollment, and use of enrollment date as a proxy for missing data on date of HIV diagnosis, which could have led to underestimation of the time between HIV diagnosis and ART initiation.

CONCLUSIONS: In this study, 68% of HIV-infected children initiated ART by 24 months. However, there was a substantial risk of LTFU before ART initiation, which may also represent undocumented mortality. In 2015, many obstacles to ART initiation remained, with substantial inequities. More effective and targeted interventions to improve access are needed to reach the target of treating 90% of HIV-infected children with ART.

29. **"We did not know what was wrong"- Barriers along the care cascade among hospitalized adolescents with HIV in Gaborone, Botswana**
Enane, L. A., Mokete, K., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29630654

High mortality among adolescents with HIV reflects delays and failures in the care cascade. We sought to elucidate critical missed opportunities and barriers to care among adolescents hospitalized with HIV at Botswana's tertiary referral hospital. We enrolled all HIV-infected adolescents (aged 10-19 years) hospitalized with any diagnosis other than pregnancy from July 2015 to January 2016. Medical records were reviewed for clinical variables and past engagement in care. Semi-structured interviews of the adolescents (when feasible) and their caregivers explored delays and barriers to care. Twenty-one eligible adolescents were identified and 15 were enrolled. All but one were WHO Clinical Stage 3 or 4. Barriers to diagnosis included lack of awareness about perinatal HIV infection, illness or death of the mother, and fear of discrimination. Barriers to adherence to antiretroviral therapy included nondisclosure, isolation, and mental health concerns. The number of hospitalized HIV-infected adolescents was lower than expected. However, among those hospitalized, the lack of timely diagnosis and subsequent gaps in the care cascade elucidated opportunities to improve outcomes and quality of life for this vulnerable group.

30. **Access to HIV care and treatment for migrants between Lesotho and South Africa: A mixed methods study**
Faturiyele, I., Karletsos, D., et al. BMC Public Health. 2018.
https://www.hivsharespace.net/resource/access-hiv-care-and-treatment-migrants-between-lesotho-and-south-africa-mixed-methods

BACKGROUND: HIV treatment and care for migrants is affected by their mobility and interaction with HIV treatment programs and health care systems in different countries.

To assess healthcare needs, preferences and accessibility barriers of HIV-infected migrant populations in high HIV burden, borderland districts of Lesotho.

METHODS: We selected 15 health facilities accessed by high patient volumes in three districts of Maseru, Leribe and Mafeteng. We used a mixed methods approach by administering a survey questionnaire to consenting HIV infected individuals on anti-retroviral therapy (ART) and utilizing a purposive sampling procedure to recruit health care providers for qualitative in-depth interviews across facilities.

RESULTS: Out of 524 HIV-infected migrants enrolled in the study, 315 (60.1%) were from urban and 209 (39.9%) from rural sites. Of these, 344 (65.6%) were women, 375 (71.6%) were aged between 26 and 45 years and 240 (45.8%) were domestic workers. A total of 486 (92.7%) preferred to collect their medications primarily in Lesotho compared to South Africa. From 506 who responded to the question on preferred dispensing intervals, 63.1% (n = 319) preferred 5-6 month ARV refills, 30.2% (n = 153) chose 3-4 month refills and only 6.7% (n = 34) opted for the standard-of-care 1-2 month refills. A total of 126 (24.4%) defaulted on their treatment and the primary reason for defaulting was failure to get to Lesotho to collect medication (59.5%, 75/126). Treatment default rates were higher in urban than rural areas (28.3% versus 18.4%, p = 0.011). Service providers indicated a lack of transfer letters as the major drawback in facilitating care and treatment for migrants, followed by discrimination based on nationality or language. Service providers indicated that most patients preferred all treatment services to be rendered in Lesotho, as they perceive the treatment provided in South Africa to be different often less strong or with more serious side effects.

CONCLUSION: Existing healthcare systems in both South Africa and Lesotho experience challenges in providing proper care and treatment for HIV infected migrants. A need for a differentiated model of ART delivery to HIV infected migrants that allows for multi-month scripting and dispensing is warranted.

31. **Monitoring progress towards the first UNAIDS target: Understanding the impact of people living with HIV who re-test during HIV-testing campaigns in rural Mozambique**
Fuente-Soro, L., Lopez-Varela, E., et al. J Int AIDS Soc. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29652098

INTRODUCTION: Awareness of HIV-infection goes beyond diagnosis, and encompasses understanding, acceptance, disclosure and initiation of the HIV-care. We aimed to characterize the HIV-positive population that underwent repeat HIV-testing without disclosing their serostatus and the impact on estimates of the first UNAIDS 90 target.

METHODS: This analysis was nested in a prospective cohort established in southern Mozambique which conducted three HIV-testing modalities: voluntary counselling and testing (VCT), provider-initiated counselling and testing (PICT) and home-based testing (HBT). Participants were given the opportunity to self-report their status to lay

counsellors and HIV-positive diagnoses were verified for previous enrolment in care. This study included 1955 individuals diagnosed with HIV through VCT/PICT and 11,746 participants of a HBT campaign. Those who did not report their serostatus prior to testing, and were found to have a previous HIV-diagnosis, were defined as non-disclosures. Venue-stratified descriptive analyses were performed and factors associated with non-disclosure were estimated through log-binomial regression.

RESULTS: In the first round of 2500 adults randomized for HBT, 1725 were eligible for testing and 18.7% self-reported their HIV-positivity. Of those tested with a positive result, 38.9% were found to be non-disclosures. Similar prevalence of non-disclosures was found in clinical-testing modalities, 29.4% (95% CI 26.7 to 32.3) for PICT strategy and 13.0% (95% CI 10.9 to 15.3) for VCT. Prior history of missed visits (adjusted prevalence ratio (APR) 4.2, 95% CI 2.6 to 6.8), younger age (APR 2.5, 95% CI 1.4 to 4.4) and no prior history of treatment ((APR) 1.4, 95% CI 1.0 to 2.1) were significantly associated with non-disclosure as compared to patients who self-reported. When considering non-disclosures as people living with HIV (PLWHIV) aware of their HIV-status, the proportion of PLWHIV aware increased from 78.3% (95% CI 74.2 to 81.6) to 86.8% (95% CI 83.4 to 89.6).

CONCLUSION: More than one-third of individuals testing HIV-positive did not disclose their previous positive HIV-diagnosis to counsellors. This proportion varied according to testing modality and age. In the absence of an efficient and non-anonymous tracking system for HIV-testers, repeat testing of non-disclosures leads to wasted resources and may distort programmatic indicators. Developing interventions that ensure appropriate psychosocial support are needed to encourage this population to disclose their status and optimize scarce resources.

32. **Childhood traumas as a risk factor for HIV-risk behaviours amongst young women and men living in urban informal settlements in South Africa: A cross-sectional study**
Gibbs, A., Dunkle, K., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29624612

Childhood traumas, in the form of physical, sexual, and emotional abuse and neglect, are globally widespread and highly prevalent, and associated with a range of subsequent poor health outcomes. This study sought to understand the relationship between physical, sexual and emotional childhood abuse and subsequent HIV-risk behaviours amongst young people (18-30) living in urban informal settlements in Durban, South Africa. Data came from self-completed questionnaires amongst 680 women and 677 men comprising the baseline of the Stepping Stones and Creating Futures intervention trial. Men and women were analysed separately. Logistic regression models assessed the relationship between six HIV-risk behaviours and four measures of trauma: the form of trauma, the severity of each trauma, the range of traumas, and overall severity of childhood trauma. Childhood traumas were incredibly prevalent in this population. All childhood traumas were associated with a range of HIV-

risk behaviours. This was for the ever/never trauma, as well as the severity of each type of trauma, the range of trauma, and overall severity of childhood trauma. Despite the wider harsh contexts of urban informal settlements, childhood traumas still play a significant role in shaping subsequent HIV-risk behaviours amongst young people. Interventions to reduce childhood traumas for populations in informal settlements need to be developed. In addition, trauma focused therapies need to be considered as part of wider HIV-prevention interventions for young adults.

33. **Messaging circumstances and economic pressures as influences on linkage to medical male circumcision following community-based HIV testing for men in rural southwest Uganda: A qualitative study**
Gilbert, H. N., Wyatt, M. A., et al. AIDS Res Treat. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29854445

Voluntary medical male circumcision (MMC) reduces risk of HIV infection, but uptake remains suboptimal among certain age groups and locations in sub-Saharan Africa. We analysed qualitative data as part of the Linkages Study, a randomized controlled trial to evaluate community-based HIV testing and follow-up as interventions promoting linkage to HIV treatment and prevention in Uganda and South Africa. Fifty-two HIV-negative uncircumcised men participated in the qualitative study. They participated in semi structured individual interviews exploring (a) home HTC experience; (b) responses to test results; (c) efforts to access circumcision services; (d) outcomes of efforts; (e) experiences of follow-up support; and (f) local HIV education and support. Interviews were audio-recorded, translated, transcribed, and summarized into "linkage summaries." Summaries were analysed inductively to identify the following three thematic experiences shaping men's circumcision choices: (1) intense relief upon receipt of an unanticipated seronegative diagnosis, (2) the role of peer support in overcoming fear, and (3) anticipation of missed economic productivity. Increased attention to the timing of demand creation activities, to who delivers information about the HIV prevention benefits of MMC, and to the importance of missed income during recovery as a barrier to uptake promises to strengthen and sharpen future MMC demand creation strategies.

34. **HIV status disclosure among postpartum women in Zambia with varied intimate partner violence experiences**
Hampanda, K. M. and Rael, C. T. AIDS Behav. 2018.
https://www.hivsharespace.net/resource/hiv-status-disclosure-among-postpartum-women-zambia-varied-intimate-partner-violence

HIV-positive pregnant and postpartum women's status disclosure to male sexual partners is associated with improved HIV and maternal and child health outcomes. Yet, status disclosure remains a challenge for many women living with HIV in sub-Saharan Africa, particularly those who are fearful of violence. The objective of the present study is to advance the current understanding of the relationship between intimate partner

violence against women and their HIV status disclosure behaviors. We specifically evaluate how the severity, frequency, and type of violence against postpartum HIV-positive women affect status disclosure within married/cohabiting couples. A cross-sectional survey was administered by trained local research assistants to 320 HIV-positive postpartum women attending a large public health center for pediatric immunizations in Lusaka, Zambia. Survey data captured women's self-reports of various forms of intimate partner violence and whether they disclosed their HIV status to the current male partner. Multiple logistic regression models determined the odds of status disclosure by the severity, frequency, and type of violence women experienced. Our findings indicate a negative dose-response relationship between the severity and frequency of intimate partner violence and status disclosure to male partners. Physical violence has a more pronounced effect on status disclosure than sexual or emotional violence. Safe options for women living with HIV who experience intimate partner violence, particularly severe and frequent physical violence, are urgently needed. This includes HIV counselors' ability to evaluate the pros and cons of status disclosure among women and support some women's decisions not to disclose.

35. **Prevalence and determinants of unplanned pregnancy in HIV-positive and HIV-negative pregnant women in Cape Town, South Africa: A cross-sectional study**
Lyun, V., Brittain, K., et al. BMJ Open. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29615449

OBJECTIVES: Prevention of unplanned pregnancy is a crucial aspect of preventing mother-to-child HIV transmission. There are few data investigating how HIV status and use of antiretroviral therapy (ART) may influence pregnancy planning in high HIV burden settings. Our objective was to examine the prevalence and determinants of unplanned pregnancy among HIV-positive and HIV-negative women in Cape Town, South Africa.

DESIGN: Cross-sectional analysis.

SETTINGS: Single primary-level antenatal care clinic in Cape Town, South Africa.

PARTICIPANTS: HIV-positive and HIV-negative pregnant women, booking for antenatal care from March 2013 to August 2015, were included.

MAIN OUTCOME MEASURES: Unplanned pregnancy was measured at the first antenatal care visit using the London Measure of Unplanned Pregnancy (LMUP). Analyses examined LMUP scores across four groups of participants defined by their HIV status, awareness of their HIV status prior to the current pregnancy and/or whether they were using antiretroviral therapy (ART) prior to the current pregnancy.

RESULTS: Among 2105 pregnant women (1512 HIV positive; 593 HIV negative), median age was 28 years, 43% were married/cohabiting and 20% were nulliparous. Levels of unplanned pregnancy were significantly higher in HIV-positive versus HIV-negative

women (50% vs 33%, p<0.001); and highest in women who were known HIV positive but not on ART (53%). After adjusting for age, parity and marital status, unplanned pregnancy was most common among women newly diagnosed and women who were known HIV positive but not on ART (compared with HIV-negative women, adjusted OR (aOR): 1.43; 95% CI 1.05 to 1.94 and aOR: 1.57; 95% CI 1.13 to 2.15, respectively). Increased parity and younger age (<24 years) were also associated with unplanned pregnancy (aOR: 1.42; 95% CI 1.25 to 1.60 and aOR: 1.83; 95% CI 1.23 to 2.74, respectively).

CONCLUSIONS: We observed high levels of unplanned pregnancy among HIV-positive women, particularly among those not on ART, suggesting ongoing missed opportunities for improved family planning and counselling services for HIV-positive women.

36. **Impact of counseling received by adolescents undergoing voluntary medical male circumcision on knowledge and sexual intentions**
Kaufman, M. R., Patel, E. U., et al. Clin Infect Dis. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29617781

BACKGROUND: Little is known regarding the impact of counseling delivered during voluntary medical male circumcision (VMMC) services on adolescents' human immunodeficiency virus (HIV) knowledge, VMMC knowledge, or post-VMMC preventive sexual intentions. This study assessed the effect of counseling on knowledge and intentions.

METHODS: Surveys were conducted with 1293 adolescent clients in 3 countries (South Africa, n = 299; Tanzania, n = 498; Zimbabwe, n = 496). Adolescents were assessed on HIV and VMMC knowledge-based items before receiving VMMC pre-procedure counseling and at a follow-up survey approximately 10 days post-procedure. Sexually active adolescents were asked about their sexual intentions in the follow-up survey. Prevalence ratios (PRs) and 95% confidence intervals (CIs) were calculated by modified Poisson regression models with generalized estimating equations and robust variance estimators.

RESULTS: Regarding post-VMMC HIV prevention knowledge, older adolescents were significantly more likely than younger adolescents to know that a male should use condoms (age 10-14 years, 41.1%; 15-19 years, 84.2%; aPR, 1.38 [95% CI, 1.19-1.60]), have fewer sex partners (age 10-14 years, 8.1%; age 15-19 years, 24.5%; aPR, 2.10 [95% CI, 1.30-3.39]), and be faithful to one partner (age 10-14 years, 5.7%; age 15-19 years, 23.2%; aPR, 2.79 [95% CI, 1.97-3.97]) to further protect himself from HIV. Older adolescents demonstrated greater improvement in knowledge in most categories, differences that were significant for questions regarding number of sex partners (aPR, 2.01 [95% CI, 1.18-3.44]) and faithfulness to one partner post-VMMC (aPR, 3.28 [95% CI, 2.22-4.86]). However, prevention knowledge levels overall and HIV risk reduction sexual

intentions among sexually active adolescents were notably low, especially given that adolescents had been counseled only 7-10 days prior.

CONCLUSIONS: Adolescent VMMC counseling needs to be improved to increase knowledge and post procedure preventive sexual intentions.

37. **Perceptions of alcohol use in the context of HIV treatment: A qualitative study**
Madhombiro, M., Marimbe-Dube, B., et al. HIV AIDS (Auckl). 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29670405

BACKGROUND: Alcohol use is associated with poor HIV treatment outcomes. This study aimed to understand patients' perceptions of the impact of alcohol use in the context of HIV care.

METHODS: The study design was a descriptive qualitative study of HIV positive individuals receiving antiretroviral treatment. The study involved four focus group discussions with male and female participants at a tertiary center, city clinic, and rural church. We employed convenience sampling and invited patients coming for their routine visits and medication refills to participate.

RESULTS: Participants had an awareness of both the direct and indirect effects of alcohol use. The direct effects related to the incompatibility of HIV medication and alcohol. The indirect effects related to the negative impact of alcohol on treatment adherence. Participants proffered reasons why HIV infected individuals on HIV treatment drink and felt that patients had to make a deliberate choice to stop drinking. Participants displayed some knowledge of interventions for drinking cessation and highlighted the use of pharmacological interventions to stop drinking. Participants indicated that they preferred HIV counselors to provide counseling services in view of the existing relationships that patients had with counselors.

CONCLUSION: People living with HIV have adequate knowledge of the effects of alcohol use in the context of HIV treatment. Stigma and the time taken to engage in an alcohol use intervention appeared to be the main impediments to uptake. The current model of HIV treatment, based on trust with the HIV care team, and maintenance of this trust, could bolster the uptake of an intervention. Involvement of HIV patients in their treatment is necessary to improve treatment outcomes in the context of alcohol use.

38. **Factors associated with linkage to HIV care and TB treatment at community-based HIV testing services in Cape Town, South Africa**
Meehan, S. A., Sloot, R., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29608616

BACKGROUND: Diagnosing HIV and/or TB is not sufficient; linkage to care and treatment is conditional to reduce the burden of disease. This study aimed to determine factors

associated with linkage to HIV care and TB treatment at community-based services in Cape Town, South Africa.

METHODS: This retrospective cohort study utilized routinely collected data from clients who utilized stand-alone (fixed site not attached to a health facility) and mobile HIV testing services in eight communities in the City of Cape Town Metropolitan district, between January 2008 and June 2012. Clients were included in the analysis if they were >/=12 years and had a known HIV status. Generalized estimating equations (GEE) logistic regression models were used to assess the association between determinants (sex, age, HIV testing service and co-infection status) and self-reported linkage to HIV care and/or TB treatment.

RESULTS: Linkage to HIV care was 3 738/5 929 (63.1%). Linkage to HIV care was associated with the type of HIV testing service. Clients diagnosed with HIV at mobile services had a significantly reduced odds of linking to HIV care (aOR 0.7 (CI 95%: 0.6-0.8), p<0.001. Linkage to TB treatment was 210/275 (76.4%). Linkage to TB treatment was not associated with sex and service type, but was associated with age. Clients in older age groups were less likely to link to TB treatment compared to clients in the age group 12-24 years (all, p-value<0.05).

CONCLUSION: A large proportion of clients diagnosed with HIV at mobile services did not link to care. Almost a quarter of clients diagnosed with TB did not link to treatment. Integrated community-based HIV and TB testing services are efficient in diagnosing HIV and TB, but strategies to improve linkage to care are required to control these epidemics.

39. **Unearthing how, why, for whom and under what health system conditions the antiretroviral treatment adherence club intervention in South Africa works: A realist theory refining approach**
Mukumbang, F. C., Marchal, B., et al. BMC Health Serv Res. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29743067

BACKGROUND: Poor retention in care and suboptimal adherence to antiretroviral treatment (ART) undermine its successful rollout in South Africa. The adherence club intervention was designed as an adherence-enhancing intervention to enhance the retention in care of patients on ART and their adherence to medication. Although empirical evidence suggests the effective superiority of the adherence club intervention to standard clinic ART care schemes, it is poorly understood exactly how and why it works, and under what health system contexts. To this end, we aimed to develop a refined programme theory explicating how, why, for whom and under what health system contexts the adherence club intervention works (or not).

METHODS: We undertook a realist evaluation study to uncover the programme theory of the adherence club intervention. We elicited an initial programme theory of the

adherence club intervention and tested the initial programme theory in three contrastive sites. Using a cross-case analysis approach, we delineated the conceptualisation of the intervention, context, actor and mechanism components of the three contrastive cases to explain the outcomes of the adherence club intervention, guided by retroductive inferencing.

RESULTS: We found that an intervention that groups clinically stable patients on ART in a convenient space to receive a quick and uninterrupted supply of medication, health talks, counselling, and immediate access to a clinician when required works because patients' self-efficacy improves and they become motivated and nudged to remain in care and adhere to medication. The successful implementation and rollout of the adherence club intervention are contingent on the separation of the adherence club programme from other patients who are HIV-negative. In addition, there should be available convenient space for the adherence club meetings, continuous support of the adherence club facilitators by clinicians and buy-in from the health workers at the health-care facility and the community.

CONCLUSION: Understanding what aspects of antiretroviral club intervention works, for what sections of the patient population, and under which community and health systems contexts, could inform guidelines for effective implementation in different contexts and scaling up of the intervention to improve population-level ART adherence.

40. **Are one-stop centres an appropriate model to deliver services to sexually abused children in urban Malawi?**
Mulambia, Y., Miller, A. J., et al. BMC Pediatr. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29712552

BACKGROUND: The Republic of Malawi is creating a country-wide system of 28 One-Stop Centres (known as 'Chikwanekwanes' - 'everything under one roof') to provide medical, legal and psychosocial services for survivors of child maltreatment and adult intimate partner violence. No formal evaluation of the utility of such services has ever been undertaken. This study focused on the experiences of the families served at the country's first Chikwanekwane in the large, urban city of Blantyre.

METHODS: One hundred seven families were surveyed in their home three months after their initial evaluation for sexual abuse at the Blantyre One Stop Centre, and 25 families received a longer interview. The survey was designed to inquire what types of initial evaluation and follow-up services the children received from the medical, legal and social welfare services.

RESULTS: All 107 received an initial medical exam and HIV testing, and 83% received a follow-up HIV test by 3 months; 80.2% were seen by a social welfare worker on the initial visit, and 29% had a home visit by 3 months; 84% were seen by a therapist at the initial visit, and 12% returned for further treatment; 95.3% had an initial police report

and 27.1% ended in a criminal conviction for child sexual abuse. Most of the families were satisfied with the service they received, but a quarter of the families were not satisfied with the law enforcement response, and 2% were not happy with the medical assessment.

CONCLUSIONS: Although a perception of corruption or negligence by police may discourage use of service, we believe that the One-Stop model is an appropriate means to deliver high quality care to survivors of abuse in Malawi.

41. **Knowledge, attitude and practice of infant feeding in the first 6 months among HIV-positive mothers at the Queen Mamohato Memorial hospital clinics, Maseru, Lesotho**
Olorunfemi, S. O. and Dudley, L. Afr J Prim Health Care Fam Med. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29781690

BACKGROUND: The balance between the risks of transmission of human immunodeficiency virus (HIV) through breastfeeding and its life-saving benefits complicates decisions about infant feeding among HIV-positive mothers in the first 6 months.

OBJECTIVE: The aim of this study was to assess the knowledge, attitude and practice of infant feeding among HIV-positive mothers attending the prevention of mother-to-child transmission services in Maseru, Lesotho.

METHOD AND SETTING: This observational cross-sectional study was done by collecting data from HIV-positive mothers attending the filter clinics of Queen Mamohato Memorial hospital in Maseru, Lesotho. HIV-positive mothers with infants below the age of 6 months attending the clinics at the time of the study were interviewed using a standardised questionnaire. We described the sociodemographic profile of the mothers, the information and education received on prevention of mother-to-child transmission (PMTCT) infant feeding options, the mothers' knowledge, attitudes and practices of infant feeding, and assessed risk factors for improved knowledge, attitudes and practices.

RESULTS: The majority (96%) of the 191 HIV-positive mothers who participated in the survey knew about the PMTCT programme and related breastfeeding services. Most of the participants chose to breastfeed (89%), while only 8% formula-fed their infants. Knowledge received during the PMTCT programme was significantly associated with the decision to exclusively breastfeed their infants. Earlier infant feeding counselling and education was associated with more exclusively breastfeeding as compared to late infant feeding counselling ($p < 0.001$).

CONCLUSION: The study found that HIV-positive mothers attending health clinics in Maseru, Lesotho, had high knowledge, and appropriate attitudes and practices with

respect to infant feeding; and that early counselling and education improved infant feeding methods among these mothers.

42. **Ethical issues in the use of SMS messaging in HIV care and treatment in low- and middle-income countries: Case examples from Mozambique**
Ossemane, E. B., Moon, T. D., et al. J Am Med Inform Assoc. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29088384

The introduction of mobile communication technologies in health care in low- and middle-income countries offers an opportunity for increased efficiencies in provision of care, improved utilization of scarce resources, reductions in workload, and increased reach of services to a larger target population. Short message service (SMS) technologies offer promise, with several large-scale SMS-based implementations already under way. Still largely lacking in the research literature are evaluations of specific ethical issues that arise when SMS programs are implemented and studied in resource-limited settings. In this paper, we examine the ethical issues raised by the deployment of SMS messaging to support patient retention in HIV care and treatment and in the research conducted to evaluate that deployment. We use case studies that are based in Mozambique and ground our discussion in the ethical framework for international research proposed by Emanuel et al., highlighting ethical considerations needed to guide the design and implementation of future SMS-based interventions. Such guidance is increasingly needed in countries such as Mozambique, where the local capacity for ethical study design and oversight is still limited and the scale-up and study of mHealth initiatives are still driven predominantly by international collaborators. These issues can be complex and will need ongoing attention on a case-by-case basis to ensure that appropriate protections are in place, while simultaneously maximizing the potential benefit of new mHealth technologies.

43. **Age differences in perceptions of and motivations for voluntary medical male circumcision among adolescents in South Africa, Tanzania, and Zimbabwe**
Patel, E. U., Kaufman, M. R., et al. Clin Infect Dis. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29617775

BACKGROUND: The World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS) have set a Fast-Track goal to achieve 90% coverage of voluntary medical male circumcision (VMMC) among boys and men aged 10-29 years in priority settings by 2021. We aimed to identify age-specific facilitators of VMMC uptake among adolescents.

METHODS: Younger (aged 10-14 years; n = 967) and older (aged 15-19 years; n = 559) male adolescents completed structured interviews about perceptions of and motivations for VMMC before receiving VMMC counseling at 14 service provision sites across South Africa, Tanzania, and Zimbabwe. Adjusted prevalence ratios (aPRs) were

estimated using multivariable modified Poisson regression models with generalized estimating equations and robust standard errors.

RESULTS: The majority of adolescents reported a strong desire for VMMC. Compared with older adolescents, younger adolescents were less likely to cite protection against human immunodeficiency virus (HIV) or other sexually transmitted infections (aPR, 0.77; 95% confidence interval [CI], .66-.91) and hygienic reasons (aPR, 0.55; 95% CI, .39-.77) as their motivation to undergo VMMC but were more likely to report being motivated by advice from others (aPR, 1.88; 95% CI, 1.54-2.29). Although most adolescents believed that undergoing VMMC was a normative behavior, younger adolescents were less likely to perceive higher descriptive norms (aPR, 0.79; .71-.89), injunctive norms (aPR, 0.86; 95% CI, .73-1.00), or anticipated stigma for being uncircumcised (aPR, 0.79; 95% CI, .68-.90). Younger adolescents were also less likely than older adolescents to correctly cite that VMMC offers men and boys partial HIV protection (aPR, 0.73; 95% CI, .65-.82). Irrespective of age, adolescents' main concern about undergoing VMMC was pain (aPR, 0.95; 95% CI, .87-1.04). Among younger adolescents, fear of pain was negatively associated with desire for VMMC (aPR, 0.89; 95% CI, .83-.96).

CONCLUSIONS: Age-specific strategies are important to consider to generate sustainable demand for VMMC. Programmatic efforts should consider building on the social norms surrounding VMMC and aim to alleviate fears about pain.

44. Adolescent access to care and risk of early mother-to-child HIV transmission
Ramraj, T., Jackson, D., et al. J Adolesc Health. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29269045

PURPOSE: Adolescent females aged 15-19 account for 62% of new HIV infections and give birth to 16 million infants annually. We quantify the risk of early mother-to-child transmission (MTCT) of HIV among adolescents enrolled in nationally representative MTCT surveillance studies in South Africa.

METHODS: Data from 4,814 adolescent (</=19 years) and 25,453 adult (>/=20 years) mothers and their infants aged 4-8 weeks were analyzed. These data were gathered during three nationally representative, cross-sectional, facility-based surveys, conducted in 2010, 2011-2012, and 2012-2013. All infants were tested for HIV antibody (enzyme immunoassay), to determine HIV exposure. Enzyme immunoassay-positive infants or those born to self-reported HIV-positive mothers were tested for HIV infection (total nucleic acid polymerase chain reaction). Maternal HIV positivity was inferred from infant HIV antibody positivity. All analyses were weighted for sample realization and population live births.

RESULTS: Adolescent mothers, compared with adult mothers, have almost three times less planned pregnancies 14.4% (95% confidence interval [CI]: 12.5-16.5) versus 43.9% (95% CI: 42.0-45.9) in 2010 and 15.2% (95% CI: 13.0-17.9) versus 42.8% (95% CI: 40.9-

44.6) in 2012-2013 (p < .0001), less prevention of MTCT uptake (odds ratio [OR] in favor of adult mothers = 3.36, 95% CI: 2.95-3.83), and higher early MTCT (adjusted OR = 3.0, 95% CI: 1.1-8.0), respectively. Gestational age at first antenatal care booking was the only significant predictor of early MTCT among adolescents.

CONCLUSIONS: Interventions that appeal to adolescents and initiate sexual and reproductive health care early should be tested in low- and middle-income settings to reduce differential service uptake and infant outcomes between adolescent and adult mothers.

45. **Ethical challenges in developing an educational video to empower potential participants during consent processes in HIV cure research in South Africa**
Staunton, C., de Roubaix, M., et al. J Virus Erad. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29682301

Obtaining consent for HIV research is complex, particularly in low- and middle-income countries. Low levels of education, complexity of science and research processes, confusion about basic elements of research, and socio-economic conditions that make access to medical care difficult have collectively led to concerns about the adequacy of the consent process. Given the exponential growth of HIV prevention and treatment research in South Africa, HIV researchers are increasingly facing challenges obtaining authentic informed consent from potential participants. It is anticipated that HIV cure research, despite being in its infancy in South Africa, will introduce a new discourse into a population that is often struggling to understand the differences between 'cure', 'preventive and therapeutic vaccines' and other elements of the research process. Coupled with this, South Africa has a complex history of 'illegitimate' or 'false cures' for HIV. It is therefore logical to anticipate that HIV cure research may face significant challenges during consent processes. HIV prevention research in South Africa has demonstrated the importance of early community engagement in educating potential research participants and promoting community acceptance of research. Consequently, in an attempt to extrapolate from this experience of engaging with communities early regarding cure research, a 15-minute educational video entitled 'I have a dream: a world without HIV' was developed to educate and ultimately empower potential research participants to make informed choices during consent processes in future HIV cure clinical trials. To aid others in the development of educational interventions, this paper discusses the challenges faced in developing this educational video.

46. **Identifying 'corridors of HIV transmission' in a severely affected rural South African population: A case for a shift toward targeted prevention strategies**
Tanser, F., Barnighausen, T., et al. Int J Epidemiol. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29300904

BACKGROUND: In the context of a severe generalized African HIV epidemic, the value of geographically targeted prevention interventions has only recently been given serious

consideration. However, to date no study has performed a population-based analysis of the micro-geographical clustering of HIV incident infections, limiting the evidential support for such a strategy.

METHODS: We followed 17 984 HIV-uninfected individuals aged 15-54 in a population-based cohort in rural KwaZulu-Natal, South Africa, and observed individual HIV sero-conversions between 2004 and 2014. We geo-located all individuals to an exact homestead of residence (accuracy <2 m). We then employed a two-dimensional Gaussian kernel of radius 3 km to produce robust estimates of HIV incidence which vary across continuous geographical space. We also applied Tango's flexibly shaped spatial scan statistic to identify irregularly shaped clusters of high HIV incidence. Results: Between 2004 and 2014, we observed a total of 2 311 HIV sero-conversions over 70 534 person-years of observation, at an overall incidence of 3.3 [95% confidence interval (CI), 3.1-3.4] per 100 person-years. Three large irregularly-shaped clusters of new HIV infections (relative risk = 1.6, 1.7 and 2.3) were identified in two adjacent peri-urban communities near the National Road (P = 0.001, 0.015) as well as in a rural node bordering a recent coal mine development (P = 0.020), respectively. Together the clusters had a significantly higher age-sex standardized incidence of 5.1 (95% CI, 4.7-5.6) per 100 person-years compared with a standardized incidence of 3.0 per 100 person-years (95% CI, 2.9-3.2) in the remainder of the study area. Though these clusters comprise just 6.8% of the study area, they account for one out of every four sero-conversions observed over the study period.

CONCLUSIONS: Our study has revealed clear 'corridors of transmission' in this typical rural, hyper-endemic population. Even in a severely affected rural African population, an approach that seeks to provide preventive interventions to the most vulnerable geographies could be more effective and cost-effective in reducing the overall rate of new HIV infections. There is an urgent need to develop and test such interventions as part of an overall combination prevention approach.

47. Prevalence and associations of psychological distress, HIV infection and HIV care service utilization in East Zimbabwe

Tlhajoane, M., Eaton, J. W., et al. AIDS Behav. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/28194585

The correlation between mental health and sexual risk behaviours for HIV infection remains largely unknown in low and middle income settings. The present study determined the prevalence of psychological distress (PD) in a sub-Saharan African population with a generalized HIV epidemic, and investigated associations with HIV acquisition risk and uptake of HIV services using data from a cross-sectional survey of 13,252 adults. PD was measured using the Shona Symptom Questionnaire. Logistic regression was used to measure associations between PD and hypothesized covariates. The prevalence of PD was 4.5% (95% CI 3.9-5.1%) among men, and 12.9% (95% CI 12.2-13.6%) among women. PD was associated with sexual risk behaviours for HIV infection

and HIV-infected individuals were more likely to suffer from PD. Amongst those initiated on anti-retroviral therapy, individuals with PD were less likely to adhere to treatment (91 vs. 96%; age- and site-type-adjusted odds ratio = 0.38; 95% CI 0.15, 0.99). Integrated HIV and mental health services may enhance HIV care and treatment outcomes in high HIV-prevalence populations in sub-Saharan Africa.

48. **Prevention of mother-to-child transmission of HIV: A cross-sectional study in Malawi**
van Lettow, M., Landes, M., et al. Bull World Health Organ. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29695882

OBJECTIVE: To estimate the use and outcomes of the Malawian programme for the prevention of mother-to-child transmission (MTCT) of human immunodeficiency virus (HIV).

METHODS: In a cross-sectional analysis of 33 744 mother-infant pairs, we estimated the weighted proportions of mothers who had received antenatal HIV testing and/or maternal antiretroviral therapy and infants who had received nevirapine prophylaxis and/or HIV testing. We calculated the ratios of MTCT at 4-26 weeks postpartum for subgroups that had missed none or at least one of these four steps.

FINDINGS: The estimated uptake of antenatal testing was 97.8%; while maternal antiretroviral therapy was 96.3%; infant prophylaxis was 92.3%; and infant HIV testing was 53.2%. Estimated ratios of MTCT were 4.7% overall and 7.7% for the pairs that had missed maternal antiretroviral therapy, 10.7% for missing both maternal antiretroviral therapy and infant prophylaxis and 11.4% for missing maternal antiretroviral therapy, infant prophylaxis and infant testing. Women younger than 19 years were more likely to have missed HIV testing (adjusted odds ratio, aOR: 4.9; 95% confidence interval, CI: 2.3-10.6) and infant prophylaxis (aOR: 6.9; 95% CI: 1.2-38.9) than older women. Women who had never started maternal antiretroviral therapy were more likely to have missed infant prophylaxis (aOR: 15.4; 95% CI: 7.2-32.9) and infant testing (aOR: 13.7; 95% CI: 4.2-83.3) than women who had.

CONCLUSION: Most women used the Malawian programme for the prevention of MTCT. The risk of MTCT increased if any of the main steps in the programme were missed.

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LAY HEALTH WORKERS (4)

49. **The role of community health workers in improving HIV treatment outcomes in children: Lessons learned from the ZENITH trial in Zimbabwe**
Busza, J., Dauya, E., et al. Health Policy Plan. 2018.

https://www.hivsharespace.net/resource/role-community-health-workers-improving-hiv-treatment-outcomes-children-lessons-learned

Reliance on community health workers (CHWs) for HIV care continues to increase, particularly in resource-limited settings. CHWs can improve HIV service use and adherence to treatment, but effectiveness of these programmes relies on providing an enabling work environment for CHWs, including reasonable workload, supportive supervision and adequate training and supplies. Although criteria for effective CHW programmes have been identified, these have rarely been prospectively applied to design and evaluation of new interventions. For the Zimbabwe study for Enhancing Testing and Improving Treatment of HIV in Children (ZENITH) randomized controlled trial, we based our intervention on an existing evidence-based framework for successful CHW programmes. To assess CHWs' experiences delivering the intervention, we conducted longitudinal, qualitative semi-structured interviews with all 19 CHWs at three times during implementation. The study aimed to explore CHWs' perceptions of how the intervention's structure and management affected their performance, and consider implications for the programme's future scale-up and adoption in other settings. CHWs expressed strong motivation, commitment and job satisfaction. They considered the intervention acceptable and feasible to deliver, and levels of satisfaction rose over interview rounds. Intensive supervision and mentoring emerged as critical to ensuring CHWs' long-term satisfaction. Provision of job aids, standardized manuals and refresher training were also important, as were formalized links between clinics and CHWs. Concerns raised by CHWs included poor remuneration, their reluctance to stop providing support to individual families following the requisite number of home visits, and disappointment at the lack of programme sustainability following completion of the trial. Furthermore, intensive supervision and integration with clinical services may be difficult to replicate outside a trial setting. This study shows that existing criteria for designing successful CHW programmes are useful for maximizing effectiveness, but challenges remain for ensuring long-term sustainability of 'task shifting' strategies.

50. **Community health worker support to improve HIV treatment outcomes for older children and adolescents in Zimbabwe: A process evaluation of the ZENITH trial**
Dziva Chikwari, C., Simms, V., et al. Implement Sci. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29792230

BACKGROUND: Community health worker (CHW)-delivered support visits to children living with HIV and their caregivers significantly reduced odds of virological failure among the children in the ZENITH trial conducted in Zimbabwe. We conducted a process evaluation to assess fidelity, acceptability, and feasibility of this intervention to identify lessons that could inform replication and scale-up of this approach.

METHODS: Field manuals kept by each CHW, records from monthly supervisory meetings, and participant data collected throughout the trial were used to assess the intervention's implementation. Data extracted from field manuals included visit type,

content, and duration. Minutes from monthly supervisory meetings were used to capture CHW attendance.

RESULTS: The trial enrolled 172 participants in the intervention arm of whom 5 subsequently refused all visits, 1 died before the intervention could be delivered, and 1 could not be located. Manuals for 8 participants were not returned, 3 were incorrectly entered, and 1 manual was lost. We had 154 manuals available for analysis. A total of 1553 visits were successfully conducted (median 11 per participant, range 1-20). Additionally, CHWs made 85 visits where they were unable to make contact with the family. Thirteen (8.4%) participants received 5 or fewer visits, 10 moved out of the study area, and 3 died. CHWs discussed disclosure with the child/family for over 89% of participants and assisted clients with developing and reviewing their personal treatment plan with over 85% of participants. Of the 20 CHWs (3 male, 17 female) selected to implement the intervention, 19 were retained at the end of the trial.

CONCLUSIONS: The intervention was acceptable to participants with most receiving and accepting the required number of visits. Key strengths were high staff retention and fidelity to the intervention. This community-based intervention was an acceptable and feasible approach to reduce virological failure among children living with HIV.

51. **Making ward-based outreach teams an effective component of human immunodeficiency virus programmes in South Africa**
Naidoo, N., Railton, J., et al. South Afr J HIV Med. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29707389

The implementation of ward-based outreach teams (WBOTs), comprised of community health workers (CHWs), is one of the three interventions of the South African National Department of Health's (NDoH) Primary Health Care (PHC) Re-engineering strategy for improving health outcomes. CHWs provide a necessary structure to contribute to successful implementation of the human immunodeficiency virus (HIV) programme in four ways: (1) prevention of HIV infection by health education, (2) linkage to care by health education and referrals, (3) adherence support and (4) identification of individuals who are failing treatment. However, CHW programme and HIV programme-specific barriers exist that need to be resolved in order to achieve maximum impact. These include a lack of stakeholder and community support for WBOTs, challenging work and operational environments, a lack of in-depth knowledge and skills, and socio-cultural barriers such as HIV-related stigma. Considering its promising structure, documentation of the WBOT contribution to healthcare overall, and the HIV programme in particular, is urgently warranted to successfully and sustainably incorporate it into the South African healthcare system.

52. **Validation of the posttraumatic stress disorder checklist - 5 (PCL-5) in a primary care population with high HIV prevalence in Zimbabwe**
Verhey, R., Chibanda, D., et al. BMC Psychiatry. 2018.

https://www.ncbi.nlm.nih.gov/pubmed/29685117

BACKGROUND: There is a dearth of validated tools measuring posttraumatic stress disorder (PTSD) in low and middle-income countries in sub-Saharan Africa. We validated the Shona version of the PTSD Checklist for DSM-5 (PCL-5) in a primary health care clinic in Harare, Zimbabwe.

METHOD: Adults aged 18 and above attending the clinic were enrolled over a two-week period in June 2016. After obtaining written consent, trained research assistants administered the tool to eligible participants. Study participants were then interviewed independently using the Clinician Administered PTSD Scale (CAPS-5) as the gold standard by one of five doctors with training in mental health.

RESULT: A total of 204 participants were assessed. Of these, 91 (44.6%) were HIV positive, 100 (49%) were HIV negative, while 13 (6.4%) did not know their HIV status. PTSD was diagnosed in 40 (19.6%) participants using the gold standard procedure. Using the PCL-5 cut-off of >/=33, sensitivity and specificity were 74.5% (95%CI: 60.4-85.7); 70.6% (95%CI: 62.7-77.7), respectively. The area under the ROC curve was 0.78 (95%CI: 0.72-0.83). The Shona version of the PCL-5 demonstrated good internal consistency (Cronbach's alpha = 0.92).

CONCLUSION: The PCL-5 performed well in this population with a high prevalence of HIV. There is need to explore ways of integrating screening tools for PTSD in interventions delivered by lay health workers in low and middle-income countries (LMIC).

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RESEARCHERS (20)

53. **A pilot study of a nurse-delivered cognitive behavioral therapy intervention (Ziphamandla) for adherence and depression in HIV in South Africa**
Andersen, L. S., Magidson, J. F., et al. J Health Psychol. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/27121977

Depression is prevalent among people living with HIV in South Africa and interferes with adherence to antiretroviral therapy. This study evaluated a nurse-delivered, cognitive behavioral therapy intervention for adherence and depression among antiretroviral therapy users with depression in South Africa (n = 14). Primary outcomes were depression, antiretroviral therapy adherence, feasibility, and acceptability. Findings support robust improvements in mood through a 3-month follow up. Antiretroviral therapy adherence was maintained during the intervention period. Participant retention supports acceptability; however, modest provider fidelity despite intensive supervision

warrants additional attention to feasibility. Future effectiveness research is needed to evaluate this nurse-delivered cognitive behavioral therapy intervention for adherence and depression in this context.

54. **Risk factors and co-morbidities associated with changes in renal function among antiretroviral treatment-naïve adults in South Africa: a chart review**
Assaram, S., Mashamba-Thompson, T. P., et al. South Afr J HIV Med. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29707388

INTRODUCTION: Our systematic scoping review has demonstrated a research gap in antiretroviral treatment (ART) nephrotoxicity as well as in the long-term outcomes of renal function for patients on ART in South Africa. Bearing in mind the high prevalence of human immunodeficiency virus (HIV) in South Africa, this is of great concern. Objectives: To determine the risk factors and co-morbidities associated with changes in renal function in HIV-infected adults in South Africa.

METHODS: We conducted a retrospective study of 350 ART-naive adult patients attending the King Edward VIII HIV clinic, Durban, South Africa. Data were collected at baseline (pre-ART) and at six, 12, 18 and 24 months on ART. Renal function was assessed in the 24-month period using the Modification of Diet in Renal Disease equation and was categorised into normal renal function (estimated glomerular filtration rate [eGFR] >/= 60), moderate renal impairment (eGFR 30-59), severe renal impairment (eGFR 15-29) and kidney failure (eGFR < 15 mL/min/1.73 m(2)). Generalised linear models for binary data were used to model the probability of renal impairment over the five time periods, controlling for repeated measures within participants over time. Risk ratios and 95% confidence intervals (CI) were reported for each time point versus baseline.

RESULTS: The cohort was 64% female, and 99% were Black. The median age was 36 years. At baseline, 10 patients had hypertension (HPT), six had diabetes, 61 were co-infected with tuberculosis (TB) and 157 patients had a high body mass index (BMI) with 25.4% being categorised as overweight and 19.4% as obese. The majority of the patients (59.3%) were normotensive. At baseline, the majority of the patients (90.4%) had normal renal function (95% CI: 86% - 93%), 7.0% (CI: 5% - 10%) had moderate renal impairment, 1.3% (CI: 0% - 3%) had severe renal impairment and 1.3% (CI: 0% - 3%) had renal failure. As BMI increased by one unit, the risk of renal impairment increased by 1.06 (CI: 1.03-1.10) times. The association of HPT with abnormal renal function was found to be insignificant, p > 0.05. The vast majority of patients were initiated on tenofovir disoproxil fumarate (TDF) (90.6%), in combination with lamivudine (3TC) (100%) and either efavirenz (EFV) (56.6%) or nevirapine (NVP) (43.4%).

CONCLUSION: This study reports a low prevalence of baseline renal impairment in HIV-infected ART-naive outpatients. An improvement in renal function after the commencement of ART has been demonstrated in this population. However, the long-term outcomes of patients with HIV-related renal disease are not known.

55. **The prevalence and determinants of active tuberculosis among diabetes patients in Cape Town, South Africa, a high HIV/TB burden setting**
Berkowitz, N., Okorie, A., et al. Diabetes Res Clin Pract. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29382589

AIMS: Studies addressing the association between diabetes mellitus (DM) and tuberculosis (TB) in sub-Saharan Africa are limited. We assessed the prevalence of active TB among DM patients at a primary care clinic, and identified risk factors for prevalent TB.

METHODS: A cross-sectional study was conducted in adult DM patients attending a clinic in Khayelitsha, Cape Town. Participants were screened for active TB (symptom screening and microbiological diagnosis) and HIV.

RESULTS: Among 440 DM patients screened, the active TB prevalence was 3.0% (95% CI 1.72-5.03). Of the 13 prevalent TB cases, 53.9% (n=7; 95% CI 27.20-78.50) had no TB symptoms, and 61.5% (n=8; 95% CI 33.30-83.70) were HIV-1 co-infected. There were no significant differences in either fasting plasma glucose or HbA1c levels between TB and non-TB participants. On multivariate analysis, HIV-1 infection (OR 11.3, 95% CI 3.26-39.42) and hemoptysis (OR 31.4, 95% CI 3.62-273.35) were strongly associated with prevalent active TB, with no differences in this association by age or gender.

CONCLUSIONS: The prevalence of active TB among DM patients was 4-fold higher than the national prevalence; suggesting the need for active TB screening, particularly if hemoptysis is reported. Our results highlight the importance of HIV screening in this older population group. The high prevalence of sub-clinical TB among those diagnosed with TB highlights the need for further research to determine how best to screen for active TB in high-risk TB/HIV population groups and settings.

56. **Beyond syndromic management: Opportunities for diagnosis-based treatment of sexually transmitted infections in low- and middle-income countries**
Garrett, N. J., Osman, F., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29689080

INTRODUCTION: In light of the limited impact the syndromic management approach has had on the global sexually transmitted infection (STI) epidemic, we assessed a care model comprising point-of-care (POC) STI testing, immediate treatment, and expedited partner therapy (EPT) among a cohort of young women at high HIV risk in South Africa.

METHODS AND FINDINGS: HIV negative women presenting for STI care underwent POC testing for Chlamydia trachomatis (CT), Neisseria gonorrhoeae (NG) and Trichomonas vaginalis (TV), and swabs were sent for NG culture and susceptibility testing. Results were available within 2 hours and women with STIs were immediately treated and offered EPT packs, including medication, condoms, and information for sexual partners.

An EPT questionnaire was administered after one week, and women retested for STIs after 6 and 12 weeks. 267 women, median age 23 (IQR 21-26), were recruited and 88.4% (236/267) reported genital symptoms. STI prevalence was CT 18.4% (95%CI 13.7-23.0), NG 5.2% (95%CI 2.6-7.9) and TV 3.0% (95%CI 1.0-5.0). After 12 weeks, all but one NG and two CT infections were cleared. No cephalosporin-resistant NG was detected. Of 63/267 women (23.6%) diagnosed with STIs, 98.4% (62/63) were offered and 87.1% (54/62) accepted EPT. At one week 88.9% (48/54) stated that their partner had taken the medication. No allergic reactions or social harms were reported. Of 51 women completing 6-week follow up, detection rates were lower amongst women receiving EPT (2.2%, 1/46) compared to those who did not (40.0%, 2/5), p = 0.023. During focus group discussions women supported the care model, because they received a rapid, specific diagnosis, and could facilitate their partners' treatment.

CONCLUSIONS: POC STI testing and EPT were acceptable to young South African women and their partners, and could play an important role in reducing STI reinfection rates and HIV risk. Larger studies should evaluate the feasibility and cost-effectiveness of implementing this strategy at population level.

57. **List randomization for eliciting HIV status and sexual behaviors in rural KwaZulu-Natal, South Africa: A randomized experiment using known true values for validation**
Haber, N., Harling, G., et al. BMC Med Res Methodol. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29793433

BACKGROUND: List randomization (LR), a survey method intended to mitigate biases related to sensitive true/false questions, has received recent attention from researchers. However, tests of its validity are limited, with no study comparing LR-elicited results with individually known truths. We conducted a test of LR for HIV-related responses in a high HIV prevalence setting in KwaZulu-Natal. By using researcher-known HIV serostatus and HIV test refusal data, we were able to assess how LR and direct questionnaires perform against individual known truth.

METHODS: Participants were recruited from the participation list from the 2016 round of the Africa Health Research Institute demographic surveillance system, oversampling individuals who were HIV positive. Participants were randomized to two study arms. In Arm A, participants were presented five true/false statements, one of which was the sensitive item, the others non-sensitive. Participants were then asked how many of the five statements they believed were true. In Arm B, participants were asked about each statement individually. LR estimates used data from both arms, while direct estimates were generated from Arm B alone. We compared elicited responses to HIV testing and serostatus data collected through the demographic surveillance system.

RESULTS: We enrolled 483 participants, 262 (54%) were randomly assigned to Arm A, and 221 (46%) to Arm B. LR estimated 56% (95% CI: 40 to 72%) of the population to be HIV-negative, compared to 47% (95% CI: 39 to 54%) using direct estimates; the

population-estimate of the true value was 32% (95% CI: 28 to 36%). LR estimates yielded HIV test refusal percentages of 55% (95% CI: 37 to 73%) compared to 13% (95% CI: 8 to 17%) by direct estimation, and 15% (95% CI: 12 to 18%) based on observed past behavior.

CONCLUSIONS: In this context, LR performed poorly when compared to known truth, and did not improve estimates over direct questioning methods when comparing with known truth. These results may reflect difficulties in implementation or comprehension of the LR approach, which is inherently complex. Adjustments to delivery procedures may improve LR's usefulness. Further investigation of the cognitive processes of participants in answering LR surveys is warranted.

58. **Impact of an educational video as a consent tool on knowledge about cure research among patients and caregivers at HIV clinics in South Africa**
Hendricks, M., Nair, G., et al. J Virus Erad. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29682302

BACKGROUND: Despite increasing access to antiretroviral therapy in low- and middle-income countries, only 54% of eligible individuals were receiving treatment in Africa by 2015. Recent developments in HIV cure research have been encouraging. However, the complex science and procedures of cure research render the informed consent process challenging.

OBJECTIVE: This study evaluates the impact of a video tool on educating participants about HIV cure.

METHODS: A questionnaire assessing the content of the video was administered to adults recruited from two clinics in South Africa. Patients and their care partners, who provided voluntary informed consent, were included in the study. The questionnaire was administered in each participant's home language before, immediately after and at 3 months after viewing the video, in an uncontrolled quasi-experimental 'one group pre-test-post-test' design. Scoring was carried out according to a predetermined scoring grid, with a maximum score of 22.

RESULTS: A total of 88 participants, median age 32.0 years and 86% female, were enrolled and completed the pre- and post-video questionnaires. Twenty-nine (33%) completed the follow-up questionnaire 3 months later to assess retention of knowledge. Sixty-three (72%) participants had a known HIV-positive status. A significant increase (10.1 vs 15.1, P=0.001) in knowledge about HIV and HIV cure immediately after viewing the video was noted. No statistically significant difference in knowledge between HIV-positive and -negative patients was noted at baseline. After 3 months, a decrease in performance participation (14 vs 13.5, P=0.19) was noted. However, knowledge scores achieved after 3 months remained significantly higher than scores at baseline (13.5 vs 9.5, P<0.01).

CONCLUSIONS: This research showed that a video intervention improved participants' knowledge related to HIV, HIV cure research and ethics, and the improvement was sustained over 3 months. Video intervention may be a useful tool to add to the consent process when dealing with complex medical research questions.

59. **Exploratory analysis of the ecological variables associated with sexual health profiles in high-risk, sexually-active female learners in rural KwaZulu-Natal**
Humphries, H., Osman, F., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29621283

PURPOSE: Young women are at high risk for negative sexual health outcomes. Despite their high risk, many sexually-active women never experience negative sexual health outcomes. This study explored the ecological risk factors associated with the risk profiles of sexually-active female high school-learners in rural KwaZulu-Natal, South Africa.

METHODS: Using baseline data from N = 596 sexually-active school-going women, we explored the ecological factors associated with being sexually-active and managing risk successfully [SARS] or unsuccessfully [SARU]. Generalised estimated equations (GEE) were applied to data collected at multiple levels while adjusting for school and other included variables. GEE were used to calculate probability of being SARU.

RESULTS: Amongst SARU learners, 21.9% had HIV, 38.6% had HSV-2, 12.5% were pregnant, 28.7% self-reported STI symptoms and 51.9% reported a previous pregnancy. Individual-level factors had the greatest impact on being SARU. Univariate and multivariate analysis highlighted several important partner factors associated with SARU. Age was significantly associated with the risk profiles ($p<0.0001$), a greater proportion of SARU learners were 18 or older compared to the SARS learners. The odds of being SARU decreased when >/=18 years (aOR = 0.2577, 95% CI 0.1462-0.4542) or if not falling pregnant was important (aOR = 0.6343, 95% CI 0.4218-0.9538). Having >1 HIV test (aOR = 2.2161, 95% CI 1.3964-3.5169) increased the odds a SARU profile.

CONCLUSION: Individual and partner level factors are important for the sexual health profile of an adolescent female. While the exploratory findings require further research; managing multiple sexual health outcomes, tailoring responses around a risk profile and including partners is essential for successful interventions.

60. **No changes on viral load and CD4+ T-cell counts following immunization with 7-valent pneumococcal conjugate vaccine among HIV-infected adults in Malawi**
Ibarz-Pavon, A. B. and French, N. Vaccine. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29636247

Vaccination has been associated with a transient increase in viremia in HIV-infected individuals, although contradicting evidence persist in the literature. As part of a

randomized placebo-controlled efficacy trial of the PCV7 in Malawi, we collected viral load and CD4+ T-cell counts from 237 adults who received two doses of vaccine or placebo, administered 4weeks apart. Analyses were conducted separately for cART and non-cART users. Our analysis show no difference in viral loads between vaccine and placebo groups, regardless of cART use. Viremia decreased from 4.1 to 2.9 log10 copies/mL ($p<0.0001$) among those using cART, consistent vaccine and placebo groups, but no changes were seen among the non-cART cohort. CD4+ T-cell counts remained unchanged regardless of cART use, or allocation to vaccine or placebo. We concluded that there was no evidence of detrimental effects of PCV7 administration on viral load or CD4+ T-cell counts six months after vaccination with PCV7.

61. **Impact of a "diagonal" intervention on uptake of sexual and reproductive health services by female sex workers in Mozambique: A mixed-methods implementation study**
Lafort, Y., Lessitala, F., et al. Front Public Health. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29721490

BACKGROUND: Female sex workers (FSWs) have high risks for adverse sexual and reproductive health (SRH) outcomes, yet low access to services. Within an implementation research project enhancing uptake of SRH services by FSWs, we piloted a "diagonal" intervention, which combined strengthening of FSW-targeted services (vertical) with making public health facilities more FSW-friendly (horizontal), and tested its effect.

METHODS: The study applied a convergent parallel mixed-methods design to assess changes in access to SRH services. Results of structured interviews with FSWs pre-intervention (N = 311) and thereafter (N = 404) were compared with the findings of eight post-intervention focus group discussions (FGDs) with FSWs and two with FSW-peer educators (PEs).

RESULTS: Marked and statistically significant rises occurred in consistent condom use with all partners (55.3-67.7%), ever use of female condoms (37.9-54.5%), being tested for HIV in the past 6 months (56.0-76.6%), using contraception (84.5-95.4%), ever screened for cervical cancer (0.0-16.9%) and having >/=10 contacts with a PE in the past year (0.5-24.45%). Increases mostly resulted from FSW-targeted outreach, with no rise detected in utilization of public health facilities. FGD participants reported that some facilities had become more FSW-friendly, but barriers such as stock-outs, being asked for bribes and disrespectful treatment persisted.

CONCLUSION: The combination of expanding FSW-targeted SRH services with improving access to the public health services resulted in an overall increased uptake of services, but almost exclusively because of the strengthened targeted (vertical) outreach services. Utilization of public SRH services had not yet increased and many barriers to access remained. Our diagonal approach was thus only successful in its vertical

component. Improving access to the general health services remains nevertheless important and further research is needed how to reduce barriers. Ideally, the combination approach should be maintained and more successful approaches to increase utilization of public services should be explored.

62. **Scaling up ART adherence clubs in the public sector health system in the Western Cape, South Africa: A study of the institutionalisation of a pilot innovation**
MacGregor, H., McKenzie, A., et al. Global Health. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29695268

BACKGROUND: In 2011, a decision was made to scale up a pilot innovation involving 'adherence clubs' as a form of differentiated care for HIV positive people in the public sector antiretroviral therapy programme in the Western Cape Province of South Africa. In 2016 we were involved in the qualitative aspect of an evaluation of the adherence club model, the overall objective of which was to assess the health outcomes for patients accessing clubs through epidemiological analysis, and to conduct a health systems analysis to evaluate how the model of care performed at scale. In this paper we adopt a complex adaptive systems lens to analyse planned organisational change through intervention in a state health system. We explore the challenges associated with taking to scale a pilot that began as a relatively simple innovation by a non-governmental organisation.

RESULTS: Our analysis reveals how a programme initially representing a simple, unitary system in terms of management and clinical governance had evolved into a complex, differentiated care system. An innovation that was assessed as an excellent idea and received political backing, worked well whilst supported on a small scale. However, as scaling up progressed, challenges have emerged at the same time as support has waned. We identified a 'tipping point' at which the system was more likely to fail, as vulnerabilities magnified and the capacity for adaptation was exceeded. Yet the study also revealed the impressive capacity that a health system can have for catalysing novel approaches.

CONCLUSIONS: We argue that innovation in largescale, complex programmes in health systems is a continuous process that requires ongoing support and attention to new innovation as challenges emerge. Rapid scaling up is also likely to require recourse to further resources, and a culture of iterative learning to address emerging challenges and mitigate complex system errors. These are necessary steps to the future success of adherence clubs as a cornerstone of differentiated care. Further research is needed to assess the equity and quality outcomes of a differentiated care model and to ensure the inclusive distribution of the benefits to all categories of people living with HIV.

63. **HBV and HIV viral load but not microbial translocation or immune activation are associated with liver fibrosis among patients in South Africa**
Maponga, T. G., Andersson, M. I., et al. BMC Infect Dis. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29739341

BACKGROUND: Co-infection with HIV negatively impacts the progression of chronic hepatitis B virus (HBV) infection, including causing rapid progression to liver fibrosis. Sub-Saharan Africa represents arguably the most important intersection of high endemicity of both chronic hepatitis B virus (HBV) infection and HIV infection.

METHODS: We recruited 46 HBV/HIV-co-infected; 47 HBV-monoinfected; 39 HIV-monoinfected; and 37 HBV/HIV-uninfected patients from Tygerberg Hospital, Cape Town, South Africa. All HIV-infected patients were on antiretroviral therapy for >/=3 months. Liver stiffness measurements were assessed using the Fibroscan (Fibroscan 402, Echosens). Cell-based immunomarkers were measured by flow cytometry. Soluble serum/plasma immunomarkers were measured by Luminex technology and enzyme immunoassays. HIV (COBAS/Ampliprep TaqMan HIV-1) and HBV viral loads (in-house assay) were also performed.

RESULTS: HBV/HIV co-infected patients showed significantly higher levels of immune activation %CD8+/HLA-DR+/CD38+ (median 30%, interquartile range: 17-53) and %CD8+/PD-1 (median 22%, interquartile range: 15-33), p </= 0.01 compared to all other study groups. Despite this, the HBV-mono-infected group had the highest proportion of patients with advanced liver fibrosis (>/=13 kPa) as measured by Fibroscan (18%). HBV mono-infected patients showed highest expression of most cytokines including IL-17 and basic fibroblastic growth factor. There was significant positive correlation between detectable HIV and HBV viral replication and liver fibrosis but not immune activation or gut translocation.

DISCUSSION: Highly-active antiretroviral therapy, including tenofovir, is effective against both HIV and HBV. Earlier therapy in the co-infected patients may therefore have controlled viral replication leading to better fibrosis scores when compared to HBV mono-infection in this study. On-going HBV and HIV viraemia, rather than microbial translocation or immune activation, appear to be the drivers of liver fibrosis. Moderate to advanced liver fibrosis in HBV-mono-infection may well indicate poor access to screening and treatment of HBV infection.

64. **Linkage to care among adults being investigated for tuberculosis in South Africa: Pilot study of a case manager intervention**
Maraba, N., Chihota, V., et al. BMJ Open. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29794100

OBJECTIVES: We piloted an intervention to determine if support from a case manager would assist adults being investigated for tuberculosis (TB) to link into TB and HIV care.

DESIGN: Pilot interventional cohort study.

PARTICIPANTS AND SETTING: Patients identified by primary healthcare clinic staff in South Africa as needing TB investigations were enrolled.

INTERVENTION: Participants were supported for 3 months by case managers who facilitated the care pathway by promoting HIV testing, getting laboratory results, calling patients to return for results and facilitating treatment initiation.

OUTCOMES MEASURED: Linkage to TB care was defined as starting TB treatment within 28 days in those with a positive test result; linkage to HIV care, for HIV-positive people, was defined as having blood taken for CD4 count and, for those eligible, starting antiretroviral therapy within 3 months. Intervention implementation was measured by number of attempts to contact participants.

RESULTS: Among 562 participants (307 (54.6%) female, median age: 36 years (IQR 29-44)), most 477 (84.8%) had previously tested for HIV; of these, 328/475 (69.1%) self-reported being HIV-positive. Overall, 189/562 (33.6%) participants needed linkage to care (132 HIV care linkage only; 35 TB treatment linkage only; 22 both). Of 555 attempts to contact these 189 participants, 407 were to facilitate HIV care linkage, 78 for TB treatment linkage and 70 for both. At the end of 3-month follow-up, 40 participants had not linked to care (29 of the 132 (22.0%) participants needing linkage to HIV care only, 4 of the 35 (11.4%) needing to start on TB treatment only and 7 of the 22 (31.8%) needing both).

CONCLUSION: Many people testing for TB need linkage to care. Despite case manager support, non-linkage into HIV care remained higher than desirable, suggesting a need to modify this intervention before implementation. Innovative strategies to enable linkage to care are needed.

65. **Pathogenic factors associated with development of disseminated intravascular coagulopathy (DIC) in a tertiary academic hospital in South Africa**
Mayne, E. S., Mayne, A. L. H., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29649339

INTRODUCTION: Disseminated intravascular coagulopathy (DIC) is a thrombotic microangiopathy arising from consumption of both coagulation factors and platelets. DIC is triggered by a number of clinical conditions including severe infection, trauma and obstetric complications. Early diagnosis and treatment of the underlying condition is paramount. A high clinical index of suspicion is needed to ensure that patients at risk of developing DIC are appropriately investigated.

METHODS: In order to establish the clinical conditions most frequently associated with DIC, we reviewed all DIC screens received at a tertiary hospital in Johannesburg, South Africa over a 1 year period.

RESULTS: The commonest clinical condition associated with DIC in our population was infection with 84% of patients infected with an identified pathogen. The most frequently diagnosed pathogen was HIV followed by Mycobacterium tuberculosis and other bacterial infections. In the majority of cases, bacteria were isolated from blood cultures. In 47 patients, HIV was the only pathogen which could be isolated. A relative risk ratio of 2.73 and an odds ratio of 29.97 was attributed to HIV for development of a DIC. A malignancy was present in 51 of the patients of which approximately 60% had co-existing infection. No cause could be attributed in 30 patients.

CONCLUSION: Infection was identified in the majority of the patients diagnosed with DIC in this study. HIV showed the highest relative risk ratio of all pathogens although previous studies have not suggested that HIV was strongly associated with DIC. In almost half of the HIV infected patients, there was no other pathogen isolated despite extensive investigation. This suggests that HIV has a strong association with the development of DIC, warranting further research into the relationship between HIV and disseminated microvascular thrombosis.

66. **A realist approach to eliciting the initial programme theory of the antiretroviral treatment adherence club intervention in the Western Cape Province, South Africa**
Mukumbang, F. C., Marchal, B., et al. BMC Med Res Methodol. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29801467

BACKGROUND: The successful initiation of people living with HIV/AIDS on antiretroviral therapy (ART) in South Africa has engendered challenges of poor retention in care and suboptimal adherence to medication. The adherence club intervention was implemented in the Metropolitan area of the Western Cape Province to address these challenges. The adherence club programme has shown potential to relieve clinic congestion, improve retention in care and enhance treatment adherence in the context of rapidly growing HIV patient populations being initiated on ART. Nevertheless, how and why the adherence club intervention works is not clearly understood. We aimed to elicit an initial programme theory as the first phase of the realist evaluation of the adherence club intervention in the Western Cape Province.

METHODS: The realist evaluation approach guided the elicitation study. First, information was obtained from an exploratory qualitative study of programme designers' and managers' assumptions of the intervention. Second, a document review of the design, rollout, implementation and outcome of the adherence clubs followed. Third, a systematic review of available studies on group-based ART adherence support models in Sub-Saharan Africa was done, and finally, a scoping review of social, cognitive and behavioural theories that have been applied to explain adherence to ART. We used

the realist evaluation heuristic tool (Intervention-context-actors-mechanism-outcome) to synthesise information from the sources into a configurational map. The configurational mapping, alignment of a specific combination of attributes, was based on the generative causality logic - retroduction.

RESULTS: We identified two alternative theories: The first theory supposes that patients become encouraged, empowered and motivated, through the adherence club intervention to remain in care and adhere to the treatment. The second theory suggests that stable patients on ART are being nudged through club rules and regulations to remain in care and adhere to the treatment with the goal to decongest the primary health care facilities.

CONCLUSION: The initial programme theory describes how (dynamics) and why (theories) the adherence club intervention is expected to work. By testing theories in "real intervention cases" using the realist evaluation approach, the theories can be modified, refuted and/or reconstructed to elicit a refined theory of how and why the adherence club intervention works.

67. **Safety of a silicone elastomer vaginal ring as potential microbicide delivery method in African women: A Phase 1 randomized trial**
Nel, A., Martins, J., et al. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29813074

BACKGROUND: Women in sub-Saharan Africa are in urgent need of female-initiated human immunodeficiency virus (HIV) preventative methods. Vaginal rings are one dosage form in development for delivery of HIV microbicides. However, African women have limited experience with vaginal rings.

OBJECTIVES: This Phase I, randomized, crossover trial assessed and compared the safety, acceptability and adherence of a silicone elastomer placebo vaginal ring, intended as a microbicide delivery method, inserted for a 12-week period in healthy, HIV-negative, sexually active women in South Africa and Tanzania.

METHODS: 170 women, aged 18 to 35 years were enrolled with 88 women randomized to Group A, using a placebo vaginal ring for 12 weeks followed by a 12-week safety observation period. 82 women were randomized to Group B and observed for safety first, followed by a placebo vaginal ring for 12 weeks. Safety was assessed by clinical laboratory assessments, pelvic/colposcopy examinations and adverse events. Possible carry-over effect was addressed by ensuring no signs or symptoms of genital irritation at crossover.

RESULTS: No safety concerns were identified for any safety variables assessed during the trial. No serious adverse events were reported considered related to the placebo vaginal ring. Vaginal candidiasis was the most common adverse event occurring in 11%

of participants during each trial period. Vaginal discharge (2%), vaginal odour (2%), and bacterial vaginitis (2%) were assessed as possibly or probably related to the vaginal ring. Thirty-four percent of participants had sexually transmitted infections (STIs) at screening, compared to 12% of participants who tested positive for STIs at crossover and the final trial visit. Three participants (2%) tested HIV positive during the trial.

CONCLUSIONS: The silicone elastomer vaginal ring had no safety concerns, demonstrating a profile favorable for further development for topical release of antiretroviral-based microbicides.

68. "I was referred from the other side": Gender and HIV testing among older South Africans living with HIV

Schatz, E. and Knight, L. PLoS One. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29684054

South Africa has a Universal Test and Treat (UTT) policy in place to ensure that everyone tests for HIV and can access treatment if they test positive. The aim of this study is to document the pathways that older South Africans who are living with HIV take to access testing and treatment in this context. Despite the aging of the HIV epidemic in South Africa and clear evidence that testing older persons (over age 50) is necessary, very little is known about the circumstances under which older persons test for HIV or their motivations for doing so. In this study, we analyze 21 qualitative, in-depth interviews with women and men aged 50 and over who are living with HIV from two townships outside of Cape Town. Using grounded theory to specify emerging themes, we find similarities and differences between older men and women in their pathways to testing. Men primarily test for HIV when their spouse is diagnosed or in connection with TB testing and treatment. Older women, who are more likely to be widowed or divorced, often test for HIV only when they are symptomatic or not responding appropriately to care for non-communicable diseases. Most importantly, we find that older South Africans do not seek testing as a response to risk. Instead, older men and women test only once they are symptomatic and referred by a provider, or as a result of a partner's status. Our respondents, particularly the women, expressed "shock" and confusion at learning they were HIV-positive because they do not see themselves as at risk of acquiring HIV. Because the benefits of UTT are greatest with early detection and treatment, older persons' tendency to test at such a late stage of illness decreases the individual and population level advantages of UTT. More research is needed to understand older persons' risk and testing behavior so that policy and programs include HIV testing messages that reach this population.

69. Decreased bone turnover in HIV-infected children on antiretroviral therapy

Shiau, S., Yin, M. T., et al. Arch Osteoporos. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29623447

In this study, we evaluated the relationships between immune activation, bone turnover, and bone mass in virally suppressed HIV-infected children and HIV-uninfected children in South Africa. We found that decreased bone mass may occur or persist independent of immune activation and altered bone turnover.

PURPOSE: HIV-infected children and adolescents have deficits in skeletal growth which include decreases in bone mass and alterations in bone microarchitecture. However, the mechanism by which HIV infection compromises bone accrual in children and adolescents is unclear. The goal of this study was to evaluate the relationships between immune activation, bone turnover, and bone mass in a group of pre-pubertal HIV-infected children randomized to remain on ritonavir-boosted lopinavir (LPV/r)-based antiretroviral therapy (ART) or switch to efavirenz-based ART in South Africa virally suppressed at the time of this study.

METHODS: This cross-sectional analysis included 219 HIV-infected and 180 HIV-uninfected children enrolled in the CHANGES Bone Study conducted in Johannesburg, South Africa. Whole body (WB) bone mineral content (BMC) was assessed by dual x-ray absorptiometry and WB BMC Z-scores adjusted for sex, age, and height were generated. Bone turnover markers, including C-telopeptide of type 1 collagen (CTx) and procollagen type I N-terminal propeptide (P1NP), were analyzed. Markers of immune activation were also measured, including cytokines IL-6 and TNF-alpha, as well as soluble CD14 and high-sensitivity C-reactive protein (CRP).

RESULTS: Compared to uninfected controls, HIV-infected children had lower WB BMC Z-scores, similar IL-6 and TNF-alpha, higher soluble CD14 and high-sensitivity CRP, and lower markers of bone resorption (CTX) and bone formation (P1NP). Bone turnover markers were not different in those remaining on LPV/r or switched to efavirenz.

CONCLUSIONS: Our findings suggest that in HIV-infected children with viral suppression, decreased bone accrual may occur or persist independent of immune activation and altered bone turnover.

70. **HIV-1 disease progression in immune-competent HIV-1-infected and breastfeeding mothers participating in the ANRS 12174 clinical trial in Burkina Faso, South Africa, Uganda and Zambia: A cohort study**
Some, E. N., Engebretsen, I. M. S., et al. BMJ Open. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29626043

OBJECTIVE: We have assessed HIV-1 disease progression among HIV-1-positive mothers in relation to duration of any or exclusive breast feeding in the context of ANRS 12174 trial.

METHODS: The analysis was completed on 203, 212, 272 and 529 HIV-1-positive and lactating mothers with CD4 count >350 cells/microL from Burkina Faso, South Africa, Uganda and Zambia, respectively. The trial compared lamivudine and lopinavir/ritonavir as a peri-exposure prophylaxis during a 50-week follow-up time. A multiple logistic regression model was run with the mothers' weight, CD4 count and HIV-1 viral load as separate dependent variables, then combined into a dependent composite endpoint called HIV-1 disease progression where HIV-1 viral load was replaced by the HIV-1 clinical stage. Exclusive or predominant breast feeding (EPBF) and any breastfeeding duration were the key explanatory variables.

RESULTS: In the adjusted model, the associations between EPBF duration and weight change, CD4 cell count and the HIV-1 viral load were consistently insignificant. The CD4 cell count was associated with a significantly higher mothers' body mass index (BMI; a mean increase of 4.9 (95% CI 2.1 to 7.7) CD4 cells/microL per each additional kilogram per square metre of BMI) and haemoglobin concentration (19.4 (95% CI 11.4 to 27.4) CD4 cells/microL per each additional gram per decilitre of haemoglobin concentration). There was no significant association between EPBF duration and HIV-1 disease progression. A higher education level was a factor associated with a slower HIV-1 disease progression.

CONCLUSION: Breast feeding was not a risk factor for a faster progression of HIV-1 disease in mothers of this cohort with a baseline CD4 cell count >350 cells/microL.

71. **Clinic flow for STI, HIV, and TB patients in an urban infectious disease clinic offering point-of-care testing services in Durban, South Africa**
Stime, K. J., Garrett, N., et al. BMC Health Serv Res. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29751798

BACKGROUND: Many clinics in Southern Africa have long waiting times. The implementation of point-of-care (POC) tests to accelerate diagnosis and improve clinical management in resource-limited settings may improve or worsen clinic flow and waiting times. The objective of this study was to describe clinic flow with special emphasis on the impact of POC testing at a large urban public healthcare clinic in Durban, South Africa.

METHODS: We used time and motion methods to directly observe patients and practitioners. We created patient flow maps and recorded individual patient waiting and consultation times for patients seeking STI, TB, or HIV care. We conducted semi-structured interviews with 20 clinic staff to ascertain staff opinions on clinic flow and POC test implementation.

RESULTS: Among 121 observed patients, the total number of queues ranged from 4 to 7 and total visit times ranged from 0:14 (hours:minutes) to 7:38. Patients waited a mean of 2:05 for standard-of-care STI management, and approximately 4:56 for STI POC diagnostic testing. Stable HIV patients who collected antiretroviral therapy refills waited a mean of 2:42 in the standard queue and 2:26 in the fast-track queue. A rapid TB test on a small sample of patients with the Xpert MTB/RIF assay and treatment initiation took a mean of 6:56, and 40% of patients presenting with TB-related symptoms were asked to return for an additional clinic visit to obtain test results. For all groups, the mean clinical assessment time with a nurse or physician was 7 to 9 min, which accounted for 2 to 6% of total visit time. Staff identified poor clinic flow and personnel shortages as areas of concern that may pose challenges to expanding POC tests in the current clinic environment.

CONCLUSIONS: This busy urban clinic had multiple patient queues, long clinical visits, and short clinical encounters. Although POC testing ensured patients received a diagnosis sooner, it more than doubled the time STI patients spent at the clinic and did not result in same-day diagnosis for all patients screened for TB. Further research on implementing POC testing efficiently into care pathways is required to make these promising assays a success.

72. **Relationship between combination antiretroviral therapy regimens and diabetes mellitus-related comorbidities among HIV patients in Gaborone, Botswana**
Tshikuka, J. G., Rankgoane-Pono, G., et al. BMC Public Health. 2018.
https://www.ncbi.nlm.nih.gov/pubmed/29631557

BACKGROUND: Combination antiretroviral therapy (cARTs) regiments are known to prolong the recipients' life even though they are risk factors for diabetes mellitus-related comorbidities (DRCs). We sought to: (i) examine cART relationship with DRCs among patients attending HIV clinics in Gaborone, Botswana (which cART regimens are associated with shorter/longer time to the event), (ii) characterize patients' underlying biomedical and demographic risk factors of DRC and identify the most important, (iii) investigate survival of patients on different cART regimens in the presence of these risk factors.

METHODS: Data from two major HIV clinics in Botswana were reviewed. Relationships between different cART regimens and DRCs were investigated among 531 recipients. Recipients' DRC risk factors were identified. Cox regression model was run. Unadjusted

and adjusted hazard ratios were computed, and hazard and survival functions for different cART regimens were plotted.

RESULTS: Major findings were: patients on second- and third-line cART were less likely to develop DRCs earlier than those on first-line cART. Patients with CD4 count </= 200 cells/mm (3) at cART initiation were more likely to develop DRCs earlier than those who had CD4 count > 200 cells/mm (3). Overweight patients at cART initiation had a higher risk of developing DRCs earlier than those who had normal body mass index. Males had a lower risk of developing DRCs earlier than females.

CONCLUSION: The risk of new onset of DRC among cART recipients is a function of the type of cART regimen, duration of exposure and patients' underlying biomedical and demographic DRC risk factors. The study has provided a survival model highlighting DRCs' significant prognostic factors to guide clinical care, policy and management of recipients of cARTs. Further studies in the same direction will likely improve the survival to the development of DRC of every cART recipient in this community.

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